2025 Plastic Surgery The Meeting Abstracts

Abstract Topics Session 1 (Not for CME)

The Next Big Fat Thing: Injectable Fat Allograft Processed Using Eco-Friendly Supercritical CO2

Abstract Presenter: Sophia Salingaros

Abstract Co-Author(s): Abby Chopoorian Fuchsman, Kate Guion Manley, Jini Jeon, Samuel Medina,Matthew Liao, Ankita Sarkar, Eric Eisenhut, Tony Eisenhut, David Bednarski, Xue Dong MD, PhD, Jason Spector MD

PURPOSE: Autologous fat grafting is widely used for soft tissue augmentation for both reconstructive and aesthetic applications. However, unpredictable volume retention and requisite donor site morbidity remain a concern. Decellularized adipose extracellular matrix (ECM) sourced from allograft donors has emerged as a promising alternative. Ideally, antigenic cellular components are removed while bioactive and biomechanical properties of the matrix are retained to recruit host cells. While conventional decellularization methods employ abrasive chemicals agents that can denature proteins and leave toxic residues, we have engineered an injectable, human-derived adipose ECM that is decellularized via supercritical carbon dioxide (scCO2). This emerging technology promises a gentler, eco-friendly isolation of matrix components, promising an enhanced post-implantation tissue regeneration.

METHODS: Adipose tissue removed from abdominoplasty procedures was mechanically homogenized, delipidated with isopropanol at 37°C, and underwent a non-wetting scCO2 cleansing step. The tissue then underwent two cycles of scCO2 decellularization, cryomilling, and scCO2 terminal sterilization. Processed adipose ECM underwent DNA quantification to verify removal of cellular debris. Adipose ECM was subcutaneously injected into dorsum and cranial subcutaneous pockets of immunocompetent C57BL/6 mice through a 20-gauge catheter (0.4mL of 0.5g sample/mL PBS). Commercially available (cross linked) hyaluronic acid (HA) was injected (0.4mL, dorsal flank) as a control. Samples were explanted at 1-, 3- and 6-months for volumetric and immunohistochemical analysis.

RESULTS: Delipidated, decellularized adipose ECM demonstrated a mean DNA content of 47ng double-stranded DNA/mg of sample, below the accepted threshold of 50ng/mg for "complete" decellularization. After six months in vivo, mean adipose flank volume was 307mm3 (77% of initial volume), adipose cranial was 273mm3 (68%), and HA volume was 1393mm3 (348%), due to its hygroscopic nature. Cranial-site adipose grafts appeared more vascularized than flank-site, consistent with greater regional blood flow. No cases of graft extrusion, infection, or seroma/hematoma formation were observed. DAPI quantification revealed significantly greater cellular density in adipose samples over HA samples at one and three months ($p<0.0001$); cellular density declined over time in all groups as inflammation subsided. M1/M2 macrophage expression ratio at three months was 0.28 and 0.36 in adipose flank and cranial grafts, respectively, indicating a predominance of the pro-regenerative M2 phenotype over pro-inflammatory M1. Perilipin expression revealed the appearance of mature adipocytes/adipose tissue developing within injected adipose ECM after three months; few cells and no adipocytes were noted in HA explants. Similarly, CD31 expression demonstrated evidence of neo-vascularization after three months in adipose ECM samples only. Picrosirius red staining under polarized light demonstrated deposition of new fibrillar collagen networks in 1-month ECM (disorganized fibers, yellow/green birefringence), which became more aligned with maturation by three months (red birefringence). No new collagen deposition was seen in HA explants. Six-month histological/biomechanical analysis is ongoing.

CONCLUSION: We present an innovative scCO2-based decellularization process to fabricate an adipose ECM scaffold which demonstrated 73% volume retention after six months in vivo, with robust architectural remodeling including adipogenesis, angiogenesis, and collagen deposition. scCO2-decellularization holds the potential for an "off-the-shelf" biologically-derived adipose ECM that circumvents harsh chemical protocols and promises superior regenerative capacity with long-term volume restoration.

An Innovative Regenerative Injectable Implant Based on Photocurable rhCollagen

Abstract Presenter: Sachin Shridharani MD, FACS

Abstract Co-Author(s): Elana Gazal, Jasmine Seror

Introduction: A new concept for facial contouring is proposed, utilizing light to in-situ harden an injectable regenerative implant. This implant is designed for smooth facial

injections and changes its rheological properties in place, upon skin illumination. The photocuring technology enhances the filler's structure, stability, and cohesiveness, transforming it from its liquid form to a silicon-like facial implant. The light wavelength and intensity used for this transformation is safe and does not heat the patient's skin. This innovative injectable implant is composed of recombinant type I human collagen (rhCollagen) and hyaluronic acid. CollPlant's rhCollagen, known for its exceptional purity, uniformity and biofunctionality, promotes cells proliferation and tissue regeneration. Over time, the newly formed tissue replaces the injected material, offering a long-lasting, natural tissue rejuvenation.

Materials and methods: The injectable implant's properties were characterized using a rheometer and a compression tester. A long-term pivotal implantation study in rats was conducted to evaluate safety, tissue regeneration and lifting capacity. Histopathological analysis, including Hematoxylin and Eosin (H&E) and Masson's Trichrome staining, was performed at 3, 6 and 12 months to assess the local tissue response, regeneration and integration. Weekley external measurements were taken to monitor the product's projection and lifting capacity. A commercial mid-face hyaluronic acid filler served as control.

In situ photocuring was further evaluated in human cadavers: the product was injected into multiple areas, primarily on the periosteum, including the jawline, chin, nasal dorsum and tip, zygoma, and temples. Following photocuring these regions were dissected to assess the material's properties after the hardening process.
Findings from animal study, along with product characterization, and human cadaver trials, are presented.

Results: The injectable regenerative implant has a storage modulus several folds higher than that of a standard commercial HA filler, while still enabling smooth injection through a 27G needle. This is achieved thanks to the photocuring technology.
When compared to commercial filler, a higher G' is achieved with the same injection force.

The long term in-vivo study demonstrated superior lifting capability compared to commercially available midface HA dermal filler with a consistent improvement in tissue ingrowth and integration, at 3, 6 and 12 months of follow up. No adverse events were reported. Moreover product safety was evaluated in-vitro and in-vivo per FDA guidance document on the use of ISO 10993-1 confirming its biological safety and biocompatibility.

Cadaver assessments further demonstrated that the photocuring process can reach the periosteum, transforming the injectable implant into a stable, gummy bear-like implant.

Conclusion: The advantages of this innovative photocurable and injectable regenerative implant have been demonstrated through in-vitro, in-vivo and in-cadaver trials.

CollPlant's minimal invasively injectable implant introduces a novel approach to facial and body aesthetics, with the potential to become a game changer in clinical practice.

Injectable Composite Collagen Hydrogel (iCCH) Induces Tissue Formation and Long-Term Volume Retention

Abstract Presenter: Xue Dong MD, PhD

Abstract Co-Author(s): Derek Luong, Adam Weisel, Rachael Cohen, Jonathan Yao, Yulia Sapir Lekhovitser, Jason Spector MD

Purpose: Soft augmentation plays a critical role in reconstructive and aesthetic procedures. Among the most popular filler materials are autologous fat and hyaluronic acid, but the former provides inconsistent graft survival and causes donor site morbidity. Although hyaluronic acid (HA) is available off-the-shelf, it requires reapplication every 1-2 years since it largely gets absorbed without forming new tissue. Pre-clinical porcine studies using composite collagen hydrogels (CCH), which consist of collagen microspheres within a lower-density collagen matrix, demonstrated significantly enhanced cellular infiltration and vascularization allowing for simultaneous skin grafting and neodermis formation in one surgical step. Herein we aim to investigate a flowable/injectable form of the CCH to assess its capacity for tissue integration and volume retention following subcutaneous implantation.

Methods: Sterile 1% bovine atelocollagen microspheres (80-300um in diameter) were mixed with 0.3% telocollagen bulk at varying microsphere-to-bulk ratios (70:30, 50:50, 30:70) to create a homogeneous, flowable hydrogel. 500ul of each mixed collagen suspension was injected subcutaneously bilaterally on the dorsa of wildtype mice, where it underwent in situ gelation. The injected materials were evaluated over a 12-month period with volumetric analysis and histological assessment to characterize local tissue responses and long-term maintenance.

Results: The injectable CCH (iCCH) exhibited excellent handling properties, allowing for smooth administration via an 18G needle without leakage. Over one year, the shape and projection of the injected collagen hydrogel was maintained across all groups, with the highest volume retention in the 70:30 composite collagen group (98.3% of initial volume). Histological analysis demonstrated a uniform distribution of collagen microspheres throughout the injected hydrogel, with significant cell infiltration and vascularization observed within the bulk collagen as early as 1 month. The collagen microspheres remained present at 12 months but decreased in size, maintaining 80% of their initial dimensions due to gradual degradation. The lower density bulk collagen was progressively replaced and remodeled by host collagen, in addition to the retained collagen microspheres, contributing to sustained volume retention. Mature vascular structures were noticed as early as 3 months and remained stable out to one year. Macrophage analysis showed a predominance of M2 macrophages over the course of the study, indicating favorable biocompatibility of the iCCH. Biomechanical studies are underway.

Conclusions: Unlike traditional fillers that resorb over time without induction of new tissue formation, this simple but unique composite collagen hydrogel promotes neovascularization and host collagen deposition, resulting in nearly complete volume retention over 12 months, without any signs of chronic inflammation. This novel biologic composite collagen injectable holds great promise for both reconstructive and aesthetic applications.

Outcomes of Alloplastic Breast Reconstruction Using OviTex: A 5-Year Review of a Single Surgeon's Experience

Abstract Presenter: Ethan Paliwoda

Abstract Co-Author(s): Hanaa Shihadeh MD, Amanda Awad MD, Malcolm Roth

Purpose: This study describes the clinical outcomes associated with the use of Ovine-Reinforced Hybrid Mesh (OviTex) in alloplastic breast reconstruction performed by a single surgeon after mastectomy. To date, published studies regarding OviTex use in breast reconstruction are lacking.

Methods and Materials: A retrospective chart review was conducted on patients treated by a single surgeon between 2019 and 2023, who underwent immediate or delayed breast reconstruction using OviTex. Outcomes reviewed include reconstructive

failure, implant exposure, infection, seroma, and hematoma. Descriptive statistics were performed using chi-squared and Fisher's exact test for small sample sizes. All statistical analyses were performed using IBM SPSS v29 (Armonk, NY).

Results: Seventy-nine patients (134 breasts) were included. The average age at the operation was 51.26 (SD=13.27) years and the average BMI at the procedure was 26.57 (SD=4.75). The majority of reconstructions involved direct-to-implant procedures (65% vs. 35% tissue expander), with a predominance of immediate reconstructions (97% vs. 3% delayed) and pre-pectoral placement (72% vs. 28% dual-plane). There was an average implant size of 426 (SD=125) mL and an average intraoperative expander fill of 235 (SD=88) mL. Reconstructive failure occurred in 29 breasts (22%), all in immediate reconstructions, primarily due to exposure (20%), infection (10%), or a combination of both (8%). Four breasts (3%) developed a seroma, two of which also required surgical intervention for exposure. No hematomas were observed. Among breasts requiring reoperation, 21% had prior radiation, 90% involved the cancer side, and 34% were current or former smokers. Reconstructive failure was significantly higher following direct-to-implant compared to tissue expanders ($p<0.001$) and on the cancer side compared to prophylactic reconstructions ($p<0.001$). Of the 25 patients who experienced an RTOR, there was a significant difference between the 23 (92%) patients who experienced an exposure with an average RTOR time of 2.20 (SD=2.29) and the two (8%) patients who only experienced an infection with an average RTOR time of 0.88 (SD=0.40) ($p=0.038$). No significant differences in reconstructive failure were noted regarding placement location (pre-pectoral vs. dual-plane) or radiation treatment.

Conclusion: This study presents the clinical outcomes of a single surgeon's use of OviTex in breast reconstruction. Continued adherence to evidence-based practices is essential for optimizing surgical strategies in this field.

Regional Differences in Costal Cartilage Chondrocytes: The Influence of Harvest Site Location on Chondrocyte Properties and Function

Background and Purpose

Abstract Presenter: Ashton Rosenbloom

Abstract Co-Author(s): Thomas Gasbeck, Lana Mamoun, Nikhil Prabhakar, Mary Ziegler MD, PhD, Alan Widgerow MD, Miles Pfaff MD, MHS

Tissue-engineered constructs offer an alternative to traditional reconstruction methods

for microtia. Auricular cartilage-derived chondrocytes are frequently used as a cell source for construct generation. However, their application is limited due to low cellular yields, slow proliferation, and phenotypic drift during in vitro expansion. Our previous research demonstrated that costal cartilage-derived chondrocytes (CCs) are a viable alternative to auricular chondrocytes. Nonetheless, identifying optimal conditions for maximal cell harvest and functionality to generate constructs remains an active area of research. Thus, we aimed to further characterize CCs and determine whether the location of cell harvest along the costal cartilage segment exhibited distinct cellular properties that could affect chondrocyte function.

Methods: Costal Cartilage-derived chondrocytes were harvested from the distal (sternal) and proximal (osteochondral junction) regions of costal cartilage in three paired pediatric donors undergoing autologous microtia reconstruction. The chondrogenic properties of CCs were evaluated in native tissue histology, 2D cell cultures, and pellet cultures. Cells were isolated by digesting the tissue in type II collagenase. The chondrogenic properties of the CCs were assessed via immunofluorescence and immunohistochemistry to detect type II collagen expression. Cell proliferation assays were also performed using the Cell Counting Kit-8 (Abcam CCK-8). Additionally, native tissue and pellet cultures were evaluated histologically via hematoxylin and eosin, Alcian blue for glycosaminoglycans and Masson's Trichrome for overall collagen. Images were quantified using ImageJ. Student t-tests were performed to evaluate statistical comparisons in RStudio.

Results: Distal costal cartilage tissue samples yielded significantly more chondrocytes than proximal cartilage samples. The histological analysis demonstrated that distal cartilage contained more densely packed cells and exhibited more type II collagen and glycosaminoglycan expression. Enzymatic digestion of the distal costal cartilage yielded 1.75-fold the number of cells per gram isolated from proximal cartilage. Native tissue histology demonstrated a higher type II collagen expression in distal CCs ($p=0.074$). Pellet cultures from distal CCs exhibited a significantly higher type II collagen expression ($p<0.05$) compared to proximal CC cultures. These results were supported by increased type II collagen expression in the distal CCs on immunofluorescence.

Conclusion: CCs within the distal and proximal regions of costal cartilage possess distinct properties. These findings suggest that CCs from distal tissue segments closer to the sternal junction may serve as a more viable cell source for cartilage scaffold seeding and construct generation. Further investigation is necessary to assess the function of distal and proximal CCs on decellularized auricular scaffolds to evaluate their chondrogenic potential.

A National Survey of Current Practice Trends in Breast Cancer Screening after Gender Affirming Mastectomy: A Call for Inclusive Care

Abstract Presenter: Matthew Depamphilis

Abstract Co-Author(s): Sasha Wood, Katya Remy MD, William Gerald Austen Jr., MD, Katherine Carruthers MD

Purpose: Gender-affirming mastectomy (GAM) may leave behind varying amounts of breast tissue conferring an unknown, nonzero risk of developing breast cancer. Current breast cancer screening guidelines provide minimal evidence-based direction tailored to this patient population. This study aimed to assess the current practices by plastic surgeons when recommending breast cancer screening following GAM.

Methods: A 12-item electronic survey was distributed to 5802 members of the American Society of Plastic Surgeons (ASPS) in 2024. Survey items focused on familiarity with current screening guidelines, individual screening practices, and confidence in recommendations. Descriptive analyses were performed.

Results: A total of 582 responses were received and among respondents, 25.4% perform GAM. Of the currently available breast screening recommendations, 31.1% of respondents follow the WPATH Standards of Care, 20.9% guidelines for cisgender women, 12.8% ACR Appropriateness Criteria, 9.5% Fenway Health guidelines, 5.4% UCSF guidelines, and 20.3% none. Only 1 in 4 plastic surgeons express confidence in providing the appropriate recommendations. The overwhelming majority (93.9%) of plastic surgeons support the development of more specific, evidence-based, and transgender-inclusive screening guidelines.

Conclusion: This is the first study to provide insight on plastic surgeon's perspectives on the current breast cancer screening guidelines for transgender individuals. Our findings reveal significant variability in practice among ASPS members regarding breast cancer screening after GAM. There is a critical need to develop improved guidelines in order to provide equitable cancer screening surveillance. Longitudinal research aimed at understanding breast cancer risk following GAM is needed to aid in the development of evidence-based screening protocols.

Unraveling Collagen Alignment in Dupuytren's Contracture: Quantification of Fibrotic Changes in Collagen Fibers Using TWOMBLI Image Analysis

Abstract Presenter: Thomas Gasbeck

Abstract Co-Author(s): Ashton Rosenbloom, Lana Mamoun, Mary Ziegler MD, PhD, Alan Widgerow MD

Introduction: Dupuytren's Disease (DD) is a progressive fibrotic disorder affecting the palmar fascia of the hand. A key feature of DD pathogenesis is disruption of normal collagen fiber anisotropy, a highly ordered pattern that provides mechanical flexibility. This organization is lost in DD, as myofibroblasts produce disordered collagen fibers that contribute to tissue stiffness and contracture (1).

Image analysis algorithms, such as TWOMBLI (The Workflow Of Matrix BioLogy Informatics), have been developed to enable the quantitative assessment of collagen fiber anisotropy and changes to the extracellular matrix (ECM). TWOMBLI is an ImageJ plugin designed to analyze ECM patterns by calculating parameters related to fiber alignment (2). It has been used in various disease models to provide insights into the structural remodeling associated with fibrosis (3).

The purpose of this study was to use TWOMBLI as a novel mechanism to empirically evaluate collagen alignment and anisotropy in Dupuytren's Disease.

Methods: Samples of nodule and cord tissue were obtained from two Dupuytren's patients undergoing palmar fasciectomy, processed, and mounted on glass slides. Slides were stained with Picrosirius Red (PSR) and imaged at 40x magnification under both brightfield and polarized light. Four regions of interest were captured from each sample.

Images were processed through TWOMBLI to generate line masks corresponding to collagen fibers. Parameters associated with collagen anisotropy were then calculated and outputs were compared between donors and tissue type.

Results: Compared to cord tissue, nodules exhibited a higher number of total matrix endpoints and lower number of hyphal growth units (HGU) – calculated as the average number of branch points per fiber length. Neither of these were statistically significant. Decreased HGU and increased endpoints have both been previously described as markers of more advanced fibrosis, signifying that Dupuytren's nodules display greater disruption of normal collagen alignment than cords.

Results also varied greatly between the individual donors, demonstrating potential patient-specific differences.

Conclusions: These results are limited by small sample size and lack of statistical significance. However, these findings provide insight into Dupuytren's pathogenesis and highlight the utility of TWOMBLI as a quantitative approach in characterizing fibrotic changes to the ECM. Further efforts are needed to evaluate these differences. Future studies should aim to incorporate a larger sample size and non-fibrotic samples as a negative control.

This study offers a novel approach to assessing fibrotic changes in collagen alignment in Dupuytren's Contracture. Though image analysis algorithms have been used previously to evaluate fibrosis, to our knowledge, this is the first attempt to quantify differences in collagen alignment in Dupuytren's Contracture or other fibrotic hand diseases.

References:

1. Walthall J, Anand P, Rehman UH. Dupuytren Contracture. In: StatPearls. Treasure Island (FL): StatPearls Publishing; February 26, 2023.
2. Wershof E, Park D, Barry DJ, et al. A FIJI macro for quantifying pattern in extracellular matrix. Life Sci Alliance. 2021;4(3):e202000880. Published 2021 Jan 27. doi:10.26508/lsa.202000880
3. Wyetzner RH, Segal EX, Jussila AR, Atit RP. Topographical changes in extracellular matrix during skin fibrosis and recovery can be evaluated using automated image analysis algorithms. FEBS Lett. 2024;598(24):2995-3004. doi:10.1002/1873-3468.14987

IGF-I Transforms Fibrosis into Fat: IGF-I Induced Transdifferentiation of Dupuytren’s Myofibroblasts into Adipocyte-Like Cells

Abstract Presenter: Thomas Gasbeck

Abstract Co-Author(s): Lana Mamoun, Ashton Rosenbloom, Mary Ziegler MD, PhD Amber Leis MD, Alan Widgerow MD

Introduction: Dupuytren's disease is a common fibrotic condition of the palm and digits. Central to the pathogenesis of the disease is the activation of Dupuytren's myofibroblasts (DMFs), which produce disorganized collagen fibers and alter the extracellular matrix (1).

Current standard treatment options involve excising or breaking down the fibrotic tissue – either via palmar fasciectomy or injection of collagenase clostridium histolyticum. However, these current modalities are associated with high rates of recurrence, usually within two years (2). We previously demonstrated that platelet rich plasma (PRP) and ASCs together induce transformation of DMFs into adipocyte-like lipid-laden cells in vitro with reduced markers of fibrosis in a rodent model (3). However, this treatment is inherently limited by person-to-person variability in PRP composition.

The purpose of this study was to determine if any individual component of PRP could act as a functional replacement in the presence of ASCs. Following a literature review and preliminary testing, insulin-like growth factor I (IGF-I) was selected as a potential candidate.

Methods: DMFs were isolated from palmar fascia taken from Dupuytren's patients. PRP was pooled from ten healthy donors and added to DMFs co-cultured with ASCs in vitro to serve as a positive control. Experimental groups consisted of DMFs with IGF-I alone and DMFs co-cultured with ASCs with IGF-I.

DMFs were also treated with insulin-like growth factor I receptor (IGF-IR) inhibitors as a negative control. Additionally, IGF-I depleted PRP was employed as another negative control. IGF-I was depleted from the pooled PRP using an antibody-based method and verified with ELISA.

The cells were assessed at four weeks using Oil Red-O or Bodipy to reveal lipid droplets.

Results: In the presence of ASCs, IGF-I successfully transformed DMFs into adipocyte-like cells in vitro, demonstrating lipogenic effects similar to PRP. DMFs treated with ASCs+PRP and ASCs+IGF-I showed significant induction of lipid-filled cells.

When DMFs were co-cultured with IGF-I-depleted PRP and ASCs, lipid-laden cells were reduced by 64%. Addition of an IGF-I receptor inhibitor to DMFs+ASCs+PRP and DMFs+ASCs+IGF-I reduced the percentage of lipid-laden cells from 84% to 13% and 80% to 11%, respectively.

Conclusions: This study offers mechanisms for discovering new therapeutic targets for treating skin fibrosis, using Dupuytren disease as a model with possible implications in other fibrotic conditions. Identifying IGF-I as a functional replacement for PRP in inducing transformation of DMFs to adipocyte-like cells in vitro is both a novel and important finding given the translational limitations of PRP as a treatment modality.

However, the use of ASCs has similar limitations. Further research efforts are needed to elucidate which paracrine mediators secreted by ASCs are responsible for the synergistic effects with IGF-I.

References:

1. Khaliq F, Orji C. Dupuytren's Contracture: A Review of the Literature. Cureus. 2024;16(12):e74945. Published 2024 Dec 2. doi:10.7759/cureus.74945
2. Nayar SK, Pfisterer D, Ingari JV. Collagenase Clostridium Histolyticum Injection for Dupuytren Contracture: 2-Year Follow-up. Clin Orthop Surg. 2019;11(3):332-336. doi:10.4055/cios.2019.11.3.332
3. Ziegler ME, Staben A, Lem M, et al. Targeting Myofibroblasts as a Treatment Modality for Dupuytren Disease. J Hand Surg Am. 2023;48(9):914-922. doi:10.1016/j.jhsa.2023.06.007

Differentiating nerve pain, headache, and migraine: which of these conditions are we able to treat as surgeons?

Abstract Presenter: Matthew Depamphilis

Abstract Co-Author(s): Merel Hazewinkel MD, Jordan Raschi, Katya Remy MD, Giulia Monnink MD, William Gerald Austen Jr., MD, Lisa Gfrerer MD, PhD

Purpose: Patients with neuropathic pain of the head and neck often experience concurrent headache disorders (HDs), particularly migraines and headaches, which may complicate the diagnosis and treatment planning. The overall impact of nerve decompression on improvement of these individual conditions is unknown. We aimed to describe the clinical features of nerve pain, as well as concomitant HDs, and report on postoperative outcomes of these three conditions following nerve decompression surgery.

Methods: From January 2023 to January 2025, 236 patients with a diagnosis of headache disorder were prospectively enrolled at two institutions. Screening for nerve

decompression surgery was performed by the senior authors based on the following criteria: (a) failure of conservative treatment, (b) symptoms and physical exam findings suggestive of nerve compression, (c) pain drawing suggesting nerve pain, and (d) positive response to nerve blocks. Demographics, pain characteristics, and accompanying symptoms were collected through patient surveys. The primary treatment outcome was evaluated by symptom reduction in terms of pain frequency (days/month), duration (hours/day), and intensity (0-10).

Results: In total, 178 (75.4%) patients reported nerve pain, 149 (63.1%) migraines, and 121 (51.3%) headaches. Of those with nerve pain, 152 (85.4%) were diagnosed with at least 1 concomitant HD. The average age of nerve pain onset was 35.8 +/-18.0 years, which was significantly later compared to both migraine (24.3 +/-13.3, $p<0.001$) and headache (26.8+/-18.2, $p=0.002$). When comparing these three pain conditions, nerve pain was more frequently described as starting at the back of the head compared to other anatomic locations (n=143 [80.3%], $p<0.001$). Headache pain quality was more commonly classified as dull (n= 47 [38.9%], $p=0.03$) whereas nerve pain quality was typically described as shock-like (n= 77 [43.3%], $p<0.001$) or stabbing (n= 112 [62.9%], $p<0.001$). At baseline, nerve pain occurred at significantly greater mean frequency in days per month (23.4 +/-18.4 days/month, $p<0.001$) and duration (17.8 +/-19.5 hours/day, $p=0.007$) than migraines or headaches. Nerve decompression surgery was performed in 45 (19.1%) patients. Of these, 36 (80.0%) also experienced migraines, and 26 (57.8%) had headaches. Postoperatively, significant decreases in median pain frequency, duration, and intensity were observed for nerve pain, migraine, and headaches ($p<0.05$). The mean postoperative follow-up was 8 months.

Conclusion: Nerve pain, migraine, and headache often coexist, and patients may experience overlap in these distinct conditions. Although nerve decompression surgery is primarily aimed at alleviating nerve pain, this study also demonstrates improvement in migraine and headache symptoms. These findings suggests that nerve compression/irritation may trigger and exacerbate concomitant HDs.

An Algorithmic Approach For Surgical Management Of Occipital Neuralgia Purpose

Abstract Presenter: Matthew Depamphilis

Abstract Co-Author(s): Katya Remy MD, Merel Hazewinkel MD, Lisa Gfrerer MD, PhD, William Gerald Austen Jr., MD

The greater occipital nerve (GON) is the largest sensory nerve in the body. Compression or irritation of the GON can lead to debilitating neuropathic pain known as occipital neuralgia (ON). This study analyzes 14-years of experience to develop an algorithm for surgical management of occipital neuralgia (ON).

Methods: A prospective cohort study was conducted of 1405 patients who were screened for nerve decompression surgery at two institutions from January 2011 to January 2025. Surgical candidacy was assessed by the senior authors based on the following criteria: (a) failure of conservative treatment, (b) symptoms and physical exam findings suggestive of nerve compression, (c) pain drawing suggesting nerve pain, and (d) positive response to nerve blocks. Demographics, pain characteristics, and accompanying symptoms were collected through patient surveys. The primary treatment outcome was evaluated by symptom reduction in terms of pain frequency (days/month), duration (hours/day), and intensity (0-10).

Results: A total of 284 patients with occipital neuralgia underwent 533 primary GON decompressions. There were 53 cases of GON reoperation with neurectomy performed in 37 (13%) patients on 43 (8.1%) nerves. At an average follow-up time of 15 months, patients that underwent GON reoperation achieved similar reduction in pain frequency (p=0.449), duration (p=0.849), and intensity (p=0.622) to those only requiring primary decompression. GON neurectomy techniques consisted of the proximal clamp, segmental cautery, protected plane approach (n= 18 [40.5%]), muscle burial (n= 14 [26.4%]), reset neurectomy with autograft (n= 8 [15.1%]), RPNI (n= 6 [11.3%]), nerve cap (n= 5 [9.4%]), and TMR with RPNI (n=2 [3.8%]). All patients achieved at least 80% improvement in pain in the cohort that underwent the proximal clamp, segmental cautery, and protected plane approach compared to only 28.6% of patients in the muscle burial group (p=0.001). A total of 48 patients (17.0%) underwent surgery to address a secondary pain site, most commonly involving the supraorbital/supratrochlear nerves (n= 25 [52.1%]). Patients that underwent secondary site surgery achieved comparable improvement in pain frequency (p=0.381), duration (p=0.683), and intensity (p=0.682) to those only requiring primary decompression.

Conclusion: Following primary decompression of the GON for treatment of ON, secondary surgeries may be required if pain reoccurs in the same location or is present at a different pain site. With the proposed algorithm, outcomes following secondary surgery were similar to those of primary decompression.

Automated Analysis of Nasopharyngoscopy for Velopharyngeal Insufficiency: A Convolutional Neural Network Approach to Velopharyngeal Port Dynamics

Abstract Presenter: Xinfei Miao

Abstract Co-Author(s): Sierra Willens, Chizoba Mosieri, James Antongiovanni, Shivang Trivedi, jamie perry PhD, Brian A Cohn, Peyman Kassani, Miles Pfaff MD, MHS

Purpose: The velopharyngeal port is a sphincter that isolates the soft palate and lateral/posterior walls of the nasopharyngeal cavity from that of the oral cavity. In velopharyngeal insufficiency (VPI), as seen in patients with clefts, there is inadequate closure of this port during speech, resulting in hypernasality. This study aimed to automate the process of identifying velopharyngeal port closure by applying a Convolutional Neural Network (CNN) to nasopharyngoscopy studies in both patients with clefts and without clefts.

Methods: A custom CNN (termed NasoNet) was developed to analyze nasopharyngoscopy videos of patients with and without VPI. Video frames were extracted at a rate of 25 frames per second, resulting in 30,620 frames, and the CNN was trained on a patient-level analysis. The CNN's architecture consisted of four convolutional layers designed to identify the status of the velopharyngeal sphincter in each frame as either "open" or "closed". Accuracy and area under the curve (AUC) were obtained to measure performance specifically.

Results: The final dataset for the patient-level analysis comprised 24,010 frames, including 13,167 frames classified as 'cleft' and 10,843 as 'non-cleft'. Within the cleft category, 5,926 out of the 13,167 cleft frames were manually labeled as 'insufficiently closed', while 2,628 out of the 10,843 non-cleft frames were labeled as 'closed'. Naso-Net achieved a frame-level accuracy of 95.41% and 94.79% for non-VPI and VPI frames with AUC values of 97.43% and 97.50%. For patient-level analysis, the model achieved an accuracy of 85% for non-VPI and 82% for VPI patients, with AUC values of 95.40% and 84.50%.

Conclusion: This study demonstrates that CNN may be developed for automated analysis in nasopharyngoscopy studies of patients with clefts. The reliable performance of Naso-Net demonstrates the potential of automated analysis to both improve VPI diagnosis and increase access to highly specialized care.

Understanding the Biology of Abnormal Scar Regrowth Through Spatial Transcriptomic Analysis

Abstract Presenter: Caitlin Blades

Abstract Co-Author(s): Ken Jones, John Fowler, David Mathes MD, Christene Huang

Purpose: Abnormal fibroproliferative scars are characterized by hypervascularity and excessive extracellular matrix accumulation. They are symptomatic, with a high potential for recurrence, and have a notable impact on patient quality of life. Research highlights the immune system's critical role in the development of these scars (1-2), but little is known about what drives their recurrence after surgical excision. Our study aims to explore gene activity in the peripheral tissue of abnormal scars to identify key mRNA molecules that may contribute to their regrowth.

Methods: Clinically defined keloid scars (n=4), hypertrophic scars (n=2), and normal skin (n=2) were collected with patient consent. All scars were removed to alleviate patient pain and discomfort. Histological evaluation identified 3 x 3 mm areas encompassing both the scar tissue and the adjacent surrounding tissue. These areas were excised and underwent spatial gene expression analysis using the Visium Cytassist platform. The marginal tissue of scars that regrew after excision (n=3) was compared to that of scars that did not regrow (n=3). Raw mRNA sequencing data were processed using 10X Cell Ranger Software to generate expression profiles for each spot and identify clusters of spots with similar profiles. The Seurat package in R (version 4.4.0) was employed to determine significant differences in gene expression between groups. Statistical significance was set at $p \leq 0.05$.

Results: Four clinically defined keloid scars were collected from two African American (AA) females, one Asian female, and one White male, averaging 50.5 ± 17.2 years old. Three scars had a history of repeated corticosteroid injections, with one treated scar regrowing 84 days post-excision. Two clinically defined hypertrophic scars were collected from an AA female and a mixed-race female, averaging 47.5 ± 9.19 years old. One scar received laser treatment, yet both scars regrew post-excision at 100 and 267 days, respectively. Two normal skin samples were obtained from an AA and a White female, averaging 58.5 ± 2.12 years old. Compared to scars that did not regrow, those that did showed a significant decrease in wound healing pathways regulated by YAP1 (Z-score: 0.54, p= 6.29e-18 vs Z-score: 4.23, p= 6.51e-25) and TGF-β (Z-score: 2.58, p= 5.54e-62 vs Z-score: 7.58, p= 9.29e-65) in the peripheral tissue. Additionally, the peripheral tissue of scars that regrew exhibited a significant increase in the inflammatory immune response regulated by TNF (Z-score: 4.35, p= 8.84e-69 vs Z-

score: 2.30, p= 3.02e-50) and STAT1 (Z-score: 6.21, p= 7.82e-20 vs Z-score: 4.28, p= 1.09e-8).

Conclusions: Our findings suggest that abnormal scar regrowth is associated with a decreased expression of wound healing genes and increased expression of inflammation-related genes in the peripheral scar tissue. This study uncovers potential targets for the development of novel therapies and highlights marginal tissue as an area of focus for future research and scar treatment applications.

References:
1. Aramaki-Hattori N, et al. Relationship between Keloid Formation and YAP/TAZ Signaling. Plast Reconstr Surg Glob Open. 2017;5(6):e1357. 2017 Jun 13.
2. Wang X, et al. Identification and characterization of four immune-related signatures in keloid. Front Immunol. 2022;13:942446. 2022 Jul 27.

Burn Depth Diagnostic System for Healthcare Using Artificial Intelligence

Abstract Presenter: Mohamed El Masry MD, PhD

Abstract Co-Author(s): Md Masudur Rahman, Surya Gnyawali PhD, Juan Wachs, Gayle Gordillo MD

Background: Burn injuries are complex and challenging in both diagnosis and management. In the U.S., 1.25 million individuals need medical attention for burns annually, with 40,000 hospitalized. Early and accurate assessment of burn depth is crucial to determine the need for surgery but challenging. Visually assessing burn depth is complex, with experienced surgeons achieving only 50-75% diagnostic accuracy. Burn depth is considered a predictor of pathological scarring that occurs in 30%-91% of burn injuries. Objective and non-invasive approaches are needed. This study presents an Artificial Intelligence (AI) system leveraging large-scale pretraining for determining burn depth using both pre-clinical and human burn dataset including non-invasive Tissue Doppler Elastography Imaging (TDI), Harmonic B-mode ultrasound and digital wound photography.

Methods: Different burn degrees were induced on the back of twelve anesthetized Yorkshire pigs (70-80 lbs.) using a standardized electrically heated burn device per IACUC protocol. Burns were created with a 150°C block for 1,10, and 60 sec, resulting in six (2" x 2") wounds per pig, with two unburnt control sites. Human data (n=30) was

collected from patients treated at American Burn Association (ABA)-verified burn center from May 2022 to May 2023 per IRP protocol. Eligible subjects had thermal burn injury within 72 hours after burn, without prior surgical debridement or intervention, male or female age 18-89 years old, and Total Body Surface Area (TBSA) involvement ≤ 75%. Chemical, electrical or radiation burns were not included. TDI to measure tissue stiffness, B-mode images, and digital photos were collected for 42 days. Biopsies were obtained from pigs and from the human subjects during debridement at OR. The AI model was trained on the pig data and validated with human data.
Results. Thirty patients were enrolled with one withdrawal. The age was 47.6± 17.6 years old, BMI=
28.8 ± 5.3 kg/m². Our model demonstrated high accuracy in detecting surgical cases and this was validated by histology. The model identified 100% of surgical cases (third-degree burns) for pig subjects. On human subjects, the model demonstrated high accuracy, it identified 7 out of 7 surgical cases (100%) and 15 out of 16 cases (94%) for non-surgical cases. The precision was 87%, sensitivity 100%, and an F1-score of 93%. The AUROC was 0.97, with a 95% Confidence Interval (CI) from 0.89 to 1.0. Critically, our system presented a clear and human-readable output to understand the surface of burn wounds, allowing a high degree of explainability often required to interpret AI-produced results.

Conclusion: This work is the first to report a burn diagnostic system using non-invasive ultrasound TDI images and AI. Tissue stiffness measurements by TDI overcome the limitations of light-based technologies. Integrating AI to assist in TDI images interpretation results in a high degree of accuracy in predicting burn depth. Accurate early diagnosis of burn depth is expected to improve overall patient outcomes.

Augmented Reality-Guided DIEP Flap Harvest: A Feasibility Study

Abstract Presenter: Tony Jiang

Abstract Co-Author(s): Amber Lu, Carson Studders, Kathryn Isaac MD, FRCSC, MPH

Purpose: CT angiography (CTA) is commonly used to identify perforators for deep inferior epigastric perforator (DIEP) flap harvest, resulting in an average reduction of 33.9 minutes for flap dissection (1). A key challenge in utilizing preoperative CTA data is the surgeon's ability to accurately translate perforator locations and vessel trajectories onto the patient during surgery. This study investigates the application of Augmented Reality (AR) to enhance the use of preoperative imaging, with the goal of improving

DIEP flap planning and harvest precision.

Methods: Software was developed for the Apple Vision Pro to support AR integration in DIEP flap reconstruction. A sterile 3D-printed optical tracker was introduced to enable accurate and rapid registration. The accuracy of segmentation, registration, and projection was first evaluated using a phantom model to determine the reprojection error. AR-projected points were manually traced on the phantom surface. The coordinates of the AR-projected and manually traced points were recorded relative to a predefined origin in the physical space, with x and y coordinates collected for each point. The reprojection error was quantified as the average displacement between the AR points and their corresponding manually traced counterparts.
With institutional ethics approval, patients undergoing DIEP flap reconstruction consented to AR use in this single-surgeon feasibility trial. Segmented anatomy visualized in AR included abdominal soft tissue layers (skin, subcutaneous tissue, fascia, rectus muscle), the deep inferior epigastric artery, perforators, and their intramuscular course. Preoperatively and intraoperatively, the surgeon manipulated the AR visualizations to assess vessel trajectories and calibers, aiding in perforator selection and flap design. Additionally, the integrated Picture Archiving and Communication System (PACS) enabled imaging to be reviewed in AR while maintaining sterility in the operating room, using hand and eye tracking as input methods.

Results: The average reprojection error in the phantom model was 2.08 mm. Three patients underwent AR-assisted DIEP flap reconstruction. Automatic registration with the optical tracker was achieved in an average of 7 seconds (n=3), with a reprojection error of less than 1 cm. Further manual refinement improved accuracy to approximately 2 mm, requiring an average of 72 seconds (n=3). Intraoperatively, accurate registration was confirmed between the AR visualizations and the real patient-specific anatomy following pedicle dissection.
The use of AR delineated vascular anatomy in relation to the rectus muscle, fascia, and subcutaneous tissue. AR enabled real-time visualization and interaction with CTA images and segmented anatomy, enhancing perforator selection, fascial incision planning, and intramuscular pedicle dissection.

Conclusion: AR enables accurate translation of preoperative imaging for DIEP flap planning and intraoperative guidance. Based on this feasibility study, a randomized controlled trial is planned to evaluate its impact on operative time, surgical safety, and decision-making.

(1) Colakoglu S, Tebockhorst S, Freedman J, et al. CT angiography prior to DIEP flap

breast reconstruction: a randomized controlled trial. Journal of Plastic, Reconstructive & Aesthetic Surgery. 2022;75(1):45-51. doi:10.1016/j.bjps.2021.05.050

Abstract Topics Session 2 (Non-CME)

Augmenting Microsurgical Training: A Low-Cost Augmented Reality System for Self-Guided Learning

Abstract Presenter: Tony Jiang

Abstract Co-Author(s): Hong Hao Xu, Carson Studders, Amber Lu, Kathryn Isaac MD, FRCSC, MPH

Purpose: Microsurgical training requires extensive hands-on practice, but accessibility is limited by the high cost and availability of surgical microscopes (1). Additionally, the need for experienced instructors and the limited number of microsurgical cases further restrict hands-on training time, creating additional barriers to skill acquisition. Augmented Reality (AR) technology offers a cost-effective solution by providing a visual environment with expert instruction, adequate magnification, and depth perception for practicing microsurgical skills. This study evaluates the utility of a novel AR-based system to improve accessibility of microsurgical training for beginners.

Methods: An AR microscope was developed to provide depth perception using two digital USB microscopes mounted on a 3D-printed stand, streaming independent video feeds to a Meta Quest 3 headset. An instructional video outlined the steps for placing and tying a suture. Using chicken thigh models for microsurgical suturing practice, 11 participants with no prior microsurgical experience completed a two-phase training session. In the first phase, they used a 2D computer screen to view an instructional video and practice on the model with simple magnification, but without depth perception. In the second phase, they used the AR headset for a 3D immersive visual environment with depth perception, magnification, and the instructional video for guided practice on the model. A foot pedal allowed playback control of the educational video. A post-session 5-point Likert scale survey assessed depth perception, hand-eye coordination, global user preference, and training effectiveness. Scores were compared using the Wilcoxon signed-rank test.

Results: The total cost of the microscope setup was $575. The microscopes were positioned to achieve a working distance of 125 mm with a magnification of 65x. Participants found depth perception significantly easier in AR (median = 4, SD = 0.40) compared to the 2D screen (median = 1, SD = 0.50, p = 0.003). Hand-eye coordination also felt more natural in AR (median = 4, SD = 0.89) compared to 2D (median = 2, SD = 1.10, p=0.033). Participants reported greater confidence suturing in AR (median = 4, SD = 0.40) than in 2D (median = 2, SD = 0.52, p = 0.003). Suture placement accuracy was also higher in AR (median = 4, SD = 0.50) than in 2D (median = 2, SD = 0.81, $p<0.05$). No participants reported discomfort with the 2D screen; however, 27.3% (n = 3) experienced mild discomfort in AR. All participants preferred AR over 2D when rating their preference on a scale from 1 (2D screen) to 10 (AR), with a median score of 9 (SD = 0.83). Additionally, 63.6% (n = 7) "strongly agreed" and 36.4% (n = 4) "somewhat agreed" that AR may improve training effectiveness. Most (90.9%, n = 10) were "very likely" to recommend AR-based training to beginners.

Conclusion: An AR microscope may provide a low-cost alternative training platform for expert-guided hands-on microsurgical skill development and mastery. By integrating depth perception, hands-on feedback, and instructional guidance, this system overcomes key limitations of traditional training methods and provides an accessible, effective solution for microsurgical skill acquisition.

(1) Gavira N, Benayoun M, Hamel Q, Fournier HD, Bigorre N. Learning, teaching, and training in microsurgery: A systematic review. Hand Surgery and Rehabilitation. 2022;41(3):296-304. doi:10.1016/j.hansur.2022.02.001

>1300cc Silicone Breast Implants For Large-Breasted Women Are Safe and Effective in Breast Reconstruction: Findings From the Athena Multicenter, Prospective Study

Abstract Presenter: Patrick Garvey MD, FACS

Abstract Co-Author(s): Mark Clemens MD, Mark Migliori, William Kane MD

Purpose: Increasing rates of obesity in the US and incidence of breast cancer have resulted in growing demand for larger breast implant sizes for implant-based breast reconstruction(1). This study aims to evaluate whether the largest implant sizes (1340cc and 1445cc) from the Athena Clinical Trial (ClinicalTrials.gov NCT02724371) for breast

reconstruction show clinically significant differences in outcomes compared to smaller sizes in the study and the benefit/risk ratio associated with these devices.

Methods: 3-year follow-up of 53 patients who received either 1340cc or 1445cc devices was conducted as part of a 10-year multicenter prospective investigational study evaluating safety and effectiveness of larger-volume implants in women undergoing post-mastectomy two-stage reconstruction. Safety (complications) and performance (satisfaction, including BREAST-Q) were analyzed using descriptive statistics.

Results: The largest implants in the Athena study were predominantly used in patients with BMI ≥35 (65.4% of those receiving 1340cc and 92.6% of those receiving 1440cc). Most patients, 42 (79.2%), with 1340cc or 1445cc devices retained their original implants at 3 years, while 11 (20.8%) required explantation. Ten of the 11 explanted patients were successfully reimplanted with another device from the study. In the revision reconstruction cohort, 90.9% of participants engaged in the study to increase their implant size due to the perception of insufficient volume in their reconstructed breasts. No significant differences were observed when comparing complication rates (including any reoperation, asymmetry, Baker Grade 3/4 capsular contracture, delayed wound healing, explantation, extrusion, malposition, infection) across device sizes using a univariate logistic regression model (Figure 1). Via BREAST-Q, patient-reported satisfaction levels showed similar high scores across lower (930-1240cc) and higher (1340-1445cc) sized devices in the study.

Conclusion: High BMI patients represent approximately half of the women currently presenting for breast reconstruction after mastectomy due to breast cancer (2). This highlights the need for larger breast implant sizes than 800cc for obese women, leading to the Athena Study of breast implants with volumes up to 1445cc. Although obese breast reconstruction patients have historically faced a higher risk of complications compared to their non-obese counterparts, data from this study revealed a favorable risk/benefit ratio for what are now the largest breast implants available on the US market. Implants larger than 1300cc required minimal revisions beyond size adjustments, with complication rates comparable to those of smaller devices. These high-volume implants demonstrated an acceptable explantation rate and high retention rates over three years. There was a strong association between the selection of these largest volume implants and women with a BMI ≥35, suggesting tailored utility for obese patients. Finally, patient and surgeon-reported outcome scores were high for these largest-volume implants, further justifying their use.

References:

1. Barone I, Giordano C, Bonofiglio D, Andò S, Catalano S. The weight of obesity in breast cancer progression and metastasis: Clinical and molecular perspectives. Semin Cancer Biol. 2020 Feb;60:274-284.
2. Srinivasa DR, Clemens MW, Qi J, Hamill JB, Kim HM, Pusic AL, Wilkins EG, Butler CE, Garvey PB. Obesity and Breast Reconstruction: Complications and Patient-Reported Outcomes in a Multicenter, Prospective Study. Plast Reconstr Surg. 2020 Mar;145(3):481e-490e.

Short-fascial Incision DIEP Flap Decreases Postoperative Narcotic Use And Length of Stay

Abstract Presenter: Haley Kenner BS

Abstract Co-Author(s): Alma Jukic, Santana Solomon BS, Michael Mazarei, Michelle Oberoi MD, Sarth Raj MD, Michel Saint-Cyr MD, MBA, MHA, FRCSC, FACS

Introduction/Purpose: Autologous tissue transfer with DIEP flap has revolutionized breast reconstruction. However, the donor site continues to be problematic with regard to postoperative abdominal laxity and risk of bulge. Extended intramuscular dissection or complex perforator course can create denervation of the rectus muscle, which places patients at higher risk of complications. Techniques to minimize the risk of bulge or abdominal wall weakness after DIEP flap breast reconstruction have been developed, including short fascial and pedicle lengths. The purpose of this study was to examine the feasibility of DIEP reconstruction with a short fascial incision to improve functional outcomes.

Methods: 189 DIEP flaps in 107 patients were performed between October 2021 and July 2024 by the senior author. All patients were included. Our control group included patients who underwent traditional DIEP flap harvest with fascial incision and pedicle length measuring between 12 to 15 centimeters (cm). We compared these to 25 patients with 48 DIEP flaps with a short fascial incision at or above the arcuate line between 7 and 12 cm, further categorized by ultra-short (<8 cm, n=14), short (8.1 to 10 cm, n=20), and moderate-short (10.1 to 12 cm, n=15) fascial lengths. Operative time, total morphine equivalents (ME) during post-operative stay, length of postoperative stay, and complication rates were analyzed.

Results: Ultra-short, short, and moderate-short fascial incisions had average pedicle lengths of 9.8cm, 11.1cm, and 11.9cm, respectively. We found a significant decrease in average total morphine equivalents (ME) required for postoperative pain control from 101.21 ME ± 168.48 (SD) for patients with traditional fascial incisions to 52.35 ME ± 55.35 for patients with short-fascial incisions ($p = 0.02$). Average length of stay decreased compared to the traditional fascial incision (1.86 days ± 0.86 vs. 2.67 days ± 1.94 $p = 0.002$). Operative time was shorter with 453 minutes ± 61.55 compared with 497 minutes ± 93.06 for traditional fascial incisions ($p = 0.009$). Flap failure rate was 1.07% and anastomotic revision rates were 0.53%. There were no flap failures in the short-fascial group. There was no significant difference in venous coupler size and major/minor complications between groups. Average follow up time was 10.1 months.

Conclusions: Short-fascial incision DIEP flap yields shorter operative time, nearly half the total morphine equivalents during postoperative stay, a shorter length of stay and faster recovery, without compromising flap viability. The short-fascial incision DIEP flap average pedicle length of 10.9 cm was adequate for comfortable microsurgery. All these advantages factor into using a short fascial incision in DIEP flap-based breast reconstruction

Pedicled Flaps Versus Free Radial Forearm Flap for Phalloplasty in Female to Male Gender Confirming Surgery: A Systematic Review

Abstract Presenter: Sebastian Mitchell MD

Abstract Co-Author(s): Thendo Netshiongolwe, Senthooran Kathiravelupillai, praveen subbiah, Ming Zien Yu, Ankur Khajuria MD

Background: The field of gender-affirming surgery is rapidly evolving, with plastic surgery units worldwide increasingly offering these services. Phalloplasty is a critical component of female-to-male (FTM) transition, providing significant psychological and functional benefits. However, there is no clear consensus on the optimal surgical technique for phalloplasty in this patient population. This systematic review examines the existing literature on the use of pedicle flaps and the free radial forearm flap in FTM gender-affirming surgery.

Methods: A systematic review was conducted following the PRISMA guidelines and was registered a priori (CRD42023479414) [1] . The search strategy adopted the Peer Review of Electronic Search Strategy (PRESS) guidance, searching PubMed/Medline, Scopus, Web of Science, ProQuest, and EBSCO for eligible studies [2]. Two independent reviewers screened and selected studies, resolving discrepancies by consensus. Flap survival and patient satisfaction were the primary outcome measures. Secondary outcomes included standing voiding ability, penetrative sexual function, number of operative stages, surgical duration, anesthetic techniques, and donor site morbidity or acceptance. Risk of bias was assessed using ROBINS-I, and evidence quality was evaluated using GRADE [3, 4].

Results: A total of 19 studies comprising 769 patients (614 radial forearm flaps, 155 pedicled anterolateral thigh flaps) were included. Both techniques demonstrated comparable outcomes, though the pedicled flap required significantly less operative time (290 vs. 516 minutes). Flap failure rates were low for both groups (1.9% radial forearm, 0.6% anterolateral thigh)($p = 0.348$) and patient satisfaction was high (78% vs. 76.2%) ($p = 1.0$). Risk of bias assessment indicated serious selection bias due to the observational nature of studies. GRADE evaluation rated the evidence as low, reflecting the absence of randomized trials in this field.

Conclusion: The radial forearm flap remains the most reliable technique for phalloplasty, with the anterolateral thigh flap serving as a secondary option when the radial forearm flap is not feasible. However, the limited number of studies and the lack of standardized outcome reporting in gender-affirming surgery make it difficult to draw definitive conclusions or establish evidence-based recommendations. While both flap types are considered safe for female-to-male phalloplasty, the small patient cohorts and absence of randomized data contribute to the ongoing uncertainty in determining the optimal approach.

References

1. Page, M. J., McKenzie, J. E., Bossuyt, et. al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ, 372, n71. https://doi.org/10.1136/bmj.n71

2. McGowan J, Sampson M, Salzwedel DM, Cogo E, Foerster V, Lefebvre C. PRESS peer review of electronic search strategies: 2015 guideline statement. J Clin Epidemiol. 2016;75:40-46. doi:10.1016/j.jclinepi.2016.01.021

3. Sterne J A, HernÃ¡n M A, Reeves B C, SavoviÄ J, Berkman N D, Viswanathan M et al. ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions BMJ 2016; 355 :i4919 doi:10.1136/bmj.i4919

4. Brozek JL, Akl EA, Alonso-Coello P, et al. Grading quality of evidence and strength of recommendations in clinical practice guidelines. Part 1 of 3. An overview of the GRADE approach and grading quality of evidence about interventions. Allergy. 2009;64(5):669-677. doi:10.1111/j.1398-9995.2009.01973.x

Enhancing Wound Healing in Plastic Surgery: Promoting Angiogenesis via Gene Upregulation Using Titanium Dioxide Nanoparticles

Abstract Presenter: Shi Fu MD

Abstract Co-Author(s): Huiting Luo, Divleen Singh MD, Shiffoni Sukhlal, Duc Bui MD, Miriam Rafailovich, Sami Khan MD, Marcia Simon, Alexander Dagum MD, Gurtej Singh

PURPOSE: Titanium dioxide nanoparticles (TiO_2 NPs) are highly regarded for their biocompatibility, antimicrobial effects, and light-scattering properties, making them promising candidates for various biomedical applications, particularly in regenerative medicine and wound repair. Previous studies indicate that TiO_2 NPs can enhance the activity of human umbilical vein endothelial cells (HUVECs) by upregulating adhesion molecules and inflammatory markers, suggesting a potential role in stimulating angiogenesis, a crucial process in effective wound healing [1]. This study aims to examine the effects of TiO_2 NPs on angiogenesis in HUVECs, focusing on their role in vascular network formation and gene regulation. To achieve this, we utilized:
• Flow cytometry and cell sorting
• Time-lapse fluorescence imaging (EVOS microscopy) to track real-time vascular development,
• Network analysis (Celleste Image Analysis software) for quantifying angiogenic branching,
• Scanning electron microscopy (SEM) for structural characterization, and
• Reverse Transcription Polymerase Chain Reaction (RT-PCR)

METHODS: HUVECs were cultured with or without 0.1 mg/mL and 0.2 mg/mL Rutile TiO_2 nanoparticles for 24 hours to assess their impact on angiogenesis. Following treatment, cells were plated on 10 mg/mL Matrigel, and capillary formation was

monitored every 20 minutes for 24 hours using EVOS fluorescence microscopy with a CO_2 on-stage incubator. Images from triplicate cultures were analyzed using Celleste Image Analysis software to quantify vascular network formation. Mechanical stress exerted by HUVEC networks on the substrate was evaluated using the Digital Image Speckle Correlation (DISC) method. To assess angiogenesis-related gene expression, RT-PCR was performed on TiO_2 NP-treated HUVECs at two time points: Day 0 (immediately after 24-hour exposure) and Day 1 (following an additional 24-hour incubation post-washing with PBS to remove excess NPs). Additionally, fluorescence-activated cell sorting (FACS) was used to determine TiO_2 NP uptake in HUVECs treated with 0.1 mg/mL TiO_2 NPs.

RESULTS: HUVECs treated with TiO_2 nanoparticles exhibited more stable and extensive vascular networks, characterized by an increased number of branches, tubes, and nodes compared to the control group. Mechanical stress analysis indicated that TiO_2-treated cells applied less force on the substrate while forming these networks. SEM imaging confirmed the integration of TiO_2 nanoparticles within cellular structures, particularly within nodes and splines, while TEM analysis revealed that the nanoparticles were predominantly localized within vacuoles adjacent to mitochondria. Gene expression analysis via RT-PCR demonstrated a significant upregulation of VEGFR2 and HGF in HUVECs treated with 0.1 mg/mL TiO_2 over consecutive days. However, VEGF expression showed a delayed response, becoming upregulated only on the second day. These findings indicate that TiO_2 nanoparticles may indirectly enhance VEGF expression by first stimulating the production of other growth factors.

CONCLUSIONS: This study demonstrates that TiO_2 nanoparticles enhance angiogenesis in HUVECs, suggesting potential applications in wound healing. Further research is ongoing to uncover the underlying mechanisms and confirm TiO_2's therapeutic potential in regenerative medicine.

REFERENCES:

1. Montiel-Dávalos, A., Ventura-Gallegos, J. L., Alfaro-Moreno, E., Soria-Castro, E., García-Latorre, E., Cabañas-Moreno, J. G., del Pilar Ramos-Godinez, M., & López-Marure, R. (2012). TiO2 nanoparticles induce dysfunction and activation of human endothelial cells. Chemical research in toxicology, 25(4), 920–930.

Eating Behavior and Weight Gain in Women Undergoing Abdominoplasty

Abstract Presenter: Julianna Arouca

Abstract Co-Author(s): Fabio X. Nahas, Lydia M. Ferreira

Introduction: Abdominoplasty is one of the most commonly performed plastic surgeries worldwide, with Brazil leading in procedure volume. Changes in eating behavior may occur before and after surgery, influencing weight gain. Weight fluctuations are linked to restrictive diets, emotional eating, and compensatory behaviors, contributing to metabolic and psychological disturbances (VITAGLIANO, 2023; ADAN, 2019). While studies show weight gain in women post-abdominoplasty (NAHAS et al., 2011), no research has examined the relationship between eating behavior and postoperative weight gain.

Methods: This longitudinal clinical study included 51 women (25–50 years old) undergoing abdominoplasty at the Federal University of São Paulo (UNIFESP). Patients with chronic diseases, smoking habits, prior bariatric surgery, or additional aesthetic procedures were excluded. The Dutch Eating Behavior Questionnaire (DEBQ) and Binge Eating Scale (BES) assessed eating behaviors preoperatively and six months postoperatively (PO6). Nutritional status was evaluated through anthropometric measurements, including BMI adjustments for excess skin and fat removal.

Results: The mean excess skin and fat mass (ESFM) removed was 832.90 ± 298.06 g, corresponding to 1.32 ± 0.48% of preoperative weight. Mean baseline weight (BW) was 62.6 ± 6 kg, increasing to 64.6 ± 6 kg at PO6, with a significant weight gain of 2.0 ± 2 kg ($p < 0.05$). BMI increased from 24.4 ± 1.7 kg/m² (POI) to 25.2 ± 2.1 kg/m² (PO6), with 56.9% of patients classified as pre-obese postoperatively.
Significant increases in eating behavior scores were observed:
• DEBQ total score: +4.5 ± 2.4 ($p < 0.001$)
• Restrained eating: +0.8 ± 1.0 ($p < 0.001$)
• Emotional eating: +2.2 ± 1.5 ($p < 0.001$)
• External eating: +1.5 ± 1.0 ($p < 0.001$)

The severity of binge eating (BES score) increased from 23.5 ± 7.0 (PRE) to 29.1 ± 3.0 (PO6) ($p < 0.001$). Women with severe BES scores preoperatively had higher BMI at both PRE and PO6, suggesting a link between binge eating and weight gain post-abdominoplasty.

Discussion: Weight regain after body contouring procedures is consistent with findings from HENDERSON et al. (2023), who observed postoperative weight recovery in 11.81% of bariatric patients and 7.56% of non-bariatric patients. SAARINIEMI et al.

(2014) reported improved body satisfaction and reduced eating disorder risk post-abdominoplasty, though additional studies were recommended.
Psychological factors significantly influence weight outcomes. MCCOMB & MILLS (2021) found that exposure to idealized body images increased body dissatisfaction in perfectionist women, potentially leading to disordered eating. CARANO et al. (2012) emphasized that food intake is regulated by both hypothalamic and emotional mechanisms, with the lipostatic theory (KENNEDY, 1950) suggesting that rapid fat loss may trigger compensatory weight regain.

ZIMMER et al. (2022) identified binge eating disorder (BED) in 10.8% of abdominoplasty patients, supporting the link between eating disorders and aesthetic surgery candidates. RAMOS et al. (2019) found 48% of rhinoplasty candidates had body dysmorphic disorder (BDD), emphasizing the need for preoperative psychological screening in plastic surgery patients.

Post-bariatric patients undergoing body contouring surgery showed better long-term weight control (DE VRIES et al., 2020), yet nutritional and psychological challenges remain. HERMAN et al. (2015) and KOKOSIS & COON (2018) highlighted postoperative nutritional deficiencies, reinforcing the importance of dietary and behavioral management.

Conclusion: Women undergoing abdominoplasty showed reduced control over binge eating and significant weight gain six months postoperatively. The findings highlight the need for nutritional and psychological support in abdominoplasty candidates to optimize postoperative weight maintenance and eating behavior.

Beyond The Threshold: The Establishment of Operative Time as a Truly Independent Predictor of Microsurgical Complications using a Multivariate-Meta Regression Model

Abstract Presenter: Raed Alderhali

Abstract Co-Author(s): Kian Daneshi, Eeshaan Ghanekar, Paola Pentangelo MD, Hamid Reza Khademi Mansour, Tim Varghese, Ankur Khajuria MD

Background: Microsurgery offers transformative reconstructive solutions for complex soft tissue defects in the breast, head and neck, and extremities, yet its intricate nature often results in prolonged operative times linked to complications such as flap failure,

infections, and poor wound healing . (1) The independent effect of operative duration remains unclear due to limited, small-scale studies that treat it as a secondary variable, often yielding exaggerated and conflicting results. To date, no study has specifically evaluated the relationship between operative times and complications in microsurgery . (2) (3) (4) Given the associated morbidity, extended hospital stays, and higher costs, our study employs a novel multivariate meta-regression accounting for ischemia time, device use, and patient comorbidities to clarify this relationship and bridge the gap between theory and practice. We also explore strategies to reduce operative times, including the use of anastomotic coupling devices (ACDs) and co-surgeon utilization.

Methods: Pre-registered on PROSPERO (CRD42024544010) and following PRISMA guidelines, we systematically searched CENTRAL, Embase, Medline, and Web of Science from inception until June 2024, without restrictions. Two reviewers independently screened studies and extracted data, excluding low-quality studies per the Newcastle-Ottawa Scale. A random-effects multivariate meta-regression using REML assessed the association between operative time and complications, adjusting for moderators (e.g., ischemia time, age, obesity) while subsequent univariate analysis validated findings.

Results: Multivariate meta-regression on 34,790 patients revealed operation time ($\beta=0.0338$, $p<0.001$) and ischemia time ($\beta=0.2590$, $p<0.001$) as significant independent predictors of complication rates. Covariates such as age, hypertension, smoking, obesity, and diabetes were also significant. Univariate analyses demonstrated strong associations of ischemia time with reoperation ($\beta=1.00$, $p<0.0001$) and infection ($\beta=0.4242$, $p<0.0001$), while operation time was significantly associated with wound complications ($\beta=0.015$, 95% CI: 0.001–0.029, $p=0.036$) and medical complications ($\beta=0.045$, $p=0.003$). ACD's reduced operative times ($\Delta=-47.17$ minutes, $p=0.0396$) and co-surgeon's reduced complication rates (β^= - 5.6852, $p < 0.001$). Heterogeneity remained high across all analyses (I^2 = 99.9%).

Conclusion: Our findings reveal that prolonged operative and ischemia times independently heighten complication risks in microsurgery, challenging the traditional 6-hour threshold. (4) By treating these factors as continuous variables, we demonstrate that even small increments in time can increase risk. We believe our study identified key methodological flaws in previous investigations, which may explain the conflicting "thresholds" reported in the literature.

1. Villavisanis DF, Zhang D, Shay PL, Taub PJ, Venkatramani H, Melamed E. Assisting in Microsurgery: Operative and Technical Considerations. J Hand Surg Glob Online. 2023;5(3):358-362. doi:10.1016/j.jhsg.2023.01.011

2. Haddock NT, Teotia SS. Efficient DIEP Flap: Bilateral Breast Reconstruction in Less Than Four Hours. Plastic and Reconstructive Surgery – Global Open. 2021;9(9):e3801. doi:10.1097/GOX.0000000000003801

3. Cheng H, Clymer JW, Po-Han Chen B, et al. Prolonged operative duration is associated with complications: a systematic review and meta-analysis. J Surg Res. 2018;229:134-144. doi:10.1016/j.jss.2018.03.022

4. Hardy KL, Davis KE, Constantine RS, et al. The impact of operative time on complications after plastic surgery: a multivariate regression analysis of 1753 cases. Aesthet Surg J. 2014;34(4):614-622. doi:10.1177/1090820X14528503

Aesthetic

Assessing The Impact of Non–Tobacco Nicotine Dependence on Postoperative Complications and Surgical Revision Rates in Breast Reduction: A Large, National Propensity Score–Matched Analysis

Abstract Presenter: Matthew Q. Dao

Abstract Co-Author(s): Bernice Yu MD, Parul Rai, Peter Taub MD, Arjun Nanda MD, Rebecca Suydam MD, Ethan Fung

Background: Smoking has been demonstrated as a significant risk factor for patients undergoing breast reduction [1]. Within the past decade, tobacco-free e-cigarettes and nicotine pouches have become popular alternative methods to smoking, as these products are perceived to be safer options [2-3]. Nevertheless, the impact of non–tobacco nicotine dependence (NTND) on breast reduction remains less explored. The present study sought to assess the effect of preoperative NTND on postoperative complications and revision rates in patients undergoing breast reduction.

Methods: The Research Network on TriNetX, a federated national database aggregating anonymized electronic health records from 103 healthcare organizations,

was queried on February 18, 2025. Patients who underwent breast reduction from January 2012 to February 2025 were included, while those with history of breast cancer, tobacco product usage, and cigarette smoking were excluded. Patients were categorized into two cohorts: those with preoperative NTND use before undergoing breast reduction and those with no documented history of nicotine dependence. A 1:1 propensity score–matching was conducted for age, sex, ethnicity, race, body mass index, and comorbidities (chronic kidney disease, liver disease, diabetes, hypertension, obesity, chronic obstructive pulmonary disease, and cerebrovascular disease). Primary outcomes evaluated surgical site infection, hematoma, acute postoperative pain, and any surgical site complications at 30-days and 90-days. Secondary analysis measured rates of postoperative breast deformity and surgical revision at 2-years. Multivariate regression was performed for outcomes, with statistical significance set at $p<0.05$.

Results: An unmatched total of 45,581 adult patients were included. The NTND and control cohorts comprised 1,432 and 44,149 patients, respectively. Following 1:1 matching, 1,424 comparable patients remained in both cohorts. At 30-days following surgery, the NTND cohort presented with significantly elevated risk for surgical site infection, hematoma, acute postoperative pain, and any surgical site complications compared to the control cohort (all $p<0.05$). After 90-days post-op, patients with preoperative NTND status continued to have significantly elevated risks of surgical site infection, hematoma, and any surgical site complications (all $p<0.05$). However, no significant differences were observed for postoperative breast deformity and surgical revision at 2-years following breast reduction.

Conclusion: This present study highlighted the association between NTND and significantly higher risks of immediate postoperative complications in breast reduction. While NTND is not linked to increased rates of deformity and surgical revision of breasts, nicotine–whether from tobacco or non-tobacco sources–can adversely impact short-term outcomes. Therefore, these findings contribute to the growing literature regarding operative risks associated with NTND, underscoring the need for cessation guidelines for non-tobacco nicotine users before undergoing breast reduction.

References:
1. Hillam JS, Borsting EA, Chim JH, Thaller SR. Smoking as a risk factor for breast reduction: An analysis of 13,503 cases. J Plast Reconstr Aesthet Surg. 2017;70(6):734-740. doi:10.1016/j.bjps.2016.12.012
2. Davis DR, Rajesh Kumar L, Morean ME, et al. Why young adults use tobacco-free nicotine E-cigarettes: An analysis of qualitative data. Addict Behav. 2024;150:107925. doi:10.1016/j.addbeh.2023.107925

3. Tosakoon S, Romm KF, Berg CJ. Nicotine pouch awareness, use and perceptions among young adults from six metropolitan statistical areas in the United States. Tob Prev Cessat. 2023;9:19. Published 2023 Jun 7. doi:10.18332/tpc/163243

Fixation Techniques Across Endoscopic Brow Lifts: A Scoping Review

Abstract Presenter: Hector Caceres

Abstract Co-Author(s): Syed Raza, Tapasya Katta, Shawn Barker, Jorge De La Torre MD, MSHQS, FACS

Since its inception in 1992, the endoscopic brow lift has gained popularity as a minimally invasive solution for treating age-related brow ptosis. (1) Over time, various fixation techniques have been developed, including cortical tunnel bone fixations, resorbable devices like Endotine, adhesives, and simple sutures. (2,3,4) Despite these various methods, there is paucity in the literature evaluating patient satisfaction and outcomes between techniques. (5) This scoping review aims to evaluate the existing literature on endoscopic brow lifts, focused on reporting outcomes and methods of reporting patient satisfaction. By synthesizing this information, we hope to provide clinicians with a clearer understanding of how different techniques impact patient experiences, and surgical results. Our goal is to enhance clinical practice and inform future research.

A licensed librarian conducted a computerized search using PubMed, Scopus, and Embase databases to identify papers including terms such as "endoscopic brow lifts," "endoscope," or "brow rejuvenation" from inception to June 2024. After analysis, 27 papers were included in this study. Studies were included if they examined endoscopic brow lifts using a single fixation technique and reported surgical outcome data. Due to heterogeneity in complication reporting, complications were categorized into aesthetic, neurological, wound-related, and other.

This review analyzed 2519 patients across 11 fixation methods. Bone tunnel (649 patients), Endotine (333), suture (906), and screw fixation (216) were the most common. Other methods were reported in one study each. Among studies reporting gender, 85.9% were female. Ages ranged from 38.8 to 72 years, with follow-up ranging from 5.1 months to 4 years. While 74% of studies addressed patient satisfaction only 22% quantified it. Bone tunnel fixation had the lowest complication profile across all four

categories. Screw fixations had the highest rate of complications across all categories. Overall, neurological complications (11.69%) were the most common followed by aesthetic (6.27%), other (4.94%), and wound-related (1.19%).

The longevity of the endoscopic approach to address brow ptosis has driven the development of various fixation methods. Despite this, there is not a clear distinction of the best approach due to the heterogeneity of the literature in reporting both surgical outcomes and patient satisfaction. Our review suggests bone tunnel fixation appears to have a favorable safety profile, while screw fixation is associated with higher rates of complications. Notably, our findings indicate that minimal complications were seen across all studies, supporting the efficacy of the endoscopic brow lift technique. There is a significant gap in the consistent reporting of complications across the literature that if addressed could lead to improved patient outcomes. Additionally, the role of muscle tone and physiological adaptation in long-term brow positioning remains unexplored and should be a focus of future investigation. Future research should focus on long-term outcomes, standardizing complication definitions, and utilizing universal patient satisfaction instruments. This effort would enhance the comparability of studies, improve surgical techniques, and ultimately elevate patient care.

References:

1. Swiftjr R, Nolan W, Aston S, Basner A. Endoscopic brow lift: objective results after 1 year. Aesthetic Surgery Journal. 1999 Jul;19(4):287–92.
2. Berkowitz RL, Jacobs DI, Gorman PJ. Brow fixation with the Endotine Forehead device in endoscopic brow lift. Plast Reconstr Surg. 2005 Nov;116(6):1761–7; discussion 1768.
3. Foustanos A. Suture fixation technique for endoscopic brow lift. Semin Plast Surg. 2008 Feb;22(1):43–9.
4. Drolet BC, Phillips BZ, Hoy EA, Chang J, Sullivan PK. Finesse in forehead and brow rejuvenation: modern concepts, including endoscopic methods. Plast Reconstr Surg. 2014 Dec;134(6):1141–50.
5. Karimi N, Kashkouli MB, Sianati H, Khademi B. Techniques of eyebrow lifting: A narrative review. J Ophthalmic Vis Res. 2020 Jun;15(2):218–35.

Evaluating the Efficacy of Dermal Fillers for Hand Rejuvenation: A Systematic Review

Abstract Presenter: Pushti Shah

Abstract Co-Author(s): Pooja Deshpande, Suhas Parise, Varoon Phondge, Kometh (Tony) Thawanyarat MD, Edward Lee MD

Introduction: Soft tissue fillers are widely used in plastic surgery for cosmetic enhancement, particularly in addressing age-related volume loss and skin laxity. Similarly, the hands are a key indicator of aging, prompting interest in rejuvenation techniques to restore volume and minimize vasculature prominence. While fat grafting is the gold standard for hand rejuvenation, it is not suitable for all patients, such as those with a history of radiation or coagulopathies. Injectable fillers provide a nonsurgical alternative for volumization and aesthetic improvement. The purpose of this study is to evaluate various filler options for hand rejuvenation to analyze aesthetic outcomes and complications.

Methods: A systemic literature review was conducted according to PRISMA guidelines. The PubMed and Embase databases were searched for studies from October 2014 to October 2024. The following keywords were used: filler, hyaluronic acid, dermal filler, calcium hydroxyapatite, L-lactic acid, Restylane Lyft, Radiesse, hand rejuvenation, volume, aging, and veins. Two reviewers independently performed title-abstract and full-text screening for inclusion. Studies with combination therapies, fat grafting, or chemical peels were excluded. Review papers, letters, and articles not in English were excluded. The included studies were reviewed for risk of bias using the Cochrane Risk of Bias, Newcastle Ottawa Risk of Bias, and Joanna Briggs Institute critical appraisal tools for randomized trials, cohort studies, and case series, respectively. Patient demographics and treatment protocol were extracted. Clinical outcomes were identified using the Merz Hand Grading Scale (MGHS), Global Aesthetic Improvement Scale (GAIS), patient satisfaction, and complications.

Results/Complications: Of 474 search results, 27 unique articles met the inclusion criteria. Among these, 7/9 randomized trials, 3/3 cohort studies, and 13/15 case series demonstrated a low risk of bias. There were 981 patients across the studies: 511 patients received Calcium Hydroxyapatite, 441 received Hyaluronic Acid, and 80 received other fillers such as poly-L-lactic acid, polymethylmethacrylate, or polycaprolactone. The patients were predominantly female (98%). Various filler volumes were utilized, ranging from 0.5mL to 3mL per treatment, with 96.3% of studies providing 1-3 treatments (range: 1-13 treatments). In 85.2% of the studies, patients received treatment on both hands. Follow-up time ranged from 4 weeks to 15 months. The incidence of complications per study had a mean of 7.2 complications across multiple injections (range: 0-79). Among the 173 total complications, common complications included difficulty performing activities (32.4%), swelling (12.9%), and loss of sensation or sensitivity (11%). Of 14 studies (494 patients) reporting the GAIS, a range of 72% to

100% of patients reported aesthetic improvement. Of the scores reporting MHGS, 4 studies (140 patients) showed an improvement from 0.8 to 1.8 points, and 5 other studies (112 patients) reported a final score between 1.1-2.1 (mean: 1.48).

Conclusions: Using fillers for hand rejuvenation is an effective approach, with high patient satisfaction as per GAIS and low complication rates. Improvements in the MGHS suggest fillers successfully restore hand volume and provide aesthetic outcomes at long-term follow-up.

Assessing Financial Disclosure in Non-Invasive Fat Reduction Research: Do Corporate Payments Impact Study Outcomes?

Abstract Presenter: Hilliard Brydges MD

Abstract Co-Author(s): Jasmina Abdalla, Joseph Nguyen, Keerthi Kurian, Carter Boyd MD, Jamie Levine MD, Raeesa Kabir

PURPOSE: Non-invasive fat reduction techniques, such as injection lipolysis, cryolipolysis, and high-frequency ultrasound, have been widely used by plastic surgeons for contouring the body and face. These non-invasive procedures offer benefits over more invasive techniques including little to no anesthesia and quicker recovery periods. The biomedical industry is heavily involved in the production of these innovative products and techniques. However, due to the possible conflicts that may arise with plastic surgeons' collaboration with the industry, it seems inherent that plastic surgeons need to disclose their conflict of interests (COI) to reduce the risk of bias when reporting outcomes in the literature. In this study, we aim to explore the relationship between corporate payments received and the outcomes of the reported non-invasive fat reduction techniques.

METHODS: A systematic review using PRISMA guidelines included studies on non-invasive fat reduction techniques published through July 2022. The Open Payments database (openpaymentsdata.cms.gov) was used to access compensation data from companies disclosed in COI statements and those received specifically from companies manufacturing the device used in the study. Study outcomes were analyzed using descriptive statistics and uni- and multi-variate analyses.

RESULTS: Of the 86 studies, 72.1% had a COI disclosure statement. Positive outcomes were reported in 56 (65.1%), negative outcomes in 8 (9.30%), and neutral

outcomes in 22 (25.6%) studies. Interventions included injection lipolysis (n = 34), cryolipolysis (n = 15), radiofrequency energy (n = 25), ultrasound-based (n = 21) and laser-based fat reduction techniques (n = 14).
Eleven authors failed to disclose COI despite receiving compensation. Positive outcomes were more frequent in studies where the first authors disclosed COI (84.2%) versus those without (59.7%) (p = 0.048). No significant differences were observed in study outcomes for the last authors with COI versus those without. However, the last authors who received compensation from companies manufacturing the device used in the study reported higher rates of positive outcomes (91.7%) versus those who did not (60.8%) (p = 0.037). This trend was not seen for first authors receiving compensation from the device-specific companies.

Receiver Operating Characteristic curve analysis showed a weak association between first-author compensation and study outcomes (AUC = 0.597). Similarly, weak associations were observed between the compensation amounts received by both first authors (AUC = 0.525) and last authors (AUC = 0.592) from the device-specific companies and study outcomes.

CONCLUSION: Our study found inconsistency and gaps in COI reporting and highlighted that the presence of a COI disclosure is associated with more positive outcomes than negative or neutral outcomes in non-invasive fat reduction-related studies. Additionally, we observed higher average compensation amounts among first and last authors with positive outcomes compared to those with negative or neutral outcomes. These findings underscore the importance of establishing consistent COI reporting guidelines across journals and in Open Payments database to increase transparency and mitigate bias in biomedical research, ultimately enhancing patient trust. COI reporting needs to be clearer and of higher quality to help the journal and the reader better understand the purity of the scientific literature.

Psychiatric Illness and Cosmetic Procedures a PearlDiver Review

Abstract Presenter: Quinn Fitzpatrick

Abstract Co-Author(s): Fedra Britvic, Annie Fritsch, Ime Inyang, Quinn Fitzpatrick, Mamtha Raj MD

INTRODUCTION: Cosmetic surgery aims to correct or improve body imperfections and is generally elective in nature.(1) Among those with psychiatric disorders that pursue

cosmetic surgeries, those with depression and anxiety are most often encountered and body dysmorphic disorder is the greatest predictor of poor outcome from a cosmetic procedure.(2) This study aims to further clarify the connection between psychiatric disorders and the pursuit of cosmetic procedures with additional analysis of complication rates.

METHODS: De-identified patient records utilizing the PearlDiver Database were accessed from 2012 to 2024 with unrestricted patient age. Records were selected based on pre-determined list of diagnosis codes categorized in the following groups: Mental Disorders with a Physiologic Cause, Psychotic Disorders, Mood Affective Disorders, Anxiety and Related Disorders, Behavioral Syndromes, Personality Disorders, Intellectual Disabilities, Attention Deficit Hyperactivity Disorder and Unspecified. Cosmetic procedures were categorized as Body Contour, Facial Aesthetics and Breast Surgery. The comparison groups consisted of patients with a psychiatric diagnosis and subsequent cosmetic procedure. We analyzed these comparison groups against 3 control groups of patients who received a cosmetic procedure (either body contour, facial aesthetic or breast surgery) but never a psychiatric diagnosis. Complication rates within each group were also analyzed. De-identified descriptive statistics for comparison and control groups were performed. Additional analysis included logistic regressions determining odds ratios of patients within psychiatric diagnosis groups and the likelihood of having a cosmetic procedure.

RESULTS: A total of 65,581,380 psychiatric claims were analyzed from 2016-2020. The majority were female (63%) with the most common diagnosis being Anxiety and Related Disorders (43%). Logistic regression of our Anxiety and Related Disorders group against the likelihood of having a cosmetic procedure classified as Body Contour (BC) or Breast Surgery (BS) resulted in the greatest odds ratio compared to the other categorized diagnosis, (BC OR: 1.65, 95% [CI]: 1.63, 1.67, BS OR: 1.79, 95% [CI]: 1.76, 1.82). Additionally, the Mood Affective group which includes diagnosis codes such as Major Depressive Disorder, resulted in an increased odds ratio for Body Contour procedure (BC OR: 1.42, 95% [CI] 1.40, 1.43). The lowest odds ratio came from a regression between the Pervasive Disorders group, which includes diagnoses such as Autism and Asperger's syndrome, and Breast Surgery cosmetic procedures (BS OR: 0.046 95% [CI]: 0.04, 0.05).

CONCLUSION: The results of our data analysis supported findings from our literature review, revealing that patients with depression and anxiety have an increased likelihood of pursuing a cosmetic procedure based off a large sample of deidentified data. Our findings stress the importance of standardized psychological screening protocols and ethical considerations for individuals seeking cosmetic procedures. Future

investigations should explore whether psychiatric illnesses impact postoperative complication rates and overall patient satisfaction.

References:

1. Barone M, Cogliandro A, Persichetti P. Ethics and plastic surgery/What is plastic surgery? Arch Plast Surg. 2017;44(1):90-92. doi:10.5999/aps.2017.44.1.90.
2. Jang B, Bhavsar DR. The prevalence of psychiatric disorders among elective plastic surgery patients. Eplasty. 2019;19:e6. PMID: 30949279; PMCID: PMC6432998.

The Mummy Study: Analyzing the Effect of Concomitant vs Staged Brachioplasty and Thighplasty on Operative Outcomes

Abstract Presenter: Alexander Comerci

Abstract Co-Author(s): Viraj Govani, Ahmet Demir, Kouadio Toukou, Lynn Frydrych MD, J. Peter Rubin MD, Jeffrey Gusenoff MD

Purpose: After massive weight loss (MWL), patients often experience skin excess and laxity, which can lead to persistent functional, psychological, and health issues. Body contouring procedures like brachioplasty and thighplasty can address these concerns and enhance patient well-being. These procedures may be performed either in a staged manner (separate surgeries) or together in a combined approach (referred to as the "mummy procedure"), requiring post-operative wrapping of both the upper and lower extremities. While staged procedures present scheduling and financial challenges, there is a lack of long-term studies comparing the outcomes of combined versus staged procedures. This study aims to explore the post-operative outcomes of these two approaches, contributing to a patient-centered approach to body contouring.

Methods: A retrospective review was conducted for MWL patients who underwent both brachioplasty and thighplasty at UPMC Department of Plastic Surgery between July 2003 and October 2023. Demographic, intra-operative, and post-operative complication data were collected. Statistical analysis included Fisher's Exact, Wilcoxon Rank-Sum, and two-sample T-tests for demographic data, and Fisher's Exact tests for complication data. Non-normally distributed continuous variables were analyzed with non-parametric tests, reporting median (IQR).

Results: Of 343 patients, 36 underwent the mummy procedure, and 28 had staged procedures. The majority of patients in both groups were female (94% vs. 93%, $p = 0.729$). The median age of the mummy cohort was 59 (IQR: 17), and for the staged

cohort, 43 (IQR: 17) (p = 0.3343). Median follow-up was 139 (IQR: 155.5) days for the mummy group and 126 (IQR: 132) days for the staged group (p = 0.3673). Median BMI at the time of body contouring was 29.02 (IQR: 5.28) kg/m² for the mummy group and 28.97 (IQR: 3.92) kg/m² for the staged group (p = 0.3759). The most common complications were wound dehiscence (28% vs. 25%), seroma (21% vs. 27%), and cellulitis (10% vs. 7%) (p = 0.841, p = 0.529, p = 0.755, respectively). No significant differences were found between the mummy and staged cohorts for other complications: hematoma (3% vs. 2%), abscess (4% vs. 2%), suture extrusion (10% vs. 9%), fat necrosis (1% vs. 2%), and contour deformity (8% vs. 4%).

Conclusion: Patients who opt for the mummy procedure or staged procedures exhibit similar demographic characteristics and post-operative outcomes. The mummy procedure does not result in a higher rate of complications compared to staged procedures. Future research should focus on patient-reported outcomes, particularly satisfaction levels with combined versus staged procedures.

Nationwide Demographic Trends and Postoperative Complications in Blepharoplasty: A TriNetX Analysis

Abstract Presenter: Amber Edson

Abstract Co-Author(s): Mary Grace Hamlin, Sarah Hodson, Annika Keeton, Khalil El Dairi

Introduction: Blepharoplasty is a common procedure that removes excess upper eyelid skin, improving function and appearance. A primary indication for blepharoplasty is dermatochalasis, a condition characterized by redundant eyelid skin that can obstruct vision and cause ocular discomfort. The risks of blepharoplasty include corneal abrasions, retrobulbar hemorrhage, eyelid malposition, and persistent dry eye syndrome. Despite its widespread use, large-scale data on patient demographics and complication risks remain limited. This study leverages the TriNetX database-a multi-institutional health network-to analyze demographic trends and postoperative complications across different timeframes, highlighting factors that may influence surgical risk and long-term outcomes.

Purpose: To synthesize large-scale demographic and complication data from TriNetX to assess the influence of preoperative dermatochalasis on postoperative outcomes in blepharoplasty patients.

Methods: A retrospective cohort study was conducted using de-identified patient records from 69 U.S. health centers in the TriNetX database. Patients who underwent blepharoplasty (n = 59,777) were identified using CPT codes and stratified into two cohorts based on preoperative dermatochalasis: those with (n = 47,007, 78.6%) and those without (n = 12,770, 21.4%). Postoperative complications were categorized into acute (≤1 month: corneal abrasions, retrobulbar hemorrhage), intermediate (1-3 months: eyelid malposition, exposure keratitis, epiphora), and chronic (1 month-3 years: scarring, persistent edema, dry eye syndrome, ptosis). Statistical analysis was performed within TriNetX, with complication rates compared between cohorts, and significance set at $p < 0.05$.

Results: Among 59,777 blepharoplasty patients, the mean age was 72, with 69.5% female, 77.3% White/Caucasian, and 76.7% non-Hispanic/Latino. A majority (78.6%) had a preoperative diagnosis of dermatochalasis. Acute complications were rare, with corneal abrasions occurring in 0.24% and retrobulbar hemorrhage in 0.03%, with no significant difference between dermatochalasis and non-dermatochalasis patients ($p = 0.148$). Intermediate complications were more frequent, with eyelid malpositions (ectropion/entropion) occurring in 1.53% of all patients and 1.56% in those with dermatochalasis ($p = 0.0056$). Chronic complications were significantly more prevalent in patients with dermatochalasis (41.24%) compared to those without (36.23%, $p = 0.0001$). Postoperative ptosis was twice as common in dermatochalasis patients (17.1% vs. 8.5%, $p < 0.001$, RR = 2.01). Persistent dry eye syndrome was also twice as likely (21.2%) vs. 10.4%, $p < 0.001$, RR = 2.04). Overall, patients with dermatochalasis had a significantly higher risk of developing any postoperative complication (39.86% vs. 20.43%, $p < 0.001$).

Conclusion: Preoperative dermatochalasis is strongly associated with an increased risk of postoperative complications after blepharoplasty, with risk ratios above 2.0. Patients with dermatochalasis face nearly double the overall complication burden compared to those without, highlighting the impact of eyelid laxity on surgical outcomes. These findings underscore the need for thorough preoperative assessment, patient counseling, and targeted postoperative care to minimize long-term complications. Optimizing surgical techniques, such as conservative tissue excision or modified closure, may improve both functional and aesthetic results. Future research should focus on refining risk models and enhancing postoperative care to guide best practices in eyelid surgery.

Glabellar Anatomy and Neurotoxin Efficacy: A Quantitative Assessment

Abstract Presenter: Salman Khan

Abstract Co-Author(s): Mehdi Lemdani, Malia Voytik MD, Arturo Rios-Diaz MD, Ashley Chang BA, Ayaka N. Deguchi MD, Robyn Broach, Ivona Percec MD, PhD

Purpose: While tailored injection patterns are common in aesthetic practices, objective data on the effects of anatomical differences on neurotoxin efficacy remains limited. Existing literature relies on subjective assessments based on rhytids, which often does not reflect underlying muscle activity. A classification system for glabellar contracture patterns (U, V, Omega (O), Inverted Omega (IO), and Converging Arrows (CA)) based on muscle activity was previously proposed (1), but the impact of various patterns on neurotoxin efficacy has not been objectively evaluated.
This study is the first to assess the influence of glabellar anatomy on neurotoxin efficacy using 3D imaging to quantify strain reduction.

Methods: Women aged 30–65 received standardized five-point injections. Dynamic strain data were collected using Vectra M3 (Canfield Scientific), a 3D imaging system that calculates precise facial strain. Strain data was captured at baseline and at follow-ups (3, 30, 90 and 180 days). Strain was defined as the percent change in the short axis of generated mesh points during furrowing.
Participants were categorized into five glabellar contracture patterns based on muscle recruitment. U and V patterns involve the procerus and corrugator supercilii, with V showing additional medial orbicularis oculi activation. O engages the corrugator, orbicularis, and frontalis, causing glabellar elevation. IO includes the procerus, corrugator, internal orbicularis oculi, and nasalis, leading to depression without approximation. CA reflects balanced activation of the procerus and frontalis. Classification was performed by an expert injector.

Results: A total of 142 neurotoxin-naïve women were enrolled, with an average age of 43.5 years (SD 9.82). The distribution of contracture patterns was: CA (30.28%), V (33.80%), U (16.20%), IO (8.45%), and O (9.15%).
At baseline, strain differed significantly across contracture patterns ($p = 0.0293$), with U exhibiting the highest mean strain at 16.54% (SD 4.71). O (16.21%, SD 4.36) and V (16.11%, SD 5.21) showed intermediate strain, while IO had the lowest baseline strain (12.01% SD 4.73). All groups showed significant reductions in strain by day 90. At 180 days, reductions diminished and were no longer statistically significant in O, V, and IO groups, but remained significant in patients with U and CA ($p<0.05$) patterns.

Maximum efficacy was observed at day 30, with differences in strain persisting (p = 0.0393). The U, V and O groups maintained greater strains (6.19%, 6.18%, and 6.08%, respectively), while the IO group recorded the lowest strain at 3.02% (SD 2.29). However, IO showed the lowest reduction in strain compared to baseline (8.37% p=0.002).

Conclusion: These findings indicate that contracture patterns significantly impact baseline glabellar activity as well as neurotoxin efficacy, with O and IO showing limited and shorter-lived responses due to additional muscle involvement. Tailored injection strategies incorporating additional toxin placement in the frontalis and orbicularis (for O) and nasalis and orbicularis pars palpebralis (for IO) may enhance outcomes.
By integrating dynamic strain analysis, this study provides objective evidence supporting personalized neurotoxin treatment approaches.

(1) de Almeida AR, Marques EM, Kadunc BV. Glabellar wrinkles: a pilot study of contraction patterns. Surg Cosmet Dermatol 2010;2:23–8

Hyaluronidase Knowledge and Accessibility in the Setting of Dermal Filler Complications: A Statewide Analysis

Abstract Presenter: Abigail Heilenman

Abstract Co-Author(s): Daniel Zaki MD, Anna Stipe, Christopher Runyan MD, Phd, Lisa David MD

Introduction: The global market for hyaluronic acid (HA) fillers, valued at $4.08 billion in 2023, is continually growing and driven by increasing accessibility of injectable procedures (1). However, major ischemic complications such as vascular occlusion, tissue necrosis, and blindness are also more prevalent. Management of these complications relies on the immediate availability of hyaluronidase (HYAL), yet discrepancies in accessibility and provider training persist. Given the expanding landscape of injectors-including non-core aesthetic practitioners such as registered nurses, dentists, and other non-surgical specialists-there is a concern about the preparedness of providers to manage filler-related complications. This study aims to assess the availability of HYAL and the presence of standardized protocols across different healthcare settings.

Methods: A telephone-based survey was conducted across 574 medical facilities in North Carolina, including emergency departments, urgent care centers, private practices, MedSpas, and hospital-affiliated Plastic Surgery & Dermatology clinics. Two distinct survey instruments were designed to account for variations in training, emergency resources, and institutional policies between emergency and elective aesthetic providers. Responses were collected on HYAL availability, provider familiarity, training in vascular occlusion management, and presence of formalized treatment protocols. Data were securely stored in REDCap and analyzed for trends in accessibility and preparedness.

Results: Respondents included a diverse range of practitioners, including physicians, PAs, nurse practitioners, medical assistants, and registered nurses (RNs, BSNs), reflecting the broad spectrum of providers performing dermal filler injections. Among surveyed facilities, 54% reported administering fillers daily, 38% weekly, and 8% monthly, with nearly all offering HA-based fillers. Despite the well-documented role of hyaluronidase in managing vascular complications, only 67% of respondents reported familiarity with HYAL, leaving 33% unaware of its use or application. Furthermore, only 54% of surveyed facilities stocked HYAL consistently, with on-hand supply ranging from two to twenty vials. Private practices reported the highest rates of managing filler complications (63%), whereas urgent care centers and emergency departments exhibited limited familiarity with both the presentation and treatment of vascular occlusions. Among all surveyed facilities, only 44% had a formalized protocol for managing filler-related complications, with common strategies including ophthalmology referral, emergency department transfer, or informal team discussions. A minority of sites reported utilizing ultrasound guidance or Delorenzi's protocol for vascular occlusion management, and several locations noted that hyaluronidase was primarily used for patient-requested filler dissolution rather than emergency intervention.

Conclusion: These findings underscore a significant gap in emergency preparedness, particularly among non-specialist settings where delayed intervention may lead to poorer patient outcomes across different healthcare settings. The limited access to hyaluronidase, lack of formalized treatment protocols, and variability in practitioner training pose significant risks to patient safety. Given the increasing number of aesthetic injectors from diverse backgrounds, standardized training programs, improved accessibility to hyaluronidase, and clear emergency management protocols are essential to mitigate the risks associated with dermal filler complications.

References:

1. Grand View Research. (2024). Hyaluronic acid-based dermal fillers market report, 2030. Hyaluronic Acid-based Dermal Fillers Market Report. https://www.grandviewresearch.com/industry-analysis/hyaluronic-acid-based-dermal-fillers-market

An Algorithmic Approach to Umbilicoplasty in Cosmetic Abdominoplasty: Optimizing Outcomes in the Social Media Era

Abstract Presenter: Ryan Enslow

Abstract Co-Author: Jerry Chidester MD

BACKGROUND: The umbilicus is a central aesthetic feature of the abdomen, and its appearance significantly influences patient satisfaction following cosmetic abdominoplasty. In the era of social media, achieving a natural-looking belly button with minimal visible scarring has become increasingly important. While numerous umbilicoplasty techniques have been described, no standardized algorithm exists to ensure reproducible, aesthetically pleasing results. This study introduces a novel algorithmic approach to umbilicoplasty, incorporating key factors such as native umbilical tissue quality, midline positioning, abdominal flap thickness, and patient preferences for umbilical shape. By employing a systematic, stepwise method, this algorithm aims to enhance the predictability and consistency of natural, aesthetically optimized umbilical outcomes with minimal scarring.

METHODS: A structured algorithm was developed based on four key considerations: (1) native umbilical tissue quality (e.g., hernias, depth), (2) umbilical midline alignment (e.g., scoliosis, abdominal asymmetry), (3) abdominal flap thickness, and (4) patient preference for the final umbilical shape. This algorithm was implemented in a consecutive case series of 525 patients who underwent elective cosmetic abdominoplasty over a five-year period (January 2020 – December 2024) performed by a single surgeon. Included procedures comprised abdominoplasty, panniculectomy with umbilical transposition, and fleur-de-lys abdominoplasty. Outcomes were assessed based on symmetry, natural appearance, and patient satisfaction. Postoperative umbilicoplasty management included prolene suture removal at seven days, umbilical training at six weeks for select patients, initiation of SkinMedica scar gel at three weeks, and adjunctive laser treatments or 5-FU + TXA injections as needed.

RESULTS: The umbilicoplasty algorithm was successfully applied in all cases, yielding consistent, aesthetically favorable outcomes with well-concealed scars in the majority of patients. Among 525 patients, complications were minimal, with no cases of complete umbilical stalk loss, no unplanned return to surgery, no umbilical stalk infections requiring additional procedures, and no recurrent hernias necessitating further surgical intervention. This systematic approach minimized complications and reduced the need for revision surgery while optimizing final aesthetic outcomes.

CONCLUSION: This algorithmic approach to umbilicoplasty standardizes surgical decision-making, enhances predictability, and may improve overall patient satisfaction in cosmetic abdominoplasty. By addressing key anatomical and aesthetic factors in a structured manner, this technique provides a reproducible method for optimizing umbilical outcomes. Future studies should further validate this approach in larger patient cohorts to assess long-term aesthetic and functional results.

Less is More: How Nasal Aesthetics Impact Visual Attention and Facial Attractiveness--An Eye Tracking Investigation

Abstract Presenter: Bradley Melnick

Abstract Co-Author(s): Rahim Laiwalla, Anmar Abu-Romman, Antoinette Nguyen, Rena Li, Rolando Casas Fuentes, Jeewon Chon MA, Tarifa Adam, Keenan Fine, Jonathan Bricker MD, Robert Galiano MD

Purpose: Facial attractiveness significantly influences social perception. While prior studies have identified the eyes and mouth as primary focal points of attention, the specific role of nasal aesthetics in overall facial attractiveness remains poorly understood. This study investigates the relationship between nose shape, perceived attractiveness, and visual attention using eye-tracking technology and anthropometric analyses. We hypothesize that the most attractive noses are noticed least, contributing to facial harmony by blending into their surroundings.

Methods: A total of 34 models (mean age 38) and 31 observers (mean age 33) participated. Models underwent standardized 2D and 3D facial imaging, and 17 anthropometric facial measurements were recorded. Observers viewed these images on an eye-tracker to record visual attention data from areas of interest (AOIs), including fixation and visit durations, revisit counts, and time to first fixation. Observers then used a 10-point visual analog scale to rate the attractiveness of the models' faces, then of

their noses using both full face photos and isolated nose photos. Photos were separated based on nose attractiveness ratings, and the corresponding gaze patterns and anthropometrics were compared across attractiveness group.

Results: Unattractive noses received significantly longer fixation durations (0.81±0.14s vs. 0.72±0.12s, P=0.03), more revisits (3.09±0.35 vs. 2.76±0.32, P=0.03), and had longer first fixation durations (0.48±0.08s vs. 0.42±0.05s, P=0.03) than attractive noses. Conversely, models with attractive noses received greater fixation on their eyes (1.92±0.15s vs. 1.69±0.27s, P=0.02). Observers also spent significantly more time fixating on the mouth of models with unattractive noses (0.65±0.13s vs. 0.54±0.07s, P=0.03). Nasal tip deviation significantly correlated with lower nasal attractiveness ratings in nose-only images (P=0.01), but lost significance when evaluated within the full face (P>0.05). Longer upper lips also predicted lower attractiveness ratings (Subnasale-to-Cheilion, 27mm vs. 24mm, P=0.05). However, traditionally emphasized proportions, including the neoclassical canons and nasal width, had limited impact (P>0.05). Interrater reliability was higher for overall facial attractiveness ratings (ICC=0.348, 95% CI: 0.243–0.490) than for nasal attractiveness ratings (ICC=0.117–0.156), indicating greater subjectivity in nasal aesthetic assessments.

Conclusions: Our results support our hypothesis, suggesting that an attractive nose enhances facial harmony by drawing minimal attention to itself, allowing gaze to focus on dominant features like the eyes. The increased mouth fixation associated with unattractive noses suggests a compensatory gaze mechanism. These findings reinforce the importance of nasal aesthetics in overall facial perception, while highlighting the need for holistic facial evaluations during rhinoplasty consults. The lack of significant correlation between tip deviation and nasal attractiveness in full face photos may help reassure patients that minor imperfections are less noticeable during normal social interactions. Eye-tracking provides an objective means of assessing nasal aesthetics by serving as a proxy for attention, and it can be integrated into surgical planning to predict how postoperative changes influence facial harmony. Future studies should incorporate dynamic facial stimuli and diverse observer populations to refine our understanding of how nasal aesthetics influence social perception.

Postoperative Outcomes in Body Contouring Procedures Following Glucagon-Like Peptide-1 Receptor Agonist Use

Abstract Presenter: Joey Liang

Abstract Co-Author(s): Tara Pillai, Sakshi Chopra, Jackson Cathey, Ash Patel MBChB, FACS

Introduction: Utilization of GLP-1 receptor agonists (GLP-1ras) has increased dramatically in recent years. While GLP-1ras appear safe to use overall, it remains unclear if pre-operative GLP-1ra use impacts body contouring surgery outcomes. This study evaluated the post-operative course of patients receiving body contouring procedures by GLP-1ra use.

Methods: A retrospective cohort study was conducted on all patients who received panniculectomies, abdominoplasties, brachioplasties, and thighplasties at a large academic institution between November 2014 and November 2024. These procedures were selected as common body contouring surgeries following significant weight loss with similar indications and complication rates.[1] GLP-1ra users were defined as patients who used any FDA-approved GLP-1ra within two years prior to their body contouring procedure. Propensity score matched analysis paired cohorts by age, smoking status, and body mass index and hemoglobin A1c at the time of surgery. Univariate analyses and multivariable logistic regression were performed.

Results: In total, 590 patients were included in this study. 100 patients (16.9%) utilized GLP-1ras prior to body contouring surgery, of whom 60 patients (60%) used GLP-1ras for obesity and 40 patients (40%) used GLP-1ras for diabetes. Compared to patients who used GLP-1ras for obesity, patients who used GLP-1ras for diabetes were older (59.1 years vs 50.5 years, $p < 0.001$), had higher hemoglobin A1c levels at the time of surgery (6.40% vs 5.23%, $p < 0.001$), and had a longer duration of GLP-1ra use (40.0 months vs 17.4 months, $p < 0.001$). Mean BMI and the number of weeks of GLP-1ra discontinuation prior to surgery did not differ between cohorts. Propensity score matched analysis paired 72 GLP-1ra and 143 non-GLP-1ra patients. In both matched and unmatched cohorts, readmission rates and emergency department encounters at 30, 60, and 90 days following body contouring surgery did not differ by GLP-1ra use (all $p > 0.05$). Similarly, rates of seroma, hematoma, and wound dehiscence did not significantly differ by GLP-1ra use in both matched and unmatched cohorts (all $p > 0.05$). Post-operative cellulitis occurred less frequently among GLP-1ra users in matched cohorts ($p = 0.008$); however, GLP-1ra use did not predict decreased cellulitis on multivariable logistic regression. Duration of GLP-1ra use and timing of discontinuation prior to surgery did not predict the incidence of wound dehiscence, seromas, or hematomas (all $p > 0.05$). Patients using GLP-1ras for obesity had lower rates of wound dehiscence than patients using GLP-1ras for diabetes ($p = 0.028$).

Conclusions: Compared to non-GLP-1ra controls, GLP-1ra users have similar post-operative outcomes following body contouring surgery. The use of GLP-1ras prior to body contouring surgery is safe overall. Wound dehiscence is more prevalent among patients taking GLP-1ras for diabetes compared to weight loss, potentially due to worse glycemic control or associated comorbidities.

REFERENCES

(1) Vieira, B. L.; Dorfman, R.; Turin, S.; Gutowski, K. A. Rates and Predictors of Readmission Following Body Contouring Procedures: An Analysis of 5100 Patients From The National Surgical Quality Improvement Program Database. Aesthet. Surg. J. 2017, 37 (8), 917–926. https://doi.org/10.1093/asj/sjx012.

A Painless Approach to Pediatric Scar Treatment: The Efficacy and Safety of Steroid Tape

Abstract Presenter: Hannah Soltani

Abstract Co-Author(s): Julie Elfishawy, Jason Zhang, Akira Yamada MD, FACS, PhD

Introduction: Hypertrophic and keloid scars can present significant aesthetic and functional concerns in pediatric patients. While traditional treatments such as steroid creams, silicone gels, and oral steroids have demonstrated varying degrees of success, there remains a need for effective, non-invasive therapies with minimal side effects. Steroid tape has emerged as a promising treatment option in Japan, but has not been widely accepted in the United States. Furthermore, data on its efficacy in pediatric populations remain limited. We aim to evaluate the effectiveness and safety of steroid tape in managing hypertrophic and keloid scars in pediatric patients.

Methods: A cohort of pediatric patients who underwent scar treatment with steroid tape were identified from clinical records. Data on patient demographics, scar characteristics, and prior treatments were collected. Scar improvement was assessed using the Vancouver Scar Scale (VSS) and Japanese Scar Scale (JSS), both pre- and post-treatment. Statistical analysis was performed to determine the significance of changes in scar index scores, which are based on scar pigmentation, vascularity, pliability, height, and overall severity. Additionally, patient charts were reviewed for adverse effects (ie skin irritation, dermatitis, breakdown) and symptom relief.

Results: A total of 25 patients (36% female, 64% male) with a mean age of 73.1 months (SD: 67.0) were included. The average scar age at treatment initiation was 2.1 months (SD: 1.8), with 80% of scars resulting from surgery and 20% from trauma. Prior treatments included steroid creams (36%), oral steroids (4%), and silicone creams (8%), while 52% of patients had received no prior therapy.

Post-treatment assessments demonstrated significant improvements across multiple scar characteristics. The Vancouver Scar Scale scores showed reductions in pigmentation (1.04 to 0.36, $p=0.001$), vascularity (1.28 to 0.64, $p=0.003$), pliability (2.44 to 0.96, $p<0.001$), and height/thickness (1.0 to 0.6, $p=0.042$), with an overall reduction in total VSS score from 5.76 to 2.56 ($p<0.001$). Similarly, Japanese Scar Scale scores improved significantly, with classification scores decreasing from 8.76 to 4.76 ($p<0.001$) and evaluation scores from 4.08 to 1.84 ($p<0.001$).
Adverse effects were minimal, with only 2 patients (8%) reporting mild side effects of skin irritation, while the remaining 92% experienced no complications. Symptom relief was noted in a majority of cases, with reduced itching and discomfort following treatment.

Conclusion: Our data demonstrates that steroid tape therapy significantly improves scar appearance and symptomatology of scars in pediatric patients with a favorable safety profile and easy application. While injection therapy is the most common delivery method for steroid treatment, steroid tape is a patient-friendly alternative, where its occlusive nature offers a more sustained, concentrated, and localized delivery of the medication to the scar, without the risk of systemic side effects. Patient compliance may be increased as steroid tape is less painful and more tolerable compared to repeated injections. Further studies will compare outcomes of steroid tape treatment to untreated patients and those receiving other forms of scar therapy to further evaluate its relative effectiveness.

Impact of Aging Risk Factors on Dermatological Parameters in Neck Aging

Abstract Presenter: Bradley Melnick

Abstract Co-Author(s): Rahim Laiwalla, Jonathan Bricker MD, Jeewon Chon MA, Antoinette Nguyen, Rolando Casas Fuentes, Keenan Fine, Anmar Abu-Romman, Tarifa Adam, Robert Galiano MD

Purpose: Facial skin aging is influenced by intrinsic and extrinsic factors, but the neck, which undergoes distinct aging processes, has been comparatively understudied. This study investigates how aging risk factors influence objective neck skin characteristics in adults over 50, using the DermaLab Combo system for a detailed biomechanical analysis.

Methods: Thirty-six adults (mean age 64.3) completed a survey assessing demographic, lifestyle, and medical risk factors. Lifetime stress levels were evaluated using the Life Change Index Scale, and satisfaction with neck appearance was measured with the FACE-Q-Appraisal of the Neck scale. Neck skin properties, including melanin, erythema, transepidermal water loss (TEWL), viscoelasticity (VE), Young's modulus of elasticity (E), and retraction time, were measured using the DermaLab Combo. Univariate and multivariate analyses adjusted for age and ethnicity.

Results: Males had significantly higher erythema levels ($P \leq 0.01$), greater TEWL ($P=0.08$), and lower skin elasticity (E) ($P=0.01$) than females. Ethnicity was the strongest predictor of melanin levels, with Black participants exhibiting significantly higher melanin levels than White and Hispanic participants ($P \leq 0.01$), as well as higher erythema levels ($P \leq 0.01$). Obesity (BMI≥30) was associated with higher melanin levels ($P=0.03$), lower VE ($P=0.02$), lower elasticity ($P=0.04$), and longer retraction time ($P=0.02$) compared to those with BMI<25. Diabetes and metabolic syndrome were linked to higher melanin ($P \leq 0.01$), higher erythema ($P=0.05$), lower VE ($P=0.03$), and lower elasticity ($P=0.02$). Higher stress levels correlated with increased melanin ($P=0.03$). Sunscreen use (SPF>30) was associated with higher VE ($P=0.03$) and greater elasticity ($P=0.05$). Smoking history was linked to prolonged retraction time ($P=0.01$), suggesting impaired biomechanical recovery. Tanning bed use was associated with lower melanin ($P \leq 0.01$) and lower erythema ($P \leq 0.01$). Participants spending ≥4 days/week in direct sunlight had significantly higher FACE-Q scores ($P=0.01$). A greater increase in BMI from age 18 was associated with decreased erythema ($P \leq 0.01$) and lower TEWL ($P=0.01$).

Conclusions: This study provides objective evidence linking aging risk factors to neck skin biomechanical properties. Obesity and smoking were associated with reduced elasticity and prolonged retraction time, while sunscreen use was linked to improved viscoelasticity and elasticity. The observed correlations between melanin, obesity, stress, and diabetes/metabolic syndrome suggest potential racial disparities in health risk factors, which warrant further investigation. These findings emphasize the importance of lifestyle modifications and photoprotection in mitigating neck skin aging and optimizing aesthetic surgical outcomes.

Aesthetic Outcomes of Fat Processing Techniques in Facial Fat Grafting for Human Immunodeficiency Virus (HIV) Lipodystrophy: A Systematic Review and Meta-Analysis

Abstract Presenter: Mare Kaulakis

Abstract Co-Author(s): Jose Antonio Arellano MD, Hilary Liu, Francesco Egro MD, Msc, MRCS, J. Peter Rubin MD, Benjamin Scott MD, Mia Carrarini

INTRODUCTION: HIV-associated lipodystrophy, a condition characterized by abnormal fat redistribution, is a common co-morbidity in patients undergoing highly active antiretroviral therapy. Facial fat loss, a hallmark of this condition, can significantly impact a patient's physical appearance and quality of life. As a result, facial fat grafting has emerged as a key therapeutic approach to restore volume and enhance facial aesthetics in individuals with HIV-related facial fat loss. This study aimed to identify the most effective facial fat process technique for facial fat grafting in these patients, with focuses on safety, physician assessment, and patient satisfaction.

METHODS: A systematic review and meta-analysis were performed and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines. The review protocol was registered with PROSPERO. The study included English-language articles published from 2002-2024 that provided extractable data on autologous fat processing and patient satisfaction following surgical intervention for facial fat grafting in patients with HIV lipodystrophy. Meta-analysis was performed using a random-effects model.

RESULTS: The systematic review identified 5,270 articles, of which 73 were selected for full-text review and 10 were deemed eligible. The total population consisted of 903 patients, with a mean age of 41.4 years (95% CI: 30.68–52.12). The mean fat graft volume was 9.96 mL (95% CI: -30.16–50.09). The site of harvest was predominantly the abdomen (77.8%), followed by the cervical lump (11.1%) and triceps (11.1%). The distribution of specific graft sites was as follows: 71.4% of patients had grafts at the Malar site, 14.3% at the Temporal site, 7.1% at the Zygomatic site, and 7.1% at the Nasolabial sulcus site. The analysis of both physician and patient satisfaction ratings based on fat process techniques (centrifugation vs. decantation) showed no significant difference, with physician satisfaction yielding a p-value of 0.67 and patient satisfaction a p-value of 0.55.

CONCLUSION: The choice of fat process technique, whether centrifugation or decantation, does not significantly affect satisfaction ratings from either physicians or patients. Despite variations in harvest sites and graft locations, the results indicate that both techniques yield comparable satisfaction outcomes. This suggests that factors beyond the fat processing method, such as harvest and graft site, may play a more pivotal role in determining patient satisfaction, physician satisfaction, and fat retention, particularly in the context of HIV lipodystrophy.

The Price of Beauty: Analyzing Medical Malpractice Cases Related to Dermal Fillers

Abstract Presenter: Lucy Wei

Abstract Co-Author(s): Makayla Kochheiser, Nancy Qin, Anna Vaeth, David Otterburn MD

Purpose: Dermal fillers have become an increasingly popular non-surgical option for aesthetic enhancement, with nearly three million procedures performed annually. The growing demand has contributed to a lucrative market; however, variations in provider training and expertise have led to inconsistencies in patient safety and an increased risk of medical malpractice. This study aims to analyze malpractice cases related to dermal filler to gain a deeper understanding of the associated risks and challenges.

Methods: The Westlaw legal database was searched for medical malpractice final jury verdicts or settlements related to dermal fillers. The names of all currently available fillers were also individually queried. Litigant demographics and credentials, type of filler, allegations for malpractice, complications, case outcomes, and award payments were analyzed. Board certification in an aesthetic specialty was defined as plastic surgery, otolaryngologist (ENT), dermatology, or oculoplastics, while all other specialties were categorized as non-aesthetic.

Results: Analysis of 22 cases revealed that four defendants (18.2%) were non-medical professionals, while the remaining 18 were physicians, two of whom (11.1%) were not board certified in an aesthetic specialty . Plastic surgeons (n=8) were the most commonly named defendants, followed by dermatologists (n=4) and ENT specialists (n=4). Silicone was the most frequently cited filler (n=4), followed by Juvederm, Radiesse, Restylane, and Sculptra (all n=3). Negligence and lack of informed consent were the most common allegations, with scarring, disfigurement, and granuloma

formation as prevalent complications. A majority of case outcomes favored the defendant (72.7%), while 22.7% resulted in plaintiff verdicts and one (4.5%) in a settlement. The average payout for plaintiff verdicts was $501,267.81 (range: $20,707.00–$1,160,000.00), while the settlement resulted in a payment of $425,000.00. Cases involving non-physician injectors or non-aesthetic board certified physicians (OR=14.00, p=0.022), as well as claims involving battery (OR=8.67, p=0.045) and fraud (OR=15.00, p=0.040), were significantly more likely to result in legal payments to the plaintiff. Additionally, plastic surgeons were more frequently named in claims related to inadequate post-injection care (p = 0.008) and loss of consortium (p = 0.036), where a plaintiff's partner claims the injury adversely affected their relationship.

Conclusion: Medical malpractice cases involving dermal fillers mainly favored defendants. Most defendants were aesthetic specialized physicians, though some lacked medical licenses or board certification in aesthetic specialties. Cases involving unqualified injectors or allegations of battery or fraud had higher odds of plaintiff verdicts or settlements. Providers should remain vigilant in postoperative care and maintain strong patient relationships to mitigate potential litigation risks in cosmetic injectable procedures.

Who’s Injecting You? Assessing Provider Credentials Among Manhattan's Aesthetic Injectors

Abstract Presenter: Lucy Wei

Abstract Co-Author(s): Nancy Qin, Makayla Kochheiser, Anna Vaeth, David Otterburn MD

Purpose: With the growing social acceptance of cosmetic enhancements, injectable treatments have surged in popularity. Manhattan has become a major hub, hosting numerous medspas and injectors. However, aesthetic injections are medical procedures that carry risks and require qualified providers. This study examines top web search results in Manhattan to assess injector credentials and practices.

Methods: Aesthetic injectors and clinics were identified using two online methods. First, providers were located through the "Find a Provider" feature on the official websites of dermal filler brands, including Bellafill, Juvederm, Radiesse, Restylane, RHA, Belotero, and Sculptra, with search parameters set to Manhattan, New York, and within a 5-mile radius. The second method involved a Google search using the query "filler in

Manhattan," in which the first five pages of search results were reviewed. Duplicates across both methods were counted only once. Each clinic's website was analyzed for practice ownership, injector credentials, board certification, and presence of an on-site physician.

Results: Out of 219 clinics analyzed, 167 (75.3%) were owned or founded by medical doctors, 38 (17.4%) by non-physician healthcare providers (e.g., dentists, DNPs, NPs, PAs, and RNs), and 13 (5.48%) by non-medical professionals such as estheticians and business owners. Twenty one clinics indicated having a Medical Director, two of whom were DNPs. Among the 19 physician Medical Directors, 10 (52.63%) were not board-certified in an aesthetic specialty, defined as plastic surgery, ENT/facial plastics, oculoplastic, or dermatology. Out of 166 clinics that had physician injectors available, 142 (64.8%) were board certified in an aesthetic field. Clinics founded by non-physicians were significantly less likely to have an on-site physician ($p < 0.001$), and when present, these physicians were more likely to not be board-certified in aesthetic specialties ($p < 0.001$). Furthermore, physicians certified in non-aesthetic fields were significantly less likely to display their credentials online ($p < 0.001$).

Conclusions: Our review of the top online results for aesthetic injectors in Manhattan reveals a wide variation in provider qualifications. Although most clinics are physician-owned, a notable number were founded by non-physicians that often lacked on-site doctor or employed non-aesthetic board certified specialists with limited credential transparency. These findings potentiate the need for greater regulatory oversight and consumer education in cosmetic injections.

Facial Cosmetic Surgery Outcomes in Patients with Major Depression: Insights from National Inpatient Trends

Abstract Presenter: Crae Pfannenstiel

Abstract Co-Author(s): Palak Dutta, Rohit Ganduboina, Cankutay Muderrisoglu, Guilherme Barreiro MD

BACKGROUND: Major depression has been associated with significantly increased likelihood of postoperative complications, expected length of stay, and/or hospital readmission in females.(1) This study aims to investigate the impact of major depression on facial cosmetic surgery outcomes using data from the National Inpatient

Sample (NIS), assessing variables such as age, complications, length of stay, and hospital charges.

METHODS: A retrospective cohort design was employed, analysing inpatient data from 2016–2020. Patients with major depression undergoing facial cosmetic surgeries were compared to a control group without depression. Standard statistical tests were used to assess the outcomes.

RESULTS: The study cohort included 352 patients who underwent facial cosmetic surgeries, comprising 321 control patients (91.2%) and 31 depression patients (8.8%). The median age differed significantly between the groups, with controls having a median age of 61.67 years compared to 53.42 years for depressed patients ($p < 0.001$). There was a higher prevalence of hypertension among depressed patients (29% vs 13.4%) ($p < 0.05$). No significant disparities were observed in the overall in-hospital outcomes following facial cosmetic surgeries.

CONCLUSIONS: In conclusion, our study demonstrates that facial cosmetic surgery outcomes are comparable between patients with and without major depression, suggesting these procedures are safe when depression is well-managed, and expectations are realistic.

REFERENCES:

1. Geoffrion R, Koenig NA, Zheng M, Sinclair N, Brotto LA, Lee T, Larouche M. Preoperative Depression and Anxiety Impact on Inpatient Surgery Outcomes: A Prospective Cohort Study. Ann Surg Open. 2021 Mar 16;2(1):49. https://doi.org/10.1097/AS9.0000000000000049

Assessment of Eyelid Parameters in Levator Advancement for Eyelid Ptosis Correction: A Prospective Study

Abstract Presenter: Raunak Goyal MBBS

Abstract Co-Author(s): Sailesh Kumar, Grant Wagner, Sherry Collawn MD, PhD

Purpose: Eyelid ptosis is a condition characterized by the drooping of the upper eyelid, which can significantly impact a patient's vision and health-related quality of life. (1) Surgical intervention is commonly required to restore normal eyelid position and improve visual outcomes. (2) One such corrective measure is levator shortening, which

involves advancing the levator muscle to improve upper eyelid position above the pupil. (3) The aim of this prospective study is to evaluate the effectiveness of levator shortening in correcting upper eyelid ptosis. This will be achieved by assessing various eyelid parameters at different stages of the surgical process, including preoperative, intraoperative, and post-operative measurements.

Methods: This study was conducted as a prospective, single-institution, single-surgeon study. The patient cohort consisted of individuals undergoing bilateral levator advancement for upper eyelid ptosis. The study period extended from February 2015 to November 2024. The eyelid parameters collected included Marginal Reflex Distance-1 (MRD-1), eyelid aperture (EA), mid-pupil to upper lid crease distance (MPC), and levator shortening (LS). Measurement techniques included the use of a ruler for MRD-1, EA, and MPC preoperatively and postoperatively, and the use of calipers for intraoperative LS measurement. All measurements were collected in millimeters.

Results: A total of 40 patients (80 eyes) were included in the study, comprising 30 females and 10 males, with an average age of 65.55 ± 11.34 years. The mean operative time was 3.20 ± 1.48 hours, and the average follow-up period was 53.91 ± 53.33 days. Among the procedures, 12 cases were combined with a blepharoplasty, 11 with a brow lift, and 8 with other procedures. Of the 40 cases, 39 were performed as a primary procedure, while one was a secondary procedure. No revisions were required postoperatively.

A total of 139 preoperative and 150 postoperative measurements were analyzed. Postoperatively, all patients had increased MRD-1, aperture, and mid pupil to crease distance. An average levator shortening of 4.71 ± 1.26 mm resulted in a mean MRD-1 increase by 2.77 ± 1.06 mm, an aperture improvement of 3.35 ± 1.76 mm, and a mid-pupil to crease distance increase of 2.69 ± 1.81 mm. No cases of under-correction or overcorrection were observed.

Immediate post-operative complications included ecchymosis (n=5), edema (n=18), erythema (n=3), dry eyes (n=4), numb eyelids (n=2), and one case each of pain over incision, blurred vision, glare sensitivity, lacrimal gland infection, and loss of forehead sensation. Late complications were reported in 5 patients, including dry eyes (n=2), mild ptosis (n=1), upper forehead hypopigmentation (n=1), and blurred vision (n=1). All patients expressed satisfaction with the outcomes, citing improved peripheral vision and improved quality of life.

Conclusion: This study highlights the efficacy of levator shortening in improving eyelid function for patients with ptosis. By utilizing these eyelid parameters, we demonstrated

postoperative improvements following bilateral levator advancement. These findings support the clinical utility of using these parameters as reliable assessment tools and reinforce levator advancement as an effective surgical technique for eyelid ptosis correction.

References:

1. Richards HS, Jenkinson E, White P, et al. Patient reported psychosocial functioning following successful ptosis surgery. Eye (Lond). 2022;36(8):1651-1655.
2. Cahill KV, Bradley EA, Meyer DR, et al. Functional indications for upper eyelid ptosis and blepharoplasty surgery. Ophthalmology. 2011;118(12):2510-2517.
3. Bilici S, Harbigil-Sever T, Ugurbas SH. Digital analysis of unilateral ptosis repair: external levator advancement vs. Müller's muscle conjunctival resection. Arq Bras Oftalmol. 2024;87(3):e20230028.

A Comparative Meta-Analysis of Complication Rates in Abdominal Body Contouring Procedures After Surgical and Non-Surgical Weight Loss

Abstract Presenter: Krishna Unadkat

Abstract Co-Author: Anita Mohan MBBS Phd

Introduction: With the rising incidence of obesity, alternative weight loss methods beyond lifestyle such as weight loss surgeries and pharmacological interventions like GLP-1 agonists are increasing in popularity. Despite the mental and physical benefits of significant weight loss, patients are often left with excess skin and subcutaneous tissue, which can cause functional impairments. Abdominal body contouring, a surgical procedure to remove this excess tissue, carries inherent risks. While complications from body contouring procedures are well-documented, the complication rates following abdominoplasty and panniculectomy across different weight loss methods have not been extensively studied. This meta-analysis aims to evaluate the complication rates of panniculectomy/abdominoplasty following weight loss surgery (WLS), lifestyle-induced weight loss (Non-WLS), and GLP-1 agonist-induced weight loss.

Methods: A systematic literature search was conducted across PubMed, Embase, Scopus, Web of Science, and the Cochrane Library, using keywords related to weight loss, WLS, GLP-1 agonists, lifestyle, abdominoplasty, panniculectomy, and surgical complications. A total of 71 articles were screened using Covidence systematic review software, with studies included if they reported surgical complications in patients who

had undergone panniculectomy and specified the type of preoperative weight loss (WLS, Non-WLS, GLP-1 agonists).

Results: Ten articles met the inclusion criteria for the meta-analysis. Among these, the WLS group had 279 reported complications compared to 188 in the Non-WLS group, yielding an odds ratio (OR) of 2.02 (95% confidence interval [CI] 1.62-2.51; $p < 0.001$). This indicates that WLS patients are over twice as likely to experience complications compared to Non-WLS patients. Hematoma, seroma, and wound infections were the most frequently reported complications. WLS patients were 57% more likely to develop hematomas (OR 1.57, CI 1.01-2.42; $p = 0.04$), which was the only statistically significant individual complication.
No articles found mentioned weight loss through pharmacological interventions such as GLP-1 agonists.

Conclusions: WLS patients face a higher risk of overall complications, particularly hematomas, compared to Non-WLS patients undergoing panniculectomy or abdominoplasty. The absence of data regarding pharmacological weight loss, particularly GLP-1 agonists, highlights a critical gap in the current literature and emphasizes the need for further studies to evaluate outcomes in this growing population. More research is needed to address the heterogeneity in complication rates and study methodologies, small sample sizes, and to better understand the risks associated with different weight loss methods.

Patient-Reported Quality of Life Measures Following Weight Loss and Body Contouring: A Scoping Review

Abstract Presenter: Krishna Unadkat

Abstract Co-Author: Anita Mohan MBBS Phd

Introduction: Obesity is a significant public health crisis in the United States that continues to rise, with a recent reported prevalence of 40.3% from the National Health and Nutrition Examination Survey (NHANES). Obesity is associated with numerous chronic diseases and imposes substantial social, psychological, and economic burdens. To improve health and quality of life, many individuals pursue weight loss through surgery, such as bariatric procedures, and medical treatments like GLP-1 agonists, alongside traditional lifestyle changes. However, massive weight loss often consequently results in excess skin, which can cause functional limitations and

psychological distress. As part of the patient's weight loss journey, body contouring procedures can alleviate these issues and offer both physical and mental benefits, but are frequently classified as cosmetic and excluded from insurance coverage. Evaluating quality of life (QoL) in patients following massive weight loss is crucial, but the diversity of QoL measures used in the literature complicates comparisons. This study provides a scoping review to assess the use of Patient-Reported Outcome (PRO) measures related to QoL following weight loss and body contouring procedures.

Methods: A literature search was performed using the PubMed database, focusing on keywords related to weight loss, weight loss surgery, and quality of life. An initial screening of 3,275 broadly relevant articles was conducted, and 799 were imported into Covidence systematic review software. After an additional round of screening, 670 articles discussing post-weight loss QoL measures, QoL following both surgical and non-surgical weight loss, and QoL after body contouring procedures were included for analysis.

Results: The number of studies addressing patient-reported QoL following weight loss more than doubled from 149 articles between 2004-2013 to 360 articles between 2014-2024. The most commonly used scales for measuring QoL after weight loss were the Short Form-36 Health Survey (SF-36), Bariatric Analysis and Reporting Outcome System (BAROS), and BODY-Q, followed by the Moorehead-Ardelt Quality of Life Questionnaire II, Impact of Weight on Quality of Life (IWQOL), EuroQol 5-Dimension 5-Level (EQ-5D-5L), and Gastrointestinal Quality of Life Index (GIQLI). SF-36 was the most widely used across diverse medical fields, BAROS was more common in bariatric surgery literature, and BODY-Q was predominant in studies focused on body contouring. While all these scales address psychological and health-related quality of life, only BODY-Q specifically evaluates the impact of excess skin.

Conclusions: Understanding QoL from the patient's perspective is vital for recommending appropriate medical, lifestyle, and surgical interventions for weight loss. While many studies explore patient-reported QoL following weight loss and body contouring, there is significant variability in the scales used, leading to challenges in comparing outcomes. The weight loss journey has two parts, starting from the initial weight loss and associated health benefits, but then there can be profound mental and physical impact associated with excess skin after massive weight loss. The benefits of body contouring procedures are often neglected across weight loss literature, and more attention should be given to including these outcomes in standardized scales to better inform insurance coverage decisions.

Data-Driven Insights: A Computational Model for Optimizing Rib Cage Remodeling Surgery

Abstract Presenter: Emily Zona

Abstract Co-Author(s): Rishith Mereddy, Aidan O'Shea, Keenan Fine, Madeline Tierney MD, Peter Wirth MD, Ellen Shaffrey MD, Ahmed Afifi MD

Purpose: Rib cage remodeling surgical techniques, such as rib osteotomy with osteosynthesis, have shown promising results in aesthetic surgery for waist narrowing (1). However, the ideal osteotomy location and fixation angle have not been thoroughly explored. This study aims to: 1) quantify the impact of osteotomy location relative to the midline and rib angle on waist circumference using an open-source database of CT images of adult rib cages in MATLAB, and 2) determine the combination of rib number, rib angle, and osteotomy location that may result in the greatest waist reduction, informing surgical planning for rib cage remodeling.

Methods & Materials: We utilized the open-source RibFrac dataset, containing high-resolution CT scans of rib cages (2). RibSeg, an open-source deep learning tool, was used to segment the individual ribs from these CT volumes. From the segmented data, we extracted 600 ribs (300 each from ribs X and XI) for the simulation.

A custom MATLAB script was created to apply five bending angles (10°, 20°, 30°, 45°, 55°) and three osteotomy distances along the midline (7 cm, 8 cm, 9 cm) to each rib. Using a chord-perpendicular method, the apex of each rib was localized, and displacement was calculated after simulating the bending. The script allowed manual selection of bending points and distance calculations through a graphical user interface (GUI). A linear mixed-effects model was used to quantify the effects of bending angle, osteotomy distance, and their interaction on rib displacement, controlling for inter-rib variation.

Results: The linear mixed-effects model showed that both bending angle ($p < 0.001$) and osteotomy distance ($p < 0.001$) significantly affected rib displacement. A significant negative interaction ($p < 0.001$) indicated that bending angle had less impact on displacement with more distal osteotomy. The average displacements for rib X at angles of 10, 20, 30, 45, and 55 were: 11.1, 22.2, 33.0, 48.9, 58.9 (7 cm osteotomy); 9.3, 18.5, 27.6, 40.8, 49.3 (8 cm); and 7.4, 14.8, 22.0, 32.5, 39.3 (9 cm). For rib XI, displacements were: 4.2, 8.3, 12.4, 18.4, 22.2 (7 cm); 3.0, 6.0, 9.0, 13.2, 16.0 (8 cm); and 2.3, 4.6, 6.8,

10.1, 12.1 (9 cm). The GUI-based framework allows users to visually compare pre- and post-osteotomy rib interactions in 3D space.

Conclusions: This study has important implications for aesthetic rib remodeling surgery aimed at waist reduction. Surgeons could upload patient CT scans into this software to determine the optimal approach for desired outcomes, enhancing personalized care. Future research may apply this method to CT images of patients from specific age, sex, and BMI categories, further advancing these findings.

References:

- Aguilar Villa H, Villabona-Florez SJ, Hoyos AE, Perez Pachon ME, Serrano-Reyes HM, Diaz Sandoval CJ. Aesthetic Rib Cage Remodeling with Osteosynthesis: Body Structural High-Definition Reshaping (Rib Osteotomy with Osteosynthesis Stabilization). Plast Reconstr Surg. 2025;155(2):279-288. doi:10.1097/PRS.0000000000011512
- Deep-learning-assisted detection and segmentation of rib fractures from CT scans: Development and validation of FracNet. eBioMedicine. 2020;103106(62):2352-3964. doi:10.1016/j.ebiom.2020.103106

Solving the Endoscopic Forehead Conundrum: Go Deep to the Deep Temporal Fascia (dDTF)

Abstract Presenter: Madeleine Landau

Abstract Co-Author(s): Tatjana Mortell MD, Emma Kostoff, John Holtrop MD, John Lindsey MD

Background: The standard approach to release of the orbital ligament via endoscopic technique is in the areolar plane between the temporoparietal fascia and the deep temporal fascia lateral to the temporal line of fusion. This plane of dissection is anatomically complex and contains the sentinel veins, branches of the frontal nerve and the inferior temporal septum, all of which obstruct access to the orbital ligament.

Methods: A retrospective review was performed of the senior author's approach to endoscopic forehead lifting, consisting of 18 patients between 2016-2024. Comparisons of pre- and postoperative photographs were made at 6-8 weeks and >6 months postoperatively to quantitate the effectiveness of this alternative technique. Measurements of the infrabrow height at five standardized points relative to the mid inter-pupillary line were taken. Patient demographics and outcomes were tabulated.

Manual scaling was performed on images due to software limitations preventing automated adjustment to the targeted 80mm, thus minor variations (range:79-82 mm) occurred.

Results: Eighteen patients were identified for inclusion in this study with 100% follow-up. The average age was 59 years (43-70). At the immediate post-operative period, the mid pupillary distance remained the same at 80.2 mm, supporting measurement reliability. Additionally, spacing between the eye and eyebrow demonstrated proportional expansion, with universal measurable increases accounting for approximate positioning of these structures, and these increases were consistent regardless of sidedness. Left-sided and right-sided measurements showed comparable distances from the mid inter-pupillary line (IPL), demonstrating bilateral symmetry both pre-operatively and post-operatively. There were no instances of frontal nerve weakness or palsy, and no instances of hematoma. One patient had a small scalp wound over a single spike of an Endotine which healed promptly with conservative management. For 10 patients, follow-up extended beyond 6 months post-operatively, with an average follow-up of 10.9 months (range: 6-32 months). Extended follow-up measurements underwent pairwise comparisons with pre-operative measurements, resulting in more remarkable differences in post-operative appearance. While symmetry was still found to be conserved in both the pre- and post-operative period, mid inter-pupillary line (IPL) to medial canthus ($p=0.14$), medial limbus ($p=0.12$), mid-pupillary line ($p=0.11$), lateral limbus ($p=0.25$), and lateral canthus ($p=0.26$), depicted subtle efficacy in achieving ideal brow positioning. Averaged measurements at each anatomical landmark demonstrated between 1.7-3.1 mm increase in brow height. With all measurements averaged together, the overall increase in brow height was 2.22 mm at 6-8 weeks post-operatively and 2.64 mm at >6 months post-operatively. All patients were satisfied with their result.

Conclusion: The plane deep to the deep temporal fascia (dDTF) provides eyebrow elevation comparable to the classic sub-temporoparietal fascial plane, avoids critical anatomic structures, allows unfettered access to the orbital ligament, and provides satisfactory objective and subjective clinical results.

BIPLANAR FACELIFT: SUBDERMAL RADIOFREQUENCY FACELIFT.

Abstract Presenter: Nora Stanford MD

Abstract Co-Author: Brian Ramirez

Introduction: Facial aging involves changes in skin, soft tissues, and bone structures, leading to wrinkles, skin laxity, and psychological effects such as social anxiety. Traditional facelifting techniques reposition soft tissues to achieve a youthful appearance, but they do not fully address skin aging signs such as fine wrinkles and photoaging. This study introduces the biplanar facelift, a novel technique combining facelifting with subdermal radiofrequency (RF) technology to enhance skin outcomes and reduce aging signs.

Methods: A retrospective cohort study was conducted on 256 patients who underwent facelifting combined with subdermal RF from 2018 to 2024. Patients with significant comorbidities or smoking habits were excluded. Data on medical history, surgical procedures, and satisfaction were analyzed, along with changes in five key skin aging signs: laxity, spots, nodules, telangiectasias, and scars. The study utilized descriptive statistics and student's t-test for significance testing.

Results: Biplanar facelift demonstrated a significant reduction in skin aging signs, with skin laxity reduced in 96.49% of cases and hyperpigmentation in 98.7%. The average additional surgical time for RF was 10–15 minutes. Minor complications, such as hematomas and dyschromia, occurred in 7.42% of patients, all resolving postoperatively. Patient satisfaction was high, with an increase in Face-Q scores from 11.6 to 92.7 out of 100.

Discussion: This technique effectively combines traditional facelifting benefits with the skin-tightening effects of RF, yielding superior results in facial rejuvenation. The biplanar facelift represents an innovative approach for treating both structural and skin-related aspects of facial aging.

Open Label Phase 2 Study to Evaluate the Safety and Efficacy of a Second Treatment Session of Utenpanium (RZL-012) into Submental Fat in Subjects Seeking Further Treatment

Abstract Presenter: Sachin Shridharani MD, FACS

Abstract Co-Author(s): Steven Dayan, Racheli Gueta, Eran Blaugrund, Patricia Walker, Sharon Cohen-Vered, Brian Biesman

RZL-012 (5-(3,6-dibromo-9H-carbazol-9-yl)-N,N,N-trimethylpentan-1-aminium chloride) is a novel injectable synthetic molecule which induces liponecrosis at the injection site,

followed by a transient inflammatory response and finally by a healing process in which fibrotic tissue replaces previous fat tissue. RZL-012 safety and efficacy profiles were tested in two clinical trials for submental fat (SMF) reduction. The objective of a three-arm, randomized, double blind, placebo-controlled phase 2b study in SMF was to determine the efficacy of low and high dose RZL-012 versus placebo on SMF reduction as well as to determine safety and tolerability of RZL-012 following a single administration session. The objective of the open label phase 2 study was to determine the safety and efficacy of RZL-012 on SMF reduction following a second administration given to subjects previously dosed with RZL-012 and seeking further improvement in SMF appearance.

Methods: In the SMF phase 2b blinded trial, male and female subjects (n = 151), aged 18-65 years with excess SMF, were enrolled in Twelve US clinics. At baseline visit, subjects received a single treatment session that consisted of multiple injections (32±4) of RZL-012 or placebo into the submental area under the chin, after which they were monitored for safety and efficacy over 84 days. In the SMF phase 2 second administration trial, subjects (N=15, aged 18-65 years) were enrolled in Two US clinics and injected with a 2nd SMF dose of RZL-012, 3-24 months after the first SMF dosing was given. Subjects were subsequently followed up for 84 days. In both studies, SMF was evaluated at baseline and after dosing using the Clinician Chin Assessment Tool (C-CAT) and Subject Chin Assessment Tool (S-CAT) as previously described. Adverse events (AEs) were recorded throughout the study.

Results: In the SMF P2b trial, the proportion of subjects who had at least a 1-grade improvement in Clinician Chin Assessment Tool (C-CAT) on Day 84 vs. baseline was significantly higher in the RZL-012 high dose versus placebo (86% vs. 56.3%, P = 0.0011). The difference between the RZL-012 high dose and placebo groups in the number of subjects with at least a 2-point improvement on both the C-CAT and S-CAT scales on Day 84 (34% vs 6.3% respectively) was also statistically significant (P = 0.0007). C-CAT and S-CAT scoring was well correlated with reductions in SMF volume as measured by MRI. In the open label second administration study, all subjects (15/15, 100%) demonstrated at least a one-grade improvement in both the C-CAT and S-CAT scales after the second dosing vs. initial baseline (prior to first dosing) and 7/15 (47%) had at least a two-grade reduction in both scales. This result demonstrated a significant improvement vs first dosing after which only 10/15 (67%) had a one-grade reduction in both C-CAT and S-CAT scales vs. initial baseline and 0/15 (0%) had a two-grade reduction. In both studies there were no SAEs nor any clinically significant changes in vital signs or laboratory tests over the course of the study. Local injection-site reactions were the most common AEs, all of which were reversible.

Conclusions: Single administration of RZL-012 into SMF resulted in a significant fat reduction appearance and second administration of RZL-012 could further improve the SMF appearance and can be used as a complementary treatment.

Transforming Aesthetic Breast Augmentation: Harmonizing Natural Contours and Enhancing Safety with Nanotextured Ergonomic Implants

Abstract Presenter: Pawel Szychta MD, Phd, Dsc, Prof.

Aim: This study explores the clinical outcomes and advancements of nanotextured ergonomic implants in aesthetic breast augmentation, highlighting their transformative potential in achieving natural contours, optimal safety, and long-term patient satisfaction.

Methods: A synthesis of three prospective cohort studies conducted between 2017 and 2024 involving 1,100 patients who underwent breast augmentation with nanotextured ergonomic implants. The studies incorporated comprehensive preoperative planning, individualized implant selection, and advanced surgical techniques. Outcomes were assessed through standardized measurements, patient-reported outcomes (BREAST-Q), and elastography to evaluate implant dynamics and integration. The studies included patients with diverse anatomical and aesthetic goals. Follow-up durations ranged from 12 months to over 5 years. Novel metrics, including dynamic tissue interaction and implant pliability, were assessed using innovative imaging modalities.

Results: Nanotextured ergonomic implants demonstrated superior biocompatibility and integration, leading to enhanced breast contour, symmetry, and upper pole fullness. Aesthetic results were stable over time, with a 95% satisfaction rate and significant improvement in BREAST-Q scores. The safety profile was exceptional, with a low complication rate (0.7% requiring revision). Elastographic analysis confirmed the implants' ability to mimic natural breast dynamics, contributing to improved patient satisfaction.

Conclusions: This research establishes nanotextured ergonomic implants as a breakthrough in aesthetic breast surgery, blending naturalistic aesthetics with robust safety. The studies emphasize the importance of advanced preoperative planning and individualized surgical approaches to optimize outcomes. These findings redefine the potential of breast augmentation, offering a paradigm shift in harmonizing aesthetic and functional goals.

References:
1. Szychta P. Aesthetic Potential and Safety Profile of Nanotextured Breast Implants. Aesthetic Surgery Journal. 2024;44(1):1-11.
2. Szychta P. Advancements in Aesthetic Breast Augmentation: Evaluating Ergonomix2 Implants. Aesthetic Plast Surg. 2024;48(2):183-198.
3. Szychta P. Achieving Harmonious Feminine Proportions with Nanotextured Implants. Plast Reconstr Surg Glob Open. 2024;12:e5751.

Rhinoplasty Trends and Patient Satisfaction: Analyzing the Less Presence Aesthetic Nose (LPAN) Concept in Japan

Abstract Presenter: Nao Ishikawa

Abstract Co-Author(s): Chihiro Matsui MD,PhD, Takahiro Yamamoto, Takako Nakako MD, Kiyomi Tachibana, Joseph Escandon MD

Purpose: In Japan, a novel rhinoplasty concept known as the less presence aesthetic nose (LPAN) has emerged, emphasizing a subtle and harmonious nasal appearance that avoids creating a strong visual impression. However, LPAN remains loosely defined, leading to discrepancies between surgeons' interpretations and patient expectations. This study aims to clarify the specific nasal characteristics associated with LPAN, assess patient satisfaction, and underscore the importance of individualized surgical strategies.

Methods: We conducted a retrospective observational study of 102 patients (11 males, 91 females; median age 25.1 years, SD=7.22) who underwent LPAN-centric rhinoplasty by a single surgeon between April 2023 and August 2024. Postoperative data were collected at the three-month follow-up. Cases involving osteotomy were excluded to minimize the impact of residual swelling on measurement accuracy. Intraoperative nasal skin thickness was subjectively graded from "Thick" (5 points) to "Visible Cartilage" (1 point). Standardized preoperative and postoperative (≥3 months) photographs were taken at a fixed distance of 2 feet with a focal length of 50 mm. Four key parameters were measured: (I) Angle D, formed by lines connecting the nasal tip, infratip, and the lowest point of the alar base at a 45° lateral view; (II) N/N ratio, representing nasal tip highlight width relative to maximum alar base width; (III) Alar-Columellar Angle (ACR), measured as the angle between bilateral alar base attachments and the columella; and (IV) NW/ID ratio, indicating maximum alar base width relative to interpupillary distance.

Postoperative satisfaction was scored as Great (3 points), Good (2 points), or Poor (1 point). Data were statistically analyzed using paired t-tests, independent t-tests, and one-way ANOVA.

Results: At the three-month follow-up, the mean postoperative values were Angle D of 13.1° (SE=0.246), N/N ratio of 44.81% (SE=0.5), ACR of 160.31° (SE=0.097), and NW/ID ratio of 58.22% (SE=0.43). The overall complication rate was low, with one infection and one hematoma resolving without deformity. Primary rhinoplasty cases displayed significantly greater changes in Angle D (p=0.027) and ACR (p=0.044) compared to revision cases. Patients who reported high satisfaction (Great, 67.6%) demonstrated ideal postoperative nasal parameters, with mean values of Angle D=13.17°, N/N ratio=44.3%, ACR=159.69°, and NW/ID ratio=58.82%. These values can serve as objective benchmarks for achieving the LPAN aesthetic. Remarkably, skin thickness was significantly associated with satisfaction (p=0.0078), with slightly thin-skinned patients reporting the highest scores.

Conclusion: This study establishes objective criteria for LPAN, providing clear benchmarks (Angle D, N/N, ACR, NW/ID) that correlate with patient satisfaction. Patients with slightly thin skin achieved the highest satisfaction, underscoring the importance of considering nasal skin thickness when planning rhinoplasty. By defining the ideal postoperative nasal parameters associated with high satisfaction for LPAN rhinoplasty, this study contributes a valuable framework for achieving consistent, aesthetically pleasing outcomes congruent with patient expectations.

Effective use of Dental Silicone-based Surgical Guides in V Line Mandibuloplasty

Abstract Presenter: Nao Ishikawa

Abstract Co-Author(s): Chihiro Matsui MD,PhD, Takahiro Yamamoto, Takako Nakako MD, Kiyomi Tachibana, Joseph Escandon MD

Purpose: Asian individuals often exhibit a wide, flat facial contour with pronounced mandibular angles. Many patients seek an oval-shaped face, increasing the popularity of mandibuloplasty. This procedure reshapes the prominent mandibular angle and achieves a more defined lower facial profile. Accurately reproducing the osteotomy line is crucial to prevent inferior alveolar nerve injury. This study introduces a simple, cost-effective surgical guide made from dental condensation silicone, enabling accurate

preoperative planning while reducing time and expenses compared to 3D-printed guides.

Methods: We retrospectively reviewed the medical records of 24 patients who underwent mandibuloplasty between April and December 2024. Patients requiring simultaneous sagittal split ramus osteotomy or bimaxillary surgery were excluded. Preoperative cone-beam computed tomography (CBCT) images were used to fabricate mandibular bone models. The surgeon drew an osteotomy line on each model, measuring four parameters. Distance A was the distance from the condylar process to the most posterior point of the osteotomy line, and distance B was the distance from the intersection of the osteotomy line and a perpendicular line between teeth 6 and 7 to the coronoid process. The angle between the osteotomy line and distance A was defined as angle C, while the angle between the osteotomy line and distance B was defined as angle D. Dental condensation silicone was mixed for 30 seconds and molded over the planned resection area on the model. After hardening, the silicone was trimmed to precisely match the osteotomy line, creating a custom surgical guide. Postoperative CBCT images were obtained one month after surgery to measure the same aforementioned distances, but these were labeled as A-post and B-post, and angles C-post and D-post, respectively. Statistical analyses used two-sample tests to compare continuous data.

Results: The average age was 32.13±6.31 years. Four male and 22 females were included. Two patients (6.67%) underwent secondary mandibuloplasty. There was 1 case of infection and 1 hematoma, both managed successfully. Intraclass correlation coefficients for repeated measurements exceeded 0.75, indicating good to excellent reliability. The mean left distance A (49.94±5.47) and left A-post were similar (49.72±5.62, p=0.058). The mean right distance A (49.81±5.43) and right A-post were comparable (49.86±5.27, p=0.809). The mean left distance B (67.33±6.83) and left B-post were comparable (67.04±5.62, p=0.089). The mean right B (68.21±6.24) and right B-post were similar (68.16±6.43, p=0.809). The mean left distance C (119.92±5.21) and left C-post were comparable (120.24±5.26, p=0.402). The mean right C (119.04±4.92) and right C-post were similar (123.27±16.21, p=0.218). The mean left distance D (52.4±3.23) and the left D-post were comparable (51.96±3.54, p=0.09). The mean right D (52.19±3.78) and right D-post were similar (51.87±3.56, p=0.193).

Conclusion: Dental condensation silicone provides a fast, safe, reliable, and economical approach to surgical guide fabrication for mandibuloplasty. Overall, comparisons of preoperative (A, B, C, D) and postoperative (A-pos, B-pos, C-pos, D-pos) measurements revealed no significant differences (all p>0.05), demonstrating that the silicone guide accurately reproduced the intended osteotomy.

New original research on the treatment of midface volume deficit with Resilient Hyaluronic Acid manufactured with Preserved Network Technology using a Multilayering approach

Abstract Presenter: Sachin Shridharani MD, FACS

Introduction and objective: Midface volume deficit, a hallmark of facial aging, is characterized by the depletion or shrinkage of supportive tissue in the central facial region1. As such, in recent years, an increasing number of patients have sought facial rejuvenation through minimally invasive techniques, with Hyaluronic Acid (HA) dermal fillers being a popular choice2. RHA fillers manufactured using the Preserved Network Technology (PNT) and developed with varying HA concentrations and rheological properties enabled their customization for specific areas and depths, allowed multilayering techniques (MLT) and contouring3. RHA4 (23mg/mL) was designed to treat dynamic wrinkles and restore age related volume loss, thanks to the PNT which optimizes tissue integration, adaptability to dynamic facial areas while maintaining projection capacity3. Recent pre-clinical research has highlighted RHA4's adipose tissue lifting capacity and integration without fibroplasia, showing better tissue projection when injected both in superficial and deep layers (MLT)4. The aim of this work is to present outcomes of a recently completed prospective, randomized, blinded evaluator, multicenter clinical study on the safety and effectiveness of Resilient HA volumizer versus an FDA-approved active comparator for treating Midface Volume Deficiency (MVD) in the US population.

Methods: The primary endpoint was to demonstrate non-inferiority of RHA4 vs active comparator 8 weeks after last treatment (initial or touch-up) for patients graded 3-4 on the Teoxane Midface Volume Deficit Scale (TMVDS)5, as assessed by the Blinded Live Evaluator (BLE) assigned at each study site. A total of 200 patients aged 22 years or older (randomization 3:1) were injected into the supraperiosteal to subcutaneous layers for cheek augmentation and correction of age-related mid-face volume deficiencies. Secondary endpoints included safety assessment, patient satisfaction, GAIS improvement, treatment volumes, optimal cosmetic result (OCR), subject satisfaction scale and midface naturalness.

Results: After 8 weeks, RHA4 led to a clinically meaningful improvement of MVD (≥ 1 grade), as assessed by BLE using the TMVDS. 75% of patients were treated with RHA4 using the MLT Approach. To reach OCR, ≤3.5mL was injected on both sides and

retreatment volumes were higher in active comparator vs RHA4 (2.3mL vs 1.3mL). RHA4 required fewer treatment sessions vs comparator to achieve equivalentOCR. Patient satisfaction with RHA4 remained high throughout the study and never decreased below 82%. 88% of patients reported natural looking results after 8 weeks in the midface subject naturalness questionnaire, increasing to nearly 100% after retreatment. RHA4 was well tolerated for MVD treatment. Reported adverse device effects and common treatment responses were mostly limited to injection site reactions, of mild severity and short duration (<14 days).

Conclusion: RHA4 demonstrated comparable effectiveness to FDA-approved volumizer, achieving non-inferior aesthetic outcomes with fewer treatment sessions. Its safety profile remained favorable regardless of the injection technique used, including the MLT which was preferred by treating investigators. In addition, RHA 4 delivered natural-looking outcomes. These findings underline RHA4 as an effective solution for midface dynamic volume restoration.

References:

1. Coleman SR, Grover R. The anatomy of the aging face: volume loss and changes in 3-dimensional topography. Aesthetic Surgery Journal. 2006;26(1s): S4-9.
2. Trévidic P et al. Injection Guidelines for Treating Midface Volume Deficiency With Hyaluronic Acid Fillers: The ATP Approach (Anatomy, Techniques, Products). Aesthet Surg J. 2022 Aug 1;42(8):920-934.
3. Faivre J, Pigweh AI, Iehl J, Maffert P, Goekjian P, Bourdon F. Crosslinking hyaluronic acid soft-tissue fillers: current status and perspectives from an industrial point of view. Expert Review of Medical Devices. 2021/12/02 2021;18(12):1175-1187
4. Flégeau K, Ballarini S, Brusini R, et al. Safety and performance of RHA®4 in the midface using the multilayering technique: preclinical and clinical evidence. Plast Reconstr Surg Global Open. 2025;13:e6560. DOI: 10.1097/GOX.0000000000006560.
5. Submitted article Bury A, et al. Creation and Validation of a Photonumeric Scale for Assessment of Midface Volume Deficit. Dermatol Surg, 2024.

DEEP PLASMA SKIN RESURFACING: ACCELERATED HEALING WITH HUMAN MSC EXOSOMES

Abstract Presenter: Melinda Lacerna Kimbrell MD, FACS

Background: Deep facial skin resurfacing with plasma technology results in better correction of superficial and deep rhytids, photo-damage and more tissue contraction

resulting in improved skin and soft tissue tightening, yet safe to perform at the same time as a face and necklift. While the outcome can be quite impressive, the recovery can be daunting. Re-epithelialization can take as long 21 days.

Objective: This study describes how topical application of MSC exosomes immediately after deep plasma resurfacing procedures have decreased the rate to re-epithelialization, decreased pain scores, improved the rate of healing and improved the overall outcomes.

Methods: A retrospective review of one surgeon's experience performing deep plasma skin resurfacing from 2017-current is presented. A total of 100 consecutive patients were treated with full face deep plasma skin resurfacing, 55 of these patients underwent a concurrent facelift and necklift. In 48 patients, MSC exosome application was performed immediately after the procedure. The amount of days to full re-epithelialization were compared between the Exosome treated group (48) and the non-treated group (52).

Results: Range of re-epithelialization for the exosome treated group was 6-14 days, compared to 10-21 days in the non-exosome treated group.
There were four complications, all with the non-exosome treated group. One patient was hospitalized due to severe constipation from post-op opiate use. Three patients developed hypertrophic scarring on the chin that were treated with triamcinolone.

Conclusion: This series over the course of 7 years compares the course of healing of Exosome treated patients versus the non-exosome treated patients following deep plasma skin resurfacing procedures. The use of topical exosomes immediately after the procedure was shown to decrease the days to re-epithelialization from 10-21 days to 6-14 days. In addition, post-operative pain and narcotic use were significantly decreased in the exosome treated group. This is most likely due to down regulation of inflammatory pathways associated with exosome use. The more rapid rate to healing, re-epithelialization and re-establishment of the skin's protective phospholipid bi-layer also decreased other complications such as infections, prolonged erythema, hypo or hyper pigmentation, and hypertrophic scarring.

Making Alar Base HA Injections Safer: The Key Role of Facial Artery Palpation & Mucosal Height

Abstract Presenter: Kiyomi Tachibana

Abstract Co-Author(s): Chihiro Matsui MD,PhD, Nao Ishikawa, Takako Nakako MD, Hatan Mortada MD, Yuzo Komuro

Background: Hyaluronic acid (HA) injections in the alar base region are increasingly popular for midface volume enhancement, particularly among Asian patients with posterior maxillary positioning. However, the presence of the facial artery (FA) in this region poses a risk of vascular complications, including arterial embolization and skin necrosis, while the proximity to the oral cavity increases the risk of infection due to inadvertent mucosal penetration. In many cosmetic clinics, HA injections are performed without prior vascular assessment using ultrasound or CT angiography. Therefore, a simpler and more practical safety method is needed. This study evaluates the efficacy of manual FA pulsation palpation and mucosal height assessment in identifying high-risk patients before HA injection.

Methods: This single-center study included 100 patients undergoing alar base HA injections between July 2023 and February 2025. FA pulsation was assessed at the alar base by placing the index finger inside the oral cavity and the thumb on the facial surface, gently pinching the area. FA pulsation was categorized as No, Weak, or Strong. Mucosal height was classified into three types: Type 1 (below the alar base), Type 2 (at the level of the alar base), and Type 3 (above the alar base). The prevalence of strong FA pulsation and high mucosal height was analyzed for risk stratification.

Results: Among the 100 patients (85 females, 15 males; mean age 39.0 ツア 11.2 years), FA pulsation was absent in 37 (37%), weak in 38 (38%), and strong in 25 (25%). Mucosal height classification revealed Type 1 in 22% of patients, Type 2 in 59%, and Type 3 in 28%. Notably, 5% of patients exhibited both strong FA pulsation and Type 3 mucosal height, identifying them as the highest-risk group for vascular occlusion and infection. Among patients who underwent HA injections using this screening method, no complications such as vascular occlusion, skin ischemia, or infection were observed.

Conclusion: Preprocedural bimanual FA pulsation palpation and mucosal height assessment are highly reliable screening methods for reducing complications associated with alar base HA injections. These techniques enable accurate risk stratification and personalized injection planning, minimizing the likelihood of vascular embolization and infection. High-risk patients, particularly those with strong FA pulsation and Type 3 mucosal height, may benefit from ultrasound-guided injections or deep periosteal placement to enhance procedural safety. This method serves as an effective screening tool for identifying high-risk patients before HA injection, ensuring a safer

injection process. By implementing these simple palpation and observational techniques, clinicians can significantly reduce vascular and infectious complications.

Application of Thulium Fiber Laser in Aesthetic Plastic Surgery

Abstract Presenter: Anastasiya Borisenko

Abstract Co-Author(s): Alexey Avdeev, Yousif Ahmed Alsheikh, Valentin Sharobaro

The continuous advancement of surgical technology has facilitated the integration of novel techniques across various surgical fields, aiming to improve patient safety, enhance tissue dissection, and optimize clinical outcomes. In plastic surgery, particularly in patients with a history of multiple aesthetic procedures, the development of fibrotic tissue presents a significant challenge, complicating dissection and increasing the risk of surgical trauma.

This study evaluates the application of the UROLASE+ Thulium fiber laser for soft tissue dissection in aesthetic plastic surgery, specifically in 10 patients undergoing a facelift, brow lift, blepharoplasty, cheiloplasty and mammoplasty operations. To our knowledge, these are the first documented uses of this technology in such a context.

The findings demonstrate that the Thulium fiber laser provides superior hemostasis, enables precise and controlled dissection, and reduces tissue trauma compared to conventional methods. Histological analysis of the laser-treated tissues confirmed minimal collateral damage, preserved skin appendages, and effective coagulation of blood vessels, indicating enhanced tissue integrity and reduced risk of postoperative complications. Additionally, its application resulted in a lower rate of complications, improved hemostasis , ease of dissection and a shortened post-operative recovery period.

These results suggest that the Thulium fiber laser represents a promising alternative to traditional dissection techniques in aesthetic surgery, particularly for cases involving fibrotic soft tissues, offering both clinical and histological advantages.

Secondary Revisions in Facial Vascularized Composite Allotransplantation (fVCA): Does Donor-Recipient Age Gap Matter?

Abstract Presenter: Felix Klimitz MD

Abstract Co-Author(s): Stav Brown MD, Martin Kauke-Navarro MD, Olivier Noel MD, PhD, Yizhuo Shen, Luccie Wo MD, Siba Haykal MD, PhD, FRCSC, FACS, Bohdan Pomahac MD

Background: Facial vascularized composite allotransplantation (fVCA) has emerged as a transformative option for patients with severe facial defects, offering functional and aesthetic restoration. However, fVCA recipients often require multiple secondary revisions to optimize outcomes. This study aimed to analyze the relationship between secondary revisions and rejection episodes and identify predictive factors associated with increased revision rates following fVCA.

Methods: Nine patients who underwent fVCA were followed from April 2009 to February 2023. Demographic information, clinical indications for transplantation, ischemia time, extent of fVCA (partial or full transplant), and the incidence of secondary revisions were recorded. 3mm punch mucosa and skin biopsies were performed to confirm rejection episodes. Linear regression analysis was performed to assess relationships between variables, and Pearson's correlation coefficients were calculated to evaluate the strength and direction of associations.

Results: Nine patients with a mean age of 46.3±15.5 years were included. The mean donor-recipient age difference was -1.8±15 years. The median follow-up time was 106 months (range, 39 to 142 months) and the average number of revision procedures per patient was 5.3 ± 3.5 procedures. The most common indication for secondary surgery was redundant skin and soft-tissue ptosis. The number of secondary revisions per year was significantly associated with the incidence of biopsy-proven rejection episodes, demonstrating a strong correlation ($r = 0.77$, $p = 0.01$; $n=9$). A strong correlation was observed between recipient age and revision rates in cases where donors were no more than 10 years older than recipients ($r = 0.81$, $p=0.02$; $n=7$). However, this correlation weakened when considering recipients who received transplants from donors who were more than 10 years older ($r = 0.59$, $p=0.09$; $n=9$). Clinical indication for transplantation, ischemia time, and extent of fVCA were not associated with secondary revision rates.

Conclusions: This is the largest study to date to analyze long-term secondary revisions in fVCA and the first to identify factors related to higher revision rates. Our findings suggest that revision rates are correlated with the incidence of rejection episodes. While a younger recipient age is associated with a lower secondary revision rate, a donor-

recipient age difference exceeding 10 years significantly increases the revision burden in fVCA patients, potentially leading to a higher rejection rate. Future studies are indicated to explore the interplay between donor and recipient age and their collective impact on surgical outcomes in fVCA to refine patient selection, optimize long-term results, and understand the aging process in fVCA patients.

A Prospective Clinical Evaluation of Combined Mechanical Septal Release and Helium Plasma RF for the Treatment of Cellulite and Skin Laxity

Abstract Presenter: Barry DiBernardo MD

Background: Cellulite affects up to 98% of post-pubertal females and is characterized by structural changes in connective tissue, leading to visible dimpling. Traditional treatments provide limited and temporary improvement. This study evaluates the safety and efficacy of a novel combination approach using mechanical septal release and helium plasma RF to disrupt fibrous septae and stimulate collagen remodeling. Cellulite treatment often requires a bi-modality approach due to the different components creating the defect: namely Fibrous bands and loose skin

Methods: This prospective, single-center, investigator-initiated trial (IIT) enrolled 22 subjects who underwent a single-session treatment consisting of mechanical septal release followed by helium plasma RF. Outcome measures were quantitative improvement from baseline in cellulite and skin laxity assessed via imaging at Day 30, 90 and 180. Additional outcome measures were Physician Global Aesthetic Improvement Scale (PGAIS), Subject Global Aesthetic Improvement Scale (SGAIS), and safety outcomes at D7, D30, D90, and D180.

Results: Quantitative image analysis demonstrated progressive and sustained improvement in cellulite appearance and skin laxity from D30 to D90 and D180. At D30, 76.2% of subjects in the right thigh and 90.5% in the left thigh showed some level of improvement. At D90 (primary endpoint), 63.6% of subjects in the right thigh and 86.4% in the left thigh demonstrated improvement compared to baseline. At D180, 77.3% of subjects in the right thigh and 81.8% in the left thigh continued to show improvement. Physician-reported outcomes using PGAIS indicated continued improvement over time, with mean scores increasing from 2.6 ± 0.9 at D30 to 2.8 ± 1.0 at D90 and D180, suggesting sustained collagen remodeling. Subject-reported aesthetic improvement, measured by the SGAIS, peaked at D90 before stabilizing at D180, reflecting high patient satisfaction.

The treatment demonstrated a favorable safety profile, with two mild adverse events (9%) considered likely related to the procedure, including one case of hematoma and one instance of transient shortness of breath attributed to helium exposure. Both events resolved without intervention. Importantly, no serious adverse events were reported, supporting the safety and tolerability of the combination approach.

Conclusions: This study demonstrates that a novel combination approach using mechanical septal release and helium plasma RF provides a safe, well-tolerated, and effective treatment for cellulite and skin laxity, with progressive and sustained improvement up to 180 days post-treatment. The combination therapy disrupts fibrous septae while promoting collagen remodeling, resulting in visible and measurable aesthetic benefits. These findings support the integration of mechanical and energy-based approaches for cellulite treatment, warranting further long-term evaluation.

Optimizing Suture Techniques for Improved Aesthetic and Functional Outcomes: A Comparative Study of Modified Buried Vertical Mattress and Intradermal Sutures

Abstract Presenter: Maoguo Shu

Abstract Co-Author: Yuyao Lin

Background: Optimal wound closure techniques are crucial in plastic and reconstructive surgery to minimize scarring and enhance aesthetic and functional outcomes. Recent studies have explored the efficacy of the Modified Buried Vertical Mattress Suture (MBVMS) and its advantages over traditional techniques in achieving superior wound edge eversion, reducing tension, and preventing hypertrophic scar formation. This study synthesizes findings from our research group on the efficacy of MBVMS compared to the conventional buried intradermal suture (BIS) technique in thoracic and multilayered wound closures.

Methods: Three studies were analyzed: a case series on MBVMS in multilayered wound closure, a randomized controlled trial (RCT) assessing MBVMS versus BIS for thoracic incisions, and a prospective split-scar study comparing both techniques on costal cartilage donor site wounds. The studies utilized validated scar assessment tools, including the Patient and Observer Scar Assessment Scale (POSAS), Vancouver Scar Scale (VSS), and Visual Analog Scale (VAS), to evaluate postoperative outcomes over three to twelve months.

Results: The MBVMS technique consistently demonstrated superior wound edge eversion immediately postoperatively and led to significantly lower POSAS, VSS, and VAS scores at follow-up assessments compared to BIS. The split-scar study revealed that MBVMS resulted in narrower scar width ($p < 0.05$) and improved scar aesthetics at three months. The RCT confirmed feasibility and higher patient satisfaction with MBVMS due to better approximation and tension distribution, which correlated with reduced hypertrophic scarring.

Conclusion: MBVMS presents a superior alternative to conventional suturing techniques for optimizing wound healing and aesthetic outcomes. By enhancing wound edge eversion and reducing skin tension, MBVMS reduces hypertrophic scarring, making it a preferred technique for high-tension wound closures. Future large-scale studies are warranted to further validate these findings across diverse surgical applications.

Liposuction of the posterior trunk and skin net sutures: better contouring and reduced revision

Abstract Presenter: Sara Ghorbani MD

Background: Back fat deposits are usually resistant to diet and exercise. The accumulation of fat in this area creates rolls or folds that lead to undesirable irregularities in body contour, reduce self-confidence and limit clothing choices. Corrective procedures include liposuction and lifting surgery. The indication for the choice of procedure is not very definite, and it seems that a number of patients need revision, but there is no precise information about its rate in the sources.

Objectives: The author has attempted to reduce the number of revisions and the need for lifting procedures by using skin net sutures in some areas of the back.

Methods: The author conducted a retrospective study of 200 patients who underwent back contouring alone or in combination with other procedures. Exclusion criteria included morbid obesity and MWL. Patients were divided into two groups: those who underwent liposuction and the use of skin tightening devices such as radiofrequency, and those who underwent liposuction and skin redistribution with skin net sutures. The revision rate was compared between the two groups.

Results: All patients were female, and their age range was from 19 to 62 years (Mean 40.45 years). The volume of liposuction is from a minimum of 1000 cc to a maximum of 3500 cc. The revision rate in the first group was about 8% and the average volume of fat removed was about 100 ml. Revision in the second group was less than one percent.

Discussion: The reason for revision is usually the patients complain, which is due to the presence of residual skin rolls. The volume of fat removed during revision was less than expected, and the amount of fibrosis appeared to be greater. It seems that during revision, the release of adhesive bands and skin redistribution are more effective in resolving the skin roll than the fat removed. If this skin distribution is performed with sutures in the first procedure, the result will be a significant reduction in the appearance of skin rolls or small folds.

Conclusion: By performing extensive liposuction of the back and releasing the skin boundaries between the rolls and folds, the skin is well redistributed with net sutures. This maneuver significantly reduces the number of revisions.

Forever young? Age as a significant risk factor in cosmetic surgery

Abstract Presenter: Charbel Saad MD

Abstract Co-Author(s): Dany Matar, Samuel Knoedler, Meltem Yashar, Salih Colakoglu MD

Background: Cosmetic surgical procedures have become increasingly prevalent, with a rising number of individuals seeking aesthetic enhancements. While research exists on perioperative risk factors in cosmetic surgery, large-scale, standardized studies evaluating comprehensive risk stratification remain relatively limited. This study aims to identify predictors of postoperative complications in cosmetic surgery, with a specific emphasis on age as a potential risk factor.

Methods: A retrospective cohort study was performed utilizing data from the National Surgical Quality Improvement Program (NSQIP) database from 2008 till 2023. A total of 10,135 patients who underwent various cosmetic procedures were included. Preoperative demographics, comorbidities, and operative characteristics were analyzed. Multivariable logistic regression was employed to determine independent predictors of overall, surgical, and medical complications.

Results: The mean age of the study population was 42.13 ± 12.2 years, with an average body mass index (BMI) of 26 ± 5.3. The most frequently performed procedures included breast augmentation with implants (35.3%) and panniculectomy (30.1%). The overall complication rate was 3.1%, with surgical complications occurring in 1.5% of patients and medical complications in 0.5%. Multivariable analysis revealed BMI as a significant predictor of overall complications (OR: 1.085, $p < 0.0001$), as well as surgical ($p < 0.0001$) and medical ($p < 0.0001$) complications. Increasing age was independently associated with a heightened risk of overall ($p = 0.0036$), surgical ($p = 0.02$), and medical ($p = 0.0342$) complications. Additionally, a history of chronic obstructive pulmonary disease (COPD) (OR: 4.292, $p = 0.03$) and significant weight loss (OR: 25.23, $p = 0.03$) were identified as notable risk factors.

Conclusions: This study identifies age as an independent risk factor for postoperative complications in cosmetic surgery, emphasizing the need for age-specific risk stratification when selecting surgical candidates. Additionally, BMI and preexisting comorbidities, such as COPD and significant weight loss, contribute to increased perioperative risk. Given the growing number of patients undergoing aesthetic procedures, these findings underscore the importance of personalized surgical planning and preoperative optimization to enhance patient safety and outcomes.

Metabolic changes after surgical subcutaneous fat removal highlighting the role of amylin in predicting fat phenotype in humans

Abstract Presenter: Mohamed Ahmed MD

Abstract Co-Author: Abeer Alsherawi MD

Introduction: Obesity, characterized by the accumulation of adipose tissue, is a chronic condition with rapidly increasing prevalence worldwide, particularly among adults. Adipose tissue secretes adipokines, which play a crucial role in maintaining metabolic homeostasis. Dysregulation of gut hormones may lead to dysregulation of adipokines and among these adipokines leptin is considered a critical hormone that plays a key role in fat mass regulation. Several studies have demonstrated a reduction in leptin levels (indicative of improved leptin sensitivity) following surgical subcutaneous fat removal (SSFR) procedures. In this paper, we look at hormonal predictors of fat mass limiting the predictors to gut hormones and adipokines. We aim to assess the interplay between these hormone levels and total body fat% to gain an understanding of the regulatory

mechanism underpinning fat mass regulation in patients pre and post body contouring surgery who may or may not have had prior bariatric surgery.

Methods: Subjects who underwent body contouring surgeries at the Department of Plastic Surgery, Hamad General Hospital, from January 2021 to December 2023 were included in this study. Each subject was prospectively followed up at three time points. At each follow-up, body composition analysis, oral glucose tolerance tests, glycemic indices, and hormonal levels were assessed. Descriptive and inferential statistical methods were employed to analyze changes and correlations between variables.

Results: Subjects that attended the visits were 34, 22 and 27 at visits 1,2 and 3 respectively. Median levels of leptin and spexin exhibited fluctuations across visits. However, these changes were not statistically significant. In contrast, GLP-1, GIP, PP, LEAP2 and Amylin levels demonstrated significant variations across visits with an initial increase in visit 2 followed by reduction in visit 3 indicating noteworthy changes over time.
When predictors of lean phenotype were analyzed using logistic regression (Table 2), there was a significant negative association with serum leptin levels and serum GIP levels. On the other hand, there was an increase of lean phenotype with history of bariatric surgery after accounting for the impact of leptin, and gut hormones.

To better understand the relationships, a margins plot demonstrated that the probability of lean phenotype was predicted by amylin, Spexin, GIP and leptin levels (Figure 1). The only predictor of leptin sensitivity (proxy through lower tertile leptin levels) was fat mass % with greater fat mass being associated with decrease in leptin sensitivity (Figure 2). Suggested overall relationships of these hormones to fat phenotype is depicted in Figure 3.

Conclusion: This molecular epidemiological study suggests that for the first time, that amylin and GIP in tandem with leptin and spexin predict the fat phenotype of patients. Rising levels of amylin and declining levels of all other hormones predicted the lean phenotype. These results suggest that a combination of gut hormones and adipokines is associated with fat phenotype in humans.

Nasal Tip Stability without Contour Irregularities: The Mastoid Fascia Hybrid Tip Graft

Abstract Presenter: Shaishav Datta MD

Abstract Co-Author(s): Steven Hanna MD, David Mattos MD, Richard Reish MD, FACS

Introduction: Rhinoplasty is both a complex and challenging surgical procedure, particularly when it comes to addressing the nasal tip. Our group previously demonstrated the success of a mastoid fascia graft in camouflaging nasal tip contour irregularities, however, sometimes the nasal tip needs more projection (1). For these patients, we have introduced the hybrid tip graft (HTG) which combines our previously described mastoid fascia tip graft with an underlay of lower lateral cartilage (LLC), to provide additional projection and definition.

Methods: A retrospective analysis of HTG for nasal tip aesthetics during open rhinoplasty in the senior author's practice was conducted from May 2021 to June 2022. The HTG is created with crushed LLC with an overlay of mastoid fascia graft. Patients were included in the study if they underwent open rhinoplasty with HTG with a minimum of 12-months of follow-up. Patients were evaluated for need for revision surgery or infection.

Results: 729 patients met the inclusion criteria, with 666 female patients with an average age of 31.9 years old. Primary rhinoplasties were performed on 510 (70%) patients. Average follow up was 21.9 months (range: 12-36 month). 21 patient (2.9%) required antibiotics for management of post-operative infection. 11 patients (1.5%) required a revision surgery, of which only 2 (0.3%) were initially primary rhinoplasties. Of the revision surgeries, only 4 (0.5%) were revisions that required the tip to be readdressed.

Conclusion: HTG is a safe, novel method to provide additional nasal tip projection, with stable results, that do not compromise the ability to camouflage tip irregularities. This technique can also be used with other soft cartilage when necessary. Use of HTG is associated with minimal morbidity and is a useful, predictable tool in many rhinoplasty patients.

1. Tugertimur B, Datta S, Goote P, Hanna SA, Morris M, Mattos D, Reish RG. Mastoid Fascia Tissue Graft as a Tip Camouflage Technique in Rhinoplasty: A Reliable Alternative to Soft Cartilage Grafts. Plast Reconstr Surg. 2024 Jul 19

Morselized Bone Graft: A Tool for Nasal Dorsum Contouring and Refinement

Abstract Presenter: Shaishav Datta MD

Abstract Co-Author(s): Steven Hanna MD, David Mattos MD, Richard Reish MD, FACS

Introduction: Achieving a smooth, refined nasal profile remains a significant challenge, particularly in thin-skinned patients who are more susceptible to contour irregularities. Many techniques are used to address this problem, including diced cartilage, fascia, dermal matrices, and implants. This study aims to evaluate the effectiveness of using morselized bone grafts (MBG)–specifically, unused bone rasp material that is typically discarded–as a technique for contouring and refining the nasal dorsum.

Methods: A retrospective chart review of rhinoplasty cases in the senior author's practice was conducted between January 2021 and June 2022. Patients who underwent MBG for dorsal contouring with a minimum of 12 months of follow-up were included. Outcomes of interest were rate of postoperative infection and the rate of operative revisions.

Results: A total of 953 patients were included in the study. The mean age was 31.6 years old. The mean follow-up period was 23.5 months, with a minimum of 12 months of follow up for each patient. The rate of postoperative infection in our case series was 2.7%, with 26 patients requiring postoperative antibiotics. 17 (1.8%) patients required operative revision. No patients sought revision rhinoplasty for concerns related to dorsal irregularities or contour defects.

Conclusion: MBG use for nasal dorsum aesthetics is a safe, convenient, and effective technique for camouflaging and concealing nasal dorsum irregularities in both primary and revision rhinoplasty. Additionally, MBG use is an efficient alternative to other techniques for addressing dorsal aesthetics with no additional donor-site morbidity when paired with boney dorsal reduction.

A 23-Year Policy Analysis of Insurance Coverage for Post-Bariatric Body Contouring Procedures

Abstract Presenter: Christina Chopra MD

Abstract Co-Author(s): Yasmina Samaha MD, Tara Huston MD, Alexia Lucas

Introduction: The rising prevalence of massive weight loss-typically defined as either a loss of 50% of a patient's excess body weight or a reduction of 100 pounds-has driven an increased demand for post–massive weight loss body contouring procedures. While numerous studies have focused on clinical outcomes and patient factors following these procedures, no comprehensive analysis has yet quantified and compared insurance coverage policies over time and across multiple payers. This abstract presents a unique examination of publicly available guidelines from Medicare, Blue Cross Blue Shield (BCBS), UnitedHealthcare, Aetna, Cigna, and Humana, aiming to illuminate evolving coverage trends and ultimately assist surgeons in optimizing patient selection and preoperative planning.

Methods: We performed a comparative policy analysis using publicly available guidelines from Medicare, BCBS, UnitedHealthcare, Aetna, Cigna, and Humana. Quantitative criteria for abdominal and non-abdominal body contouring procedures were extracted, and historical policy data (2000–2023) were reviewed to document trends in coverage evolution.

Results: Most insurers require a ≥50% excess weight loss threshold and mandate 6–12 months of weight stability. For abdominal procedures (abdominoplasty/panniculectomy), approximately 70% of policies specify that the pannus must extend 8–10 cm below the pubic symphysis, and 90% require documentation of ≥3 episodes of recurrent skin infections or related complications within 12 months. These criteria yield a coverage rate of approximately 65–70% for abdominal procedures. In contrast, non-abdominal procedures (e.g., brachioplasty, thighplasty, trunk lifts) are approved in only 20–30% of cases. Functional criteria for coverage were strictly physical and did not guarantee approval. The literature review demonstrated a clear policy evolution: from <30% coverage in the early 2000s to ~65–70% for abdominal procedures by 2020, while non-abdominal procedures have consistently remained at a 20–30% approval rate.

Conclusion: Our analysis reveals significant variability in insurance coverage for post–massive weight loss body contouring procedures. Quantitative thresholds for coverage have become relatively well-established for abdominal procedures, whereas non-abdominal procedures are rarely approved and lack standard criteria for coverage. These discrepancies highlight the need for standardized, evidence-based guidelines in non-abdominal procedures, thus allowing surgeons to optimize patient selection, enhance preoperative documentation, and better manage patient expectations regarding insurance approval. This will ultimately lead to more efficient and effective care, an increasingly relevant issue for the growing post-massive weight loss population. Future multicenter studies are warranted to validate these criteria and assess their long-term clinical impact.

Abdominoplasty Practice Patterns: An American Society of Plastic Surgeons (ASPS) Member Survey - How Much Has Changed Over 20 Years?

Abstract Presenter: Marjorie Kragel

Abstract Co-Author(s): Morgan Fish MD, Elad Fraiman, Pierce Janssen MD, Alan Matarasso MD, FACS, James Zins MD

Background: In 2006, Matarasso et al. published an American Society of Plastic Surgeons (ASPS) member survey detailing abdominoplasty practice patterns. The purpose of the current study is to explore how surgical techniques, ancillary procedures, practice patterns, and surgical outcomes have changed in the interim.

Methods: A 38-question descriptive survey was designed based on Matarasso's 2006 study. Selected modifications were incorporated to investigate new techniques and trends. Surveys were distributed anonymously to a random cohort of 1,765 ASPS members. Results were compared to the 2006 survey and to current practice recommendations in the plastic surgery literature.

Results: A total of 256 responses (14.5% response rate) were received. Full abdominoplasty with rectus plication and umbilical transposition was the most performed abdominal contouring technique by the majority of respondents in both studies. Utilization of abdominal flap liposuction as an adjunct to abdominoplasty decreased from 54% in 2006 to 48.6% in 2023. Use of ultrasound-assisted liposuction also decreased from 13% to 6.4%, while that of power-assisted liposuction increased from 14% to 50.7%. Progressive tension sutures and tranexamic acid were novel practice tools incorporated by 49.8% and 38.3% of respondents, respectively. Drain use decreased from 98% in 2006 to 82.5%. Willingness to perform concomitant breast surgery was universally high for both surveys. Current respondents were, however, less likely to perform intraabdominal or facial surgeries compared to 2006.

Conclusions: Nuanced changes in the abdominoplasty operation have occurred over the past twenty years, as have adjuncts utilized to improve results and limit morbidity.

Dorsal Preservation Versus Dorsal Reduction Rhinoplasty Techniques for Aesthetic and Functional Outcomes: A Systematic Review and Meta-analysis

Abstract Presenter: Lucas Kreutz Rodrigues MD

Abstract Co-Author(s): Luiz Fabio Silva Ribeiro, Lucas De Freitas, Ofonime Chantal Udoma-Udofa, Pedro Henrique Reginato, Rafael Mateus Correa, Karim Bakri MD

PURPOSE: Rhinoplasty is one of the most frequently performed plastic surgeries worldwide, involving different techniques to manage the nasal dorsum. However, the potential differences in outcomes between the dorsal preservation (DP) and dorsal reduction (DR) techniques remain unclear. This meta-analysis evaluates the DP and DR techniques in terms of functional and aesthetic outcomes, revisions surgeries needed and post-operative hump recurrence.

METHODS: We searched PubMed, Cochrane, and Embase up to January 20 th, 2025, for studies comparing DP versus DR in rhinoplasty patients. The primary outcome was the standardized functional outcome scores in the long-term postoperative period. Secondary outcomes included: standardized functional outcome in the short-term postoperative period, subjective aesthetic outcomes in the short-term and long-term postoperative periods, standardized aesthetic outcome and total SCHNOS in the long-term postoperative period, revisions surgeries needed, and hump recurrence. Subgroup analyses were performed to evaluate different scales (SCHNOS, NOSE, VAS and UQ).

RESULTS: Ten studies comprising 1,339 patients were included. DP was associated with higher satisfaction in the UQ subgroup for subjective aesthetic outcome in the short-term postoperative period (MD 1.13 points [CI 95% 0.74; 1.52]; $p < 0.001$, $I^2 = 0\%$), however a significantly higher rate of hump recurrence was also observed in this group (RR 2.94 [CI 95% 1.23; 7.03]; $p = 0.02$, $I^2 = 0\%$). No significant differences were found in standardized functional outcomes (in the short-term and long-term), subjective aesthetic outcome, standardized aesthetic outcome or total SCHNOS (in the long-term), and revision surgeries needed between the DP and DR groups.

CONCLUSION: The DP technique showed no significant differences compared to the DR group in standardized functional outcomes (in the long-term and short-term), subjective aesthetic outcome, standardized aesthetic outcome or total SCHNOS (in the long-term), and revision surgeries needed. DP was associated with statistically higher satisfaction scores in the UQ subgroup for subjective aesthetic outcome in the short-term period, but also was associated with a significantly higher rate of hump recurrence.

Is One Technique Superior? A Comparison of the Short Scar Facelift and the Conventional Facelift

Abstract Presenter: Ryan McKee MD

Abstract Co-Author(s): Kelsey Baran DO, Ramy Sharaf, Rohan Arora, Lindsey Morrow, Joe Hartman, Bruce Mast MD

Purpose: Surgical techniques to address facial aging can be broadly categorized as either "conventional" or "short scar" facelifts (1-3). The senior author has used the minimal access cranial suspension (MACS) lift for patients with lesser degrees of facial aging, while reserving a conventional facelift for more advanced aging (4). Critics of the MACS lift have argued that it produces inferior results compared to traditional facelift (4-5). The aim of this study is to assess the efficacy of the MACS lift by comparing results obtained with conventional facelift, in a single practice.

Methods: A retrospective review was performed to identify all patients who underwent facial rejuvenation surgery by the senior author between January 2011 and June 2024. Demographic data, type of procedure, and patient-reported satisfaction were recorded. Clinical photographs were evaluated by four independent graders without a background in Plastic Surgery, and each patient was assigned a global aesthetic improvement score (GAIS) from 1-5 (1 = worse, 5 = very much improved).

Results: 157 patients underwent 160 facial rejuvenation procedures: 93 (58%) MACS lifts and 67 (42%) conventional facelifts. The mean follow up was 4 months and post-operative patient satisfaction was 87%. Forty patients were randomly selected for photo analysis, n=20 for both MACS and conventional facelift. Mean overall GAIS was 4.12. The mean GAIS for conventional facelift was 4.11 compared to 4.13 for the MACS lift.

Conclusion: The short scar facelift and conventional facelift each offer unique advantages with equivalent outcomes and success in properly selected patients. Both procedures should be in a surgeon's armamentarium to provide an individualized approach to facial aging.

References:

1. Ivy, Edward J. M.D.; Lorenc, Paul Z. M.D.; Aston, Sherrell J. M.D.. Is There a Difference? A Prospective Study Comparing Lateral and Standard SMAS Face Lifts with

Extended SMAS and Composite Rhytidectomies. Plastic and Reconstructive Surgery 98(7):p 1135-1143, December 1996.
2. Avashia, Yash J. MD1; Stuzin, James M. MD2; Cason, Roger W. MD3; Savetsky, Ira L. MD1; Rohrich, Rod J. MD1. An Evidence-Based and Case-Based Comparison of Modern Face Lift Techniques. Plastic and Reconstructive Surgery 152(1):p 51e-65e, July 2023.
3. Tonnard, Patrick M.D.; Verpaele, Alexis M.D.; Monstrey, Stan M.D., Ph.D.; Van Landuyt, Koen M.D.; Blondeel, Philippe M.D., Ph.D.; Hamdi, Moustapha M.D.; Matton, Guido M.D.; Tonnard, Patrick L. M.D.. Minimal Access Cranial Suspension Lift: A Modified S-Lift. Plastic and Reconstructive Surgery 109(6):p 2074-2086, May 2002.
4. Mast, Bruce A. MD. Advantages and Limitations of the MACS Lift for Facial Rejuvenation. Annals of Plastic Surgery 72(6):p S139-S143, June 2014.
5. Lotte F. Hijkoop, Hieronymus P.J.D. Stevens, Berend van der Lei. The minimal access cranial suspension (MACS) lift: A systematic review of literature 18 years after its introduction. Journal of Plastic, Reconstructive & Aesthetic Surgery 75(3):p 1187-1196, March 2022.

Safety and Outcomes of Combined Aesthetic Surgical Procedures: A Retrospective Study of Risk Factors, Complication Rates, and Outcomes

Abstract Presenter: Hatan Mortada MD

This retrospective study aimed to assess the safety and outcomes of combined aesthetic surgical procedures compared to single procedures by analyzing risk factors, complication rates, and postoperative results. Conducted at two medical centers in Riyadh, Saudi Arabia, the study reviewed patient records from January 2019 to December 2022 for surgeries performed by a senior surgeon. Included patients underwent either single aesthetic procedures (e.g., abdominoplasty, liposuction, breast augmentation) or combined procedures frequently paired with abdominoplasty. Data encompassed 670 patients, with outcomes tracked for complications (infections, seromas, hematomas), reoperations, and 30-day hospital readmissions. Patient demographics, operative details, and postoperative events were extracted from medical records, with statistical analysis using chi-squared tests and multivariable logistic regression.

The cohort included 670 patients (median age 37 years, 89.1% female), with 188 (28.1%) undergoing combined procedures and 482 (71.9%) single procedures. Follow-up averaged 12 months, capturing final outcomes. Combined procedures most

commonly involved abdominoplasty with liposuction (15.4%) or breast surgery (6.1%). The overall complication rate was 7.9%, with infections predominant (28.3% of complications). Combined procedures exhibited significantly higher complication rates than single procedures (49.1% vs. 26.3%, $p < 0.001$). Specific combinations-abdominoplasty with breast surgery ($p = 0.011$) and abdominoplasty with liposuction ($p = 0.002$)-showed elevated risks. Reoperation rates were 10.4%, with no significant difference between groups, while readmissions occurred in less than 1% of cases. Multivariable analysis identified combined procedures (OR 2.59, 95% CI 1.27-5.33, $p = 0.009$) and prior plastic surgery (OR 2.14, 95% CI 1.01-4.41, $p = 0.042$) as independent risk factors for complications. Single procedures, such as augmentation mammaplasty, had lower complication rates (1.9% vs. 14.6%, $p = 0.010$).

The findings indicate that combining aesthetic procedures increases complication risks, particularly with abdominoplasty paired with liposuction or breast surgery, compared to isolated surgeries. Despite advantages like reduced recovery time and cost, the elevated risk underscores the need for meticulous patient selection and preoperative planning. Surgeons should prioritize individualized risk assessment and patient counseling to optimize safety and satisfaction. These results align with prior studies reporting higher morbidity in combined surgeries, emphasizing the balance between efficiency and risk in aesthetic practice (1, 2).

References:

Winocour J, Gupta V, Ramirez JR, et al. Plast Reconstr Surg. 2015;136(5):720e-726e.
Michot A, Alet J, Pélissier P, et al. Ann Chir Plast Esthet. 2015;61(1):e9-e19.

A Clinically Relevant Model for Hands-On Training in Ultrasound-Guided Gluteal Fat Grafting: The Miami Butt Model

Abstract Presenter: Emily Finkelstein MD

Abstract Co-Author(s): Pat Pazmino MD, Onelio Garcia MD

Purpose: While the anatomy of the gluteal region is relatively straightforward to learn for a board-certified plastic surgeon, the technique for fat grafting under ultrasound guidance requires a level of hands-on training. However, a survey distributed to members of The Aesthetic Society in March of 2023 found that more than of respondents thought accessibility and availability of training for ultrasound-guided Brazilian Butt Lift (BBL) procedures was insufficient (1). One limiting factor for making

training more widely available is the absence of an anatomically relevant, cost-effective, and easily executable clinical model. This report will showcase the intricacies and advantages of the novel hemi-abdominoplasty model and compare it to that of the established cadaver model in hopes of improving the availability and accessibility of ultrasound-guided BBL training.

Methods: The authors simulated conducting two ultrasound-guided BBL workshops for 20 participants in South Florida, one using the hemi-abdominoplasty model and the other utilizing the validated cadaver model. Models were compared based on total expense and complexity of technical planning. The hemi-abdominoplasty model utilizes an abdominoplasty specimen that is bonded to a portion of pork belly with skin to create a hemi-buttock. While the abdominoplasty specimen provides the intact dermis, superficial fat compartment, and deep fat compartment, the pork belly with skin represents the underlying gluteal muscle and fascia. To commence the workshop participants should receive a brief demonstration on how to identify the gluteal layers on ultrasound using the hemi-abdominoplasty model. The attendees can then practice injecting food-colored grits (substitute for adipose tissue) subcutaneously, with instructions to inject green grits into the superficial fat compartment and the purple grits into the deep fat compartment under ultrasound guidance. Following injection, the model can be bread loafed (sliced into sections) to determine whether the injection was in the correct plane.

Results: Cadaver specimens that met the specific criteria for validation were quoted to cost $4,580 per specimen ($2,290 per participant), or $45,800 for 10 stations. Adding in the cost required for specimen delivery and disposal ($7,770), the total for conducting a workshop would exceed $53,570. Alternatively, the calculated cost per hemi-abdominoplasty model was $32, totaling $640 for a 20-participant workshop. Benefits of the hemi-abdominoplasty model include not having to find and coordinate with an outside company to procure, deliver, and dispose of the validated cadaver specimens. Abdominoplasty specimens can be procured from local plastic surgeons performing an abdominoplasty procedure in the days preceding the workshop and can be disposed of as medical waste following the end of the workshop. Moreover, bonding the abdominoplasty specimen to the pork belly is relatively simple and can be completed by any staff member within a few minutes.

Conclusions: Compared to the validated cadaver model, the hemi-abdominoplasty model requires less technical planning and incurs significantly lower costs. The improved reproducibility of this model makes it a viable option for implementation at local, regional, and national plastic surgery meetings, enhancing the accessibility and availability of ultrasound-guided BBL training.

1) Finkelstein ER, Wo L, Garcia O, Kassira W. The Brazilian Butt Lift Remains the Deadliest Aesthetic Surgery Procedure: Are Plastic Surgeons Adjusting Their Surgical Practice to Promote Safety?. Aesthet Surg J. 2023;44(1):NP69-NP76.

How to Prevent and Treat Complications in Facelift Surgery Part 2: Long Term Complications

Abstract Presenter: Viren Patel MD

Abstract Co-Author(s): R'ay Fodor, Anthony Deleonibus MD, Nicholas Sinclair MD, James Zins MD

Background: Facelift remains a mainstay in the treatment of facial aging, with approximately 100,000 facelifts performed by American Society of Plastic Surgery members in 2023.1 Previously, our group published a review of short-term complications following facelift surgery, with an emphasis on prevention, recognition, and treatment.2 Here, we present the companion to that publication, focusing on long-term complications following facelift surgery.

Methods: A review was performed of available literature regarding the prevention and treatment of long-term complications following facelift surgery. Using both the available literature and the experience of the senior author (J.Z.), we present a discussion of long-term complications following facelift surgery, with strategies to manage complications if they were to occur.

Results: From the review, ten long-term complications following facelift surgery were identified. In some series, platysmal banding was cited as the most common reason for reoperation after facelift, with some authors citing incidence as high as 30% 3 Based on some surgeons' experience, this complication can be prevented and treated by performing a revision midline platysmaplasty, but others advocate for denervation of the platysma by transecting the cervical branch. Contrary to previous literature, we found the cobra deformity to be the next most common adverse, long-term finding. This problem is more complex than previously cited and is multifactorial in nature. Recurrent nasolabial folds and jowls were the third most common reason for re-operation, which was at times associated with prominent submandibular glands..4 As suggested by previous studies, only partial resection of the gland has led to reliable, long-standing results. There are a number of complications associated with aberrant healing ,

including pixie ear, loss of tragal definition and hypertrophic scarring. While these complications may not be preventable, risk can be reduced by ensuring there is not excess tension on any portion of the closure and judiciously limiting skin resection.

Conclusion: Facelift is an effective, safe means to treat signs of facial aging, but risk of long term-complications remains real. While short-term complications are often functional, long-term complications tend to be related to unsatisfactory cosmetic outcomes. In our experience, recurrent platysmal banding and cobra deformity result from ongoing and continued laxity of aging soft tissue, and their occurrence is relatively unpreventable. On the other hand, other complications can generally be prevented with careful pre-operative assessment and intraoperative technical refinements.

1. American Society of Plastic Surgeons. 2023 Plastic Surgery Statistics Report. Published online 2023. https://www.plasticsurgery.org/documents/news/statistics/2023/plastic-surgery-statistics-report-2023.pdf
2. Sinclair NR, Coombs DM, Kwiecien G, Zins JE. How to Prevent and Treat Complications in Facelift Surgery, Part 1: Short-Term Complications. Aesthetic Surgery Journal Open Forum. 2021;3(1):ojab007. doi:10.1093/asjof/ojab007
3. Stuzin JM. Discussion: Treatment of Anterior Neck Aging without a Submental Approach: Lateral Skin-Platysma Displacement, a New and Proven Technique for Platysma Bands and Skin Laxity. Plast Reconstr Surg. 2017;139(2):322-323. doi:10.1097/PRS.0000000000003031
4. Matarasso A, Elkwood A, Rankin M, Elkowitz M. National plastic surgery survey: face lift techniques and complications. Plast Reconstr Surg. 2000;106(5):1185-1195; discussion 1196. doi:10.1097/00006534-200010000-00033

Rhinoplasty Education During Residency: Discussion of Current Barriers, Challenges, and Opportunities for Improvement

Abstract Presenter: Sumun Khetpal MD

Abstract Co-Author(s): Anne Hall, Yasmine Ibrahim, Jason Roostaeian MD

Background: Rhinoplasty is a complex operation that warrants careful consideration of both functional and aesthetic principles. Despite its prevalence within plastic surgery and otolaryngology fields, its exposure and education are highly variable among training

programs, ultimately impacting the confidence of trainees in surgical practice. Moreover, the purpose of this study is multi-fold: 1) to identify the various methods utilized for educating residents on the technical and clinical aspects of rhinoplasty; 2) to evaluate the outcomes associated with these various educational approaches; 3) to identify barriers (if present) that may obstruct exposure and education of rhinoplasty; 4) to suggest alternative methods and solutions for residents to leverage for optimizing education and instruction within rhinoplasty.

Methods: A review was conducted using the PubMed / MEDLINE database using a combination of the following key terms: "rhinoplasty," "rhinoplasty education," and "resident training." Articles were included that 1) discussed methods of educating residents on the technical and clinical aspects of rhinoplasty, and 2) reported outcomes to objectively assess such methods. The search was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Results: Thirteen studies were included in the analysis. The majority of the studies discussed three-dimensional printed models and surgical simulators, followed by cadaver laboratories, detailed rhinoplasty educational programming, and video-assisted learning tools. In terms of assessed outcomes, surveys were utilized to assess residents' confidence before and after intervention, test their knowledge on various clinical aspects, and their perceived effectiveness of these tools.

Conclusion: This study highlights the various measures taken to provide education and instruction on rhinoplasty. Beyond intra-operating teaching and modeling, surgical simulators are highly effective and valuable for residents to practice technical maneuvers including septal dissection and osteotomies. There are notable limitations to these methods of instruction, namely the mastery of aesthetic judgment, surgical approach, reliance on tactile feedback, perception of the procedure in the academic plastic surgery, and practice model for resident education. Future efforts should be made to leverage artificial intelligence and software technologies in elevating education in rhinoplasty.

“Ozempic Face” in Plastic Surgery: A Systematic Review of the Literature on GLP-1 Receptor Agonist Mediated Weight Loss and Analysis of Public Perceptions

Abstract Presenter: Giulia Daneshgaran MD

Abstract Co-Author: Daniel Gould MD, Phd

Purpose: The obesity epidemic affects over 100 million adults in the United States (U.S.). Glucagon-like peptide 1 (GLP-1) receptor agonists, originally designed for type-2 diabetes, have gained popularity after clinical trials demonstrated their weight loss potential. Recent surveys suggest that 32 million U.S. adults have trialed these medications. Terms like "Ozempic® face", "Ozempic® butt" and "Ozempic® body" have been coined to describe the rapid volume loss from semaglutide therapy resulting in signs of advanced aging. The objective of our study was to review plastic surgery publications discussing GLP-1 receptor agonists and characterize the public's perception on the effect of these medications on weight loss.

Methods: A systematic review of the PubMed database was conducted to identify articles discussing GLP-1 receptor agonist use in plastic surgery. Articles in non-English languages or on non-human subjects were excluded. Included articles were qualitatively analyzed and a bias assessment was completed using standardized checklists. To supplement this review, Google® Trends and Google® News were used to track public interest in these medications and their effect on face and body morphology over the past five years, noting breakout related queries defined by search growth exceeding 5,000%.

Results: Many recurrent themes were identified in the twenty-three articles included in this systematic review: 1) Several injectable drugs on the market are used on- and off-label for weight loss, 2) GLP-1 receptor agonists cause morphological changes resembling signs of advanced aging, 3) Surgical and non-surgical options exist to address these changes, 4) Adverse gastrointestinal effects of these medications help guide peri-operative management, 5) Important contraindications exist to their use that prescribing providers should be aware of. Online searches for "Ozempic" were highest of all the GLP-1 receptor agonists searched (linear trend=0.050 compared to 0.018 for "Wegovy" and 0.017 for "Mounjaro"). Breakout related queries included "Ozempic face", "Ozempic celebrities", and "Ozempic shortage". Online searches for "Ozempic face" have rapidly risen since January 2023, when the first article discussing this phenomenon was reported in the news. These searches were linked to rising searches for "face filler" and "plastic surgeons". Compared to the rate of change for "Ozempic face" (linear trend=0.012), "Ozempic butt" and "Ozempic body" have seen lower search volumes over time (linear trend=0.0015 for both).

Conclusions: The sale and use of GLP-1 receptor agonists is growing at an unprecedented rate. In our Google® Trends and Google® News analysis, we found that

the popularization of "Ozempic® face" has been linked to rising searches for "face filler" and "plastic surgeons". As the unintended morphological changes of GLP-1 receptor agonists become increasingly reported, so does the public interest in seeking rejuvenation procedures. Although limited by study biases, this systematic review can help the plastic surgery community prepare for the rising needs of this patient population by understanding the risk and benefit profile of GLP-1 receptor agonists and developing clear clinical practice guidelines for their safe use.

A Comparison of Aesthetic Surgery Education Among United States Plastic Surgery Residency Programs

Abstract Presenter: Emily Finkelstein MD

Abstract Co-Author(s): Meaghan Clark, Alexander Harris, Rita Shelby MD, Wrood Kassira MD

Purpose: Given the rising demand for aesthetic surgery, there has been a growing emphasis on aesthetic surgery training for plastic surgery residents. More recently, this was reflected by a change in the number of required aesthetic surgery case logs, increasing from 50 to 150 cases. Nonetheless, significant variability likely exists in the clinical and non-clinical aesthetic surgery education provided across different residency programs. This study aims to evaluate and compare the aesthetic surgery curricula across accredited United States plastic surgery residency programs.

Methods: In November 2023, the authors conducted a cross-sectional evaluation of 103 accredited United States plastic surgery residency programs. Using publicly available online resources, the authors assessed each program's non-clinical and clinical aesthetic surgery curriculum components. Emails were sent to program coordinators to confirm information identified online. Didactics on aesthetic surgery and injectables courses for residents were considered non-clinical components. Clinical components included the number of weeks spent on rotations with exposure to aesthetic surgery, presence of a dedicated resident cosmetic clinic, and the number of faculty performing aesthetic procedures.

Results: Most programs included information on aesthetic surgery education in their publicly available program curricula (n=97) and offered aesthetic surgery clinical experience primarily at their main residency institution rather than through affiliated surgical center (n=78). Forty-three programs (42%) had evidence of didactic education on aesthetic procedures and thirty programs (29%) advertised injectables courses. Of

the programs with publicly available block schedules (n=36), residents averaged 20 weeks on rotations providing clinical exposure to aesthetic surgical procedures (range: 4 – 36 weeks). Thirty-eight programs (37%) incorporated elective time into their curriculum. Thighplasty (n=78) and facelift (n=82) were the least commonly mentioned procedures residents had exposure to. Only 32 programs (31%) advertised a dedicated resident aesthetic surgery clinic, 88% of which (n=28) specified injectables were available to the residents. Across all programs, there were a total of 516 core faculty widely (range: 0 to 16 per institution) and 64 adjunct faculty that performed aesthetic procedures. Eighty-three programs (81%) either did not have or mention adjunct faculty in the community specializing in aesthetic surgery. Identified adjunct faculty more often completed an aesthetic fellowship (14% vs 9%; $p>0.05$) and were significantly more often members of The Aesthetic Society than their core faculty counterparts (38% vs 20%; $p<0.002$).

Conclusion: Both clinical and non-clinical aesthetic surgery training varied substantially among United States plastic surgery residency programs. Fewer than half of programs mentioned non-clinical educational components including didactic education and injectable teaching courses. Only one-third of programs had a dedicated resident aesthetic clinic, which could provide residents with a more comprehensive clinical experience. Variability in time spent on rotations with aesthetic surgery exposure and faculty involvement highlights potential discrepancies in resident case exposure beyond the required minimum. Moreover, only one-third of programs offered elective time for residents to pursue additional aesthetic surgery opportunities. As the demand for aesthetic surgery grows, aesthetic surgery training may become more standardized. Due to variability in training, aesthetic fellowship training may be sought out, particularly in the field of facial aesthetics.

Characterizing “Ozempic Face”: Preliminary Findings of a Prospective Study of Volumetric Facial Changes and Patient Perceptions Associated With Glucagon-like Peptide-1 Agonists

Abstract Presenter: Bernice Yu MD

Abstract Co-Author(s): Carol Wang MD, Max Mandelbaum MD, Jacquelyn Roth, Nargiz Seyidova MD, Peter Taub MD

Weight loss associated with injectable glucagon-like peptide-1 (GLP-1) agonists, such as semaglutide derivatives like Ozempic, has led to a social media phenomenon named "Ozempic Face". The term describes facial volume loss resulting in an "aged"

appearance, which has prompted consultations with plastic surgeons for facial rejuvenation. However, these observations are primarily anecdotal with a paucity of studies quantifying the facial changes associated with GLP-1 agonist use. This study objectively characterizes volumetric facial changes associated with GLP-1 medications and correlates patient perceptions of these changes.

Following institutional review board approval, a prospective observational study was conducted of patients initiating an injectable GLP-1 agonist regimen for weight loss. Eligible patients had a BMI > 30 kg/m2 and less than 3 months of prior GLP-1 agonist use. Baseline demographics, weight, and 3D images were captured for volumetric analysis using the Vectra XT three-dimensional (3D) imaging system (Canfield Scientific, Inc., New Jersey). At each visit, patients completed the FACE-Q Aesthetic Modules for satisfaction of the overall face, under chin area, cheeks, and lines and visual age analogue scale.

Patients were re-evaluated at approximately every three months to reassess weight, images, and FACE-Q outcomes with a planned final endpoint at two years. Volumetric differences were measured in bilateral buccal and under chin areas and all FACE-Q raw scores were converted to Rasch-transformed scores with a range of 0 to 100 with higher scores indicating better outcomes. Differences in Rasch-transformed FACE-Q scores were reported for each module between timepoints. Volumetric and FACE-Q scores were normalized to each patient's weight change between timepoints.

To date, 45 patients have been enrolled, with 18 patients (40%) reaching the three-month follow-up. Of these 18 patients, the mean age was 44.2 ± 10.7 years old, mean BMI was 39.5 ± 8.0 kg/m2, and mean weight was 112.6 ± 25.0 kg. On average, patients used a GLP-1 agonist for 4.0 ± 1.3 months, with a weight loss rate of 2.1 kg/month (8.0% body weight). At the 3-month follow-up, mean volume loss was 4.2 ± 3.5 cc in the buccal area and 17.9 ± 16.5 cc under the chin, corresponding to a rate of 1.56 cc/kg and 4.45 cc/kg, respectively. On the FACE-Q, patients reported looking 0.7 years older than their actual age for every kilogram lost. However, they were more satisfied with their overall appearance (+ 3.0 points/kg), under chin (+ 3.4 points/kg), cheek (+ 8.4 points/kg), and lines (+ 2.2 points/kg).

The present study provides the first objective and patient-reported outcomes regarding facial changes in weight loss patients secondary to GLP-1 agonists. Preliminary findings suggest that, within three months of initiating a GLP-1 regimen, patients experience a more slender facial appearance and increased satisfaction with their appearance despite slight perceptions of aging. These early results suggest that the 3-month time point may be too early to consider facial rejuvenation interventions. Continued research at the present institution will further explore longer term volumetric changes to identify

the optimal time for rejuvenation and compare GLP-1-related facial changes with traditional weight loss methods.

Machine Learning as an Objective Tool for Predicting Outcomes in Facial Aesthetic Surgery

Abstract Presenter: Jess Rames MD

Abstract Co-Author(s): Basel Sharaf MD, Alexander Lipinski, Krishna Sinha, Khaled Alameddine MD

Background and Purpose: Cosmetic surgery encompassed a 146-billion-dollar global market in 2024 that is projected to grow in the future (1). Furthermore, younger patients are now more likely to seek cosmetic procedures due to social media influences and changes in public attitudes towards aesthetic surgery (2). Choosing which procedure or combination of procedures is appropriate remains a daunting task for consumers and surgeons alike. The goal of this study was to leverage machine learning models capable of determining perceived age and attractiveness to objectively predict cosmetic outcomes in patients undergoing aesthetic procedures.

Materials and Methods: A dataset from the publicly available ASPS Before and After photos was compiled for facelift, browlift, and eyelid surgeries. Only photos with procedures documented in detail were included. Two machine learning models were trained to detect perceived age and beauty. Our age classifier algorithm was trained on over 400,000 annotated faces using a deep multi-layer perceptron approach. Beauty classification was trained using pulled averages from over 10,000 reference photos measured on a Likert scale between 0-100. Pre- and postoperative photographs were used to generate per patient age and beauty predictions before and after surgery. Primary outcomes included perceived change in age and beauty stratified by procedure. Uni- and multi-variate odds ratio (OR) analyses were performed to interrogate procedures and demographic factors associated with improvements in age perception, beauty, and a composite scaled scored of both. Vector field plots were constructed to demonstrate the relationship between preoperative perceived age, beauty, and composite benefit from surgery.

Results: A total of 676 patients operated on by 65 surgeons from 22 different states/provinces in the USA/Canada were included in the analysis. 328 (48.5%), 172 (25.4%), 82 (12.1%), and 427 (63.2%) underwent facelift, necklift, browlift, or eyelid

surgeries, respectively. The majority of patients underwent a combination of procedures. Patients whose actual age was 25% lower than their perceived age were the most likely to see a composite benefit from surgery [16.71(3.50-126.60), p=0.0014] on univariate analysis. Multivariate OR analyses [OR (CI), p-value] revealed increased perceived preoperative age to be proportionately associated with improved younger appearance and combined age/beauty benefit independent of procedure [1.04 (0.99-1.08), p=-6.1 e-9]. Patients with higher preoperative beauty scores were less likely to see a benefit after surgery [0.90 (0.86-0.94), p=1.5 e-5]. The largest combined benefit was appreciated after Facelift+Necklift+Browlift+ Eyelid combined surgery [11.34 (1.84-103.34), p=0.015]. The vector plots demonstrate the complex multivariate relationships between preoperative perceived age/beauty and relative benefit per procedure, with areas in red highlighting greatest relative benefit.

Summary: Our study demonstrates the value of machine learning for objectively assessing aesthetic facial surgery using perceived age and beauty as novel preoperative markers. Perceived older preoperative age, decreased preoperative attractiveness, and increased number of concurrent procedures predicted improved cosmetic benefit. However, the interaction between perceived preoperative age and beauty demonstrated a complex, non-linear relationship when optimizing for postoperative composite benefit.

Citations:

1. Pandey D, Shivarkar A. Cosmetic Surgery and Procedures Market Size, Share, and Trends 2024 to 2034.; 2024.
2. Montemurro P, Porcnik A, Hedén P, Otte M. The Influence of Social Media and Easily Accessible Online Information on the Aesthetic Plastic Surgery Practice: Literature Review and Our Own Experience. Aesthetic Plast Surg. 2015;39(2). doi:10.1007/s00266-015-0454-3

Facial Aging in Black Population: AI-Assisted 3D Morphometric Analysis of the Midface and Mandibular Bony Structures in 284 CT Scans

Abstract Presenter: Sara Hussein MD

Abstract Co-Author: Basel Sharaf MD

Background: Current aging models are largely based on the White/Caucasian population with limited data on diverse ethnicities. As demand for patient-specific

surgical planning in craniomaxillofacial surgeries increases, further understanding of facial aging in various ethnic/racial groups is necessary. Thus, the American Society of Plastic Surgeons (ASPS) reported an increasing demand for culturally tailored aesthetic enhancements [1]. The aim of this study is to expand our 3D statistical shape modeling (SSM) to describe the age-related changes in the Black/African American population. Methods: A retrospective analysis was conducted on 284 CT scans, stratified by gender and age groups (20-39, 40-59, and 60-79 years). We excluded any trauma scans, edentulous individuals, or any suspicion of deformities and orthodontic interventions. Machine Learning (ML) scripts were used to automate the 3D segmentation of the bony structures in Mimics software v.25.0. SSM was then applied to generate average models of the midface and mandibular skeletal structures for each age group. Linear measurements, angles, and volume differences were analyzed using pairwise comparisons, including 3D heatmaps for volumetric analyses and linear facial skeletal measurements.

Results: Of 128 females and 156 males, the mean ages for the young and old groups were 31.2 years (SD:± 5.9) and 67 years (SD:± 5.2), respectively. Over the midface, both genders exhibited significant increases in the distances between the supra- and infra- orbital foramen with age ($p<0.01$). The pyriform angle decreased significantly with age, with a reduction of 4.5° in females and 7.1° in males ($p <0.01$). Similarly, the maxillary angle showed contraction with aging by 4° in both genders ($p<0.001$). The nasofrontal angle, however, showed gender-specific variability, with Black females showing increased glabellar protrusion and males displaying glabellar flattening ($p<001$). Over the mandible, the measurements showed gender-specific remodeling. Thus, females demonstrated more bone contraction in comparison to males. The mandibular ramus height decreased by 5 mm in females ($p= 0.001$), while in males, it remained relatively stable, with a 1 mm reduction over time ($p> 0.05$). A similar trend was observed in the mandibular angle, where females showed an increase of 3.5° and 1° in males ($p<0.001$). Notably, while our previous study in the White population reported an expansion in mandibular intercondylar and bigonial widths by up to 7 mm with age, Black individuals demonstrated stability in both measurements. Furthermore, a small longitudinal series of CT scans spanning at least 10 years for the same patient, was analyzed separately to confirm the reliability of SSM in capturing the age-related skeletal changes. Consistent results and heatmap patterns revealed an average change of 0.5 mm per decade.

Conclusion: This study highlights age-related remodeling in the midface and mandible using advanced 3D imaging and analysis tools, identifying shared trends and distinct variations across diverse ethnic populations. SSM efficiently elucidated these patterns in facial aging on a population level. Such findings highlight the necessity of future

research on ethnic-specific approaches in aesthetic and reconstructive craniomaxillofacial interventions.

[1] ASPS | 2023 Plastic Surgery Statistics Report (https://www.plasticsurgery.org/documents/news/statistics/2023/plastic-surgery-statistics-report-2023.pdf)

Shifting Trends in Otoplasty Timing: Age-Related Complications and Optimal Age at Surgery

Abstract Presenter: Noelle Garbaccio

Abstract Co-Author(s): Emily Long MD, Justin Cordero, Lacey Foster, Oren Ganor MD, Dr. Samuel Lin MD

Background: Prominent ears are a common congenital ear deformity that cause significant stress in children. Families typically pursue otoplasty once children experience unhappiness or bullying related to their ears. Most surgeons advise against performing otoplasty in children under five years old. While otoplasty is a relatively safe cosmetic procedure, trends in surgical timing and age-related complications are not well understood. This study evaluates over a decade of shifting trends in otoplasty timing and 30-day postoperative outcomes by age cohort.

Methods: This study analyzed deidentified patient data in the global TriNetX database. Otoplasty patients were identified using CPT codes. Patients with congenital malformation syndromes, diseases of the blood and blood-forming organs, or endocrine/nutritional/metabolic diseases were excluded for comparability. Trends in otoplasty by age group were assessed over three time periods (2010-2014, 2015-2019, 2020-2025). Four age groups (<5, 5-10, 11-16, 17-22 years) were evaluated for differences in 30-day complication rates related to wound healing, bleeding, and infection.

Results: 1,459 patients underwent otoplasty from 2010-2025. The proportion of procedures in ages 0–4 declined from 40.5% to 31.5%, while cases in ages 10-14 increased from 16.3% to 26.0%. Ages 5-9 remained stable at about 30%. 30-day all-cause complication rates were significantly higher in ages 0-4 than 5-10 (7.874% vs 1.381%, $p < 0.0001$). Rates of wound complications and return to operating room were also significantly higher in ages 0-4 than older age groups

Conclusions: About 60% of otoplasties are performed between ages 0 and 10. Otoplasty trends in the last 15 years suggest the dominant age range for otoplasty is shifting older to include less children aged 0-4 years and more adolescents aged 10-14 years. 30-day all-cause complication rates support this transition, as ages 0-4 experience higher complications than their older peers. Our data suggest otoplasty can be safely performed as early as ages 5-10, and otoplasty before age 5 should be approached cautiously.

Beauty at the Microscopic Level: Investigating the Role of Exosomes in Facial Rejuvenation

Abstract Presenter: Emily Stack

Abstract Co-Author(s): Colby Spongberg, Diane Duncan MD

Background: Exosomes, nanosized extracellular vesicles, have emerged as a promising modality in aesthetic medicine for facial rejuvenation due to their role in promoting collagen synthesis, enhancing skin elasticity, and modulating pigmentation (1,2). Studies have demonstrated their efficacy in combination with laser and microneedling treatments, showing enhanced skin regeneration and accelerated healing (3,4).

Objective: This systematic review aims to investigate the impact of exosome use in aesthetics, specifically in human clinical studies measuring outcomes in wrinkles, pigmentation, elasticity, skin texture, and overall aesthetic improvement. Methods: A literature search was conducted in Winter 2025 using MEDLINE, Embase, the Cochrane Central Register of Controlled Trials, ClinicalTrials.gov, and the Trip Medical Database, focusing on clinical studies using exosomes in aesthetic treatments. Our search yielded 195 articles, of which six met inclusion criteria.

Results: The included studies explored exosomes in conjunction with CO_2 laser therapy (n=1), microneedling (n=2), and topical application only (n=3). Various aesthetic improvement metrics were assessed, with the most common being wrinkles (n=5), pigmentation (n=4), elasticity (n=3), skin texture (n=3), and overall aesthetic improvement (n=6), all showing statistically significant improvement ($p<0.05$). Elasticity demonstrated an average improvement of 7.2%. The studies using microneedling as the application modality reported an average 6.32% reduction in wrinkles. When used,

the Global Aesthetic Improvement Scale (GAIS) scored at least one point higher compared to baseline. Common assessment tools included PRIMOS, VISIA, GAIS, and the Cutometer.

Discussion: These six studies demonstrated positive results with exosome use, without significant adverse effects, across various application modalities. The findings support further investigation into exosomes as a safe and effective tool in aesthetic medicine, with the potential to enhance skin rejuvenation and overall aesthetic outcomes. The rapid advancements in technology provide numerous ways to quantify aesthetic results. However, the diversity of assessment techniques makes direct comparisons across studies challenging. This study highlights the need for a standardized approach to evaluating facial aesthetics to improve scientific analysis and clinical application.

References:

1. Théry C, Zitvogel L, Amigorena S. Exosomes: composition, biogenesis, and function. Nat Rev Immunol. 2002;2(8):569-579. doi:10.1038/nri855
2. Zhang B, Gong J, He L, et al. Exosomes-based advancements for application in medical aesthetics. Front Bioeng Biotechnol. 2022;10:1083640. Published 2022 Dec 20. doi:10.3389/fbioe.2022.1083640
3. Kwon HH, Yang SH, Lee J, et al. Combination treatment with human adipose tissue stem cell-derived exosomes and fractional CO_2 laser for acne scars: A 12-week prospective, double-blind, randomized, split-face study. Acta Derm Venereol. 2020;100(18):adv00310. doi:10.2340/00015555-3666
4. Park GH, Kwon HH, Seok J, et al. Efficacy of combined treatment with human adipose tissue stem cell-derived exosome-containing solution and microneedling for facial skin aging: A 12-week prospective, randomized, split-face study. J Cosmet Dermatol. 2023;22(12):3418-3426. doi:10.1111/jocd.15872

Safety of Extended SMAS Facelift Versus SMAS Plication: A Retrospective Cohort Study on Matched Patients

Abstract Presenter: Osama Darras MD

Abstract Co-Author(s): Elad Fraiman, Alvaro Reategui MD, Pierce Janssen MD, James Zins MD

Background: Extended superficial muscular aponeurotic system (SMAS) facelift techniques release zygomatic cutaneous and masseteric ligaments in the sub-SMAS

plane, thus requiring surgical dissection inherently more invasive than SMAS plication counterparts. Some surgeons associate extended SMAS and deep plane techniques with higher complication rates due to this sub-SMAS dissection, although the current literature does not definitively support this. Therefore, this study aims to compare intraoperative and postoperative outcomes of extended SMAS versus SMAS plication techniques.

Methods: A retrospective analysis of consecutive patients undergoing primary facelift surgery by a single surgeon between January 2014 and January 2024 was performed. Patients were subdivided into extended SMAS and SMAS plication groups. Age, BMI, sex, frequency of secondary facelifts, local tranexamic acid (TXA) injection, and comorbidities prevalence were matched to minimize bias. All patients received a subcutaneous infiltration of 0.5% lidocaine with 1:200,000 epinephrine, with or without 1 or 2 mg/mL of TXA. Patient demographics, adjunct procedures, surgical time, minor complications, and major complications were examined. SPSS 29.0 was used for analysis. T-test, Mann–Whitney U test, and Chi-Square were used as appropriate.

Results: In total, 124 patients were identified: 62 in Group 1 (extended SMAS) and 62 in Group 2 (SMAS plication). The median follow-up time was 326 days. No significant difference in terms of age (P = 0.350), BMI (P = 0.053), sex (P = 0.668), follow-up time (P = 0.924), TXA use (P = 1), rate of ancillary lipo-grafting (P = 0.275), rate of ancillary phenol peel (P = 0.128), hypertension and diabetes mellitus prevalence (P = 1, 0.094, respectively) was observed. None of these patients developed a major complication. All minor complications reported in each group were not significantly different. The operative time was 22 minutes longer in extended SMAS but not significant (P = 0.075).
Conclusions: The extended SMAS technique requires more invasive sub-SMAS dissection than SMAS plication techniques. Complication profiles for a single surgeon were rare and comparable upon comparison between matched SMAS technique groups. Extended SMAS facelift is a safe and effective procedure preferred by the lead author for a majority of primary facelift patients. SMAS plication is particularly helpful in secondary cases and for patients with significant facial soft tissue loss. These observations underscore the necessity of customizing the surgical approach to align with the specific goals of each patient.

Elective Cosmetic Neck Surgery in a Patient with a Hypoglossal Nerve Stimulation Device: A Case Report

Abstract Presenter: Marjorie Kragel

Abstract Co-Author(s): Pierce Janssen MD, Elad Fraiman, James Zins MD

Introduction: The use of Inspire hypoglossal nerve stimulators (HNS) for managing obstructive sleep apnea (OSA) is increasing, yet limited guidance exists on the safe approach to neck rejuvenation surgery in patients with these implants. Understanding the anatomy and potential risks of operating on patients with Inspire devices is critical for plastic surgeons. This report discusses the execution of neck rejuvenation in a patient with an Inspire device, explores the relevant anatomy, and offers recommendations for managing such cases.

Case Presentation: A 64-year-old male with excess neck skin and tissue laxity sought surgical rejuvenation. He had a history of severe OSA treated with an Inspire HNS placed three years prior. After thorough preoperative counseling, he underwent direct excision of neck skin with Z-plasty. Intraoperative ultrasound mapping confirmed that the Inspire lead was positioned lateral to the planned dissection field. Postoperatively, the patient reported difficulty activating the device, but diagnostic evaluation confirmed normal function. He did require a temporary reduction in stimulation amplitude, possibly related to intraoperative bipolar cautery use. The patient was successfully titrated back to his original settings and ultimately achieved an excellent cosmetic result.

Discussion: This case highlights strategies to minimize risks when performing neck rejuvenation in patients with Inspire devices. Understanding the components of the Inspire device and their relationship to anatomic structures is critical. Ultrasound can identify lead placement and guide safe dissection. Bipolar cautery or ultrasonic scalpel should replace monopolar cautery when possible. Preoperative counseling and close postoperative follow-up with sleep specialists are essential for optimal outcomes.

Could the Use of Tranexamic Acid in Facelifts Complicate Wound Healing? A Retrospective Cohort Study on Matched Patients

Abstract Presenter: Osama Darras MD

Abstract Co-Author(s): Elad Fraiman, Alvaro Reategui MD, Pierce Janssen MD, James Zins MD

Background: A recently published paper reported on healing issues in facelift patients who received tranexamic acid (TXA) mixed with their local anesthetic (1). While this is

primarily anecdotal, it raises concerns about the use of TXA. Therefore, we compared the incidence of these healing problems between a large group of patients receiving TXA and a matched group not receiving it.

Methods: A single-surgeon retrospective cohort study for patients who underwent facelift surgery between 2014 and 2024. Patients were categorized by TXA use. Age, BMI, sex, and hypertension prevalence were matched to minimize bias. All patients received general anesthesia and a subcutaneous injection of 0.5% lidocaine with 1:200,000 epinephrine. Operative time and complications were examined.

Results: Each group included 261 patients. Median follow-up was 232 days. No significant differences in age (P = 0.221), BMI (P = 0.589), sex (P = 1), hypertension (P = 0.52), secondary facelift (P = 0.19), lipo-grafting (P = 0.66), phenol peel (P = 0.83) were observed. None of these patients developed a major complication. Minor wound healing problems occurred in 1 patient in the non-TXA group and 2 in the TXA group (P = 0.563). Hematomas occurred in 5 patients in each group (P = 1). All other minor complications were not significant. Non-TXA group's mean operative time was 20 minutes longer than that in TXA (P < 0.001).

Conclusions: This study challenges prior assertions regarding TXA and its impact on wound healing complications. By analyzing a large, matched cohort, our findings support that the safety of TXA is upheld, as the rates of complications, including wound healing issues and hematomas, remain comparable (2). These results advocate for the utilization of TXA in facial aesthetic surgery, as it contributes to time efficiency in the operating room without posing additional risks.

References: 1- Yalamanchili S, Talei B, Azizzadeh B, Auersvald A, Frankel AS. Wound Healing Complications With Tranexamic Acid: Not the Silver Bullet After All. Aesthet Surg J. 2023 Nov 16;43(12):1409-1415. doi: 10.1093/asj/sjad177. PMID: 37265094. 2- Coombs DM, Kwiecien GJ, Sinclair NR, Jin A, Zins JE. Local Infiltration of Tranexamic Acid During Facelift Improves Operating Room Efficiency: A Matched Patient Study. Aesthet Surg J. 2022 Aug 24;42(9):971-977. doi: 10.1093/asj/sjac067. PMID: 35350068.

Impact of Serotonergic Antidepressants on Hematoma After Abdominoplasty: A Propensity Score-Matched Analysis

Abstract Presenter: Agustin Posso MD

Abstract Co-Author(s): Audrey Mustoe BA, Micaela Tobin, Mohammed Yamin, Morvarid Mehdizadeh, Tricia Mae Raquepo, Maria Escobar MD, Sarah Karinja MD, Ryan Cauley MD MPH, Bernard Lee MD, MBA, MPH

Background: Abdominoplasty is a commonly performed procedure that removes the excess of adipose tissue and skin, sometimes it also involves abdominal muscle repair. There is a growing incidence of psychiatric conditions, particularly major depressive disorder, in patients undergoing aesthetic plastic surgery. Concerns have emerged about the potential impact of serotonergic antidepressants, such as selective serotonin reuptake inhibitors (SSRIs) and serotonin and norepinephrine reuptake inhibitors (SNRIs), on postoperative outcomes, especially regarding the incidence of hematomas.

Purpose: This study aims to investigate whether the use of serotonergic antidepressants is associated with an increased risk of postoperative hematoma after abdominoplasty.

Methods: The TriNetX database was queried to identify patients who underwent abdominoplasty. Patients were classified in two cohorts: exposure cohort included patients who used SSRIs or SNRIs during the month before surgery, while control cohort included patients who did not use these medications during the same period. A propensity score-matching analysis was performed to adjust for demographics (age, sex, race, ethnicity), body mass index, comorbidities (nicotine dependence, diabetes mellitus, major depressive disorder, coagulation defects), and laboratory analyses (prothrombin time, activated partial thromboplastin time, and platelets). The primary outcome was hematoma occurrence at 30 days post-surgery. Secondary outcomes included seroma, wound dehiscence, surgical site infection, transfusion, and hematoma/seroma evacuation.

Results: Before propensity score-matching, the exposure group consisted of 3,196 patients and the control group had 26,149 patients. After matching, each group contained 3,178 individuals. Patients who used serotonergic antidepressants had a significantly increased risk of hematoma (risk ratio [RR] 1.66, p=0.029), seroma (RR 1.87, p=0.005), wound dehiscence (RR 1.79, p=0.012), surgical site infections (RR 1.38, p=0.047), transfusion (1.35, p=0.012), and hematoma/seroma evacuation (RR 1.83, p<0.001) within 30 days post-surgery.

Conclusion: Patients with a preoperative use of serotonergic antidepressants may be at an increased risk of hematoma and other complications following abdominoplasty. Further research is needed to investigate the mechanisms behind this association.

Bony Septal Grafts Enhance Aesthetic Subunits and Ventilation in Unilateral Cleft Lip Nasal Deformity

Abstract Presenter: Yang An MD, PhD

Abstract Co-Author: Zimo Wang

Background: East Asian patients with unilateral cleft lip and nasal deformity(UCLND) have severe septal deviated. An innovated septal reconstruction method using both perpendicular plate of ethmoid (PPE) and cartilage septum may improve ventilation and achieve similar aesthetic improvements as septal reconstruction using costal cartilage.

Methods: Patients with UCLND who underwent septal reconstruction using PPE or costal cartilage in the same period were retrospectively included in a 1:1 ratio. Comparison of preoperative and postoperative differences in NOSE and ROE scales and changes in scores between the two groups were made. Changes in nasal airway morphology and ventilatory function were analysed using computational fluid dynamics in a case using PPE.

Results: A total of 24 patients were included for analysis. Patients undergoing septal reconstruction using PPE showed significant improvement in NOSE scores and ROE scores.The improvement in ROE scores was similar to patients undergoing septal reconstruction using costal cartilage. Computational fluid dynamics analysis showed that septal reconstruction using PPE improved the patient's bilateral nasal airway morphology and flow symmetry.

Conclusions: The combined application of PPE and septal cartilage to reconstruct the nasal septum in East Asian patients with UCLND is effective to improve the ventilation function and nasal airway symmetry. This strategy can achieve aesthetically similar results to septal reconstruction using costal cartilage.

Do Male Patients Have More Complications in Facelift Surgery? A Retrospective Cohort Study on Matched Patients

Abstract Presenter: Osama Darras MD

Abstract Co-Author(s): Elad Fraiman, Alvaro Reategui MD, Pierce Janssen MD, James Zins MD

Background: Prior studies have illustrated different complication profiles with male facelifts versus female facelifts. For example, the literature historically reports higher hematoma rates in men, possibly due to observations that men often have thicker skin with more robust subcutaneous tissue and hair follicles, use nicotine products, consume alcohol at higher rates, and have higher baseline blood pressure than female patients. This study aims to add to the available literature by investigating differences in complications between matched groups of male and female patients undergoing facelift procedures by a single surgeon implementing consistent, standardized hematoma prevention precautions.

Methods: A retrospective analysis of consecutive patients undergoing primary facelift surgery by a single surgeon between 2014 and 2024 was performed. Patients were subdivided into male and female patient groups. Age, BMI, revisions, local tranexamic acid (TXA) use, and comorbidities (Hypertension and diabetes mellitus) status were matched to minimize bias. Patient demographics, surgical time, minor complications, and major complications were examined. SPSS 29.0 was used for analysis. T-test, Mann-Whitney U test, and Chi-Square were used as appropriate.

Results: A total of 68 patients were included (34 male, 34 female). Median follow-up time was 302 days, IQR [76,537]. Mean operative time was 40 minutes longer for male patients than female patients ($P < 0.001$). Estimated blood loss exceeding 100cc was significantly higher in the male group (34.78% and 6.9%, respectively, $P = 0.011$). There were no statistically significant differences in minor or major complications, including delayed wound healing, hypertrophic scarring, infection, hematoma (1/34 men, 1/34 women, P= 1), and reoperation rate.

Conclusions: This single-surgeon study reports no significant differences in minor or major complications between matched male and female patients undergoing primary facelift. Notably, longer operative times and higher incidences of estimated blood loss exceeding 100cc for male patients in this study may reflect anatomical, behavioral, and medical factors that explain higher reported hematoma rates in men. Nevertheless, hematoma rates were comparably low and did not differ between gender groups in this study. Diligent and evidence-based hematoma precautions, strict perioperative pressure control, emesis precautions, and, more recently, the addition of local TXA seem to be effective means of optimizing prospective hemostasis and equalizing hematoma rates between male and female facelift patients. However, special efforts to prevent

hematoma in high-risk male patients may bias results in the current study and explain nonconformity to the literature.

Enhancing Postoperative Care in Cosmetic Surgery Using Prompt Agents and Chain-of-Thought Strategies to Improve Retrieval-Augmented Generation Models

Abstract Presenter: Prabha Srinivasagam Phd

Abstract Co-Author(s): Cesar Abraham Gomez Cabello MD, Sahar Borna MD, Syed Ali Haider M.B.B.S., Ariana Genovese, Maissa Trabilsy, Cui Tao, Antonio Forte MD, PhD, MS

Introduction: Providing effective postoperative guidance is essential for improving patient outcomes and satisfaction in plastic surgery. Retrieval-Augmented Generation (RAG) models powered by Large Language Models (LLMs) hold significant promise in delivering personalized and accurate postoperative support. However, their success is highly dependent on the optimization of prompts, which shape the model's reasoning and response generation. This work highlights the transformative potential of incorporating Prompt Agents and Chain-of-Thought (COT) strategies to optimize reasoning and elevate AI-driven postoperative care. By leveraging these techniques, we aim to set new standards for accuracy, relevance, and decision-making performance in clinical applications.

Method: The study evaluated two distinct RAG architectures integrated into Gemini 1.0 Pro using a curated set of 32 postoperative questions covering five common plastic surgery procedures: liposuction (n=7), breast augmentation (n=6), abdominoplasty (n=6), mastopexy (n=6), and blepharoplasty (n=7). The first architecture utilized a naive RAG pipeline as a baseline, while the second introduced an advanced framework with Prompt Agents incorporating COT strategies. This advanced pipeline enhanced reasoning capabilities, allowing the system to generate more precise, accurate, and contextually relevant responses tailored to postoperative queries.
Performance was systematically assessed using key metrics, including medical accuracy, relevance, precision, recall, and F1 score, ensuring a robust evaluation of each model's effectiveness in addressing complex patient concerns. The Prompt Agent-COT framework was designed to improve clinical reasoning and ensure alignment with medical standards, particularly in addressing nuanced and detailed postoperative questions.

Results: The results demonstrated the superiority of the Prompt Agent-COT framework over the naive RAG pipeline across all performance metrics. The advanced architecture achieved exceptional results, including a precision of 0.81, recall of 1.0, and an F1 score of 0.90. The relevance of its responses was similarly impressive, with 88% rated as highly relevant, 12% as moderately relevant, and 0% as low relevance. The accuracy distribution further underscored its effectiveness, with 81% of responses classified as highly accurate, 19% as moderately accurate, and 0% as low accuracy.
In contrast, the naive RAG model underperformed significantly, achieving a precision of 0.50, recall of 0.33, and an F1 score of 0.39. Its relevance distribution showed only 43% of responses rated as highly relevant, 44% as moderately relevant, and 13% as low relevance. Accuracy metrics reflected similar challenges, with 50% of responses falling in the low accuracy range, 25% in the medium range, and only 25% in the high range. These results emphasize the transformative impact of integrating Prompt Agents with COT strategies, showcasing the ability of this advanced framework to outperform baseline models in delivering high-quality responses.

Conclusion: This study demonstrates the pivotal role of Prompt Agents and Chain-of-Thought strategies in enhancing the reasoning capabilities of RAG-based LLMs for postoperative care. The advanced framework not only improves the precision and accuracy of responses but also ensures greater contextual relevance, tailoring guidance to the unique needs of postoperative patients. By addressing the limitations of naive implementations, this approach provides a transformative solution for delivering superior patient care, paving the way for more reliable, precise, and intelligent AI-driven systems in plastic surgery.

Timing is Everything: The Impact of The Menstrual Cycle on Reduction Mammaplasty Outcomes

Abstract Presenter: Tara Sara Saffari MD, MS

Abstract Co-Author(s): Esther Ochoa, Sophia Chryssofos, Katherine Long, Daniel Colchado, Danielle Serota, Justin Sacks MD, MBA, Saif Badran MD, PhD

Background: Reduction mammaplasty is one of the most common procedures in plastic surgery, particularly among premenopausal women. Hormonal fluctuations throughout the menstrual cycle have been postulated to influence wound healing. Elevated progesterone and reduced estrogen levels during the postovulatory (luteal) phase have been linked to higher inflammatory responses, disrupted tissue remodeling,

and poorer postoperative outcomes, compared to the preovulatory (follicular) phase. The study aimed to evaluate the impact of surgical timing during the menstrual cycle on post-operative complications and wound healing following bilateral reduction mammaplasty.

Methods: A retrospective review was conducted on 1,618 female patients who underwent a bilateral reduction mammaplasty from January 2013 through December 2024. Patients with a recorded last menstrual period (LMP) within 35 days of surgery were included. Breast cancer patients and patients with irregular periods were excluded. The menstrual cycle phase (pre- versus postovulatory) at the time of surgery was determined based on the LMP. Patient characteristics, ovulatory cycle details, peri-operative data, and postoperative surgical outcomes were collected. Statistical analysis included descriptive statistics, t-tests, and multivariate regression analysis to examine the independent impact of menstrual timing while addressing the effect of other confounders.

Results: A total of 129 patients were included, of which 46 (35.7%) were operated during the preovulatory phase, and 83 (64.4%) during the postovulatory phase. Both groups had similar distributions of age, ethnicity, body mass index, comorbidities, and resected breast mass ($p>0.05$). The postovulatory group had a significantly higher total surgical complications rate (e.g. seromas, hematomas, or surgical site infections) (RR=2.40, 95% confidence interval [CI] 1.07–5.41; $p=0.032$) and wound dehiscence incidence (RR=2.08; 95% CI 1.04–4.15, $p=0.042$,) compared to the preovulatory group. Additionally, the postovulatory group was associated with higher rates of fat necrosis (RR=2.77; 95% CI 0.33–23.01) and hypertrophic scar formation (RR=1.94; 95% CI 0.68–5.55), though these findings were not statistically significant ($p>0.05$).

Conclusions: Undergoing bilateral reduction mammaplasty performed during the postovulatory phase is associated with an increased risk of postoperative wound dehiscence and total complications rate. Considering the timing of the menstrual cycle when scheduling this elective surgery may be a modifiable factor to optimize outcomes in elective breast surgery.

Minimally Invasive Correction of Excessive Gingival Display: A Systematic Review and Meta-Analysis

Abstract Presenter: Charlotte Thomas

Abstract Co-Author(s): Morvarid Mehdizadeh, Justin Cordero, Reinhard Knerr, Hannah Shi, Catherine Cascavita, Kaavian Shariati, Jade Smith, Noelle Garbaccio, Lacey Foster, Dr. Samuel Lin MD

Purpose: Excessive gingival display, often referred to as "gummy smile," is a common aesthetic concern that can adversely affect patients' self-esteem and facial harmony. Minimally invasive correction has gained traction as a viable alternative to more invasive surgical approaches. While existing reviews have centered primarily on Botox injections, emerging techniques such as dermal fillers and autologous fat grafting offer additional avenues for gummy smile correction. This systematic review and meta-analysis aims to comprehensively assess the efficacy, safety, and aesthetic outcomes of these non-surgical interventions. By comparing relative effectiveness, patient satisfaction, and associated complications across treatment modalities, we seek to better inform clinical decision-making and expand the range of minimally invasive options available to patients.

Methods: Literature review was conducted across PubMed, Medline, and Web of Science according to PRISMA guidelines, for articles published up to November 2024. Data extracted included author, specialty, year of publication, sample size, age, sex, follow-up period, minimally-invasive technique employed, total injection units, number of injection points, muscle targets, pre-procedure gingival exposure, post-procedure gingival exposure at each follow-up time point, patient satisfaction measured during each reported follow-up time point, complications. A meta-analysis was performed across all follow-up time points for each technique and reported gingival exposure, with statistical significance set at $p < 0.05$.

Results: Our search identified 619 publications, of which 33 met the inclusion criteria, examining a total of 717 patients aged 16 to 50 years. Non-surgical techniques for the correction of excessive gingival display decreased gingival exposure by 0.85 mm in the first month following treatment (95% CI: -1.0, -0.7, $p<0.0001$, $I2=56.4\%$). Further investigation into treatment type, follow-up time, and administered units found that each additional follow-up day significantly increases gingival exposure by 0.0037 mm (95% CI: 0.003,0.005, $p<0.0001$), Botox significantly reduces gingival exposure by 0.52mm (95% CI: -0.79,-0.25, $p<0.001$) compared to non-Botox treatment, and the units of Botox applied does not significantly influence gingival exposure ($p=0.64$). Lastly, patient satisfaction was assessed across studies, finding that 78% of patients who underwent non-surgical treatment for excessive gingival display reported satisfaction with their results (95% CI: 0.7233; 0.8401, $p<0.001$, $I2=58.1\%$).

Conclusions: Minimally invasive therapies, including botulinum toxin injections, dermal fillers, and autologous fat grafting, significantly reduce excessive gingival display and provide high patient satisfaction. Botox yields greater immediate reductions compared to non-Botox approaches, and the overall dose does not appear to significantly influence outcomes. These findings underscore the value of non-surgical options as viable first-line therapies for correction of excessive gingival display, though further long-term research is needed to assess durability and refine treatment protocols.

Changes in Public Plastic Surgery Interest Following Celebrity Cosmetic Surgery Announcements: A Bivariate Regression Analysis

Abstract Presenter: Varoon Phondge

Abstract Co-Author(s): Pooja Deshpande, Kometh (Tony) Thawanyarat MD, Nitya Devisetti, Nicole Margiotta, Edward Lee MD, Alex Wong MD

BACKGROUND: Celebrities substantially influence public behavior and trends, particularly in cosmetic surgery. When celebrities publicly disclose their own plastic surgery procedures, it can drive societal interest and enhance acceptance of these interventions on a wide scale. Understanding the extent of this influence is essential for plastic surgeons, as it provides insights into shifting trends in cosmetic surgeries and patient motivations. These trends can significantly impact various aspects of cosmetic plastic surgery, shaping the types and frequency of elective procedures patients pursue, the materials and devices used, and the demand for surgeons skilled in specialized techniques. The purpose of this study is to explore the relationship between celebrity announcements of cosmetic procedures and the resulting changes in public interest towards these procedures, as reflected through Google search volume data.

METHODS: We identified 19 celebrities with publicly announced cosmetic procedures, totaling 27 procedures. 63 search terms related to these procedures, based on the 2023 Aesthetic Plastic Surgery Statistics, were entered into Google Trends to gather search volume data for one year before and one year after each announcement (inflection point). Paired t-tests compared search volumes in the pre- and post-announcement periods to detect significant changes in the public interest. A bivariate regression analysis was performed to evaluate the relationship between the timing of celebrity disclosures and changes in search volumes over time, with significance set at $p < 0.05$.

RESULTS: The aggregate search volumes one year before and after each celebrity's procedure announcement were compared, revealing significant changes in 13 of the 27 cases. Significant increases in search volume were observed for Kim Kardashian's botox, Chrissy Teigen's mastopexy, Iggy Azalea's rhinoplasty, Kris Jenner's facelift, Christina Aguilera's botox, Simon Cowell's botox, and Red Ewing's cheek implants ($p < 0.05$). Significant decreases in search volumes were noted for Kylie Jenner's lip augmentation, Bella Hadid's rhinoplasty, Cardi B's butt injections, butt injection removal, and nose fillers, and Khloe Kardashian's rhinoplasty ($p < 0.05$).

CONCLUSIONS: This study underscores the influence of celebrity cosmetic surgery announcements on public interest, with significant changes in search volumes for various procedures. Increased searches following announcements, such as Kim Kardashian's Botox or Chrissy Teigen's Mastopexy, suggest that celebrity endorsements can drive interest, while declines, like that of Kylie Jenner's lip augmentation, may reflect shifting beauty standards or evolving public attitudes. For instance, Cardi B's public regret over her procedures aligns with the observed decrease in searches for butt injections, highlighting how celebrity sentiment may shape public perception. These insights offer plastic surgeons valuable understanding of patient motivations and shifting aesthetic preferences, enabling them to anticipate changes in patient demand for cosmetic procedures and adapt their services, technologies, and training to meet evolving expectations. Future research should expand the celebrity sample and examine how celebrities' attitudes toward their procedures influence the public perception of cosmetic surgery.

Classification and Management of Plunging Tip in Primary Rhinoplasty

Abstract Presenter: R'ay Fodor

Abstract Co-Author(s): Rebecca Kelley, Rafael Ramos Vecchio MD, Elad Fraiman, Abigail Meyers MD, Bahman Guyuron MD, Ali Totonchi MD

Background: "Plunging tip" is a common nasal deformity, characterized by excessive downward drooping of the nasal tip while smiling. Accurate assessment and correction of a plunging tip are essential components of rhinoplasty. This study aims to measure changes in the nasolabial and columellar-labial angles before and after smiling as well as assess the efficacy of surgical interventions in improving tip plunging.

Methods: This is a retrospective study of patients who underwent primary rhinoplasty at a single private practice with standardized preoperative and postoperative profile view photographs with and without smiling. The nasolabial angle (NLA) was defined as the angle formed by the intersection of the long axis of the nostril and a line drawn perpendicular to the Frankfort horizontal. The columellar-labial angle (CLA) was defined as the angle between the inferior border of the columella and a line from subnasale to labrale superius. Tip plunging was quantified as the differences in NLAs and CLAs with and without smiling. Matched-pairs analyses were used to assess changes in tip plunging both within and between preoperative and postoperative photographs. Analysis of variance was employed to detect intraoperative maneuvers with significant effects on tip plunging.

Results: Forty-seven patients were analyzed [72.3% female, mean age: 34.68±12.98 years, median follow-up time: 406 days (IQR:359-531)]. Preoperatively, both NLAs (without smiling: 98.7°±9.0°, smiling: 84.4°±10.3°, $p<0.0001$), and CLAs (without smiling: 87.1°±11.2°, smiling: 83.1°±15.2°, $p<0.0001$) decreased significantly upon smiling. Postoperatively, the NLA was also significantly narrower upon smiling (without smiling: 100.5°±6.4°, smiling: 90.5°±8.4°, $p<0.0001$), while the CLA increased upon smiling (without smiling: 91.4°±9.5°, smiling: 93.4°±12.6°, $p<0.0001$). Tip plunging was significantly reduced postoperatively compared to preoperatively as measured by both the NLA ($p=0.003$) and the CLA ($p=0.0008$). For both preoperative and postoperative assessments of tip plunging using the NLA, 100% of patients exhibited some degree of decrease in the NLA upon smiling. In contrast, preoperative tip plunging assessed with CLA demonstrated plunging in only 66% of patients. Postoperatively, most patients demonstrated a widened CLA upon smiling (55%). Widening of the CLA upon smiling was attributed to concomitant retraction of the upper lip; tip plunging was still appreciated on visual analysis. Significantly reduced plunging as assessed by the NLA was noted with nasal spine grafts ($p=0.004$) and tip cartilage onlay grafts ($p=0.02$). Reduced plunging assessed by the CLA was demonstrated with tip suspension sutures ($p=0.03$) and lateral crural struts ($p=0.03$). The columellar strut, deployed in approximately 89% of patients, was associated with significantly decreased plunging as assessed by both the CLA ($p<0.0001$) and the NLA ($p<0.0001$).

Conclusions: The NLA is a more reliable measure of tip plunging than the CLA, as it is less influenced by non-nasal landmarks. Nasal spine grafts, tip cartilage onlay grafts, tip suspension sutures, and lateral crural struts were associated with reduced tip plunging. This study was limited by an inability to analyze septal extension grafting, caudal septum resection, and release of the depressor septi nasi due to their rarity or absence in this sample.

Fracturing the Flow: Computational Insights into Nasal Osteotomies and Airway Dynamics

Abstract Presenter: Jade Smith

Abstract Co-Author(s): Sujata Syamal, Noelle Garbaccio, Dorien Schonebaum, Morvarid Mehdizadeh, Justin Cordero, Lacey Foster, Dr. Samuel Lin MD

PURPOSE: Nasal osteotomies are integral to rhinoplasty, often used to modify the nasal bony framework for aesthetic and structural refinement. However, lateral osteotomies may cause medialization of the nasal turbinates and narrowing of the bony vault, potentially compromising nasal aerodynamics postoperatively (1). This study employs Computational Fluid Dynamics (CFD) modeling to simulate airflow changes following different degrees of lateral osteotomy infracturing in rhinoplasty patients.

METHODS: Open-source midface skull and airflow cavity models were volume-rendered using 3D Slicer© (version 5.6.2) and exported for further refinement (2-4). ANSYS SpaceClaim (v2024R2) was used to create 1mm, 2mm, and 3mm lateral osteotomies via a high-low-high trajectory outlined in previous literature and airflow volume changes were noted (5). Using ANSYS Fluent (v2024R2), CFD was conducted using the Finite Volume Method (FVM) with continuity and Navier-Stokes equations for steady-state, incompressible, laminar air flow to obtain velocity changes. Nasal cavity material properties were set based on prior literature and inlet velocity and outlet pressures were set based on physiological inspiratory conditions.

RESULTS: Compared to the control model, the 1mm, 2mm, and 3mm infracturing lateral osteotomies exhibited airflow volume decreases of 1.2%, 2.5% and 4.3% respectively. All models exhibited decreases in velocity at the airway-bone interfaces compared to control models. The 2mm model demonstrated velocity decreases along the full perimeter of the airflow cavity and the 3mm model exhibited significant decreases in airflow velocity throughout the full airflow cavity suggesting significant impacts on overall nasal airflow.

CONCLUSION: Utilizing computational simulations, we evaluated changes in nasal airflow with 1mm, 2mm, and 3mm infractured lateral osteotomies. Volumetric measurements revealed progressive decreases in airflow volume capacity compared to control models. Corresponding fluid flow analyses suggest that the measured volume

changes from 2mm and 3mm osteotomies impact airflow velocity throughout the nasal airflow cavity, ultimately affecting breathing outcomes.

REFERENCES:

1. Guyuron, B. Nasal osteotomy and airway changes. Plast Reconstr Surg, 1998:856-860. doi:10.1097/00006534-199809030-00017
2. Fedorov, A., Beichel, R., Kalpathy-Cramer, J., et al. 3D Slicer as an image computing platform for the Quantitative Imaging Network. Magn Reson Imaging. 2012;30(9):1323-1341. doi:10.1016/j.mri.2012.05.001
3. Banoub, RG.; Gill, KS.; Karp, AR, et al. 3D Printed Midface Models for Percutaneous Nasal Osteotomy Surgical Education. Department of Otolaryngology Data Sets. 2021;(1). https://jdc.jefferson.edu/otodata/1
4. Brüning J, Hildebrandt T, Heppt W, et al. Characterization of the Airflow within an Average Geometry of the Healthy Human Nasal Cavity. Sci Rep. Feb 28 2020;10(1):3755. doi:10.1038/s41598-020-60755-3
5. Locketz GD, Lozada KN, Becker DG. Osteotomies-When, Why, and How? Facial Plast Surg. Feb 2020;36(1):57-65. doi:10.1055/s-0040-1701478

Assessing and Comparing Varied Definitions of the Nasolabial Angle

Abstract Presenter: R'ay Fodor

Abstract Co-Author(s): Rebecca Kelley, Rafael Ramos Vecchio MD, Elad Fraiman, Viren Patel MD, Bahman Guyuron MD, Ali Totonchi MD

Background: The nasolabial angle is a common metric used to assess nasal appearance. However, definitions of the nasolabial angle are variable, and at present, no single definition is universally accepted. Given the relative ubiquity of the nasolabial angle in aesthetic evaluation, it is necessary to assess the reliability of the various definitions and examine how they correlate with one another. To that end, this study aims to evaluate and compare the four most common definitions of the nasolabial angle.

Methods: Patients undergoing primary rhinoplasty at a single private practice from 2000-2024 were analyzed. Nasolabial angles were measured on preoperative profile-view photographs. Four different definitions of the nasolabial angle were used: (1) the angle formed by the long axis of the nostril aperture and a line perpendicular to the Frankfort horizontal (N-FH), (2) the angle formed by the long axis of the nostril and a line drawn from glabella to pogonion (N-GP), (3) the angle formed by a line from

subnasale along the inferior columellar border and a line from subnasale to labrale superius (C-LS), and (4) the angle formed by a line from subnasale along the inferior columellar border and a line tangent to the cutaneous upper lip proper (C-UL). The appearance of subnasale was categorized as either distinct or indistinct. Within each measurement, skewness was calculated and goodness-of-fit was assessed with the Shapiro-Wilk test. Measurements were compared using bivariate analysis.

Results: One-hundred patients (84 female, 16 male) were included in the analysis. Mean N-FH was 96.9±6.2°, mean N-GP was 104.2±6.3°, mean C-LS was 109.6±7.8°, and mean C-UL was 132.4±12.5°. N-FH was the least skewed measurement (skewness: -0.2), followed by C-UL (skewness: -0.4) and C-LS (skewness: 0.5), with N-GP being the most skewed (skewness: -0.6). N-FH was the most normally distributed measurement (W=0.99, p=0.4), followed by C-LS (W=0.98; p=0.1) and C-LS (W=0.98; p=0.08). N-FH, C-LS, and C-UL were found to be normally distributed, while N-GP was not (p=0.03). N-FH values correlated significantly with N-GP (p<0.0001) and C-LS values (p=0.03). N-GP was also significantly correlated with C-LS (p=0.003). Neither N-FH nor N-GP correlated with C-UL (p=0.2 and p=0.9, respectively). C-UL correlated only with C-LS (p<0.0001). C-LS was the only measurement that correlated significantly with all three corresponding measurements (N-FH: p=0.03, N-GP: p=0.003, C-UL: p<0.0001). Subnasale was easily distinguishable in only 14 patients; it was not readily discernible in the remaining 86.

Conclusions: In our cohort, the most reliable metric for assessing nasolabial angle was N-FH. Despite its reliability, N-FH lacks a true "labial" component, raising an important question regarding the accuracy and utility of current nomenclature. Additionally, the nasolabial angle depends on the Frankfort horizontal, which is a radiographic line whose position can only be estimated on visual analysis, thereby reducing the objective nature of the metric. Variability in the relationship between glabella and pogonion undermines the interpretability of N-GP. Though C-LS was most associated with various nasolabial measurements, C-LS and C-UL rely on the distinctiveness of subnasale and values may be disproportionately driven by anterior nasal spine prominence or maxillary morphology.

The Efficacy of the Combination Use of Fractional CO2 Laser and Pulsed Dye Laser for Scar Management: A Systematic Review & Meta-analysis

Abstract Presenter: Zaid Dajani

Abstract Co-Author(s): Maysaa Alghamdi, Jullanar Alkhunein, Abdulgader Basamad, Rabab Alkhalaf, Fatima AlGhamdi, feryal alali, Abdullah Khaled ALMARRI

Background: Scarring is a common consequence of tissue injury, often causing both physical discomfort and emotional distress. While fractional CO2 laser (FCL) and pulsed dye laser (PDL) have both shown promise in treating scars individually, there is limited research exploring their combined use. This systematic review aims to evaluate the effectiveness and safety of combining FCL and PDL for scar management, following the PRISMA guidelines.

Methods: We conducted a thorough search of several databases, including PubMed, Cochrane, MEDLINE, and ScienceDirect, up until December 2024. The studies included in this review assessed the combined use of FCL and PDL in patients with scars from various causes, focusing on outcomes like scar size, thickness, redness, and pliability. To be included, studies had to have a control group. We independently extracted data and assessed the quality of the studies using standardized tools, with the risk of bias evaluated through the Cochrane Risk of Bias tool for randomized controlled trials (RCTs) and the Newcastle-Ottawa Scale for non-randomized studies.

Results: A total of nine studies, involving 247 patients, were included in the review. The combination of FCL and PDL was found to significantly improve scar appearance, reducing scar thickness, pigmentation, and vascularity. Overall, the aesthetic outcomes were enhanced, as reflected in improvements in Vancouver Scar Scale (VSS) and Patient and Observer Scar Assessment Scale (POSAS) scores. Patient satisfaction rates were high, reaching up to 96.67%. Adverse effects were minimal and manageable, with erythema and hyperpigmentation being the most common, but none of these were long-lasting. Compared to monotherapy, the combined therapy showed superior results, especially in treating hypertrophic and keloid scars.

Conclusion: The combination of FCL and PDL significantly improves scar remodeling and delivers better clinical outcomes than either laser alone. This approach is especially effective for hypertrophic and keloid scars, with high patient satisfaction and minimal side effects. However, more research with standardized treatment protocols and longer follow-up is needed to confirm the long-term benefits and safety of this dual-laser approach.

References:

1. Butzelaar L, Ulrich MM, Mink van der Molen AB, Niessen FB. Currently known risk factors for hypertrophic skin scarring: a review. J Plast Reconstr Aesthet Surg. 2016.

2. Lawrence JW, Mason ST, Schomer K, Klein MB. Epidemiology and impact of scarring after burn injury: a systematic review of the literature. J Burn Care Res. 2012;33:136–46. doi:10.1097/BCR.0b013e3182374452.

3. Wolfram D, Tzankov A, Pülzl P, Piza-Katzer H. Hypertrophic scars and keloids: a review of their pathophysiology, risk factors, and therapeutic management. Dermatol Surg. 2009;35:171–81. doi:10.1111/j.1524-4725.2008.34406.x.

4. Zhang C, Zhu K, Li Y, Zhang X, He J. Efficacy of fractional carbon dioxide laser therapy for burn scars: a meta-analysis. J Dermatol Treat. 2019;30(4):382–7.

5. Tiwari VK. Burn wound: How it differs from other wounds? Indian J Plast Surg. 2012;45:364–73. doi:10.4103/0970-0358.101319.

Uncovering the Drivers of Postoperative Opioid Prescribing in Panniculectomy

Abstract Presenter: Meeti Mehta BS

Abstract Co-Author(s): Aileen Cui, Adaora Okigbo, Jeffrey Gusenoff MD, J. Peter Rubin MD

Introduction: Postoperative opioid prescriptions can vary significantly, impacting patient recovery and the risk of opioid-related complications. This study aims to identify the factors that influence the total daily opioid dose prescribed postoperatively, measured in morphine milligram equivalents (MME). By examining demographic, procedural, and clinical factors, we seek to uncover patterns that may contribute to variations in opioid prescribing. Understanding these factors is crucial for optimizing pain management and reducing the risk of opioid misuse and complications.

Methods: A retrospective review of panniculectomy patients from 2022-2024 was conducted. Demographic/clinical data and postoperative opioid prescriptions were recorded. For standardized comparison, the total daily MME dose prescribed was calculated by multiplying the dosage, frequency, and the corresponding MME multiplier. Multivariate linear regression was performed to calculate regression coefficients (β) for variables that influence the total daily opioid dose prescribed postoperatively, controlling for potential confounding demographic, clinical, and procedural variables. Statistical significance was alpha = 0.05.

Results: 172 panniculectomy patients were included, with 87% female, 71% White, at an average age of 47 years. The average procedure time was 135 minutes, and patients had 2 drains placed, on average. The most common opioid prescribed was oxycodone (87%) and the average period of opioid therapy was 4 days. On average, the total daily MME dose prescribed was 33.

Several procedural factors were associated with variations in the total daily opioid dose prescribed. Patients who underwent liposuction were more likely to be prescribed higher amounts of daily opioids compared to those who did not undergo liposuction (β=12.69, p=0.001). Each additional minute of procedure duration was associated with a higher likelihood of receiving more opioids/day (β=0.002, p<0.001). Patients who had more drains placed were likely to be prescribed lower amounts of daily opioids (β=-6.60, p<0.001). Procedures ending in the afternoon were linked to a higher prescribed daily opioid dose (β= 3.24, p=0.04) compared to those ending in the morning (β= -4.30, p=0.009). Greater intraoperative patient body temperature variation was associated with a lower daily opioid dose prescription (β = -0.88, p = 0.02).

Demographic and clinical factors also played a role. Each additional year of age was linked to an increase in prescribed opioid dose/day (β= 0.16, p=0.049). Asian patients were likely to be prescribed lower amounts of daily opioids compared to White patients (β= -25.89, p=0.004). Higher preoperative BMI was associated with greater amounts of daily opioids prescribed (β = 0.16, p = 0.04). A longer time between bariatric surgery and panniculectomy was associated with lower amounts of daily opioids prescribed (β = -0.03, p = 0.04).

Conclusion: This study identifies several factors-procedural, demographic, and clinical-that influence the total daily opioid dose prescribed after panniculectomy. Since all patients underwent a similar surgical procedure with controlled variables, the observed variations in opioid prescribing patterns are likely influenced by a combination of procedural factors, provider practices, and patient characteristics. Understanding these factors can help inform more objective, evidence-based approaches to opioid prescribing, ultimately optimizing pain management and reducing the risk of opioid-related complications.

Brachioplasty: A Modern Approach to Arm Aesthetics

Abstract Presenter: Patricia Fuentes

Abstract Co-Author: R. Brannon Claytor MD

Purpose: Arm aesthetics often receive insufficient attention in body rejuvenation, despite their role in overall body harmony. Loose arm skin is a noticeable change associated with aging and massive weight loss but is refractory to minimally invasive treatments such as radiofrequency microneedling or laser therapy. Traditional brachioplasty focuses on skin excision; however, elite arm rejuvenation extends beyond simple removal. By emphasizing gentle contours and underlying muscle definition, an aesthetic and youthful arm appearance can be achieved. This study evaluates a refined approach to brachioplasty using tumescent anesthesia, liposuction for contouring and pre-dissection, dart incisions for precise skin excision, and patient-assisted intraoperative muscle flexion to optimize outcomes.

Technique: A single-center retrospective chart review was conducted, analyzing patients who underwent brachioplasty with tumescent anesthesia between July 2020 and December 2023. Preoperative markings were made with the patient standing, beginning at the ulnar groove between the olecranon and medial epicondyle. Anterior markings were placed at the most inferior portion of the arm while retracting the skin posteriorly to create a convex contour from the elbow to the axilla. A Z-plasty pattern was incorporated into the axilla and, when necessary, extended onto the lateral chest wall for enhanced contouring. Posterior markings were placed similarly by retracting the skin anteriorly. Patients received oral pain medication, and tumescent anesthesia was infused into the soft tissue. The procedure was performed under awake anesthesia, allowing for repositioning and intraoperative muscle flexion to assess contouring and skin turgor. Liposuction was performed before skin excision to facilitate pre-dissection and sculpting. Skin was excised down to the fascial layer while preserving critical neurovascular structures, particularly the medial antebrachial cutaneous and ulnar nerves. Dart incisions and multiple crossing marks ensured precise alignment of tissue post-excision, achieving tensionless closure while maintaining smooth contours. At the axilla, maximal tissue excision was performed, with Z-plasty insetting to prevent scar shortening and contracture. Patient cooperation during the procedure further enhanced sculpting at the bicipital groove and triceps.

Results: A total of 54 patients underwent brachioplasty with liposuction under tumescent anesthesia. The majority (95%) were female, with a mean age of 50.7 years (range: 34–75) and a mean BMI of 29.07. Three male patients, with a mean age of 56.67 years (range: 55–59) and a mean BMI of 29.44, also underwent the procedure. Eight patients had concurrent surgeries, including neck lift with liposuction (n=2),

bilateral breast reduction, mastopexy, back liposuction, trunk liposuction, and bilateral mastopexy with implant removal. One female patient developed deep vein thrombosis (DVT) and pulmonary embolism, later diagnosed with an undiagnosed antithrombin III deficiency. No nerve injuries were reported.

Conclusion: Brachioplasty has evolved into an art form beyond excess skin removal. Optimizing results requires refined techniques, including strategic preoperative markings, liposuction-assisted contouring, dart incision-based excision, and awake tumescent anesthesia to facilitate intraoperative contour evaluation. This approach allows for concurrent procedures with favorable outcomes and minimal complications, enhancing arm aesthetics and patient satisfaction.

Deep Plane Facelift Under Tumescent Anesthesia: A Retrospective Chart Review

Abstract Presenter: Patricia Fuentes

Abstract Co-Author: R. Brannon Claytor MD

Background: The deep plane facelift is a procedure utilized to correct progressive soft tissue sagging and neck laxity associated with the aging process. Choosing to perform this procedure can improve aesthetic outcomes as well as decrease operative times. With patients requesting less procedures under general anesthetics, trends have turned towards performing minorly invasive procedures under tumescent anesthesia (1). Limited research has been done on the safety and efficacy of more invasive procedures, such as the deep plane facelift, under tumescent anesthesia (2). This study aims to illustrate the exceptional outcomes that can safely be obtained performing the deep plane facelift under tumescent anesthesia.

Methods: This study is a retrospective chart review of 101 patients who underwent a deep plane facelift with tumescent anesthesia between March 2021 and September 2023. All procedures were performed in a Class A QUADA-accredited surgical facility by the senior author. Tumescent fluid containing lidocaine and epinephrine was used for local anesthesia, pain control, and hemostasis. Patients received oral diazepam and oxycodone preoperatively, along with intraoperative IV antibiotics. Patients remained awake throughout the procedure. No drains were used, and all patients were discharged home under the care of a family member.

Results: A total of 101 deep plane facelifts were performed under tumescent anesthesia, with 91.1% (n=92) of patients being female and 8.9% (n=9) male. The average age of female patients was 61.96 years (range: 42–83) with a mean BMI of 24.05, while male patients had an average age of 65.11 years (range: 59–74) with a mean BMI of 28.51. Additionally, 33.6% (n=34) of patients underwent concurrent procedures, including blepharoplasty (n=17), lip lift (n=5), CO2 laser (n=3), facial fat grafting (n=2), and rhinoplasty (n=1). Seven patients, all female, experienced minor complications: skin eschar (n=2), hematoma (n=2), and seroma (n=3). No nerve injuries were reported.

Conclusion: The deep plane facelift provides patients with excellent results compared to other methods of facial rejuvenation. This is an invasive operation that can be performed safely under tumescent anesthesia, providing patients with optimal outcomes and decreased risk of postoperative complications associated with prolonged anesthesia. As patient awareness of deep plane facelifts increases, there is growing demand for a more definitive procedure involving the release of retaining ligaments for optimal SMAS repositioning, As patients increasingly seek procedures with faster recovery times and reduced reliance on general anesthesia, this technique offers a durable, effective alternative that enhances patient comfort and surgical efficiency.

(1): Plastic Surgery Statistics Report: ASPS National Clearinghouse of Plastic Surgery Procedural Statistics. 2019.
(2): Frojo G, Dotson A, Christopher K, Kaswan S, Lund H. Facelift performed safely with local anesthesia and oral sedation: analysis of 174 patients. Aesthet Surg J. 2019;39(5):463-469.

The Extended SMAS Controls Submandibular Gland Ptosis

Abstract Presenter: Tatjana Mortell MD

Abstract Co-Author(s): Jadyn Heffern, H. Harvak Hajebian MD, John Holtrop MD, Abigail Chaffin MD, John Lindsey MD

Background: Conventional facelift surgery may fail to adequately address submandibular gland ptosis (SMGP), prompting recommendations for partial gland resection. Alternatively, the extended SMAS technique involves a more extensive SMAS-platysma dissection, providing lower facial and neck rejuvenation while

preserving the submandibular glands. This study aims to quantify the effect of the extended SMAS technique on SMGP.

Methods: This retrospective cohort study analyzed 53 patients who underwent extended SMAS facelift surgery over a ten-year period in the senior author's practice (Table 1). Photographic analysis was used to quantify SMGP correction and cervicomental angle (CMA) improvement.

Results: All patients were available at a mean follow-up of 8.4 months (range: 1–34 months). Mean SMGP decreased from 8.9 mm preoperatively (range: 0–23 mm) to 0.1 mm postoperatively (range: 0–3.9 mm), with an average improvement of 8.01 mm ($P < 0.001$). Mean CMA improved from 152° (range: 100–180°) to 121° (range: 92–156°), with a mean change of 30.8° ($P < 0.001$), Table 2. Two patients (3.8%) were dissatisfied, and three (5.7%) required office revisions.

Conclusion: The extended SMAS facelift technique effectively controls SMGP, nearly eliminating submandibular gland visibility on postoperative photographic analysis while enhancing neck angularity. This improvement may result from the thorough release of the cervical and parotid retaining ligaments, as well as the platysma-auricular ligament. This level of SMAS-platysma flap mobilization may create a more effective sling-like effect on the contents of the digastric triangle, potentially obviating the need for submandibular gland resection.

Global Aesthetic Trends: A Benchmark for US Plastic Surgeons

Abstract Presenter: Parul Rai

Abstract Co-Author(s): Marie Mina, Gabrielle Rodriguez MD, Kathryn Reisner, Zaheer Hanif, Anitesh Bajaj, Emily George MD, Arun Gosain MD

Purpose: This study aims to provide a comprehensive quantitative analysis of aesthetic procedure trends worldwide compared to the US, providing a relatable benchmark for US-based plastic surgeons. Examining trends in aesthetic surgery across different regions and levels of economic development, this study also explores the relationship between socioeconomic factors and the prevalence of these procedures.

Methods & Materials: Data were analyzed from the 2023 International Society of Aesthetic Plastic Surgery (ISAPS) Global Survey, encompassing over 21 million procedures reported by more than 1,600 board-certified plastic surgeons across 23 countries. To facilitate comparisons across countries with varying population sizes, procedure rates were calculated per 100,000 people. To focus on procedure rates among the aesthetic clientele in a given country, procedure rates were also calculated per 1,000 aesthetic procedures. Linear regression analysis was used to assess the correlation between GDP per capita and procedure prevalence. Chi-squared tests were employed to compare the proportion of surgical versus nonsurgical procedures between developed and developing countries. Finally, odds ratios (ORs) and their respective 95% confidence intervals (CIs) were calculated to compare procedure rates abroad with those in the US. To capture the full spectrum of variation in aesthetic procedures between the US and other regions, procedures with the five highest and lowest ORs were identified for each region. Conversely, those with ORs closest to 1 were also identified to determine procedures that have similar popularity in the US.

Results: Developing countries demonstrate a preference for surgical procedures (55.4%), while nonsurgical procedures predominate in developed countries (66.8%) ($p < 0.0001$). A moderate positive correlation was found between GDP per capita and total aesthetic procedures ($r = 0.49$, $p < 0.05$). This correlation was more pronounced for nonsurgical procedures ($r = 0.53$, $p < 0.05$), with no significant correlation observed for surgical procedures ($r = 0.23$, $p = 0.291$). Latin America exhibits a significantly higher volume of buttock augmentation (OR = 13.71 [95% CI: 13.53-13.89], $p < 0.0001$), the Middle East shows a preference for rhinoplasty (OR = 10.36, [95% CI: 10.26-10.47], $p < 0.0001$), and eyelid surgery is more prevalent in Southeast Asia (OR = 8.83, [95% CI: 8.71-8.95], $p < 0.0001$) compared to the US. Europe mirrors the US with a strong preference for nonsurgical procedures (71.1% vs. 60.6%, respectively), and shares 9 out of the top 10 surgical procedures.

Conclusion: While anecdotal evidence and qualitative observations have hinted at variations in surgical expertise and beauty standards across different countries, this study represents the first quantitative analysis to rigorously assess and measure these international trends. The higher prevalence of surgical aesthetic procedures in developing countries, where access to surgical care is often limited, presents a seeming paradox. This may be attributed to a prioritization of long-lasting results and a desire to avoid the ongoing maintenance associated with nonsurgical options. The complex relationship between GDP per capita and aesthetic procedure volume suggests an interplay of economic capacity and the cultural value a region places on aesthetic enhancements.

BREAST

Prophylactic Antibiotic-Loaded Cement, Absorbable and Non-Absorbable, for Implant-Based Breast Reconstruction

Abstract Presenter: Alvin Nguyen
Abstract Co-Author(s): Garrison Leach MD, Shahnur Ahmed MD, Robert Clark MD, Rahim Nazerali MD, Al Hassanein MD, MMSc, FACS, Christopher Reid MD

Introduction: Periprosthetic infection rates in postmastectomy breast reconstruction remain a significant issue, and may result in explantation, with a large portion of patients choosing to forego reconstruction thereafter. This study aims to evaluate the use of both absorbable and non-absorbable prophylactic antibiotic cement to reduce infection rates in implant-based breast reconstruction.

Methods: A multi-institutional, retrospective review was performed of patients who underwent tissue expander (TE) reconstruction with both permanent and absorbable versions of antibiotic-loaded cement. Patients received either 1) polymethylmethacrylate (PMMA) plates loaded with vancomycin and tobramycin or 2) absorbable calcium sulfate (CS) beads or discs loaded with gentamycin and vancomycin. Demographics, medical history, perioperative details, and complications were collected. Comparisons were made between those who received non-absorbable PMMA and those who received absorbable CS.

Results: Two hundred eighteen TE reconstructions were performed on 139 patients. Ninety-two (42.2%) breasts received non-absorbable, antibiotic-loaded PMMA, and 126 (57.8%) breasts received absorbable, antibiotic-loaded CS. Six (2.8%) breasts had infections, with 1 (0.5%) occurring beyond 6 weeks post-operatively and 5 (2.3%) occurring within 6 weeks. Four of the 6 infected breasts had previous debridement due to wound dehiscence or mastectomy flap necrosis, and 1 occurred within the setting of an infected drain site. No TEs were lost due to infection. Antibiotic-loaded, non-absorbable PMMA and absorbable CS had no significant differences in infection rates (4.3% vs 1.6%, respectively).

Conclusion: Antibiotic-loaded cement can be effectively used for infection prevention with implant-based reconstruction. Non-absorbable PMMA and absorbable CS for local antibiotic delivery resulted in similar safety profiles.

Do Extended Prophylactic Antibiotics Reduce Postoperative Infections and Bacterial Presence in Breast Reconstructions? A Prospective Randomized Controlled Trial.

Abstract Presenter: Aviella Goodman Gabay MD

Abstract Co-Author(s): Yonit Wiener – Well, Ronen Toledano MD, Yoav Gronovich MD, MBA, Shahar Talisman, Yotam Teldan MD, Sapir Lev, Adi Maisel Lotan MD

Introduction: The rate of implant-based breast reconstruction following mastectomy has been steadily increasing(1) . However, one of the most detrimental complications is surgical site infection, with reported rates in the literature reaching up to 30% (2). Perioperative antibiotic protocols vary, with some surgeons prescribing antibiotic prophylaxis until drain removal, while others adhere to guidelines from the CDC and the Surgical Care Improvement Project, administering only a preoperative dose. Extended antibiotic therapy may contribute to the development of drug-resistant infections and other adverse effects(1). Most existing literature is retrospective, with some studies reporting no significant reduction in infection rates with extended antibiotic use, while others suggest an increase in postoperative infections(3). This randomized controlled study aims to examine whether there is a difference in infection rates or bacterial growth on drain cultures between patients receiving a single preoperative dose of antibiotics and those following an extended antibiotic protocol until drain removal.

Methods: A single-center, prospective randomized controlled trial. Patients undergoing breast reconstruction were randomized into two groups: one group received a single dose of antibiotics prior to surgery, while the second group received antibiotics until drain removal. Drains were cultured to assess bacterial growth. Data on patient demographics, surgical details, clinical outcomes, and drain culture results were collected and subsequently analyzed.

Results: Data from 63 breasts were collected and analyzed. Results revealed no significant difference in postoperative infection rates between the group receiving a single dose of antibiotics and the group receiving antibiotics until drain removal (16.1%

vs 12.5%, respectively; p = 0.73). However, the extended antibiotic treatment group demonstrated significantly less bacterial growth on drain cultures compared to the single-dose group (40.6% vs 71%, respectively; p = 0.015). Pathogen distribution varied, with mixed gram-positive organisms being the most common in the extended antibiotic group, while Cons was the predominant pathogen in the single-dose group

Discussion: Interestingly, our findings suggest that extended antibiotic treatment significantly reduced bacterial growth on drains, indicating a potential decrease in bacterial presence within the breast pocket. However, despite this reduction, extended antibiotic therapy did not lead to a statistically significant decrease in postoperative infection rates. These findings are important, as they may encourage surgeons to discontinue prolonged prophylaxis, thereby reducing the risk of drug-resistant bacteria, and contribute to the standardization of antibiotic therapy protocols. In conclusion, our results indicate that extended therapy does not reduce postoperative infections and is not warranted in breast reconstruction.

1. Sergesketter AR, Langdell HC, Shammas RL, et al. Efficacy of Prophylactic Postoperative Antibiotics in Tissue Expander-Based Breast Reconstruction: A Propensity Score-Matched Analysis. Plast Reconstr Surg. 2024;153(3):496E-504E. doi:10.1097/PRS.0000000000010825
2. Sisco M, Kuchta K, Alva D, Seth AK. Oral Antibiotics Do Not Prevent Infection or Implant Loss after Immediate Prosthetic Breast Reconstruction. In: Plastic and Reconstructive Surgery. Vol 151. Lippincott Williams and Wilkins; 2023:730E-738E. doi:10.1097/PRS.0000000000010073
3. Clayton JL, Bazakas A, Lee CN, Scott Hultman C, Halvorson EG. Once is not enough: Withholding postoperative prophylactic antibiotics in prosthetic breast reconstruction is associated with an increased risk of infection. Plast Reconstr Surg. 2012;130(3):495-502. doi:10.1097/PRS.0b013e31825dbefe

Breast Reconstruction Decision Making in Women with Breast Cancer-Related Genetic Mutations

Abstract Presenter: Joey Liang

Abstract Co-Author(s): Juliet Dalton, Samantha Thomas, Koumani Ntowe, Jennifer Plichta, Brett Phillips MD, MBA, Jenny Foster

Background: Breast reconstruction following mastectomy is a significant consideration for many patients. Understanding the factors influencing these decisions can enhance patient counseling and optimize outcomes, particularly for those with breast cancer-related genetic mutations. Our study aims to explore the decision-making patterns regarding the type and timing of breast reconstruction among women with such mutations, with or without a breast cancer diagnosis.

Methods: We identified adult women with breast cancer-related genetic mutations who underwent mastectomy (risk-reducing or therapeutic for a known cancer diagnosis) at a single academic institution. High penetrance (BRCA1, BRCA2, CDH1, PALB2, PTEN, STK11, TP53) and moderate penetrance mutations (ATM, BARD1, CHEK2, NF1, RAD51C, RAD51D) were included. Patients were stratified based on receipt of breast reconstruction and timing (immediate vs delayed). Demographic, clinical, and treatment-related factors were compared by receipt of reconstruction and reconstruction timing.

Results: Among 357 patients, 59.4% (N=212) underwent breast reconstruction. Reconstruction rates were higher for risk-reducing mastectomy (74.2%) compared to therapeutic mastectomy (54.5%, p=0.001). Patients who underwent reconstruction were younger at genetic testing (median age 42.1 vs. 46.3 years, p<0.001) and mastectomy (43.7 vs. 47.8 years, p<0.001), with a lower BMI (25.0 vs. 27.5, p=0.002). Immediate reconstruction was more common (87.3%) than delayed (12.7%), especially following prophylactic mastectomy (100% vs. 81.5% for therapeutic, p<0.001). Patients who underwent nipple-sparing or skin-sparing mastectomies were more likely to have reconstruction compared to those with total mastectomy (p<0.001). Among those who had reconstruction, implants were preferred over autologous methods (63.7% vs. 36.3%). Most implant reconstructions involved a tissue expander (78.5%), while autologous reconstructions commonly utilized free abdominal (DIEP) flaps (55.8%, p=0.02). The sequence of genetic testing and breast cancer diagnosis significantly influenced both the receipt (p=0.001) and timing of reconstruction (p<0.001). High penetrance mutation carriers more frequently had immediate reconstruction compared to delayed (86.4% vs. 71.4%, p=0.03), although mutation type was not associated with the overall likelihood of undergoing reconstruction (p=0.90). Neither race nor parity significantly impacted reconstruction decisions.

Conclusion: Our study provides valuable insights into factors influencing breast reconstruction patterns among women with breast cancer-related genetic mutations. Younger age, lower BMI, and the type of mastectomy were associated with higher reconstruction rates. The sequence of genetic testing and cancer diagnosis also influenced decisions regarding reconstruction. These findings underscore the

importance of multidisciplinary care to support personalized patient counseling and optimize outcomes.

Training the Next Generation: Impact of Plastic Surgery Resident Involvement on DIEP Outcomes in a High-Volume Microsurgical Breast Practice

Abstract Presenter: Eric Zeng

Abstract Co-Author(s): Samuel Kogan MD., Mary Duet MD, Marion Tapp MD, Joyce Cui, John Michael Robinson MD, Christopher Runyan MD, Phd

Introduction: Resident involvement in complex microsurgical procedures is essential for advancing surgical training, yet it often raises concerns amongst patients and surgeons. While general surgical outcomes have been studied, the impact of resident participation in microsurgery remains underexplored. This study leverages a unique case control-like opportunity from a healthcare merger to evaluate plastic surgery resident involvement in a high-volume microsurgical breast practice.

Purpose: To evaluate the impact of plastic surgery resident involvement on postoperative outcomes in DIEP flap breast reconstruction, addressing the gap in research on resident participation in complex microsurgery.

Methods: A retrospective review was conducted on 395 patients who underwent DIEP flap reconstruction from December 2021 to May 2024. Patients were stratified into three cohorts: dual attendings without a resident (n = 174), with a plastic surgery resident (n = 147), or with a general surgery resident (n = 38). Demographics, operative details, and postoperative outcomes were analyzed, focusing on complication rates, flap ischemia time, infection, length of stay, and revisions. Statistical analysis was performed in R Studio using T-tests and Mann-Whitney U tests for continuous variables, Fisher's Exact tests for categorical variables, and Shapiro-Wilk tests for normality.

Results: Demographics, comorbidities, and treatment histories were similar across all cohorts. Flap ischemia time was marginally longer in the plastic surgery resident cohort (46 minutes vs. 39 minutes, p = 0.001), but the difference was not clinically significant. Resident involvement did not negatively impact any complication rate, including flap loss, reoperation, hematoma, seroma, wound dehiscence, skin necrosis, fat necrosis, and infection. Estimated blood loss and length of stay were comparable across all

groups. Revision rates were also comparable between cases performed with and without resident participation (53.5%, 51.7%, p = 0.841).

Conclusion: Plastic surgery resident involvement in complex microsurgical cases is safe and does not compromise patient outcomes. Flap ischemia time was statistically, though not clinically, increased, with no statistically significant increase in total operative time. This research holds broad implications in surgical education, supporting the notion that resident involvement in complex microsurgical procedures is both safe and vital for developing the next generation of skilled plastic surgeons. Further discussion and studies are warranted to investigate efficiency, economic implications, and long-term patient outcomes.

A Patient-Derived Tissue Engineered Breast Biomimetic Platform More Accurately Interrogates the Response to Chemotherapy

Abstract Presenter: Sophia Salingaros

Abstract Co-Author(s): Abby Chopoorian Fuchsman, Kate Guion Manley, Tim Li, Xue Dong MD, PhD, Jason Spector MD

PURPOSE: Engineering a patient-specific, in vitro breast cancer model holds the potential to revolutionize our understanding of disease progression and significantly improve treatment paradigms. Our laboratory has successfully developed a patient tissue-derived, engineered 3D platform that contains all cellular components found within the breast. Herein, we aim to 1) quantify breast cancer cell proliferation and migration in 'plain' collagen culture in response to varying concentrations of doxorubicin, and 2) compare this response when cancer cells are cultured within our biomimetic (BM) platform, fabricated from collagen and patient breast derived cells.

METHODS: Breast tissue from healthy female patients undergoing non-oncologic reduction mammaplasties was processed to isolate mature adipocytes, stromal vascular fraction (with immune cell components), and ductal epithelial organoids. Tri-layer 3D constructs, approximately 50µl volume each, were engineered in a 96-well plate: 1) a base layer of RFP-tagged triple negative breast cancer cells (TNBC), 2) a middle layer with either breast-derived components suspended in 0.3% collagen ("BM") or 0.3% collagen alone without cells ("Collagen"), and 3) a top layer of GFP-tagged human umbilical vascular endothelial cells (HUVEC). BM and Collagen constructs were treated

in triplicate with the following doxorubicin concentrations: 0μM (no treatment), 1μM, 10μM, and 100μM. Constructs were incubated at 37°C under normoxic conditions (20% O2). Confocal imaging was performed immediately before (pre-treatment) and 2 days after (post-treatment) the addition of doxorubicin. An Imaris™ machine learning algorithm was built to measure vertical z-axis TNBC position, and a regression plane of cell location was reconstructed in RStudio. Forty-eight hours after doxorubicin treatment, tumor cells that exceeded one standard deviation from this plane were considered "migrated" towards the endothelial layer. Post-treatment tumor cell counts and mean z-axis distance of "migrated" cells were normalized to pre-treatment values.

RESULTS: Both pre- and post-doxorubicin treatment, confocal microscopy revealed ~800μm thick constructs with distinct TNBC, intermediary BM or Collagen, and HUVEC layers. Normalized post-treatment TNBC cell count was greater in BM wells than Collagen wells in all conditions, though not reaching statistical significance ($p>0.05$). The half maximal inhibitory concentration (IC50) was 3.43μM in Collagen and 5.11μM in BM constructs suggesting potential sequestration and/or metabolism of the chemotherapy by patient-derived cells. A greater percentage of TNBC were migratory in BM wells versus Collagen wells, reaching significance at 10μM ($p=0.024$) and 100μM ($p=0.008$) doxorubicin. No significant effect on mean migration distance was observed over time by doxorubicin concentration.

CONCLUSIONS: This tissue-engineered platform allows for a detailed and more faithful characterization of cancer cell behavior within a patient-specific biomimetic breast environment in response to chemotherapeutic agents. Attenuation of the negative doxorubicin effect on percentage tumor migration and potentially cell count within the biomimetic milieu suggests that breast-derived cell constituents may be absorbing/metabolizing the chemotherapeutic agent. Characterization of migratory tumor cell phenotype is important as these cells may be preferentially implicated in metastatic behavior. Further refinement of this platform holds significant promise as a personalized screening tool for modeling breast cancer response to potential therapeutics.

Delayed Acellular Dermal Matrix Placement in Multistage Pre-pectoral Implant-based Breast Reconstruction

Abstract Presenter: Michael Mazarei

Abstract Co-Author(s): Kathleen LeFiles, Janelle Rodriguez MD, Irene Ma MD, Michel Saint-Cyr MD, MBA, MHA, FRCSC, FACS

Introduction: In two-stage breast reconstruction, standard practice utilizes acellular dermal matrix (ADM) at the first stage during tissue expander placement. The disadvantages of this approach include infectious complications resulting in TE removal and ADM loss. These complications present a large opportunity-cost requiring not only multiple operations, but also since ADM is expensive. In this study, we compared complication rates in first-stage versus second-stage ADM use in two-stage implant-based breast reconstruction. Our goal was to provide the first cost utility analysis of using acellular dermal matrix at the second stage at the time of expander-implant exchange.

Methods: We retrospectively reviewed patients from August 2021 to December 2024 undergoing two-stage pre-pectoral breast reconstruction. All patients underwent tissue expander placement without ADM during the initial surgery. During the second stage, tissue expanders were replaced with permanent implants using ADM. Primary outcomes were postoperative complications (infection, seroma, hematoma, necrosis, readmissions). Secondary outcomes included infection rates, implant loss, and revisions.

Results: Among 39 patients (71 breasts), 32 underwent bilateral reconstruction and 7 underwent unilateral reconstruction. The average intraoperative tissue expander fill was 250 cc of air and the final expansion expander volume was 550 cc of saline. The implant size range was 210–755 ml. The overall complication rate was 7.0% (n=5 breasts), with infection rate of 5.6% (4 breasts), and 4.2% (3 breasts) rate of implant removal. Seroma and hematoma rates were both 1.4%, with no cases of skin necrosis. Minor complication rates were 2.8% and major complication rates were 4.2%. The average duration of follow-up period was 250 days.

Conclusion: Second-stage ADM in two-stage breast reconstruction shows lower complication rates, particularly for infection and seroma, supporting its potential as a safer, more reliable, and cost-effective alternative to first-stage ADM use.

Medical Malpractice in Cosmetic and Reconstructive Breast Surgery: A Systematic Review

Abstract Presenter: Andrew Malek

Abstract Co-Author(s): Yibin Zhang, Kala Pham, Anne Kim, Morayo Fernandez, Zach Yung, Sai Shanthanand Rajagopal, Justin Broyles MD

Purpose: Medical malpractice is a commonly raised claim that nearly all physicians will face at some point during their careers. Plastic surgeons are no exception to this, particularly those performing cosmetic and reconstructive breast surgery. This review aimed to evaluate the outcomes of medical malpractice cases across cosmetic and reconstructive breast surgery and identify common factors leading to litigation.

Methods: PubMed, Web of Science, SCOPUS, Embase, and MEDLINE were queried on October 10, 2024. MeSH terms plastic surgery, breast, malpractice, and related search terms were used without time restriction. Studies that included outcomes of medical malpractice claims filed for cosmetic and reconstructive breast procedures were included. Exclusion criteria included claims outside of the United States, editorials or commentaries, studies without case outcomes, or those not involving medical malpractice. Means across studies were compiled using a simple weighted average based on the number of cases in each study.

Results: Of the 1254 studies queried, 5 studies provided data on medical malpractice claims following cosmetic and reconstructive breast surgeries. These comprised a total of 537 medical malpractice claims filed against plastic surgeons from 1982 to 2020. These included 109 breast reconstruction claims (20.3%), 213 breast reduction claims (39.7%), and 215 cosmetic breast surgeries (40.0%). The most common allegations made by plaintiffs included disfigurement (46.9 - 52.7%), scarring (38.7 - 46.9%), infection (8.6 - 21.6%), and the need for revision surgery (17.2 - 42.5%). Other claims included necrosis, asymmetry, emotional distress, and pain.

426 cases cited specific reasons for plaintiff liability. A total of 746 causes of action were cited in these claims, with the most common being negligence (50.4%), lack of informed consent (25.7%), and failure to diagnose/treat (10.4%). 535 studies included specific case outcomes. Of these, cases were decided in favor of the defendant in 346 instances (64.7%), with the remainder of cases (35.3%) resulting in payment to the plaintiff, either in the form of damages or settlement.

Of cases decided in favor of the plaintiff, financial awards varied significantly. Plaintiff verdicts resulted in a mean damages award across all studies of $538,171 (range: $130,422 - $1,036,469). Settlement amounts had a comparatively narrower range, with a mean of $521,576 (range: $481,055 - $633,960). Of 389 cases with geographic

information reported, most cases were litigated in California (18.8%), New York (14.4%), and Florida (10.5%), with relatively fewer cases in Pennsylvania (5.4%), Missouri (4.6%), Texas (3.8%), and Michigan (3.8%).

Conclusion: This review highlights the significant financial and professional risks associated with cosmetic and reconstructive breast litigation. Findings suggest a need for enhanced patient education and shared decision-making, particularly regarding aesthetic outcomes, revision surgeries, and infection prevention strategies to mitigate legal risk. Surgeons practicing in states lacking legal caps on damages awarded to successful plaintiffs in medical malpractice suits such as New York and Florida may be faced with litigation more frequently than those with stricter tort reform, such as Texas and Michigan.

Discerning The Optimal Timing for Autologous Breast Reconstruction in The Setting of Postmastectomy Radiotherapy

Abstract Presenter: Aaron Dadzie

Abstract Co-Author(s): Sydney Somers, Katie Hansen, Madison Gardner, Joanna Chen, Catherine Bautista, Devin Eddington, Alvin Kwok MD, MPH, Jayant Agarwal MD

Purpose: Autologous breast reconstruction (ABR) following postmastectomy radiotherapy (PMRT) is often delayed by several months due to the known adverse effects of radiation on reconstructive flaps, however, the optimal time between PMRT and ABR remains uncertain. While it is commonly believed that a longer interval between radiation and reconstruction enhances safety, evidence of this is conflicting. We sought to analyze our institutional data to determine if an optimal timing for autologous breast reconstruction following postmastectomy radiotherapy exists.

Methods: A single-institution retrospective chart review was performed on female patients 18 years and older who underwent abdominally based free flap breast reconstruction from July 2015 to September 2024. Cases were analyzed on a per flap basis and were stratified into 2 groups: one that underwent PMRT and one group that did not. The non-PMRT group served as our control. The PMRT group was then further stratified to 4 cohorts based on the time from PMRT to their ABR. The cohorts were 0-3 months, 3-6 months, 6-12 months, and greater than 12 months. Patient demographics, operative characteristics, hospital length of stay, medical history, and postoperative

complication rates were collected. The primary outcomes were major complications: OR take back and flap loss. Secondary outcomes were all other complications including hematoma, seroma, fat necrosis, infection, and dehiscence. Fisher's Exact and Pearson's Chi-squared test were used to detect group differences.

Results: There were a total of 522 flaps amongst 339 patients that met our study criteria. Of these, 191 (36.7%) of the flaps were performed following PMRT: 5 (2.6%) in the 0-3 months cohort, 72 (37.7%) in the 3-6 months, 71 (37.2%) in the 6-12 months, and 43 (22.5%) in the 12+ months cohort. The majority (83%) of all breast were reconstructed using the deep inferior epigastric perforator free flaps. When comparing postoperative outcomes, we found no statistically significant differences between rates of reoperation, flap thrombosis, or flap failure when comparing cases with or without PMRT and no statistically significant differences when comparing cases performed between 0-3 months, 3-6 months, 6-12 months, or 12+ months.

Conclusion: The results of this study suggests that the time between radiotherapy and autologous reconstruction has little effect on the rate of postoperative complications. The lack of differences found in the 0-3 months cohort may be due to an insufficient sample size therefore it may be premature to suggest conclusions about this group. Clinically, this study would point to ABR to be safe as soon as 3 months following PMRT. Further studies and larger sample sizes will allow researchers to better determine the optimal timing of breast reconstruction following PMRT, in particular for those who may undergo reconstruction within 3 months.

Outcomes of Breast-Conserving Therapy in Patients with Prior Breast Augmentation

Abstract Presenter: Samuel Fallon

Abstract Co-Author(s): Scott Odorico MD, Eilene Yang, Roma Sonik, Aparna Vijayasekaran MBBS

Background: Patients with a history of breast augmentation and a new diagnosis of breast cancer face uncertainty surrounding outcomes of breast-conserving therapy (BCT). Surgical complications, poor aesthetic outcomes, and implant issues such as capsular contracture are frequently encountered following radiation treatment and

complicate decision making. We aim to review our experience following BCT in patients with prior augmentation.

Methods: A single-center, retrospective review was performed of all patients with prior breast augmentation undergoing lumpectomy for a newly diagnosed malignancy. Patients with procedures done from 2007 to 2024 were included, and those with prior mastectomies or lumpectomies on the same site were excluded. We collected demographics, comorbidities, and outcomes data.

Results: 65 breasts in 63 patients met inclusion criteria. 52 (80.0%) implants were in the subpectoral plane and 13 (20.0%) were prepectoral. 52 (80.0%) received radiation treatment after their procedure. 43 cases (66.2%) had concurrent sentinel lymph node biopsy and 5 (7.7%) had axillary lymph node dissections. Plastic surgery was consulted preoperatively in 29 cases (44.6%), and 14 (21.5%) cases had plastic surgeons involved in the procedure after tumor removal. Complications included 10 cases of seromas (15.8%), 0 unplanned implant removals, 0 implant infections, 0 unplanned hospitalizations, and 7 cases of new capsular contracture (12.2%) in patients receiving radiation with a mean time first noted of 2.5 years after surgery (range 0.5-4.2 years).

Conclusions: With a low rate of complications, BCT is a safe option for patients with augmentation implants. Patients should be informed of the risk of capsular contracture, especially if receiving radiation treatment. Involvement of plastic surgeons can be helpful for procedural planning and optimizing surgical results. Further study of aesthetic and patient satisfaction outcomes following BCT is needed to better guide patient and provider decision making.

Prepectoral Versus Subpectoral Implant-Based Breast Reconstruction: Evaluating the Shift

Abstract Presenter: Holly Cordray

Abstract Co-Author(s): Salman Khan, Malia Voytik MD, Justus Zemberi, Gustavo Capone, Ashley Chang BA, Robyn Broach, Said Azoury MD

Purpose: This study evaluated trends in implant-based breast reconstruction, anticipating a shift in preference toward prepectoral implants-rather than subpectoral or dual-plane-alongside technical advancements addressing complications historically

associated with the prepectoral approach. We aimed to correlate changes in technique with clinical outcomes.

Methods: The cohort included adult patients who received implant-based breast reconstruction at the University of Pennsylvania Health System from 2018-2024. Demographic, clinical, operative, and postoperative data were collected. To evaluate trends over time in plane selection, regressions were fitted using percentages of quarterly intervals to reduce noise. Chi-square/Fisher's exact tests were used to compare complications by reconstructive approach; relative risk (RR) was calculated for significant associations.

Results: The study included 670 patients. All cases used either a subpectoral (n = 297) or prepectoral plane (n = 373). Use of prepectoral implants rose significantly across the seven-year study period: according to linear regression, time explained 79.5% of the variance in implant plane selection over quarterly intervals (P = .001), with prepectoral implants increasing from 4.0% of cases in 2018 to an annual peak of 94.2% in 2023 and 89.7% in 2024. Patient clinical characteristics were largely similar between implant planes. Prepectoral implants showed significantly lower incidence of postoperative fat necrosis (RR for prepectoral vs subpectoral: 0.3, 95% CI: 0.1-0.9), native nipple-areolar complex necrosis (RR 0.2, 95% CI: 0.1-0.5), and chronic implant-associated pain (RR 0.4, 95% CI: 0.1-0.8; all P < .05). However, prepectoral implants showed significantly higher incidence of postoperative surgical site infections (RR 3.3, 95% CI: 2.0-5.4), delayed breast healing/dehiscence (RR 1.9, 95% CI: 1.3-2.9), tissue expander loss (RR 2.6, 95% CI: 1.5-4.4), and implant loss (RR 4.8, 95% CI: 1.7-13.8; all P ≤ .001). Prepectoral implants also required significantly higher rates of reoperation due to complications (RR 2.0, 95% CI: 1.4-2.7; P < .001) and readmissions for complications (RR 2.2, 95% CI: 1.2-3.8; P = .005). Acellular dermal matrix use with prepectoral implants did not appear to modify these associations. Stratified analyses generally did not show confounding from reconstruction staging (direct-to-implant vs two-stage, where 20.4% of prepectoral implants were placed directly without prior tissue expanders); differences in prepectoral vs subpectoral complications remained significant, though direct-to-implant prepectoral reconstructions showed the highest incidence of implant loss (19.7% vs 3.1% for two-stage prepectoral, P < .001). Incidence of postoperative cellulitis, seroma, hematoma, mastectomy necrosis, grades III-IV capsular contracture, emergency department visits, or aesthetic revisions did not differ significantly by prepectoral vs subpectoral plane.

Conclusions: This cohort showed a nearly complete reversal of implant plane preference from 2018-2024, with the prepectoral approach supplanting the subpectoral. While prepectoral implants demonstrated lower incidence of necrosis and chronic pain,

our cohort showed nearly five times higher risk of prepectoral implant loss along with increased risks of infection, delayed healing, and expander loss, ultimately doubling overall risks of reoperation and readmission compared to subpectoral implants. These results suggest that prepectoral implants may be underperforming, with a complication-driven reoperation rate approaching 30%, warranting further study to determine whether we need to reconsider the prepectoral approach.

Does Breast Reconstruction Impact Radiation Therapy? Examining Device Type, Placement, and Dosimetry Effects.

Abstract Presenter: Miriam Becker

Abstract Co-Author(s): Megan Orr, Kelly Kisling, Natalie Sarafian, Dominique Rash, Haydee Ojeda-Fournier, Catheryn Yashar, Christopher Reid MD

Introduction: Preference of prepectoral breast reconstruction has progressively surpassed subpectoral placement over the last decade, with most reconstructions being prepectoral.(1-3) However, the impact of reconstruction, including type (immediate with an implant vs. delayed with a TE) and device placement (prepectoral vs. subpectoral) on radiation therapy (RT) planning and dosimetry has not been well described. This study compared RT dosimetry metrics and time to treatment between reconstructed and non-reconstructed cases, and by reconstruction device type and placement.

Methods: This single-institution study included 161 patients who underwent mastectomy or lumpectomy followed by RT (2021-2024). Eighty patients had reconstruction (implants: n=29, TEs: n=51); 81 were non-reconstructed. Reconstruction was prepectoral (n=41) or subpectoral (n=39). Radiation outcomes included mean heart dose, lung irradiation, undertreated ("cold spots") and overtreated ("hot spots") areas, plan uniformity (V105/V95), and internal mammary node (IMN) coverage. Additional outcomes included time to RT, IMN omission, TE deflation requests, and skin complications.

Results: Patients with subpectoral reconstructions had significantly higher mean heart dose than non-reconstructions (112 vs 85 cGy, p=0.02) but significantly lower percentage radiation to the ipsilateral lung (19% vs 22%, p =0.001). Compared to non-reconstructed cases (1.70), patients with both pre (1.45) and subpectoral reconstructions (1.52) had a lower volume of cold spots (V80/V95, p <0.001).

Prepectoral reconstructions had a lower volume of cold spots than subpectoral reconstructions (p=0.03). Results persisted after adjusted analysis.
Examining cases where TE vs. implants were present during RT, TE cases had significantly lower cold spots (1.46 vs 1.53, p=0.05) However, these results did not persist after adjusted analysis.
Sub analyses of subpectoral implants (n=20) vs. subpectoral TE (n=19) and prepectoral implants (n=9) vs prepectoral TE (n=32) demonstrated that prepectoral TE had significantly lower cold spots (1.44 vs. 1.53, p=0.02). These results did not persist after adjusted analysis.
The odds of having to drop IMN treatment from a subpectoral radiation plan were about 92% lower than for a prepectoral plan p = 0.007), OR = 0.084 (95% CI: 0.002 – 0.645).
The odds of having to drop IMN treatment from a prepectoral plan were about 3.98 times higher than for a non-reconstructed plan (p = 0.02), OR= 3.98 (95% CI: 1.19 – 14.56). Associations persisted after adjusted analysis controlling for treatment laterality and cancer staging.
Groups did not differ significantly in number of plans with adequate IMN coverage (V90%), volume of hot spots or dose uniformity. N=4 (9.8%) of patients with prepectoral TE reconstructions and N=2 (5.1%) of patients with subpectoral TE reconstructions required deflation of the contralateral TE for radiation planning. Time from oncologic surgery to RT and skin findings did not differ significantly according to reconstruction status, device placement or type.

Conclusion: Based on the evaluated metrics, the position of chest wall implants/TEs does not significantly impact the radiation treatment plan quality or timing. For patients with prepectoral implants, there may be additional considerations which impact the ability to include the internal mammary nodal chain in the treatment fields. Reconstruction, especially subpectoral, may help minimize lung dose when IMN treatment is needed.

References:

1. Seth AK, Sisco M. Prepectoral Breast Reconstruction. Plast Reconstr Surg. 2025;155(1):213e-227e. doi:10.1097/PRS.0000000000011737
2. Copeland-Halperin LR, Lyatskaya Y, Bellon JR, et al. Impact of Prepectoral vs. Subpectoral Tissue Expander Placement on Post-mastectomy Radiation Therapy Delivery: A Retrospective Cohort Study. Plast Reconstr Surg – Glob Open. 2023;11(12):e5434. doi:10.1097/GOX.0000000000005434
3. Sinnott CJ, Pronovost MT, Persing SM, Wu R, Young AO. The Impact of Premastectomy Versus Postmastectomy Radiation Therapy on Outcomes in Prepectoral Implant-Based Breast Reconstruction. Ann Plast Surg. 2021;87(1s Suppl 1):S21-S27. doi:10.1097/SAP.0000000000002801

Investigating Hyperbaric Oxygen Therapy in Mastectomy Skin Flap Salvage: A Systematic Review

Abstract Presenter: Sofia Ghani

Abstract Co-Author(s): Rebecca Friedman, Raymond Kroma, Matteo Laspro, Sachin Chinta, Ernest Chiu MD, FACS

Objective: Breast cancer is the second leading cause of cancer-related death among women in the United States. Recently, an increasing proportion of women are choosing to undergo mastectomy over breast-conserving therapy. Skin flap ischemia and necrosis remain some of the most common and significant postoperative complications following mastectomy, occurring in up to 30% of patients (1,2).This often requires prolonged wound care, surgical debridement, and reoperation, diminishing patient satisfaction and quality of life. Hyperbaric oxygen therapy (HBOT) involves the administration of 100% oxygen at pressures greater than atmospheric pressure, which has demonstrated its ability to enhance oxygenation, angiogenesis, and wound healing, yet remains underutilized after mastectomy (3). This systematic review consolidates clinical data on outcomes of HBOT treatment of ischemic mastectomy skin flaps.

Methods: The authors conducted a systematic literature review through September 2024 of PubMed, Scopus, Cochrane Library, and Web of Science according to the PRISMA guidelines. Study characteristics, demographic information, operative characteristics, postoperative outcomes, and adverse events were collected.

Results: Our search yielded 401 results. After duplicate title removal, 351 abstracts were reviewed; 282 studies were excluded. A full-text screening of 69 articles was conducted, and clinical data was collected from nine articles. This resulted in 87 patients and 108 ischemic breast flaps, of which 82 patients (94%) and 100 flaps (93%) received HBOT, achieving a flap salvage rate of 82%. The average time to complete healing with HBOT was 35 days versus 65.9 days without. 100% of mastectomy-related symptoms in 16 patients resolved after HBOT. 20 (24%) patients experienced HBOT-related adverse effects, but all events were resolved entirely except in one patient (sinus discomfort) who opted out of treatment early.

Discussion: Our systematic review highlights HBOT as a beneficial adjuvant therapy for salvaging ischemic mastectomy flaps, as indicated by the high flap salvage rate. We emphasize HBOT's therapeutic potential to promote tissue repair, mitigate ischemic damage, and avoid surgical reoperation. The potential of HBOT to promote healing and achieve flap salvage offers a promising future for mastectomy patients. The timely resolution of ischemia is critical to preserving the functional integrity and aesthetic outcome of the flap, heavily influencing the short- and long-term outcomes for mastectomy patients. Therefore, selecting an appropriate therapeutic for flap compromise cannot be overstated. This systematic review highlights HBOT's role as a safe and effective adjuvant therapy for mastectomy patients with ischemic skin flaps. It reinforces the potential of HBOT to promote healing and achieve flap salvage.

References

1. Mlodinow, A.S., et al., Risk factors for mastectomy flap necrosis following immediate tissue expander breast reconstruction. J Plast Surg Hand Surg, 2014. 48(5): p. 322-6.
2. Razavi, S.A., A.L. Hart, and G.W. Carlson, Ischemic Complications After Bilateral Nipple-sparing Mastectomy and Implant-based Reconstruction: A Critical Analysis. Ann Plast Surg, 2021. 86(6S Suppl 5): p. S526-s531.
3. Nasr, Hani Y. MD; Rifkin, William J. MD; Muller, John N. MD; Chiu, Ernest S. MD. Hyperbaric Oxygen Therapy for Threatened Nipple-Sparing Mastectomy Flaps: An Adjunct for Flap Salvage. Annals of Plastic Surgery 90(5S):p S125-S129, May 2023. | DOI: 10.1097/SAP.0000000000003441

Use of Absorbable Antibiotic Delivery Beads in Implant Based Breast Reconstruction

Abstract Presenter: Aneeq Chaudhry

Abstract Co-Author(s): Hana Shah, Rita Loureiro PA, Harry Salinas MD, Matthew Treiser MD, Miguel Medina III, MD

Purpose: Infection remains a major complication in implant-based reconstruction following mastectomy, with rates ranging from 2.5% to 24% (1). Traditional prevention strategies, including perioperative antibiotics and antiseptic irrigation, have shown limited success. While prophylactic absorbable antibiotic beads have demonstrated efficacy in orthopedic and trauma settings, their role in implant-based reconstruction

remains underexplored. This study evaluates their effectiveness in reducing infection rates, reconstructive loss, and overall outcomes.

Methods: This retrospective cohort study included patients who underwent primary implant-based breast reconstruction with partial subpectoral tissue expanders over a one-year period (January 2024 to December 2024) at a single institution. All patients received a contoured, perforated acellular dermal matrix (ADM), which served as an inferior pole sling. This created a retromuscular pocket.

The experimental group received biodegradable calcium sulfate antibiotic beads (Stimulan ®) infused with 1g vancomycin and 240mg gentamicin in this pocket before tissue expander placement. The inferior border of the pectoralis major was then sewn to the ADM, and two postoperative drains were placed in the prepectoral space. The control group underwent primary partial subpectoral implant-based breast reconstruction with tissue expanders without antibiotic beads over a two-year period at the same institution. Both groups had expanders placed in the same fashion, with ADM and postoperative drains, and received perioperative and post-operative prophylactic antibiotics.

Results: Over a one-year period, 206 patients (353 breasts) underwent implant-based breast reconstruction with prophylactic antibiotic beads, while 113 patients (189 breasts) served as historical controls. The average age was 52.38 years, the mean BMI was 27.12, and the mean mastectomy weight was 570 g. There were no statistically significant differences in age, BMI, or mastectomy weight between groups ($p > 0.05$, t-test analysis).

The infection rate was 9.35% (33/353) in the antibiotic bead group, significantly lower than 20.11% (38/189) in the control group ($p < 0.001$, chi-square analysis). Total reconstructive loss was 3.97% (14/353) in the bead group compared to 14.89% (27/189) in the control group ($p < 0.001$, Fisher's exact test). Among reconstruction losses, 2.27% (8/353) of breasts in the bead group were lost due to infection, compared to 11.64% (22/189) in the control group, while 1.70% (6/353) of bead group breasts were lost due to soft tissue failure. Reoperation for infection was performed in 7.93% (28/353) of total reconstructed breasts, with 20 salvaged with surgical washout (71.43%), 5 salvaged without surgery, and 8 ultimately resulting in reconstruction loss.

Conclusion: Our preliminary results showcased low infection rates and reconstructive loss secondary to infection with utilization of prophylactic antibiotic beads. These findings suggest that the beads may serve as an effective adjunct for infection

prevention in breast cancer patients by providing localized antibiotic delivery. However, further studies are needed to confirm their impact.

References:
1. Kenna DM, Irojah BB, Mudge K, Eveler K. Absorbable Antibiotic Beads Prophylaxis in Immediate Breast Reconstruction. Plast Reconstr Surg. 2018;141(4):486e-492e. doi:10.1097/PRS.0000000000004203

Incidence of Breast Implant-Associated ALK-Negative Anaplastic Large Cell Lymphoma in the United States

Abstract Presenter: Lauren Lowe

Abstract Co-Author(s): Dylan Kim, Alfred Neugut, David Horowitz, Christine Rohde MD, MPH, Connor Kinslow

Introduction: The incidence rate of breast implant-associated anaplastic large cell lymphoma (BIA-ALCL) is rapidly rising globally and has been strongly associated with textured implant utilization. In 2021, The World Health Organization International Agency for Research on Cancer introduced an International Classification of Diseases in Oncology (ICD-O-3) histology code for anaplastic lymphoma kinase (ALK)-negative ALCL/BIA-ALCL, allowing for the first time, calculation of population-based incidence rates in the US.

Methods: We identified patients newly diagnosed with ALK-negative ALCL/BIA-ALCL in the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) Database, representing 28% of the US population. Cases were identified if diagnosed in 2021, the first year the ICD-O-3 histology code was implemented. We calculated age-adjusted incidence rates per 100 million persons/year and compared with previous estimates of ALCL and ALCL/T-cell lymphoma, not otherwise specified (T-NOS).

Results: In 2021, there were 9 women diagnosed with ALK-negative ALCL/BIA-ALCL. The incidence rate of ALK-negative ALCL/BIA-ALCL in 2021 was 17.3 (95% CI: 7.7-33.9) per 100 million persons per year. The combined incidence rate of ALK-positive ALCL, ALK-negative ALCL/BIA-ALCL, and T-NOS in 2021 was 23.2 (95% CI: 11.7-41.6). For comparison, the 2020 estimates of ALCL and ALCL/T-NOS were 27.9 (95% CI: 14.9-48.0) and 53.3 (95% CI: 34.4-79.1).

Conclusion: We report the first incidence estimates for ALK-negative ALCL/BIA-ALCL in the US. Use of the ICD-O-3 histology code will enable epidemiological studies to distinguish BIA- from non-BIA-ALCL cases.

Operative Outcomes of Implant Pocket Change to Prepectoral Location After Submuscular Breast Reconstruction

Abstract Presenter: Samuel Fallon

Abstract Co-Author(s): Scott Odorico MD, Aidin Gharavi, Eilene Yang, Aparna Vijayasekaran MBBS

Background: Post-mastectomy breast reconstruction remains most commonly implant-based. Historically, implants were often placed in a subpectoral pocket. Patients with submuscular implants frequently encounter animation deformity, pain, and cosmetic issues, prompting consideration for removal, exchange, plane change, or autologous reconstruction. Advances in prepectoral reconstruction have prompted many patients to undergo movement of their implants from a submuscular pocket to a prepectoral pocket (a "pocket change"). We aimed to review our institution's experience with this phenomenon.

Methods: We conducted a single-center, retrospective review analyzing all patients with prior submuscular breast reconstruction (for post-mastectomy etiology) who underwent pocket change procedures from 2014-2023. We collected data on demographics, comorbidities, and outcomes.

Results: Procedures on 277 breasts in 154 patients met inclusion criteria. There were various reasons for pursuing surgery, including: pain/discomfort (173 patients, 63%), animation deformity (158 patients, 57%), cosmetic issues unrelated to animation deformity (94 patients, 34%), muscle spasm (84 patients, 30%), capsular contracture (68 patients, 25%), and implant rupture (44 patients, 16%). 52 cases (19%) involved staged procedures with prepectoral tissue expanders placed before exchange with implants. Of the 277 procedures, mesh was used in 196 of the procedures (71%). Mean length of postoperative follow-up was 2.52 years. Complications included 7 seromas (2.5%), 1 hematoma (0.4%), 10 infections (3.6%), and 7 hospitalizations within 30 days of surgery (2.5%). 6 patients (2.2%) underwent removal of the prepectoral implant within

1 year of surgery-5 due to infection and 1 due to early capsular contracture. 17 (6.1%) of patients encountered at least one of these early complications. 10 cases of capsular contracture were reported (3.6%). Of the 82 patients who provided pain outcome data within 60 days of either a unilateral or bilateral procedure, 74 (90%) reported resolved or significantly improved pain.

Conclusions: A pocket change procedure is a safe and effective intervention to treat animation deformity and pain caused by submuscular implants. Further study is warranted to evaluate aesthetic outcomes and patient satisfaction.

Balancing Efficiency and Outcomes: A Multi-Institutional Analysis of Immediate Breast Reconstruction

Abstract Presenter: Joyce Cui

Abstract Co-Author(s): Eric Zeng, Marion Tapp MD, Mary Duet MD, Caitrin Curtis MD, Anna Stipe, Lilian Galarza Paez, Abigail Heilenman, Thomas Steele MD, John Michael Robinson MD

Introduction: Immediate breast reconstruction is generally preferable for breast cancer patients, due to its psychosocial, cost, and logistical benefits. Though, immediate reconstruction has challenges in both implant-based reconstruction (IBR) and autologous breast reconstruction (ABR) (1). Complication rates are variable, with older age and higher body mass index (BMI) identified as risk factors (2). Limited research exists on revision surgeries in immediate reconstruction. This study evaluates complications and revision rates in immediate IBR and DIEP flap reconstruction at two institutions.

Methods: A retrospective review was conducted of all patients who underwent immediate IBR (65 patients, 116 breasts) or ABR with DIEP flaps (158 patients, 158 breasts) following mastectomy between 2018 and 2024 at two medical institutions. Patient demographics, medical history, operative details, complications, and revision surgeries were analyzed.

Results: IBR and ABR patient characteristics were comparable, except for BMI (IBR: 25.46, ABR: 30.75, $p<0.001$), ptosis grade ($p=0.002$), and radiation history (IBR: 21.5%, ABR: 44.9%, $p=0.002$). IBR breasts had significantly lower odds of minor complications

(p<0.001, OR 0.22, CI 0.13–0.39) compared to ABR. Further analysis of minor complications showed lower rates of infection (p=0.005, OR 0.26, CI 0.11–0.66) and wound dehiscence (p=0.027, OR 0.39, CI 0.18–0.86) in IBR. No significant differences were observed in major complications, seroma, hematoma, or skin necrosis.

IBR patients were 5.9 times less likely to undergo revision surgery compared to ABR patients (52.3% vs. 71.5%, p<0.001, CI 0.10–0.28). Additionally, IBR patients had 2.5 times lower odds of requiring fat grafting (p=0.003, CI 0.22–0.72) and 5.3 times lower odds of scar revision (p<0.001, CI 0.08–0.44). The total number of revisions was significantly lower in IBR (0.71 per patient) compared to ABR (0.96 per patient) (p<0.001).

Conclusion: Patients undergoing immediate IBR are 83% less likely to require revision surgery compared to those undergoing immediate ABR. While over half of patients required additional procedures, IBR appears to be a more efficient reconstructive option with fewer revisions. Minor complication rates were lower in IBR, while major complication rates were similar between groups. These findings underscore the importance of individualized decision-making in immediate breast reconstruction.

References:
1. Matar, D. Y., Wu, M., Haug, V., Orgill, D. P., & Panayi, A. C. (2022). Surgical complications in immediate and delayed breast reconstruction: A systematic review and meta-analysis. In Journal of Plastic, Reconstructive and Aesthetic Surgery (Vol. 75, Issue 11). https://doi.org/10.1016/j.bjps.2022.08.029
2. Xu, F., Sun, H., Zhang, C., Jiang, H., Guan, S., Wang, X., Wen, B., Li, J., Li, X., Geng, C., & Yin, J. (2018). Comparison of surgical complication between immediate implant and autologous breast reconstruction after mastectomy: A multicenter study of 426 cases. Journal of Surgical Oncology, 118(6). https://doi.org/10.1002/jso.25238

A Novel Approach to Breast Ptosis in Reduction Mammoplasty: Outcomes of the Paisley Pattern Incision

Abstract Presenter: Gemma Toogood

Abstract Co-Author(s): Julia Isber, Grayson Hetherington, Derek Asserson MD, Devra Becker MD

Introduction: Different incision patterns in breast reduction mammoplasty offer distinct advantages and disadvantages. The most commonly used Wise pattern allows for excess lateral skin to be resected but comes with the downsides of a scar that radiates from the nipple-areolar complex to the underside of the breast both laterally and medially.(1,2) The Vertical pattern, the next most widely used technique, creates a smaller, more aesthetically favorable scar but does not allow for adequate resection of excess lateral skin.(1,2) To address this concern, a novel modification to the vertical incision, the Paisley pattern, allows for resection of excess lateral skin, similar to the Wise pattern but without a medial scar – offering a unique advantage over both the Wise and Vertical techniques.(1) This study aims to compare the postoperative outcomes of bilateral breast reduction mammoplasty utilizing the Paisley Pattern skin resection versus the more commonly used Wise and Vertical patterns.

Methods: A retrospective chart review was conducted at Regional One Health including patients aged 18 years and older who underwent a bilateral breast reduction mammoplasty between January 2020 and November 2024. Measurements included demographics, comorbidities, surgical incision technique, body mass index (BMI), and postoperative complications. 60-day postoperative complications were recorded and include seroma, hematoma, wound dehiscence, infection, and revision surgeries.

Results: In the study time frame, 118 patients underwent bilateral breast reduction mammoplasty. The average BMI of patients in this study was 33. 60 (58%) were resected using the Wise technique, 44 (37%) were resected using the Vertical surgical incision technique, and 14 (12%) using the Paisley technique. Of this cohort there were 9 reoperations, 4 of which were revisions related to patient dissatisfaction. The Paisley and Wise technique resulted in 0 revisions, whereas the Vertical technique results in 1. There were 28 patients with reported complications within this cohort, with a 36.4% complication rate for the Vertical technique, 21.4% for the Paisley technique, and 14.8% for the Wise technique. Between the surgical techniques there was no significant difference in rate of complications or rate of reoperation. Rates of complications between BMI were not considered statistically significant. The operating time varied between techniques, the Paisley technique averaged 2.47 hours, the Vertical technique averaged 3.05 hours, and Wise averaged 4.71 hours. The difference between Paisley and Vertical techniques' operative time was not statistically significant ($p=0.152$), however the operative time between Paisley and Wise as well as wise compared to Vertical were considered significant ($p<0.001$).

Conclusions: When used for bilateral breast reduction mammoplasty, the Paisley Pattern skin resection had comparable postoperative outcomes to the Wise and Vertical

patterns. Shorter operative time as well as a trend towards fewer complications and reoperations holds implications for broader technique adoption.

References:
1. Becker DB. The Paisley Pattern Breast Reduction. Plast Surg (Oakv). 2019;27(2):189-194. doi:10.1177/2292550319828797
2. Greco R, Noone B. Evidence-Based Medicine: Reduction Mammaplasty. Plast Reconstr Surg. 2017;139(1):230e-239e. doi:10.1097/PRS.0000000000002856

Topical Tacrolimus: A Game-Changer in Full Thickness Necrosis Prevention In Alloplastic Breast Reconstruction

Abstract Presenter: Lucy Wei

Abstract Co-Author(s): Makayla Kochheiser, Anna Vaeth, Nancy Qin, David Otterburn MD

Purpose: Skin necrosis is a common complication following mastectomy, with reported incidence rates as high as 30% (1). Our previous studies in rodent models demonstrated that topical tacrolimus significantly reduces skin flap necrosis and outperforms other studied topicals (2-3), but its use in human ischemic skin has yet to be described. This study aims to introduce topical tacrolimus as an effective adjunctive treatment for skin necrosis after immediate breast reconstruction.

Methods: A retrospective review was conducted on patients after mastectomy with immediate tissue expander breast reconstruction between October 2023 and December 2024. Patients deemed at risk for skin ischemia, by either gross observation or abnormal indocyanine green angiography findings, were prescribed topical tacrolimus and instructed to apply twice a day. Patient demographics, medication timelines, surgical details, complications, and clinical outcomes were analyzed using descriptive statistics.

Results: 15 patients (n= 20 breasts) were analyzed. The mean age and BMI were 55.20± 3.31 and 22.53±0.71 respectively. The average length of tacrolimus usage was 18.85±2.63 days. Of all at-risk breasts, only one breast developed full-thickness necrosis, resulting in a 95% salvage rate. Necrosis was completely prevented in ten breasts (50.0%). All patients were able to continue their scheduled breast cancer

treatment and reconstruction without any significant delays. No adverse effects related to topical tacrolimus use were reported by all patients.

Conclusion: This study demonstrates that topical tacrolimus is a safe and effective strategy for preventing full-thickness necrosis in threatened mastectomy flaps. These promising results should be followed up with a randomized control trial to determine the efficacy of topical tacrolimus in treatment for mastectomy flap necrosis.

References:
1. Nykiel M, Sayid Z, Wong R, Lee GK. Management of mastectomy skin flap necrosis in autologous breast reconstruction. Ann Plast Surg. 2014;72 Suppl 1:S31-S34. doi:10.1097/SAP.0000000000000174
2. Jung W, Van Y vu R, Huang H, Wald G, Otterburn DM. The Effect of Pre-and Postsurgical Topical Tacrolimus on Pedicled Flap Survival in Rats: A Pilot Study. Plastic and Reconstructive Surgery Global Open. 2021;9(10 Suppl).
3. Wald G, Van YV, Towne W, Otterburn DM. The Effect of Topical Tacrolimus on Pedicled Flap Survival: A Histological Analysis. Ann Plast Surg. 2021;87(1s):S57-S59. doi:10.1097/SAP.0000000000002799

Comparative Analysis of Breast Implant Illness Symptoms in Implant-Based, Autologous, and No Reconstruction Mastectomy Patients: A Propensity-Score Matched TriNetX Study

Abstract Presenter: Emmi Deckard

Abstract Co-Author(s): Yash Mehta, Andre-Philippe Sam, Medha Vallurupalli, Payton Grande, Daniel Novak, Christopher Reid MD

Background: Breast implant illness (BII) refers to a set of nonspecific systemic symptoms including fatigue, joint pain, anxiety, cognitive dysfunction, rash, and weight changes reported by some patients with breast implants. Although BII lacks formal diagnostic criteria and is not universally recognized, public awareness has grown, with some individuals undergoing explantation in hopes of symptom relief. Existing studies offer mixed findings-while explantation can alleviate symptoms for some, others report persistent issues, suggesting multifactorial mechanisms. Given limited epidemiological data on BII-compatible symptoms, especially when comparing different reconstructive approaches, this retrospective cohort study utilized the TriNetX federated global network

to evaluate the incidence of these symptoms in mastectomy patients who underwent autologous reconstruction, implant-based reconstruction, or no reconstruction.

Methods: We queried TriNetX for women aged ≥18 years diagnosed with breast cancer between 2005 and 2025 who had a mastectomy with or without reconstruction. Patients with pre-existing BII-compatible symptoms or with non-breast malignancies were excluded. Three cohorts were defined: no reconstruction, autologous reconstruction, and implant-based reconstruction. BII-compatible symptoms outlined by the FDA-fatigue, joint pain, anxiety, cognitive dysfunction, autoimmune disease, hair loss, depression, rash, headache, and abnormal weight changes-were identified via ICD-10 codes between 3–30 years post-surgery. 1:1 Propensity score matching was performed for age, race, receptor status, TNM stage, BMI, diabetes, hypertension, and hyperlipidemia. Risk ratios (RR) with 95% confidence intervals assessed differences in symptom incidence.

Results: After matching, 3,854 patients were included in the implant vs. autologous comparison, 6,990 in autologous vs. no reconstruction, and 4,380 in implant vs. no reconstruction. Compared to no reconstruction, autologous reconstruction had significantly higher risks of fatigue (RR=1.406; p=0.006), joint pain (RR=1.287; p=0.004), cognitive dysfunction (RR=2.089; p=0.040), and abnormal weight gain (RR=2.701; p=0.001). There were no significant differences between implant-based and autologous groups. When implant-based reconstruction was compared to no reconstruction, the implant group showed a lower risk of fatigue (RR=0.663; p=0.007) and rash (RR=0.611; p=0.041). All other symptoms, including anxiety, depression, headache, hair loss, and other weight changes, did not differ significantly.

Conclusions: In this analysis, autologous reconstruction was linked to higher rates of certain BII-like symptoms compared to no reconstruction, whereas implant-based reconstruction posed no additional risk relative to autologous and was associated with fewer symptoms than no reconstruction. These findings imply that factors such as surgical complexity, psychosocial stress, or comorbidities may underlie postoperative systemic symptoms. Cancer patients may also experience heightened surveillance, health anxiety, or somatic complaints, prompting further research. Prospective investigations with standardized patient-reported outcomes, extended follow-up, and psychosocial assessments are needed to clarify BII pathophysiology, refine diagnostic criteria, and determine whether these symptoms arise from inflammatory or psychological origins. Ultimately, standardized definitions and diagnostic pathways may reduce confusion and support evidence-based counseling for patients considering or undergoing reconstruction.

Second Stage Mastopexy Following Nipple-Sparing Mastectomy in Implant and Autologous-Based Breast Reconstruction Reduces NAC Malposition

Abstract Presenter: Michael Mazarei

Abstract Co-Author(s): Michel Saint-Cyr MD, MBA, MHA, FRCSC, FACS, Irene Ma MD, Ricardo Gomez, Nicholas Lombana MD

Introduction: Dermal pedicle flaps and immediate mastopexy certainly are powerful tools at the first stage of the reconstruction in selected patients with excellent vascularity to the mastectomy skin flaps, small to moderate sized breasts, thick mastectomy skin flaps, and minimal comorbidities. Nevertheless, many patients are not candidates for immediate mastopexy and are better served by performing this at the second stage of their reconstruction. In this article, we describe the 2-stage surgical technique that has been used by the senior for all his primary tissue-expander based breast reconstruction. Our goal was to compare mastopexy volume, rate of NAC malposition, and necrosis in first versus second stage mastopexy.

Methods: A retrospective review of NSM patients undergoing two-stage reconstruction from 2021 to 2024 was conducted. This included a total of 150 patients. We assessed NAC positioning, complication rates, and the impact of mastopexy techniques (periareolar vs. inverted-T). Fat grafting was performed in all implant-based reconstructions. Data included implant size, flap type, and adjunctive procedures such as capsulorrhaphy.

Results: 150 patients (242 breasts) with average age of 51.2 ± 3.8 years old underwent mastopexy at the second stage of reconstruction. The mean weight of the excised breast tissue was 575 ± 120 grams. The overall complication rate was 8%. There was one case of complete nipple necrosis. There were no cases of flap loss. Asymmetry of the NAC was present in 8% of the groups.

Conclusion: Our results compare very favorably to historical mastopexy results in cosmetic surgery and are relatively much lower than reports when performed at the time of initial reconstruction and mastectomy. The striking result of this series is that NAC was able to be positioned in the correct normal Pitanguy's point position in phase two despite having grade two or greater ptosis at the initial reconstruction This study supports second-stage mastopexy as a safe and effective method to enhance

reconstructive outcomes after NSM, particularly when combined with fat grafting and pre-pectoral implant placement.

Predicting Breast Reconstruction Readmission, Reoperation, and Prolonged Length of Stay: A Machine Learning Approach

Abstract Presenter: Ariel Gabay

Abstract Co-Author(s): Jonlin Chen MD, Babak Mehrara MD, Carrie Stern MD, Chris Gibbons PhD, Jonas Nelson MD

Purpose: Predicting short-term postoperative complications after breast reconstruction is critical for improving patient outcomes and reducing healthcare costs. This study aimed to investigate the utility of machine learning algorithms to predict 30-day readmission, 30-day reoperation and prolonged length of stay in patients undergoing breast reconstruction.

Methods: Data was collected from patients who underwent autologous, implant, and tissue expander-based reconstruction in the National Surgical Quality Improvement Program (NSQIP) database (2020-2022). Six machine learning algorithms (XGBoost, LightGBM, Random Forest, AdaBoost, logistic regression, and a neural network) were trained to predict 30-day readmission, 30-day reoperation and prolonged length of stay. Model performance was assessed using area under the receiver operating characteristic curve, sensitivity, specificity, and Brier score. SHapley Additive exPlanations (SHAP) values ranked predictors influencing model outcomes.

Results: A total of 27,718 patients (5,584 autologous; 8,170 implant; 13,964 TE) were included. Top-performing machine learning models showed moderate to strong predictive performance across cohorts for 30-day reoperation, 30-day readmission, and prolonged length of stay, with AUCs ranging from 0.614 to 0.861. The highest AUCs were achieved for prolonged length of stay in the implant cohort (AUC 0.861) and for 30-day readmission in the delayed autologous cohort (AUC 0.859). Key predictors of reconstructive complications included operative time, BMI, age, reconstruction timing, and ASA class.

Conclusion: Machine learning can predict short-term postoperative outcomes in breast reconstruction patients. With further model refinement and data quality optimization,

these models may improve preoperative risk-stratification and patient outcomes in breast reconstruction.

Clinical Outcomes of Acellular Dermal Matrix Alone Versus Acellular Dermal Matrix with Adipodermal Flaps in Implant-Based Breast Reconstruction: A Multi-Center Analysis

Abstract Presenter: Lilian Galarza Paez

Abstract Co-Author(s): Anna Stipe, Eric Zeng, Abigail Heilenman, Joyce Cui, Caitrin Curtis MD, Adam Katz MD

Background: Implant-based breast reconstruction (IBBR) is increasingly utilized by plastic surgeons. Continued challenges in IBBR include limited expander/implant coverage and frequent complications. Improved coverage is tackled with biological meshes and dermal flaps though their comparative improvement in complications is limited; thus, some surgeons combine these tools. The purpose of this study was to evaluate clinical outcomes of IBBR using acellular dermal matrix (ADM) alone versus ADM combined with adipodermal flaps (ADF) across multiple medical centers.

Methods: We identified 382 patients who received IBBR with implants or tissue expanders after mastectomy at two Atrium Health medical centers between January 2018 and July 2024. Data on patient demographics, preoperative ptosis grade, and body mass index (BMI) was retrospectively collected. Clinical outcomes including seroma, hematoma, infections, and necrosis were categorized as either major complications or minor complications based on whether they required return to the operating room.

Results: Of the 643 reconstructions, 580 used ADM alone and 63 used ADM with ADF. Patients who received ADM with ADF had higher BMIs ($p<0.001$). The ADM with ADF cohort had higher grades of preoperative ptosis ($p<.001$). The ADM with ADF cohort had 1.87 times the odds of major complications compared to the ADM cohort, though not statistically significant ($p=0.243$). Similarly, there were no differences in the odds of overall complications, minor complications, or revisions ($p=.325$, $p=.321$, $p=0.09$). Notably, in patients with grade III ptosis, there was a significantly higher rate of major complications in the ADM with ADF cohort (20.9% vs 8.0%; $p=0.046$).

Conclusions: Previous studies found similar aesthetic outcomes and complication rates when comparing IBBR with ADM versus no ADM and ADM versus ADF (1,2). We find that adding ADF to IBBR with ADM provides no significant change in risk of complications. When taken into consideration with previous findings that ADM alone versus ADF alone do not have significant differences in complications, we support the conclusion that opting for ADF alone might be a more cost-effective approach to IBBR without a significant increase in complication risk (3). Previous studies have not explored other patient factors, aside from BMI, that may influence the outcomes of different reconstructive aids. Here, we identify ptosis as a possible predictor of increased complication risk though more research is needed.

References:
1. Lohmander F, Lagergren J, Johansson H, Roy PG, Brandberg Y, Frisell J. Effect of Immediate Implant-Based Breast Reconstruction After Mastectomy With and Without Acellular Dermal Matrix Among Women With Breast Cancer: A Randomized Clinical Trial. JAMA Netw Open. 2021 Oct 1;4(10):e2127806. doi:10.1001/jamanetworkopen.2021.27806

2. Hon HH, Mubang RN, Wernick BD, Freedman SF, Stoltzfus JC, Miele LF, Stawicki SP, Morrissey WM Jr. Acellular Dermal Matrix Versus Inferior Deepithelialized Flap Breast Reconstruction: Equivalent Outcomes, with Increased Cost. Plast Reconstr Surg Glob Open. 2017 Jun 28;5(6):e1382. doi: 10.1097/GOX.0000000000001382.

3. Mata Ribeiro L, Meireles RP, Brito IM, Costa PM, Rebelo MA, Barbosa RF, Choupina MP, Pinho CJ, Ribeiro MP. Comparison of Outcomes in Immediate Implant-Based Breast Reconstruction: Acellular Dermal Matrix versus Inferior Dermal Flap. Arch Plast Surg. 2022 Apr 6;49(2):158-165. doi: 10.1055/s-0042-1744404.

Does Liposomal Bupivacaine Reduce Postoperative Opioid Use in Tissue Expander Based Breast Reconstruction?

Abstract Presenter: Thomas Ren

Abstract Co-Author(s): Andre Galenchik-Chan, Nicolas Oltean, Eric Forney MD

Introduction: Tissue expander-based breast reconstruction commonly relies on opioids for postoperative pain management, but opioid use is associated with significant

adverse effects, including nausea, sedation, constipation, and the potential for dependence. With the increasing adoption of Enhanced Recovery After Surgery (ERAS) protocols, multimodal pain management strategies have been developed to minimize opioid consumption. Liposomal bupivacaine (Exparel) provides prolonged analgesia for 48-72 hours, potentially reducing postoperative opioid requirements compared to traditional bupivacaine (Marcaine), which has a duration of only 6-8 hours. This study evaluates whether Exparel regional blocks reduce opioid consumption in patients undergoing breast reconstruction with tissue expander placement compared to Marcaine.

Methods: A retrospective cohort study was conducted using medical records from January 2019 to June 2022 across multiple institutions. Patients undergoing tissue expander-based breast reconstruction with either Exparel or Marcaine administered via PECs 1, PECs 2, and serratus anterior blocks were included. Opioid prescriptions were confirmed through the New York Prescription Monitoring Program (PMD) and converted into morphine equivalent doses (MED) for comparison. Exclusion criteria included patients with chronic pain, pre-existing opioid use, or incomplete PMD documentation. Primary outcomes included total opioid consumption (MED), number of opioid prescriptions, and differences in opioid type usage between the two cohorts. Statistical analysis included Chi-square tests, ANOVA, and Tukey's Honestly Significant Difference tests, with a significance threshold of $p<0.05$.

Results: A total of 163 patients were analyzed (42 Marcaine, 121 Exparel). The mean age was 53.8 years, with 57 unilateral and 106 bilateral reconstructions. Groups did not differ significantly by age, laterality of reconstruction, or timing of tissue expander placement, though the Exparel group had a significantly higher proportion of sub-pectoral tissue expander placements ($p<0.05$). The Exparel group had significantly lower opioid consumption, with a mean MED of 97.2 ± 81.8 compared to 160.5 ± 150.6 in the Marcaine group ($p<0.005$). Additionally, patients receiving Exparel had fewer total opioid prescriptions ($p<0.05$). When analyzing opioid type, patients in the Exparel cohort who were prescribed Percocet or Oxycodone (alone or in combination) had significantly lower MED and total opioid prescriptions compared to the Marcaine group ($p<0.05$). However, there was no significant difference in Tramadol use between cohorts, suggesting that patients receiving Tramadol may represent a subgroup with a higher baseline opioid requirement. Patients prescribed multiple opioid types (e.g., Percocet + Tramadol or Percocet + Oxycodone) had higher MED and total opioid prescriptions than those prescribed a single opioid type ($p<0.05$), emphasizing the impact of combination opioid therapy on overall consumption.

Conclusion: The use of Exparel regional blocks significantly reduces postoperative opioid consumption and total opioid prescriptions following tissue expander-based breast reconstruction compared to Marcaine. This is likely due to Exparel's extended analgesic effect during the critical early postoperative period, when pain is most severe. These findings align with previous studies demonstrating the efficacy of Exparel in reducing opioid use across various surgical procedures. While Exparel offers improved pain control and opioid reduction benefits, its higher cost remains a consideration. Future prospective, multi-institutional studies with larger patient populations are needed to further validate these findings and assess the cost-effectiveness of Exparel in routine breast reconstruction protocols.

BMI and Surgical Outcomes in Post-Mastectomy Breast Reconstruction: A Safety-Net Hospital Experience

Abstract Presenter: Michael Kim

Abstract Co-Author(s): Jordan Gasho, Elizabeth Boudiab MD, Pedro Angel Perez, Helen Zhu, Joseph Carey MD, Emma Koesters MD, David Daar MD, MBA

Background: Safety-net hospitals care for underserved populations, often treating many publicly insured and uninsured patients with complex comorbidities. As a results, surgical outcomes at these facilities are often worse compared to other institutions [1][2]. With the increasing prevalence of post-mastectomy implant-based reconstruction, more overweight and obese women are seeking breast reconstruction. Although obesity is a known risk factor for postoperative complications with breast reconstruction, most studies rely on large databases, limiting focus on safety-net populations, which may be more vulnerable [3][4]. This study assessed the safety and risk of post-mastectomy implant-based reconstruction in obese patients at a safety-net hospital.

Methods: A retrospective review was conducted on patients who underwent mastectomy with implant-based reconstruction between February 2010 and June 2024 at a Los Angeles safety-net hospital. Patients with less than three months of follow-up were excluded. Remaining patients were stratified into nonobese (BMI = 20 to 29.9 kg/m2) and obese (BMI > 30 kg/m2) groups. The Area Deprivation Index (ADI) was calculated for each patient to assess socioeconomic status [5]. Rates of postoperative implant complications (including mastectomy flap necrosis, infection, implant exposure, implant loss, implant exchange, seroma, and wound dehiscence), infection, and

unplanned reoperations were collected. Demographics and risk factors for complications were considered. Statistical analyses included Chi-Squared and Fisher's exact tests for categorical variables and Kruskal-Wallis test for continuous variables. A multivariable regression analysis controlled for differences between the nonobese and obese cohorts.

Results: During the study period, 101 patients met inclusion criteria, yielding 158 breast reconstructions. In total, 56% were Spanish-speaking and 68% of Latinx/Hispanic ethnicity. The majority (93%) were covered by public insurance and 7% were uninsured or self-pay. Mean (range) ADI was 6 (1-9). Most patients (92%) were treated with tissue expander, while 7.9% received direct to implant reconstruction. The prevalence of obesity was 27.7%, with 17.8% defined as class I obese (BMI = 30 to 34.9 kg/m2), 5.9% defined as class II obese (BMI = 35 to 39.9 kg/m2), and 3.9% defined as class III obese (BMI > 40 kg/m2). Compared to nonobese patients, the obese groups had a higher prevalence of hypertension (p=0.02). No significant differences in other risk factors were identified, including diabetes mellitus, positive smoking history, perioperative chemotherapy, and perioperative radiotherapy (p>0.05). Obese patients (BMI >30 kg/m2) had significantly higher rates of all-cause implant complications (p=0.045), unplanned reoperation (p=0.036), tissue expander removal (p=0.001), and infections (p=0.004). Most (34.6%) unplanned reoperations were for tissue expander removal, followed by excision of necrosed skin (19.2%) and implant removal for infection (11.5%). Median time to unplanned reoperation was 3.45 months (IQR 1.18-9.89 months), with similar durations across BMI groups (p=0.53). Seven patients (6.9%) were readmitted within 30 days, with no significant difference between groups (p=0.09). On logistic regression controlling for hypertension, obesity remained a predictor of infection (OR=3.79, 95% CI: 1.26-11.37, p=0.017).

Conclusion: Obesity was associated with higher risks for complications in implant-based breast reconstruction, specifically infection. Further studies should focus on further delineating the relationship between severity of obesity and breast implant complications.

References:
1. Mouch CA, Regenbogen SE, Revels SL, Wong SL, Lemak CH, Morris AM. The quality of surgical care in safety net hospitals: a systematic review. Surgery. 2014;155(5):826-838. doi:10.1016/j.surg.2013.12.006
2. Hong Y, Zheng C, Hechenbleikner E, Johnson LB, Shara N, Al-Refaie WB. Vulnerable Hospitals and Cancer Surgery Readmissions: Insights into the Unintended Consequences of the Patient Protection and Affordable Care Act. J Am Coll Surg. 2016;223(1):142-151. doi:10.1016/j.jamcollsurg.2016.04.042

3. Taghioff SM, Slavin BR, Mehra S, Holton T, Singh D. Risk stratification of surgical-site outcomes by BMI and flap type in autologous breast reconstruction. J Plast Reconstr Aesthet Surg. 2023;80:115-125. doi:10.1016/j.bjps.2023.01.042
4. Fischer JP, Cleveland EC, Nelson JA, et al. Breast reconstruction in the morbidly obese patient: assessment of 30-day complications using the 2005 to 2010 National Surgical Quality Improvement Program data sets. Plast Reconstr Surg. 2013;132(4):750-761. doi:10.1097/PRS.0b013e31829fe33c
5. Kind AJH, Buckingham WR. Making Neighborhood-Disadvantage Metrics Accessible - The Neighborhood Atlas. N Engl J Med. 2018;378(26):2456-2458. doi:10.1056/NEJMp1802313

The Price is Right? Hourly Pay Disparities in Breast Reconstruction.

Abstract Presenter: Chanel Varney

Abstract Co-Author(s): Jenny Foster, J. Andres Hernandez MD, Brett Phillips MD, MBA, Andrew Atia MD, Alexandria Mullikin MD, Pranav Haravu MD, Andreas Seas

Background: Microvascular breast reconstruction exhibits high levels of patient satisfaction but is performed far less often than implant-based reconstruction (1). Underpayment of free flap reconstruction is thought to contribute to this trend (2). Previous studies have characterized compensation disparities between the two reconstruction types by measuring 1) work relative value units (wRVUs) per hour, 2) claims-based reimbursement per wRVU, and 3) theoretical CMS-based reimbursement per hour (3-5). This study re-explores compensation disparities between implant-based and free flap reconstruction, using real-world collections and operative times data to calculate an effective hourly reimbursement rate.

Methods: The PearlDiver multi-payer claims database was queried from 2017-2022 for records matching immediate implant (CPT-19340), delayed implant (CPT-19342), tissue expander (CPT-19357), free flap (CPT-19364), or DIEP flap (S2068) operations. Individual claims were included if they represented an operation performed by a plastic surgeon, had non-zero reimbursement, and did not co-list mastectomy-related CPT codes. The National Surgical Quality Improvement Program (NSQIP) database was queried from 2017-2022 to obtain operative time data from records with parallel inclusion criteria. Median collections were divided by median operative time to establish

an effective hourly reimbursement rate. Differences between groups were analyzed via Kruskal-Wallis and Mann-Whitney tests.

Results: Median per-operation reimbursements for immediate implant, delayed implant, tissue expander, free flap, and DIEP flap were $2,538, $2,245, $3,316, $8,265, and $16,363, respectively ($p<0.01$). Median operative times for delayed implant (19342), tissue expander (19357), and free flap (19364) were 89.0, 93.0, and 450.0 minutes, respectively ($p<0.01$). The overall 2017-2022 median hourly reimbursement rates for immediate implant, delayed implant, tissue expander, free flap, and DIEP flap were $1,711/hr, $1,513/hr, $2,139/hr, $1,102/hr, and $2,218/hr, respectively. Each group earned significantly greater reimbursements from non-CMS than CMS payers ($p<0.01$). For each group, median per-operation reimbursements were greater in inpatient than outpatient settings; however, outpatient operations earned greater hourly rates due to significantly reduced operative times ($p<0.01$).

Conclusions: By leveraging claims data, our study captures a broader array of factors impacting real-world reimbursement than are reflected by wRVU- or CMS-based estimates alone. By standardizing reimbursement according to operative time, we enable direct comparison between reconstruction groups. The data show compensation disparities between implant-based and free flap reconstruction, including a two-fold difference in hourly reimbursement between tissue expander and free flap groups. These trends may arise from differences in commercial insurance negotiations and variable usages of inpatient versus outpatient settings. Without intervention, reimbursement disparities may insufficiently incentivize the growth of microvascular reconstruction techniques.

References:

1. Panchal H, Matros E. Trends in postmastectomy breast reconstruction. Plast Reconstr Surg. 2017;140(5S):7S-13S.
2. Panchal H, Shamsunder M, Sheinin A, et al. Physician payments and microvascular breast reconstruction. Plast Reconstr Surg. 2020;145(2):333-339.
3. Cadwell JB, Ahsanuddin S, Patel S, et al. RVUs and operative time in plastic surgery. J Plast Reconstr Aesthet Surg. 2022;75(7):2286-2292.
4. De la Fuente Hagopian A, Farhat S, Reddy NK, et al. Reimbursement in reconstructive vs. aesthetic surgery. Plast Reconstr Surg Glob Open. 2024;12(11):e6313.
5. Shamsunder MG, Sheckter CC, Sheinin A, et al. Payment variation for microsurgical reconstruction. Plast Reconstr Surg. 2021;147(3):505-513.

Safety And Efficacy Of Polydioxanone (Durasorb) Mesh In Prepectoral Direct-To-Implant Breast Reconstruction

Abstract Presenter: Reena Sulkar MD

Abstract Co-Author: Frederick Duffy Jr., MD

Options for breast reconstruction with implants continue to evolve. Increasingly implants are placed in the prepectoral space to avoid added discomfort from muscle elevation which leads to less animation deformity, less pain, and swifter recovery. In addition, the direct-to-implant approach bypasses tissue expander placement completely in select patients, which diminishes the complications associated with additional surgery (expander implant exchange) and improves patient satisfaction. Because of the surgical dissection involved with a mastectomy however, direct-to-implant reconstruction often requires mesh to control implant position to maximize the aesthetic result.

There are a variety of meshes available to address clinical scenarios that require soft tissue support, such as controlling implant position in direct-to-implant breast reconstruction. This series examined the efficacy of Durasorb mesh, a polydioxanone mesh that is FDA approved and a relatively new addition to the existing meshes available for use in reconstructive and aesthetic breast surgery. Durasorb provides for structural support of the implant at the time of placement but is more biocompatible than other mesh options. Durasorb degrades and disappears over time and appears to lead to less seromas, chronic inflammation, and minimal long-term foreign body reactions. This abstract details the results of a single surgeon's use of Durasorb in direct-to-implant breast reconstruction over a 30 month period.

Seventy-eight patients had direct-to-implant breast reconstruction in the prepectoral space over the study period. Sixty-two patients had bilateral reconstruction, and sixteen patients had unilateral reconstruction for a total of 140 distinct surgical sites. Intraoperative fluoroscopic imaging of all mastectomy flaps was used at the time of implant placement in all DTI patients which lowers the likelihood mastectomy flap necrosis and implant exposure. No patient spent more than one night in the hospital, and as the study progressed, more patients were sent home the same day. Of the 140 implants placed, four implants became infected and had to be removed (3% of the total placed). An additional three patients had their implants removed or exchanged because of mastectomy skin necrosis, including one patient who presented nine months after reconstruction with lower pole skin necrosis without infection. At the time of this abstract

review, approximately 20% of patients had additional elective procedures such as fat grafting or implant exchanges postoperatively during the study period for a variety of aesthetic and symmetry reasons.

This study demonstrates the safety and effectiveness of Durasorb mesh in immediate direct-to-implant breast reconstruction. In selected patients this study negates the additional cost and risk of first stage tissue expander breast reconstruction. Patients are out of the hospital quicker and throughout the study period an increasing percentage of patients had their mastectomies and direct-to-implant reconstructions as outpatients. The results of this series suggests that Durasorb mesh may deliver superior results in direct-to-implant breast reconstruction in select patients with lower overall cost, shorter hospitalizations, and diminished short term complications based on prior studies and less long term foreign body reactions.

Revisiting Pre-Operative Screening for Tissue Expander Infections

Abstract Presenter: Tiffany Shi

Abstract Co-Author(s): Victoria Lee, Ermina Lee, Christina Kuhrau, Kiersten Woodyard De Brito MD, Ryan Gobble MD

Background: Tissue expander (TE) infections are a significant concern in breast reconstruction, leading to increased morbidity, extended treatment durations, potential loss of the expander, and delays in final reconstructive procedures. Staphylococcus aureus, including methicillin-resistant Staphylococcus aureus (MRSA), are frequently implicated pathogens in these infections. Consequently, preoperative nasal swabbing and decolonization protocols have been implemented to mitigate infection risks associated with these organisms. However, a standardized, universally accepted protocol for infection prevention remains elusive. This study evaluates the impact of preoperative S. aureus and MRSA screening on TE-related infections.

Methods: A retrospective chart review was conducted, encompassing 151 TEs implanted in 93 patients at a single institution. Preoperative screening for S. aureus and MRSA was performed, with results confirmed prior to surgical intervention. Patients identified as carriers received appropriate decolonization treatment. The primary outcome measured was the incidence of TE infections necessitating premature

removal. All statistical analyses, including student T-tests, were performed using R software (v.4.2.0).

Results: Of 93 patients, 50 received pre-operative screening. S. aureus was identified in 9/50 (18%) and MRSA in 1/50 (2%), and appropriately treated. Of 151 TEs placed, 16 (10.6%) were prematurely removed due to infection concern. 9/16 (56%) were culture-positive with 1 growing skin flora (C. acnes). 5/8 (62.5%) of the remaining culture-positive infections grew P. aeruginosa, while 2/8 (25%) grew S. marcescens. One patient's culture grew MRSA, but notably, this patient was neither S. aureus nor MRSA-positive prior to TE placement. There were no significant differences in days from implantation (p=0.85) or days from the last fill (p=0.66) to first noted infection between TEs with and without culture growth.

Conclusions: Pre-operative screening and decolonization for S. aureus and MRSA alone may not sufficiently reduce the incidence of TE infections, given the prevalence of infections caused by other pathogens. Our findings further suggest that infection risk may be driven more by bacterial colonization, host susceptibility, and procedural factors rather than the timing of implantation or expansions. A more comprehensive infection control strategy should be considered to address the diversity of infectious agents with attention to institution-specific microbial factors. Further research is warranted to develop and validate effective preventive measures tailored to the specific risk factors and microbial profiles associated with breast reconstruction procedures.

Vascular Delay vs. Immediate Implant-Based Breast Reconstruction: Analyzing Predictors and Complications

Abstract Presenter: Anna Stipe

Abstract Co-Author(s): Lilian Galarza Paez, Eric Zeng, Joyce Cui, Abigail Heilenman, Caitrin Curtis MD, Adam Katz MD

Background: Implant-based breast reconstruction (IBBR) may be performed immediately at the time of mastectomy, within 28 days for ischemic preconditioning (vascular delay reconstruction, VDR), or more than 28 days after mastectomy (delayed reconstruction) (1). Immediate reconstruction (IR) is often favored due to its psychological benefits, preservation of the native breast envelope, and its cost-effectiveness by reducing operating time and hospital stays (2). However, some

surgeons opt for VDR to optimize mastectomy flap perfusion. While the literature does not often distinguish between VDR and delayed reconstruction, it is noted that patients with higher BMIs, smoking history, and prior radiation may be more likely to undergo delayed reconstruction (3).

Objective: This study aimed to analyze patient characteristics in IR versus VDR groups and assess whether factors such as BMI, smoking history, and prior radiation can help predict optimal reconstructive timing. Additionally, ischemic complication rates were compared in IR versus VDR breasts.

Methods: Patients who underwent IBBR between 2018 and 2024 with at least 6 months of follow-up were identified. A retrospective chart review was performed, and statistical analysis was conducted using chi-squared tests, t-tests, and Fisher's exact tests to compare BMI, smoking history, radiation history, and complication rates between IR and VDR groups.

Results: A total of 384 IBBR cases met the inclusion criteria, comprising 318 IR and 66 VDR cases. The average BMI in the IR group was 27.7 ± 6.7 compared to 26.3 ± 4.9 in the VDR group (p-value = 0.057). Ninety (28.3%) patients in the IR group were current or previous smokers compared to 15 (22.8%) in the VDR group (p-value = 0.728). Seventy-five (23.6%) patients in the IR group had prior radiation history compared to 12 (18.2%) in the VDR group (p-value = 0.338). There was a total of 22 (4.2%) ischemic complications in the IR group when considering all reconstructed breasts (n = 528) compared to 5 (4.6%) in the VDR group (n = 110) (p-value = 0.797).

Conclusion: BMI, smoking history, and prior radiation history showed no significant differences between the IR and VDR groups. This suggests low utility using these factors to predict the need for VDR. The decision is likely driven by the surgeon's intraoperative assessment of ischemic risk to the flap. Additionally, ischemic complication rates were similar between the two groups, suggesting that VDR may not provide a significant benefit. However, it's possible that ischemic complications were prevented by the use of VDR. A randomized trial is needed to determine the true benefit of VDR.

Sources:
(1). Prabhu, S., Llull, R., & Katz, A. (2022). The Language of Implant-based Breast Reconstruction: Can We Do Better? Plast Reconstr Surg Glob Open, 10(8), e4482. https://doi.org/10.1097/GOX.0000000000004482

(2). Ananthakrishnan, P., & Lucas, A. (2008). Options and considerations in the timing of breast reconstruction after mastectomy. Cleve Clin J Med, 75 Suppl 1, S30-33. https://doi.org/10.3949/ccjm.75.suppl_1.s30
(3). Sullivan, S., Fletcher, D., Isom, C., & Isik, F. (2008). True incidence of all complications following immediate and delayed breast reconstruction. Plast Reconstr Surg, 122(1), 19-28. https://doi.org/10.1097/PRS.0b013e3181774267

Impact of Perioperative Vasopressor Use on Postoperative Outcomes in DIEP Flap Breast Reconstruction for Patients with Breast Cancer

Abstract Presenter: Michael Turgeon MD

Abstract Co-Author(s): Renee Gao, Yibin Zhang, Goutam Gadiraju, Yizhuo Shen, Madeline Duncan, Justin Broyles MD

Introduction: The Deep Inferior Epigastric Perforator (DIEP) flap is a widely used approach for breast reconstruction given its incorporation of autologous tissue and minimal donor site morbidity. However, there is debate regarding the use of vasopressors during these procedures, given the concern of vasospasm, thrombosis, or congestion that may compromise flap perfusion. Recent studies have challenged this notion, suggesting that the judicious use of vasopressors may not adversely affect flap outcomes.(1) This study aims to evaluate the impact of intraoperative and perioperative vasopressor use on vascular complications in DIEP flap breast reconstruction and to examine the relationship between vascular anastomosis requirements and vasopressor administration.

Methods: A retrospective review of patients with stage I-III breast cancer (AJCC 8th edition) who underwent DIEP flap breast reconstruction 2023-2024 at a single, quaternary-referral center were included. Primary outcomes were postoperative complications, including wound dehiscence, fat necrosis, partial, and total flap necrosis.

Results: Of 217 patients, 343 DIEP flaps were included, with 41.5% (n=90) and 58.5% (n=127) undergoing unilateral and bilateral DIEP, respectively. The mean BMI was 28.5±3.8. Radiation therapy was administered to 79.3% (n=172) of patients. Vasopressors (phenylephrine, ephedrine, and/or epinephrine) were administered in 34.0% (n=120) of cases, among which 53.4% (n=63) only received vasopressors during

induction, 21.2% (n=25) only received vasopressors intraoperatively, and 26.7% (n=32) received vasopressors both at induction and intraoperatively.

Among patients who received vasopressors intraoperatively, 24% (n=6) had wound dehiscence, 28% (n=7) had fat necrosis, and 12% (n=3) had partial flap necrosis. There were no cases of surgical site infection or total flap loss. The median follow-up was 257 days.

Vasopressors administered at induction were associated with the need for additional superficial venous anastomosis (OR=4.69, 95% CI 1.42-15.4, p=0.01). The use of ≥2 vasopressors intraoperatively was associated with venous anastomosis revision (OR=3.70, 95% CI 1.21-11.32, p=0.02). Postoperative blood transfusions, venous anastomosis revision, arterial anastomosis revision, and longer operative time was associated with increased partial flap necrosis (OR=5.91, 95% CI 1.46-23.9, p=0.01; OR=3.58, 95% CI 1.36-9.43, p=0.01; OR=3.33, 95% CI 1.28-8.69, p=0.01; OR 1.31, 95% CI 1.02-1.69, p=0.03, respectively). Importantly, vasopressor use, either administered at induction or intraoperatively, was not associated with an increased risk for postoperative complications.

Conclusion: Vasopressor use, either administered at induction or intraoperatively, was not associated with an increased risk of postoperative complications for patients undergoing DIEP flap breast reconstruction. However, vasopressor use may portend technical challenges, particularly with the venous anastomosis. The judicious use of vasopressors is recommended.

1. Szabo Eltorai A, Huang CC, Lu JT, Ogura A, Caterson SA, Orgill DP. Selective Intraoperative Vasopressor Use Is Not Associated with Increased Risk of DIEP Flap Complications. Plast Reconstr Surg. 2017;140(1):70e-77e. doi:10.1097/PRS.0000000000003444

Pushing the Boundary on Traditional: Modified Nipple-Sparing Goldilocks (NSGL) with Implant-Based Breast Reconstruction in Patients with High Preoperative Risk

Abstract Presenter: Evann Mitchell

Abstract Co-Author(s): Suhair Maqusi MD, Nicole Oweis, Caroline Freedle, Moneim Elomeiri MD

Background: Nipple preservation with mastectomy improves aesthetic outcome, patient satisfaction, and wellbeing. However, patients with high BMI, comorbidities, and significant breast ptosis have increased risk profiles in breast reconstruction, which historically precluded them from nipple-sparing mastectomy (NSM) and implant-based breast reconstruction (IBBR). The Goldilocks technique, contouring residual mastectomy skin flaps to shape a breast mound, was originally introduced to provide enhanced cosmesis and breast volume in these high-risk patients previously ineligible for IBBR. Recent studies demonstrate modified Goldilocks techniques that repurpose the dermal pedicle to provide autologous NSM or enhanced support for IBBR in high-risk patients. However, there is no study to date that evaluates the safety and efficacy of Nipple-Sparing Goldilocks with IBBR in patients with high BMIs and significant ptosis.

Objective: To characterize the safety of Nipple-Sparing Goldilocks (NSGL) versus Traditional NSM (TNSM) with IBBR in patients with high BMI and breast ptosis.

Methods: A retrospective analysis was conducted on patients undergoing NSGL or TNSM with immediate prepectoral IBBR at the University of Oklahoma Health Sciences Center from January 2023 to April 2024. Exclusion criteria included ADM use and prior breast surgery. Inclusion criteria required minimum 3-month follow-up and complete preoperative measurements (BMI, sternal notch-to-nipple (SNN), nipple-to-inframammary fold (NIMF) and mid-clavicle-to-nipple distance (MCN)). Postoperative complications, characterized by nipple necrosis, wound dehiscence, infection, device exposure and failure, and pocket salvage, were compared using univariate and multivariate data analysis. $P < 0.05$ determined significance.

Results: A total of 49 patients (84 breasts) were included. Mean follow-up was 10 and 14 months for NSGL (n = 54 breasts) and TNSM (n = 30 breasts), respectively. NSGL had significantly higher BMI (35.5 vs. 25.7 kg/m2, $p < 0.0001$) and greater ptosis measurements (SNN, MCN, NIMF; all $p < 0.0001$) than TNSM, while age was similar across groups. There was no significant difference in overall complication rate between NSGL (n = 20) and TNSM (n = 8, $p = 0.469$). Partial nipple necrosis was significantly higher in NSGL (n = 6) versus TNSM (n = 0, $p = 0.038$). Full nipple necrosis was clinically higher in NSGL (n = 7) than in TNSM (n = 1), though not statistically significant ($p = 0.249$). All other measures of complication showed no significant differences ($p > 0.05$), including multivariate and matched analyses adjusting for confounders.

Conclusion: Despite significantly higher BMI and greater ptosis, Nipple-Sparing Goldilocks showed similar overall complication rates to Traditional NSM with IBBR. Even though the Goldilocks group exhibited a higher incidence of nipple necrosis, the difference in full nipple necrosis was not statistically significant, suggesting larger studies are needed to further assess this risk. Importantly, many of these patients with higher BMI and breast ptosis would traditionally not be considered for a nipple-sparing mastectomy and opted for the risk of nipple necrosis in pursuit of improved aesthetics and satisfaction. These findings suggest nipple-sparing Goldilocks with IBBR is safe in high-risk patients, expanding reconstructive possibilities for those historically excluded from nipple-sparing mastectomy.

Utility of Tranexamic Acid in Reduction Mammaplasty: A Systematic Review and Meta-Analysis

Abstract Presenter: Ethan Fung

Abstract Co-Author(s): Keisha Montalmant MD, MPH, Jacquelyn Roth, Maxwell Godek, Jian Li, Bernice Yu MD, Peter Henderson MD, MBA, FACS

Purpose: The use of tranexamic acid (TXA) in reduction mammaplasty is increasing among plastic surgeons. Its efficacy and impact on complications, however, are not yet well understood. Previous reviews analyzing TXA use in breast surgery have included multiple different procedures leading to variable results. This study, however, aims to comprehensively evaluate the impact of TXA on postoperative outcomes in reduction mammaplasty alone.

Methods: A systematic review was conducted according to PRISMA guidelines. Pubmed, MEDLINE, CENTRAL, Scopus, and Web of Science databases were queried to identify studies reporting TXA application in breast surgery. A dual-screener approach was employed to select reduction mammaplasty studies for full-text screening. Primary outcomes assessed were hematoma and seroma; secondary outcomes assessed were surgical site infection (SSI), nipple-areola complex (NAC) necrosis, drain output, drain duration, and thromboembolic events. Data were pooled, and a meta-analysis was performed. Odds ratios (OR) and mean differences were reported via the Mantel-Haenszel and Inverse-Variance methods, respectively.

Results: Seven studies with a total of 1,396 patients were included, with 53.1% of patients (n=741) receiving TXA. Of those receiving TXA, 100% of patients received TXA intraoperatively, and 62.6% of patients (n=464) received both topical and intravenous administration. TXA administration significantly reduced postoperative hematoma formation (OR 0.35; 95% CI [0.20-0.63]; P < 0.001), with 2.3% of patients (n=17) developing hematomas in the TXA group, compared to 7.2% of patients (n=47) in those who did not receive TXA. No statistically significant differences were found in seroma rates, SSI, NAC necrosis, or drain duration. No thromboembolic events were reported in either group.

Conclusion: TXA administration during reduction mammaplasty reduced the incidence of postoperative hematoma formation without impacting postoperative seroma, SSI, NAC necrosis, drain duration, or thromboembolic events.

Feeling the Heat and the Touch: Longitudinal Sensory Outcomes Following Breast Reduction Mammaplasty

Abstract Presenter: Makayla Kochheiser

Abstract Co-Author(s): Nancy Qin, Anna Vaeth, Lucy Wei, Marcos Lu Wang MD, David Otterburn MD

Purpose: Breast reduction mammaplasty is one of the most commonly performed plastic surgery procedures, and loss of sensation is a common concern among patients. While some evidence suggests that long-term loss of tactile sensation in the nipple-areolar complex (NAC) may not be significant, limited data exists regarding changes in temperature sensation and tactile sensation across all breast regions over time. This study aims to assess longitudinal changes in tactile and temperature sensation following breast reduction.

Methods: Forty-six patients (n = 94 breasts) undergoing reduction mammaplasty with superomedial or superior pedicle and Wise pattern incisions were prospectively followed. Neurosensory testing was completed at 9 breast regions (outer superior, outer medial, outer inferior, outer lateral, inner superior, inner medial, inner inferior, inner lateral, and NAC) using a pressure-specified sensory device to record sensation on a scale of 0 to 100, where higher values indicate worse sensitivity. Temperature detection was assessed with a hot and cold pack at 5 regions (superior, medial, inner, lateral, and

NAC). Neurosensory and temperature sensation testing were performed preoperatively and then at 1 month, 3-6 months, and 12 or more months postoperatively. Student t-tests and chi-squared tests were performed to determine differences in tactile and temperature sensation from baseline, respectively.

Results: Preoperatively, the average tactile sensation was 29.4 g/mm² on the breast and 18.4 g/mm² on the NAC. By 1 month postoperatively, tactile sensation had returned to baseline in all regions except for the inner inferior (42.2 g/mm² vs. 31.5 g/mm²), inner lateral (38.1 g/mm² vs. 29.1 g/mm²), and NAC (44.7 g/mm² vs. 18.4 g/mm²) regions ($p < 0.05$). Tactile sensation had returned to baseline in all breast regions by 3-6 months, except for the NAC (26.9 g/mm² vs. 18.4 g/mm², $p < 0.05$), which did not return to baseline until 12+ months. Preoperatively, heat sensation was accurately identified 99.4% of the time on the breast and 98.8% on the NAC, while cold sensation was accurately identified 100% of the time on the breast and 97.6% on the NAC. By 1 month postoperatively, hot and cold sensation was significantly worse at the inferior breast (76.3% vs. 98.8% for hot sensation, 63.2% vs. 100% for cold sensation; $p < 0.05$) and NAC (76.3% vs. 98.8% for hot sensation, 55.3% vs. 97.6% for cold sensation; $p < 0.05$), while all other breast regions were at baseline. These reductions in temperature sensitivity persisted throughout the follow-up period of 12 or more months ($p < 0.05$).

Conclusion: These results indicate that sensation is preserved in the medial, superior, and lateral areas of the breast following reduction mammaplasty with superomedial or superior pedicle and Wise pattern incision. Tactile sensation returned to baseline in all regions within 12 months or more, with the NAC taking the longest to recover. While temperature sensation improved over time, it remained diminished in the inferior breast and NAC. This information can be used to guide patient counseling regarding sensory outcomes following breast reduction mammaplasty.

Dual-Nerve vs. Single-Nerve Coaptation in DIEP Flap Breast Reconstruction: A Pilot Study on Sensory Recovery and Patient Reported Outcomes

Abstract Presenter: Annie Mcveigh

Abstract Co-Author(s): Makayla Kochheiser, Lucy Wei, Anna Vaeth, Carson Gundlach, Marcos Lu Wang MD, Malini Chinta MD, David Otterburn MD, Nancy Qin

PURPOSE: Preserving sensation after mastectomy is a key concern for women. This pilot study compares sensory recovery and patient-reported outcomes between patients undergoing single-nerve versus dual-nerve coaptation in deep inferior epigastric perforator (DIEP) flap breast reconstruction.

METHODS: Patients undergoing mastectomy with DIEP flap reconstruction by a single surgeon were identified. Before 2023, a single nerve coaptation was performed between a thoracoabdominal nerve and the anterior cutaneous branch of T3. Starting in 2024, a second coaptation was added using the lateral branch of T3. Neurosensory testing using the pressure-specified sensory device was conducted across nine breast regions preoperatively and at 3, 6, and 9 months postoperatively. Average sensory recovery was evaluated relative to baseline and compared between the single-neurotized and dual-neurotized groups.

At 6 months postoperatively, the BREAST-Q Reconstruction Module (breast satisfaction, physician satisfaction, psychosocial well-being, sexual well-being, and physical well-being (chest)) and the BREAST-Q Sensation Module (breast symptoms, breast sensation, and sensation-related quality of life (QOL)) were administered. Each domain was rescaled from 1 to 4 on a Likert scale and compared between cohorts using Student's t-test.

RESULTS: This study included 29 single-neurotized patients (50 breasts) and 16 dual-neurotized patients (30 breasts). Demographics, comorbidities, and adjunctive oncologic treatments were comparable between groups.

At 3 months postoperatively, the dual-neurotized group demonstrated better sensory recovery compared to the single-neurotized group (54.8% vs. 41.2%), with results approaching statistical significance ($p = 0.092$). By 6 months, the dual-neurotized group showed significantly superior sensation (70.3% vs. 42.5%, $p = 0.002$), and this difference remained significant at 9 months (74.8% vs. 47.0%, $p = 0.015$).

Within the BREAST-Q Reconstruction Module, the two cohorts were comparable in breast satisfaction, physician satisfaction, chest physical well-being, and sexual well-being. However, psychosocial well-being scores were significantly higher in the dual-neurotized cohort (3.24 vs. 2.78, $p = 0.041$), particularly in questions related to emotional health, self-confidence, feeling feminine, and feeling normal.

Within the BREAST-Q Sensation Module, the dual-neurotized cohort reported significantly higher scores in the breast sensation domain (1.65 vs. 1.13, $p = 0.045$).

However, the breast symptoms and sensation-related QOL domains were comparable between groups.

CONCLUSION: This pilot study supports dual-nerve coaptation in DIEP flap breast reconstruction, demonstrating superior objective and subjective sensory recovery compared to single-nerve coaptation. Additionally, psychosocial well-being scores were significantly higher in the dual-neurotized cohort, particularly in areas of emotional health, self-confidence, and overall sense of normalcy.

The Role of Implant Cohesivity in Direct-to-Implant Breast Reconstruction: Complications and Revision Surgery Outcomes

Abstract Presenter: Renee Gao

Abstract Co-Author(s): Neil Parikh, Goutam Gadiraju, Yizhuo Shen, Yibin Zhang, Alex Dong, Hannah Shi, Justin Broyles MD

Background: In implant-based reconstruction (IBR), surgeons must determine both implant position (pre-pectoral or sub-pectoral) and reconstruction timing (direct-to-implant [DTI] or two-staged). Pre-pectoral DTI reconstruction has gained increasing popularity due to its compelling advantages: pre-pectoral placement demonstrates reduced postoperative pain and higher patient satisfaction, while the single-stage DTI approach lessens surgical burden. However, DTI reconstruction has also been associated with increased revision rates.(1) Amidst this complex clinical landscape, the impact of implant cohesivity on primary, and especially re-operative surgical outcomes remains underexplored. This study evaluates the impact of implant cohesivity on complications, surgical revision rates, and aesthetic outcomes in both primary and revision DTI breast reconstruction to establish evidence-based guidelines for implant selection.

Methods: A retrospective cohort analysis was conducted on adult female patients who underwent unilateral or bilateral, skin- or nipple-sparing mastectomy, with pre-pectoral DTI breast reconstruction between January 2020 to August 2024. Reconstructions performed without tissue reinforcement matrices were excluded. Demographics, implant characteristics, complications, and reoperation patterns were recorded. Multivariable regression assessed associations between implant cohesivity and outcomes, controlling for confounders. Wilcoxon test examined the shift in implant cohesivity at revision.

Results: The cohort consisted of 249 patients undergoing 371 DTI breast reconstructions. Mean age was 50.5±10.1 years, and the mean BMI was 27.2±5.5. The median follow-up time was 361 (range: 122-1049) days. In the breast-level analysis, 106 (28.6%) were performed with low-cohesivity (LC) implants, 100 (27.0%) with medium (MC), and 165 (44.5%) with high cohesivity (HC).

Complications included rippling in 125 breasts (34%). HC implants demonstrated significantly lower rippling (OR=0.27, $p<0.001$) and contracture (OR=0.33, $p=0.023$) compared to LC implants. However, HC implants were associated with increased implant flipping (OR=8.87, $p=0.049$). Post-mastectomy radiation was associated with reduced rippling (OR=0.38, $p=0.01$) but increased contracture (OR=3.41, $p=0.015$).

Revision surgery was performed in 143 breasts (38.5%), among which 61 (42.7%) received revision for medical reasons, including positive margins, infection, hematoma, and painful contracture, and 82 (57.3%) received revision for cosmetic concerns. MC implants were associated with increased odds of reoperation (OR=1.38, $p=0.018$), while HC implants did not significantly increase reoperation risk. When stratifying by indications for revision, hypertension (OR=2.5, $p=0.03$) and smoking (OR=1.89, $p=0.04$) increased the likelihood of medical revisions. Among cosmetic revisions, fat grafting for rippling correction (21 breasts, 14.1%) achieved an 86% resolution rate. Wilcoxon analysis demonstrated a significant trend toward higher-cohesivity implant selection during revision surgery ($p=0.048$).

Conclusion: This analysis demonstrates distinct complication profiles associated with implant cohesivity in pre-pectoral DTI breast reconstruction. High-cohesivity implants showed superior performance in preventing rippling and contracture, though with an increased risk of implant flipping. The observed trend toward higher-cohesivity implant selection during revision surgery, coupled with successful fat grafting outcomes for rippling correction, suggests potential strategies for managing specific complications. As DTI breast reconstruction continues to evolve, understanding the relationship between implant cohesivity and outcomes provides valuable guidance for optimizing both primary and revision surgical approaches.

1. Basta MN, Gerety PA, Serletti JM, Kovach SJ, Fischer JP. A Systematic Review and Head-to-Head Meta-Analysis of Outcomes following Direct-to-Implant versus Conventional Two-Stage Implant Reconstruction. Plast Reconstr Surg. 2015;136(6):1135. doi:10.1097/PRS.0000000000001749

Travel Distance and Neighborhood Deprivation Impact DIEP Flap Reconstruction Outcomes

Abstract Presenter: Sharmi Amin

Abstract Co-Author(s): Natalie Guzman, Daniel Jenkins, Amanda Young, Riya Doshi, Jaclyn Mauch MD, Adeyiza Momoh MD, Paige Myers MD

Purpose: Patients in resource-limited neighborhoods and those living farther from hospitals face increased barriers to elective surgical care, leading to higher rates of poor postoperative outcomes. Existing literature focuses on how travel distance affects access to post-mastectomy breast reconstruction, yet limited data explores how these factors influence outcomes. The deep inferior epigastric perforator (DIEP) flap, the gold standard for autologous breast reconstruction, yields high patient satisfaction but requires intensive follow-up, which may be impacted by geographic barriers. This study examines how travel distance and neighborhood socioeconomic status affect postoperative outcomes in DIEP flap breast reconstruction.

Methods: A retrospective review identified patients who underwent DIEP flap breast reconstruction at a quaternary institution between January 2021 and September 2024. Patients' residential ZIP codes were used to determine the distance to our institution and to assign national and state-specific Area of Deprivation Index (ADI) scores. Primary outcomes included surgical complications (infection, seroma, hematoma, wound dehiscence, flap loss), medical complications (deep vein thrombosis, pulmonary embolism, urinary tract infection), and reoperation rate. Patient characteristics and complication rates were compared across travel distance and ADI scores using t-tests and linear regression models.

Results: A total of 342 patients were included in the study, of whom 85.3% were White, with an average Elixhauser Comorbidity Index of 4.04 (SD 6.01). The mean age at the time of surgery was 51.4 (SD 10.1) years, and 41% of patients received radiation prior to reconstruction. The rates of any medical or surgical complications were 16.3% (n=56) and 52.1% (n=178), respectively. Wound infections (n=93, 27.1%) and dehiscence (n=54, 15.8%) were the most common surgical complications. Unplanned readmission rates were 12.8% (n=44) with a 19.2% (n=66) reoperation rate across the cohort.

The average distance traveled was 70.2 miles, ranging from 2 to 320 miles. Patients who experienced surgical complications traveled an average of 12.4 miles more than

those without surgical complications (P<0.05). Specifically, patients who suffered total flap loss (n=6, 1.7%) resided significantly further from our institution, traveling an additional 67 miles on average (P<0.01). Positive linear correlations were observed between travel distance and ADI scores with rates of seromas, hematomas, surgical site infections, and wound dehiscence. No clinically significant differences in medical complications and reoperation rates based on travel distance or ADI were observed. Notably, each one-unit increase in national and state-specific ADI scores corresponded to travel distance increases of 0.82 miles (P<0.01) and 6.94 miles (P<0.01), respectively, suggesting that patients from more deprived neighborhoods traveled longer distances for care.

Conclusion: Patients living farther from their surgical center and in areas with higher neighborhood deprivation indices face increased risks of surgical complications following DIEP flap breast reconstruction. Additionally, those in limited-resource neighborhoods often travel greater distances for surgical and follow-up care, incurring direct care costs and indirect expenses like lost wages and travel costs, which collectively limit healthcare options. These challenges underscore the urgent need for improved postoperative support and more accessible surgical services to ensure all patients have equitable access to high-quality care, regardless of geographic and socioeconomic barriers.

Evaluating the P1 Technique in Post-Mastectomy Breast Reconstruction: A Matched Cohort Analysis

Abstract Presenter: Payton Grande

Abstract Co-Author(s): Christian Palacios, Tatjana Mortell MD, Matthew Uzelac, Justine Araya-Colvin, Devi Lakhlani, Max Silverstein MD, Priscila Cevallos MD, Rahim Nazerali MD

Background: The P1 technique is a modified prepectoral approach in implant-based breast reconstruction involving a thin strip of pectoralis muscle that covers the implant superiorly. To understand its clinical safety, we compared post-operative outcomes among patients who underwent first-stage breast reconstruction with tissue expander (TE) placement in the P1 versus prepectoral plane.

Methods: A retrospective chart review was conducted on patients who underwent post-mastectomy tissue expander (TE) placement followed by implant-based reconstruction using either partial submuscular (P1) or prepectoral placement. All procedures were performed by a single surgeon, with a minimum follow-up of 60 days after implant placement. Data was collected on patients' demographics, comorbidities, oncologic treatment history, operative details, and complications following TE placement and second-stage breast reconstruction. Propensity-score matching analysis was performed using patients who underwent prepectoral TE placement to generate an appropriately matched comparison cohort for statistical analysis, with Chi squared analysis and Fisher's exact test to assess for significant differences between groups.

Results: 67 patients fit the study criteria. From that group, 32 patients were matched between the two groups for a total of 64 patients. Post-match, the P1 technique had significantly lower rates of seroma following TE compared to the prepectoral technique (9.4% vs 47.0%;p=0.0008). Additionally, there were no significant differences in infection (15.6% vs 28.1%;p=0.22), dehiscence (3.1% vs 15.6%;p=0.20), hematoma (6.3% vs 0.0%;p=0.49), and mastectomy skin necrosis (3.1% vs 9.4%;p=0.61) following TE placement.

Further, when analyzing complications following second-stage reconstruction, there were no significant differences between P1 and prepectoral patients in the occurrence of postoperative infection, dehiscence, seroma, and hematoma (p>0.05). Those in the P1 cohort had comparable rates of prolonged pain–defined as the endorsement of breast pain greater than 60 days following implant placement (15.6% vs 12.5%, p=1.00)–while also having significantly lower rates of referral to physical therapy when compared to those in the prepectoral cohort (18.8% vs 50.0%, p=0.009).

Notably, patients who underwent P1 reconstruction experienced significantly lower rippling or stepoff following implant placement (mild rippling: 37.5% vs 31.3%; moderate rippling: 0.0% vs 40.6%; p=0.0002). The median number of fat grafting procedures was 1.0 (IQR: 0–1) in the P1 group and 1.0 (IQR: 1–2) in the prepectoral group. The mean number of procedures was slightly higher in the prepectoral group (1.16 ± 0.72) compared to the P1 group (0.97 ± 0.69). However, a Wilcoxon rank-sum test showed no statistically significant difference between groups (Z = -1.33, p=0.184).

Conclusion: The P1 technique demonstrates a comparable safety profile to traditional prepectoral placement, with notably lower rates of breast implant rippling which potentially may increase patient satisfaction and decrease the necessity for aesthetic reoperation. Our findings suggest that the P1 approach may offer a promising

alternative, reducing specific complications such as seroma while maintaining overall safety.

Impact of Primary Care Engagement and Care Fragmentation on Autologous Breast Reconstruction Outcomes

Abstract Presenter: Hibo Wehelie

Abstract Co-Author(s): Robert DeVito MD, Eileen Wen, Chris Campbell MD, FACS, John Stranix MD, Scott Hollenbeck MD, FACS

Background: Although primary care engagement has been shown to improve outcomes in other surgical settings, limited research exists on the impact of primary care visits on outcomes in breast reconstruction surgery. This study examines the effect of perioperative primary care utilization and care fragmentation on outcomes following autologous breast reconstruction.

Methods: A retrospective chart review was conducted on patients undergoing autologous breast reconstruction after mastectomy for breast cancer or elevated cancer risk between 2017 and 2022. Clinical data and surgical outcomes were collected from the electronic medical record. Patients were categorized based on primary care provider (PCP) status and further classified into fragmented or non-fragmented care based on whether their PCP was affiliated with our institution. Descriptive statistics and multivariate regression models used for analysis.

Results: A total of 264 patients were included in the study: 214 (81.1%) had a PCP, while 50 (18.9%) did not. Among those with a PCP, 142 (67.3%) had fragmented care (FC), and 72 (33.6%) with non-fragmented care (NFC). Patients without a PCP were younger at the age of 47.4 years, compared to 53.0 years in the NFC group and 51.7 years in the FC group (p=0.011). Patients without a PCP also had the highest rates of mastectomy skin necrosis compared to those in the NFC and FC groups (26.0% vs. 12.5% vs. 8.5%, respectively; p = 0.007). Furthermore, those with FC had significantly reduced odds of skin necrosis compared to those without a PCP (OR = 0.295, p=0.009). Additionally, those with FC had significantly higher rates of donor site infection than both the NFC group and those without a PCP (17.0% vs. 2.8% vs. 10.0%, respectively; p = 0.009). Finally, patients with FC had a significantly shorter length of stay (LOS), with a

mean of 2.6 days, compared to those in the NFC (3.14 days) or no PCP groups (2.72 days).

Conclusions: These findings suggest a nuanced impact of primary care status and care fragmentation on complex breast reconstruction surgery outcomes, suggesting benefits of non-fragmented care. Further research is needed to explore the potential for perioperative primary care optimization to enhance patient recovery and minimize complications.

Detection Rates of Incidental Cancers and Re-excision Rates during Oncoplastic Surgery

Abstract Presenter: Caroline King MD, MBA

Abstract Co-Author(s): Anne Kim, Gabriel De La Cruz Ku MD, Kerry Gaffney MD, Cherilyn Song BSA, Carly Wareham MD, Christopher Homsy MD, Salvatore Nardello, Abhishek Chatterjee MD,MBA, Sarah Persing MD, MPH

Introduction: Compared to breast-conserving therapy (BCT), oncoplastic breast surgery allows for larger resections to maximize oncologic outcome without compromising aesthetics. Few studies compare detection rates of incidental cancers found on these larger resections in oncoplastic surgery compared to the current standard of care, BCT. We aim to report our findings of tumor size, detection rates, and re-excision rates for oncoplastic surgery.

Methods: Consecutive oncoplastic cases from January 2022 to February 2025 were identified. Patient, tumor, and surgical characteristics were retrieved from retrospective chart review. Incidental cancers were defined as a separate focus of invasive cancer or ductal carcinoma in situ (DCIS) not previously identified on biopsy or on preoperative imaging. Descriptive statistics were used to define preoperative and postoperative tumor sizes, rates of incidental cancer detection, and surgical intervention.

Results: We identified 157 patients, with 86 undergoing volume displacement (VD) oncoplastic surgery, and 71 undergoing volume replacement (VR) oncoplastic surgery. Median preoperative size by imaging modality for VD cases was 1.0cm (IQR 0.8, 1.6) for mammography, 2.1cm (1.4, 3.3) for magnetic resonance imaging (MRI), and 1.0cm (0.7, 1.2) for ultrasound. Median postoperative size among VD cases based on

pathologic assessment was 1.5cm (0.8, 2.2). Median preoperative size by imaging modality for VR cases was 1.1cm (0.9, 1.8) for mammography, 1.8cm (1.3, 2.9) for MRI, and 1.1cm (0.9, 1.8) for ultrasound. Median postoperative size among VR cases based on pathologic assessment was 1.2cm (0.7, 1.5). Overall incidental cancer detection rate was 5.7%. Of the nine identified incidental cancers among 157 patients, one was a new focus of invasive ductal carcinoma (IDC), two were new foci of invasive lobular carcinoma, and the remainder were additional foci of DCIS on additionally excised margins outside of the initial lumpectomy specimen or present within a specimen for a non-IDC invasive cancer. Among patients with known IDC histologic subtypes, associated DCIS was present in 65.9% of cases. Positive margin rate requiring re-excision was 3.2%.

Conclusions: Our findings demonstrated that mammographic and ultrasound imaging modalities were generally predictive of pathologic tumor size while MRI generally overpredicted size. Additionally, we report early data from oncoplastic resections demonstrating a 5.7% detection rate of additional incidental cancers and clearance of associated DCIS in the setting of invasive cancers with low re-excision rates for positive margins after oncoplastic resection (3.2%) compared to literature values for BCT ranging 20-40%.† Future studies will aim to compare these findings directly with a matched cohort to appropriately compare these detection rates and re-excision rates more formally to BCT.

References:
†Zhang Y, Wu J, Huang W, Wang Y, Rivera Galvis L, Chen T, Han B. Pathologic evaluation of lumpectomy resection margins for invasive breast cancer: a single institution's experience. Int J Clin Exp Pathol. 2023 Feb 15;16(2):40-47. PMID: 36910891; PMCID: PMC9993018.

Reevaluating Complication Profiles in Postmastectomy Breast Reconstruction: A Comparative Analysis of Prepectoral and Submuscular Tissue Expander Placement

Abstract Presenter: Laasya Gadamsetti

Abstract Co-Author(s): Jeewon Chon MA, Julia Huang, Rachel Retik, Ava Jennings, Jessica Luo MD, Antoinette Nguyen, Eleanor Bucholz MD

Background: Two-stage breast reconstruction has traditionally involved submuscular tissue expander (TE) placement, but this approach is associated with significant postoperative pain, breast animation deformity, and muscle-related complications. Prepectoral TE placement with acellular dermal matrix (ADM) coverage has emerged as an alternative, potentially reducing these issues while maintaining aesthetic outcomes. However, concerns remain regarding infection risk and long-term safety. This study aims to analyze complication rates and risk factors associated with each approach to inform surgical decision-making.

Methods: A preliminary retrospective review who underwent tissue expander-based breast reconstruction at our institution (January 2012 - January 2024) was conducted. Statistical analyses, including chi-square tests, independent t-tests, Spearman correlation, and logistic regression, were performed to assess the relationship between surgical technique, adjuvant therapies, and overall complication rates.

Results: This analysis included 184 female patients, with most identifying as White (69.0%), followed by Black/African American (15.8%), Asian (4.3%), and Other (10.9%). The average BMI was 28.58. Smoking history included 65.2% never smokers, 31.0% previous smokers, and 3.8% current smokers. Breast cancer staging varied, with 15.2% diagnosed at stage 0, 22.3% at stage I, 19.0% at stage II, 7.6% at stage III, and 1.1% at stage IV.
No significant differences in complication rates were observed between prepectoral and submuscular tissue expander placement ($\chi^2 = 0.186$, $p = 0.666$; OR = 1.23, 95% CI: 0.62–2.44), nor were complications associated with mastectomy type, ADM use, or mesh use. Mastectomy tissue weight ($t = 0.434$, $p = 0.665$) and final expander fill volume ($t = -1.463$, $p = 0.147$) also showed no correlation with complication risk. Adjuvant chemotherapy ($\chi^2 = 0.0$, $p = 1.0$; OR = 1.04, 95% CI: 0.53–2.05) and radiation therapy, whether before ($\chi^2 = 1.32$, $p = 0.25$; OR = 1.73, 95% CI: 0.78–3.85) or after ($\chi^2 = 0.05$, $p = 0.82$; OR = 0.87, 95% CI: 0.43–1.75) TE placement, did not significantly impact complication rates.
However, a key finding emerged; higher intraoperative fill volumes were significantly associated with an increased risk of complications ($t = 2.05$, $p = 0.045$). Spearman's correlation confirmed a weak but statistically significant positive relationship between intraoperative fill volume and complication rates ($\rho = 0.184$, $p = 0.026$), suggesting that overaggressive initial expansion may be a modifiable risk factor.

Conclusions: Prepectoral TE placement does not appear to increase complication risk compared to the submuscular approach. Traditional risk factors, including radiation and chemotherapy, were not significant predictors of complications. However, intraoperative fill volume emerged as a potential modifiable risk factor. A complete analysis, including

the remaining patient cohort and a detailed complication category breakdown, will be conducted to further refine these findings.

References:
1. Panchal, H., Matros, E. (2017). Current trends in postmastectomy breast reconstruction. Plast Reconstr Surg, 140(7S), 7S-13S.
2. Soni, et al. (2022). Complication Profile of Total Submuscular Versus Prepectoral Tissue Expander Placement: A Retrospective Cohort Study. Annals of Plastic Surgery, 88(S5), S439-S442.

Submuscular or Subfascial? Single Surgeon Experience of 300 Consecutive Subfascial Breast Augmentation Cases with P4HB and Highly Cohesive Breast Implants

Abstract Presenter: Camden Van Tassell

Abstract Co-Author(s): Jerry Chidester MD, Ryan Reichman, Cole Sandvik, Brayden Gonder

Purpose: The choice between submuscular and subfascial implant placement remains a critical decision in breast augmentation, potentially impacting patient outcomes, complication rates and overall patient satisfaction. Recent advancements, including the use of bioabsorbable scaffolds such as Poly-4-Hydroxybutyrate (P4HB, GalaFLEX & GalaFLEX LITE), offer improved soft tissue integrity and long-term aesthetic outcomes (1). This study evaluates the safety, complication rates, and clinical outcomes of 300 consecutive subfascial breast augmentation cases by a single surgeon using P4HB scaffolding in conjunction with highly cohesive fifth and sixth generation silicone breast implants.

Methods: A retrospective review of 370 consecutive cases (300 subfascial, 70 submuscular) performed by a single surgeon between January 2023 and February 2025 was conducted. Patient demographics, implant characteristics, postoperative complications, and revision rates were analyzed. Implant placement was either subfascial or submuscular, and all 370 cases incorporated P4HB to enhance soft tissue support. Follow-up duration ranged from six months to two years. Major complications were defined as those requiring reoperation, while minor complications included non-operative concerns such as palpability, pain, or transient discomfort.

Results: Among the 370 patients, the mean age was 35 years (range 19–61), and the average BMI was 23.4 (range 16.9–34.3). The most frequently reported minor complication was implant palpability (7%), followed by transient sharp pain along the P4HB scaffold (4%), which resolved within 180 days postoperatively. Major complications necessitating surgical intervention occurred in 2% of cases and consisted of only implant malposition with no capsular contracture (2). There were no reports of scaffold-related infections or hematomas. The incidence of complications demonstrated a downward trend over time, suggesting a learning curve benefit with continued surgical experience using P4HB.

Conclusion: This study represents the largest consecutive case series to date analyzing subfascial breast augmentation with P4HB scaffolds. Our findings highlight the safety and effectiveness of this technique, with low major and minor complication rates. The use of P4HB appears to contribute positively to long-term implant stability and soft tissue support, making it a viable alternative to traditional submuscular placement. Further studies with extended follow-up are warranted to validate these outcomes and optimize surgical techniques for enhanced patient satisfaction and aesthetic longevity (3).

References: (1) Tijerina VNE, Elizondo RAS, Garcia-Guerrero J. Experience of 1000 Cases on Subfascial Breast Augmentation. Aesthet Plast Surg. 2010;34:16-22. doi:10.1007/s00266-009-9402-4. (2) Li S, Mu D, Liu C, Xin M, Fu S, Xu B, Li Z, Qi J, Luan J. Complications Following Subpectoral Versus Prepectoral Breast Augmentation: A Meta-analysis. Aesthet Plast Surg. 2019;43:890-898. doi:10.1007/s00266-019-01404-7. (3) Gould DJ, Shauly O, Ohanissian L, Stevens WG. Subfascial Breast Augmentation: A Systematic Review and Meta-Analysis of Capsular Contracture. Aesthet Surg J Open Forum. 2020;2(1):ojaa006. doi:10.1093/asjof/ojaa006.

The Impact of Obesity on Breast Reconstruction with Deep Inferior Epigastric Perforator Flaps

Abstract Presenter: Matthew Sink

Abstract Co-Author(s): Anna Boydstun, Ashlie Elver MD, Benjamin McIntyre MD

Purpose: The deep inferior epigastric perforator (DIEP) flap continues to be a mainstay treatment option for patients undergoing breast reconstruction. Thorough preoperative evaluation of patients desiring DIEP flap reconstruction is essential for optimizing surgical outcomes. With a prevalence of over 40% in the United States, obesity is one of the most common patient factors surgeons encounter during this evaluation. This study aims to characterize the effects of obesity on patient outcomes following DIEP flap reconstruction, with the hope of broadening the surgical options made available to these patients and their providers.

Methods: The authors performed a retrospective review including patients undergoing breast reconstruction with DIEP flaps at a single institution under the direction of one surgeon over a 7-year period. Patient demographics, therapeutic regimens, operative characteristics, and postoperative complications were collected. Using the World Health Organization criteria for obesity, patients were separated into two cohorts for analysis. Complications recorded included infection, hematoma, seroma, tissue necrosis, and dehiscence of surgical sites. Additionally, rates of flap loss and abdominal wall hernia or bulge were recorded. Both individual complication rates and total complications between the normal BMI and high BMI groups were the primary outcomes. Statistical analyses including Chi-Square and t-test were performed accordingly using GraphPad Prism 10.2.3.

Results: There were 121 patients identified through this review. The average BMI was 33.5 kg/m2 with a maximum of 54.7 kg/m2. There were 81 patients in the obese cohort and 40 patients in the normal weigh cohort. There was an average of 1.55 complications in the normal weight cohort and 2.36 in the obese cohort ($p=0.02$). Ten patients had a BMI ≥ 40.0 kg/m2 and suffered an average of 3.10 complications ($p=0.019$). While breast hematoma was more common in obese patients (8.5%; $p=0.04$) the remaining complications were not significantly higher.

Conclusion: While patients with obesity may be at greater risk of experiencing complications such as breast hematoma, patients may find this an acceptable risk profile, and thus should be counseled on their candidacy to pursue autologous reconstruction. The authors advocate for continued research into specific factors affecting patient outcomes after these procedures to support equitable care for individuals with obesity.

SCORE S electing and C atorigizing O perative R econstruction E ffeciently SCORE: Application in Autologous Breast Reconstruction Utilizing CTA Scoring for Efficient Scheduling in Autologous Breast Reconstruction

Abstract Presenter: Thomas Troia

Abstract Co-Author(s): Nicholas Haddock MD, Sumeet Teotia MD, Lauren Kim, Alexis Lakatta MD

Our study introduces a novel preoperative scoring system to predict operative time in autologous breast reconstruction using computed tomography angiography (CTA). By quantifying key anatomical and patient-specific factors, we aim to improve operating room (OR) scheduling efficiency and resource allocation.

A retrospective review was conducted on 180 patients who underwent autologous breast reconstruction with 355 flaps between 2023 and 2024. Preoperative CTA scans were scored on a scale of 1 to 10, with lower scores indicating greater technical difficulty. Scores were categorized into three groups: 1-3, 4-6, and 7-10, which dictated scheduling protocols. Operative times were documented and analyzed against these scores.

The preoperative scores demonstrated a moderate negative correlation with operative time ($R = -0.454$, $p < 0.001$). Patients in the 1-3 score group had the longest average operative time of 372 ± 44.64 minutes, followed by the 4-6 score group with 358 ± 125.05 minutes. The 7-10 score group had the shortest operative time, averaging 258.57 ± 64.13 minutes. This suggests that higher scores, indicating easier procedures, are associated with shorter operative times. Furthermore, statistically significant difference in operative time (minutes) between the three groups ($F(2, 177) = 25.109$, $p < .001$). Furthermore, a statistically significant difference in operative time was observed between the three groups ($F(2, 177) = 25.109$, $p < .001$). The effect size (eta-squared = .221) indicates that group membership accounts for a substantial 22.1% of the variance in operative time, reinforcing the predictive power of the scoring system.

Our study demonstrates a significant correlation between preoperative CTA scores and operative time, suggesting that this scoring system can serve as a valuable tool for optimizing OR scheduling. By accurately predicting operative duration, surgeons can allocate resources more effectively, streamline workflows, and improve patient outcomes by minimizing delays and ensuring surgeries are performed with optimal preparation. This approach has the potential to enhance surgical efficiency, improve

resource management, and reduce healthcare costs in autologous breast reconstruction.

Surgical Outcomes of Prepectoral Two-Stage Breast Reconstruction in Patients Treated with CDK4/6 Inhibitors: A Retrospective Review

Abstract Presenter: Yasmine Ibrahim

Abstract Co-Author(s):Tahera Alnaseri, Anne Hall, Milan Carter, Chris Tiancheng Zhao, Julissa Molina-Vega, Maral Demirjian, Lorna Kwan, Sione Markarian, Kaavian Shariati, Marlena Freeman, Melodyanne Cheng, Mediget Teshome, Michael Delong MD

Background: Cyclin-Dependent Kinase (CDK)4/6 inhibitors - such as Palbociclib, Ribociclib, and Abemaciclib - are a new class of drugs providing a targeted approach to treat certain breast cancers, mainly hormone receptor-positive (HR+), HER2-negative (HER2-) cancers in advanced or metastatic stages. CDK4/6 inhibitors prevent progression of cells through mitosis, and their impact on the healing process is incompletely understood. Currently, there are no data available to assess the impact of CDK4/6 inhibitors on surgical outcomes for prepectoral two-stage implant-based breast reconstruction. In this retrospective review, we evaluated surgical outcomes for prepectoral two-stage breast reconstruction in patients who underwent therapy using CDK4/6 inhibitors.

Methods: A retrospective review was conducted of all patients who underwent immediate two-stage prepectoral reconstruction at a single center between January 2018 and October 2024. Patients were excluded if they underwent autologous reconstruction, direct-to-implant surgery, delayed reconstruction or had less than three months of follow-up. Collected data included breast cancer laterality, histology, staging, and subtype, as well as receipt of neoadjuvant or adjuvant therapy (e.g. chemotherapy or HER2-targeted therapy). The primary outcome was documentation of the following complications: major infection, hematoma, seroma, mastectomy flap necrosis, and implant removal for any reason. Major complications were further defined as those requiring readmission or a return to the operating room. Statistical comparisons were performed using Chi-square (or Fisher's exact) tests for categorical variables and Wilcoxon rank-sum tests for continuous variables.

Results: A total of 472 patients underwent tissue expander placement, with 30 patients receiving CDK4/6 as adjuvant therapy during the expansion phase. The median age of all patients was 46.7 years. Patients who received CDK4/6 inhibitors were more likely to have undergone neoadjuvant chemotherapy (43.3% vs. 28.5%) and the expansion phase of chemotherapy (36.7% vs. 16.4%) compared to those who did not receive CDK4/6 inhibitors (p = 0.0005). The major complication rate was similar between the CDK4/6 inhibitor and the non-CDK4/6 inhibitor groups (26.7% vs 26.3%, p=0.97). Reoperation rates were also comparable at 23.3% in the CDK4/6 inhibitor group vs. 23.1% in the non-CDK4/6 inhibitor group (p=0.97). While major infection rates were not significantly different in the CDK4/6 inhibitor group compared to the non-CDK4/6 inhibitor group (3.3% vs 8.4%, p=0.50), minor infection rates were significantly lower in the CDK4/6 inhibitor group (0.0% vs. 12.4%, p=0.04). Other complications, including capsular contracture, hematoma, seroma, necrosis, and rupture, did not show significant differences between the two groups.

Among 423 patients who completed implant exchange, 25 (5.9%) received adjuvant CDK4/6. The major complication rate was higher in the CDK4/6 group compared to non-users (14.3 vs 8.7, p=0.36). Similarly, major infections occurred in 4.0% of CDK4/6 users compared to 1.0% in non-users (p=0.26). While seroma rates were higher in CDK4/6 users (8.0% vs 1.5%, p=0.08), this difference did not reach statistical significance.

Conclusion: CDK4/6 inhibitors were not associated with higher surgical complication rates among patients undergoing immediate prepectoral reconstruction at our institution. Larger, multi-center studies are needed to assess the risk-benefit profile of CDK4/6 inhibitors more accurately in diverse patient populations.

Positionally Stable Smooth Implants: An In Vivo Submuscular Model

Abstract Presenter: Sophia Salingaros

Abstract Co-Author(s): Matthew Liao, Abby Chopoorian Fuchsman, Kate Guion Manley, Tim Li, Samuel Medina, Xue Dong MD, PhD, Jason Spector MD

PURPOSE: Following the voluntary recall of textured implants due to their association with Breast Implant-Associated Anaplastic Large Cell Lymphoma (BIA-ALCL), plastic surgeons have lost the major benefits conferred by the textured surface-positional

stability. This loss is particularly important in submuscular implant placement, which is at greater risk of displacement induced by muscle contraction. To address this challenge, we have engineered a novel smooth-surface breast implant design featuring small cylindrical wells on the outer surface to promote tissue ingrowth and stabilize the implant. We have previously reported that Positionally Stable Smooth Implants (PSSI) demonstrate superior positional stability compared to smooth implants (and comparable to textured), in a subcutaneous in vivo model (which simulated pre-pectoral placement). In this study, we assess PSSI positional stability in a rodent model of submuscular implant placement.

METHODS: Hemispherical miniature 2cc breast implants were fabricated using polydimethylsiloxane and cast in 3D-printed negative molds. A 7.5mm metal marker was embedded into the implant for measurement reference. PSSI implants were designed with wells spanning 2mm width (W) by 1mm depth (D), with a density of 26, 52, or 70 wells per implant. Miniature smooth and textured implants (salt-loss technique) served as controls. Six implants per group were placed under the latissimus dorsi muscle on the bilateral dorsa of female Sprague-Dawley rats. Implant rotation and position was evaluated via microCT at 2, 4, 8, and 12 weeks (margin of error: +/-10 degrees). Cumulative rotation was calculated by summing the calculated rotation between each measurement interval. Animals were sacrificed at 12 weeks, and implant-capsule units were explanted en bloc for histological analysis and quantification of capsule thickness.

RESULTS: Over the 12-week period, PSSI implants exhibited a cumulative rotation of 47.6+/-28.3 degrees, which was significantly lower than smooth implants at 151.5+/-32.1 degrees ($p<0.0001$) and comparable to textured implants, which rotated 25.4+/-9.8 degrees ($p>0.05$). Increasing the density of PSSI wells appeared to reduce the rotation, though not statistically significant (W2D1(26), 56.3+/-30.7 degrees; W2D1(52), 51.7+/-34.9 degrees; W2D1(70), 33.8+/-13.6 degrees). MicroCT imaging confirmed tissue infiltration of homogenous density conforming along the PSSI wells at 2 weeks. En bloc explantation of 12-week capsules confirmed robust capsular ingrowth into PSSI wells within the submuscular plane, effectively anchoring the implant to the surrounding tissue. Histological assessment of capsule thickness and collagen density is ongoing.

CONCLUSION: Cumulative rotation measurements confirmed that tissue ingrowth into PSSI wells corresponded in a significant reduction of implant rotation compared to smooth implants. These preliminary data suggest a promising alternative to textured surface breast implants for providing positional stability in the submuscular plane.

Characterizing the Spectrum of Complications in Lumbar Flaps

Abstract Presenter: Thomas Troia

Abstract Co-Author(s): Nicholas Haddock MD, Sumeet Teotia MD

Introduction: Lumbar artery perforator (LAP) flaps are a viable alternative for autologous breast reconstruction, particularly for patients with insufficient abdominal tissue or a history of abdominal surgery. While LAP flaps offer distinct advantages in terms of tissue quality and body contouring, their adoption has been limited due to technical complexity and a relatively high complication rate. This study aims to characterize the spectrum of complications associated with LAP flaps and evaluate their role in breast reconstruction.

Methods: A retrospective review of 268 LAP flaps performed at our institution was conducted. Patient demographics, comorbidities, surgical details, and postoperative complications were analyzed. Flaps were categorized into four groups: pure unilateral, pure bilateral, adjunct (combined with other flaps), and salvage (used after prior reconstruction failure).

Results: A total of 268 LAP flaps were used to reconstruct 274 breasts in 141 patients. Most reconstructions were bilateral (74.6%) or adjunctive (18.3%), with a smaller proportion of unilateral (8.5%) and salvage cases (1.1%). The mean patient age was 50.2 years, and the mean BMI was 25.6. Common comorbidities included hypertension (21.3%) and diabetes (9.2%). The most frequent reconstruction timing was delayed-immediate (62.4%), followed by delayed (31.9%) and immediate (5.7%). Overall complication rates varied by flap category, with the adjunct group showing the highest complication rate (24.5%). Flap failure rates ranged from 6% to 10%, with donor site seroma being the most prevalent issue.

Conclusion: LAP flaps provide a valuable option for patients who are not candidates for traditional abdominal-based reconstruction. Despite their technical challenges, they offer favorable aesthetic outcomes and additional body contouring benefits. However, their use is associated with a higher rate of complications, particularly donor site seroma and prolonged ischemia time. Optimizing patient selection, refining surgical techniques, and implementing preoperative imaging strategies can help mitigate these risks. As experience grows, LAP flaps may become more widely accepted as a standard reconstructive option in select patient populations.

Comparative Racial Analysis of the Social Determinants of Health Among Patients Undergoing Breast Reconstruction Post-Mastectomy

Abstract Presenter: Jace Boswell

Abstract Co-Author(s): Manar Al Rubaye, Jasmine Craig MD, Jacqueline Israel MD

Introduction: Many patients with breast cancer who undergo mastectomy opt to undergo breast reconstruction. Breast reconstruction can profoundly, and positively impact patients' emotional and physical well-being (1). There are well-documented disparities between reconstruction rates of white and non-white participants (2). The aim of this study is to use a national dataset with comprehensive social determinants of health (SDoH) surveys to perform comparative racial analysis for patients with breast cancer who did and did not undergo breast reconstruction.

Methods: We queried the All of Us Research Program to analyze racial disparities in whether patients underwent breast reconstruction (BR) post-mastectomy. We identified 5,731 mastectomy participants (70% from 2014-2022, range 1980-2022). Two cohorts were defined: mastectomy-only group (n=4,584; 2,987 non-Hispanic white; 1,597 non-white) and BR group (n=1,147; 351 non-Hispanic white, 796 non-white). We compared various social determinants of health (SDoH) constructs -including basic demographics, healthcare access, social and community interactions, and neighborhood environment- across racial subgroups using descriptive and comparative tests. A multivariate logistic regression with BR as the outcome was also performed, adjusting for age, income, insurance, and deprivation index.

Results: The odds of undergoing BR, regardless of technique, are 25.5% (OR = 0.745; 95% CI: 0.0629-0.883) lower for non-white subjects compared to white subjects. In the mastectomy-only group, non-white participants experienced higher inability to afford follow-up care (3.4% vs 2.8%, $p<0.001$) and primary care (8.35% vs 2.96%, $p<0.001$), while experiencing more delayed care (9.17% vs 5.13%, $p<0.001$) and a greater inability to afford a specialist than white patients (12.42% vs 6.18%, $p<0.001$). They also reported higher perceived discrimination (1.81 vs 1.61, $p<0.001$), housing instability (1.10% vs 1.0%, $p=0.001$), and physical disorder - a measure of the quality of one's living environment - (2.20% vs 2.11, $p<0.001$) compared to white participants. These differences were not statistically significant among various types of breast reconstruction.

Conclusion: Our study found that white participants were more likely to undergo BR than non-white participants. We observed a 26% disparity between white and non-white patients, which is consistent with historical data, suggesting that this gap is not closing over time. Analysis of SDoH revealed significant racial differences in the mastectomy-only group but not in the BR group. While race is a factor, SDoH significantly influences access to breast reconstruction. The lack of racial disparity within the reconstruction group implies that only individuals with better SDoH-such as the ability to afford a specialist-were able to obtain reconstruction. Targeted interventions aimed at improving patient ability to receive medical care are needed to help decrease the gap in racial disparity. These interventions would be better assisted by data at the local levels to help address which of these specific SDoH are more prominent in local areas.

1. Sharma, Ketan, et al. "Race and Breast Cancer Reconstruction." Plastic and Reconstructive Surgery, vol. 138, no. 2, Aug. 2016, pp. 354–361, https://doi.org/10.1097/prs.0000000000002344.
2. Connors, Shahnjayla K., et al. "Racial Disparities in Breast Reconstruction at a Comprehensive Cancer Center." Journal of Racial and Ethnic Health Disparities, 13 Oct. 2021, https://doi.org/10.1007/s40615-021-01169-3. Accessed 6 Nov. 2021.

Breast Reduction as a Transformative Step Towards a Healthier Lifestyle: Insights from a Retrospective Survey

Abstract Presenter: Emily Duckworth

Abstract Co-Author(s): Keenan Fine, Antoinette Nguyen, Anmar Abu-Romman, Abigail Uryga, Rena Li, Robert Galiano MD

Background: This investigation aimed to gain a more comprehensive understanding of lifestyle changes enacted by patients following bilateral breast reduction (BBR) surgery.

Methods: A retrospective survey was completed by 135 women who underwent BBR between January 2016 to January 2024. The survey assessed demographics, surgical motivations, exercise, diet, and changes in diagnosed medical conditions and substance use postoperatively. Area Deprivation Index (ADI) and Social Vulnerability Index (SVI) analyses were run to determine if geography and socioeconomic status impacted propensity to experience positive outcomes from breast reduction.

Results: Approximately 86.7% of participants reported feeling healthier post-surgery, with notable improvements in physical activity (72.6%), diet (51.3%), and weight loss (55.6%). QoL scores increased from 5.3 to 7.8 out of ten. Exercise frequency increased, particularly in high-impact activities. Thirty-six percent of patients intentionally changed their diet. There was no association between resection weight and QoL, body image satisfaction, or weight loss, but higher resection weight was associated with an increase in exercise. High ADI/SVI individuals experienced greater weight loss than "Low Deprivation" patients.

Conclusion: BBR encourages positive lifestyle changes, such as increased physical activity and healthier diet. There is no relationship between resection weight and amount of symptom relief experienced after BBR. Individuals living in greater ADI and SVI areas experienced increased weight reduction after surgery. This finding is novel and warrants further study to delineate populations most likely to receive health benefits from breast reduction surgery. Overall, these findings further define the salutary effects of breast reduction procedures on women's health and position the procedure as health-promoting, not merely symptom relieving.

Preoperative and Intraoperative Predictors of Prolonged Length of Stay in Autologous Breast Reconstruction: A Stratified Analysis Using 2011-2023 ACS-NSQIP Datasets

Abstract Presenter: Bo Hyun (Allen) Kong

Abstract Co-Author(s): Nitya Devisetti, Tyra Albert, Payton Grande, Elizabeth Cox MD, Rahim Nazerali MD, Albert Losken MD

Background: Length of stay (LOS) following breast reconstruction varies based on patient characteristics, surgical technique, and perioperative factors. Identifying independent predictors of prolonged LOS can improve preoperative planning and optimize resource utilization. This study evaluates preoperative and intraoperative factors influencing LOS in patients undergoing autologous reconstructions using a categorical odds ratio-based approach.

Methods: A retrospective analysis of 2011-2023 ACS-NSQIP dataset was conducted, stratifying patients by reconstruction type. LOS was assessed based on preoperative

factors (e.g., BMI, diabetes, modified Frailty-5 Index) and intraoperative factors (e.g., operative time, concurrent procedures). Each factor was analyzed independently using odds ratios (ORs) and 95% confidence intervals (CIs) to determine its impact on prolonged LOS.

Results: We reviewed 28,658 reconstructions including free flaps, pedicled TRAM flaps, latissimus dorsi flaps. BMI was a significant predictor of prolonged LOS only in free flaps ($p<0.0001$) but was not statistically significant in pedicled TRAM ($p=0.291$) or latissimus dorsi ($p=0.526$) flaps. Age had a statistically significant relationship with LOS only for free flaps ($p=0.0117$). Among the modified Frailty-5 Index variables, diabetes was the only independent predictor of prolonged LOS in free flaps ($p=0.016$). Intraoperatively, concurrent procedures were significantly associated with increased LOS only in latissimus dorsi flaps ($p=0.011$), while operative time was the strongest intraoperative predictor across all reconstruction types ($p<0.0001$). Free flap reconstructions had the longest mean operative time (470.54 min) and mean LOS (3.71 days), followed by pedicled TRAM (350.44 min, 3.97 days), and latissimus dorsi flaps (257.27 min, 2.29 days, $p<0.0001$).

Conclusions: Preoperative and intraoperative factors play a critical role in LOS following breast reconstruction. BMI and diabetes influence LOS in free flap reconstruction, while operative time is a key factor across all procedures. Optimizing perioperative planning may help reduce hospital stays and improve patient outcomes.

Is the receipt of breast reconstruction in the United States after oncologic mastectomy affected by demographic factors?

Abstract Presenter: Heather Faulkner MD, MPH

Abstract Co-Author: Shannon Su MD

Introduction: Breast cancer is the leading cause of cancer-related deaths among women worldwide, with an estimated 298,000 new cases diagnosed in 2023.[1] Surgical treatment with mastectomy or lumpectomy is a cornerstone of breast cancer care. A substantial number of women undergo breast reconstruction after mastectomy or lumpectomy. While breast reconstruction has been shown to improve quality of life without affecting cancer recurrence or survival rates, significant disparities persist in access and utilization. [2–4] This study explores the impact of socioeconomic factors,

specifically insurance status and Social Vulnerability Index (SVI), on rates of breast reconstruction in the United States.

Methods: A retrospective cohort analysis was conducted using the Epic Cosmos database, comprising records from over 372,000 patients diagnosed with breast cancer and treated with mastectomy or lumpectomy between 2014 and 2024. Patients were categorized into autologous, implant-based, or oncoplastic reconstruction groups based on CPT codes. Insurance status and SVI scores served as key variables. Statistical analyses, including descriptive statistics and Chi square tests, were performed to evaluate associations between demographic factors and breast reconstruction rates. Statistical significance was set at $p < 0.05$.

Results: Between 2014 and 2024, 296,911 breast cancer patients underwent lumpectomy or mastectomy, with 21.35% (n=63,408) opting for reconstruction or oncoplastic reduction. Most patients had an SVI score between 25–50% (n=81,233). Insurance type varied, with 58.3% having commercial insurance. Chi-square analysis showed higher SVI score and public insurance type to be significantly associated with a decreased odds of reconstruction ($p < 0.001$). Patients with SVI >25% had 8% lower odds of reconstruction, while those with Medicaid, Medicare, or self-pay had 34% lower odds than commercially insured patients.

Conclusion: This study highlights disparities in breast reconstruction based on insurance and SVI scores, underscoring the need for targeted interventions. Standardized counseling, patient education, policy reforms, and incentivizing surgeons in underserved areas may improve access. Future research should address barriers to care to enhance outcomes for vulnerable patients. These findings support ongoing efforts to promote equity in reconstructive breast surgery.

1. NIH Surveilance E and ERP. Cancer Stat Facts: Female Breast Cancer.; 2023. Accessed January 29, 2024. https://seer.cancer.gov/statfacts/html/breast.html
2. Zehra S, Doyle F, Barry M, Walsh S, Kell MR. Health-related quality of life following breast reconstruction compared to total mastectomy and breast-conserving surgery among breast cancer survivors: a systematic review and meta-analysis. Breast Cancer. 2020;27(4). doi:10.1007/s12282-020-01076-1
3. Hu ES, Pusic AL, Waljee JF, et al. Patient-reported aesthetic satisfaction with breast reconstruction during the long-term survivorship period. Plast Reconstr Surg. 2009;124(1). doi:10.1097/PRS.0b013e3181ab10b2
4. Wilkins EG, Cederna PS, Lowery JC, et al. Prospective analysis of psychosocial outcomes in breast reconstruction: One-year postoperative results from the Michigan

breast reconstruction outcome study. Plast Reconstr Surg. 2000;106(5). doi:10.1097/00006534-200010000-00010

Does Lymph Node Retrieval Technique Impact Lymphedema Rates in Patients Undergoing Mastectomy?

Abstract Presenter: Jennifer Wang
Abstract Co-Author(s): Jenny Chen, Thomas Amburn, Andrea Barrio, Audree Tadros MD, MPH, Michelle Coriddi MD

BACKGROUND: Breast cancer patients treated with axillary lymph node dissection (ALND) have an approximate 20-30% lifetime risk of developing upper extremity lymphedema, with multiple different causative factors implicated in the pathogenesis. (1, 2)However, incision placement as a risk factor has not been well studied. In patients undergoing mastectomy, ALND can be performed through the mastectomy incision or through a separate axillary incision, and it is unknown whether the former causes more lymphatic disruption resulting in higher lymphedema rates. The aim of our study was to assess whether ALND through the mastectomy incision versus a separate axillary incision impacts lymphedema rates.

METHODS: A retrospective chart review was performed of female patients who underwent mastectomy and ALND between January 2017 and December 2020. Operative characteristics collected included mastectomy incision type, performance of a separate axillary incision, number of nodes removed, and performance of breast reconstruction. The primary outcome of interest was development of lymphedema as defined by ICD-10 codes. Crude rates of lymphedema were compared between groups using chi-squared test, without adjustment for time-to-event differences. Predictors of lymphedema were identified by multivariable logistical regression analysis.

RESULTS: Overall, 1,036 patients were included; 553 underwent ALND via the mastectomy incision and 483 underwent ALND via a separate axillary incision. Median age of the cohort was 51 and the median follow up time was 3.9 years from index surgery. More than half of patients had a skin sparing mastectomy (67%) and post mastectomy breast reconstruction (70%). The median number of regional lymph nodes examined in patients who had ALND via the mastectomy incision and via a separate axillary incision was 17 and 18, respectively (p=0.23). Median time to lymphedema diagnosis was 1.3 years. Lymphedema rates between patients who had ALND via the

mastectomy incision were not significantly different from those who had ALND via a separate incision (30.0% vs 29.0%, p=0.77). Similarly, multivariable logistical regression showed patients with ALND performed through the mastectomy incision did not have significantly greater odds of developing lymphedema compared to those with a separate incision (Odds ratio [OR] 1.11, p=0.50).

CONCLUSION: Patients who received ALND via the mastectomy incision as compared to a separate axillary incision do not have significantly greater rates of lymphedema. A patient specific approach is appropriate when considering lymph node retrieval technique.

REFERENCES

1. Coriddi M, Khansa I, Stephens J, et al. Analysis of Factors Contributing to Severity of Breast Cancer–Related Lymphedema. Annals of Plastic Surgery 2015; 74(1):22-25.
2. Morrell R, Halyard M, Schild S, et al. Breast cancer-related lymphedema Mayo Clinic proceedings 2005 Nov; 80(11).

Financial Implications of Achieving Post-Operative Day 1 Discharge After DIEP

Abstract Presenter: Alvin Nguyen

Abstract Co-Author(s): Vivian Hu MD, Gene Cho, Christopher Reid MD

Introduction: Enhanced Recovery After Surgery (ERAS) programs have improved the recovery course for patients undergoing autologous breast reconstruction, demonstrating reduced hospital stays and high success rates. While the average length of stay remains around 3 days, growing reports have suggested discharge within 24 to 48 hours to be safe and feasible. This study aimed to evaluate the financial implications of safely discharging patients within 1 day after deep inferior epigastric perforator (DIEP) flap breast reconstruction.

Methods: A retrospective review was performed of patients who underwent free flap breast reconstruction by a single surgeon from November 2021 to October 2024. Data collected included demographics, medical and surgical history, hospital length of stay (HLOS), and facility costs. Facility costs were defined as insurance payments to the hospital. Wilcoxon rank-sum tests with post-hoc Bonferroni corrections compared facility costs based on HLOS. A multivariate regression model assessed for factors associated

with cost differences, with insurance type, reconstruction laterality and timing, and HLOS included as potential covariates.

Results: A total of 181 DIEP flaps were performed on 130 patients. Seventy-nine (60.8%) patients underwent unilateral reconstruction and 51 (39.2%) underwent bilateral reconstruction. Forty-four (33.8%) patients underwent immediate reconstruction and 86 (66.2%) underwent delayed reconstruction. Average length of stay was 1.5 days (SD 0.65 days), with 75 (57.7%) patients discharged on post-operative day (POD) 1, 46 (35.4%) on POD2, and 8 (6.2%) on POD3. The cumulative facility payment was $4,344,636.00. Average payments to the hospital were not significantly different between those discharged on POD1, POD2, and POD3 ($33,992.31, $27,768.86, $55,927.54, respectively, ps>0.05). After multivariate regression, insurance type, reconstruction laterality, reconstruction timing, and HLOS were not associated with any cost differences.

Conclusion: POD1 discharge after DIEP flap breast reconstruction is not only safe and feasible, but also cost-effective. Facility payments were not statistically significant with longer HLOS, even after controlling for insurance type, reconstruction laterality, and reconstruction timing.

Risk Factors of Thermal Sensory Recovery Following Mastectomy with Immediate Alloplastic Reconstruction

Abstract Presenter: Michael Stigliano

Abstract Co-Author(s): Makayla Kochheiser, Carson Gundlach, Anna Vaeth, Annie Mcveigh, Lucy Wei, Malini Chinta MD, Marcos Lu Wang MD, David Otterburn MD, Nancy Qin

PURPOSE: During mastectomy, breast sensory nerves are frequently sacrificed, resulting in protective sensory loss. While numerous studies have explored the recovery of tactile sensation, thermal sensation remains understudied. This study represents the largest investigation to date evaluating thermal sensation recovery in patients undergoing mastectomy with immediate alloplastic reconstruction, as well as the first to identify associated risk factors.

METHODS: Patients undergoing mastectomy with immediate alloplastic based reconstruction were prospectively identified. Data on patient demographics, comorbidities, and adjunctive oncologic regimens were collected. Neurosensory testing was performed at the following time intervals: preoperative, 1–6 months, 6–12 months, 12–36 months, and >36 months. Testing was conducted in 5 distinct areas of the breast (superior, medial, inferior, lateral, and nipple areolar complex (NAC)) using hot (52°C) and cold (12°C) packs. Patients were blinded during testing and asked to respond with "hot," "cold," or "unable to tell." Composite scores (percent correct out of 5) were calculated for heat and cold perception in each breast. Subsequently, univariate and multivariate linear regression, controlling for time since mastectomy, were performed to identify predictors of thermal sensory recovery. A mixed-model approach was used to account for repeated measurements from the same patient over time.

RESULTS: A total of 77 patients (136 breasts) were included in the study. The results demonstrated a gradual improvement in thermal sensation over time. In the early postoperative period (1–6 months), only 46.5% of breast regions correctly perceived cold stimuli, and 57.7% accurately detected heat stimuli. However, by >36 months postoperatively, these rates increased to 80.0% and 78.8% for cold perception and heat perception, respectively.

Subanalysis at >36 months revealed that thermal sensory recovery was highest in the superior and medial regions, with over 90% of patients accurately identifying both cold and heat stimuli in these areas. In contrast, the NAC demonstrated the poorest thermal sensory recovery, with only 62.5% correctly perceiving heat and 67.4% perceiving cold by 36+ months.

As a secondary aim, we utilized mixed-model regression to identify predictors of thermal sensory recovery. Higher body mass index ($\beta = -0.014$), active smoking ($\beta = -0.123$), and both neoadjuvant chemotherapy ($\beta = -0.140$) and adjuvant chemotherapy ($\beta = -0.094$) were significantly associated with diminished heat perception. For cold perception, only adjuvant chemotherapy ($\beta = -0.086$) was identified as a significant negative predictor, corresponding to an 8.6% reduction in cold detection accuracy. Nonsignificant predictors included age, preoperative radiation, adjuvant radiation, hormone therapy, menopausal status, hypertension, and hyperlipidemia.

CONCLUSIONS: Our findings show that thermal sensation gradually improves over time, with nearly 80% of breast regions accurately identifying cold and heat stimuli by 36 months post-reconstruction. However, we found that chemotherapy, particularly adjuvant chemotherapy, was significantly associated with poorer sensory recovery.

These insights can inform preoperative counseling, helping patients set realistic expectations for sensory outcomes.

Demographic and Surgical Determinants of Implant Profile Selection in Prepectoral Direct-to-Implant Breast Reconstruction

Abstract Presenter: Renee Gao

Abstract Co-Author(s): Yizhuo Shen, Yibin Zhang, Goutam Gadiraju, Alex Dong, Hannah Shi, Anne Marie Raymakers, Neil Parikh, Justin Broyles MD

Background: Implant profile selection significantly impacts aesthetic outcomes in prepectoral direct-to-implant (DTI) breast reconstruction, yet remains poorly understood as a clinical decision point. Despite extensive research on implant cohesivity, critical knowledge gaps exist regarding factors driving profile selection and its influence on surgical techniques and outcomes. This study is the first to systematically evaluate the demographic determinants of profile choice and examines how these decisions affect surgical approach and reconstruction success in DTI reconstruction.

Methods: A retrospective cohort analysis was conducted on adult female patients who underwent unilateral or bilateral, skin- or nipple-sparing mastectomy with prepectoral DTI breast reconstruction at a s ingle, quaternary-referral center between January 2020 and August 2024. Implant profiles were standardized across manufacturers using the projection-to-diameter ratio (pd ratio): low (0.20-0.24), medium low (0.25-0.29), medium (0.30-0.32), medium high (0.33-0.39), high (0.40-0.42), and extra high (≥0.43). Patient demographics, implant characteristics, complications, and reoperation patterns were documented. Multivariable regression identified predictors of profile selection and assessed relationships between profile choice and clinical outcomes.

Results: Among 295 breast reconstructions, implant profile selection exhibited a distinct distribution, with the majority of patients receiving medium high (120, 40.7%) or medium low (89, 30.2%) profiles, followed by medium (62, 21.0%), high (18, 6.1%), low (5, 1.7%), and extra high (1, 0.3%) profiles. Multivariable analysis identified that each unit increase in Body Mass Index (BMI) was associated with a mild but significant increase in the likelihood of choosing a higher-profile implant (OR=1.04, 95% CI=1.01-1.08, p=0.048). Conversely, each year increase in age correlated with lower odds of higher-profile selection (OR=0.90, 95% CI=0.93-0.99, p=0.008). Importantly, among the 100

(33.9%) patients who experienced postoperative complications, including contracture, flipping, and rippling, implant profile demonstrated no statistically significant correlation with the occurrence or type of complications observed. Additionally, among the 72 (24.4%) patients who underwent reoperation, no significant association was found between implant profile selection and reoperation rates. The implant profile type also demonstrated no significant association with the need for implant change during subsequent operations.

Conclusions: Our findings demonstrate clear demographic patterns in implant profile selection, with younger patients, increased BMI, and those with diabetes receiving higher-profile implants. Profile choice is directly associated with the surgical approach but, notably, does not affect complication rates, reoperation risk, or eventual profile changes. Given that profile selection has minimal impact on medical outcomes, this decision should be primarily driven by patient preferences, aesthetic goals, and individual anatomical considerations. These insights emphasize the importance of a shared decision-making process between patients and surgeons, prioritizing patient-specific aesthetic standards while ensuring safe, personalized breast reconstruction outcomes.

Skin-Reducing Mastectomy and Breast Reconstruction: A Multicenter Analysis of Complications and Ptosis Grade

Abstract Presenter: Joyce Cui

Abstract Co-Author(s): Abigail Heilenman, Eric Zeng, Anna Stipe, Lilian Galarza Paez, Caitrin Curtis MD, Abigail Peoples MD, Thomas Steele MD, Bennett Calder MD, Adam Katz MD

Introduction: Implant-based breast reconstruction (IBBR) remains the most common form of post-mastectomy breast reconstruction, with evolving techniques tailored to individual body types (1). Large, ptotic breasts present unique surgical challenges (2). The skin-reducing mastectomy (SRM) offers favorable aesthetic outcomes for ptotic breasts, yet its impact on postoperative complications remains debated. Some studies suggest higher risks of hematoma and wound dehiscence, while others argue it may be a safer alternative than traditional mastectomy incisions (1, 2). Few studies have compared revision rates. This study aims to examine the rates of postoperative outcomes and revisions between SRM and non-SRM (NSRM) patients.

Methods: A retrospective review was conducted on patients with grade II or III ptosis who underwent IBBR between 2018 and 2024 at two medical institutions. A total of 192 patients (342 breasts) met inclusion criteria. Demographics, medical history, operative details, postoperative complications, and revision rates were analyzed. Major complications were defined as those requiring reoperation.

Results: Patients were stratified into SRM (35 patients, 67 breasts) and NSRM (157 patients, 275 breasts) groups. Baseline characteristics were similar except for BMI, mental health conditions, and ptosis grade. SRM breasts had 2.8 times higher odds of major complications compared to NSRM breasts (p=0.014, CI 1.13–6.66). While overall and minor complication rates were not significantly different between groups, SRM breasts had 3.38 times higher odds of infection (p=0.010, CI 1.20–9.23) and 5.14 times higher odds of skin necrosis (p=0.002, CI 1.68–16.04). No significant differences were found in rates of wound dehiscence, seroma, hematoma, implant exposure, or implant rupture. Numbers of revision surgery differed significantly between groups (0.37 SRM vs. 0.74 NSRM, p=0.038), though the percentage of patients undergoing revision, fat grafting, scar revision, capsulorrhaphy, or capsulectomy was comparable. After adjusting for significant covariables, SRM breasts remained 2.63 times more likely to experience major complications (p=0.036, CI 1.03–6.38), while SRM patients had 2.5 times lower odds of undergoing revision surgery (p=0.020, CI 0.17–0.84).

Conclusion: SRM is associated with a higher risk of major complications, infections, and skin necrosis compared to NSRM but a lower overall number of revision procedures. However, the likelihood of undergoing revision surgery remains similar between groups. These findings highlight the importance of careful patient selection and surgical planning when considering SRM in IBBR.

References:
1. Chemakin, K., Ricci, J. A., Benacquista, T., Draper, L., & Weichman, K. (2024). Mastectomy Incision Choice in Ptotic Patients Undergoing Immediate Implant-Based Reconstruction. Annals of Plastic Surgery, 93(2), 163–171. https://doi.org/10.1097/SAP.0000000000003969
2. Roostaeian, J., Pavone, L., da Lio, A., Lipa, J., Festekjian, J., & Crisera, C. (2011). Immediate placement of implants in breast reconstruction: Patient selection and outcomes. Plastic and Reconstructive Surgery, 127(4). https://doi.org/10.1097/PRS.0b013e318208d0ea

The Paradox of Partial Sensation: How Moderate Sensory Recovery May Actually Lead to Decreased Quality of Life After Breast Reconstruction

Abstract Presenter: Annie Mcveigh

Abstract Co-Author(s): Makayla Kochheiser, Anna Vaeth, Lucy Wei, Carson Gundlach, Hao Huang MD, Jasmine Yu, David Otterburn MD, Nancy Qin

PURPOSE: The BREAST-Q Sensation Module, developed in 2020, standardizes patient-reported measures of breast sensation and its impact on quality of life (QOL). This study utilizes the module to compare long-term patient-reported outcomes among breast reconstruction patients with the least, moderate, and most sensate breasts.

METHODS: Patients who underwent mastectomy with immediate reconstruction by a single surgeon were identified. Postoperative neurosensory testing was performed using a pressure-specified sensory device, with scores ranging from 0 to 100 g/mm², where higher scores indicate worse sensation. At each testing session, patients also completed the BREAST-Q Sensation Module, which assesses three domains: (1) subjective breast sensation, (2) adverse breast symptoms, and (3) sensation-related QOL.

Only patients who underwent neurosensory testing more than 12 months after surgery were included. They were stratified into three cohorts based on objective sensory scores: most sensate (≤ 50 g/mm²), moderately sensate (> 50 g/mm² and < 75 g/mm²), and least sensate (≥ 75 g/mm²). BREAST-Q survey scores were then compared among the three groups using independent t-tests with Bonferroni correction for multiple comparisons.

RESULTS: A total of 47 patients (20 alloplastic, 17 deep inferior epigastric perforator (DIEP) flap) were included, with 13 classified as least sensate, 12 as moderately sensate, and 12 as most sensate. The groups were comparable in demographics, comorbidities, reconstruction type distribution, and time to survey completion (median: 36 months; range: 12–60 months).

Subjective patient-reported sensation scores from the BREAST-Q aligned with objective sensory measurements, with the most sensate group reporting the highest subjective sensation scores (2.16 vs. 1.52 vs. 1.21, $p < 0.001$). Adverse breast symptoms-including stinging, throbbing, burning, aching, and spasms-were statistically similar across groups but were marginally elevated in the moderately sensate cohort.

When assessing the impact of breast sensation on QOL, the most sensate group reported the highest QOL scores, followed by the least sensate group. Notably, the moderately sensate group exhibited the lowest sensation-related QOL scores, with significant reductions in self-confidence, body perception, clothing choices, bra comfort, and sexual life compared to the most sensate group ($p < 0.01$). No significant differences in QOL scores were observed between the most and least sensate groups.

CONCLUSION: Our findings suggest that patients with moderate breast sensation report the lowest sensation-related QOL. One possible explanation is that patients with moderate sensation may experience heightened awareness of their sensory deficits, leading to greater dissatisfaction. Unlike those in the least sensate group, who may have adapted to their lack of sensation, or those in the most sensate group, who experience near-normal sensory function, the moderately sensate group may exist in a frustrating intermediate state-able to perceive sensation, but with noticeable impairments. Further research is needed to explore the psychological mechanisms underlying this trend and whether targeted patient counseling could mitigate its impact.

The Impact of Nicotine Dependence on Outcomes of Breast Reconstruction: A Propensity Score-Matched Analysis of 18,804 Patients

Abstract Presenter: Grace Gasper

Abstract Co-Author(s): Yousef Tanas MD, Joshua Wang, Brandon Cambre, Philong Nguyen

Purpose: Nicotine dependence is known to cause impaired wound healing and increase risk of surgical complications. This study evaluates the impact of nicotine dependence on postoperative outcomes in patients undergoing breast reconstruction.

Methods: A retrospective cohort study was conducted using data from the TriNetX global health research network. Patients undergoing breast reconstruction (all implant based and free flap) between January 2000 and February 2023 were categorized into two cohorts: those with nicotine dependence documented within 6 months before surgery (n = 9,472) and those without nicotine use (n = 54,061). Primary outcomes included fat necrosis, skin flap necrosis, dehiscence, infection, seroma formation,

hematoma formation, implant loss, flap death/loss, reoperation, readmission, and capsular contracture.

Result: Propensity score matching was performed, resulting in balanced cohorts of 9,402 patients each. The nicotine dependence cohort had a higher incidence of seroma formation (3.6% vs. 3.1%, $p = 0.042$), flap death/loss (1.8% vs 1.3%, $p = 0.004$), fat necrosis (5.6% vs. 4.2%, $p < 0.001$), implant loss (1.4% vs. 0.9%, $p = 0.001$), readmission (18.2% vs 14.2%, $p < 0.001$), and capsular contracture (4.3% vs 3.3%, $p < 0.001$). There was no statistically significant difference between the two cohorts with regard to infection (0.2% vs. 0.1%, $p = 0.094$) and hematoma formation (1.6% vs 1.3%, $p = 0.114$).

Conclusion: Nicotine dependence increases the risk of many surgical complications in breast reconstruction, especially seroma formation, flap loss, fat necrosis, implant loss, readmission, and capsular contracture. These results emphasize the need for smoking and nicotine cessation prior to breast reconstruction.

Aesthetic Considerations In Enhancing The Abdominal Donor Site In DIEP Flap-Based Breast Reconstruction

Abstract Presenter: Janelle Rodriguez MD

Abstract Co-Author(s): Haley Kenner BS, Alma Jukic, Santana Solomon BS, Michael Mazarei, Sarth Raj MD, Michelle Oberoi MD, Michel Saint-Cyr MD, MBA, MHA, FRCSC, FACS

Introduction/Purpose: Autologous breast reconstruction with DIEP flap places strong emphasis on aesthetic outcomes of the breast, which often comes at the expense of a sub-optimal donor site aesthetic result, especially regarding the location of the abdominal scar and abdominal contouring. The "golden ratio" for umbilicoplasty of 1.6 between xiphoid-umbilicus and umbilicus-lower abdominal crease sets an aesthetic goal for placement of the lower abdominal scar within the lower abdominal crease. The purpose of this study was to propose an increased attention to the abdominal donor site in DIEP flap-based breast reconstruction through aesthetic modifications.

Methods: We introduce an "aesthetic DIEP" reconstruction with a low abdominal incision, bilateral corsetplasty, diastasis repair, ideal umbilicus placement, and second-

stage aesthetically-minded abdominal lipoaspiration. The "golden ratio" for umbilicoplasty of 1.6 between xiphoid-umbilicus and umbilicus-lower abdominal crease was used to set placement of the lower abdominal scar within the lower abdominal crease and define umbilicus placement. Corsetplasty and diastasis repair were performed based on laxity along the semilunar lines and linea alba.

Results: Of 107 patients with 189 DIEP flaps by the senior author from 2021-2024, 35 patients underwent low-incision DIEP flap reconstruction. Of these, 18 patients underwent bilateral corsetplasty in combination with diastasis repair. At the second stage, 24 of 26 patients underwent fat grafting with aesthetically enhancing abdominal lipoaspiration. The average ratio of the xiphoid margin-umbilicus to umbilicus-lower incision distance was 1.63 (average umbilicus-lower incision distance of 8.67 cm ± 1.25). Operative time and complications were not significantly different compared to patients with traditional DIEP reconstruction.

Conclusions: Our low abdominal scar allows for better concealment under clothing and reflects the lower abdominal crease in the aforementioned "golden ratio" for umbilicus placement. Enhancing DIEP reconstruction with a low abdominal incision, corsetplasty, and second-stage aesthetically-targeted lipoaspiration yields an improved donor site aesthetic, while maintaining excellent functional outcomes.

Characterization of the Differences in Capsular Cellular Response in Breast Cancer Patients following Pre- and Post-Mastectomy Radiotherapy

Abstract Presenter: Sarah Petrecca

Abstract Co-Author(s): Hillary Nepon MD, Nikita Kalashnikov, Tyler Safran MD, M.Sc, FRCSC, Tassos Dionisopoulos MD, Peter Davison MD, Joshua Vorstenbosch MD, PhD, FRCSC

PURPOSE: Post-mastectomy radiotherapy in alloplastic breast reconstruction has been linked to capsular contracture rates of up to 40%, increased risk of complications, and poor outcomes (1, 2). There is strong clinical association between radiation and capsular fibrosis(3, 4). The underlying mechanism, specifically whether the radiated tissues or the radiated capsule contribute to peri-prosthetic fibrosis, remains poorly understood. To better characterize radiation-induced capsular fibrosis, we investigated whether capsules from alloplastic breast reconstruction patients with pre-mastectomy

radiation differ from the capsules of patients with post-mastectomy radiation by comparing the inflammatory and fibrotic cellular infiltrates.

METHODS: Capsule tissue was collected from pre-mastectomy (N=10) and post-mastectomy (N=10) radiated patients undergoing revision surgery. Experimental groups were matched based on demographic variables. Capsular thickness was assessed using Masson Trichrome. Capsular cellular populations were measured with immunohistochemistry (total macrophages, M1 pro-inflammatory macrophages, M2 wound-healing macrophages, CD3+ total T-Cells, CD4+ helper T-cells, fibroblasts, and myofibroblasts).

RESULTS: The demographics of the two groups were statistically similar. Pre-mastectomy radiation capsules were thicker ($p=0.08$) and contained an increased infiltrate of M2 wound-healing macrophages ($p=0.07$), CD3+ total-T cells ($p=0.15$), myofibroblasts ($p=0.6$) and fibroblasts ($p=0.0009$). In comparison, post-mastectomy radiation capsules displayed increased total macrophages ($p=0.53$), M1 pro-inflammatory macrophages ($p=0.66$) and CD4+ T cells ($p=0.56$).

CONCLUSIONS: Our results suggest that the cellular response in capsular tissue varies based on the timing of radiation therapy. Pre-mastectomy radiation capsules exhibit an anti-inflammatory, wound-healing phenotype, potentially mediating the deposition of fibroblasts and myofibroblasts, leading to thicker capsules. Post-mastectomy radiation induced a pro-inflammatory phenotype with increased CD4+ T cell infiltration. Expanding our understanding of these differences could determine the mechanisms underlying radiation-induced capsular contracture and provide insight into ways of minimizing its impact on patients.

REFERENCES:

1. Ricci JA, Epstein S, Momoh AO, Lin SJ, Singhal D, Lee BT. A meta-analysis of implant-based breast reconstruction and timing of adjuvant radiation therapy. J Surg Res. 2017;218:108-16.
2. Magill LJ, Robertson FP, Jell G, Mosahebi A, Keshtgar M. Determining the outcomes of post-mastectomy radiation therapy delivered to the definitive implant in patients undergoing one- and two-stage implant-based breast reconstruction: A systematic review and meta-analysis. Journal of Plastic, Reconstructive & Aesthetic Surgery. 2017;70(10):1329-35.
3. Lipa JE, Qiu W, Huang N, Alman BA, Pang CY. Pathogenesis of radiation-induced capsular contracture in tissue expander and implant breast reconstruction. Plast Reconstr Surg. 2010;125(2):437-45.

4. Hammond JB, Kosiorek HE, Cronin PA, Rebecca AM, Casey WJ, III, Wong WW, et al. Capsular contracture in the modern era: A multidisciplinary look at the incidence and risk factors after mastectomy and implant-based breast reconstruction. The American Journal of Surgery. 2021;221(5):1005-10.

Increasing Access to Oncoplastic Reconstruction: Expanding Criteria for Central Lumpectomy Defect Repair

Abstract Presenter: Emma Lascar

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Purpose: Central lumpectomy is growing in popularity as an alternative to mastectomy in patients with subareolar breast cancer and/or involvement of the nipple-areolar complex (NAC). Traditionally, these patients have been excluded from consideration of breast conservation therapy (BCT) due to concerns of suboptimal aesthetic outcomes, leaving mastectomy as the only remaining option.1 However, with advancements in oncoplastic breast surgery, including techniques like adjacent tissue transfer and oncoplastic tissue rearrangement, cosmetic results and breast symmetry have greatly improved, making BCT a feasible option for a broader range of patients. This case series reviews oncoplastic reconstruction of central lumpectomy defects among patients with a range of breast phenotypes and tumor characteristics.

Methods: Patients who underwent central lumpectomy with subsequent reconstruction from 2021 to 2024 were retrospectively identified and queried for demographic data, disease characteristics, adjuvant therapy, reconstructive techniques, and postoperative outcomes.

Results: Nine patients who underwent central lumpectomy with total or subtotal NAC resection followed by immediate reconstruction were identified. The mean age of the patients was 56.2 years, and the mean BMI was 31.97 kg/m2 (range: 20.32 to 39.41). Preoperative breast cup sizes ranged from B to EE. The mean tumor size was 21.6 mm (± 9.1), with a mean tumor weight of 51.8 g (± 25.8). Seven breasts were reconstructed using an oncoplastic reduction mammoplasty approach, while two were reconstructed with a lateral intercostal artery perforator (LICAP) flap. Circular skin paddles were included in six reconstructions and immediate nipple reconstructions were performed in

two patients. Six patients underwent contralateral surgery for symmetry at the time of their reconstruction. Minor wound healing complications were reported in five patients (55%); of these, two required a delayed start to radiation, one required readmission, and two underwent revision surgery at post-operative times points of two weeks and 17 months. Mean follow-up was 276 days (range: 53 to 776).

Conclusions: Concerns regarding feasibility and aesthetic outcomes following central lumpectomy reconstruction have historically limited the number of patients considered candidates for breast conservation therapy. Our case series demonstrates successful central lumpectomy reconstructions with favorable outcomes in patients across a broad range of tumor size and body habitus. Aesthetic results can be optimized through individualized preoperative planning based on the patient's breast shape and size. These findings support expanding access of BCT to include patients undergoing central lumpectomy with NAC resection.

References

1. Bertozzi N, Pesce M, Santi PL, Raposio E. Oncoplastic breast surgery: comprehensive review. Eur Rev Med Pharmacol Sci. 2017;21(11):2572-2585.

Optimizing Venous Thromboembolism Prophylaxis Following DIEP Flap Breast Reconstruction

Abstract Presenter: Taylor Kreul

Abstract Co-Author(s): Jacob Koster, Arad Arasteh, Haley Kenner BS, Alma Jukic, Santana Solomon BS, Michael Mazarei, Janelle Rodriguez MD, Michel Saint-Cyr MD, MBA, MHA, FRCSC, FACS

Background: Deep inferior epigastric perforator (DIEP) flaps are an increasingly common option for breast reconstruction patients. However, this procedure also poses a relatively high risk for venous thromboembolism (VTE) in plastic surgery patients. While individual patient risk factors for coagulation must be considered to tailor postoperative prevention, it remains challenging to predict which patients will develop VTE. This study evaluates the effectiveness of a standardized prophylactic regimen for VTE prevention in DIEP patients, integrated with Enhanced Recovery After Surgery (ERAS) protocols.

Methods: A prophylactic protocol was implemented for DIEP patients at a single institution starting in October 2021. Preoperative measures included patient education and subcutaneous heparin administration. Intraoperatively, shorter fascial incisions and pedicle lengths minimized operative time, while pain was managed with transversus abdominis plane (TAP) blocks and incisional infiltration analgesia. Postoperatively, patients were discharged on day one with two weeks of enoxaparin sodium (Lovenox), lower extremity sequential compression devices (SCDs), compressive garments, and physical therapy beginning the day after surgery to encourage early ambulation. This regimen was universally applied, regardless of individual VTE risk factors. A retrospective review of DIEP flap patients operated on between October 2021 and July 2024 assessed posteropative deep vein thrombosis (DVT) or pulmonary embolism (PE) as the primary outcome.

Results: Among 189 DIEP flaps in 110 patients, one patient developed an upper extremity DVT 120 days after initial DIEP reconstruction and one day after bilateral revision surgery. No other VTEs were reported during the six-month average follow-up period. This protocol did not increase bleeding complications, emergency room visits, or readmissions.

Conclusion: This standardized VTE prophylactic protocol effectively reduced the risk of DVT and PE in DIEP flap breast reconstruction patients without increasing bleeding or other complications. It offers a safe, adaptable approach suitable for ERAS protocols, warranting further prospective evaluation.

Short Interval Free Autologous Breast Reconstruction (SIBT) after Adjuvant Radiation Therapy Appears to be Safe

Abstract Presenter: Elizabeth Cox MD

Abstract Co-Author(s): Kyle Ockerman, Andrew Martella, Carolyn Cafro, Jaimie Bryan MD, Arash Momeni MD, Sarah Sorice Virk MD

Introduction: The need for post mastectomy radiation therapy (PMRT) is a foundational component of multimodal breast cancer treatment for locally advanced disease. However, it can delay the reconstruction process, often leads to unfavorable cosmetic outcomes, and has high complication rates. In order to minimize postoperative complications, patients undergoing PMRT have been traditionally offered delayed, and

more recently, delayed immediate autologous breast reconstruction 6-9 months after radiation. However, this process has physical and mental health implications for the patient who has to live without a breast for a substantial period, often endures painful radiation induced contractures, and a poorer aesthetic outcome due to the loss of the breast skin envelope. Similarly, delayed immediate reconstruction in the setting of PMRT is commonly associated with expander related complications.

Recently, a study performed at MD Anderson Cancer Center showed success with the delivery of neoadjuvant radiation therapy (NRT) therapy 2-5 weeks prior to mastectomy and immediate autologous breast reconstruction, challenging the classic teaching.1

Applying these principles in the adjuvant setting, this study evaluated the feasibility and safety of performing autologous breast reconstruction within a 2–4-week interval after PMRT.

Methods: Between April to November 2024, patients who underwent PMRT followed by DIEP flap breast reconstruction within 3 weeks after PMRT were retrospectively identified and analyzed. The primary outcome was complete autologous flap loss. Demographic, treatment, and outcomes data were collected.

Results: Three patients were identified. All patients received 50 Gy in 25 fractions to the chest wall and regional nodes for 5 weeks following an average of 60.3 days (range: 53-73 days) after mastectomy. All patients underwent DIEP flap breast reconstruction at an average of 19.7 days (range: 17-21 days) after PMRT. The patients had no intra or postoperative complications, including no flap related issues/loss, skin or fat necrosis, infection, seroma, or hematoma. Notably, intraoperatively the patients' recipient internal mammary vessels were found to be soft and pliable clinically indistinguishable from virgin vessels without any evidence of radiation damage. Both the surgeon and patient were satisfied with their results, with an average postoperative BREAST-Q breast satisfaction score of 87, psychosocial well-being score of 73.5, and sexual well-being score of 62.5 (rated on a scale from 0 (worst) to 100 (best)).

Conclusion: Short interval free autologous breast reconstruction (SIBT) after PMRT was successful and safe. This strategy streamlines the reconstructive process, minimizes patient discomfort, and expedites the overall reconstruction timeline for breast cancer patients undergoing adjuvant radiation without exposing the flap to any untoward radiation induced sequela. A larger randomized control study to better determine the safety and efficacy of SIBT is currently underway.

References:

1. Hoffman KE, Smith BD, Singh P, et al. Prospective Clinical Trial of Premastectomy Radiotherapy Followed by Immediate Breast Reconstruction for Operable Breast Cancer. International Journal of Radiation Oncology, Biology, Physics. 2023;117(2):e179-e180. doi:10.1016/j.ijrobp.2023.06.1030

The Nipple Sparing Option: Simultaneous Free Nipple Grafting Combined with Autologous Breast Reconstruction

Abstract Presenter: Hamzah Almadani

Abstract Co-Author(s): Jocelyn Lu MD, Ara Salibian MD, Alejandro Gimenez, Eloise Stanton MD, Ketan Patel MD

Introduction: For many patients, presence of a nipple on a reconstructed breast defines completion of breast restoration. Increased patient satisfaction following nipple preservation/reconstruction has been reported regarding symmetry, aesthetics, shape, texture, and perceived sexual attractiveness. These findings elucidate both psychological and physical benefits to patients provided by the presence of a nipple following breast reconstruction

Free nipple grafting(FNG) has been long reported as a viable alternative for aesthetic results and patient satisfaction in the setting of reduction mammaplasty in severe macromastia. Though FNG has been associated with drawbacks such as nipple depigmentation, projection loss, loss of sensation, and nipple viability, the FNG method has the potential to provide immense aesthetic satisfaction to patients with large, ptotic breasts. This study demonstrates that the same concept as FNG used for reduction mammaplasty can be applied to autologous reconstruction following mastectomy in patients that do not qualify for nipple sparing mastectomy. This study reports the use of FNG at time of mastectomy, in conjunction with autologous breast reconstruction to provide a "nipple-sparing" result.

Methods: A retrospective chart review was performed at two institutions for patients who underwent immediate autologous breast reconstruction with simultaneous FNG by the senior author(KMP). Patient information collected included age, gender, BMI, indication for procedure and follow-up time. Recorded outcomes included nipple survival, nipple depigmentation, nipple revision and post-surgical complications. Statistical analysis was completed using IBM SPSS 24.

Results: A total of 44 patients who underwent a total of 72 nipple grafts were performed. The population mean age was 53.6 years, mean BMI was 28.9 and mean follow-up was 366 months. 43 patients(69 breasts) underwent autologous reconstruction using the deep inferior epigastric perforator(DIEP) flap(15 unilateral, 54 bilateral). 1 patient underwent unilateral TRAM flap, and 1 patient underwent bilateral pedicled latissimus dorsi flaps.

A total of 38 nipple grafts were performed on the right breast, including 11 cancerous breasts. 34 nipple grafts were performed on the left breast, of which 21 were on the cancerous side. Average mastectomy breast weight was 862g for the right breast and 1022g for the left breast. 12 patients underwent neoadjuvant chemo, 2 underwent neoadjuvant radiation, 12 patients underwent adjuvant chemo, and 5 patients underwent adjuvant radiation.

100% of nipple grafts survived, with no grafts demonstrating nipple necrosis and or flap loss. 14 patients(38.1%) had minor postoperative complications, including: 7 patients with wound dehiscence, 4 patients(4 nipples) demonstrated nipple depigmentation, and 3 patients requested further cosmetic surgical intervention/revision.

Conclusion: For patients who are not candidates for NSM, FNG offers a viable alternative in conjunction with reconstruction. This technique preserves the 3-dimensionality of the nipple areola complex as well as some native dermal and epidermal architecture, leading to a more natural appearance compared to nipple reconstruction with or without tattooing. Based on the results of this study, mastectomy with FNG and autologous reconstruction allows for favorable aesthetic outcomes with minimal postoperative complications or nipple loss. While limitations of FNG persist, it remains a safe and cosmetically beneficial option for patients with limited native nipple preservation choices.

Prophylactic Absorbable Antibiotic Beads: Effect on Tissue Expander Reconstruction Outcomes following Mastectomy Skin Necrosis

Abstract Presenter: Shahnur Ahmed MD

Background: Mastectomy skin necrosis is problematic in tissue expander reconstruction with rates between 7 to 30%. Partial or full-thickness skin necrosis may

harbor bacterial colonization promoting infection and risk of implant loss. Absorbable antibiotic-impregnated calcium-sulfate antibiotic beads have been described to reduce tissue expander (TE)/implant infection when used prophylactically for prepectoral breast reconstruction. The purpose of this study is to evaluate the effect of absorbable antibiotic beads on outcomes in patients who develop mastectomy skin necrosis after immediate postmastectomy tissue expander breast reconstruction.

Methods: A single-center retrospective review was performed for patients who underwent mastectomy, immediate prepectoral TE reconstruction on the same day (2018-2024). Patients who developed mastectomy skin necrosis were included. Patients were divided into two groups: Group 1 (absorbable antibiotic beads with TE placement) and Group 2 (no antibiotic beads with TE). Demographical information was recorded. Surgical-site infection (90-days) and implant removal were the outcome variables.

Results: The study included 61 patients (75 total breasts with necrosis) who underwent prepectoral TE breast reconstruction following mastectomy and developed mastectomy skin necrosis. The patients included in the study with mastectomy skin necrosis were 12 patients in Group 1 (16 breasts) and 49 patients in Group 2 (59 breasts). Baseline characteristics were not significantly difference between groups (p=1). There was no difference between nipple-sparing mastectomy or skin-sparing mastectomy between groups (p=0.1094). Acellular dermal matrix was used in 66.7% (8/12) of Group 1 compared to 83.7% (41/49) of Group 2 (p=0.2285). Operative management of mastectomy skin necrosis including debridement and reclosure was required in 50% (6/12) of Group 1 compared to 69.4% (34/49) of Group 2 patients (p=0.3093). There was one occurrence (6.3%, 1/16 TEs) of surgical-site infection in Group 1 and 35.6% (21/59 TEs) in Group 2 (p=0.0288). TE removal resulted in 6.3% (1/16 TEs) in Group 1 and 33.9% (20/59 TEs) in Group 2 (p=0.0310). The mean follow-up time was 189 days (range 146-236 days).

Conclusion: Patients who develop mastectomy skin necrosis after prepectoral tissue expander reconstruction may experience lower rates of TE removal and infection when prophylactic absorbable antibiotic-impregnated beads are used. Patients who develop mastectomy skin necrosis are at high risk for infection and TE loss. Prophylactic antibiotic beads used at the time of mastectomy with prepectoral TE reconstruction decrease the risk of infection and TE loss in patients who experience mastectomy skin necrosis.

Impact of Monoclonal Antibody Migraine Treatment on Surgical Outcomes in Free Flap Breast Reconstruction: A Retrospective Cohort Study

Abstract Presenter: Ayaka N. Deguchi MD

Abstract Co-Author(s): Salman Khan, Malia Voytik MD, Margaret Hornick MD, Sean Li MD, Robyn Broach, Joseph Serletti MD

Purpose: As the prevalence of migraines and breast cancer morbidity continue to rise among women globally, it is crucial to consider that female patients undergoing breast reconstruction may also be receiving migraine treatments. Calcitonin gene-related peptide (CGRP) is an inflammatory protein known to initiate migraine attacks, which also plays a critical role in wound healing by promoting revascularization and enhancing keratinocytes proliferation. Since the FDA approved CGRP antibodies in 2018, they have become a promising therapeutic option for chronic migraines. While some preliminary case reports have suggested a possible link between CGRP antibodies and impaired wound healing, there's limited evidence on their impact on perioperative outcomes. With the increased use of CGRP antibodies in the migraine population, understanding the association of this medication and surgical outcomes is crucial for preventing clinical complications. This study aims to determine the perioperative impact of CGRP antibodies on free flap breast reconstruction.

Methods: Adult female patients who were diagnosed as migraine or chronic headache and underwent free flap breast reconstruction at our Health System between November 2018 and December 2024 were included in our retrospective study. We compared two cohorts: migraine patients treated with CGRP antibodies within 30days before and/or after free flap reconstruction and migraine patients not treated with CGRP antibodies. Demographics, comorbidities, preoperative and postoperative medications, and perioperative complication data were analyzed.

Results: Among 1338 free flap breast reconstruction patients, 81 were diagnosed as migraine or chronic headache: 13 patients (25 flaps) in CGRP-treated cohort and 68 patients (117 flaps) in control cohort. There was no significant difference in demographics, comorbidities, and perioperative details such as flap types between cohorts. Multivariate regression analysis revealed that CGRP-treated cohort had a significantly higher incidence of flap skin necrosis (16% vs 5.1%, OR 5.74, p=0.0307). When triptan use, the first line treatment for acute migraine attacks, was accounted for as a confounding factor in the analysis, delayed wound healing in flap site was also significantly prevalent in the CGRP group (20.0% vs 8.5%, OR 1.35 p= 0.0478). Other complications such as vascular compromise, surgical site infection, hematoma, and

hernia were not significantly different between the two cohorts. The median time to heal from delayed wound was longer in the CGRP group with 86 days (IQR: 48.5 - 121.5 days) and 59 days (IQR 42 – 123 days) for the control group. Median healing time from skin necrosis in the CGRP group was 100 days (IQR 67.25- 173.25 days) and 100 days (IQR 32.5 – 105 days) for the control group.

Conclusion: This is the first comprehensive study evaluating the impact of CGRP antibodies on perioperative outcomes of free flap reconstruction. Our findings further imply the potential impaired wound healing, particularly an increased incidence of skin necrosis, when CGRP antibodies are in effect during surgical interventions. These results align with preliminary case reports, underscoring the need for cautious administration of this treatment, especially in patients undergoing surgery. Further research with larger patient population is needed to validate these findings.

Scar-free Breast Augmentation: A Novel Approach for Implant-Based Breast Reconstruction

Abstract Presenter: Xin Cui MD

Objective：The aim of this study is to offer a completely scar-free breast reconstruction approach with implant for patients undergoing abdominoplasty combined with breast augmentation.

Methods: First, the abdominoplasty was performed. After the skin flap has been dissected, we proceed with scarfree breast augmentation. For dual-plane breast augmentation, subcutaneous tunnels were created starting from the subxiphoid region, extending laterally at the 11 and 1 o'clock positions, with each tunnel measuring 4 cm in width. Dissection was performed carefully along the deep fascia until reaching the medial-inferior segment of the inframammary fold. The pectoralis major muscle was incised, and pocket dissection was continued beneath the pectoralis major muscle to create a dual-plane pocket. Dissection proceeded in the order of medial → superior → lateral → inferior regions, with particular attention to distinguishing the pectoralis minor muscle. After precise hemostasis and pocket irrigation with antibiotic solution, the implant was inserted and positioned. Bilateral drains were placed under the abdominal flap, exiting at the pubic area. The abdominoplasty was then completed.

Results: A cohort of 39 patients was included in the study, with a mean age of 29.84±2.94 years and a mean Body Mass Index (BMI) of 20.83±1.73 kg/m². The median volume of the implanted prosthesis was 290.40±40.80 ml, and the mean extubation time was 3.08±0.95 days. Among the 39 patients, one patient had a follow-up period of 1 year, 11 patients had a follow-up period exceeding 6 months, and the remaining 27 patients had follow-up periods ranging from 1 to 5 months. No significant complications, such as infection, hematoma, abnormal breast morphology, implant displacement, or exposure, were observed.

Conclusion: Endoscopic-assisted dual-plane implant breast augmentation through an abdominoplasty incision is a straightforward, feasible, safe, and effective procedure that results in no scarring in the breast region. Postoperative outcomes indicate an absence of serious complications, and patient satisfaction rates are high. This method offers a safe and efficient solution for patients requiring both abdominoplasty and breast augmentation.

Internal Bra and Suspension Techniques in Improving Breast Reduction Outcomes

Abstract Presenter: Aleksandr Shteynberg MD

Abstract Co-Author(s): Nicole Gladstein, Andrii Smolnikov, Michael Lynch, mark shimanov, Uchenna Eleam

Purpose Statement: Challenges of standard breast reduction techniques include providing stable, long-term breast contour, projection, and position. Over time, loss of upper pole volume, lower pole stretching, and overall breast descent inevitably lead to a less aesthetically pleasing appearance and may result in patient dissatisfaction.
In the past several years, slowly absorbable meshes such as poly-4-Hydroxybutyrate (P4HB) have been introduced as soft tissue reinforcement material to address breast ptosis. Several studies have demonstrated the effectiveness of P4HB mesh in the correction of ptosis and long-term maintenance of results.
We introduce a novel technique that combines a P4HB mesh internal bra with an inferior pedicle suspension to not only address ptosis, but to improve the stability of breast contour, upper pole fullness, cleavage, and lateral sweep.

Methods and Materials: This novel technique builds upon the standard Wise pattern inferior pedicle reduction mammoplasty technique by supplementing it with two additional maneuvers: pedicle suspension and internal bra mesh placement. The base of the inferior pedicle is suspended to the pectoralis fascia along the breast meridian starting from the second to fifth intercostal spaces using a slowly absorbable running suture. The internal bra consists of P4HB mesh that is customized to create a bra-like sling. The mesh is attached laterally and medially to the pectoralis fascia, and superiorly and inferiorly to the de-epithelialized dermal component of the pedicle.
To evaluate the effectiveness of the combined internal bra and suture suspension technique, we will measure the nipple-to-inframammary fold distance, sternal notch-to-nipple distance, and breast width. We will also compare 3-, 6-, and 9-month postoperative images. Patient satisfaction will be evaluated using a Breast Q scale.

Results: Since January 2023, 9 patients have undergone breast reduction using the internal bra and suspension technique. An average of 4.8 months (range of 1.8 to 9.8 months) has elapsed post-operatively for this cohort. There were no significant postoperative breast complications. This surgical technique provided satisfactory breast shape and lift, which has been maintained to date. A comparison of postoperative images at 3 and 6 months postoperatively reveals no significant changes in breast position.

Conclusions: The combination of the internal bra and inferior pedicle suspension technique is a novel approach that can be added to breast reduction techniques to maximize results. While using this technique, we were able to improve breast contour, upper pole fullness, cleavage, and lateral sweep as compared to standard techniques. Patients have high satisfaction with the aesthetic results and reliable, optimized breast appearance with improved medium-term results that will likely translate to long-term outcomes. Positive initial findings with this technique warrant further exploration of its potential to improve the longevity of breast reduction results and to provide implant-like outcomes.

Deep Learning-Powered Computer Vision for Forecasting Mastectomy Skin Flap Necrosis Outcomes in Prosthetic Breast Reconstruction: A Pilot Study

Abstract Presenter: Rami Elmorsi MD

Abstract Co-Author(s): Kate Liao, Philip Hanwright MD, Alexander Mericli MD

Introduction: Mastectomy skin flap necrosis (MSFN) is a challenging complication that adversely impacts the reconstructive outcomes of patients undergoing prosthetic-based breast reconstruction. Its management ranges from conservative medical treatment to the use of an entirely new flap for coverage in resistant or advanced cases.

Methods: We developed a pilot machine learning-powered computer vision framework designed to predict the ultimate fate of MSFN based on initial breast images taken at the time of presentation. The models were trained to classify outcomes into one of four categories: response to medical treatment, requirement for clinical debridement, requirement for surgical debridement, or need for a new flap. A total of 166 images were utilized for training and 5-fold cross-validation of several models, including a 100-layer neural network (NN), gradient boosting model (GBM), random forest (RF), k-nearest neighbor (kNN), and a stacked model combining NN and GBM. An external testing dataset, consisting of 17 blinded images, was used to evaluate model performance.

Results: During 5-fold cross-validation, the NN model demonstrated superior predictive performance with an AUC of 0.79, followed by the stacked NN+GBM model with an AUC of 0.76. On the external testing dataset, both the NN (AUC = 0.72) and stacked models (AUC = 0.75) outperformed the other approaches.

Conclusions: Deep learning-powered computer vision shows significant potential in predicting the outcomes of MSFN based solely on the initial presentation image. Our pilot models achieved AUCs above 70% on both cross-validation and external testing, underscoring the promise of this technology in guiding clinical decision-making in prosthetic-based breast reconstruction.

Evolution of Length of Stay in Microsurgical Breast Reconstruction: A National Study of 21,771 Flap Cases from a 16-Year NSQIP Analysis

Abstract Presenter: Georgios Karamitros MD, MS

Abstract Co-Author(s): Grigorios Lamaris MD, PhD, Michael Grant MD, PhD, FACS, Armin Catic MD

Background: Reducing postoperative length of stay (LoS) benefits both patients and hospital systems [1, 2]. This study leverages the National Surgical Quality Improvement

Program (NSQIP) database to identify predictors of extended LoS following microsurgical free flap breast reconstruction.

Methods: We retrospectively analyzed NSQIP data (2007–2022) to identify factors influencing LoS after DIEP flap reconstruction, using CPT code 19364 to select cases. Candidate predictors were chosen based on clinical relevance and entered into a Poisson regression model. A backward stepwise selection approach, guided by Akaike's Information Criterion (AIC), was applied to derive the most parsimonious model. Incidence rate ratios (IRRs) with 95% confidence intervals (CIs) were reported to quantify associations. Model diagnostics confirmed minimal overdispersion, validating the Poisson assumptions. Analyses were performed in R.

Results: A total of 21,771 cases of DIEP flap breast reconstruction were analyzed. The number of procedures increased annually between 2007 and 2022, with a concurrent decline in length of stay (LoS) over time. Each additional year was associated with a 2.6% reduction in LoS (IRR = 0.974; 95% CI: 0.972–0.976), reflecting advancements in perioperative care and surgical efficiency. Surgical duration was a significant predictor of extended hospitalization, with each additional hour in the operating room increasing LoS by 6.2% (IRR = 1.062; 95% CI: 1.060–1.065). Additionally, comorbidities played a notable role in prolonged hospital stays. Patients with diabetes experienced a 5.8% increase in LoS (IRR = 1.058; 95% CI: 1.029–1.088), while those with a bleeding disorder had a 15.1% longer LoS (IRR = 1.151; 95% CI: 1.061–1.246). When stratified by American Society of Anesthesiologists (ASA) classification, patients with ASA II and ASA III had 4.4% and 8.5% longer hospital stays, respectively, compared to those classified as ASA I. Racial differences in LoS were also observed. Hispanic patients had the most pronounced increase in LoS, with a 22.0% longer stay (IRR = 1.220; 95% CI: 0.844–1.694). Black (IRR = 1.022) and Asian (IRR = 1.034) patients also exhibited slightly extended hospitalization durations. In contrast, Native Hawaiian/Pacific Islander (IRR = 0.915) and American Indian/Alaska Native (IRR = 0.895) patients had shorter LoS compared to the reference population.

Discussion: From 2007 to 2022, LoS for DIEP flap breast reconstruction significantly declined, reflecting advancements in surgical techniques, perioperative care, and patient management. Key predictors of extended LoS included longer operative time, comorbidities (diabetes, bleeding disorders), and higher ASA classification. The findings provide valuable insights for risk stratification and surgical planning, optimizing patient care and resource allocation.

References:

1. Fischer, J. P., Fox, J. P., Nelson, J. A., Kovach, S. J., & Serletti, J. M. (2015). A longitudinal assessment of outcomes and healthcare resource utilization after immediate breast reconstruction-comparing implant-and autologous-based breast reconstruction. Annals of surgery, 262(4), 692-699.
2. Holoyda, K. A., Magno-Padron, D. A., Carter, G. C., Agarwal, J. P., & Kwok, A. C. (2022). National trends in length of stay for microvascular breast reconstruction: an evaluation of 10,465 cases using the American College of Surgeons National Surgical Quality Improvement Program database. Plastic and Reconstructive Surgery, 149(2), 306-313.

Is Immediate Lymphatic Reconstruction safe with Implant-Based Breast Reconstruction? A Retrospective Cohort Study

Abstract Presenter: Diwakar Phuyal MD

Abstract Co-Author(s): Fuad Abbas MD, Osama Darras MD, Zoe Belardo, Risal Djohan MD, MBA, Steven Bernard MD, Graham Schwarz MD, Raffi Gurunian MD, Sarah Bishop MD

Background: Lymphedema is a chronic complication following axillary lymph node dissection (ALND). While breast reconstruction has been associated with a reduced risk of lymphedema, the role of immediate lymphatic reconstruction (ILR) in implant-based breast reconstruction (IBR) remains underexplored. ILR may provide functional and aesthetic benefits, yet its impact on postoperative complications, including infection, seroma, wound dehiscence, and reoperation, remains unclear. This study evaluates complication rates associated with ILR in the context of IBR after ALND.

Methods: An IRB-approved retrospective review was conducted on 126 consecutive patients undergoing mastectomy with ALND and IBR. Among them, 41 patients underwent ILR, while 85 did not. Data collected included demographics, treatment characteristics, perioperative details, and postoperative complications. Assessed complications included infection (minor and major), seroma, hematoma, wound issues, deep vein thrombosis (DVT), mastectomy flap necrosis, reoperation, implant explantation, and hospital readmission. The primary outcome was the comparison of complication rates between the ILR and non-ILR groups.

Results: The ILR and non-ILR groups were similar in age (52.05 ± 10.76 vs. 48 ± 10.57 years, p = 0.14), BMI (27.03 vs. 27.21, p = 0.55), smoking status (0% vs. 5.9%, p = 0.44), and comorbidities, except for a higher prevalence of hypertension in the non-ILR group (42.4% vs. 22%, p = 0.02). The ILR group had higher rates of radiation therapy (100% vs. 75.3%, p = 0.001) and chemotherapy (95.1% vs. 71.8%, p = 0.002).

Mean operative time was significantly longer in the ILR group (333.44 ± 119.66 minutes vs. 247.98 ± 75.93 minutes, p < 0.001). Despite this, overall complication rates were comparable (39% vs. 35.3%, p = 0.69). No significant differences were observed in readmission rates (2.4% vs. 9.4%, p = 0.269), minor infections (2.4% vs. 1.2%, p = 0.55), major infections (12.2% vs. 18.8%, p = 0.45), seroma requiring intervention (7.3% vs. 4.7%, p = 0.68), wound issues (9.8% vs. 4.7%, p = 0.44), or implant exposure (7.3% vs. 3.5%, p = 0.39). The rates of DVT/pulmonary embolism were comparable in two groups (4.9% vs. 0%, p = 0.104. Reoperation rates (24.4% vs. 27.1%, p = 0.831) and implant explantation rates (22% vs. 23.5%, p = 1) were also comparable.

Conclusions: ILR is a safe adjunct to IBR following ALND, demonstrating similar complication rates compared to non-ILR cases despite longer operative times. The comparable rates of infection, seroma, reoperation, and implant explantation suggest that ILR does not introduce additional postoperative risks. Given the known benefits of ILR in reducing lymphedema risk, its use in IBR may offer significant advantages without increasing morbidity. Future prospective studies are needed to further assess the long-term impact of ILR in this patient population.

Stacking Ensemble Machine Learning for Prediction of 30-Day Readmissions Following DIEP Flap Breast Reconstruction: Analysis of NSQIP Data

Abstract Presenter: Berk Ozmen MD

Abstract Co-Author(s): Diwakar Phuyal MD, Graham Schwarz MD

Background: Unplanned readmissions following deep inferior epigastric artery perforator (DIEP) flap breast reconstruction pose significant challenges, increasing healthcare costs and patient morbidity. Machine learning models have shown potential in predicting surgical outcomes, but their application to DIEP flap procedures remains underexplored. This study aimed to develop a stacking ensemble model to predict

unplanned 30-day readmissions in DIEP flap breast reconstruction patients using the National Surgical Quality Improvement Program (NSQIP) dataset.

Methods: A retrospective analysis was performed on NSQIP data from 13,312 DIEP flap procedures conducted between 2016 and 2022. Data preprocessing included cleaning, feature standardization, and missing value imputation. A 70/15/15 train-validation-test split was utilized, and a stacking ensemble approach was employed to handle nonlinear relationships and class imbalance. The ensemble integrated multiple base learners (Random Forest, Extra Trees, SVM, XGBoost, and Logistic Regression) with an optimized XGBoost classifier as the meta-estimator. Hyperparameter tuning was performed via randomized search, with a 3-fold stratified cross-validation ensuring model robustness. Performance was evaluated using precision, recall, and F1-score, with emphasis on effectively identifying readmission cases.

Results: Among the cohort, 5.4% experienced unplanned readmissions. The stacking classifier achieved an accuracy metric of 0.8788 and demonstrated high recall score of 0.79 for readmission prediction on the test set.

Conclusion: The artificial intelligence machine learning stacking ensemble model effectively predicted unplanned readmissions in DIEP flap breast reconstruction patients, prioritizing the identification of at-risk patients. This approach holds promise for integration into clinical workflows to enhance patient management and reduce readmission rates through targeted interventions for high-risk patients.

Introducing the PRIME DIEP: The Latest Evolution in Autologous Breast Reconstruction

Abstract Presenter: Kevin Mcgarry MD

Abstract Co-Author(s): Seth Aschen MD, Jenny Chen, Jonas Nelson MD, Robert Allen Jr., MD

Purpose: The Deep Inferior Epigastric Perforator (DIEP) flap is a mainstay of autologous breast reconstruction, yet inadvertent damage to the abdominal wall can lead to bulge, hernia, and/or functional deficits. In order to minimize morbidity, several adaptations have been described (i.e. fascial-sparing, robotic-assisted). Herein, we introduce the latest evolution, the paramedian reflection for innervated muscle

enhancement (PRIME) DIEP flap. This technique minimizes splitting of the muscle, avoids the muscular nerves to the muscle, provides excellent visualization for pedicle dissection, and limits fascial closure to a midline plication.

Methods: From July 2024 to January 2025, patients undergoing DIEP flap reconstruction were screened with preoperative magnetic resonance angiography (MRA). Inclusion criteria were a single perforator (or multiple closely oriented perforators) arising from the medial row with a short (< 4 cm) intramuscular course. After suprafascial flap elevation, a limited fascial incision is made directly over the chosen perforator(s) to allow for complete intramuscular dissection. Once through the muscle, the fascial opening is extended inferomedially towards the medial border of the rectus muscle and then inferiorly towards the pubic symphysis. The medial border of the rectus muscle is mobilized superficially and laterally, exposing the deep inferior epigastric pedicle. This paramuscular or paramedian approach to the pedicle negates the need for further muscle splitting, while preserving all of the nerve supply to the rectus abdominus. After harvest of the flap, the fascial closure is included in a midline plication.

Results: Twelve PRIME DIEP flaps were performed in patients with an average age of 52 years and mean body mass index of 26. Most (70%) cases were delayed reconstructions with a mean flap weight of 657g. A single perforator was used in 77% of flaps, with an average perforator diameter of 1.8mm. There were no donor-site bulges, hernias, or fascial dehiscences noted. One recipient-site hematoma requiring operative evacuation was the only notable complication.

Conclusions: The PRIME DIEP flap preserves the integrity and innervation of the rectus abdominis by limiting muscle disruption and maintaining nerve supply. We feel that this technique offers advantages similar to robotic-assisted DIEP flaps without the need for specialized training or instrumentation. Further studies with longer follow up are needed to confirm our belief that this technique improves outcomes and limits donor-site morbidity compared to standard DIEP flaps.

Intraoperative Ketorolac Is Associated with Risk of Reoperation After Mastectomy: Comparison After Four Years of Practice Change

Abstract Presenter: Ayana Cole-Price MD, MSc

Abstract Co-Author(s): Patrick McCormick, Jonas Nelson MD, Melissa Assel, Hanae Tokita

Purpose: Ketorolac is an effective postoperative analgesic; however, its potential to increase the risk of postoperative bleeding remains unclear. In a previous retrospective study (McCormick, 2021), our institution found that intraoperative ketorolac use was associated with a higher rate of bleeding-related complications in mastectomy patients. As a result, we removed ketorolac from our ERAS protocol and now aim to compare reoperation and opioid use rates in mastectomy patients before and after this protocol revision.

Methods: We identified all women undergoing mastectomy at our ambulatory surgery cancer center from January 2016 to June 2024. We removed ketorolac from our post-mastectomy ERAS protocol on May 1, 2020. We tested for an association between the risk of reoperation due to bleeding on postoperative day 0 or 1 and study period using a multivariable logistic regression model adjusted for age, body mass index (BMI), preoperative prescription for an anticoagulant, preoperative prescription for an antiplatelet medication, and reconstruction status (no immediate reconstruction, subpectoral, prepectoral) separately in unilateral and bilateral procedures. As a secondary outcome we tested the association between study period and requiring the top quartile opioids (intravenous or oral) within first 24 hours postoperatively with a multivariable logistic regression model, adjusting for age, BMI, receipt of a peripheral nerve block, and reconstruction status (no immediate reconstruction, subpectoral, prepectoral) separately in unilateral and bilateral procedures.

Results: Overall, 9085 patients were analyzed. The risk of reoperation due to bleeding was 3.2% (n=141) before ketorolac removal and 2.0% (n=94) following ketorolac removal. On multivariable analysis, removal of ketorolac was associated with a significant reduction in the risk of reoperation in unilateral procedures (OR=0.33, 95% CI 0.20, 0.51, p<0.001). In bilateral procedures the effect size was smaller and missed the standard cutoff for statistical significance (OR=0.71; 95% CI 0.47, 1.06; p=0.10) however on adjusted analysis ketorolac receipt was associated with a significant increase in the risk of reoperation (OR=2.08; 95% CI 1.37, 3.11; p<0.001). We noted a 30% reduction in the odds of requiring the top quartile of postoperative opioids after the removal of ketorolac in both unilateral and bilateral procedures (OR=0.69, 95% CI 0.60, 0.81, p<0.001; OR=0.76, 95% CI 0.63, 0.92, p=0.005, respectively).

Conclusions: Removal of ketorolac from our ERAS protocol resulted in a significant reduction in the risk of bleeding-related reoperation and was not associated with an

increase in opioid administration. These findings provide further support against routine use of ketorolac in the perioperative care of the mastectomy patient.

References:
McCormick PJ, Assel M, Van Zee KJ, et al. Reply to: "Ketorolac Following Mastectomy: Is There an Increased Risk of Reoperation?". Ann Surg Oncol. Dec 2021;28(Suppl 3):777-778. doi:10.1245/s10434-021-10073-3

Direct-to-Implant Breast Reconstruction: A Head-to-Head Meta-Analysis of Subpectoral Versus Prepectoral Implant Placement Across 33 Comparative Studies

Abstract Presenter: Yousef Tanas MD

Abstract Co-Author(s): Grace Gasper, Aldona Spiegel MD

Purpose: Implant-based breast reconstruction (IBBR) remains the most popular option for women undergoing breast reconstruction after mastectomy worldwide. Recently, prepectoral (PP) IBBR has resurged in popularity, especially with direct-to-implant (DTI) reconstruction. Studies have reported conflicting evidence regarding complication rates of PP DTI versus subpectoral (SP) DTI. Given the variability in reported outcomes for these two planes, this head-to-head meta-analysis pools data from 33 comparative studies on complication rates and BREAST-Q patient-reported outcomes to establish definitive conclusions that help inform clinical decision-making regarding the optimum plane for DTI reconstruction.

Methods: PubMed, Scopus, and Web of Science were screened in February 2025. PRISMA guidelines were followed. Observational studies were included if they compared the two planes in DTI reconstruction and had reported at least one of the primary outcomes (surgical complications). The secondary outcomes assessed were pain scores, BREAST-Q scores, and length of hospital stay. Review Manager 5.4 was used for analysis. Dichotomous data were presented as risk ratios (RR) with their respective confidence intervals (CI) using the Mantel-Haenszel method. Continuous data were presented as mean differences (MD) or standardized mean differences (SMD) with their respective CI using the inverse variance method. SMD was used when pooling an outcome measured by different scales in the included studies. Heterogeneity was assessed using I^2 statistics. A random-effects model was applied in case of

significant heterogeneity followed by sensitivity analysis. Subgroup analyses (ADM, synthetic mesh, and implant texture) were performed where appropriate.

Results: A total of 33 studies (5652 implants) were included in the meta-analysis. SP DTI placement was associated with a slightly lower risk of implant loss or explantation compared to prepectoral placement (RR = 0.73, 95% CI = 0.55 to 0.97, P = 0.03); subgroup analysis with ADM rendered this difference statistically insignificant (RR = 0.79, 95% CI = 0.56 to 1.12, P = 0.19). SP DTI also showed a significantly higher risk of animation deformity (RR = 8.02, 95% CI = 3.72 to 17.33, P < 0.00001), higher risk of malposition (RR = 6.88, 95% CI = 1.66 to 28.46, P = 0.008), higher pain scores (SMD = 0.31, 95% CI = 0.14 to 0.48, P = 0.0005), lower BREAST-Q breast satisfaction (SMD = -1.44, 95% CI = -2.26 to -0.61, P = 0.0006), lower physical wellbeing (SMD = -0.27, 95% CI = -0.52 to -0.02, P = 0.04), and longer length of stay in days (MD = 0.69, 95% CI = 0.26 to 1.12, P = 0.002). Nonetheless, no statistically significant differences were found between the two techniques (even after subgroup analysis) for rates of seroma, hematoma, infection, skin flap necrosis, nipple necrosis, dehiscence, implant exchange, reoperation, and capsular contracture rates.

Conclusion: Although both planes in DTI reconstruction appear to result in similar postoperative complications, PP DTI seems to result in higher patient satisfaction, lower risk of animation deformity, malposition, and shorter length of hospital stay. This meta-analysis suggests that PP DTI may be a better choice depending on patient-specific factors and surgeon preference.

Perioperative Cannabis Use: A Hidden Risk for Increased Opioid Use?

Abstract Presenter: Malini Chinta MD

Abstract Co-Author(s): Nancy Qin, Lucy Wei, Theresa Webster MD, Carson Gundlach, Leslie Cohen MD, David Otterburn MD

PURPOSE: Cannabis use has increased drastically since recreational cannabis was legalized in New York in 2021. This study evaluates how cannabis use affects postoperative opioid consumption and pain scores in patients undergoing mastectomy and alloplastic reconstruction.

METHODS: Patients who underwent mastectomy with immediate tissue expander (TE) reconstruction between 2019 and 2024 were identified and classified as either cannabis users or non-users. Postoperative opioid consumption, acetaminophen use, and pain scores were assessed in 12-hour increments. Discharge opioid quantities and refill rates were also evaluated. Linear regression analysis was performed to identify risk factors for increased opioid consumption.

RESULTS: The study included 40 cannabis users and 197 non-users. Alcohol use (62.5% vs. 43.15%, $p = 0.036$) and tobacco use (20.0% vs. 5.08%, $p = 0.004$) were significantly more common among cannabis users. They were also more likely to be black (12.5% vs. 4.57%, $p = 0.066$), approaching significance. Age, body mass index, cup size, comorbidities, and intra-operative factors (TE plane placement, axillary biopsy/dissection, mastectomy type) were otherwise comparable.
Postoperative length of stay was comparable between groups (1.33 days for cannabis users vs. 1.28 days for non-users, $p = 0.49$), as were complication rates, including takebacks (2.5% vs. 0%, $p = 0.17$) and readmissions within 30 days (0% vs. 5.08%, $p = 0.376$).
Postoperative pain scores were significantly higher among cannabis users at 0–12 hours (4.42 vs. 3.68, $p = 0.018$), 12–24 hours (4.53 vs. 3.36, $p = 0.004$), and throughout hospitalization (4.46 vs. 3.53, $p = 0.002$). Similarly, opioid consumption was significantly higher in cannabis users at 0–12 hours (29.55 vs. 19.73 MME, $p = 0.001$), 12–24 hours (20.69 vs. 15.35 MME, $p = 0.038$), and in total throughout hospitalization (67.40 vs. 44.38 MME, $p = 0.010$). While acetaminophen consumption was lower in cannabis users across all postoperative time points, the differences were not statistically significant.
Univariable and multivariable linear regression identified younger age ($\beta = -0.56$, $p < 0.001$), cannabis use ($\beta = 16.56$, $p = 0.008$), active smoking ($\beta = 18.93$, $p = 0.032$), and longer hospitalization ($\beta = 2.53$, $p < 0.001$) as significant predictors of increased opioid consumption ($R^2 = 0.72$). Although discharge opioid quantities were comparable, cannabis users were significantly more likely to request refills (42.5% vs. 22.8%, $p = 0.02$). Additional regression analysis further identified cannabis use ($\beta = 39.44$, $p < 0.001$), younger age ($\beta = -0.71$, $p = 0.010$), and larger breast cup size ($\beta = 8.25$, $p = 0.002$) as significant predictors of requesting opioid refills ($R^2 = 0.28$).

Conclusion: Our findings suggest that perioperative cannabis use may be associated with higher pain scores and increased opioid consumption in both inpatient and outpatient settings following mastectomy and TE reconstruction. These results highlight the need for tailored pain management strategies to optimize postoperative analgesia in cannabis-using patients.

Evaluating Clinical Outcomes of Air vs. Saline Inflation in Immediate Prepectoral Implant-Based Breast Reconstruction with Tissue Expanders

Abstract Presenter: Nisha Gupta MD

Abstract Co-Author(s): Brett Johnson, Robert DeVito MD, Arielle Grieco, Alaina Matthews, Christopher Reid MD, Alvin Kwok MD, MPH, Scott Hollenbeck MD, FACS, Michael Delong MD

Background: Implant-based breast reconstruction (IBBR) commonly uses saline to inflate tissue expanders. Air inflation has been proposed as an alternative to potentially improve early postoperative outcomes, but evidence comparing complication rates between the two approaches remains limited (1). Leveraging data from the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) Breast Reconstruction Pilot, this study examines postoperative outcomes following immediate prepectoral IBBR with air versus saline inflation.

Methods: A retrospective analysis of the ACS NSQIP Breast Reconstruction Pilot dataset was conducted. Patients who underwent immediate prepectoral IBBR with tissue expanders from June 2024 to January 2025 were stratified by fill type (air vs. saline). The primary endpoints were rates of mastectomy skin flap necrosis (MSFN), hematoma, and seroma. Multivariable logistic regression models adjusted for relevant patient- and procedure-specific variables, and generalized estimating equations accounted for clustering at the patient and hospital levels.

Results: A total of 711 breast reconstructions from 422 patients were included (35.7% air-filled and 64.3% saline-filled). Although MSFN (5.5% vs. 2.8%) and hematoma (3.2% vs. 1.3%) were more frequent in the air-filled group, these differences did not reach statistical significance. By contrast, seroma was significantly more common with air inflation (22.4% vs. 8.5%), corresponding to an odds ratio of 3.09 (95% CI, 1.81–5.29; $P<0.01$). Sensitivity analysis revealed a significant unadjusted association between fill type and mesh use, indicating that no-mesh procedures with air inflation were linked to the highest seroma rates.

Conclusion: Air inflation for immediate prepectoral IBBR with tissue expanders does not provide a clear early postoperative advantage over saline-filled procedures. The significantly higher seroma rate with air inflation highlights the need for additional

strategies to minimize this complication and optimize patient outcomes. Further studies clarifying patient risk profiles may help clinicians tailor the choice of air versus saline fill to individual patients.

References:
1. Kim EJ, Friedman R, Nickman S, et al. Air Versus Saline in Tissue Expanders: A Systematic Review of the Literature. J Reconstr Microsurg. 2024;40(06):458-465. doi:https://doi.org/10.1055/s-0044-1782208

Long-Term Outcomes of Prepectoral vs. Subpectoral Implant-Based Breast Reconstruction Following Post-Mastectomy Radiotherapy: A Prospective Comparison

Abstract Presenter: Eva Roy MD

Abstract Co-Author: Yoon Chun MD

Purpose: Prepectoral implant-based breast reconstruction (PP-IBR) is increasingly favored over subpectoral reconstruction (SP-IBR) to reduce animation deformity, yet data regarding its outcomes after post-mastectomy radiotherapy (PMRT) are limited. PMRT poses unique challenges, including progressive fibrosis and reconstruction compromise. This study aims to prospectively compare long-term outcomes of PP-IBR and SP-IBR following PMRT.

Methods: Data were obtained from the multicenter randomized trial, Study of Radiation Fractionation on Patient Outcomes After Breast Reconstruction (FABREC).1 Complications, aesthetic results, and patient-reported outcomes (PROs) were assessed between groups. Complications included infection, explantation, delayed healing, and unplanned reoperation. The FACT-B and Breast-Q Reconstruction Module were administered, and aesthetic outcomes were evaluated by blinded reviewers at 6 and 18 months following PMRT. Multivariable analysis was performed to evaluate whether PP-IBR vs. SP-IBR was associated with outcomes after controlling for other covariates.

Results: Among 380 patients, 224 underwent PP-IBR and 156 SP-IBR. Demographics were similar, except SP-IBR had a higher proportion of tissue expanders and lower body mass index (BMI). No significant differences were noted in patient reported outcomes for physical well being, social well being, emotional well being, and functional

well being at both 6 and 18 months using the FACT-B survey. There were also no significant difference in satisfaction with breasts, psychosocial well being, sexual well being, and physical well being using the BREAST-Q questionnaire at both 6 and 18 months, but higher BMI correlated with lower sexual well-being scores at both 6 and18 months (Estimate -0.60, p=0.03). SP-IBR was associated with lower aesthetic score at 6 months compared to PP-IBR; however, only age remained significant at 18 months (Estimate -0.02, p=0.00).

Conclusion: In PMRT settings, both PP-IBR and SP-IBR exhibit comparable complication rates and long-term aesthetic and PRO outcomes. Patient factors, such as age and BMI, appear to play a more prominent role in overall outcomes.

References

1. Wong JS, Uno H, Tramontano AC, Fisher L, Pellegrini CV, Abel GA, Burstein HJ, Chun YS, King TA, Schrag D, Winer E, Bellon JR, Cheney MD, Hardenbergh P, Ho A, Horst KC, Kim JN, Leonard KL, Moran MS, Park CC, Recht A, Soto DE, Shiloh RY, Stinson SF, Snyder KM, Taghian AG, Warren LE, Wright JL, Punglia RS. Hypofractionated vs Conventionally Fractionated Postmastectomy Radiation After Implant-Based Reconstruction: A Randomized Clinical Trial. JAMA Oncol. 2024 Aug 8:e242652. doi: 10.1001/jamaoncol.2024.2652. Epub ahead of print. PMID: 39115975; PMCID: PMC11310844.

Lumbar Artery perforator versus Stacked Four Flaps: A Comparative Outcomes Analysis and Evolving Indications

Abstract Presenter: Dominic Henn MD

Abstract Co-Author(s): Nicholas Haddock MD, Sumeet Teotia MD

Background: For patients with high volume requirements for autologous breast reconstruction but limited abdominal tissue availability, alternative donor sites are required. While stacked four-flap reconstructions using two deep inferior epigastric perforator (DIEP) flaps and two profunda artery perforator (PAP) flaps have been used with good outcomes, bilateral lumbar artery perforator (LAP) flaps have become an increasingly popular alternative for these patients at our institution.

Methods: A retrospective review was conducted on 96 patients who underwent bilateral LAP flap reconstructions (192 flaps) and 85 who underwent bilateral stacked four-flap reconstructions (340 flaps) between December 2018 and December 2024. Demographics, surgical outcomes, complications, and BREAST-Q patient satisfaction scores were analyzed. Aesthetic outcomes were assessed via standardized postoperative images rated through a crowdsourcing platform.

Results: Institutional trends show a sharp increase in LAP flap cases since 2021, with a decline in four-flap reconstructions. Patients with bilateral LAP flaps had significantly fewer donor-site complications (27.1% vs. 49.4%, $p = 0.002$), specifically fewer donor-site wound complications (7.3% vs. 43.5%, $p < 0.001$), and donor site infections (2.1% vs. 12.9%, $p = 0.02$) and a reduced rate of fat necrosis (5.2% vs. 21.2%, $p = 0.004$) compared to patients with four flaps. Operative times were comparable (550.4 vs. 547.8 minutes, $p = 0.9$), and BREAST-Q scores showed no significant differences in patient satisfaction (85.3 ± 12.0 vs. 84.5 ± 9.7) between the groups.

Conclusion: Bilateral LAP flaps reduce complication rates compared to four flap reconstructions and lead to comparable aesthetic outcomes. While four flaps are still required for select patients, LAP flaps have largely replaced four-flap reconstructions at our institution and should be considered the preferred option for the majority of patients with high volume requirements and limited donor site availability.

Effect of Acellular Dermal Matrix on Outcomes in Immediate Prepectoral Implant-Based Breast Reconstruction with Tissue Expanders

Abstract Presenter: Brett Johnson

Abstract Co-Author(s): Robert DeVito MD, Arielle Grieco, Alaina Matthews, Christopher Reid MD, Alvin Kwok MD, MPH, Scott Hollenbeck MD, FACS, Michael Delong MD

Background: Immediate prepectoral implant-based breast reconstruction (IBBR) with tissue expanders is widely performed following mastectomy. Acellular dermal matrix (ADM) is often incorporated to enhance implant support and potentially improve aesthetic outcomes. However, the impact of ADM on postoperative complications remains a subject of ongoing debate (1). Leveraging data from the American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) Breast

Reconstruction Pilot, this study examines the association between ADM use and clinical outcomes in patients undergoing immediate prepectoral IBBR with tissue expanders.

Methods: A retrospective analysis of the ACS NSQIP Breast Reconstruction Pilot dataset was conducted. Patients who underwent immediate prepectoral IBBR with tissue expanders from June 2024 to January 2025 were stratified by ADM use. The primary endpoints were 30-day deep/organ space surgical site infection (SSI), reoperation (overall and for tissue expander removal), and seroma. SSI and reoperation rates were assessed at the patient-level, while seroma incidence was evaluated for each reconstructed breast. Multivariable logistic regression adjusted for relevant patient- and procedure-related factors, and generalized estimating equations accounted for clustering at both patient and hospital levels.

Results: A total of 420 patients (255 with ADM and 155 without ADM) and 739 reconstructed breasts (441 with ADM and 298 without ADM) were analyzed. ADM use was not associated with higher odds of deep/organ space SSI (OR 0.66, 95% CI 0.18–2.27), reoperation (OR 0.67, 95% CI 0.31–1.42), or tissue expander removal (OR 0.90, 95% CI 0.26–3.20). However, seroma rates were significantly lower in the ADM group (7.7% vs. 22.5%), corresponding to a 71% reduction in the odds of seroma (OR 0.29, 95% CI 0.15–0.53; $P<0.01$).

Conclusion: In immediate prepectoral IBBR with tissue expanders, ADM use decreased the risk of seroma without increasing deep/organ space SSI or reoperation rates. These findings help alleviate concerns about ADM-related postoperative complications and underscore its value in optimizing surgical outcomes. Future research should explore long-term complications, patient-reported outcomes, and cost-effectiveness to further guide clinical decision-making.

References:
1. Cinquini M, Rocco N, Catanuto G, et al. Should Acellular Dermal Matrices Be Used for Implant-based Breast Reconstruction after Mastectomy? Clinical Recommendation Based on the GRADE Approach. Plast Reconstr Surg Glob Open. 2023;11(2):e4821. doi:https://doi.org/10.1097/gox.0000000000004821

Predicting Resection Weights of Reduction Mammaplasty: A Multi-Institutional Retrospective Analysis Using Machine Learning

Abstract Presenter: Devin Clegg MD

Abstract Co-Author(s): Stefanos Boukovalas MD, Brett Beaulieu-Jones, Gulsah Onar, Aaron Hendizadeh, Kimberley Brondeel MD, Michelle Seu, Kimberly Khoo MD, Linda Phillips MD, Georgios Kokosis MD

Background: Reduction mammaplasty (RM) for macromastia is one of the most performed procedures by plastic surgeons in the United States, demonstrating significant improvements in symptoms and quality of life. Despite this, RM is often not reimbursed by insurance, with high rates of preauthorization denials, and increasing denials over time. Many of the criteria for authorization or reimbursement include a minimum resection weight of tissue removed, often utilizing the Schnur Scale outside of its original intent. A single-institution study previously performed by our authors demonstrated that machine learning (ML) utilizing preoperative anthropometric variables was an accurate alternative to the Schnur Scale in predicting resection weights during RM. Based on these findings, we sought to evaluate ML and regression modeling in a heterogenous multi-institutional population for predicting RM resection weights with improved accuracy and generalizability.

Methods: A multi-institutional retrospective study was performed including 635 patients from three institutions who underwent RM for macromastia between 2017 and 2022. Preoperative anthropometric variables included body surface area (BSA), body mass index (BMI), sternal notch-to-nipple (SN-N), and nipple-to-inframammary fold (N-IMF) measurements. Demographics, comorbidities and surgical data were also collected. ML and regression models were evaluated for accuracy in predicting individual and total breast resection weights. The Schnur Scale estimates were calculated for comparison. After cross-validation, a final model for each method was trained utilizing a single institution dataset, then evaluated a single time on data from the two additional institutions. The mean absolute errors (MAE) were reported. Coefficients for the regression models were tested to determine the likelihood of association.

Results: In our study population, the mean age at the time of RM was 38.5 years and 50.4% of patients were White. Mean BMI was 32.8 kg/m2, mean BSA was 2.0 m2, mean SN-N was 33.9 cm, and mean N-IMF was 15.3 cm. The demographics and comorbidities of the participating institutions varied greatly. Six of the seven models evaluated demonstrated lower MAEs than the Schnur Scale across individual and total predicted resection weights. Elastic Net regression had the lowest MAEs across individual right (164.2), left (163.8), and total breast resection weight predictions (310.5). This equated to a reduction of 39.1% for the right breast, 36.7% for the left breast, and 40.9% for total breast resection weights in the MAE from the Schnur Scale. Four shared

covariates across both the left and right breasts demonstrated significance after multiple testing correction: preoperative BMI, SN-N, N-IMF, and race/ethnicity. BSA was found not to be a significant covariate for either the left (P= .16; [95% CI -18.4, 111.4]) or right (P= .22; [95% CI -23.8, 104.0]) breast.

Conclusions: ML and regression modeling demonstrated improved accuracy in predicting resection weights for RM compared to the Schnur Scale in a heterogenous and multi-institutional population. Preoperative anthropometric measurements of BMI, sternal notch-to-nipple, and nipple-to-inframammary fold, in addition to race/ethnicity were found to be the covariates of greatest importance in predicting resection weights. BSA did not demonstrate significance as a covariate. This study provides further evidence of promising alternatives to the Schnur Scale.

Acellular Dermal Matrix in Implant-Based Reconstruction Increases 6-Month Complication Rates

Abstract Presenter: Emily Long MD

Abstract Co-Author(s): Noelle Garbaccio, Audrey Mustoe BA, Jade Smith, Dorien Schonebaum, Justin Cordero, Lacey Foster, Morvarid Mehdizadeh, Dr. Samuel Lin MD

Background: Acellular dermal matrix (ADM) is a widely utilized material in implant-based breast reconstruction due to its potential ability to provide structural support and enhance aesthetic outcomes. However, concern for infection risk persists. This study evaluates the effect of ADM on postoperative outcomes in implant-based reconstruction using a large, propensity-score matched analysis.

Methods: TriNetX, an online electronic health record database, was queried using ICD10 and CPT codes for breast implant and tissue expander reconstruction. Patients were stratified into two cohorts: those with ADM (CPT 15777) ("ADM") placed at reconstruction and those without ("non-ADM"). Propensity-score matching was performed on 76 characteristics, including age, demographics, BMI, breast cancer type and location, long-term drug therapy, chemotherapy, irradiation, cancer genomics and other comorbidities. CPT/ICD- Primary outcomes, identified by CPT/ICD10 codes, captured mechanical failures of the breast prosthesis or implant; infectious or inflammatory reactions related to internal prosthetic devices, implants, or grafts; other unclassified implant-related complications; postoperative surgical infections;

postoperative complications of the skin and subcutaneous tissue, including cellulitis; peri-implant capsulectomy or removal of synthetic breast substitute; and postoperative wound dehiscence. Risk analysis compared postoperative outcomes for 6 months after surgery. Risk difference, risk ratio, and odds ratio were calculated to understand the independent effects of ADM.

Results: The query returned 23,656 patients with ADM and 39,482 without ADM. 15,469 patients matched to each cohort. After matching, the ADM cohort had significantly older age at surgery (50.8±11.6 years vs 46.5±13.5 years, $p<0.001$), higher prevalence of previous breast biopsy (23.8% vs 22.1%, $p<0.001$), and lower prevalence of previous mastectomy procedures (11.8% vs 12.7%; $p=0.009$); other variables were not significantly different, including BMI (27.4±6.1 vs 27.3 ± 6.2, $p=0.293$). Mean follow-up times were 172 ± 32 days for ADM and 169 ± 37 days for non-ADM. ADM use in implant-based breast reconstruction was associated with significantly higher risks of all studied outcomes in the 6-month postoperative period. Postoperative infections and wound dehiscence were respectively 1.585 and 1.419 times more likely to occur with ADM, and skin complications were more than twice as likely. Implant complications, such as capsular contracture and inflammation, were also more likely in the ADM group. Notably, the ADM group experienced breast implant explantation/capsulectomy 1.7x as often as the non-ADM group.

Conclusions: To our knowledge, this is the largest comparison of clinical outcomes using ADM in implant-based breast reconstruction to date. Our data suggest ADM placed at time of implant-based reconstruction is associated with significantly higher risk of infection, wound dehiscence, skin complications, and breast implant explantation within 6 months after surgery. This new information may shed more recent light on ADM's complication profile against potential aesthetic/structural benefits when choosing options in implant-based breast reconstruction.

The Effect of Neoadjuvant Chemotherapy on Implant Loss in Immediate Tissue Expander Based Breast Reconstruction

Abstract Presenter: Eileen Wen

Abstract Co-Author(s): Robert DeVito MD, Hibo Wehelie, Daniel Alejandro Mendoza, Scott Hollenbeck MD, FACS, John Stranix MD, Chris Campbell MD, FACS

Background: Implant-based reconstruction represents the most common method of breast reconstruction today. To preserve the viability and surface area of the skin envelope, immediate tissue expander placement is performed in two thirds of all patients undergoing breast reconstruction. Neoadjuvant chemotherapy is becoming more common and can have systemic effects that may place patients at risk for implant loss, infection, wound, and other complications.

Methods: We performed a retrospective review of all cases of implant-based breast reconstruction at a single institution between 2017 and 2024. A total of 210 patients met inclusion criteria of immediate tissue expander placement. 51% of cases were bilateral and 319 total breasts were reconstructed. 71 patients underwent neoadjuvant chemotherapy and 139 did not. Using regression analysis patients were matched for laterality, age, BMI, and ASA status. Patients were separated into neoadjuvant chemotherapy and non-neoadjuvant chemotherapy cohorts. Primary outcomes were all-cause implant loss, wound, infection, and seroma.

Results: The rate of tissue expander loss in patients who underwent neoadjuvant chemotherapy was 23% (24/105 breasts), and the rate of implant loss in patients who did not undergo neoadjuvant chemotherapy was 10.7% (23/214 breasts). On chi-square analysis and Fisher exact tests this difference was statistically significant (p=0.007). On regression analysis neoadjuvant chemotherapy increased risk of implant loss by 15% (p=0.039). There were no statistically significant differences in wound, seroma, and infection.

Conclusion: In this study neoadjuvant chemotherapy is an independent risk factor for implant loss after immediate tissue expander-based breast reconstruction. Further analysis of technique, implant factors, and specific chemotherapeutic agents are warranted.

Smooth Versus Textured Tissue Expanders in Breast Reconstruction: A Comparative Meta-Analysis of 7,738 Tissue Expanders

Abstract Presenter: Yousef Tanas MD

Abstract Co-Author: Aldona Spiegel MD

Purpose: The choice between smooth tissue expanders (STEs) and textured tissue expanders (TTEs) in breast reconstruction has been a topic of discussion among many plastic surgeons with conflicting studies on their complication rates and the theoretical risk of breast implant-associated anaplastic large cell lymphoma (BIA-ALCL) with textured devices. The aim of this updated head-to-head meta-analysis is to provide a comparison of the complication profiles of STEs and TTEs to update the literature and help inform clinical decision-making.

Methods: PRISMA guidelines were followed. PubMed, Scopus, and Web of Science were searched for relevant studies in January 2025. All observational studies from inception to search date comparing TTEs with STEs and reported complications were included. Review Manager 5.4 was used to calculate the risk ratios (RR) and 95% confidence intervals (CI) using the Mantel-Haenszel method. Heterogeneity was assessed using I^2 statistics. In cases of significant heterogeneity, a random-effects model was applied followed by sensitivity analysis.

Results: Nine studies (7738 tissue expanders: 3487 STEs and 4251 TTEs) were included in the meta-analysis. STEs were associated with a significantly higher risk of malposition (RR = 1.65, 95% CI = 1.23 to 2.20, p = 0.0007) and explantation (RR = 1.33, 95% CI = 1.05 to 1.67, p = 0.02) compared to TTEs. Nonetheless, STEs had a lower risk of capsular contracture (RR = 0.27, 95% CI = 0.12 to 0.61, p = 0.002) and mastectomy skin flap necrosis (RR = 0.82, 95% CI = 0.69 to 0.98, p = 0.03). There were no statistically significant differences in rates of seroma, hematoma, wound infection, and wound dehiscence. Across all 9 included studies, BIA-ALCL was not reported in both arms.

Conclusion: This head-to-head meta-analysis indicates that although STEs may increase the risk of malposition and explantation, they may have a lower risk of capsular contracture and mastectomy skin flap necrosis compared to TTEs. Further comparative studies are necessary to confirm these findings, particularly comparing rates of capsular contracture due to the small number of studies that reported this outcome and the contradicting notion that smooth implants are more likely to result in capsular contracture. Studies with longer follow ups are necessary to assess the risk of BIA-ALCL.

Drain Pain - Rethinking the Utilization of Abdominal Drains in Obese patients undergoing Abdominally based Breast Reconstruction

Abstract Presenter: Tara Mather MD

Abstract Co-Author(s): Erin Doren MD, MPH, John LoGiudice MD

Introduction: DIEP flaps are regarded as the gold standard in breast reconstruction. Abdominally-based breast reconstruction historically required the use of abdominal drains in the donor site to reduce the rate of abdominal seroma. Recently, authors have found that abdominal drains may not reduce abdominal complications and may cause discomfort. Use of progressive tension sutures in abdominoplasty has challenged the need for drains. A retrospective study was performed to compare abdominal complications in patients who have undergone DIEP flap breast reconstruction both with and without abdominal drains with progressive tension sutures over a two year period at our institution. We also sought to determine the effect of abdominal drains on the patient experience using triage nurse calls and number of RN visits required for drain management as a proxy.

Methods: A retrospective chart review was performed from 2021-2023 of all patients who underwent abdominally-based breast reconstruction at our institution. Demographics, perioperative data, and outcomes were recorded. The data were analyzed for statistical significance.

Results: A total of 174 consecutive patients treated by 3 surgeons met criteria. 103 patients were in the drain-free cohort and 61 patients were in the drain cohort. The average age of the drain-free and drain cohorts were 50.7 and 48.4, respectively (range 26-77). The average BMI of the drain-free and drain cohorts were 30.0 and 31.6, respectively (range 19.5-45.2). The rate of abdominal seroma in the drain-free cohort and drain cohort was not significantly different at 7.8% and 14.8%, respectively (p=0.1956). The rate of abdominal hematoma was not significantly different in the drain-free cohort and drain cohort at 0.0% and 1.7%, respectively (p=0.1938). Compared to the drain cohort, the drain-free cohort had a similar rate of triage calls regarding drains (drain-free cohort =1.4 calls per patient, drain cohort = 1.3 calls per patient, p = 0.6994). The drain-free cohort had significantly fewer RN visits for drain issues (drain-free cohort = 1.3 visits in 90 days, drain cohort = 1.6 visits in 90 days, p = 0.0357).

Conclusion: This study shows with significance that patients undergoing abdominally-based breast reconstruction without abdominal drains have the same rate of abdominal complications as those with drains, suggesting that the use of the abdominal drain is not necessary. Furthermore, patients without drains had fewer nurse drain visits. Our study is unique as it includes a large cohort with a high average BMI for a study of this kind.

Preoperative Sarcopenia and Outcomes in DIEP Flap Breast Reconstruction: A Propensity Score-Matched Analysis

Abstract Presenter: Jesse Chou MD

Abstract Co-Author(s): Robert DeVito MD, Hibo Wehelie, Amanda Silva MD, Scott Hollenbeck MD, FACS, John Stranix MD, Chris Campbell MD, FACS

Background: Sarcopenia, characterized by progressive loss of skeletal muscle mass and strength, has been linked to higher rates of postoperative complications across various surgical disciplines. However, its effect on autologous breast reconstruction has not been described. This study aims to evaluate the association between preoperative sarcopenia and surgical outcomes in patients undergoing DIEP flap breast reconstruction.

Methods: This retrospective cohort study included all patients who underwent DIEP flap breast reconstruction at a single academic institution between June 2017 and September 2024. Preoperative computed tomography angiography (CTA) was routinely obtained for surgical planning unless contraindicated; therefore, only patients with CTA were included. Sarcopenia was defined using the psoas muscle mass index (L3-PMI, cm^2/m^2) at the L3 vertebra, calculated as the cross-sectional area of the psoas muscles normalized to height. The threshold for sarcopenia was determined using receiver operating characteristic (ROC) analysis.

Propensity score matching (PSM) was performed (1:1 nearest-neighbor matching) for age, BMI, comorbidities, reconstruction laterality, timing, and adjuvant treatments. Balance was assessed using standardized mean differences (SMDs < 0.1). Post-matching, logistic regression was used to evaluate associations between sarcopenia and postoperative complications. Statistical significance was set at $p < 0.05$.

Results: 203 patients with mean age 51.7 years, (range 27–77) were included. 64 (31.5%) were sarcopenic and 139 (68.5%) were non-sarcopenic. Sarcopenic patients were older (69.76 vs. 71.6 years, $p = 0.01$) but had no significant differences in BMI, comorbidities, reconstruction laterality, timing, or adjuvant treatments. After PSM, sarcopenia remained associated with higher rates of breast revision ($p = 0.026$), donor

site infection (p = 0.0109), recipient site wounds requiring intervention (p = 0.015), and hematoma (p = 0.027).

Conclusions: Preoperative sarcopenia is independently associated with increased postoperative morbidity following autologous breast reconstruction. These findings highlight the need for preoperative risk stratification and optimization strategies in sarcopenic patients.

Factors Contributing to Insurance Approval for Breast Reduction: A Regional Analysis of the Southeastern US

Abstract Presenter: Christopher Kalmar MD MBA

Abstract Co-Author(s): Eileen Wen, Tatjana Mortell MD, Ellen Satteson MD, Yemi Ogunleye MD, SM, Abigail Chaffin MD, Galen Perdikis MD, Chris Campbell MD, FACS

BACKGROUND: Insurance coverage for reduction mammaplasty is currently dictated by a sliding scale based on body surface area. However, the correlation between musculoskeletal symptoms and physical examination measurements to these estimated resection weights has not been elucidated. The purpose of this study was to determine whether morphometric parameters of patients with insurance coverage from breast reduction are correlated to ultimate resection weights.

METHODS: Retrospective cohort study was conducted across seven academic institutions of patients undergone insurance-covered reduction mammaplasty from 2010-2019 to analyze pre-operative symptomatology, clinical measurements, and BMI as they relate to resection weights.

RESULTS: During the study interval, 2500 patients underwent reduction mammaplasty, of which 46% of patients were white, and 80% of patients were between the ages of 20-59. All but 10% of patients were overweight or obese. Pre-operatively, 91% of patients endorsed upper back pain and 81% endorsed neck pain, while 6% had no musculoskeletal symptoms. 65% of patients had a nipple to inframammary fold distance of 13-18cm, and 40% had a sternal notch to nipple distance of 30-34 cm. Pre-operative neck pain, BMI (Pearson correlation r=0.63), sternal notch to nipple distance (r=0.71), and nipple to inframammary fold (NIMF) distance (r=0.62) all correlated with resected weight. Regression analysis demonstrated increasing age and BMI as independent risk

factors for overall complications. BMI alone independently predicted nipple necrosis ($p=0.002$) and fat necrosis ($p<0.001$).

CONCLUSIONS: Patients achieving insurance approval for reduction mammaplasty in the southeast were overweight or obese with pre-operative MSK symptoms. There was a strong positive correlation between neck pain, BMI, SNN, and NIMF distance versus resected weights, suggesting that symptoms and physical examination measurements may be similarly important to BMI in predicting medically necessary resection weights for reduction mammaplasty.

Optimizing Postoperative Care: A Custom GPT-4o Chatbot for Breast Surgery Counseling and FAQs

Abstract Presenter: Claudy Sarpong

Abstract Co-Author(s): Joseph Larson, Isabella Oh, Subhas Gupta MD, PhD, FRCSC, FACS

Purpose: Chatbots have an impressive ability to answer patient inquiries and assist medical personnel, but they are limited by specialty-specific knowledge deficits and a lack of informational integrity. These issues can be addressed by training chatbots for specific work functions. The purpose of this study was to develop a custom-trained chatbot to answer common patient questions following breast surgery.

Methods: A custom chatbot was developed using an advanced language platform trained with internal and public patient information resources. A comparison study was conducted between the chatbot and nurse responses to common patient questions posed after breast surgery. Response tone, comprehension, accuracy, effectiveness, and clarity were evaluated using a Likert scale.

Results: The chatbot significantly outperformed the comparison group's responses across all five measured metrics with large effect sizes in each ($p < 0.001$; rank-biserial correlation > 0.5). The chatbot achieved a mean overall score of 4.30 out of 5, which was significantly higher than the comparison group's overall mean of 2.96 ($p < 0.001$; rank-biserial correlation 0.656). The chatbot achieved the largest effect sizes under the comprehension and effectiveness metrics (respective rank-biserial correlation 0.722 and

0.668), demonstrating highest improvement over the comparison's performance in these areas.

Conclusions: The chatbot shows potential to enhance postoperative patient care in breast surgery. The chatbot provided responses that were ranked higher than the comparison group across all measured communication metrics. These findings highlight the potential for chatbots to improve patient counseling, alleviate patient anxiety, increase post-operative patient compliance, and improve patient-provider communication.

Outcomes of Free Flap Breast Reconstruction with Vasopressor Use: A Database Driven Propensity Score-Matched Analysis

Abstract Presenter: Olivia Julian MD

Abstract Co-Author(s): Mary Newland, Charles Lee MD, Rea Chroneos, Timothy Shane Johnson MD, John Roberts MD

Purpose: Autologous breast reconstruction with free tissue transfer is an integral component of treatment for breast cancer patients. Although these procedures are commonly performed by plastic surgeons, they are by nature highly complex, lengthy, and require close postoperative monitoring. Utilizing agents such as vasopressors for hemodynamic management remains controversial, as vasopressors induce vasoconstriction, which could decrease tissue perfusion and threaten the viability of the flap (1). However, the true effects of vasopressor use on free flap outcomes are unknown and existing literature has found mixed results (2, 3). Therefore, our study aims to analyze the outcomes of free flap breast reconstruction in the setting of perioperative vasopressor use.

Methods: The TriNetX LLC. National Health Research database was utilized to identify patients who had a breast cancer diagnosis and underwent free flap reconstruction between 2004-2024. The database was further queried for those who did and did not receive vasopressors within 5 days of surgery and the two cohorts were subsequently matched for their demographics and comorbidities. Then, common procedural terminology (CPT) codes were used to assess for procedures related to flap complications. These included revision of the microvascular anastomosis, flap debridement, hematoma evacuation, and blood vessel repair within 7 days

postoperatively. Diagnoses such as venous thromboembolism (VTE) and sepsis were also included as postoperative complications.

Results: Of the 17,151 patients who underwent free flap breast reconstruction, a total of 7,309 patients were associated with vasopressor use and 6,842 were not. When the two groups were matched for their demographics and comorbidities, 5,909 patients were identified in each cohort. There was no significant difference in the rate of free flap complication rates among those who did (16.5%) and did not (17.5%) receive vasopressors perioperatively (p=0.1349).

Conclusion: Our study demonstrates that perioperative vasopressor use does not significantly impact the complication rate associated with free flap breast reconstruction. Patients who received vasopressors did not experience a higher rate of postoperative complications, including those requiring return to the operating room, within the first 7 days after the index surgery. Therefore, these results imply that vasopressor use is safe when clinically indicated without an increased risk of complications.

1. Larcher Q, Mernier T, Feigna M, Pozzo V, Lantieri L. Impact of Norepinephrine Use on Free Flap Survival in Breast Reconstructive Microsurgery. Microsurgery. 2025 Jan;45(1):e70026. doi: 10.1002/micr.70026. PMID: 39865374.
2. Goh CSL, Ng MJM, Song DH, Ooi ASH. Perioperative Vasopressor Use in Free Flap Surgery: A Systematic Review and Meta-Analysis. J Reconstr Microsurg. 2019 Sep;35(7):529-540. doi: 10.1055/s-0039-1687914. Epub 2019 May 1. PMID: 31042803.
3. Michelle L, Bitner BF, Pang JC, Berger MH, Haidar YM, Rajan GR, Tjoa T. Outcomes of perioperative vasopressor use for hemodynamic management of patients undergoing free flap surgery: A systematic review and meta-analysis. Head Neck. 2023 Mar;45(3):721-732. doi: 10.1002/hed.27289. Epub 2023 Jan 8. PMID: 36618003.

Natural Breast Rejuvenation with Implant-Free Upper Pole Fullness Achieved Through Pioneering Autoaugmentation Mastopexy Techniques Using Native Tissue

Abstract Presenter: Pawel Szychta MD, Phd, Dsc, Prof.

Aim: To explore the outcomes and transformative potential of a novel mastopexy approach utilizing advanced autoaugmentation techniques. This innovative method

achieves upper pole fullness and breast rejuvenation exclusively using native tissue, offering a groundbreaking alternative to traditional techniques reliant on implants.

Methods and Materials: A prospective study was conducted in years 2019-2025, involving patients undergoing mastopexy with autoaugmentation at a single center. All procedures were performed using a standardized protocol, focusing on tissue preservation and redistribution to enhance breast aesthetics. Patient outcomes were assessed preoperatively and postoperatively using standardized measurements and patient-reported outcome tools. Diverse clinical presentations and anatomical variations were included to the study. All procedures were performed by a single surgeon with extensive experience in breast aesthetics. Follow-up periods ranged from 12 to 72 months.

Results: The autoaugmentation mastopexy approach demonstrated significant improvements in breast projection, upper pole fullness, and overall aesthetic harmony. Patients reported high satisfaction rates. Objective measurements confirmed long-term maintenance of upper pole volume and cleavage definition. Minimal postoperative complications, including delayed wound healing, occurred in fewer than 1% of cases. Conclusions. This study highlights the pioneering role of implant-free autoaugmentation techniques in redefining mastopexy possibilities. The approach ensures natural, long-lasting aesthetic results and eliminates implant-associated risks. These findings suggest a paradigm shift in breast surgery, emphasizing patient-centric, sustainable, and innovative methods to achieve optimal outcomes.

Comparing nipple sparing mastectomy with a Goldilocks technique with traditional inframammary fold incision for immediate prepectoral implant-based reconstruction

Abstract Presenter: Nicole Le MD, MPH

Abstract Co-Author(s): Logan Ziegler, Bilal Koussayer,Timothy Nehila
Kristen Whalen MD
Lauren Kuykendall MD

Background: Nipple sparing mastectomy (NSM) improves patient quality of life and self-image but has traditionally been limited to patients with minimal or no ptosis due to

the difficulty in manipulating the skin envelope. The Goldilocks technique, however, allows preservation of the nipple-areolar complex (NAC) in larger, ptotic breasts by utilizing an autologous dermal flap. This study aimed to assess the viability of NSM utilizing a goldilocks technique.

Methods: A retrospective review compared patients that underwent NSM with Goldilocks technique (NSM Goldilocks) to the traditional NSM with an inframammary fold incision (NSM IMF). The NAC is maintained on the distal aspect of the goldilocks flap and closed with Wise pattern incisions (Figure 1).

Results: A total of 39 patients (66 breasts) were included in this study. Between 2019 and 2025, five patients (10 breasts) underwent NSM goldilocks (figure 2) and 34 patients (66 breasts) underwent NSM IMF. The average age was 50 ± 10 years and mean BMI was 24.8 ± 4.2. The nipple to IMF distance of NSM Goldilocks (10.2 ± 2.3cm) was significantly larger than in NSM IMF (7.8 ± 1.7cm), $p < 0.01$. NSM goldilocks had similar odds of overall complications as NSM IMF (OR 1.97 (0.31–12.76), $p = 0.48$).

Conclusion: While NSM remains the gold standard for ideal candidates with minimal ptosis, the Goldilocks technique provides a viable alternative for larger, ptotic breasts, expanding the eligibility for NAC preservation. Further studies are needed to validate its safety and efficacy.

Outcomes after Infection and Explantation in Alloplastic Reconstruction

Abstract Presenter: Gaia Santiago

Abstract Co-Author(s): Akhil Seth MD, Mark Sisco MD, Kanad Ghosh MD

Purpose: Infection requiring implant removal after immediate alloplastic breast reconstruction continues to be a vexing problem for the reconstructive surgeon and patient. While most patients go on to compete the reconstructive process, there is little data regarding the optimal management of these patients. This study examines reconstructive options and outcomes after alloplastic reconstructive failure due to infection.

Methods: A retrospective study was conducted with patients from a single institution undergoing immediate alloplastic reconstruction complicated by infection requiring

removal of the implant. Patients undergoing delayed reconstruction or immediate autologous reconstruction were excluded. SPSS software was used to compare continuous variables via independent t-test and categorical variables compared by Chi-square.

Results: 71 patients (78 breasts) were included in the study with an average age of 50.8 years and average BMI of 29.6 kg/m2. The majority of breasts underwent tissue-expander reconstruction (n=60, 76.9%) with the remainder undergoing direct-to-implant reconstruction (n=18, 23.1%) ; explantation occurred a median of 28 days (range 8-355) after reconstruction. The majority of infections were due to Staphylococcus Aureus (n=32, 45.1%) and Pseudomonas Aeruginosa (n=19, 26.8%). 54 patients (76.1%) and 58 breasts (74.4%) of the original cohort underwent secondary reconstruction. Secondary reconstruction was done with tissue-expanders (n=35, 60.3%), silicone implants (n=9, 15.6%), DIEP or msTRAM flaps (n=8,13.8%), and latissimus flaps with tissue-expanders (n=6, 10.3%).
Recurrent infections occurred in ten breasts (17.2%), eight of which had been secondarily reconstructed with tissue-expanders and two with implants. Of these, two were successfully treated with IV antibiotics and 8 required repeat explantation. Of the eight breasts that required a second explant, six went on to complete reconstruction successfully. The most common organism responsible for recurrent infection was Staphylococcus aureus (n=3, 30%). No patients who underwent secondary reconstruction with autologous tissue developed recurrent infection.

Conclusion: The majority of patients who develop an infection requiring explant are able to complete reconstruction successfully. However, these patients are at a higher-than-average risk for recurrent infection. Conversion to autologous reconstruction may increase the likelihood of success.

Subpectoral Versus Prepectoral Tissue Expander Placement in Breast Reconstruction: A Comparative Meta-Analysis of Complication Profiles and Patient Outcomes of 10,476 Tissue Expanders

Abstract Presenter: Yousef Tanas MD

Abstract Co-Author(s): Grace Gasper, Alexa De La Fuente Hagopian MD
Aldona Spiegel MD

Purpose: The optimal plane of tissue expander (TE) and prosthetic device placement in breast reconstruction is still debatable among surgeons, with conflicting studies on subpectoral versus prepectoral techniques regarding their complication profiles. The aim of this meta-analysis is to compare the outcomes of TE placement in the subpectoral vs. prepectoral planes in terms of postoperative complications and patient-reported satisfaction.

Methods: PubMed, Scopus, and Web of Science were screened. PRISMA guidelines were followed. Observational studies were included if they compared the two TE placements and had reported at least one of the primary outcomes (surgical complications). Secondary outcomes were BREAST-Q scores, length of hospital stay, time to completion of expansion, and time to drain removal. Review Manager 5.4 was used for analysis. Dichotomous data were presented as risk ratios (RR) with their respective confidence intervals (CI) using the Mantel-Haenszel method. Continuous data were presented as mean differences (MD) with their respective CI using the inverse variance method. Heterogeneity was assessed using I^2 statistics. A random-effects model was applied when significant heterogeneity was found. This was followed by sensitivity analysis.

Results: 23 studies (10,476 tissue expanders) met the inclusion criteria and were included in the meta-analysis. Subpectoral TE was associated with a significantly lower risk of seroma (RR = 0.67, 95% CI = 0.53 to 0.85, p = 0.0009), wound dehiscence (RR = 0.74, 95% CI = 0.56 to 0.97, p = 0.03), longer length of hospital stay in days (MD = 0.08, 95% CI = 0.05 to 0.12, p < 0.00001), and longer time to completion of expansion in days (MD = 24.66, 95% CI = 15.39 to 33.92, p < 0.00001) compared to prepectoral TE placement. Nonetheless, no statistically significant differences were observed between the two planes regarding rates of hematoma, infection, skin flap necrosis, nipple necrosis, TE loss, readmission, TE exposure, malposition, capsular contracture, reoperation, BREAST-Q scores, and time to drain removal. A meta-analysis could not be performed for pain scores due to the heterogeneity in the pain scoring assessment across the 3 studies that reported it; however, all 3 studies that assessed pain reported lower scores with prepectoral TE placement.

Conclusion: This head-to-head meta-analysis shows that while TE placement in the subpectoral plane may pose a lower risk of seroma formation and wound dehiscence compared to the prepectoral plane, both approaches demonstrate comparable outcomes for most postoperative complications and patient satisfaction; however, prepectoral TE placement may result in shorter time to complete expansion, shorter length of stay, and less pain.

Utility of Artificial Intelligence Interface to Improve Readability of the Breast Implant Checklist Forms from Three Major Industries in Plastic Surgery

Abstract Presenter: Grace Ryu

Abstract Co-Author(s): Ambroise Gilles MD, Timothy Shane Johnson MD, Charles Lee MD

Purpose: ChatGPT is an artificial intelligence (AI) platform with over 100 million users, serving as a key resource that has proven to be useful in clinical settings. There is a strong emphasis on the ease and readability of informative education materials provided to patients. With regards to breast implants, the FDA recommends all patients who are to undergo breast implant placement to review and sign a checklist delineating the risks, indications, and monitoring guidelines of breast implants during the pre-operative visit. These forms are standardized nationally and provided by the three major leading companies: Allergan, Sientra, and Mentor. However, the readability of the forms and patient's complete comprehension of details, risks, and complications is difficult to assess. Therefore, this study aims to evaluate the readability of the existing breast implant consultation forms and how the use of ChatGPT can improve readability and facilitate patient's comprehension of their procedures.

Methods: Breast implant checklists available online from Allergan, Sientra, and Mentor's official websites were obtained. ChatGPT was queried to convert and create documents for the same procedures at a 6th grade reading level, which is the official grade level recommended by the American Medical Association in regards to patient information materials. Readability was assessed using the Flesch Reading Ease score and Flesch-Kincaid Reading level before and after AI-conversion. These are metric systems commonly used to assess and provide a numeric gauge of comprehension difficulty that readers experience when reading a text. Content reliability and accuracy of the AI materials were assessed by three physicians utilizing the Global Quality Scale.

Results: The mean Flesch Reading Ease scores for Allergan, Sientra, and Mentor's consultation forms before and after ChatGPT conversion were 29.43 and 67.4, ($p = 0.003$) and the Flesch-Kincaid grade levels were 16.1 and 6, ($p = 0.001$), both showing statistical significant difference. The word count was found to have an 84.6% reduction in length after conversion (Table 1).

Conclusion: The Breast implant checklist provided by three major companies in America, Allergan, Menton, and Sientra are at a reading level higher than recommended for the general public. We used ChatGPT to convert these documents into a language more accessible to patients with a significant improvement in readability as demonstrated by Flesch Reading Ease andFlesh-Kincaid grade level. This study shows the potential role AI can play in empowering patient understanding and facilitating communication between patients and treating physicians with regards to the details, risks, benefits, and complications of undergoing breast implant based procedures.

Preservation of Nipple-Sparing Mastectomy Skin Envelope Using A Re-elevation Technique Following Previous Tissue Expander Loss in DIEP Flap Breast Reconstruction

Abstract Presenter: Janelle Rodriguez MD

Abstract Co-Author(s): Haley Kenner BS, Alma Jukic, Santana Solomon BS, Michael Mazarei, Irene Ma MD, Michel Saint-Cyr MD, MBA, MHA, FRCSC, FACS

Introduction: The preservation of the breast skin envelope in autologous breast reconstruction offers significant benefits, including maintaining the initial breast skin color tone, sensation, footprint, projection, and patient's sense of self. Two-stage reconstruction involving the initial placement of tissue expanders immediately after nipple-sparing mastectomy (NSM) followed by autologous DIEP flap reconstruction offers a lower risk of mastectomy skin flap necrosis and better overall definition. Despite these benefits, tissue expander loss due to infection can result in contracture of the skin envelope on the chest wall. This can severely impact the final aesthetic outcome and create esthetic asymmetry with the contralateral intact skin envelope in bilateral cases.

Methods: This study investigates a series of 68 patients (120 breasts) who underwent two-stage autologous breast reconstruction from November 2021 to June 2024 with the initial reconstruction involving NSM and pre-pectoral tissue expander placement. We identified 10 patients (15 breasts) who required removal of their tissue expander due to infection or wound complications and underwent re-elevation of their mastectomy skin flap during autologous reconstruction to preserve their entire skin envelope. We analyzed complication rates and the ability to regain the initial NSM characteristics from the initial tissue expander-based reconstruction.

Results: Patients were followed to assess the impact of well-vascularized tissue on the improvement of skin envelope dermal scarring and rippling after capsulotomy and capsulectomy. We compared the number of revisions required to achieve the final aesthetic outcome between patients who underwent two-stage reconstruction with and without tissue expander loss.
There were no significant differences in revision rates or the number of revisions between the control group (no tissue expander loss) and the group with tissue expander loss and re-elevation of the NSM skin envelope. The complication rates in the re-elevation group were identical to those in the control group. The interval time from tissue expander loss to autologous reconstruction was approximately 4 months.

Conclusion: Aggressive capsulectomy and capsulotomy in the setting of a previously lost tissue expander after NSM are powerful tools in preserving the aesthetic characteristics of the initial mastectomy. Our findings suggest that re-elevation with aggressive capsulotomy and capsulectomy offers a significant aesthetic advantage and should be strongly considered in autologous reconstruction following tissue expander loss. This approach improves the vascularity and softening of irregularities over time. Additionally, the revision rates following tissue expander loss were similar to those in the control group, confirming the effectiveness of this technique.

Comparing Outcomes in Obese Patients: Deep Inferior Epigastric Perforator Flap vs. Implant-Based Breast Reconstruction

Abstract Presenter: Caitrin Curtis MD

Abstract Co-Author(s): Eric Zeng, Joyce Cui, Anna Stipe, Lilian Galarza Paez, Abigail Heilenman, Mary Duet MD, Marion Tapp MD, Adam Katz MD, Thomas Steele MD

Introduction: Obesity increases the risk of complications in deep inferior epigastric perforator (DIEP) flap breast reconstruction, particularly infection rates and donor site morbidity (1). Efforts to define an appropriate BMI cutoff for DIEP flap candidacy remain controversial. Implant-based breast reconstruction (IBBR) is often considered an alternative, though it also carries higher complication rates with increasing BMI (2). This study compares complication and revision rates in obese patients undergoing DIEP flap versus IBBR.

Methods: A retrospective review was conducted of patients who underwent breast reconstruction at two institutions from 2017 - 2024. Patient demographics, operative details, post-operative complications, and revision surgeries were analyzed. Major complications were defined as those requiring unplanned surgical intervention. Patients were categorized into DIEP flap and IBBR groups and further stratified by obesity status: non-obese (BMI <30), class 1 obesity (BMI 30–34.9), and class 2 obesity (BMI ≥35).

Results: A total of 1,308 patients were included, with 895 undergoing DIEP flap reconstruction and 413 undergoing IBBR. In patients with class 1 obesity, DIEP was associated with a higher rate of minor complications compared to IBBR (50% vs. 20%, $p<0.0001$), a trend that persisted in class 2 obesity (62.6% vs. 25%, $p<0.0001$). However, major complication rates did not differ significantly between groups. DIEP patients had significantly higher successful reconstruction completion rates than IBBR patients both in class 1 obesity (98.5% vs. 75%, $p < 0.0001$) and class 2 obesity (98.9% vs. 84.9%). Additionally, DIEP patients had higher revision rates, with class 1 patients requiring revision in 61.2% of cases vs. 36.7% for IBBR ($p<0.0001$) and class 2 patients requiring revision in 64.2% vs. 41.5% of cases ($p<0.0001$).

Conclusion: Despite higher rates of minor complications and revisions, DIEP flap reconstruction consistently demonstrated higher success rates across all BMI categories compared to IBBR. These findings suggest that while DIEP flap reconstruction may require more postoperative adjustments, it provides a more reliable reconstructive outcome for obese patients. Further research is needed to refine surgical decision-making and postoperative care strategies for this high-risk population.

[1] Nelson JA, Sobti N, Patel A, Matros E, McCarthy CM, Dayan JH, Disa JJ, Cordeiro PG, Mehrara BJ, Pusic AL, Allen RJ Jr. The Impact of Obesity on Patient-Reported Outcomes Following Autologous Breast Reconstruction. Ann Surg Oncol. 2020 Jun;27(6):1877-1888. doi: 10.1245/s10434-019-08073-5. Epub 2019 Dec 6. PMID: 31811437; PMCID: PMC8435214.

[2] Srinivasa DR, Clemens MW, Qi J, Hamill JB, Kim HM, Pusic AL, Wilkins EG, Butler CE, Garvey PB. Obesity and Breast Reconstruction: Complications and Patient-Reported Outcomes in a Multicenter, Prospective Study. Plast Reconstr Surg. 2020 Mar;145(3):481e-490e. doi: 10.1097/PRS.0000000000006543. PMID: 32097295.

Factors Associated with Clinical Trial Discontinuation in Aesthetic and Reconstructive Breast Surgery

Abstract Presenter: Tina Moon MD

Abstract Co-Author(s): Tanujit Dey PhD, Andrea Pusic MD, MHS, FACS, FRCSC
Erin Taylor MD

Introduction: Randomized controlled trials are the gold standard for investigating the safety and efficacy of a new intervention. In particular, clinical trials in aesthetic and reconstructive breast surgery are critical for the advancement of treatment modalities and device development. This study evaluates the factors associated with early discontinuation of breast reconstruction and aesthetic breast surgery related clinical trials.

Methods: A cross-sectional analysis of all breast surgery related clinical trials on the ClinicalTrials.gov registry was performed. Trials were categorized as aesthetic, reconstructive, or both. Clinical trials related to breast cancer surgery only without reconstruction were excluded. Trials listed as "suspended", "terminated", or "withdrawn" were defined as discontinued trials. Trials were then further sub-divided into 7 study topics, which included: (1) anesthesia/pain management, (2) infection control/wound healing, (3) breast implant/tissue expanders, (4) general breast reconstruction, (6) fat grafting, (6) microsurgery, and (7) patient/surgical education. Additional factors examined included intervention type, funding source, enrollment size, subject gender, subject age, trial start date, and location.

Results: A total of 3,658 clinical trials were identified with start dates between January 1994 to July 2024. Of these, 565 trials were included in final analysis. Seventy-eight percent of studies were reconstructive, 8% were aesthetic, and 14% were both. A total of 75 trials were prematurely discontinued, most commonly secondary to low patient accrual (24%), inadequate staffing (12%), industry/manufacturer decision (9%), and institutional regulations (9%). Thirty-nine percent of discontinued trials were device related, followed by drug/pharmaceutical (33%) and surgical technique (21%). Study category, topic, enrollment size, and study location were not associated with early discontinuation. Observational studies were least likely to be discontinued (OR = 0.23 [0.10-0.48], $p<0.001$). Non-industry funded studies had a higher likelihood of early discontinuation compared to industry funded studies (OR = 2.07 [1.17-3.59], $p = 0.011$).

Conclusion: Successful completion of clinical trials in aesthetic and reconstructive breast surgery is essential for improving patient outcomes. Our study demonstrates that

13% of clinical trials did not reach fruition, largely secondary to poor patient recruitment and staffing issues. Targeted efforts to help support trial completion is necessary to help improve evidence-based practice within breast surgery.

Wound Complications Associated with Use of Glucagon-Like Peptide-1 Agonists in Autologous Microsurgical Breast Reconstruction

Purpose: Glucagon-like peptide-1 (GLP-1) agonists have long been used for diabetic glycemic control but have recently increased in popularity as injectable weight-loss drugs. It is well-known that outcomes in plastic surgery procedures improve when weight and glycemic control are optimized preoperatively. However, data on the effects of GLP-1 agonist therapy on plastic surgery outcomes is lacking, particularly within breast reconstruction. This study aims to explore complication rates of GLP-1 agonist use in autologous microsurgical breast reconstruction.

Methods: A national study was conducted using the PearlDiver database. Using procedure codes, all adult female free flap breast reconstruction cases were identified from January 2017 to November 2024. Patients were categorized into those who had taken GLP-1 agonists and those who had not. Demographic and comorbidity data was collected. Univariate and multivariate regression analyses were conducted. Multivariate regression controlled for age, diabetes, obesity, and chemotherapy treatment. Odds ratios (ORs) were calculated, and a p-value less than 0.05 was considered significant.

Results: 12,474 patients who underwent free flap breast reconstruction were included. Of these, 1.7% (n=214) had received treatment with a GLP-1 agonist during the study period. In comparison, 98.3% (n=12,260) had not. Multivariate regression revealed that patients taking GLP-1 agonists had a significantly higher 30-day occurrence of wound dehiscence rate of 13.1% vs 5.5% in the no-GLP-1 group (OR 1.33, p=0.042). When compared to the no-GLP-1 group, patients taking GLP-1 agonists also had a higher 30-day occurrence of seroma (8.4% vs. 2.8%, OR 1.52, p=0.023) and reoperation (10.7% vs 10.4%, OR 1.37, p=0.004). There was no significant difference in 30-day occurrence of other complications, including surgical site infection, non-healing wound, hematoma, or readmission.

Discussion: GLP-1 agonists are becoming increasingly popular in our society. Although they have several proven benefits, their perioperative risk profile is still being studied. This study found that free flap breast reconstruction patients who take GLP-1 agonists

have a significantly increased risk of seroma, wound dehiscence, and reoperation. These findings may inform plastic surgeons' preoperative counseling of breast reconstruction patients who are taking these drugs. Additional research is needed to understand better the mechanisms underlying the risks seen in this study. Furthermore, this database study was limited in its ability to determine when these drugs were being taken relative to surgery. Future studies could help elucidate the pre- or post-operative time frame during which it is safest to take GLP-1 agonists.

The Impact of Body Mass Index in Outcomes of Staged Breast Reduction before Nipple-Sparing Mastectomy with Immediate Autologous Reconstruction

Abstract Presenter: Michael Choi

Abstract Co-Author(s): Aileen Gozali MD, Merisa Piper MD

PURPOSE: Nipple-sparing mastectomy (NSM) is challenging in patients with macromastia or ptosis. Staged reduction before NSM can optimize outcomes in this population (1). Body mass index (BMI) has been shown to be a predictor of complications following immediate post-mastectomy reconstruction (2). No prior studies have shown how BMI may impact outcomes in patients undergoing staged reduction before NSM with immediate autologous reconstruction. Our study aims to understand how complication rates vary across BMI groups.

METHODS: Patients who underwent a staged reduction before NSM with immediate autologous reconstruction between January 2018 through October 2023 were retrospectively reviewed for demographics, surgical details, and outcomes. Outcomes collected include infection, delayed wound healing, seroma, hematoma, mastectomy skin-flap and nipple-areolar complex necrosis, flap loss, unplanned reoperation, and readmission. Patients were stratified into five BMI categories according to the World Health Organization classifications – normal weight (18.5–24.9), pre-obese (25.0–29.9), and obesity classes I (30.0–34.9), II (35.0–39.9), and III (≥40) – and outcomes were compared. Additional analysis grouped patients into obese (BMI ≥ 30) and non-obese (BMI < 30) categories and compared outcomes.

RESULTS: A total of 30 patients (57 breasts) were analyzed, with a median follow-up of 318 days (range, 20 to 1020 days). The median interval between the two surgeries was 172 days (range, 89 to 776 days). There were no significant differences in BMI before or

after reduction (p=0.25). Averaging the BMI at time of reduction and mastectomy, 12 breasts (21.2%) were in the normal weight category, 20 breasts (35.1%) in the pre-obese category, 18 breasts (31.6%) in the obesity class I category, and 7 breasts (12.3%) in the obesity class II category. There were no patients with class III obesity in our cohort. The groups differed significantly in race (p<0.001), diabetes (p=0.002), smoking status (p=0.001), and mastectomy incision type (p=0.023). The majority of pre-obese and obese class I patients identified as White (80.0% and 83.3%), whereas most obese class II patients identified as Black (71.4%). Diabetes was observed only in obese class II patients (28.6%), while current smoking was exclusive to normal-weight patients (16.7%). For mastectomy incisions, all normal-weight patients used the inframammary-fold approach, while other BMI groups, though primarily using the same technique, also utilized peri-areolar, vertical, and Wise-pattern incisions. When comparing outcomes, there were no differences in overall or individual complication rates across BMI groups (p=0.098). When stratified into obese and non-obese categories, obese patients had higher risk of post-NSM infection (p=0.039) and the development of any complication after NSM (p=0.020). On multivariate regression analysis controlling for BMI, race, diabetes, smoking status, and NSM incision, obesity was identified as an independent predictor for development of any post-NSM complication (OR=1.18, p=0.045).

CONCLUSIONS: Among patients undergoing staged breast reduction before NSM with immediate autologous reconstruction, we found that patients with a BMI higher than 30 had a significantly higher risk of developing post-NSM complications. In the setting of a staged procedure, this highlights an opportunity for preoperative interventions to optimize the BMI of these patients to improve outcomes.

REFERENCES

1.Awaida-CJ,-Bernier-C,-Bou-Merhi-JS,-et-al.-Staged-mastopexy-before-nipple-sparing-mastectomy:-Improving-safety-and-appearance-in-implant-based-and-autologous-breast-reconstruction.-Plastic-&-Reconstructive-Surgery.-Published-online-June-19,-2023.-doi:10.1097/prs.0000000000010823

2.Srinivasa-DR,-Clemens-MW,-Qi-J,-et-al.-Obesity-and-breast-reconstruction:-Complications-and-patient-reported-outcomes-in-a-multicenter,-Prospective-Study.-Plastic-&-Reconstructive-Surgery.-2020;145(3).-doi:10.1097/prs.0000000000006543

Comparative Aesthetic and Clinical Outcomes of Wise Pattern and Breast-Splitting Incisions in Skin-Sparing Mastectomy with Immediate Tissue Expander Reconstruction

Abstract Presenter: Nicole Sanchez Figueroa MD, Msc

Abstract Co-Author(s): Scott Odorico MD, Maria Rios Sanche, Aparna Vijayasekaran MBBS, Jorys Martinez-Jorge MD

Background: Since its introduction, skin-sparing mastectomy (SSM) has revolutionized oncologic breast surgery by optimizing aesthetic outcomes. Various incision techniques have been utilized to facilitate oncologic resection while preserving reconstructive potential. Among these, the Wise pattern and breast-splitting incisions are commonly employed, each with distinct advantages and surgical considerations. While prior studies have primarily compared complication rates between these techniques, limited data objectively assess their aesthetic outcomes. This study aimed to provide a comprehensive comparison of aesthetic and clinical outcomes between Wise pattern and breast-splitting incisions in SSM with immediate tissue expander reconstruction.

Methods: A retrospective cohort study was conducted at a high-volume academic institution, analyzing 294 breasts (167 patients) from 2015 to 2023. Patients undergoing SSM with immediate tissue expander reconstruction were categorized into two cohorts based on mastectomy incision type: Wise pattern (n=129) and breast-splitting (n=165). Aesthetic outcomes were assessed using a validated questionnaire evaluating symmetry, volume, scar quality, shape, contour, and overall appearance. The survey was distributed via REDCap to 7 attending plastic surgeons and 15 trainees. Statistical analyses included the Wilcoxon rank-sum test, Pearson's chi-square test, and Cox proportional hazards model. All statistical analyses were performed using BlueSky Statistics © 2024.

Results: Wise pattern incisions demonstrated superior aesthetic outcomes, with significantly higher ratings in volume symmetry ($p=0.001$), shape and contour ($p<0.001$), scar quality ($p<0.001$), and overall appearance ($p<0.001$). No significant differences were observed in inframammary fold appearance ($p=0.279$) or symmetry scores ($p=0.727$). A shift towards increased utilization of the Wise pattern technique over time was observed ($p=0.004$), aligning with a preference for improved aesthetic results. Analysis using Pearson's chi-square test indicated that seroma incidence was significantly higher in the Wise pattern cohort (10.1% vs. 3.0%, $p=0.013$). The Cox proportional hazards model revealed no significant differences in overall complication rates (HR=1.75, 95% CI: 0.90–3.43, $p=0.1001$), first revision surgery (HR=1.32, 95% CI:

0.85–2.05, p=0.223), or second revision surgery (HR=1.55, 95% CI: 0.70–3.45, p=0.281). Hematoma, dehiscence, and skin necrosis rates were low and did not differ significantly between the groups. The mean (SD) follow-up was 31.2 (26.36) months.

Conclusions: This study provides the first validated, objective aesthetic comparison between Wise pattern and breast-splitting incisions in SSM with immediate tissue expander reconstruction. The Wise pattern approach yields superior aesthetic outcomes, particularly in volume, shape, contour, and scar quality, making it the preferred choice for patients with larger, ptotic breasts. Despite a slightly higher seroma rate, complication risks remain low and comparable between techniques. These findings highlight the importance of individualized incision selection to balance aesthetic goals and surgical safety in breast reconstruction. Future studies should explore long-term patient satisfaction and potential refinements in technique to further optimize reconstructive outcomes.

Malposition After Breast Implant Surgery: A Systematic Review and Meta-Analysis of Surgical and Device Characteristics

Abstract Presenter: Gabrielle Rodriguez MD

Abstract Co-Author(s): Emily George MD, Morgan Gamble, Parul Rai, Jason Zhang, Reyna Patel, Diana Griffin, Anitesh Bajaj, Arun Gosain MD

Purpose: Implant malposition is the second most common reason for revision surgery after capsular contracture in breast augmentation and remains one of the leading causes of revision surgery following breast reconstruction.(1,2) In addition to aesthetic concerns, inappropriately positioned implants can cause pain, discomfort and emotional distress. Thus, it is key for surgeons to understand the risk factors associated with this complication. The aim of this systematic review and meta-analysis is to provide evidence of surgical, and implant characteristics associated with implant malposition following primary breast augmentation and reconstructive surgery.

Methods: A literature search was conducted on February 3, 2025, using the PubMed, CINHAL, Scopus, and Cochrane Library databases to identify relevant articles. This systematic review includes observational studies involving adult females who experienced implant malposition following primary breast augmentation and reconstruction. Case reports, case series, reviews, editorials, letters to the editor, animal

studies, in vitro studies, as well as studies focused exclusively on transgender patients were excluded. Results were synthesized using random-effects models to generate pooled risk ratios (RRs) with 95% confidence intervals.

Results: A total of 2,032 articles were identified, and 13 studies (36,103 implants) were ultimately selected for review after eligibility screening and quality appraisal. This meta-analysis suggests that prepectoral implant placement has a significantly decreased risk of malposition compared to subpectoral placement (RR= 0.58, CI [0.38,0.87] p = 0.0085) and primary augmentation had less risk compared to reconstruction (RR= 0.78, CI [0.64,0.93] p = 0.0070). However, no significant differences in malposition were found between smooth vs textured implants (RR = 1.27, CI [0.84,1.91] p = 0.249), smooth round vs textured anatomical implants (RR= 1.04, CI [0.27,3.67] p = 0.951), or implants placed in the subpectoral plane compared to dual plane (RR= 0.97, CI [0.12,7.84] p = 0.976).

Conclusion: This systematic review and meta-analysis highlights key surgical and implant related factors associated with implant malposition following primary breast augmentation and reconstructive surgery. The findings suggest that subpectoral implant placement significantly increases the risk of malposition compared to prepectoral placement, and primary augmentation carries lower risk than reconstruction. However, implant texture does not appear to significantly impact malposition rates. These findings can guide patient counseling, inform clinical management and optimize surgical planning to minimize the risk of implant malposition in breast surgery.

References:
1. Fracol M, Qiu CS, Chiu WK, Feld LN, Shah N, Kim JYS. Lateral and Inferior Implant Malposition in Prosthetic Breast Reconstruction: Incidence and Risk Factors. Plast Reconstr Surg Glob Open. 2020;8(5):e2752. doi:10.1097/GOX.0000000000002752
2. Coroneos CJ, Selber JC, Offodile AC, Butler CE, Clemens MW. US FDA Breast Implant Postapproval Studies. Ann Surg. 2019;269(1):30-36. doi:10.1097/SLA.0000000000002990

Review of Outcomes of OviTex PRS Reinforced Tissue Matrix in Implant-Based Breast Reconstruction

Abstract Presenter: Zain Aryanpour MD

Abstract Co-Author(s): Stacy Wong MD, Nancy Wong MD, David Mathes MD, Christodoulos Kaoutzanis MD

Background: Acellular dermal matrix (ADM) is the gold standard tissue substitute used as an adjunct in implant-based breast reconstruction (IBR) and has afforded improved outcomes across many studies compared to IBR without tissue substitutes. A substantial amount of research has been performed to identify alternative and potentially more accessible, cost-effective tissue substitutes that can be used safely and with equivalent outcomes as ADM. OviTex PRS (TELA Bio) is an FDA-approved reinforced ovine tissue matrix and has shown comparable efficacy to ADM in primate models of soft tissue repair (1). However, no clinical studies exist assessing the efficacy of OviTex PRS in human subjects. The purpose of this non-inferiority study is to compare post-operative outcomes between OviTex PRS and ADM in IBR.

Methods: We performed retrospective review of patients who underwent post-oncologic IBR at a large academic institution. Patients were grouped into whether they underwent IBR with AlloDerm ADM (control) or OviTex (experimental). Patients were excluded if they underwent mixed reconstruction (both ADM and OviTex), concomitant flap procedure at time of IBR, or if they underwent only soft tissue augmentation with either product. Covariates of interest included patient demographics (age, body mass index, ASA score) and surgical characteristics (e.g., unilateral vs bilateral, tissue expander vs direct to implant, pre-pectoral vs sub-pectoral placement, etc.). The three types of OviTex were additionally evaluated (permanent, short-term resorbable, or long-term resorbable). Outcomes of interest included post-operative complications including minor infections requiring antibiotics, major infections requiring surgical intervention, fluid collections (seroma/hematoma), wounds/dehiscence, mastectomy flap necrosis, implant exposure, overall operative complications, and explant. All patients had a minimum of 6 months of follow-up. Standard statistical analysis was performed with significance set to $p < 0.05$.

Results: 242 patients who met inclusion criteria underwent IBR of a total of 429 breasts with either ADM (n=115) or OviTex (n=127) between August 2021 and August 2024. Within the OviTex group, 37 patients underwent IBR with the permanent variant, 12 patients with short-term resorbable, and 78 with long-term resorbable. There was no impact of OviTex type on any of the evaluated post-operative outcomes (p=0.37). When comparing ADM versus OviTex in IBR, there was no difference between the groups in any of the evaluated outcomes (p=0.33), specifically as it pertains to operative complications (18.3% vs 18.9%, respectively, p=0.88), explant rate (12.2% vs 14.2%, respectively, p=0.63), or implant salvage rate (33.3% vs 25.0%, respectively, p=0.52). Incidentally, the OviTex group underwent pre-pectoral (p=0.03) and direct-to-implant

reconstruction ($p<0.001$) more frequently than the control group without notable differences in postoperative outcomes.

Conclusions: Our data suggests that OviTex PRS is a safe and reliable option as a supportive tissue substitute in IBR. Our study suggests non-inferiority of OviTex PRS to standard ADM in IBR, representing a possible cost-saving alternative.

References

1. Overbeck N, Beierschmitt A, May BC, Qi S, Koch J. In-Vivo Evaluation of a Reinforced Ovine Biologic for Plastic and Reconstructive Procedures in a Non-human Primate Model of Soft Tissue Repair. Eplasty. 2022;22:e43. Published 2022 Sep 14.

Surgical Outcomes of Prepectoral Two-Stage Breast Reconstruction in Patients Treated with Pembrolizumab: A Retrospective Review

Abstract Presenter: Yasmine Ibrahim

Abstract Co-Author(s): Anne Hall, Milan Carter, Chris Tiancheng Zhao, Julissa Molina-Vega, Maral Demirjian, Lorna Kwan, Cindy Curiel, Kasra Rahmati, Aman Tahir, Siam Rezwan, Michael Delong MD, Tahera Alnaseri

Background: Triple-negative breast cancer (TNBC), defined by a lack of estrogen (ER) and progesterone (PR) receptor expression and the absence of human epidermal growth factor receptor 2 (HER2), represents 20% of all breast cancers and is the most aggressive subtype. In the past several years, however, Pembrolizumab has emerged as a promising immunotherapy for TBNC in addition to chemotherapy. Due to the recent approval and relatively limited number of patients, there are currently no prior data available to determine the impact of Pembrolizumab on surgical outcomes after breast reconstruction. In this retrospective review, we evaluated surgical outcomes for two-stage prepectoral breast reconstruction in breast cancer patients who received Pembrolizumab at a high-volume breast center.

Methods: Retrospective review was conducted of all patients undergoing immediate two-stage prepectoral reconstruction at a single center with at least 3 months of follow-up from January 2018 to October 2024. Autologous reconstruction, delayed reconstruction, and direct-to-implant cases were excluded as were patients that received chemotherapy after implant exchange. Breast cancer laterality, cancer

histology, staging, subtype, neoadjuvant and adjuvant therapy (chemotherapy, HER2 immunotherapy, and Pembrolizumab) were collected. Complications included infection, hematoma, seroma, mastectomy flap necrosis, and implant removal for any reason. Major complications were defined as requiring readmission or return to the operating room. Variables were compared using Fisher Exact Tests and Wilcoxon Rank Sum Test.

Results: A total of 472 patients were analyzed. Twenty-seven (6%) patients received Pembrolizumab during their treatment. The median age of all patients was 46.7 years and median follow-up time was 12 months (interquartile range 7.0-19.0). One hundred and thirty-six (29.4%) underwent neoadjuvant chemotherapy and 423 (89.6%) reached their second stage of reconstruction and received implants. Seromas were significantly more likely during the expansion phase of reconstruction in patients who received pembrolizumab (44.4% vs 27%, p=0.049). All other complications and aggregate major complication rates were not statistically different in the expansion phase. Major complication rate after implant exchange was found to be significantly higher for patients who received Pembrolizumab (26.3% vs 8%, p=0.0194) leading to higher reoperation rates (19.1% vs 3.7%, p=0.0107).

Conclusion: Pembrolizumab has emerged as a promising new therapy for TNBC in recent years, however its impact on surgical outcomes for two-stage prosthetic breast reconstruction is currently unknown. In our cohort, patients undergoing therapy incorporating Pembrolizumab experienced significantly higher rates of seroma following the first stage of reconstruction while major complications and reoperation were found to be significantly higher following implant exchange. These data may inform perioperative shared decision-making and further studies should be considered to define the impact of immunotherapy on outcomes following other types of breast reconstruction.

References

1. https://www.nejm.org/doi/full/10.1056/NEJMoa2202809
2. https://www.nejm.org/doi/full/10.1056/NEJMoa1910549
3. https://link.springer.com/article/10.1007/S00404-015-3859-Y
4. https://ascopubs.org/doi/abs/10.1200/JCO.2017.35.15_suppl.556
5. https://link.springer.com/article/10.1007/s12032-017-1071-6

Demographics of Patients Undergoing Autologous Breast Reconstruction at a Tertiary Care Center: A Descriptive Analysis

Abstract Presenter: Julianna Zeepvat

Abstract Co-Author(s): Makenna Ash MD, Olutolashe Ebunlomo, Orr Shauly MD, Abdl-Rawf Al-Nowaylati MD, Gabriela Garcia Nores MD, Paridhi Agarwal

Background: Autologous breast reconstruction (ABR) offers many benefits to patients when compared to implant based breast reconstruction (IBBR), including reduced need for maintenance or surveillance, use of the patient's own tissue, and ability to change size along with the patient's changes in weight. However post-operative recovery is substantially longer for ABR than IBBR; additionally, patients may have cultural or religious beliefs that influence their decision to pursue one type of breast reconstruction over another.

Project Aim: The aim of this project was to define demographic factors that may influence a patient's selection of the method of breast reconstruction.

Methods: All patients undergoing ABR at a tertiary care center in Atlanta, GA, from January 2016 to October 2024 were included in the study. Patients were called and surveyed regarding race, religion, political ideology, socioeconomic status, and social support. Data was analyzed in JMP.

Results: 82 patients consented to be a part of the study. The average age of participants was 50.6 years, the average BMI was 32.2, and 18.3% of patients had a diagnosis of diabetes mellitus. 47.6% underwent bilateral DIEP, 45.1% underwent unilateral DIEP, and 7.3% underwent another type of ABR.

46.3% of patients identified as Black, 6.1% identified as Hispanic, and 76.8% identified as non-Catholic Christian. 50% of patients identified their political ideology as neither Democrat nor Republican, 96.3% spoke English as their primary language, and 62.2% were married at the time of surgery. 50% of patients identified an undergraduate degree as the highest form of education they had obtained, 69.5% were employed at the time of surgery, and 46.3% had a household income of $100,000 or greater. 92.8% of patients had a primary care provider (PCP), 90.2% had discussed method of breast reconstruction with their oncologist prior to meeting with their plastic surgeon, and 64.6% knew that they were interested in receiving ABR prior to meeting with their plastic surgeon.

Conclusion: The majority of patients undergoing ABR at this institution showed evidence of strong social support and middle to high socioeconomic status. The majority were married, employed with high household income, already had a PCP, and practiced

non-Catholic Christianity. Future studies should compare these demographic factors with those of patients undergoing IBBR in order to evaluate differences between the two groups.

Craniomaxillofacial

Orbital Anthropometrics Correct to Age-Matched Values after Strip Craniectomy in Metopic Craniosynostosis

Abstract Presenter: Amy Graham MD

Abstract Co-Author(s): Adam Goodreau MD, Christopher Forrest MD, Johanna Riesel MD

Background: Children with metopic craniosynostosis have distinct orbital dysmorphologies that include perceived hypotelorism and a symmetric, elliptical orbital aperture canted toward the synostosed suture. The extent to which hypotelorism is a true skeletal difference or, rather, perceived hypotelorism in the setting of trigonocephaly has been previously debated (1). Additionally, maneuvers to address the intercanthal distance during traditional fronto-orbital advancement procedures yield inconsistent results on orbital anthropometrics. The purpose of this study is to expand on our previous work by detailing pre- and post-operative orbital anthropometrics among a cohort of metopic synostosis patients undergoing endoscopic strip craniectomy (ESC) compared to age-matched controls. We aim to (1) detail the presence/absence of true skeletal hypotelorism in young infants with metopic synostosis and (2) define the role of ESC in restoring orbital anthropometric parameters to normal values.

Methods: A retrospective, cohort study was performed at a single center over a three-year (2020 – 2023) period. Using Slicer software, a three-dimensional craniometric analysis was performed on preoperative and one-year postoperative CT images of children with metopic craniosynostosis and age-matched peers. Twelve craniometric parameters were obtained. Age-matched children with normocephalic head shapes who underwent CT scan for other reasons than to rule-out craniosynostosis were utilized for comparison.

Results: Nine children were included as subjects in the study and fourteen children were included as controls. The mean age of subjects at pre-operative CT scan was 69.3 days and 72.3 days for controls. The mean age of subjects at post-operative CT scan was 14.8 months and 14.3 months for controls, for a mean follow-up of 11.4 months after ESC. 64 orbits were analyzed. Pre-operative subject Dacryon to Dacryon (Da-Da) measurements showed a significant difference from controls (12.2 ± 0.54 millimeters v. 15.4 ± 0.53 millimeters; p=0.0007), while post-surgery, there was no significant difference (16.11 ± 0.67 millimeters v. 15.10 ± 0.50 mm; p=0.2392). Similarly, Zygomaticofrontal suture to Zygomaticofrontal suture (ZF-ZF) measurements revealed a significant pre-operative difference (61.3 ±1.25 millimeters v. 67.2 ± 2.38 millimeters; p=0.0238) with post-operative normalization (76.0 ± 1.22 millimeters v. 76.0 ± 1.19 millimeters; p=0.9767). The supraorbital notch to anterior nasal spine to supraorbital notch (SON-ANS-SON) angle also indicated significant pre-operative differences (39.9 ± 0.96 degrees v. 60.1 ± 3.06 degrees; p=0.0001), with post-operative measurements showing no significant difference from controls (49.6 ± 1.39 degrees v. 55.3 ± 2.00 degrees; p=0.0674).

Conclusions: Previous work demonstrated improvement in interdacryon distance before and after endoscopic strip craniectomy. The present effort shows that orbital hypotelorism in young infants with metopic synostosis is a true skeletal difference from age-matched controls that corrects after endoscopic strip craniectomy.

References:

1. Patel KB, Skolnick GB, Mulliken JB. Anthropometric Outcomes following Fronto-Orbital Advancement for Metopic Synostosis. Plast Reconstr Surg. 2016 May;137(5):1539-1547. doi: 10.1097/PRS.0000000000002129

Mitigating Infant Positional Plagiocephaly Through Parental Education: Results from a Clinical Study

Abstract Presenter: Jessica Farzan

Abstract Co-Author(s): Lisa Nguyen Yvonne Nguyen Anna Bogursky Yiming Zhang Janice Lalikos MD

Introduction: Positional plagiocephaly is characterized by cranial asymmetry, and can be the result of prolonged, uneven pressure on the developing skull (1). Causes include

extended time in the supine position, one-sided feeding, or insufficient tummy time (2,3). Beyond cosmetic concerns, it can affect visual, auditory, and speech development(1,2,4). Following the "Back-to-Sleep Campaign," prevalence rose to 16-22.1% in 6-week-old infants (4). In Massachusetts, 4.3% of newborns receive helmet therapy, which can $1,600 on average (5). Despite its extensive impact on development and finances, many caregivers and parents lack awareness, underscoring the need for improved education and prevention strategies.

Methods: This study, a partially blinded, two-arm randomized control trial, is ongoing at University of Massachusetts Memorial Hospital (June 2022 to January 2025). Newborns are assigned to control or intervention groups, with the latter receiving plagiocephaly prevention education. Cephalic index (CI, a proxy for plagiocephaly) measurements and parent surveys are collected at 2-, 4-, and 6-months of age. Increased CI tracks with cranial deformation. Analyses compared measurements and survey responses between groups using unpaired two-sample t-tests and difference-in-difference analysis.

Results: Interim analysis includes 107 subjects. The average baseline CI for control (cCI) and intervention (iCI) groups was 86.85 (SD 6.72) and 86.41 (SD 6.70), respectively ($p = 0.983$). At 2 months, cCI and iCI were 87.81 (SD 8.10) and 86.34 (SD 4.48) ($p = 0.420$). At 4 months, cCI and iCI were 90.34 (SD 4.62) and 86.28 (SD 6.19) ($p = 0.014$). At 6 months, cCI and iCI were 84.86 (SD 4.48) and 83.81 (SD 5.40) ($p = 0.204$) (Table 1). There was a statistically significant difference between control and intervention group parent behaviors, with the intervention group scoring more points for better compliance with recommendations (15.87 vs. 13.75) ($p = 0.028$), suggesting greater adoption of preventative measures by intervention parents.

Conclusion: Our interim analysis demonstrates a positive trend, with the intervention group demonstrating less cranial deformation at each time interval and reaching statistical significance at 4 months. This aligns with parent-reported behaviors at 4 months, where intervention parents demonstrated greater implementation of preventative measures. The correlation between parental engagement and CI supports the intervention's potential efficacy. As we enroll more newborns, we anticipate enhanced statistical power, leading to more definitive conclusions at 6 months. Preliminary data suggests that early education may help prevent positional plagiocephaly.

Average CI Intervention Group Control Group P Mean (SD) Baseline CI 86.41 (6.70) 86.85 (6.72) 0.98 Mean (SD) CI at 2 mo 86.34 (4.48) 87.81 (8.10) 0.42 Mean (SD) CI at 4 mo 86.28 (6.19) 90.34 (4.62) 0.014 Mean (SD) CI at 6 mo 83.81 (5.40) 84.86 (4.48)

0.2 Table 1 – Average CI of the intervention and control groups at the 2-, 4-, and 6-month time points.

References

1. Aarnivala H, Vuollo V, Harila V, Heikkinen T, Pirttiniemi P, Valkama AM. Preventing deformational plagiocephaly through parent guidance: a randomized, controlled trial. Eur J Pediatr. Sep 2015;174(9):1197-208. doi:10.1007/s00431-015-2520-x
2. Marshall JM, Shahzad F. Safe Sleep, Plagiocephaly, and Brachycephaly: Assessment, Risks, Treatment, and When to Refer. Pediatr Ann. Oct 1 2020;49(10):e440-e447. doi:10.3928/19382359-20200922-02
3. Biggs WS. Diagnosis and management of positional head deformity. Am Fam Physician. May 1 2003;67(9):1953-6.
4. Cavalier A, Picot MC, Artiaga C, et al. Prevention of deformational plagiocephaly in neonates. Early Hum Dev. Aug 2011;87(8):537-43. doi:10.1016/j.earlhumdev.2011.04.007
5. Wood JJ, Phan QA, Phan J, et al. Treatment of Plagiocephaly With Orthotic Helmets: Prevalence, Costs, and Inequities in Massachusetts. J Craniofac Surg. Jan-Feb 01 2025;36(1):74-77. doi:10.1097/SCS.0000000000010655

Timing of Cleft Palate Repair and Its Impact on Velopharyngeal Insufficiency Surgery: A 30-Year Analysis

Abstract Presenter: Anika Kim

Abstract Co-Author(s):Melanie Bakovic, Valeria Mejia, Asli Pekcan, Raina Patel, Eloise Stanton MD, Alyssa Valenti MD, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Velopharyngeal insufficiency (VPI) is common in the cleft palate (CP) population. While some studies indicate that earlier age of CP repair may reduce VPI rates, the optimal timing for CP repair and its relation to the need for subsequent VPI surgery remains unclear. This study aims to evaluate how the timing of cleft palate repair impacts the rate of VPI surgery at a single institution.

Methods: A retrospective review of patients who underwent cleft palate repair before the age of 18 months at a tertiary children's hospital between 1990 and 2023 was conducted. Patients with craniofacial syndromes and a follow-up time of less than five years from CP repair were excluded. Data on patient demographics and cleft repair

were collected. The primary outcome measure was the rate of VPI surgery. Fisher's exact and Wilcoxon rank-sum tests were performed both before and after propensity score matching for sex, age, insurance payor, cleft phenotype, surgical technique, and surgeon experience.
Results: A total of 393 patients met the inclusion criteria, with 108 patients remaining post-matching. The median age at cleft palate repair was 11.2 months (Range: 3.3-17.8). The cleft types were categorized as cleft lip and palate (81.1%), isolated cleft palate (17.9%), and submucosal cleft palate (1.0%). According to the Veau classification, the clefts were further categorized as Class I (isolated soft palate) (5.6%), Class II (hard/soft palate) (9.3%), Class III (complete unilateral cleft palate involving the alveolar ridge) (42.6%), and Class IV (complete bilateral cleft palate involving the alveolar ridge) (40.7%). Out of these patients, 67 (17.0%) underwent VPI surgery. Pre- and post-matching analysis indicated that CP age was not significantly different between patients who required VPI surgery and those who did not (median age post-matching: 11.5 months vs 11.1 months, p = 0.6).

Conclusion: This study reveals that within the first 3 years of life, the timing of cleft palate repair does not significantly affect the risk of subsequent VPI surgery. These findings suggest that factors other than the timing of initial CP repair may be more influential in determining the risk of future VPI. While the timing of CP may not impact VPI surgery rates, further research is warranted to explore its effects on VPI diagnosis and the need for speech therapy.

Evaluating the Impact of Early Mandibular Distraction Osteogenesis on Obstructive Sleep Apnea in Patients with Robin Sequence: A 20-Year Review

Abstract Presenter: Valeria Mejia

Abstract Co-Author(s): Asli Pekcan, Melanie Bakovic, Raina Patel, Marvee Turk MD, Pasha Shakoori MD, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Mandibular distraction osteogenesis (MDO) has emerged as a powerful technique for airway management in patients with Robin Sequence (RS). The optimal age to perform MDO in RS patients has yet to be rigorously investigated. In this study, we evaluate the role of surgical timing in optimizing respiratory outcomes after MDO over a 20-year period.

Methods: A retrospective review of patients with RS who underwent MDO at a major children's hospital between 2004 and 2023 was conducted. Patients without both pre- and post-operative polysomnography were excluded. The primary outcome of interest was the Obstructive Apnea-Hypopnea Index (OAHI), classified as mild for OAHI 1-5, moderate for OAHI 6-10, and severe for OAHI >10. Secondary outcomes included major postoperative complications requiring reoperation or readmission, supplemental oxygen requirement at discharge, and post-MDO tracheostomy. Statistical analyses were performed using piecewise regression, Pearson's chi-square, and Student's T-tests.

Results: A total of 63 patients with RS met the inclusion criteria. Patients had a median age of 5.85 weeks at the time of MDO. After MDO, patients demonstrated an average OAHI reduction of 24.7 events per hour, corresponding to a mean post-operative OAHI of 8.7 ± 3.9. Piecewise linear regression identified a temporal threshold of 4 weeks, above which the relationship between age at surgery and OAHI reduction changed significantly. The mean OAHI reduction for those who underwent MDO before the age of 4 weeks was 19.6 ± 4.6, while that for those who underwent MDO after 4 weeks was 26.8 ± 3.6 ($p<0.05$). The early cohort had significantly lower postoperative average highest-end tidal CO_2 volume (44.3 ± 0.7 mmHg vs 47.9 ± 0.6 mmHg, $p<0.05$). Postoperatively, the early cohort also had a higher proportion of patients in the mild OAHI category (48.3% vs 23.5%, $p<0.05$). Major complications, supplemental oxygen at discharge, post-MDO tracheostomy, syndromic conditions, cleft palate, and cardiopulmonary diagnoses did not vary between cohorts.

Conclusion: Patients who underwent MDO before four weeks of age were significantly more likely to have mild OSA postoperatively, and lower postoperative highest-end tidal CO_2 volumes. These findings suggest early intervention with MDO may be optimal for improving OSA in patients with RS. Neonatal OSA can lead to impaired growth and development, cardiovascular morbidity, and can even be life-threatening. Therefore, MDO at 4 weeks or before is a suitable option for RS patients to help mitigate these severe risks.

Optic Nerve Sheath Diameter on Computed Tomography Scans Reflects Elevated Intracranial Pressure in Patients with Craniosynostosis

Abstract Presenter: Dominic Romeo MD

Abstract Co-Author(s): Jonathan Sussman, Dr. Benjamin Massenburg MD, Mark Halverson, Jinggang Ng, Meagan Wu, Grant Liu, Scott Paul Bartlett MD, Jesse Taylor MD, Jordan Swanson MD, MSc

Background: Assessment for elevated intracranial pressure (ICP) helps guide interventional decision-making to treat craniosynostosis. However, noninvasive techniques for measuring ICP are limited. This study assessed whether optic nerve sheath diameter (ONSD) on low-dose computed tomographic (CT) scans is associated with ICP in patients with craniosynostosis.

Methods: Pediatric patients treated between 2014 and 2023 with craniosynostosis, intraoperative ICP measurements by direct subdural catheterization, and spectral domain-optical coherent tomographic (SD-OCT) data were included. ONSD was retrospectively assessed on preoperative CT scans by a masked neuroradiologist and compared with measures and proxies of ICP.

Results: Among the 132 patients included (median age, 6.9 years; interquartile range, 4.7 to 9.5 years), 41 (31.1%) had a syndromic diagnosis. Maximal ONSD was increased in patients with an ICP of 15 mmHg or greater (6.1 mm versus 5.5 mm; $P < 0.01$) and 20 mmHg or greater (6.3 mm versus 5.6 mm; $P < 0.01$). Maximal ($r = 0.32$; $P < 0.001$), minimum ($r = 0.26$; $P = 0.003$), and average ($r = 0.29$; $P < 0.001$) ONSD correlated with direct ICP measurements. ONSD and SD-OCT measurements were also correlated (maximum retinal nerve fiber layer, $r = 0.21$, $P = 0.04$; maximum retinal thickness, $r = 0.24$, $P = 0.02$). An ONSDmax threshold of 5.75 mm demonstrated 65% sensitivity and 64% specificity for detecting ICP of 15 mmHg or greater on optimized receiver operating characteristic curve analysis. Multivariable logistic regression generated an algorithm incorporating ONSDmax and age to detect an ICP of 20 mmHg or greater with 64% sensitivity and 80% specificity.

Conclusions: ONSD measured on low-dose CT scans detected elevated ICP with moderate accuracy. Precision increased when patient age was taken into consideration. Given the ease of accessing CT scan data, this may be a helpful ICP proxy for clinical decision-making.

Prospective Multicenter Analysis of Neuroimaging and Behavioral Outcomes in Infants with Craniosynostosis: Initial Results and Proof of Concept Study

Abstract Presenter: Noah Alter

Abstract Co-Author(s): Christopher Bonfield, Andrea Hiller MD, Matthew Pontell MD, Todd Constable, Michael Alperovich MD, MSc, Tiffany Howell, Eylem Ocal, Michael Golinko MD, MA, Allen Newton

Purpose: Craniosynostosis (CS) disrupts normal skull and facial development and is associated with an increased risk of neurocognitive impairment. Surgical intervention in infancy is aimed at correcting skull morphology and mitigating potential neurodevelopmental delays. However, the impact of surgical correction on brain development and long-term cognitive outcomes remains unclear. This study establishes a standardized, multi-institutional neuroimaging protocol to assess pre- and post-operative brain changes in infants with CS, using advanced neuroimaging techniques to evaluate white matter integrity and functional connectivity. Neuroimaging findings are compared to healthy controls from the Baby Connectome Project (BCP) to elucidate the effects of cranial surgery on brain development and neurocognitive outcomes.

Methods: This prospective, multi-institutional study was conducted across three craniofacial centers: Vanderbilt University Medical Center, Yale University, and Arkansas Children's Hospital. Twenty-two infants diagnosed with CS were enrolled and underwent non-sedated neuroimaging using Diffusion Tensor Imaging (DTI) and functional MRI (fMRI) at two time points: pre-operatively and 2–4 months post-operatively. Imaging parameters including Fractional Anisotropy (FA), Mean Diffusivity (MD), Axial Diffusivity (AD), and Radial Diffusivity (RD) were analyzed to assess white matter integrity and functional connectivity in key brain regions. Neurocognitive outcomes were measured using the Bayley Scales of Infant Development (BSID-4) to evaluate cognitive, motor, and language skills. Normative neuroimaging trend lines were constructed from 911 healthy infants at 1,010 time points in the BCP dataset, enabling direct comparisons with age- and sex-matched controls.

Results: This study successfully implemented a standardized, multi-site MRI protocol for non-sedated neuroimaging in infants with CS. Of the 22 enrolled infants, 21 completed imaging and neuropsychological testing, yielding a total of 42 MRI scans. The cohort had a mean pre-operative age of 5.6 ± 1.4 months and post-operative age of 10.3 ± 1.7 months. Sagittal synostosis was the most prevalent subtype (55%), followed by metopic (23%), unicoronal (14%), and bicoronal (9%). Surgical interventions included cranial vault reconstruction (64%) and strip craniectomy (36%).
Initial neuroimaging analyses revealed significant pre-operative reductions in FA and increased MD, AD, and RD across all synostosis subtypes compared to age- and sex-matched controls, indicating compromised white matter integrity prior to surgical intervention. Post-operatively, infants demonstrated robust improvements in FA and reductions in MD, AD, and RD, suggesting a trend toward normalization of white matter

microstructure. Notably, the magnitude of white matter recovery varied by suture type, anatomical location, and surgical approach.

Conclusion: This proof-of-concept study demonstrates the feasibility of a multi-site, non-sedated MRI protocol for evaluating neurodevelopmental outcomes in infants with CS. The observed pre-operative deficits in white matter integrity and subsequent post-operative improvements underscore the importance of early surgical intervention in mitigating neurodevelopmental delays. Future analyses will explore post-surgical neuroimaging changes and their neurocognitive correlates to guide surgical decision-making and optimize patient outcomes.

3D Printed Beta-TCP Ceramic Bone Replacement Manufactured by Lithography-Based Ceramic Manufacturing (LCM): A Short-Term Rabbit Analysis

Abstract Presenter: Allison Diaz

Abstract Co-Author(s): Lukasz Witek, Nick Tovar, Edmara Bergamo, Bruno Silva, Roberto Flores MD

Background: Despite limitations such as donor-site pain, resorption, and limited size and shape of bone stock, autologous bone grafts are the gold standard for bone replacement (1,2). Although beta-tricalcium phosphate (β-TCP) is an established bone replacement material, wide clinical applications have been limited by lack of bone infiltration within its bulk form. Lithography-based ceramic manufacturing (LCM), a novel form of 3D printing, leverages photopolymerization to create β-TCP structures with higher feature resolution and surface quality than traditional techniques. This fabrication modality allows for increased control of the microarchitecture of the construct creating a porous design that facilitates bony infiltration and enables engineers to manufacture implant sizes and shapes that are not possible with traditional ceramic processing (3). While the technology is promising, limited research is available on LCM fabricated scaffolds in animal models.

Purpose: This study explores the bone regenerative capacity of LCM fabricated 100% β-TCP scaffolds for the repair of critically-sized mandibular defects using a skeletally mature rabbit model.

Methods: Unilateral critical-sized bony defects (10mm × 10mm, full thickness) were created in mandibular rami of New Zealand White rabbits (N=10). Seven rabbits underwent bony defect repair using LCM scaffolds made of 100% β-TCP and three

rabbit defects remained unfilled as negative controls. Animals were euthanized after 8 weeks, and the mandibles were harvested, cleaned and scanned using micro–computed tomography (micro-CT) (μCT 40; SCANCO Medical, Bassersdorf, Switzerland) with 18 μm resolution. Imaging data was processed using Amira Software for three-dimensional (3D) reconstruction and volumetric analysis. Histological analysis was performed using Stevenel blue and van Gieson red picrofuchsin staining. Two-dimensional (2D) histomorphometric quantification was also performed.

Results: There was no evidence of scaffold fracture during initial bony defect repair or at necroscopy. No bridging bone was seen in unfilled defects. 3D volumetric analysis revealed bridging bone within LCM β-TCP implant sites yielding 8.62±3.47% in fill of bone. Remaining scaffold volume was 32.95±3.21% of the defect. 2D histologic analysis revealed that mean regenerated bone and remaining scaffold was 14.09±6.7% and 34.14±2.5% of the defect respectively. Bone regeneration and remaining scaffold obtained via 2D histologic analysis were consistent with results from 3D volumetric analysis ($p<0.05$). Qualitative histological analysis of defect sites repaired with scaffolds revealed areas of vascularized woven and lamellar bone, with no evidence of ectopic bone, excess inflammation, or fracture.

Conclusion: Bone regeneration in a short-term rabbit model following critical-sized mandibular defect repaired with LCM 100% β –TCP scaffolds demonstrate analogous radiographic and histologic properties as native bone.

References:

1. Younger EM, Chapman MW. Morbidity at bone graft donor sites. J Orthop Trauma. 1989;3(3):192-5. doi:10.1097/00005131-198909000-00002
2. Ahlmann E, Patzakis M, Roidis N, Shepherd L, Holtom P. Comparison of anterior and posterior iliac crest bone grafts in terms of harvest-site morbidity and functional outcomes. J Bone Joint Surg Am. May 2002;84(5):716-20. doi:10.2106/00004623-200205000-00003
3. Ryan E, Yin S. Compressive strength of β-TCP scaffolds fabricated via lithography-based manufacturing for bone tissue engineering. Ceramics International. 2022/06/01/ 2022;48(11):15516-15524. doi:https://doi.org/10.1016/j.ceramint.2022.02.085

Comparison of Cranial Vault Remodeling, Suturectomy, and Suturectomy with Springs for Lambdoid Craniosynostosis

Abstract Presenter: Josephine Schmidt

Abstract Co-Author(s): Winston Owens, David Bauer, Lucas Dvoracek MD

Background: Craniosynostosis of the lambdoid suture is a rare malformation, accounting for 1-5% of all non-syndromic craniosynostoses, and may present as unilateral, bilateral, or in complex forms.1 Insufficient surgical correction may render patients with permanent mental deficits from intracranial hypertension and psychological distress from cosmetic deformity. Surgical techniques to address craniosynostoses have evolved, with common options being cranial vault remodeling (CVR), suturectomy, and more recently, spring-assisted suturectomy.2 There is a paucity of literature surrounding comparison between different techniques for treatment of lambdoid craniosynostosis. We present outcomes of patients with lambdoid craniosynostosis who underwent surgical intervention at a level one pediatric institution.

Methods: A retrospective analysis of 26 patients who were surgically treated from January 2011 to February 2025 for lambdoid craniosynostosis was conducted. Patients with bilateral lambdoid craniosynostosis and those with three or more affected sutures were excluded from the study.

Results: Of the 26 patients, the average age at diagnosis by CT scan was 7.7 months (Range: 0.8-23.5 months). Sixty-five percent of the patients were male, and 77% of the patients were white. Isolated lambdoid craniosynostosis (77%) was the most common presentation, followed by lambdoid craniosynostosis with sagittal suture involvement (19%), and lambdoid craniosynostosis with metopic suture involvement (4%). The right lambdoid suture was involved in 54% of cases, and all patients were non-syndromic. Cranial vault remodeling (CVR) was completed in 65% of patients, suturectomy with molding helmet therapy (23%), and suturectomy with springs (12%). Of patients who underwent CVR, the median age at surgery was 10.7 months (Range: 7.2-26.7 months), median operative time was 340 minutes (Range: 240-528), 11.8% had additional suture involvement, 35% experienced postoperative complications, and no patients required additional surgery. Of patients who underwent suturectomy with molding helmet therapy, the median age at surgery was 3.7 months (Range: 2.2-4.6 months), median operative time was 259 minutes (Range: 210-407), 50% had additional suture involvement, 67% experienced postoperative complications, and 33% required secondary CVR due to refusion of sutures in one patient and residual head deformity in another. Of patients who underwent suturectomy with springs, the median age at surgery was 6.5 months (Range: 5-8.4), median operative time was 207 minutes (Range: 113-260), and no patients required additional surgery.

Conclusion: Suturectomy and molding helmet therapy has limited utility to address lambdoid craniosynostosis with 33% of cases in our study requiring additional vault remodeling surgery. While CVR is the current standard of care for craniosynostosis, cosmetic results are modest at best. Suturectomy with spring assisted-cranioplasty demonstrates promising correction of the primary deformity with low morbidity and may become more commonplace for lambdoid craniosynostosis.

References

1. Rhodes JL, Tye GW, Fearon JA. Craniosynostosis of the Lambdoid Suture. Semin Plast Surg. 2014;28(3):138-143. doi:10.1055/s-0034-1384809
2. Sameer Shakir, Melissa Roy, Amy Lee, Craig B. Birgfeld. Management of Sagittal and Lambdoid Craniosynostosis - ClinicalKey. Oral Maxillofac Surg Clin. 2022;34(3):421-433.

Understanding Health-Related Quality of Life and Experience of Care in Individuals with Face Transplantation

Abstract Presenter: Calvin Schuster

Abstract Co-Author(s): Elena Tsangaris, Anne Klassen PhD, Bohdan Pomahac MD, Andrea Pusic MD, MHS, FACS, FRCSC, Manraj Kaur PhD

PURPOSE: Since 2005, 50 face transplants have been performed globally with a 10-year transplant survival of 74%, defined as either transplant loss or patient death (1). Facial vascularized composite allotransplants (fVCA) are a reconstructive option for patients with severe facial disfigurements due to trauma, disease, or malformation meant to improve psychosocial wellbeing and restore facial function and appearance. While data on graft survival has been reported, there is limited data on patient-reported outcome measures (PROMs) following fVCA. FACE-Q is a series of rigorously developed PROMs that can be used to measure appearance, facial function, health-related quality of life, and adverse effects in patients with facial conditions (2). This study utilizes FACE-Q concepts to investigate health-related quality of life and experience of care in individuals who underwent fVCA.

METHODS: Semi-structured interviews were conducted with patients recruited from the Plastic Surgery Transplantation Program at Brigham and Women's Hospital in Boston, MA. FACE-Q concepts informed the interview guide. Interviews were audio-recorded

and transcribed. Data were coded using line-by-line coding and content analysis. Constant comparison was used to create themes and subthemes.

RESULTS: Interviews were conducted with the recipients of seven fVCAs with a mean age of 54.6 years old at the time of surgery (SD 10.9, range 31-68). A majority were White (85.7%, n=6), one was Black (14.3%), and 57.1% were men (n=4). Time between injury and fVCA varied from 2-10 years and follow-up time varied from 3-10 years. After fVCA, 85.7% (n=6) expressed overall satisfaction with their facial appearance; one expressed that appearance was unimportant. 71.4% (n=5) felt their postoperative faces were proportionate, one felt the donor's face was too large, and one felt the teeth and palate were too large.
A majority had an improved ability to eat postoperatively compared to preoperatively (85.7%, n=6); however, despite notable improvement, 57.1% (n=4) still experienced functional challenges with eating such as food falling out of their mouth or difficulty swallowing some solids. For drinking, 71.4% (n=5) experienced an improvement, but 42.9% (n=3) still experienced functional challenges such as difficulty drinking from a cup. Of those who had difficulty breathing preoperatively, 60.0% (n=3) experienced improved breathing postoperatively and 40.0% (n=2) experienced continued difficulty breathing postoperatively. Of those who discussed financial impact, 33.3% (n=2) experienced financial strain related to the fVCA. Overall, 57.1% (n=4) described decreased distress in social settings, for example, feeling like they fit in more with others, were stared at less, and were more comfortable going out in public and meeting new people after the fVCA. 85.7% (n=6) described a desire to help other fVCA recipients by sharing their experiences or a benefit to hearing the experiences of other fVCA recipients before their own. All patients expressed strong overall satisfaction with how fVCA impacted their lives. One recipient noted, "I'm so happy I got a second chance at life."

CONCLUSIONS: fVCA can impact the quality of life of patients with severe facial disfigurements by improving functional and psychosocial outcomes such as the ability to eat, drink, breathe, and exist comfortably in public spaces.

Citations:

1. Homsy P, Huelsboemer L, Barret JP, Blondeel P, Borsuk DE, Bula D, Gelb B, Infante-Cossio P, Lantieri L, Mardini S, Morelon E, Nasir S, Papay F, Petruzzo P, Rodriguez E, Özkan Ö, Özmen S, Pomahac B, Lassus P. An Update on the Survival of the First 50 Face Transplants Worldwide. JAMA Surg. 2024 Dec 1;159(12):1339-1345. doi: 10.1001/jamasurg.2024.3748. PMID: 39292472; PMCID: PMC11411447.

2. Klassen AF, Rae C, Riff W, Denadai R, Murray DJ, Bracken S, Courtemanche DJ, Bulstrode N, O'Hara J, Butler D, Goldstein J, Tassi A, Hol ML, Johnson D, Ganske IM, Kölby L, Benitez S, Breuning EE, Malic CC, Allen GC, Pusic AL, Cano S. FACE-Q craniofacial module: Part 2 Psychometric properties of newly developed scales for children and young adults with facial conditions. J Plast Reconstr Aesthet Surg. 2021 Sep;74(9):2330-2340. doi: 10.1016/j.bjps.2021.03.009. Epub 2021 Mar 25. PMID: 34172403.

Primary Cleft Rhinoplasty for the Unilateral Cleft Nose Deformity: The Case for Overcorrection

Abstract Presenter: Sarah L. Barnett

Abstract Co-Author(s): Isabel Ryan BS, Philip Tolley MD, Meagan Wu, Jinggang Ng, Nicholas Han, Allison Hu MD, Scott Paul Bartlett MD, Jesse Taylor MD, Jordan Swanson MD, MSc

Background: Primary rhinoplasty (PR) at the time of unilateral cleft lip repair intervenes directly on the stigmata of the cleft nasal deformity, correcting nasal tip under-projection, alar rim collapse, columellar deviation, alar base retraction, nasal sill widening, and nasal floor disruption with the goal of improved nasal symmetry. This study aims to assess that goal while comparing the anthropometric changes seen in the immediate and extended post-operative period to evaluate efficacy of PR techniques and their longevity with continued facial growth.

Methods: Retrospective review was utilized to identify all patients who underwent primary rhinoplasty by a single surgeon from 2018-2024. Anthropometric measurements were conducted on standardized 2D photographs pre-operatively, immediately post-operatively, and at 1 year post-operatively. Patients with standardized 3D photographs were treated as a subgroup, with measurements taken pre-operatively and immediately post-operatively. Anthropometrics were expressed as angles or ratios, with a ratio closer to 1 indicating improved symmetry. Analysis was conducted using paired t-tests and Wilcoxon signed-rank tests.

Results: 29 patients met inclusion criteria, of which 22 had standardized 2D photographs and 8 had 3D photographs. 1 patient had both 2D and 3D photographs and was included in both subgroup analyses. Within the 2D cohort comparing pre-op to

immediate post-op measurements, nostril width (1.95±0.63 vs. 0.96±0.15), nasal base width (1.75±0.50 vs. 0.99±0.14), alar height (0.82±0.17 vs. 1.02±0.16), lateral lip height (LLH) (0.74±0.19 vs. 0.96±0.15), and philtral height (0.52±0.17 vs. 0.97±0.16) were significantly more symmetrical post-operation ($p<0.05$). Columellar deviation angle was improved post-operatively as well (13.96º±7.55º vs. 6.3º ±2.28º, $p<0.05$). Average columellar height was significantly increased post-operatively (0.77±0.20 vs. 1.13±0.27, $p<0.001$), however absolute difference from ideal (0.25±0.16 vs. 0.19±0.23, $p=0.092$) approached but did not reach significance. There was noted to be significant relapse in columellar height (1.11±0.27 vs. 0.90±0.15), nostril width (1.15±0.23 vs. 0.96±0.15), nasal base width (1.16±0.22 vs. 0.99±0.14), and alar height (0.88±0.07 vs. 1.02±0.16) when comparing immediate post-op to 1-year measurements ($p<0.05$). 3D anthropometrics corroborated 2D findings in the pre- to immediate post-operative period.

Conclusions: Thoughtful primary rhinoplasty at the time of unilateral cleft lip repair results in improved symmetry in multiple domains as assessed by anthropometric measurement in the immediate post-operative period and at one year follow up. However, some degree of nasal relapse should be anticipated in the long-term. Overcorrection at the time of PR may therefore be beneficial to achieve the best long-term nasal symmetry.

Surgical Outcomes of Pediatric Patients with Fibrous Dysplasia

Abstract Presenter: Jainaha Srikumar

Abstract Co-Author(s): Alexandre Meira Pazelli MD, Samir Mardini MD, Waleed Gibreel MD

Background: Surgical treatment of fibrous dysplasia (FD) in the pediatric patients is an area that has not been fully studied. In addition, the literature lacks data on outcomes of different surgical treatment modalities. We examine our experience with surgical treatment of fibrous dysplasia in the pediatric population treated at Mayo Clinic.

Methods and Materials: A retrospective review of 20 patients who had at least one surgery for craniofacial fibrous dysplasia before 18 years of age.Diagnosis of fibrous dysplasia was determined by pathologic confirmation, or if there was no record of pathology findings, by presence of imaging features characteristic of fibrous dysplasia.

Surgeries were categorized into three groups: (1) bone contouring only, (2) removal of the involved bone, contouring, and replacement of the contoured bone, or (3) en bloc resection of the involved bone and reconstruction with an alloplastic material, bone allograft, or bone autograft obtained from non-involved sites. Recurrence, need for secondary surgeries, and occurrence of post operative complications were the main primary outcomes.

Results: Monostotic FD was present in 55% of patients, while the remaining patients had polystotic bone involvement. The median age of presentation was 10 years old, with the most common presentations being visible growth in 50% and pain in 22%. Median age at first surgery was 12 (range 8 - 17). A total of 36 distinct surgical procedures were performed in 20 patients with a mean number of 1.9 surgeries/patient (range 1-5). Median follow up duration was 10.6 years (IQR 6.9 - 15.8 years). The maxilla was both the bone that was most commonly affected and most commonly operated on, being affected in 10 patients, with 7 of them undergoing 14 surgeries involving the bone. Other commonly involved regions included the zygoma (n = 6) and mandible (n = 6). The most common indication was visible or palpable growth in 63.9% of cases followed by confirmation of diagnosis (13.9%) and pain or headache (8.3%). The oldest age at which a pediatric patient needed a subsequent surgery was 23 years. Bone contouring only was the initial surgery in 15 patients; removal of the involved bone, contouring, and replacement of the contoured bone was the initial surgery in 1 patient; and en bloc resection of the involved bone and reconstruction was performed in 4 patients. In the group of patients who had undergone contouring procedures, 9 (55.6%) had recurrence requiring subsequent surgeries. Two of the nine needed multiple contouring and debulking surgeries, and one was treated with a subsequent complete resection and reconstruction. Patients with subsequent surgeries had a mean time to reoperation of 3.7 years (range 0.24 – 9.8). Four patients, all with monostotic calvarial disease, initially had a resection and reconstruction. None of the patients who had an en bloc resection and reconstruction, either as an initial or subsequent surgery, had recurrence. The remaining one patient had removal, contouring, and replacement of the involved bone, with no later recurrence of disease. Three of the contouring and debulking procedures, all involving the maxilla, resulted in a complication – two of which required surgical repair, while one (CN V2 numbness) did not. The two complications managed surgically were a lateral canthus distraction requiring one surgery to repair and a lower lid ectropion requiring two. The en bloc resection and reconstruction done to treat a recurrence was the only en bloc resection and reconstruction with a complication. It resulted in malocclusion that did not require further operations.

Conclusions: Surgical treatment of fibrous dysplasia has an acceptable risk profile, with surgical complications occurring in 10% of patients. Recurrence rate and need for

secondary surgical procedures was relatively high in patients who had bone contouring only. This could be indicative of the natural continued progression of the disease in this age group.

Rigorous Study of Cranial Suture Closure Timing in the Era of High Resolution CT Imaging: A Radiographic Analysis of 1119 Pediatric Head CT Scans

Abstract Presenter: Nicholas Han

Abstract Co-Author(s): Mark Halverson, Ashley Chang BA, Philip Tolley MD, Sara Reis Teixeira, Karuna Shekdar, Jordan Swanson MD, MSc, Scott Paul Bartlett MD Erin Simon Schwartz, Jesse Taylor MD

Purpose: Classical teaching suggests that the sagittal, coronal, and lambdoid sutures normally begin to close during the third decade of life. Therefore, in pediatric patients, the incidental finding of a closed suture is often alarming and raises concerns for potential craniosynostosis. Distinguishing craniosynostosis from normocephalic cranial suture closure can be challenging, particularly when a closed suture is discovered in an otherwise asymptomatic patient. This study investigates the prevalence of incidentally discovered cranial suture closure in healthy pediatric patients and its effects on cranial vault morphology.

Methods: A retrospective review was performed of patients aged 0 to 18 who underwent head CT imaging in our institution's pediatric emergency department from May 2014 to April 2024. Patients with a diagnosis of any known craniofacial disorder, genetic syndrome, skull fracture, prior skull surgery, intracranial pathology such as ventriculoperitoneal shunt or hydrocephalus, and CT slice thickness > 1mm were excluded. All scans were reviewed on axial images by one of three attending neuroradiologists for the presence of open, partially fused, or completely fused metopic, sagittal, coronal, and lambdoid sutures. Cephalic index was computed as the quotient of greatest biparietal diameter, measured on the widest axial slices, and occipitofrontal diameter, measured on lateral scout radiographs. Patient demographics, age at time of scan, and indication for imaging were also recorded and compared with appropriate statistics.

Results: A total of 1,119 scans met inclusion criteria, with a mean patient age of 8.35 years. Most patients were male (62.5%), and trauma was the most common indication

for imaging (91.2%). Overall, complete sagittal suture closure was observed in 5.8% of patients, and 5.3% had partial closure. In patients aged 15 to 18, 17.3% of patients had either a partially (8.9%) or completely (8.4%) closed sagittal suture. Partial coronal and lambdoid suture closures were observed in 2.4% and 1.3% of patients, respectively, with complete closure being rare (≤0.4%). The metopic suture was closed in 83% of patients, with only 6.8% remaining open, consistent with its known closure early in life. Most coronal and lambdoid sutures exhibited symmetrical closure patterns, with strong correlations between the right and left coronal ($r=0.90$, $p<0.0001$) and right and left lambdoid sutures ($r=0.94$, $p<0.0001$). Sagittal suture closure showed a weaker but significant correlation with coronal and lambdoid sutures ($r\approx0.3$, $p<0.0001$), indicating that while some individuals may have a predisposition for multi-suture closure, many experience isolated sagittal fusion. In multivariable regression analysis adjusting for age, sex, race, and involvement of other sutures, sagittal suture closure was associated with a decrease in cephalic index ($\beta=-0.8$, $p=0.026$). Among patients with a CI <70, 86.4% exhibited partial or complete sagittal suture closure, though most patients with complete sagittal suture closure remained normocephalic (CI>70, 83.1%).

Conclusions: Our study found that up to 17% of pediatric patients may experience normocephalic partial (8.9%) or complete (8.4%) sagittal suture closure by age 18. While sagittal suture closure was linked to a decreased cephalic index, most patients with incidental closure remained normocephalic.

Management of Aplasia Cutis Congenita: An 11 Year Experience

Abstract Presenter: Vamsi Mohan

Abstract Co-Author(s): Winston Owens, Alexandra McLennan, Alexandra Martinez, Heather Burns MD, Edward Buchanan MD

Background: Aplasia cutis congenita (ACC) is a rare condition characterized by the focal absence of skin and soft tissue, often seen on the scalp. (1) While most ACC lesions affect superficial tissues such as the epidermis or dermis and heal with minimal intervention, more severe disease can lead to complications such as exposed bone or dura, cerebrospinal fluid leaks, hemorrhage, or infection, which may require surgical intervention.(1–4) Herein, we present all patients with ACC who were treated at a large academic pediatric hospital.

Patients and Methods: A retrospective chart review and analysis of patients diagnosed with ACC who were treated from January 2012 to October 2023 was conducted. Variables that were collected included patient demographics, birth history, co-morbidities, surgical intervention, types of conservative therapy, sites affected by ACC, depth of tissue involvement, and lesion outcomes.

Results: 162 patients with ACC were identified. Complete medical records detailing the management of ACC could be obtained on 144. Four patients were included in the initial cohort, but excluded from the final analysis since they died prior to resolution of the ACC. Of the 144 patients, 55% (79/144) were female and 47% (67/144) had other comorbidities including 12% (17/144) with internal organ abnormalities. The average area affected across the entire cohort was 7.05 cm2 (Range: 0.12 to 96 cm2). Patients who were typically managed with local wound care (21%) and those who received surgical treatment (26%) had average lesion sizes of 7.14 cm2 and 16.19 cm2 (range: 0.70 to 96 cm2), respectively. Incidentally, patients, managed with education and close follow up only, were noted to have smaller lesion sizes (1.87 cm2). Twelve percent of patients did not follow up.

Conclusions: ACC most commonly involves the superficial tissues of the scalp and is often seen with concomitant limb anomalies or comorbid conditions such as cardiac or neurologic defects. Conservative treatment and reassurance are often suitable for most lesions; however, surgical intervention may be necessary to mitigate risk of life-threatening complications. Further research should pursue indications for surgery, and the best practice for local wound care to achieve the fastest time to closure.

References

1. Alexandros B, Dimitrios G, Elias A, et al. Aplasia cutis congenita: Two case reports and discussion of the literature. Surg Neurol Int. 2017;8:273. doi:10.4103/sni.sni_188_17
2. Beekmans SJA, Don Griot JPW, Mulder JW. Split rib cranioplasty for aplasia cutis congenita and traumatic skull defects: more than 30 years of follow-up. J Craniofac Surg. 2007;18(3):594-597. doi:10.1097/scs.0b013e3180576f44
3. Santos de Oliveira R, Barros Jucá CE, Lopes Lins-Neto A, Aparecida do Carmo Rego M, Farina J, Machado HR. Aplasia cutis congenita of the scalp: is there a better treatment strategy? Childs Nerv Syst ChNS Off J Int Soc Pediatr Neurosurg. 2006;22(9):1072-1079. doi:10.1007/s00381-006-0074-y
4. Harvey G, Solanki NS, Anderson PJ, Carney B, Snell BJ. Management of aplasia cutis congenita of the scalp. J Craniofac Surg. 2012;23(6):1662-1664. doi:10.1097/SCS.0b013e31826542de

Surgical Management of Palatal Fistula Repair in Adults: Challenges, Recurrence Rates, and Speech Improvement

Abstract Presenter: Muhammad Daiem MD

Abstract Co-Author: Ghulam Qadir Fayyaz MD

Background: Palatal fistulae remain the most challenging complication following cleft palate repair, with incidence rates ranging from 2.4% to 35%. They pose significant morbidity for patients, including oronasal regurgitation, speech impairment, and failure to thrive. While extensively reported in pediatric populations, palatal fistula repair in adults remains poorly documented, with adult patients presenting with significant challenges due to chronic defects, excessive scarring, and limited tissue elasticity, necessitating the use of various techniques for successful closure. This study aims to evaluate the surgical management of adult palatal fistulas, highlighting the complexities, recurrence rates, and post-operative speech outcomes, providing insight into the most effective surgical techniques for fistula closure in adult patients.

Methods: A retrospective review was conducted of adult patients aged 18 and above presenting with palatal fistulas at CLAPP Hospital, Lahore, Pakistan, over nine years (2015–2023). Data were collected on basic demographic characteristics, fistula size and location, surgical techniques, recurrence rates, and speech outcomes. Various surgical techniques, including Secondary Bardach Repair, Secondary Langenbeck Repair, Buccal Sulcus Flap, Buccinator Myomucosal Flap, and Tongue Flap, were employed based on the size and location of defects. Speech assessment was performed pre- and post-operatively using a modified Ann Kummer Speech Evaluation Protocol. Statistical analysis was conducted using Pearson's Chi-squared test, Fisher's Exact Test, and Welch's t-test, with significance set at $p < 0.05$ using R Statistical Software (Version 4.3.2; R Core Team 2024). Results: A total of 245 adult patients (152 males, 93 females; mean age 24.7 ± 6.47 years) were included. Most fistulas were located in the anterior (26.5%) and posterior (8.6%) hard palate, with a substantial proportion extending through multiple regions (26.9%). Fistula sizes varied, with 29.8% classified as S1 (1–5mm), 26.5% as S2 (6–10mm), 17.6% as S3 (11–15mm), and 20.4% as S4 (>15mm). The most commonly utilized surgical technique was the Secondary Bardach Repair (59.2%), followed by Buccal Sulcus Flap (13.5%), Secondary Langenbeck Repair (8.6%), and Buccinator Myomucosal Flap (5.3%). Post-operatively, fistula recurrence was observed in 21.6% of cases, with significantly higher recurrence in patients

presenting with recurrent fistulae ($p = 0.0209$). Speech assessment revealed significant improvement after surgical repair. Pre-operatively, 81.2% of patients exhibited severe hypernasality (G3), while post-operatively, this reduced to 18.4%. The mean composite speech score improved from 14.0 to 11.4 ($p < 0.001$). Patients experiencing a recurrence of fistula had significantly worse speech outcomes compared to those who did not ($p < 0.001$).

Conclusion: Palatal fistula repair in adults remains a challenging but essential intervention to improve speech and overall quality of life. This study provides valuable insights into the surgical management, recurrence risks, and functional outcomes of this condition, emphasizing the need for future multi-center studies with longer follow-up periods to refine treatment protocols for this underrepresented patient population.

Bridging the Gap: Assessing the Reporting of Social Determinants of Health Across a Decade of Craniofacial Reconstruction Trials

Abstract Presenter: Daniel Kwon

Abstract Co-Author(s): Henry Diamond-Pott, Katherine Stark, Rachel Klem, Mateo Restrepo Mejia, Peter Taub MD

Purpose: Social determinants of health (SDOH) play a critical role in shaping patient outcomes across medical and surgical disciplines. These factors have been shown to influence access to care, surgical decision-making, and postoperative recovery. In the field of craniofacial surgery, where patient outcomes are closely tied to both functional and aesthetic considerations, understanding these factors is particularly important. The present study sought to evaluate the frequency and trends of SDOH reporting in randomized controlled trials (RCTs) of craniofacial surgery over the past decade, with a focus on identifying gaps in reporting and assessing whether research quality indicators influence SDOH inclusion.

Methods: A systematic review was conducted according to the Preferred Reporting Items for Systematics and Meta-Analyses (PRISMA) statement guidelines. The PubMed database was queried for manuscripts based on RCTs published from 2014-2024. Manuscripts focusing primarily on craniofacial reconstruction, published in English, involving participants ≥18 years old, with reported patient outcomes related to surgical interventions were included. Primary endpoint was whether each manuscript SDOH

variables. Secondary endpoints were year of publication, countries of publication, and journal impact factor. The frequency of variables reported either solely within the manuscript or within the manuscript and its tables were noted. Chi-square tests were performed for univariate analyses, and Pearson correlation coefficients were calculated for comparisons across time. Statistical significance was set at $p<0.05$.

Results: A total of 93 trials were included. Age (97.3%), sex/gender (53.4%), and BMI/weight (26.0%) were the most reported variables. Education level (4.1%), insurance (1.4%), socioeconomic status (2.7%), marital status (0%), alcohol use (1.4%), geography (0%), employment (1.4%), and housing (0%) were the least commonly reported. Age ($p<0.001$) and sex/gender ($p=0.003$) were significantly less likely to be reported in tables. Trials of US origin were not significantly more likely to report any SDOH measure than non-US trials. No significant correlation was observed between year of publication and proportion of trials reporting SDOH variables ($R=0.143$, $p=0.675$). There was also no significant correlation between impact factor and proportion of trials reporting SDOH variables ($R=0.229$, $p=0.711$).

Conclusion: Despite the well-established impact of SDOH on health outcomes, our findings highlight a persistent underreporting of these factors in craniofacial reconstruction trials. While basic demographic variables such as age and sex/gender were frequently included, critical socioeconomic variables were rarely documented. The absence of significant improvements over time suggests that awareness of SDOH has not yet translated into reporting practices. Given the growing emphasis on health equity, future research should prioritize the standardized inclusion of SDOH variables in clinical trials to enhance the generalizability of findings and inform more equitable surgical care.

References:

1. Khetpal S, Sasson DC, Lopez J, Steinbacher DM, Gosain AK. The Impact of Social Determinants of Health in Facial and Craniomaxillofacial Reconstruction: Can We Do Better?. Cleft Palate Craniofac J. 2022;59(7):938-945. doi:10.1177/10556656211037510
2. Bakovic M, Starsiak L, Bennett S, et al. Socioeconomic Influence on Surgical Management and Outcomes in Patients with Craniosynostosis - A Systematic Review. Cleft Palate Craniofac J. Published online June 17, 2024. doi:10.1177/10556656241261838

Fragility Analyses of the Robustness of Randomized Clinical Trials for the Prophylactic Antibiotic Use in Craniofacial Trauma: A Systematic Review of Randomized Clinical Trials

Abstract Presenter: Barite Gutama MD

Abstract Co-Author(s): Yomna Zayneldeen MD, Ralph Raheb-Khelo, Noah Alter, Ronald Cornely MP, Matthew Pontell MD, Izabela Galdyn

Purpose: Fragility analyses have been utilized to evaluate the strength of randomized clinical trials (RCTs) and are interpreted in relative terms, given there is no universal cutoff (1-5). In heart failure and diabetes RCTs, median fragility indices (FI) are 26 [8.5, 39.3] and 16 [4, 29], respectively (1, 2). In contrast, the existing three reviews on plastic surgery RCTs report lower FI: 90 significant plastic surgery RCTs had a median FI of 1 [0, 4], landmark plastic surgery RCTs had 4 [2, 7.5], and acellular dermal matrix studies had 4 [3, 5] with a fragility quotient (FQ) of 0.04 [0.03, 0.07] (1-5).

This study conducts fragility analyses to examine the robustness of RCTs on antibiotic prophylaxis (AP) in craniofacial trauma.

Methods: RCTs with dichotomous outcomes were sourced from PubMed, Embase, Web of Science, SCOPUS, and Cochrane, using the PRISMA guidelines for systematic reviews. Fragility index (FI) and reverse fragility index (rFI) - number of events needed to alter outcome significance- and fragility quotient (FQ) - FI or rFI divided by sample size (standardized fragility across trials) - were calculated.

Results: Out of 1730 studies screened, four RCTs met the inclusion criteria. The RCTs evaluated fractures of the mandible, maxilla, orbital walls, and base of skull. The median sample size for the RCTs was 105 [IQR: 85.3, 121], with a median fragility index of 7.5 [IQR: 5.5, 8.3] and a median fragility quotient of 0.072 [IQR: 0.050, 0.12]. The two statistically significant RCTs showing decreases in infection with AP had a median sample size 129 [IQR: 115, 143], a median FI of 4.5 [IQR: 2.8, 6.3], and a median FQ of 0.043 [IQR: 0.025, 0.061]. The remaining two non-significant RCTs had a median sample size of 73.5 [IQR: 55.8, 91.2], median rFI of 8 [IQR: 7.5, 8.5], and a median rFQ of 0.15 [IQR: 0.11, 0.20].

Conclusions: The current RCTs on AP in craniofacial trauma are weak and susceptible to minor changes. We believe it is challenging to form blanket antibiotic prophylaxis protocols based on these data. Management of each individual patient and fracture should be undertaken on a case-by-case basis.

References:

1. Campbell RT, Jhund PS, Petrie MC, McMurray JJV. How robust are clinical trials in heart failure? Kieran F. Docherty1. Eur Heart J. 2017;38(5). doi:10.1093/eurheartj/ehw427

2. Chase Kruse B, Matt Vassar B. Unbreakable? An analysis of the fragility of randomized trials that support diabetes treatment guidelines. Diabetes Res Clin Pract. 2017;134. doi:10.1016/j.diabres.2017.10.007

3. Chin B, Copeland A, Gallo L, et al. The Fragility of Statistically Significant Randomized Controlled Trials in Plastic Surgery. Plast Reconstr Surg. 2019;144(5):1238-1245. doi:10.1097/PRS.0000000000006102

4. Ormseth BH, Elhawary H, Janis JE. The Fragility of Landmark Randomized Controlled Trials in the Plastic Surgery Literature. Plast Reconstr Surg Glob Open. 2024;12(1). doi:10.1097/GOX.0000000000005352

5. Wang A, Kwon D, Kim E, Oleru O, Seyidova N, Taub PJ. Statistical fragility of outcomes in acellular dermal matrix literature: A systematic review of randomized controlled trials. Journal of Plastic, Reconstructive & Aesthetic Surgery. 2024;91:284-292. doi:10.1016/j.bjps.2024.02.047

Clinical and Aesthetic Outcomes of Neo-Frontobandeau Technique for Fronto-Orbital Advancement

Abstract Presenter: Allison Hu MD

Abstract Co-Author(s): Philip Tolley MD, Aaron Zhao, Nicholas Han, Isabel Ryan BS, Scott Paul Bartlett MD, Jesse Taylor MD, Jordan Swanson MD, MSc

Background: Conventional frontal-orbital advancement (FOA) effectively expands the cranial vault but is associated with long-term sequelae including temporal hollowing, bony contour irregularities, and supraorbital retrusion. To mitigate these challenges, an alternative single-segment neo-frontobandeau transposition has been employed at our

center for five years. Previous studies have demonstrated comparable perioperative safety, volumetric expansion, and correction of metopic craniosynostosis-related cranial dysmorphology to conventional FOA. However, the most important question remains the longer-term aesthetic outcomes of neo-bandeau FOA in comparison to conventional FOA. In this study, we compare clinical and medium-term aesthetic outcomes between patients who underwent neo-bandeau FOA and conventional FOA for craniosynostosis with anterior dysmorphology.

Methods: We retrospectively reviewed all children who underwent neo-frontobandeau FOA between 2013-2023 at our institution. Children 18 months of age or those with clinical signs of early relapse or irregularities were included. Patients were age- and sex-matched to patients who underwent traditional FOA for nonsyndromic isolated metopic craniosynostosis. Preoperative and immediate postoperative computed tomography (CT) scans were processed using CranioRate, a machine learning algorithm, to objectify the degree of cranial dysmorphology. A 5-point Likert scale (1 being the worst, 5 being the best) was developed through consensus refinement utilizing sentinel photographs and descriptions to exemplify scale thresholds. Blinded 2D photographs taken before revisions were reviewed by plastic surgeons for aesthetic outcomes (temporal hallowing, frontal bone irregularity/convexity, and supraorbital retrusion).

Results: A total of 50 patients met inclusion criteria. All patients who underwent conventional FOA had metopic craniosynostosis (n=25, 100%), while patients who underwent neo-bandeau FOA had metopic (n=16, 64.0%), sagittal (n=6, 24.0%), bicoronal (n=2, 8.0%), or multi-suture synostosis (n=1, 4.0%). Preoperatively, there were no differences in cranial dysmorphology severity measures between cohorts ($p>.05$). Similarly, there were no significant differences in complication rates, perioperative outcomes, or surgical times ($p>.05$). Mean age at photo assessment was 3.9±1.5 years. On blinded Likert assessment, patients with NB (n=25) had improved temporal hallowing scores (4.2 ± 0.8 vs 3.5 ± 1.2, $p<.001$), frontal bone irregularity (4.5 ± 0.7 vs 3.6 ± 1.2, $p<.001$), sagittal frontal convexity (4.2 ± 0.9 vs 3.6 ± 1.2, $p<.001$), and supraorbital retrusion (3.9 ± 1.0 vs 3.5 ± 1.0, $p=.010$) compared to patients with FOA (n=25). In subgroup analysis with NB (n=17) or FOA (n=25) for metopic synostosis only, all of these findings held ($p<.01$). IRR was 88.8% overall, 89.7% for the temporal hallowing scale, 94.7% for frontal bone irregularity, 87.7% for frontal bone contour, and 83.3% for supraorbital retrusion.

Conclusions: The neo-bandeau FOA technique for anterior cranial vault morphology shows similar clinical efficacy and complication rates to traditional FOA but may provide improved aesthetic outcomes and stability of result over time.

A Novel VSP Technique Improves Outcomes in Endoscopic Suturectomy for Coronal Craniosynostosis

Abstract Presenter: Theresa Webster MD

Abstract Co-Author(s): Albert Truong MD, Naikhoba Munabi MD, Thomas Imahiyerobo MD

Background: Identifying the coronal suture endoscopically can be challenging yet few studies have evaluated using virtual surgical planning (VSP) guidance in assisting operative technique. We sought to compare operative outcomes following VSP-guided and non-VSP guided endoscopic suturectomy for patients with unicoronal and bicoronal craniosynostosis.

Methods: Patients who underwent endoscopic-assisted suturectomy for uni- or bicoronal craniosynostosis from 2020 to 2024 were retrospectively reviewed. In one cohort, a surface marking guide developed with VSP was used to facilitate identification of the coronal suture. Patient demographics, estimated blood loss, operative time, length of stay, and secondary fronto-orbital advancement were compared between VSP and non-VSP cohorts.

Results: 17 patients were included undergoing 12 unilateral and 5 bilateral suturectomies. Eight patients (4 unicoronal and 4 bicoronal) were in the VSP cohort and 9 patients (8 unicoronal and 1 bicoronal) were in the non-VSP cohort. Overall EBL for unilateral cases was 12.1 +/- 7.5 mL. Patients who underwent VSP had equivalent EBL to the non-VSP cohort (10.0 +/- 1.0 mL vs 13.1 +/- 19.2 mL, $p = 0.53$). For bilateral cases, EBL for the VSP cohort was 28.8 +/- 30.9 mL compared to 50 mL for the one bilateral non-VSP guided case. Patients who had VSP guidance had significantly reduced operative time for unilateral cases (63+/-17 minutes vs 81+/- 20 minutes, $p < 0.01$). For bilateral cases, VSP guidance was 78 +/- 26 minutes compared to 118 minutes for the one bilateral case with non-VSP guidance.

Conclusions: Using VSP to assist endoscopic coronal suturectomy reduces operative time. This outcome likely reflects a decreased reliance on intraoperative assessment, increased fidelity of neo-suture placement, idealized placement and decreased size of the access incision, and restriction of neo-suture width to preserve surrounding bone.

The Impact of Custom Endoprosthesis versus Non-Custom Reconstruction on Facial Symmetry in Pediatric Jaw Reconstruction

Abstract Presenter: Anika Kim

Abstract Co-Author(s): Asli Pekcan, Melanie Bakovic, Valeria Mejia, Raina Patel
Mark Urata MD, Jeffrey Hammoudeh MD, Pasha Shakoori MD

Background: Surgical resection of pediatric mandibular tumors may result in significant facial disfigurement. While custom endoprosthesis (CE) and non-custom reconstruction (NCR) have been successfully used for microsurgical mandibular reconstruction, the comparative impact on facial symmetry between these techniques remains poorly characterized. The purpose of this study was to analyze facial anthropometrics to compare improvement in post-resection disfigurement among children undergoing CE and NCR following hemimandibulectomy.

Methods: A retrospective review was conducted of children who underwent mandibular reconstruction at a major children's hospital from August 2009 to March 2022. Cohorts included patients receiving CE and NCR. Anthropometric measurements from frontal images taken one year postoperatively included gonion-to-menton (Go-Me), gonion-to-midline (Go-Mid), stomion-to-cheilion (Sto-Ch), intercanthal line (ICL) to gonion (ICL-Go) and ICL to cheilion (ICL-Ch). Symmetry ratios between the surgical and non-operative sides were calculated, with 1.0 signifying ideal symmetry. The percentage of absolute deviation from ideal symmetry was calculated, with lower values indicating favorable outcomes. Statistical analysis was performed using Fisher's exact and Mann-Whitney U tests.

Results: A total of 25 patients undergoing mandibular reconstruction met inclusion criteria. Thirteen patients received CE and 12 underwent NCR. Of the resected tumors, 84% were benign and 16% were malignant. None of the patients received preoperative radiation therapy. Reconstructive methods included free tissue transfer (CE: 69.2% vs. NCR: 16.7%), bone grafting (23.1% vs. 66.7%), and local flaps (7.7% vs. 16.7%) (p=0.03). Overall flap survival was 100%. Hardware failure occurred in 7.7% of CE and 50.0% of NCR patients (p=0.03). Postoperatively, the CE cohort demonstrated decreased deviation from ideal symmetry compared to the NCR cohort in four anthropometric metrics (Go-Mid: 11.3% vs. 14.2% , p=0.42; Sto-Ch: 8.6% vs. 11.3%,

p=0.39; ICL-Go: 4.6% vs. 7.0%, p=0.29; Go-Me: 7.1% vs. 9.9%, p=0.41). The CE cohort exhibited greater deviation from symmetry in only one metric (ICL-Ch: 2.7% vs. 1.3%, p=0.12).

Conclusion: Overall, reconstruction with CE demonstrated a trend towards improved facial symmetry compared to NCR, as evidenced by reduced deviation from ideal symmetry in most anthropometric measurements. These findings may inform clinical decision-making and set more accurate preoperative expectations for pediatric mandibular reconstruction. Further studies with a larger patient population are necessary to more precisely determine the significance of differences in postoperative facial symmetry between CE and NCR in microsurgical mandibular reconstruction.

Bilateral Cleft Lip Revision, A 10 Year Institutional Review

Abstract Presenter: Matthew Brett DO

Abstract Co-Author(s): Roberto Flores MD, David Staffenberg MD, DSc (Honoris Causa), Natalie Plana MD

Purpose: This study compares the aesthetic outcomes of two common surgical techniques for bilateral cleft lip revision: complete bilateral cleft lip revision and Abbe flap. Specifically, the study quantifies changes in upper lip anatomy, including scar width, philtrum width, lip height, and sagittal relationships between the upper and lower lip.

Methods: A single-institution, 10-year, retrospective review was conducted on 39 patients with bilateral cleft lip who underwent either complete bilateral cleft lip revision (n=20) or Abbe flap (n=19) between 2014 and 2023. Preoperative and postoperative (at least six months follow-up) photographs were analyzed using Dolphin Imaging software. Frontal view measurements included left and right scar width, philtrum width, superior lip width, philtrum column height, total upper lip height, and vermillion tubercle height. Measurements were assessed as ratios of postoperative to preoperative values. Additionally, sagittal view measurements analyzed the angle formed between the radix, upper lip, and lower lip, as well as the labial angle relative to Frankfurt Horizontal. A paired t-test was performed to assess statistical significance ($p < 0.05$).

Results: The study included 39 patients: 20 with complete bilateral cleft lip revision and 19 with Abbe flap. Key findings included:
• Scar width: Significant reductions were observed in left (0.71, $p<0.001$) and right scar width (0.73, $p<0.001$) in the complete revision group, but no significant change in the Abbe flap group.
• Philtrum width: The complete revision group demonstrated a significant reduction (0.62, $p=0.001$), while the Abbe flap group showed no change.
• Total Upper Lip height: The complete revision group showed a slight increase in upper lip height (7%, $p=0.04$), while the Abbe flap group demonstrated a larger increase (22%, $p<0.001$).
• Vermillion height: Both groups showed increases in superior vermillion height (13% in complete revision, $p=0.005$, and 21% in Abbe flap, $p=0.0005$).
• Sagittal angles: The radix-upper lip-lower lip angle increased by 25 degrees ($p=0.001$) in the Abbe flap group, but did not change significantly in the complete revision group. Similarly, the labial angle from Frankfort Horizontal decreased significantly in the Abbe flap group (7 degrees, $p=0.004$), while only a slight change was observed in the complete revision group that was not significant.

Conclusions: Both complete cleft lip revision and Abbe flap are effective in improving upper lip aesthetics, but they serve different purposes. Complete cleft lip revision is more effective at improving scar quality and narrowing the philtrum, while the Abbe flap is superior for elongating the philtrum, increasing total upper lip height, and correcting sagittal discrepancies. These findings can guide surgical decisions for patients with bilateral cleft lip, based on their specific anatomical needs. The study highlights the importance of considering both functional and aesthetic goals when selecting the appropriate surgical technique for bilateral cleft lip revision.

Transverse Mandibular Distraction Technique for Complex Craniofacial Reconstruction

Abstract Presenter: Mackenzie French MD

Abstract Co-Author(s): Joanna Chen, Catherine Bautista, Candace Winterton, Joshua Chow, Richard Byrd, Lucia Collar Yagas MD, Duane Yamashiro, Barbu Gociman MD, Brittany Foley MD, 5301267676./Whitney Moss MD

Purpose: Various surgical techniques have been employed in the correction of maxillomandibular discrepancies. Distraction osteogenesis is a modality utilized when large bony deficiencies require reconstruction. In patients with severe mandibular transverse inadequacy, distraction osteogenesis can be utilized to correct the mandibular width (1, 2). Previous reports described external distractor appliances and bone-borne devices (3-5). Here, a novel technique in transverse mandibular expansion using a tooth-borne distraction appliance is described.

Methods: Two patients with congenital anomalies that resulted in severe class II malocclusion, bilateral posterior crossbite, and mastication difficulties were treated for mandibular transverse correction. Preoperatively, a custom-designed tooth-borne mandibular distractor was fabricated by the orthodontic team for each patient. A midline mandibular osteotomy was made through a chin incision and the tooth-borne mandibular distractor was placed on the lower dental arch. Activation of the device was initiated on postoperative day three and was continued until imaging and clinical exam demonstrated acceptable mandibular width. Consolidation was carried out for 6 weeks prior to removal of the device. During this time, an additional stiff acrylic component was added to the device to prevent bony movement. Secondary mandibular ramus lengthening was performed in typical fashion several months later for both patients.

Results: Acceptable posterior overjet, mandibular form, and mandibular width were achieved for each patient. There were no identified complications with mandibular incisors health. These findings are suggestive of appropriate mandibular transverse correction.

Conclusion: These cases represent a novel technique for successful treatment of micrognathia in the transverse dimension while minimizing potential complications.

References

1. Winters R, Tatum SA. Craniofacial distraction osteogenesis. Facial Plast Surg Clin North Am. Nov 2014;22(4):653-64. doi:10.1016/j.fsc.2014.08.003
2. 4. Efunkoya AA, Bamgbose BO, Adebola RA, Adeoye JB, Akpasa IO. Maxillomandibular distraction osteogenesis. J Craniofac Surg. Sep 2014;25(5):1787-92. doi:10.1097/scs.0000000000000907

3. Garreau É, Wojcik T, Rakotomalala H, Raoul G, Ferri J. Symphyseal distraction in the context of orthodontic treatment: a series of 35 cases. Int Orthod. Mar 2015;13(1):81-95. doi:10.1016/j.ortho.2014.12.003

4. Alkan A, Ozer M, Baş B, et al. Mandibular symphyseal distraction osteogenesis: review of three techniques. Int J Oral Maxillofac Surg. Feb 2007;36(2):111-7. doi:10.1016/j.ijom.2006.11.005
5. Starch-Jensen T, Kjellerup AD, Blæhr TL. Mandibular Midline Distraction Osteogenesis with a Bone-borne, Tooth-borne or Hybrid Distraction Appliance: a Systematic Review. J Oral Maxillofac Res. Jul-Sep 2018;9(3):e1. doi:10.5037/jomr.2018.9301

The Accuracy of Virtual Surgical Planning in Mandibular Distraction Osteogenesis

Abstract Presenter: Theodore Hyman MD

Abstract Co-Author(s): Matthew Seebald, Jacqueline Bochkova, Athena Zhang MD, Gary Rogers MD, Albert Oh MD, Debra-Adele Misse

Background: Virtual surgical planning (VSP) is an invaluable tool for craniofacial surgeons. In mandibular distraction osteotomy (MDO), routinely performed in severe cases of Robin sequence (RS), VSP allows surgeons to precisely place osteotomies and hardware, maximizing airway expansion while minimizing complications such as nerve or tooth bud injury (1). Longer distraction distances may predispose to condylar resorption, but current literature lacks consensus on regarding their effect other complications like facial nerve dysfunction (2,3). Nevertheless, increased distraction lengths may improve clinical outcomes such as postoperative Apnea-Hypopnea Index and oxygen requirements (4). Little evidence exists on whether VSP predictions match the eventual size of distraction. The authors conducted a review of MDO cases to determine whether VSP accurately predicts final distraction distance.

Methods: Cases of MDO performed between 2019 and 2024 were retrospectively reviewed. Regardless of VSP prediction, patients were distracted until class III occlusion of 2-3 mm was achieved on clinical examination. Final distraction distance was assessed via computed tomography and direct measurement of distractors during explantation. These distances were compared to preoperative VSP from two independent surgical device companies. For each VSP, an ideal prediction (minimum distance to achieve desired class III occlusion) and maximum prediction (maximum distance simulated in the VSP) were recorded.

Results: Thirty-four cases of MDO performed in RS were reviewed, representing n=65 osteotomies for which final distraction distance was measured. CT and direct measurement of final distraction demonstrated excellent agreement (mean difference 3.4%). For n=46 osteotomies, VSP predicted 5 to 10mm of distraction required to achieve class III occlusion. In these cases, VSP underestimated the final distraction by 9.0mm on average. N=16 predicted 11 to 15mm of ideal distraction, and n=5 predicted greater than 15mm, with mean underestimations of 7.2mm and 3.7mm, respectively. Overall, 96.4% of distractions exceeded the ideal distance predicted by VSP, with 60.0% of distractions exceeding the maximum prediction.

Discussion/Conclusions: This study identifies significant discrepancies between distraction distances predicted by VSP and those needed to reach clinical endpoints. This study highlights both the importance of clinical assessment in determining distraction distance and a need for further research into the effects of long distraction lengths in RS.

References

1. Resnick CM. Virtual Surgical Planning for Mandibular Distraction in Infants with Robin Sequence. Plast Reconstr Surg Glob Open. 2017 Jun 16;5(6):e1379.
2. Shu KY, Liu W, Zhao JL, Zhang ZY, et al. Condylar resorption post mandibular distraction osteogenesis in craniofacial microsomia: A retrospective study. J Craniomaxillofac Surg. 2023 Nov;51(11):675-681. doi: 10.1016/j.jcms.2023.10.001. Epub 2023 Oct 6. PMID: 37852887.
3. Kapoor E, Mantilla-Rivas E, Rana MS, Oh AK, et al. Facial Nerve Dysfunction After Mandibular Distraction Osteogenesis in Patients with Robin Sequence: A Systematic Review and Meta-Analysis. Cleft Palate Craniofac J. 2023 Apr;60(4):395-404.
4. Stanton E, Kondra K, Jimenez C, Hammoudeh JA, et al. Increased Distraction Magnitude Leads to Greater Reduction in the Apnea-Hypopnea Index in Infants With Robin Sequence. J Oral Maxillofac Surg. 2022 Sep;80(9):1486-1492.

Primary Palatoplasty Results Versus Normative Velopharyngeal Anatomy: Immediate Post-Surgical Assessment Using Intraoperative Magnetic Resonance Imaging

Abstract Presenter: Leticia Lenkiu

Abstract Co-Author(s): Andrew Willmer, Hannah Brown, Adrian Osias, Tiffany Lee, Samantha Power, Joseph Lopez MD, jamie perry PhD, Rajendra Sawh-Martinez MD, MHS, FACS

Background: Cleft palate repair aims to restore velopharyngeal function by repositioning the levator veli palatini (LVP) muscle and reconstructing the velar anatomy. While intraoperative assessment traditionally relies on surface level visualization, intraoperative magnetic resonance imaging (iMRI) provides real-time, high-resolution imaging of the deep anatomical structures to be manipulated during the operation. This study investigates the feasibility of iMRI use for surgical analysis and quantitative assessment of results.

Methods: In this study, seven patients between the ages of 11 and 13 months undergoing primary palatoplasty were evaluated using iMRI. Pre- and postoperative measurements of LVP length, origin-to-origin, velar length, effective velar length, velopharyngeal depth, and angles of origin were compared to normative data. Paired sample t-tests and root mean square error (RMSE) analysis evaluated differences between preoperative, postoperative, and control measurements.

Results: Novel assessment of the preoperative cleft anatomy, including detailed analysis for the LVP size, position and anatomical variation were performed. Postoperatively, mean LVP length increased by 8.437 mm ($p < 0.001$), reducing RMSE calculated relative to normal anatomy from 15.421 preoperatively to 7.88 postoperatively. Post-surgically, mean reconstructed velar length was 27.97 ± 5.4, 7.723 mm longer than the control group ($p < 0.01$). After surgery, mean EVL increased by 3.323 mm ($p < 0.05$). Surgical repair established an intravelar segment length comparable to normal anatomy (17.0 ± 1.46 mm post-palatoplasty vs. 15.9 ± 2.06 mm in normative data). No significant differences were noted after data was normalized relative to weight, length and head size.

Discussion: This study is the first compilation of a series of detailed anatomical analysis of the un-operated levator veli palatini muscles in infants at the time of surgical repair. Real-time quantitative assessment of cleft palate repair, intraoperative surgical planning and objective evaluation of outcomes was performed. Findings suggest that the un-operated levator sling has significant variability in shape, size and orientation. Postoperatively, the LVP length, IVL, and EVL may serve as markers of surgical success. The functional implications of differences in velar and velopharyngeal measurements are yet to be elucidated. Future studies with larger cohorts objectively analyzing the detailed preoperative and postoperative LVP anatomy are needed to further optimize surgical approaches aimed at reducing cleft palate repair complications.

Palatal Fistula Difficulty Index - A Tool for Assessing Surgical Complexity & Optimizing Referral

Abstract Presenter: Muhammad Daiem MD

Abstract Co-Author: Ghulam Qadir Fayyaz MD

Background: Palatal fistulas represent the most challenging complication after cleft palate repair, with recurrence rates ranging from 2.4% to 35%. The lack of a standardized difficulty index complicates surgical decision-making, specifically in the management of complex defects. The Palatal Fistula Difficulty Index (PFDI) was formulated as a quantitative tool to stratify fistula complexity based on anatomical and functional factors. With numerical scores assigned across six categories - location, size, configuration, number of fistulae, velopharyngeal function, and recurrence - the index ensures patients with complex defects receive timely referrals to tertiary institutes, optimizing postoperative outcomes. This study aimed to develop and validate the Palatal Fistula Difficulty Index by assessing its reliability and accuracy in identifying high-risk cases necessitating specialized intervention.

Methods: A prospective study was conducted at CLAPP Hospital, Lahore, Pakistan, over three months from November 2024 to January 2025. A total of 30 patients with palatal fistulas were selected and assessed using the six-category index, which assigned scores for: (1) Fistula Location (Midline, Lateral, Subtotal); (2) Size (<1 cm, 1–3 cm, >3 cm); (3) Configuration (Longitudinal, Transverse, Irregular); (4) Number of Fistulae (Single, Two, >Two); (5) Palate Function (Both Adequate, Function Adequate but Length Inadequate, Neither Adequate); and (6) Recurrence (Primary, Operated Once, Operated More Than Once). Selected cases were distributed to 20 experienced cleft surgeons across different institutions. Each surgeon independently evaluated the cases and assigned a score, which they sent back for analysis. Inter-rater reliability was assessed using the intraclass correlation coefficient (ICC). Postoperative outcomes were analyzed, focusing on fistula recurrence, operative time, and functional outcomes. Statistical analyses were conducted using R Statistical Software (Version 4.3.2; R Core Team 2024).

Results: The inter-rater reliability of the PFDI was excellent (ICC = 0.91, 95% CI: 0.87–0.94), indicating high agreement among evaluators. The index score correlated significantly with operative time ($r = 0.82$, $p < 0.001$), confirming its predictive value for

surgical complexity. Logistic regression analysis demonstrated that each 1-point increase in the score was associated with a 2.95-fold increased risk of recurrence (OR = 2.95, 95% CI: 2.11–4.27, $p < 0.001$). The recurrence rate increased significantly with complexity, with low complexity cases (6–9 points) showing a 5% recurrence rate, moderate cases (10–14 points) an 18% recurrence rate, and high complexity cases (15–18 points) a 42% recurrence rate ($p < 0.001$, χ^2 test). Operative time also varied significantly between groups (low complexity: 43 ± 11 min; moderate: 74 ± 19 min; high: 112 ± 24 min, $p < 0.001$, ANOVA). 72% of high-complexity cases treated at non-specialized centers ultimately required referral to the tertiary cleft center due to failed closure.

Conclusion: The Palatal Fistula Difficulty Index is a reliable and predictive tool for classifying palatal fistula complexity and guiding referral decisions. Higher scores were strongly associated with longer operative times, increased recurrence risk, and the need for specialized surgical intervention, making the scorecard a valuable triage system for identifying cases that should be referred to tertiary cleft centers.

Streamlined Preoperative Evaluation of Velopharyngeal Dysfunction: A Novel Protocol for Simultaneous Speech MRI and Carotid MRA Evaluation

Abstract Presenter: Mbinui Ghogomu

Abstract Co-Author(s): Molly Macisaac, Jamilla Vieux, S. Alex Rottgers MD, Jordan Halsey MD

Introduction and Purpose: Velopharyngeal dysfunction (VPD) disrupts speech by impairing velopharyngeal closure, leading to nasal air escape. Accurate anatomical assessment is essential for selecting appropriate surgical interventions. Speech MRI provides detailed visualization of the levator veli palatini (LVP) and velopharyngeal closure patterns, surpassing traditional diagnostic tools (1). Patients with syndromic VPD have an increased risk (49-60%) of carotid artery medialization (2), necessitating preoperative vascular imaging, as intraoperative assessment using carotid pulsations poorly correlates with actual artery position (3). While 22q11.2 Deletion Syndrome has the highest association, other syndromes also present with vascular variability, highlighting the need for vascular assessment (4). Traditionally, speech MRI and carotid MRA are performed separately, with MRA requiring anesthesia. To improve efficiency

and reduce patient burden, we developed a novel dual-imaging protocol combining speech MRI and carotid MRA into a single, nonsedated imaging session. We describe our protocol parameters to facilitate replication at other centers.

Methods: Our dual protocol was applied to high-risk VPD patients, including those with syndromic diagnoses or incomplete genetic workups. Imaging consisted of:
1. Speech MRI – Nonsedated acquisition guided by a speech-language pathologist, capturing sustained phonation of "EEE," "SSS," and "SHH" in sagittal and oblique coronal views. The MRI assessed LVP orientation, velopharyngeal closure patterns, and VP gap size.
2. Carotid MRA – Nonsedated 2D and 3D time-of-flight sequences from the skull base to the neck. The protocol was truncated to exclude the aortic arch and circle of Willis, optimizing imaging time while maintaining surgical relevance.

Results: Eight patients have completed the dual-protocol. Speech MRI consistently provided information for surgical planning including LVP integrity, VP gap size, and closure patterns. Carotid MRA successfully mapped vascular anatomy, with image quality comparable to traditional sedated MRA protocols. One case demonstrated carotid medialization. In all patients, the dual-protocol directly influenced surgical decision-making by simultaneously providing comprehensive anatomical and vascular data. Average total imaging time ranged from 15-20 minutes.

Conclusions: This dual-imaging protocol is a novel, efficient approach to preoperative VPD evaluation, offering comprehensive anatomical and vascular data in a single session. It streamlines diagnostics, eliminates unnecessary anesthesia, improves surgical planning, and reduces patient burden. Future studies will assess larger cohorts, evaluate cost-effectiveness, and further refine implementation strategies.

References:
1. Zwa 5. Perry JL, Snodgrass TD, Gilbert IR, et al. Establishing a clinical protocol for velopharyngeal MRI and interpreting imaging findings. Cleft Palate Craniofac J. 2024;61(5):748–758. doi:10.1177/10556656221141188
2. Oppenheimer AG, Fulmer S, Shifteh K, et al. Cervical vascular and upper airway asymmetry in velo-cardio-facial syndrome: correlation of nasopharyngoscopy with MRA. Int J Pediatr Otorhinolaryngol. 2010;74(6):619–625. doi:10.1016/j.ijporl.2010.03.006
3. Mitnick RJ, Bello JA, Golding-Kushner KJ, Argamaso RV, Shprintzen RJ. The use of magnetic resonance angiography prior to pharyngeal flap Surgery in patients with velocardiofacial syndrome. Plast Reconstr Surg. 1996;97(5):908–919. doi:10.1097/00006534-199604001-00005

4. Raol N, Caruso P, Hartnick CJ. Use of imaging to evaluate course of the carotid artery in surgery for velopharyngeal insufficiency. Ann Otol Rhinol Laryngol. 2015;124(4):261–265. doi:10.1177/0003489414554943

Using Machine Learning to Quantify Severity of Sagittal Craniosynostosis in 195 Patients

Abstract Presenter: Tobi Somorin

Abstract Co-Author(s): wenzheng tao, Janina Kueper MD, Angel Dixon, Nicolas Kass, Krithika Iyer, Nawazish Khan, Jake Wagoner, Ashley Rogers MD, Ross Whitaker, Shireen Elhabian, Jesse Goldstein MD

Introduction: Sagittal craniosynostosis (SCS) manifests with complex phenotypes and requires precise assessments to guide management and lower the risk of developmental complications. CranioRate™ is an advanced supervised machine learning algorithm initially developed to characterize and quantify metopic craniosynostosis (MCS) severity, validated by expert craniofacial surgeon ratings. (1) Here we describe the process of developing the CranioRate™ sagittal severity score (SSS) using our validated supervised machine learning (ML) techniques and describe the spectrum of severity among a large population of patients with SCS.

Methods: A survey with an internet-based rating portal was administered to expert craniofacial surgeons. Respondents evaluated the severity of a series of SCS and normal control images. These ratings validated a principal-component-analysis ML tool to produce the SSS. A leave-one-out-cross-validation (LOOCV) analysis evaluated SSS against the prior gold standard, cephalic index (CI). We assessed its performance in comparison with the cranial morphology deviation (CMD) score which is based on unsupervised ML and applied the SSS to a large population of patients with SCS.

Results: The survey was completed by 54 craniofacial surgeons, each rating a random set of 20 patients (75% SC:25% control), resulting in 1080 rating records. After applying AUC-based screening, 50 surgeons were retained for analysis. The SSS achieved a significantly higher accuracy in predicting expert responses than CI in LOOCV ($p<0.01$). Consensus ratings were superior to diagnostic labels in quantifying within-group variations, and skin descriptors were shown to be equivalent in terms of predictive power as skull descriptors. The CMD score showed a strong correlation with the SSS

(Pearson coefficient of 0.92, Spearman coefficient of 0.90, $p < 0.01$). We present the frequency distribution of SSS in 195 patients with SCS as well a population of 170 normal and 221 patients with metopic craniosynostosis.

Conclusions: We introduce the SSS as a novel metric to quantify severity in SCS and describe the distribution of phenotypic severity in a large cohort of patients (Figures 1 and 2). The findings underscore the potential of machine learning models for comprehensive severity quantification in SCS. These methods pave the way for more objective, precise, and consistent evaluations, marking a significant step forward in the collaborative study and management of SCS.

1. Beiriger JW, Tao W, Bruce MK, et al. CranioRate: An Image-Based, Deep-Phenotyping Analysis Toolset and Online Clinician Interface for Metopic Craniosynostosis. Plast Reconstr Surg. 2024;153(1):112e-119e. doi:10.1097/PRS.0000000000010452

Burden of Operative Craniofacial Trauma in Mexico

Abstract Presenter: Srinithya Gillipelli

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Background: Injuries caused by craniofacial trauma (CFT) require specialized surgical care. This represents a challenge in low- and middle-income countries (LMICs) where the burden of injury is high and specialized plastic surgical capacity is low. This study aimed to characterize the epidemiology, injury patterns, and demographic distribution of CFT cases in Mexico, to understand CFT trends which could lead to more effective prevention strategies, improved treatment capacity, and improved patient outcomes.

Methods: This retrospective study analyzed trauma cases from a national public hospital registry in Mexico from January through December 2022. CFT cases were identified using ICD-10 diagnostic codes, while surgical interventions were classified using ICD-9 procedure codes. Demographic data, injury mechanisms, fracture patterns, surgical interventions, infection rates, length of stay (LOS), and mortality rates were

analyzed. Geographic trends were evaluated by correlating case distributions with patients' home state and healthcare center characteristics.

Results: Of 462,103 trauma cases, 33,935 (7.3%) involved CFT, with 6,733 cases (19.8%) requiring surgical intervention. The median age of patients was 28 years (IQR 20), with young adults (18–40 years) comprising 56.7% of cases, followed by adults over 40 years (24.9%) and children under 18 years (18.4%). Males accounted for 79.7% (n=5,366) of operative cases. Nationally, the leading causes of injury were road traffic events (25.8%, n=1,736), interpersonal violence (24.2%, n=1,631), and falls (22.6%, n=1,522). Regional variability was observed: states with larger urban centers, such as Ciudad de México, Puebla, and Guanajuato, reported the highest caseloads (n=2,385). Road traffic events dominated in Puebla (26.3%, n=190), while interpersonal violence was more common in Guanajuato (18.3%, n=89). Among older adults, falls accounted for 52.4% (n=246) of cases.
Mandibular fractures (17.9%, n=1,207) were the most common, followed by maxillary and zygomatic fractures (10.1%, n=678) and nasal bone fractures (7.0%, n=471). Interpersonal violence was associated with mandibular fractures, while falls correlated with nasal fractures. Median LOS was 2 days (IQR 7). Mortality occurred in 3.39 per 1,000 cases. Postoperative infection rates were 1.2%, with higher rates reported in second-level care centers in resource-limited areas.

Conclusions: Craniofacial trauma in Mexico disproportionately affects young adult males, primarily resulting from road traffic events, interpersonal violence, and falls, with distinct patterns by age and mechanism. Variations in outcomes of CFT across Mexico are associated with regional resource availability. While infection and mortality rates were relatively low, mortality was higher in Mexico than in CFT cases in the United States.(1) Prolonged LOS in resource-limited regions demonstrates a need for strengthening surgical capacity. Addressing regional inequities in healthcare access, expanding emergency response capabilities, and increasing the plastic surgery workforce can improve patient outcomes and equity in trauma care.

References

1. Sethi RK, Kozin ED, Fagenholz PJ, Lee DJ, Shrime MG, Gray ST. Epidemiological survey of head and neck injuries and trauma in the United States. Otolaryngol Head Neck Surg. 2014 Nov;151(5):776-84. doi: 10.1177/0194599814546112. Epub 2014 Aug 19. PMID: 25139950; PMCID: PMC4481864.

Mastering the Art of Symmetry: Long-Term Outcomes in Patients with Tessier No. 7 Cleft using the Myomucosal Flap Advancement Technique

Abstract Presenter: Valeria Mejia

Abstract Co-Author(s): Raina Patel, Erin Wolfe MD, Melanie Bakovic, Asli Pekcan, Sophia Garnica, Alyssa Valenti MD, William Magee, III MD, DDS, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Restoring facial symmetry in patients with Tessier 7 clefts may present challenges in achieving functional and aesthetic outcomes. While oral commissure reconstruction has been performed with varying degrees of success, there remains a need for comprehensive facial analysis to evaluate the symmetry of outcomes. Similarly, the rarity of this condition has resulted in limited data regarding the efficacy of current treatment paradigms. This study analyzes facial anthropometrics to compare postsurgical symmetry after commissuroplasty in children with Tessier 7 cleft over 18 years.

Methods: A retrospective review of children who underwent commissuroplasty at a major children's hospital between 2005 and 2023 was conducted. Cohorts included preoperative and postoperative measurements within 6 months. Anthropometric measurements from frontal images (repose position) included stomion-to-chelion (Sto-Ch), chelion-to-contralateral ala (Ch-Ala), chelion-to-lateral canthus line (Ch-LC), chelion-to-menton (Ch-Men) and chelion angle deviation (Ang-Dev) (Figure 1). Symmetry ratios between the operative and non-operative sides were calculated using a range of [0.0-1.0], with 1.0 signifying ideal symmetry. For patients with bilateral Tessier 7 clefts, symmetry ratios were calculated from both sides of the face. Major revisions were defined as repeat commissuroplasty for facial asymmetry or excision of contracted scarring. Statistical analysis was performed using Student T-tests.

Results: A total of 32 patients underwent commissuroplasty for Tessier 7 of which 25 met inclusion criteria. Six patients had bilateral Tessier 7 clefts and 19 patients had unilateral Tessier 7 clefts (Right-sided: 76% vs Left-sided: 24%). All patients' clefts were repaired with a myomucosal advancement flap commissuroplasty technique. Mean age at surgery was 13.3 ± 3.0 months. Of all patients, 48% were female, 32% had an additional Tessier cleft, and 20% were syndromic. Overall, 25% of patients required major revisional procedures. Compared to the preoperative cohort, postoperative patients demonstrated increased symmetry in four anthropometric measurements (Sto-Ch: 0.73 vs 0.89, $p<0.001$; Ch-Ala: 0.84 vs 0.92, $p<0.001$; Ch-LC: 0.88 vs 0.94, $p=0.002$; Ch-Men: 0.86 vs 0.94 ($p<0.001$). No significant difference was found between

pre- and postoperative chelion angle deviation symmetry ratios (Ang-Dev: 0.51 vs 0.61, p=0.139). Percent improvement was recorded across each measurement (Table 1). Mean follow-up time was 3.74 ± 6.5 years for 7 patients. Symmetry ratios from follow-up anthropometric measurements did not vary significantly from postoperative asymmetry ratios.

Conclusion: Overall, oral commissure reconstruction demonstrated improved facial symmetry in the following measurements: Sto-Ch, Ch-Ala, Ch-LC, and Ch-Men with the myomucosal advancement flap technique. However, there was no significant improvement in chelion angulation symmetry after the surgery. Postoperative symmetry did not change significantly over follow-up time. More studies are required to evaluate the most effective means of repairing these clefts to optimize long-term symmetrizing outcomes.

A Review of 193 Orbital Fractures and Associated Injuries - A 20 Year Experience at A Level I Pediatric Trauma Center

Abstract Presenter: Caroline Kreh

Abstract Co-Author(s): Valeria Mejia, Melanie Bakovic, Asli Pekcan, Raina Patel, Marvee Turk MD, Sophia Garnica, William Magee, III MD, DDS, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Orbital fractures are among the most common craniofacial injuries in children, varying significantly from adult cases in their patterns and presentations. This study analyzes the mechanisms and management of pediatric orbital fractures over a two-decade period.

Methods: A retrospective review was conducted of patients with CT-confirmed orbital fractures at a major children's hospital from 2004 to 2024. Health records were reviewed for fracture type, injury mechanism, associated injuries, and surgical history. Statistical analyses used Pearson's chi-squared and ANOVA.

Results: A total of 188 patients with orbital fractures were included. Of them, 39.4% underwent surgical correction at an average of 16.3 days after presentation. The mean age at injury was 11.6 years. Fractures most commonly occurred in males (72.5%) and were most commonly due to sports-related injuries (20.7%). Orbital floor fractures

(47.2%) and zygomaticomaxillary complex (ZMC) fractures (17.6%) were the most common subtypes overall. Naso-orbital ethmoid fractures were the most common subtype requiring surgical correction (71.4%). Entrapment was observed in 7.3% of patients and was most common in orbital floor fractures (71.4%). Orbital roof fractures had the highest rate of pneumocephalus (50%) while orbital rim fractures had the highest rate of vertebral fracture (16.7%). ZMC fractures had higher rates of infraorbital nerve hypoesthesia (25%), with improvement after surgery in 70% of cases.

Conclusion: Pediatric orbital fractures exhibit distinct patterns and associations, emphasizing the need for targeted approaches in diagnosis and management that differ from adult paradigms.

Predictive Power of the Modified Frailty Index in Craniofacial Mass Resections

Abstract Presenter: Rohan Mangal

Abstract Co-Author(s): Anshumi Desai MD, Angela Luo, Kashyap Tadisina MD, Paulo Coelho, Lauren Yarholar MD

Purpose: Craniofacial masses, including jaw cysts, benign tumors, and malignant lesions of the maxilla, mandible, and oral vestibule, require tailored surgical management to balance oncologic control with functional and aesthetic outcomes. While some lesions are amenable to simple excision, others demand extensive resection, increasing the risk of complications. Despite advances in surgical techniques, postoperative morbidity remains a concern, influenced by patient factors such as comorbidities and frailty.
Frailty, a state of reduced physiological reserve, is a known predictor of poor surgical outcomes but remains underexplored in craniofacial mass resections. This study evaluates the impact of frailty on postoperative outcomes in craniofacial mass resections by stratifying patients into low-risk (5-mFI<2) and high-risk (5-mFI≥2) cohorts. By analyzing morbidity, hospital length of stay, and readmission rates, we aim to determine whether integrating frailty assessment into preoperative planning can improve risk stratification and optimize patient care.

Methods: A retrospective analysis was conducted using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database from 2011 to 2021. Patients undergoing craniofacial mass excisions were identified through

CPT codes, and frailty was assessed using the 5-mFI, comprising hypertension, diabetes, respiratory disease, congestive heart failure, and functional dependence. Patients were stratified into 5-mFI<2 and 5-mFI≥2 cohorts. Demographics, comorbidities, operative characteristics, and postoperative outcomes were compared between groups.

Results: A total of 6,858 patients were analyzed, with 4,372 (63.8%) in the 5-mFI<2 cohort and 2,486 (36.2%) in the 5-mFI≥2 cohort. Patients in the 5-mFI≥2 group were significantly older (mean age: 63.15 vs. 44.12 years, p<0.001) and had higher BMI (29.08 vs. 26.71, p<0.001). Functional independence was significantly lower in the 5-mFI≥2 cohort (95.62% vs. 99.27%, p<0.001).

Postoperatively, the 5-mFI≥2 cohort exhibited higher rates of all-cause complications (38.29% vs. 20.11%, p<0.001) and severe systemic complications (4.10% vs. 0.73%, p<0.001). Specific complications such as postoperative bleeding (9.53% vs. 3.59%, p<0.001), wound dehiscence (2.17% vs. 1.30%, p=0.006), and unplanned intubation (1.53% vs. 0.32%, p<0.001) were significantly more frequent in the 5-mFI≥2 group. The length of hospital stay was significantly longer for patients in the 5-mFI≥2 cohort (3.63 vs. 2.55 days, p<0.001), and prolonged hospitalization (>30 days) was more prevalent (1.21% vs. 0.41%, p<0.001). Readmission rates were also higher in the 5-mFI≥2 cohort (5.79% vs. 3.61%, p<0.001).
Multivariable analysis demonstrated that patients with 5-mFI≥2 had increased odds of all-cause complications (p=0.031) and severe systemic complications (p=0.023), even after adjusting for confounders. Operative time was significantly longer in the 5-mFI≥2 group (213.84 vs. 166.51 minutes, p<0.01).

Conclusion: Patients with 5-mFI≥2 undergoing craniofacial mass resections experience significantly higher rates of postoperative complications, including systemic and wound-related complications, along with longer hospital stays. Frailty assessment using the 5-mFI provides valuable risk stratification for surgical candidates, enabling better perioperative planning and patient counseling. Integrating frailty metrics into routine preoperative evaluations may optimize clinical outcomes and inform targeted interventions for high-risk patients. Further prospective studies are warranted to refine risk prediction models and enhance perioperative management strategies in craniofacial surgery.

Short- and Long-Term Outcomes of Autologous vs. Alloplastic Microtia Repair: A Propensity Score-Matched Analysis

Abstract Presenter: Noelle Garbaccio

Abstract Co-Author(s): Lacey Foster, Jade Smith, Oren Ganor MD, Dr. Samuel Lin MD

Background: Microtia and anotia are traditionally reconstructed using costal or auricular cartilage. However, recent advancements in alloplastic techniques challenge autologous reconstruction as the gold standard. While alloplastic implants enable earlier intervention and potentially enhance aesthetic outcomes, they carry potentially higher risks of early complications. Differences in long-term outcomes are unexplored. This study compares short-term (30-day) and long-term (≥3-year) outcomes of autologous and alloplastic microtia/anotia reconstruction.

Methods/Techniques: We used TriNetX, a global research platform, to analyze patient-level data from multiple healthcare organizations. Patients who underwent autologous or alloplastic microtia/anotia repair were identified by CPT and ICD-10 codes. Propensity-score matching controlled for demographics and comorbidities to establish comparable autologous/alloplastic cohorts. Short-term outcomes captured surgical wound dehiscence; surgical site infection; any postoperative infection; graft- or prosthetic-related complications; and debridement procedures occurring within 30 days after surgery. Long-term outcomes assessed graft/prosthetic complications and additional ear surgeries documented at least three years after surgery. The aggregate risk of any of these outcomes is termed all-cause complications. Multivariate and Kaplan-Meier analyses assessed differences in risk over time. Cox proportional hazards models further measured the impact of select variables on outcome risk.

Results: Before matching, the autologous reconstruction group had 352 patients, and the alloplastic reconstruction group had 187 patients. Mean age at surgery was not significantly different (8.2-----±10.5 vs 6.44±10.3 years, p=0.0643). After matching, each cohort had 182 patients. Follow-up was longer in the autologous group than in the alloplastic group (median: 3,824 vs. 3,369.5 days). In the 30-day post-operative period, alloplastic repairs had significantly higher risk of wound disruption (RD: 5.5%, 95% CI: 2.184%–8.805%, p = 0.0013); all-cause complications were similar.

At three years after surgery or later, the autologous cohort experienced significantly more additional external ear operations (Risk Difference: 9.49%, 95% CI: 0.967%–18.017%, p = 0.0322), and they were 32.8% more likely than the alloplastic group to have any additional surgeries (RR=1.328, 95% CI: 1.023-1.724) in that timeframe.

However, autologous repairs had significantly less long-term graft/prosthetic complications (HR = 0.586, p = 0.0156).

The Cox model reaffirmed that alloplastic repairs carry higher rates of short-term complications, but timing within the thirty-day window did not significantly differ between groups (HR=1.747, p=0.4055). Musculoskeletal and connective tissue diseases imparted the highest risk of experiencing a complication in 30 days (HR=7.229, p=0.0061). At three years after surgery or later, the long-term Cox model similarly found that alloplastic repairs were more likely to have complications than autologous repairs (HR=0.557, p=0.0028). Age at surgery was not significant in the long-term model.

Conclusions: Autologous microtia repair may offer greater long-term durability but is likely to need adjustments, while alloplastic repair has higher risk of complications in short- and long-term settings, requiring postoperative monitoring. It is important to note that longer follow-up times in the autologous group may have led to more surgeries observed. When selecting a reconstructive approach for microtia, surgeons should weigh the importance of durability vs. need for adjustment alongside the patient's priorities and surgical expectations.

All You Need Is One: Unilateral Buccal Flaps Do Not Affect Facial Symmetry After Palatoplasty

Abstract Presenter: Kylie Swiekatowski

Abstract Co-Author(s): Christopher Williams, Hendrik Lintel MD, Danielle Sobol MD, Matthew Greives MD, Ellen Wang

Introduction: The use of myomucosal buccal flaps during the repair of the cleft palate may decrease the rate of complications such as dehiscence and perforation, decreasing tension during closure and lengthening the nasal layer. However, some surgeons have concerns for unilateral harvest of buccal flaps, which can result in subsequent facial asymmetry. This study aims to investigate if the use of unilateral buccal flaps in primary palatoplasty results in perceived facial asymmetry for a patient.

Methods: Photographs of patients with cleft palate who have undergone primary palatoplasty at our institution were included in a de-identified survey to obtain crowdsourced data within medical students and physicians at our institution. Patients

were grouped by unilateral or no buccal flaps used with their palatoplasty. The photographs were obtained from the medical records and de-identified by censor bars across the eyes and thinly around the nose in a T-shape so that only the cheeks and mouth area and administered as a survey where respondents were asked to rate the degree of asymmetry of the face (symmetry score) and which side appeared larger (cheek laterality score). Statistical analysis was performed to describe the differences between perceived facial asymmetry of patients between groups with an intraclass correlation coefficient (ICC) to report inter-rater reliability.

Results: The cohort included 14 patients, divided into two treatment groups: 7 patients with unilateral buccal flaps and 7 patients with no buccal flaps. Of these patients, 8 (57%) are male, and 6 (43%) are female. The vast majority of patients (11 (79%)) had Veau III cleft palate; 2 (14%) had Veau IV, and 1 (7%) had Veau I. The mean age at surgery was 12.9 ± 2.4 months and age at time of survey was 6.2 ± 0.8 years. The groups were similar with no difference in age at surgery, age at survey, cleft type, race, and gender. A total of 35 completed survey responses were received. The mean symmetry score (with 10 being most symmetric) was 6.7 ± 0.7: 6.7 ± 0.8 for unilateral buccal flaps, and 6.8 ± 0.7 for none ($p = 0.7$). The mean cheek laterality score (1 being bigger on the left and 5 being bigger on the right) was 2.8 ± 0.5: 2.7 ± 0.5 for unilateral buccal flaps, and 2.9 ± 0.4 for none ($p = 0.4$). Overall, the inter-rater reliability was good (0.8), using the interclass correlation coefficient.

Discussion: There was no significant difference between perceived asymmetry of patients status post primary cleft palate repair. Future directions include surveying lay people to assess broader perspectives of facial asymmetry and long-term follow-up of outcomes in patients with and without buccal flaps. This suggests that patients can safely undergo palatoplasty with unilateral buccal flaps without the concern for aesthetic impacts on future facial symmetry.

Orbital Facial Trauma in Pediatric Patients: A Biomechanical Link to Vertebral Injuries

Abstract Presenter: Valeria Mejia

Abstract Co-Author(s): Melanie Bakovic, Asli Pekcan, Raina Patel, Medha Vallurupalli, Alyssa Valenti MD, William Magee, III MD, DDS, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Maxillofacial fractures in adults carry a risk for cervical spine injuries (CSI), yet this risk remains understudied in pediatric patients. This study examines injury mechanisms, treatment approaches, and CSI associations in pediatric maxillofacial fractures over two decades.

Methods: A retrospective review of patients under 18 with computed tomography-confirmed maxillofacial fractures from 2002 to 2024 was conducted. Inclusion criteria were nonsyndromic patients with fractures due to blunt trauma. Data on demographics, fracture types, injury mechanisms, CSI occurrence, and treatment were analyzed using chi-squared and T-tests.

Results: Of 2,401 patients, 395 met the inclusion criteria; 35.2% required surgery. The mean age was 11.6 years, with a male-to-female ratio of 3:1. Orbital fractures were most common (47.6%), followed by maxillary fractures (25.1%). Falls (27.8%) and assault (17.7%) were the leading causes. Patients with orbital fractures had a significantly higher CSI rate (3.2%) than those with other fracture types (0.57%, $p<0.05$). Orbital fractures also correlated with higher surgical intervention rates (39.9% vs. 28.9%, $p<0.05$).

Conclusions: Children with orbital fractures are at a notably higher risk for CSI than those with other maxillofacial fractures. This risk may result from unique pediatric biomechanics, specifically a higher upper-to-lower face ratio, potentially facilitating force transmission from the face to the cervical spine. Given the frequency of high-energy trauma in orbital fractures, careful cervical spine evaluation in these patients is essential to ensure comprehensive care and avoid missed injuries.

"Updated results and conclusions will be presented during the PSTM presentation."

A Cut Above: Enhanced Hemostasis in Endoscopic Strip Craniectomy Performed with a Diamond Burr Drill Bit Versus Conventional Instruments

Abstract Presenter: Aidan O'Shea

Abstract Co-Author(s): Keenan Fine, Emily Zona, Jessica Blum MD, Catharine Garland MD, Daniel Cho MD, PhD

PURPOSE: Endoscopically assisted surgery for craniosynostosis has emerged as a sophisticated alternative to open cranial vault remodeling, offering significant advantages particularly with respect to reduced blood loss and overall perioperative morbidity. However, intraoperative blood loss remains a significant concern even with minimally invasive repair. Herein we describe our experience with the novel technique of performing the endoscopic strip craniectomy using a diamond burr drill bit, which provides continuous hemostasis to the bone edges during cutting. Outcomes with the diamond burr (DB) are compared with those of procedures where the strip craniectomy was performed with traditional instrumentation (scissors, rongeurs, and/or non-diamond burr drill bit).

METHODS: A retrospective chart review was conducted of patients who underwent endoscopic strip craniectomy with two pediatric neurosurgeons at a single institution between 2012 and 2024 for the treatment of single-suture craniosynostosis. Instrumentation used to complete the craniectomy was documented alongside operative duration, incidence of durotomy, intraoperative blood loss, and intraoperative transfusion requirements. Postoperative transfusion requirements and postoperative complications were also noted.

Multivariable linear regression was conducted to compare DB procedures with traditional endoscopic procedures (control group) for outcomes of intraoperative blood loss, length of stay (LOS), operative time, and intraoperative volume transfused, while controlling for age, weight, and craniosynostosis type. Additionally, binary logistic regression, using the same covariates, was employed to compare DB procedures with traditional endoscopic procedures in assessing the likelihood of intraoperative transfusion, postoperative transfusion, durotomy, and persistent calvarial defect after one year.

RESULTS: A total of 83 patients met inclusion criteria, with the DB group comprising 68 patients and the control group comprising 15. The mean intraoperative blood loss for the DB group was 26.6 mL compared to 74.0 mL in the control group. Operative time in the DB group was 143.0 minutes versus 114.9 minutes in the control group. The incidence of intraoperative blood transfusion was 16.2% in the DB group and 53.3% in the control group.

In multivariable analysis, use of DB was associated with significantly less intraoperative blood loss (β=-48.5 mL, 95% CI -73.2 – -23.8 mL, p=0.0002) and a significantly lower odds of intraoperative blood transfusion (OR 0.142, 95% CI 0.037–0.509, p=0.0032). Use of DB was not significantly associated with odds of durotomy (p=0.648), postoperative blood transfusion (p=0.952), or persistent calvarial defect (p=0.252), nor

was it associated with a shorter LOS (p=0.677). Intraoperative transfusion volumes were slightly lower in the DB group, although this did not reach statistical significance (β=-60.7 mL, 95% CI -128.8–7.5 mL, p=0.076). Use of DB was associated with a slightly longer operative time (β=26.8 min, 95% CI 0.3–53.3 min, p=0.048). Two patients in the DB group experienced a wound breakdown requiring operative washout and antibiotics.

CONCLUSIONS: Performing strip craniectomy using a diamond burr results in significantly less intraoperative blood loss and significantly lower odds of requiring an intraoperative blood transfusion when compared to traditional endoscopic instrumentation. This technique is relatively easily implemented and stands to further enhance the known effect of endoscopic craniosynostosis repair on perioperative outcomes relative to open cranial vault remodeling.

From Prominent to Proportionate: Social Perceptions of Patients with Protruding Ears Undergoing Otoplasty

Abstract Presenter: Kendall Pitre

Abstract Co-Author(s): Clarice Swift, Michael Lebhar MD, Katherine Benedict MD, Laura Humphries MD, Ian Hoppe MD, Samantha Morin

Background: Otoplasty is a surgical procedure that corrects protruding ears, enhancing both functionality and aesthetics. Beyond physical appearance, this intervention may influence societal perceptions of a patient's attractiveness, personality traits, and interpersonal characteristics. This study examines social perceptions of pediatric patients following otoplasty.

Methods: Using Amazon Mechanical Turk, a RedCap survey was distributed to assess social perceptions of pre- and postoperative photographs of two patients who underwent otoplasty. Respondents rated patient images using a seven-point Likert scale across categories, including personality traits, expressed emotions, interpersonal attributes, and expected life experiences. Pre- and postoperative results were averaged for each patient, and paired t-tests ($p < 0.05$, 95% CI) determined significance.

Results: Among 998 responses, postoperative images were perceived more negatively. Patients appeared more submissive ($p < 0.000$), untrustworthy ($p < 0.009$), unattractive ($p < 0.041$, $p < 0.027$), surprised ($p < 0.008$), less happy ($p < 0.039$), and less fun ($p <$

0.010). They were also associated with loneliness ($p < 0.026$), anxiety ($p < 0.045$), and academic struggles ($p < 0.006$). Socioeconomic status perceptions were inconclusive, with one patient seen as having higher SES ($p < 0.027$) and the other lower SES ($p < 0.027$). Patient 1 was perceived as more successful postoperatively ($p < 0.000$), while Patient 2 appeared more dominant ($p < 0.009$).

Conclusion: This study highlights the psychosocial implications of otoplasty, emphasizing the need for preoperative education and expectation management for patients and families.

Development of a Clinical Workflow and Machine Learning Algorithm for Hypernasality Diagnosis Using CAPS-A-AM Rated Speech Samples in Pediatric Patients with Velopharyngeal Dysfunction

Abstract Presenter: Molly Macisaac

Abstract Co-Author(s): Jamilla Vieux, Chelsea Sommer, Joshua Wright
Ruth Bahr
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Introduction and Purpose: Velopharyngeal dysfunction (VPD), commonly associated with cleft palate, results in hypernasal speech that affects intelligibility and can lead to social stigmatization. Accurate diagnosis and classification of VPD are critical for determining whether a patient requires surgical intervention or would benefit from speech therapy alone. The gold standard for VPD assessment is perceptual speech evaluation by trained speech-language pathologists (SLPs) using the CAPS-A-AM (1). However, access to these specialists is limited in many centers. Recent efforts to incorporate machine learning (ML) into VPD diagnosis have relied on samples limited to isolated phonemes, internet speech samples, and crowd-sourced data (2). These models have not been trained on prospectively accrued and reproducibly rated speech samples. Our project aims to develop a clinically viable ML algorithm for VPD diagnosis based on CAPS-A-AM-rated, standardized speech samples, advancing beyond the approaches previously attempted.

Methods: This prospective, single-center study enrolled pediatric participants (ages 2–17) with and without VPD. Participants provided standardized speech samples recorded by an SLP following CAPS-A-AM protocols. Speech samples were independently rated by blinded and unblinded CAPS-A-AM-trained SLPs, with inter- and intra-rater reliability assessed. Mel spectrogram images of sustained vowels (/a/, /i/, /u/) were generated using Audacity, and acoustic features (jitter, shimmer, formant frequencies) were extracted using Praat. To enhance model performance, a pairwise comparison technique was applied to the Mel spectrogram images, increasing class separability. ML models were trained to differentiate hypernasal from normal speech using /i/ and /u/ spectrograms, as these vowels are the most sensitive to hypernasality detection. Performance was assessed using standard metrics, including accuracy and F1-score. Additionally, a large language model (ChatGPT-4.0) was tested as a classification tool for comparison.

Results: A total of 36 speech samples have been collected and processed (VPD: n=24, Control: n=12), with a median age of 8.1 years (range: 5.1–17.9) and an equal male-to-female distribution (18:18). All participants completed standardized speech tasks without exclusions. CAPS-A-AM ratings classified VPD participants as borderline (29%), mild (25%), moderate (21%), and severe (25%) hypernasality. No control participants had hypernasality scores above zero. ML models, trained on /i/ and /u/ Mel spectrogram images, achieved an F1-score of 0.97, significantly outperforming ChatGPT-4.0 (F1 = 0.44).

Conclusions: This study establishes a reproducible pipeline for standardized speech sample collection and demonstrates the feasibility of AI/ML for binary hypernasality classification. Future work will expand datasets through multi-center collaboration, integrate longer speech samples with richer acoustic features, and transition toward severity grading models to enhance clinical utility.

References:

1. Ruda JM, MD, Krakovitz P, MD, Rose AS, MD. A Review of the Evaluation and Management of Velopharyngeal Insufficiency in Children. Otolaryngologic clinics of North America. 2012;45(3):653-669. doi:10.1016/j.otc.2012.03.005W.-K. Chen, Linear Networks and Systems (Book style). Belmont, CA: Wadsworth, 1993, pp. 123–135.
2. Zhang A, Pyon RE, Chen K, Lin AY. Speech Analysis of Patients with Cleft Palate Using Artificial Intelligence Techniques: A Systematic Review. FACE. 2023;4(3):327-337. doi:10.1177/27325016231187985

Incision Approach Impacts Postoperative Complications in Mandibular Angle Fractures: A Multivariate Analysis

Abstract Presenter: Timothy Olsen

Abstract Co-Author(s): Keith Sweitzer MD, Raquel Arias-Camison, Carla Guedikian, Derek Bell MD

PURPOSE: This study evaluates how incision type (intraoral vs retromandibular) and patient characteristics influence postoperative complications following open reduction and internal fixation (ORIF) of mandibular angle fractures.

BACKGROUND: Mandibular angle fractures account for approximately 30% of mandibular fractures and pose unique challenges due to their anatomical location and high risk of complications such as infection, malocclusion, and hardware failure. (1) The optimal surgical approach remains debated; intraoral incisions minimize scarring and facilitate third molar extraction, whereas retromandibular approaches may offer shorter operative times. (2,3) However, comparative data on complication rates remain limited.

METHODS AND MATERIALS: A retrospective review of 116 patients with mandibular angle fractures treated with ORIF from January 2018 to April 2023 was conducted. Multivariate logistic regression assessed the impact of surgical approach while controlling for patient factors (age, BMI, smoking status, caries presence, number of fractures, and third molars). Postoperative complications served as the primary outcome stratified into infection, return to the operating room (RTOR), and postoperative third molar extractions.

RESULTS: The median age was 31.7 years (Interquartile Range [IQR] = 23.4–46.3), and BMI was 24.4 kg/m² (IQR = 21.9–27.8). Retromandibular incisions increased complication risk 11.2-fold versus intraoral (P = 0.022, 95% CI = 1.4–86.7), while combined approaches increased risk 3.6-fold (P = 0.030, 95% CI = 1.1–12.2). Among retromandibular subtypes, trocar use significantly increased complications (Odds Ratio [OR] = 5.11, P = 0.014, 95% CI = 1.9–14.0), whereas transparotid and retroparotid approaches were not significantly different from intraoral. Isolated angle fractures were protective (OR = 0.17, P = 0.023, 95% CI = 0.04–0.79). Age, BMI, smoking, and third molar extraction were not significant predictors. No significant predictors emerged for infection or RTOR, though older age and avoiding intraoperative third molar extraction

trended toward increased infection risk (P = 0.053) and decreased RTOR rates (P = 0.078).

CONCLUSIONS: Surgical approach significantly impacts complication rates in mandibular angle fracture repair. Retromandibular and combined incisions pose higher risks than intraoral approaches, with trocar use carrying the greatest risk. Patient factors appear to play a lesser role in outcomes than previously assumed. These findings underscore the importance of refining incision selection to optimize patient outcomes and reduce morbidity.

REFERENCES:
(1) Singh S, Fry RR, Joshi A, Sharma G, Singh S. Fractures of angle of mandible - A retrospective study. J Oral Biol Craniofac Res. 2012;2(3):154-158. doi:10.1016/j.jobcr.2012.10.001
(2) Ellis E III, Schubert W. Transoral approach to the angle. AO Surgery Reference. Published 2024. Accessed February 27, 2025
(3) Nam SM, Kim YB, Lee SJ, et al. A comparative study of intraoral versus retromandibular approach in the management of subcondylar fracture. BMC Surg. 2019;19:28. doi:10.1186/s12893-019-0487-7

Early Cranioplasty Improves Neurologic Recovery in Syndrome of the Trephined

Abstract Presenter: Ryan Enslow

Abstract Co-Author(s): Caroline Gillespie, Mia Panlilio, Abdulaziz Elemosho MD, Kerry-Ann Mitchell MD, PhD

BACKGROUND: Traumatic brain injury (TBI) and strokes account for over 1 million hospitalizations annually in the US. Decompressive craniectomy (DC) is a life-saving surgical procedure in which a segment of the skull is removed to alleviate elevated intracranial pressure in severe cases. However, this intervention can lead to a condition known as the Syndrome of the Trephined (SoT) or "Sinking Flap Syndrome", which is characterized by marked neurological dysfunction due to the large size skull defect. A defining feature of SoT is neurologic improvement following cranioplasty (CP). Optimal timing for cranioplasty remains uncertain in this patient population.

OBJECTIVE: To determine whether the timing of CP, early (≤3 months) versus delayed (>3 months), can influence neurological outcomes in patients with Syndrome of the Trephined (SoT).

METHODS: Following PRISMA guidelines, we conducted electronic searches across PubMed, Embase, Cochrane, Web of Science, and PsycINFO to identify studies evaluating neurologic outcomes in SoT patients based on CP timing. All study types, including case reports and case studies, were included. Eligible studies reported on patients of all ages diagnosed with SoT or demonstrating neurologic improvement following CP, with documented timing of symptom resolution. Non-English articles, non-human studies, cases involving external CP, and duplicate articles were excluded.

RESULTS: Among 514 articles reviewed, 85 met inclusion criteria, with 201 patients undergoing early and 347 delayed CP. Early CP was primarily performed for hemorrhage (51.2%), trauma (33.8%), and stroke (16.4%), while delayed CP was most often indicated for trauma (59.1%), stroke (16.4%), and hemorrhage (13.3%). Patients in the early group most commonly presented with altered consciousness (60.5%), motor deficits (14.9%), and cognitive deficits (10.7%), whereas the delayed group primarily exhibited motor deficits (36.1%), cognitive deficits (17.1%), and altered consciousness (10%). Interestingly, early CP led to significantly higher rates of symptom improvement, with altered consciousness (100% vs. 71.7%), motor deficits (95.2% vs. 75.4%), and cognitive deficits (100% vs. 81%) showing enhanced recovery rates compared to delayed CP ($p<0.001$, $p<0.001$, $p<0.02$, respectively). Overall improvement rates of these symptoms were significantly higher in the early group (98.9%) than in the delayed group (82.1%, $p<0.05$).

CONCLUSION: Our findings indicate that early cranioplasty is associated with significantly higher symptom improvement rates in SoT patients compared to delayed cranioplasty. However, the retrospective nature of the included studies introduces variability, and differences in surgical indications-such as the higher prevalence of TBI in delayed cranioplasty cases-may confound the results. Further randomized controlled trials are needed to validate these findings and establish the optimal timing for cranioplasty.

Comparison of Complication Rates for Head and Neck Reconstructive Surgery Between Medication Related Osteonecrosis of the Jaw, Osteoradionecrosis, Benign Lesions, and Malignant Cancers

Abstract Presenter: Austin Lignieres MD

Abstract Co-Author(s):Edward Facundus, Ron Mccall III, Kendall Pitre, Holman Taylor, John Phillips, Adam Fleming, Ashlie Elver MD, Benjamin McIntyre MD, Laura Humphries MD

Background: Current findings show that medication-related osteonecrosis of the jaw (MRONJ) and osteoradionecrosis (ORN) have higher postoperative complication rates than benign lesions following reconstruction. Although malignant cancer reconstruction surgeries also carry risks, MRONJ and ORN often result in more severe, chronic complications. This study examines complication rates following head and neck (H&N) reconstruction across these disease processes.

Methods: A retrospective review identified patients who underwent H&N reconstruction at a single institution from 2016 to 2024. Patients were categorized by disease type: Cancer, Benign Lesion, ORN, MRONJ, or other. Demographic data, including race, age, and social vulnerability index (SVI) quartile, were collected. Mean complication rates were analyzed for total, within 30 days post-op, and beyond 30 days post-op. ANOVA and post-hoc tests were used to assess significance ($p<0.05$).

Results: Among 121 patients, disease cohorts included: cancer (60.33%, n=73), benign lesions (20.66%, n=25), ORN (3.30%, n=4), MRONJ (5.79%, n=7), and Other (9.92%, n=12). Complication rates beyond 30 days post-op were SVI 1 (39%), SVI 2 (36%), SVI 3 (18%), and SVI 4 (59%) ($p=0.014$). Significant differences were found between SVI 3 and SVI 4 ($p=0.007$).

Conclusion: There were no significant differences in complication rates between disease types. SVI 4 patients may experience more complications due to poorer living conditions and healthcare access, while SVI 3 patients might have lower complication rates due to loss to follow-up. These findings highlight the importance of considering patient population factors post-operatively to optimize outcomes.

Assessing Dynamic Smile Outcomes in Pediatric Facial Palsy: An Image-Based Approach After Free Gracilis Muscle Transfer

Abstract Presenter: Anika Kim

Abstract Co-Author(s): Asli Pekcan, Raina Patel, Valeria Mejia, William Magee, III MD, DDS, Mark Urata MD, Jeffrey Hammoudeh MD, Melanie Bakovic

Background: Facial nerve palsy in children leads to significant functional impairment and facial asymmetry. While free gracilis muscle transfer (FGMT) is a cornerstone technique for smile reanimation in both pediatric and adult patients, its evaluation has mainly focused on the single metric of commissure excursion. This study uses machine learning-based image analysis for a comprehensive assessment of FGMT's effectiveness in restoring dynamic smiles in children with facial palsy.

Methods: A retrospective review was conducted in children who underwent FGMT for facial palsy at a major children's hospital between 2007 and 2020. Data collection included pre- and post-operative chart reviews and image analysis. Anthropometric measurements were obtained by a single reviewer using an artificial intelligence-based smile analysis software. Primary outcomes included commissure excursion, commissure angle, dental show, and smile symmetry. Statistical analysis was performed using Wilcoxon sign-rank test.

Results: A total of 31 patients with an average age of 10 years underwent FGMT for smile reanimation during the study period. The most common diagnosis was Moebius Syndrome (48%). Donor nerves for gracilis neurotization included 18 ipsilateral trigeminal nerves (58.1%) and 12 contralateral facial nerves via cross-face sural nerve grafts (38.7%). Overall, 84% of patients demonstrated active gracilis contraction within a mean of 2.5 years postoperative follow up. Commissure excursion increased by 9.7 mm at one year ($p<0.05$) and symmetry significantly improved for commissure height, commissure excursion, upper lip height and smile angle. There were no significant improvements in dental show, commissure angle, and symmetry of dental show and lower lip height. Furthermore, only 16% of patients demonstrated symmetric smiles within the follow up period.

Conclusion: While FGMT effectively restores commissure excursion in pediatric patients with facial palsy, achieving multidimensional smile reanimation remains a challenge. New techniques in multi-vector free tissue transfer and a better understanding of postoperative smile rehabilitation may help optimize FGMT outcomes in pediatric patients.

Quantitative Evaluation of Temporalis Muscle Atrophy and Temporal Hollowing Following Decompressive Hemicraniectomy

Abstract Presenter: Fiona Griffin MS

Abstract Co-Author(s): Margaret Wang, Ali Mansour, Nidhi Shinde, Albert Woo MD

Introduction: Temporal hollowing and muscle atrophy are common sequelae following decompressive hemicraniectomy (DHC), which typically involves intraoperative transection of the temporalis muscle to achieve access. These changes may compromise craniofacial aesthetics and necessitate subsequent reconstruction. This study quantifies volume and morphological changes of the temporalis muscle using postoperative CT imaging. These measurements are essential for surgical planning and improving patient education regarding expected outcomes.

Methods: We conducted a retrospective study on adult patients at our institution who underwent DHC and had preoperative and at least six-month postoperative CT imaging between January 2005 to December 2019. Temporalis muscle dimensions (volume, surface area, length, and height) were measured and compared between operative and nonoperative sides using 3D Slicer. Flatness and elongation, denoting muscle flattening and stretching, respectively, were included for clinical relevance. Statistical analyses were performed and adjusted for confounders including age, sex, smoking status, and medical comorbidities.

Results: One hundred patients met inclusion criteria. The cohort consisted of 44 females and 56 males. Smoking history varied among participants, with 18% identified as current smokers, 34% as former smokers, and 48% as never having smoked. Hypertension was present in 46% of patients, while 11% had diabetes. Twenty-two percent of patients had associated facial fractures, and 23% had skull fractures. The mean age at DHC was 45.8 ± 16.5 years. The most common indication for DHC was cerebrovascular events (52%), followed by trauma (44%), and infection (4%). Patients were categorized into two primary groups based on DHC indication: cerebrovascular etiology (ischemic stroke, hemorrhagic stroke) and trauma (blunt and penetrating head injuries). Due to limited sample size, patients with infection-related DHC were excluded from sub-analyses.
Notably, 100% of patients exhibited temporal hollowing on follow-up imaging. The mean decrease in temporalis muscle volume was 13.01 cm^3 (SD = 8.36 cm^3). The average time between DHC and cranioplasty was 141 ± 630 days, while the average time between cranioplasty and CT imaging was 435 ± 618 days. Additionally, 71% of patients required reoperation for plastic surgery indication (23%). Significant changes were

observed on the operative side compared to the nonoperative control. Muscle volume decreased by 36.6% ($p < 0.001$), surface area by 39.0% ($p < 0.001$), and flatness by 16.6% ($p < 0.001$). Elongation decreased by 5.03% ($p < 0.05$), length by 26.9% ($p < 0.001$), and height by 29.5% ($p < 0.001$). Height above the zygomatic process, a marker of temporal hollowing, was reduced by 42.7% ($p < 0.001$).
Additionally, we examined the relationship between temporalis muscle atrophy and surgical factors. There was no significant difference in mean atrophy severity between patients with and without complications ($p=0.133$). Similarly, no significant association was found between indication for DHC and degree of muscle atrophy ($p=0.413$).

Conclusion: Our findings reveal profound morphometric changes in the temporalis muscle following DHC which significantly impact facial symmetry. Given that all patients exhibited temporal hollowing postoperatively, this study underscores the need for improved patient education regarding aesthetic and functional outcomes. Further research should explore surgical modifications to improve post-DHC craniofacial aesthetics.

Predictors of No-Show After Facial Trauma: The Effect of a Comprehensive Social Services Program

Abstract Presenter: Maeson Zietowski

Abstract Co-Author(s): Rebeka Dejenie, Russell Reid MD, PhD

Purpose: Patients who have undergone traumatic injury are at increased risk for readmission or re-presentation to emergency departments. Additionally, documented follow up rates are low after traumatic injury (1). To address possible socioeconomic and systemic barriers a comprehensive social services program – the Violence Recovery Program (VRP) was implemented at a level 1 trauma center. Program specialists are trained to provide social support, case management, and psychological services. In this study, we aim to investigate the impact of this program on no-show rate after facial trauma.

Methods: A retrospective review of facial trauma patients consulted to plastic surgery at a level 1 trauma center was performed. Two cohorts were identified: 1) A 2018 low-VRP cohort (May 2018 to October 2018)) and 2) A 2024 high-VRP cohort (January 2024 to June 2024). The low-VRP cohort was defined as the first 6 months the level 1 trauma

center was established, when the VRP program was initiated in a limited capacity. The high-VRP cohort consists of the most recent months, when the VRP program was operating at full capacity. Data collected included VRP intervention and patient demographics including insurance status and injury mechanism. Univariate analysis was performed to assess differences between the 2018 and 2024 cohorts in demographics, VRP involvement, and no-show rate. Additionally, univariate analysis was performed on the combined cohort to determine associations between VRP involvement and no-show rate. Logistic regression analysis was conducted on the combined cohort.

Results: Overall, 204 patients were included in the 2024 cohort and 139 in the 2018 cohort. There was a significantly higher rate of no-show in the 2018 cohort (n=42, 30.2%) compared to the 2024 cohort (n=32, 15.7%) (OR: 2.32, p=0.001). There was also significantly higher VRP intervention in the 2024 cohort (n=82, 40.2%) than the 2018 cohort (n=4, 2.9%) (OR: 22.73, p<0.001). Patient demographics were similar between cohorts with no significant differences in race (p=0.057), age (p=0.157), gender (p=0.317), or proportion of violent (assault, ballistic) injury (p=0.483). However, there was a significant difference in insurance providers between cohorts (p<0.001) as well as significant association between no-show rate and gender (p=0.009) within the 2024 cohort. All other patient information was not significantly associated with no-show rate in either cohort. When pooling the 2024 and 2018 cohorts, VRP intervention was significantly associated with clinic attendance (OR: 1.96, p=0.047). Logistic regression using the combined cohort identified VRP intervention as an independent predictor of higher clinic attendance (OR: 2.50, p=0.015). Insurance status and gender were not significant after regression analysis.

Conclusions: The integration of a comprehensive social services program is associated with decreased no-show rates after facial trauma. Our data shows that VRP involvement remained a predictor of increased plastic surgery clinic attendance, highlighting the potential impact of social support services on patient engagement. Future studies should explore the specific mechanisms by which this multifaceted program influences patient adherence.

Reference:
1. Shilati FM, Silver CM, Baskaran A, et al. Transitional care programs for trauma patients: A scoping review. Surgery. 2023;174(4):1001-1007. doi:10.1016/j.surg.2023.06.038

Midline Cleft Lip: Clinical Insights and Surgical Outcomes

Abstract Presenter: Raina Patel

Abstract Co-Author(s): Asli Pekcan, Valeria Mejia, Melanie Bakovic, Marvee Turk MD, William Magee, III MD, DDS, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Midline cleft lip (MCL) is an extremely rare congenital anomaly, with an estimated incidence of less than 1% of all patients with cleft lip and palate. Although its precise origin is unknown, it is thought to occur as a result of incomplete merging of the medial nasal prominences. There are very few reported cases characterizing MCL in the literature. Our study seeks to offer further information on MCL and its associated anomalies, as well as various techniques for effective surgical repair.

Methods: A retrospective review was conducted of all patients evaluated by the Plastic and Reconstructive Surgery department at a tertiary children's hospital for repair of MCL from 2005-2023. Data collected included cleft phenotype, associated comorbidities, operative metrics, and perioperative outcomes.

Results: Our review identified 20 patients, 70% female and 30% male. Of this cohort, 20% were born prematurely. and 20% were diagnosed with a craniofacial syndrome, these being oro-facial-digital syndrome in three patients and craniofrontonasal dysplasia in one patient. 40% had isolated cleft lip while 60% had cleft lip and palate. In terms of associated anomalies, central nervous system anomalies were the most prevalent. Half of the cohort had agenesis or dysgenesis of the corpus callosum, 30% had holoprosencephaly, and 15% had encephalocele. Only three patients had no associated comorbidities. One patient expired prior to surgery. The median age at repair was 6.4 months (IQR: 3.5-15 months). Mean follow-up time after repair was 10.4±5.5 years. Surgical techniques employed involved wedge excision of redundant midline tissue with straight line approximation of cleft margins±incorporation of triangular flaps, release of aberrant oribicularis oris attachments from bilateral maxilla, and gingivobuccal sulcus release with supraperiosteal dissectio for mobilization. There were no intraoperative complications. Postoperatively, two patients developed infections and one patient developed hemangioma. 25% of patients required revision surgery; indications included: scar revision, vermillion asymmetry, constricted nasal orifices, and wound debridement.

Conclusion: This study highlights the rarity of MCL and its frequent association with significant comorbidities, particularly central nervous system disorders. The favorable safety profile of the surgical techniques used is notable; however, the 25% revision rate

suggests a need for continued evaluation and refinement of postoperative outcomes. Future research should focus on establishing standardized care protocols for these patients.

Which Factors Predict Clearance for Surgery in Patients Aged 0-5 Treated by a Cleft-focused NGO?

Abstract Presenter: Alexander Plonkowski MD

Abstract Co-Author(s): Rachel Donaldson, Priyanka Naidu MD, Marvee Turk MD, Caroline Yao MD, xWilliam Magee, III MD, DDS

Introduction: As one of the most common congenital anomalies, cleft lip and palate (CLP) contribute significantly to the global surgical burden, particularly in low- and middle-income countries. Access to timely and safe surgical intervention is critical for improving patient outcomes, yet access to care remains limited. While prior research has explored barriers to surgical access and predictors of post-operative complications for patients with cleft lip and palate globally, few studies have investigated factors impacting preoperative surgical clearance. This study aims to identify patient characteristics associated with surgical clearance in pediatric patients treated by a cleft-focused NGO.

Methods: A retrospective review was conducted of patients presenting for primary cleft repair within a major global cleft organization between 2022-2024. Patients were included if they were 5 years of age or below at time of assessment, had complete health records, and had a surgical indication of primary CLP repair. Patients with incomplete data or with surgical indication other than primary cleft repair were excluded. Health records were reviewed for patient demographics, country of origin income classification, nutritional status, and past medical history of all systems. Nutritional status was quantified using Z-Scores. The primary outcome of interest was clearance for surgery as determined by an examining pediatrician. Statistical analysis was performed using Chi-Square or T-tests as appropriate, significant variables were included in logistic regression models.

Results: In total, 1,270 patients with CLP were included, of which 758 (58.1%) were male and 532 (41.9%) were females. The most common countries of origin were Honduras (n = 299, 23.5%), Paraguay (n = 160, 12.6%), Guatemala (n = 150, 11.8%),

and Morocco (n = 143, 11.3%). The overall number of patients cleared for cleft surgery was 1,103 (86.9%). On multivariate regression patients from both low-income countries (OR = 0.35 [0.21, 0.58], p = 0.002) and low-middle incomes countries (OR = 0.54 [0.40, 0.73], p = 0.002) had decreased odds of surgical clearance than patients from upper-middle-income or high-income countries. Patients with greater Z-scores had increased odds of surgical clearance (OR = 1.26 [1.10, 1.43], p < 0.001). Additionally, patients with past medical history of any hematological (OR = 0.27 [0.14, 0.54], p = 0.002) or respiratory (OR = 0.09 [0.05, 0.17], p < 0.001) pathology had significantly decreased odds of surgical clearance.

Conclusion: Preoperative clearance serves as a critical checkpoint ensuring safety before cleft surgery; however, it may also represent an additional barrier to surgical access for families who have already overcome significant challenges to reach care. Predictive factors associated with surgical non-clearance in pediatric patients seeking CLP repair highlight potential targets for preoperative education, medical optimization, and resource allocation to improve access for patients seeking safe and timely surgery. Further work aiming to understand the reason low-income and low-middle income status are predictive factors for surgical non-clearance is necessary, as these countries bear the greatest burden of untreated surgical disease.

References:
1. Fletke KJ, Kaysin A, Jones S. Preoperative Evaluation in Children. Am Fam Physician. 2022;105(6):640-649.
2. Goldschneider KR, Cravero JP, Anderson C, et al. The Pediatrician's Role in the Evaluation and Preparation of Pediatric Patients Undergoing Anesthesia. Pediatrics. 2013; 134(3): 634-641. 10.1542/peds.2014-1840
3. Kantar RS, Hamdan US, Muller JN, et al. Global Prevalence and Burden of Orofacial Clefts: A Systematic Analysis for the Global Burden of Disease Study 2019. J Craniofac Surg. 2023; 34(7): 2012-2015. doi:10.1097/SCS.0000000000009591
4. Plonkowski AT, Naidu P, Davis GL, Etemad S, Otobo DD, Dwyer AM, Yao CA, Magee WP 3rd. Barriers to timely primary cleft surgery in patients treated by an international cleft-focused NGO across 18 countries. World J Surg. 2025 Feb 17. doi: 10.1002/wjs.12469. Epub ahead of print. PMID: 39961773.
5. Swanson MA, Auslander A, Morales T, et al. Predictors of Complication Following Cleft Lip and Palate Surgery in a Low-Resource Setting: A Prospective Outcomes Study in Nicaragua. Cleft Palate Craniofac J. 2022;59(12):1452-1460. doi:10.1177/10556656211046810

Neurocognitive and Psychiatric Outcomes in Pediatric Craniosynostosis: Insights for Plastic Surgery from a Retrospective Risk Analysis

Abstract Presenter: Viraj Govani

Abstract Co-Author(s): Mary Wilding, Janina Kueper MD, Aileen Cui, Tobi Somorin, Siri Ravuri, Ashley Rogers MD, Jesse Goldstein MD

Purpose: Despite advances in surgical techniques, the impact of craniosynostosis on neurodevelopmental outcomes in pediatric patients remains a significant concern, particularly in those with coexisting neuropsychiatric diagnoses (Peck 2022). This study aims to explore the neuropsychiatric outcomes and potential risk factors in pediatric patients diagnosed with craniosynostosis.

Methods: We retrospectively reviewed patients with craniosynostosis at UPMC Children's Hospital (March 2003 to September 2023), examining demographics, clinical presentation, neurocognitive diagnoses, surgeries, and patient outcomes. Descriptive statistics, chi-square tests, t-tests, and logistic regressions were performed using STATA, with significance set at $p<0.05$.

Results: An analysis was conducted on a cohort of 719 pediatric patients with craniosynostosis with an average duration of follow-up of 5.68 ± 3.99 years. Among our patients, 64.3% were male and 83.0% were Caucasian, with a mean age at diagnosis of 36.77 ± 43.61 months. Furthermore, 132 patients were eventually diagnosed with neurocognitive and psychiatric disorders. These patients had a mean Pediatrics Symptom Checklist score of 17.68±9.24, General Anxiety Disorder-7 score of 6.78±8.11, and Patient Health Questionnaire-9 score of 5.32±6.10.

Patients who developed neurocognitive and psychiatric outcomes were diagnosed with craniosynostosis at a later age ([57.62 ± 44.56] vs. [30.10 ± 41.21]; $p<0.001$), were older at their initial PRS visit ([48.63 ± 40.75] vs. [29.15 ± 41.21]; $p<0.001$), and had a longer follow-up duration in PRS ([81.70 ± 54.71] vs. [57.73 ± 47.58]; $p=0.002$) compared to those without such outcomes. Patients with squamosal and lambdoid craniosynostosis were significantly more likely to develop developmental delay ($p=0.013$), and patients with squamosal craniosynostosis were significantly more likely to develop autism spectrum disorder (ASD) ($p=0.042$). In addition, patients with sagittal craniosynostosis had significantly higher Autism Diagnostic Observation Schedule (ADOS) Comparison Scores compared to other types of craniosynostosis. Each additional month of age at the time of diagnosis significantly raised the odds of having

ASD by approximately 1.08% ($p=0.002$), ADHD by approximately 1.42% ($p<0.001$), learning disorders by approximately 1.97% ($p<0.001$), and developmental delay by approximately 1.26% ($p<0.001$). Similar analysis looking at the age at surgical intervention did not yield significant results.

Conclusions: This study underscores the critical importance of early diagnosis and characterization of craniosynostosis, as delayed detection was associated with increased rates of ASD, ADHD, developmental delay, and learning disorders. These associations highlight the intricate and interconnected relationship between craniosynostosis and the subsequent development of comorbid psychiatric and neurocognitive conditions in pediatric patients. Given the significant impact of age at diagnosis on neurodevelopmental outcomes, early screening and intervention may help mitigate long-term cognitive and behavioral challenges. Future research should explore the underlying mechanisms driving these associations and evaluate targeted interventions to improve patient outcomes.

References:
1. Peck CJ, Junn A, Park KE, et al. Longitudinal Outpatient and School-Based Service Use among Children with Nonsyndromic Craniosynostosis. Plastic & Reconstructive Surgery. Published online September 20, 2022. doi:https://doi.org/10.1097/prs.0000000000009678

Optimizing Free Tissue Transfer for Pediatric Scalp Reconstruction: A Systematic Review of Donor Site Selection

Abstract Presenter: Diego Gomez

Abstract Co-Author(s): Emily Cooper MS, Celia Ernstrom, Skyler Palmer, David Mathes MD, Timothy Irwin MD, Brooke French MD, David Khechoyan MD, Phuong Nguyen MD, Jason Yu DMD, MD

Purpose: Microvascular free tissue transfer represents the most advanced reconstructive modality for extensive scalp defects. In pediatric patients, this approach presents unique technical challenges, including limited donor site availability due to a high skull-to-body ratio, concerns regarding donor site morbidity and long-term effects on growth, and a smaller vessel caliber with increased risk of vasospasm. This study systematically reviews the literature on free tissue transfer for scalp reconstruction in

pediatric patients to assess safety, compare outcomes across different flap types, and determine optimal donor site selection.

Methods: A systematic review of the available literature was conducted following PRISMA guidelines. Studies reporting on pediatric (0–17 years of age) free flap scalp reconstruction were included. Scalp replantations and pedicled flaps were excluded. Extracted variables included patient demographics, surgical characteristics, and postoperative outcomes. Statistical analyses were performed to evaluate complication rates and flap-specific performance.

Results: A total of 34 studies comprising 105 pediatric patients (107 free flaps) met inclusion criteria. Mean patient age was 8.5 ± 4.58 years (male, 66.3%; female, 33.7%; not reported, 6.7%). Trauma and burns accounted for most scalp defects (73.3%), followed by malignancy (14.3%), infection (7.6%), and congenital anomalies (4.8%). The mean defect size was 246 ± 164 cm^2. The most frequently utilized donor sites were the anterolateral thigh (ALT, 43.8%) and latissimus dorsi (LD, 36.2%), followed by the scalp (4.8%) and groin (3.8%). Younger children (0-6) were more likely to receive ALT flaps (68.4%), while 7–12-year-olds were more likely to receive LD flaps (70%; $p<0.001$).

Overall, 19% of patients experienced at least one complication (22 total complications), of which 63.6% were minor and 36.4% were major. Flap-related complications comprised 81.8% of all complications. Neither patient age nor defect etiology was associated with increased complication risk. Compared to other flap types (excluding LD), ALT flaps had a significantly lower complication rate (OR 0.093; CI 0.0183–0.365; $p<0.001$). However, in cases where complications occurred, ALT flaps were associated with a higher proportion of flap-related complications compared to LD flaps (100% vs. 70%; $p<0.001$). Muscle-sparing flaps exhibited a 64% higher, albeit statistically insignificant, odds of complication compared to muscle-containing flaps.

Conclusions: Microvascular free tissue transfer is a safe and effective reconstructive approach for pediatric scalp defects across all age groups, demonstrating high flap survival despite anatomical and technical challenges. The ALT and LD flaps remain the preferred options, with the LD flap demonstrating a lower rate of flap-related complications. Flaps other than ALT and LD were associated with a significantly higher complication rate, underscoring the importance of individualized flap selection to optimize reconstructive outcomes in pediatric patients.

Three-Dimensional Cephalometric Growth Patterns of Pediatric Mandibular Development

Abstract Presenter: Bernice Yu MD

Abstract Co-Author(s): Kaan Oral, Bradley Delman, Peter Taub MD, Reanna Shah

Introduction: Advancements in three-dimensional (3D) reconstruction have significantly contributed to our understanding of mandibular growth and development. While previous research has primarily focused on congenital deformities and orthodontic applications, the normal developmental trajectory of the mandible in early infancy remains underexplored. The present study addresses this gap by analyzing mandibular development patterns in pediatric patients from birth to 12 months using 3D cephalometric measurements.

Methods: A retrospective chart review of patients undergoing computed tomography (CT) facial bone, spine, or neck from 2000 to 2023 was conducted. The inclusion criteria included patients between 0-12 months and CT scans with complete visibility of the mandible. The population excluded patients undergoing CT imaging for a known or suspected mandibular abnormality (developmental or post-traumatic) as well as patients with reported syndromic diagnosis at the time of imaging. Three-dimensional mandibular models were reconstructed using the open-source software 3D Slicer 5.6.1 (https://slicer.org/) and marked with 24 cephalometric landmarks to calculate 12 bilateral and 4 trans-mandibular measurements, including gonial angle, mandibular body length, ramus length, mandibular notch width, notch angle, condylar surface area, alveolar ridge surface area, bicondylar width, mandibular basal width bigonial, mandibular basal width bi-antegonial, and coronoid process and condylar height, width, and length. Statistical t-tests assessed associations, with statistical significance set at $p<0.05$.

Results: Of 77 patients analyzed, nine (12%) were neonates (0-28 days), fourteen (18%) were 1-3 months old, twenty (26%) were 3-6 months old, twenty (26%) were 6-9 months old, and fourteen (18%) were 9-12 months old. The largest growth was observed in condylar surface area with 91.7% increase from 0.284±0.06 cm^2 in neonates to 0.543±0.11 cm^2 in the 9-12-month cohort, followed by condyle length with an 84.8% increase from 7.29±0.66 mm to 13.5±1.86 mm, ramus length at 54.4% increase from 21.16±2.05 mm to 33.52±2.94 mm, and coronoid process length (42.8% increase from 6.68±0.55 mm to 9.54±0.87 mm). All growth changes stated were statistically significant with $p<0.001$. Alveolar ridge surface area increased substantially, from 3.50±0.43 cm^2 in neonates to 4.80±0.43 cm^2 in those aged 9-12 months.

Additionally, the mental angle was significantly smaller (p=0.02) in the 9-12 month population (80.98±4.99 degrees) than neonates (88.25±7.31 degrees). Curves between the 6-9 month and 9-12 month populations were flat, suggesting the infant phase of mandibular growth is complete by 9 months.

Conclusion: The present study demonstrates significant growth patterns in healthy pediatric patients with most notable increases in the condylar surface area, condylar length, ramus length, and alveolar ridge development. These findings highlight the dynamic nature of mandibular maturation during infancy, emphasizing the role of the condyle and ramus in early mandibular elongation. The results provide valuable baseline data for understanding normal growth patterns, which may aid in the early detection of developmental anomalies and contribute to clinical applications in pediatric craniofacial care.

Investigating the Effects of Sociodemographic Factors on Timing of Care in Patients with Craniosynostosis

Abstract Presenter: Anitesh Bajaj

Abstract Co-Author(s): Kathryn Reisner, Jason Zhang, Taylor Hallman MD, Mech Frazie, Umer Qureshi, Parul Rai, Emily George MD, Gabrielle Rodriguez MD, Arun Gosain MD

Purpose: Prior research has found that delayed referral to a specialist is linked to worsened surgical and long-term neurologic outcomes in patients with craniosynostosis (1, 2). Therefore, the present study aimed to investigate the interplay between neighborhood-level factors, age at initial clinic presentation, and age at surgical repair in patients undergoing craniosynostosis.

Methods: A retrospective chart review of patients with craniosynostosis who underwent surgical repair at our institution from 2007-2023 was conducted. Patient race, ethnicity, primary language, insurance status, operative time, length of stay, complications, suture type, and repair type were collected. Patient geographic information was extracted to perform geospatial analyses involving neighborhood disadvantage.

Specifically, three metrics of neighborhood disadvantage were used: Area Deprivation Index (ADI), Social Vulnerability Index (SVI), and Child Opportunity Index (COI). Tertiles

based on these metrics were established to compare age at initial clinic presentation, age at repair, and delays in clinic presentation/repair (over 9 and 12 months, respectively) with tertile 1 indicating the least disadvantaged for ADI/SVI but the most disadvantaged for COI. Bivariate analyses and multivariate logistic regression models were used for comparisons.

Results: Overall, 388 patients were included. Across tertiles, there were significant differences in distribution of race, ethnicity, and insurance status along with differences in postoperative infection rates ($p<0.05$). Compared to the most disadvantaged tertiles across the three indices (ADI, SVI, COI), the least disadvantaged tertile had significantly earlier age at surgical repair and age at clinic representation ($p<0.05$). There was a stepwise increased frequency of delayed repair and clinic presentation across tertiles in all indices ($p<0.05$). On multivariate analysis, ADI tertile 3 (OR: 2.90, $p=0.043$) was associated with higher odds of delayed surgical repair whereas COI tertile 3 (OR: 0.37, $p=0.032$) was associated with lower odds. In addition, private insurance was shown to independently decrease the odds of both delayed initial presentation to clinic and delayed surgical repair ($p<0.05$).

Conclusions: Overall, our study found that neighborhood level disadvantage was significantly associated with later timing of both initial clinic visit and surgical repair in craniosynostosis patients. Therefore, efforts should be made to facilitate timely referrals for patients and address systemic barriers to care that disproportionately affect patients from disadvantaged areas.

References

1. Bruce WJ, Chang V, Joyce CJ, Cobb AN, Maduekwe UI, Patel PA. Age at Time of Craniosynostosis Repair Predicts Increased Complication Rate. Cleft Palate Craniofac J. 2018;55(5):649-654. doi:10.1177/1055665617725215

2. Patel A, Yang JF, Hashim PW, et al. The impact of age at surgery on long-term neuropsychological outcomes in sagittal craniosynostosis. Plast Reconstr Surg. 2014;134(4):608e-617e. doi:10.1097/PRS.0000000000000511

Crafting Smiles: The Enduring Impact of Early Cleft Lip Repair on Patient Outcomes

Abstract Presenter: Raina Patel

Abstract Co-Author(s): Valeria Mejia, Melanie Bakovic, Asli Pekcan, Marvee Turk MD, Alyssa Valenti MD, William Magee, III MD, DDS, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Early cleft lip repair (ECLR) leverages the natural plasticity of neonates from maternal estrogen to reshape the cleft and nose. Our institution has demonstrated short-term aesthetic and functional success in 300 patients, but long-term results remain unexplored. This study evaluates the long-term outcomes of ECLR.

Methods: A retrospective review was conducted of nonsyndromic patients with unilateral cleft lip±palate (UCL/P) undergoing lip repair before three months of age from 2015 to 2024. Patients were excluded if they had less than five years of follow-up. Demographic, preoperative, and postoperative data were collected, along with anthropometric measurements from frontal and basal images.

Results: Of the 133 patients who met inclusion criteria, 57 had suitable images for analysis. The mean gestational age at surgery was 37±18.4 days, and mean follow-up time was 7.3±1.3 years. Comparing preoperative to postoperative ratios, ECLR demonstrated significant improvements in commissure length ($p<0.001$), nostril breadth ($p<0.001$), and nostril width ($p<0.001$). Compared to traditional lip repair with nasoalveolar molding (TLR+NAM), the ECLR cohort had a similar cleft width ratio (0.49 vs. 0.42; $p=0.41$), while showing equivalent improvements in medial lip height ($p=0.79$), lateral lip height ($p=0.21$), and lateral lip length ($p=0.74$).

Conclusion: Early cleft lip repair (ECLR) enhances aesthetic outcomes while maintaining similar cleft width ratios compared to traditional repair (TLR+NAM). These results underscore the long-term benefits of ECLR as a superior approach for managing unilateral cleft lip±palate.

Long-Term Stability of Patient-Specific 3D-Printed Titanium Fixation Plates in LeFort I Osteotomy

Abstract Presenter: Helen Zhou

Abstract Co-Author(s): Nicholas Han, Philip Tolley MD, Isabel Ryan BS, Allison Hu MD, Lawrence Levin, Joseph Napoli MD, DDS, Scott Paul Bartlett MD, Jordan Swanson MD, MSc, Jesse Taylor MD

Purpose: While the stability of LeFort I osteotomies has long been demonstrated, there is less well documented data evaluating the long-term outcomes of custom 3D-printed titanium fixation plates. With the increasing adoption of virtual surgical planning (VSP) and CAD/CAM technology, patient-specific implants are becoming more prevalent in orthognathic surgery. This study investigates the long-term stability of patient-specific 3D-printed titanium plates in LeFort I orthognathic surgery.

Methods: A retrospective review was conducted of all patients who underwent LeFort I osteotomy using patient-specific 3D-printed titanium fixation plates at our institution between July 2015 and August 2023. Patients were included if they had available preoperative, immediate postoperative (<30 days post-op), and long-term postoperative (>360 days post-op) CT scans or lateral cephalograms. Patients who underwent additional surgical interventions between imaging time points were excluded. Cephalometric analysis was performed using Dolphin Imaging Software (Version 12.0.63).

Results: A total of 58 patients met the inclusion criteria, with a mean age of 18.8 years at surgery. Nineteen patients (32.8%) had a cleft-related diagnosis. Preoperative occlusion included 38 (65.6%) Class III cases, 15 (25.9%) Class II cases, and 5 (8.6%) Class I cases with an associated cant, crossbite, or vertical maxillary hyperplasia. Nineteen patients (32.8%) had a congenital syndrome. Average interval between operation and long-term imaging was 602 days (SD 424 days). The mean preoperative SNA was 79.1 degrees, increasing to 86.3 degrees immediately postoperatively and measuring 84.9 degrees at long-term follow-up, with statistically significant differences between all three time points ($p<0.0001$). This resulted in the mean increase in SNA being 7.2 degrees (SD 3.8), with an average long-term relapse rate of 22.2% (SD 17.2%). Despite this relapse, 86.2% (n=50 of 58) of patients remained in Class I occlusion at long-term follow up. Magnitude of relapse was positively correlated with magnitude of immediate post-operative change in SNA (r: 0.295, $p=0.014$). When controlling for age at surgery, sex, magnitude of immediate post-operative change in SNA, and post-operative day of long-term imaging, there were no differences in amount of long-term relapse among patients with a history of cleft palate ($p=0.527$), congenital syndrome ($p=0.464$), or prior surgery to the maxilla ($p=0.152$), though this may reflect a lack of statistical power.

Conclusions: This study represents the largest cohort to date evaluating long-term relapse rates in LeFort I osteotomies using patient-specific 3D-printed titanium fixation plates. Although a small degree of long-term relapse can be expected beyond one year, the clinical impact of this low-magnitude relapse appears minimal, with most patients maintaining Class I occlusion. Encouragingly, patients with syndromic diagnoses, cleft palate, or prior surgery of the maxilla did not experience greater degrees of long-term relapse, suggesting the ability of patient-specific plates to provide similar stability across a wide range of patient phenotypes.

Psychosocial Challenges and Mental Health Outcomes in Individuals with Microtia

Abstract Presenter: James Antongiovanni

Abstract Co-Author(s): Chizoba Mosieri, Peter Dinh, Medha Vallurupalli, Yash Mehta, Nikhil Shah MD, Andreina Urrutia Gonzalez, Van Hoang, Tayo Arowojolu MD, PhD, Douglas Olson, Sharon Vargas, Miles Pfaff MD, MHS, Raj Vyas MD

Purpose: Among craniofacial anomalies, microtia-a congenital deformity characterized by an underdeveloped or absent external ear-can profoundly affect the psychosocial well-being of those impacted. While surgical interventions have improved aesthetic outcomes, the mental health implications of living with a visible facial defect remain underexplored.

The Patient-Reported Outcomes Measurement Information System (PROMIS) is a validated tool that provides insights into the emotional health of children with craniofacial conditions. This study leverages PROMIS instruments to understand the mental health landscape for individuals with microtia, aiming to inform holistic, patient-centered care that addresses both physical and psychological needs.

Methods: Patients diagnosed with microtia (ICD-10 code Q17.2) who underwent or were evaluated for surgical treatment at a tertiary children's hospital completed PROMIS assessments to evaluate psychosocial outcomes, including family and peer relationships, anger, anxiety, depression, and stress using a Likert-scale format. The control group consisted of pediatric patients from well-child visits at the same institution with no craniofacial abnormalities. Data were collected directly from patients and guardians and supplemented by a retrospective electronic medical record review

recorded in the REDCap program. A t-test analysis compared psychosocial outcomes between patients with microtia, control groups, and those with other craniofacial anomalies.

Results: A total of 704 individuals were included in the dataset, 82 of whom had a diagnosis of microtia (39 male, 42 female). Compared to controls, patients with microtia showed no significant differences in family and peer relationships or anger. However, patients with microtia reported significantly higher levels of anxiety, depression, and stress ($M = 1.94$, $SD = 0.70$ vs. $M = 2.21$, $SD = 0.89$, $p = 0.047$; $M = 1.62$, $SD = 0.69$ vs. $M = 1.96$, $SD = 0.89$, $p = 0.017$; $M = 1.91$, $SD = 0.75$ vs. $M = 2.14$, $SD = 0.89$, $p = 0.033$, respectively). Additionally, lower family relationship ratings approached significance in patients with microtia compared to those with other craniofacial anomalies ($M = 4.12$, $SD = 0.88$ vs. $M = 4.38$, $SD = 0.61$, $p = 0.058$). No significant differences in anger, anxiety, depression, or stress were found between patients with microtia and other craniofacial anomaly groups. Analyzing gender differences revealed that males reported significantly higher peer relationship scores compared to females ($M = 4.04$, $SD = 0.83$ vs. $M = 3.47$, $SD = 1.05$), while no significant sex differences were observed in other psychosocial outcome measures, although males generally reported slightly lower scores than females.

Conclusions: This study highlights the psychosocial challenges faced by individuals with microtia, such as elevated depression and weaker family and peer relationships compared to those with other craniofacial anomalies. It also emphasizes gender-specific psychosocial differences that patients experience. The findings underscore the need for holistic care that addresses both physical and emotional needs. Insights from PROMIS assessments can guide integrated care, combining psychological support with surgical treatment to improve overall well-being in patients with microtia.

Analyzing Pediatric Skull Fracture Bone Healing: A Case Study Using Serial MR Imaging

Abstract Presenter: Sai Anusha Sanka

Abstract Co-Author(s): Tongyao Wang, Gary Skolnick MBA, Cihat Eldeniz, Paul Commean, Corinne Merrill, Yasheng Chen, Hongyu An, Kamlesh Patel MD

Introduction: Traditionally, the assessment of skull fractures in pediatric patients has relied heavily on conventional CT scans, which come with concerns regarding ionizing radiation exposure, especially in children. We present an approach to assess the dynamic healing progression of pediatric skull fractures using motion-corrected pseudo-CT images derived from MRI scans. Our innovative technique seeks to address these concerns while offering a deeper understanding of the healing process.

Methods: Our methodology involved enrolling a single 5-week-old patient diagnosed with a parietal skull fracture. Following conventional CT, biweekly non-sedated MRI scans were conducted until the fracture was no longer visible. These scans employed a cutting-edge 5-minute golden-angle stack-of-stars radial VIBE MR sequence. A self-navigated motion correction technique was utilized to minimize motion artifacts in the MR images. A pre-trained 3D ResUNet network was then applied to generate pseudo-CT images from the MRI data, enabling the visualization of fracture healing progress across four imaging time points.

Results: The results feature the standard-of-care CT plus pseudo-CT imaging from four scans which depict the progression of a mildly depressed fracture of the parietal bone healing across nine weeks. Pseudo-CT images demonstrated some evidence of healing in the skull fractures three weeks post-trauma. Importantly, it was observed that the fracture in this infant had not completely healed until approximately seven to nine weeks post-trauma.

Conclusion: Our study sheds light on the timeline for healing skull fractures and introduces an innovative method for assessing pediatric skull fractures using pseudo-CT images generated from MRI scans. This understanding is crucial for guiding medical assessments in cases of such fractures. Furthermore, our findings highlight the utilization of automated motion correction and machine learning-generated pseudo-CT images for pediatric cranial imaging. This research contributes to both the clinical management of pediatric skull fractures and the broader utilization of advanced safe imaging techniques in pediatric healthcare.

Nutritional Status and Surgical Wound Healing in Myelomeningocele: Investigating the Role of Weight-for-Age Z-Scores

Abstract Presenter: Molly Macisaac

Abstract Co-Author(s): Allie Morris, Syed Hassan Akbari, Jordan Halsey MD, S. Alex Rottgers MD

Introduction and Purpose: Myelomeningocele (MMC), the most severe form of neural tube defect (NTD), requires surgical intervention within the first few days of life. Despite advances in surgical repair techniques, MMC patients remain at high risk for postoperative complications, including wound dehiscence, cerebrospinal fluid leaks, and infection (1). Neonatal wound healing presents unique challenges due to immature skin barrier function, increased susceptibility to infection, limited subcutaneous tissue, and potential nutritional deficits exacerbated by prematurity and associated comorbidities (2). Nutrition plays a critical role in tissue regeneration, collagen synthesis, and immune function, yet postoperative nutritional optimization in this population remains poorly characterized in the literature (3). We aimed to evaluate the relationship between weight-for-age z-scores (WAZ) and wound healing outcomes following primary MMC repair and hypothesized that infants with lower z-scores would have an increased incidence of wound healing complications.

Methods: A retrospective chart review was conducted on patients who underwent primary MMC repair between 2017-2024. Data collected included demographics, gestational age, birth weight, nutritional support, and WAZ recorded throughout the first 30 days of life. Postoperative wound healing complications including superficial dehiscence, full dehiscence, CSF leaks, infection, and tissue necrosis, were documented. Patients were divided into two cohorts: those with no dehiscence and those with any dehiscence (superficial or full). Z-scores at different postoperative time points were compared between groups.

Results: A total of 29 patients met inclusion criteria, with 10 (34%) experiencing no dehiscence, 11 (38%) having superficial dehiscence, and 8 (28%) having full dehiscence. Patients with wound dehiscence consistently had lower WAZ at all time points compared to those without dehiscence, though differences did not reach statistical significance. The largest difference in WAZ was observed at weeks 3 and 4 (Week 3: -0.93 vs. -1.50, p=0.199; Week 4: -0.91 vs. -1.53, p=0.178).

Conclusions: Preliminary findings suggest that lower WAZ may be associated with increased wound dehiscence following primary MMC repair, supporting the role of nutritional status in postoperative wound healing. The greatest differences in WAZ were observed during weeks 3 and 4, coinciding with the expected timing of suture dissolution and early tissue remodeling, a period when insufficient healing may contribute to dehiscence. However, the current sample size is underpowered to reach statistical significance. Further data collection is ongoing, with plans to expand the

cohort to improve statistical power and validate these findings. Optimizing early postoperative nutrition may serve as a modifiable factor to improve surgical outcomes in this high-risk population.

References:
1. Cherian J, Staggers KA, Pan IW, Lopresti M, Jea A, Lam S. Thirty-day outcomes after postnatal myelomeningocele repair: a National Surgical Quality Improvement Program Pediatric database analysis. J Neurosurg Pediatr. 2016;18(4):416-422. doi:10.3171/2016.1.PEDS15674
2. Riddle S, Karpen H. Special Populations-Surgical Infants. Clin Perinatol. 2023;50(3):715-728. doi:10.1016/j.clp.2023.04.008
3. Li K, Li X, Si W, et al. Preoperative and operation-related risk factors for postoperative nosocomial infections in pediatric patients: A retrospective cohort study. PLoS One. 2019;14(12):e0225607. Published 2019 Dec 23. doi:10.1371/journal.pone.0225607

Cost Comparison between Spring-Assisted Cranioplasty and Open Cranial Vault Remodeling as the Primary Surgical Management of Single-Suture Craniosynostosis

Abstract Presenter: Ron Mccall III

Abstract Co-Author(s): Gidarell Bryant Jr., Kendall Pitre, Holman Taylor, Colton Fernstrum MD, Laura Humphries MD, Ian Hoppe MD, Samantha Morin

Background: Spring-assisted cranioplasty (SAC) has been shown to decrease operative time, intraoperative blood loss, and postoperative hospital stay when compared to open procedures. Also, endoscopic strip craniectomy with helmeting has been shown to be less costly overall than open procedures. However, it is unknown if this is also true with SAC, which requires a second surgery for spring removal. The goal of this study is to provide a financial comparison between spring-assisted cranioplasty and other open surgical procedures for the treatment of single-suture craniosynostosis.

Methods: Following Institutional Board Review approval, a retrospective review was conducted on all patients diagnosed with single-suture craniosynostosis between 2012-2024. Charges for the operating room (OR), anesthesia, intensive care unit (ICU) stay, non-ICU stay, and total overall costs, along with other surgical data, were analyzed.

Costs were adjusted for inflation utilizing Consumer Price Index codes provided by the US Bureau of Labor. Expenses for patients with single-suture craniosynostosis who underwent SAC (n=36) were compared to those who underwent open cranial vault remodeling procedures (n=103) such as fronto-orbital advancement (n=57), posterior vault distraction osteogenesis (n=2), posterior cranial vault remodeling (n=19), pi-plasty (n=21), or total cranial vault remodeling (n=4). Independent t-tests were utilized with the significance value of 0.05.

Results: The total overall cost of treatment for patients undergoing SAC was over $13,500 less than those undergoing open procedures ($p=0.05$). Patients undergoing SAC also had shorter total hospital length of stay (2.97 days versus 5.09 days, $p<0.01$) and ICU length of stay (25.44 hours vs 30.65, $p<0.02$). There was no significant difference in the hospital stay costs between groups, likely due to the additional post-anesthesia care unit expenses for spring removal, which was added to the hospital stay average. Although the time spent in the ICU was shortened between the subgroups, the difference was not reflected in the cost analysis as ICU stays are charged per diem. Individual procedure lengths were also lower in patients undergoing SAC (1.90 hours vs 3.35 hours, $p<0.01$), along with blood loss and blood replacement (108.44 mL and 117.94 vs 237.91 mL and 281.57 mL, respectively, $p<0.01$).

Conclusion: This study shows that when compared to open procedures for single-suture craniosynostosis, SAC can decrease overall costs of care, hospital and ICU length of stay, procedure length, and blood loss.

Use of Certain Pesticides Associated with Increased Risk of Cleft Lip and Palate in California

Abstract Presenter: Justine Araya-Colvin

Abstract Co-Author(s): Christian Palacios, Payton Grande, Priscila Cevallos MD, Kelsi Krakauer MD, Rahim Nazerali MD, Rohit Khosla MD, Clifford Sheckter MD

Background: Cleft lip with or without palate (CL/P) and cleft palate (CP) are common birth defects in the U.S. CLP and CP are associated with a genetic anomaly or classified as an isolated, non-syndromic orofacial cleft (NSOFC), with NSOFC making up 70-75% of occurrences (1). The underlying mechanism is thought to be multifactorial, having both genetic and environmental interactions (2). Based on a meta-analysis, there is a

large body of evidence regarding the teratogenicity of pesticides including 18 relevant studies. Pesticide associated birth defects included neural tube defects, including two times increased risk for spina bifida, cryptorchidism, and gastroschisis (3). Given there is a lack of data looking specifically at NSOFC and pesticide exposure has been linked with other midline defects, our aim is to explore the correlation between county pesticide levels and the incidence of N SOFC.

Methods:A retrospective chart review of patients who had a consultation for NSOFC at a single institution was performed. Data was collected on patient demographics, geographic data, and prenatal and/or maternal information, such as substance use, that was included in their chart. Patient data was combined with pesticide data exported from California's Pesticide Use Reporting database by zip code. CL/P and CP were analyzed separately. Incidence of NSOFCs were calculated using live birth rate by county from the California Health and Human Services open data portal. Multiple poisson regressions for the top ten most frequently reported pesticides for CL/P and CP respectively were performed to evaluate the association between unique pesticides and CL/P and CP.

Results: Of the patients included, n= 146 for CL/P and n= 68 for CP. Pesticides significantly associated with increased risk of CL/P are spinosad (Estimate [E]=0.4135, p=0.010) and spinetoram (E=0.6053, p=0.0227). Pesticides significantly associated with increased risk of CP are abamectin (E=1.0244, p=0.0495) and potassium bicarbonate (E=0.8426, p=0.0056). All other positive pesticide association estimates were not statistically significant.

Conclusion: Presence of certain pesticides are associated with increased incidence of CL/P and CP at a zip code level of geographic granularity, even when established confounding factors are controlled for. The significant associations of spinetoram, spinosad, and abamectin are particularly pertinent due to the breadth of their uses ranging from agricultural and urban pest control to household applications. Spinosad and abamectin both help control various insects in farms, gardens, and urban environments. Spinetoram helps control pests in stored grain and on domestic cats (4). More research is needed to determine causality.

References:
1. Evans K, Hing AV, Cunningham M. Chapter 95-Craniofacial Malformations. In: Gleason CA, Devaskar SU, eds. Avery's Diseases of the Newborn (Ninth Edition). Philadelpia: W.B. Saunders; 2012:1331-1350.
2. Khan MI, Cs P, Srinath NM. Genetic Factors in Nonsyndromic Orofacial Clefts. Glob Med Genet. 2020;7(4):101-108.

3. Mostafalou S, Abdollahi M. Pesticides: an update of human exposure and toxicity. Archives of Toxicology. 2017;91(2):549-599.
4. Environmental Protection Agency. (n.d.-b). Spinetoram, Spinosad, Abamectin. EPA. https://comptox.epa.gov/dashboard/

Predictors of Revision Fistula Surgery in Resource-Limited Settings Among Patients with Cleft Palate

Abstract Presenter: Srinithya Gillipelli

Abstract Co-Author(s): Laura Herrera Gomez MD, Allyn Auslander

Introduction: Fistula recurrence remains a significant challenge in cleft surgery, often necessitating revision procedures. Understanding the factors associated with revision surgery can inform strategies to improve surgical outcomes. This study evaluates fistula repair trends in Latin America and Caribbean (LAC) region from 2022 to 2024, analyzing revision rates by country, surgical technique, and fistula size to identify key predictors of revision surgery.

Methods: A retrospective review of patients who underwent fistula repair in surgical programs in Latin America and the Caribbean (LAC) between 2022 and 2024 was conducted. Patient demographics, surgical details, and revision rates were extracted from program records. Descriptive statistics were used to summarize revision rates by country, technique, and fistula size. A logistic regression model assessed predictors of revision surgery. Cases with missing or blank data for key variables were excluded from the analysis.

Results: Of the 3,656 patients screened, 173 (4.7%) underwent fistula repair. Among these, 12 (6%) were primary repairs, 100 (51%) were classified as first revision surgeries, 28 (14%) as second revision surgeries, and 11 (5.6%) as third or higher revision surgeries. Revision rates varied by country, with the highest observed in Panama (16.4%), Honduras (6.3%), and Guatemala (5.0%), while Ecuador (2.5%) and Bolivia (2.5%) had the lowest rates. Among surgical techniques, turn-over flaps (81.4%) had the highest revision rates. Fistula size influenced revision likelihood, with larger fistulas (>1 cm) showing an 87.3% revision rate, while smaller fistulas (<0.5 cm) had an 86.2% revision rate. Logistic regression identified FAMM flap (OR: 0.046, p=0.039) as a

significant predictor of lower revision likelihood. No significant association was found between revision status and country.

Conclusion: The rate of fistula repair in the LAC region is comparable to that in high-resource settings, despite delays in presentation. Revision rates in the LAC region remain high, with variability across countries and surgical techniques. Larger fistulas and turn-over flaps were associated with higher revision rates.

Understanding the Influence of Comorbidities on Postoperative Feeding in Patients with Robin Sequence Undergoing Mandibular Distraction Osteogenesis

Abstract Presenter: Caroline Kreh

Abstract Co-Author(s): Melanie Bakovic, Asli Pekcan, Raina Patel, Valeria Mejia, Marvee Turk MD, Alyssa Valenti MD, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Mandibular distraction osteogenesis (MDO) is an effective technique for improving respiratory and feeding function in patients with Robin Sequence (RS). While many patients with RS have comorbid conditions, there is limited data regarding their impact on feeding outcomes after MDO. We aim to examine the relationship between comorbidities and feeding outcomes in patients with RS who underwent MDO.

Methods: A retrospective review of patients with RS who underwent MDO at a tertiary children's hospital between 2004 and 2022 was conducted. Patients with preoperative tracheostomy or less than one year of follow up were excluded. Data on respiratory, cardiac, gastrointestinal and neuromuscular comorbidities were collected. Primary outcome measures included gastrostomy tube (G-tube) placement and time from surgery to full per-os (PO) intake. Statistical analyses were conducted using chi-squared tests and Mann-Whitney U tests.

Results: A total of 73 patients met inclusion criteria. Patients had a median corrected gestational age at MDO of 4.3 weeks (IQR: 2.4-7.4 weeks) and were distracted to a median distance of 30.0 mm (IQR: 25-30 mm). Twenty seven patients (37.0%) had respiratory comorbidities, including central sleep apnea (40.7%), laryngomalacia (22.2%), and subglottic stenosis (11.1%). Twenty one patients (28.8%) had cardiac comorbidities, including atrial septal defect (42.9%), patent ductus arteriosus (23.8%), and ventricular septal defect (14.3%). Additionally, 28 patients (38.4%) had

gastroesophageal reflux disease and 22 patients (30.1%) had hypotonia. Postoperative G-tube placement rates were 5.0% for patients with one comorbidity, 21.4% for those with two comorbidities, 33.3% for those with three comorbidities, and 58.3% for patients with three or more comorbidities ($p = 0.011$). The risk of postoperative G-tube placement was 10.5 times higher in patients with three comorbidities compared to those with no comorbidities ($p = 0.001$). Hypotonia was associated with the highest rate of G-tube placement (45.5%) and the lowest rate of full PO intake (68.2%). Only 73% of patients with one or more comorbidities reached full PO intake, while 100% of patients with no comorbidities achieved full PO intake ($p = 0.03$). The time required to achieve full PO intake did not significantly vary between those with and without comorbidities.

Conclusion: The prevalence of comorbid conditions in patients with RS was associated with higher rates of postoperative G-tube placement and a lower likelihood of achieving full PO intake. For patients with three or more comorbidities, considering G-tube placement at the time of MDO surgery may be beneficial due to the significantly higher rates of postoperative G-tube placement observed in this group. G-tube placement can provide essential nutritional support, which is critical for recovery and healing during the postoperative catabolic state.

Calvarial Bone Healing After Cranioplasty In Mice – Effect of EFF-Nanotransfected cells on Baseline Rate of Healing.

Abstract Presenter: Abdulaziz Elemosho MD

Abstract Co-Author(s): Jude Kluemper, Ryan Enslow, Caroline Gillespie, Hallie Harris, James Orfila, Paco Herson, Do-Gyoon Kim, Kerry-Ann Mitchell MD, PhD

Introduction: Cranioplasty with autologous cryopreserved bone is associated with up to 52% failure rates, in part due to bone resorption from impaired revascularization. The aim of this study was to delineate the process of calvarial bone healing and determine the effect of Nanotransfection technology on calvarial bone healing in mice.

Methods: Two groups of C56BL/6 mice underwent hemicraniectomy and cranioplasty with either non-cryopreserved (nCCBG) or cryopreserved (CCBG) bone grafts. Each group had six cohorts (≥8 mice) euthanized at 1, 2, 3, 4, 8, and 10 weeks post-cranioplasty. For nanotransfection, experimental mice received brdU-labeled EFF-

nanotransfected cells with Matrigel, while the sham group received sham-transfected cells. Healing was evaluated using immunohistochemistry and Micro-CT.

Results: Different regions were evaluated: 1) central bone graft, 2) bone graft and 3) rim of native bone to evaluate the healing process at different regions after cranioplasty. DAPI intensity and nuclei counts indicated a significantly higher cell density in the bone grafts ($p < 0.001$) of nCCBG group only from weeks 3 to 4, compared to the CCBG group. There was no difference in cell densities of nCCBG compared to CCBG at week 1 and 2 ($p > 0.05$). Vascular intensity via lectin staining was similar across groups and timepoints.
Micro-CT analysis showed that at week 1 through 8 post-cranioplasty, the rim of bone graft had significantly more new bone added than central bone graft ($p < 0.05$) in both CCBG and nCCBG, however, no difference was found between the rim of the bone graft and the and rim of native bone in the amount new bone added in both CCBG and nCCBG groups ($p < 0.05$). Further, the rim of bone graft had significantly lower TMD than central bone graft and rim of native bone in both CCBG and nCCBG groups ($p < 0.05$) over the same period. The quality of bone at the rim of the bone graft was more heterogeneous than every other regions, as indicated by their wide standard deviation in gray level.
Finally, EFF-nanotransfected cells were assessed for their impact on cranioplasty healing. BrdU-labelled cells were identified at the cranioplasty site as early as week 1 post-cranioplasty. Defect site in EFF and sham mice had higher lectin vascular intensity than native bone in EFF ($P=0.0044$) and sham mice ($P=0.0009$) respectively.

Conclusion: These studies demonstrate that EFF-nanotransfected cells are viable at the cranioplasty site. Further studies are ongoing to determine the effect on rates of autologous calvarial bone healing.

Opioid Use Following Pediatric Cleft and Craniofacial Procedures: A Review of 16,806 Cases

Abstract Presenter: Adam Fleming

Abstract Co-Author(s): Ashlie Elver MD, Laura Humphries MD, Ian Hoppe MD

Background: Pediatric opioid prescribing following surgery has received increased attention due to concerns regarding misuse, prolonged use, and associated risks. While

opioid stewardship has been widely studied in general pediatric surgery, prescribing patterns in cleft and craniofacial surgery remain unclear. This study analyzes opioid prescription trends at discharge for craniofacial procedures, identifying demographic, procedural, and perioperative factors associated with opioid use.

Methods: A retrospective analysis of the 2023 Pediatric National Surgical Quality Improvement Program (PNSQIP) database was conducted, identifying all patients who underwent cleft and craniofacial procedures. Patients were stratified based on whether they received an opioid prescription at discharge. Demographic variables (age, sex, race, ASA classification), hospital status (inpatient vs. outpatient), and perioperative characteristics (operative time, anesthesia time, and length of stay) were compared. Opioid prescribing rates were analyzed across individual CPT codes to identify procedures most and least associated with opioid use. Statistical comparisons were performed using t-tests and chi-square analyses.

Results: Among 16,806 patients, 7,260 (43.2%) were discharged with an opioid prescription. Oxycodone (73.36%) was the most commonly prescribed opioid, followed by hydrocodone (19.97%). Patients who received opioids were older (7.00 ± 6.36 vs. 5.36 ± 5.63 years, $p < 0.001$), less often male (58.15% vs. 61.29%, $p < 0.001$), and more likely to have inpatient status (39.16% vs. 34.95%, $p < 0.001$). Opioid prescribing rates varied significantly across craniofacial procedures. The highest opioid prescription rates were observed in major craniofacial osteotomies, including 21147 (81.82%), 21146 (78.95%), and 21141 (75.18%). In contrast, the lowest opioid prescription rates were observed for CPT codes 42810 (excision of a branchial cleft cyst or vestige limited to skin and subcutaneous tissues, 5.42%), 42815 (excision of a branchial cleft cyst, vestige, or fistula extending beneath the subcutaneous tissue and/or into the pharynx, 10.04%), and 69300 (otoplasty, 25%). Among cleft-related procedures, primary cleft lip repair (40700: 43.61%, 40701: 45%) had moderate opioid prescribing rates, whereas palatoplasty (42210: 66.13%) was associated with higher opioid prescriptions. Perioperative characteristics also differed between opioid and non-opioid groups, with longer operative times (144.45 ± 88.88 min vs. 120.79 ± 83.11 min, $p < 0.001$), longer total anesthesia times (209.10 ± 103.17 min vs. 180.60 ± 100.77 min, $p < 0.001$), and shorter hospital stays in opioid recipients (1.11 ± 1.73 vs. 1.32 ± 4.30 days, $p < 0.001$).

Conclusions: Postoperative opioid prescribing patterns vary widely across cleft and craniofacial procedures, with osteotomies and palatoplasty associated with higher opioid use compared to primary cleft lip repair and otolaryngologic procedures. The findings suggest that procedure-specific factors, rather than standardized guidelines, drive opioid prescribing practices. Given the known risks of opioid exposure in pediatric populations, these results underscore the need for specialty-specific opioid stewardship

programs and evidence-based prescribing guidelines in craniofacial surgery. Future research should assess longitudinal opioid use and whether variability in prescribing practices affects long-term outcomes.

Characterizing NICU Admissions for Neonates with Cleft Lip and/or Palate: A Multicenter Study of Clinical Interventions

Abstract Presenter: Medha Vallurupalli

Abstract Co-Author(s): Nikhil Shah MD, Kevin Blaine, Raj Vyas MD

Purpose: Neonates with cleft lip and/or palate (CL/P) on occasion require neonatal intensive care unit (NICU) admission and care. However, the specific NICU clinical interventions and outcomes of this population remain poorly characterized in large-scale studies. This study aims to describe the clinical course, interventions, and outcomes of neonates with CL/P admitted to the NICU, providing data to improve neonatal care strategies, optimize resource allocation, and enhance family education.

Methods: A retrospective cohort study was conducted using the Pediatric Health Information System (PHIS), a national database aggregating data from over 49 children's hospitals. NICU admissions for neonates <31 days old with CL/P between January 2016 and December 2023 were identified. Subjects were stratified into three groups: cleft palate only (CP), cleft lip only (CL), and both cleft lip and palate (CLP). Data extraction included demographics, birth characteristics, length of stay, procedural interventions, respiratory support, feeding therapy, medication use, and imaging studies. Statistical analyses included descriptive statistics, odds ratios, and regression modeling to evaluate differences between cleft subtypes.

Results: A total of 923 neonates met inclusion criteria (CL: 9.6%, CP: 36.6%, CLP: 53.7%). Birth characteristics varied significantly among groups, with neonates with CL exhibiting the highest rates of prematurity (65.7%) and lowest gestational age (36.0 weeks, IQR: 34.0-38.0). Median NICU length of stay differed significantly ($p<0.001$), with CP having the longest duration (12.0 days, IQR: 5.0-23.0), followed by CLP (9.0 days, IQR: 5.0-18.0) and CL (5.0 days, IQR: 3.0-17.0).
Feeding interventions were among the most common NICU procedures, reflecting significant feeding challenges in this population. Swallowing evaluations were performed in 75.1% of CLP, 71.5% of CP, and 40.7% of CL neonates. Feeding therapy

was initiated in 71.2% (CLP), 66.4% (CP), and 39.6% (CL), with a high reliance on feeding tubes and specialized feeding equipment. Respiratory support was frequently required, with non-invasive ventilation used in 35.8% of cases. Airway management strategies, including CPAP and supplemental oxygen, were particularly necessary in neonates with Pierre Robin sequence.
Medication use was also significant, with anti-infective agents administered to 71.4% (CL), 58.3% (CP), and 53.8% (CLP), highlighting increased infection risk in this population. Gastrointestinal agents were used in over 85% of cases, supporting enteral feeding challenges, while pain management and sedation were commonly required for procedural interventions.

Conclusions: NICU admission for neonates with CL/P is associated with substantial healthcare utilization, with feeding and respiratory complications being primary drivers of prolonged hospitalization. Infants with CP and CLP exhibited the highest burden of interventions, emphasizing the need for structured feeding protocols, early lactation support, and standardized airway management strategies. These findings underscore the importance of multidisciplinary coordination and targeted parental education to optimize neonatal outcomes and reduce hospital length of stay. Future research should explore strategies for standardizing NICU protocols to enhance care consistency and improve long-term health outcomes for neonates with CL/P.

Assessing the Relationship between Cephalometric Changes Following Facial Feminization Surgery and GENDER-Q Outcomes

Abstract Presenter: Helia Hosseini

Abstract Co-Author(s): Paula Flores Perez, Melanie Vassallo, Albert Rancu, Michael Alperovich MD, MSc

Background: Gender-affirming surgery (GAS) includes reconstructive procedures designed to align a patient's physical characteristics with their gender identity. Facial feminization surgery (FFS) is essential in reducing gender dysphoria, with modifications to the forehead, mandible, and other facial structures enhancing feminine facial aesthetics and improving quality of life in transgender patients. However, limited quantitative assessments exist regarding cephalometric changes following FFS and their correlation with patient-reported outcomes using a validated, transgender-specific

instrument. This study investigates the relationship between cephalometric changes and GENDER-Q outcomes in FFS patients.

Methods: Patients who underwent FFS procedures-including frontal sinus setback, suprabrow contouring, genioplasty, and gonial angle reduction-at a single academic institution were identified. Preoperative and postoperative CT scans were analyzed using validated methods to isolate regions of interest. Surface area, volume, and region-specific morphometric values were calculated.

The GENDER-Q is a validated patient-reported outcome measure (PROM) designed for transgender and gender-diverse (TGD) individuals. This study included gender dysphoria and social well-being scales from the health-related quality of life domain, the surgery information scale from the experience of care domain, and facial appearance scales.

Preoperative and six-month postoperative GENDER-Q scores were compared using paired two-tailed Student's t-tests. Pearson correlation assessed relationships between GENDER-Q scores and cephalometric changes, with univariate linear regression performed for significant correlations.

Results: A total of 24 patients were included, with a mean age of 34.5 ± 8.7 years. The average time between surgery and postoperative GENDER-Q assessment was 7.0 ± 3.4 months. Case distribution was as follows: 21 forehead contouring/frontal sinus setbacks, 21 genioplasties, and 10 mandibular angle reductions.

A significant correlation was observed between the change in frontonasal angle (FNA) and overall facial satisfaction. For every 1% decrease in FNA, facial satisfaction increased by 1.01 ($p = 0.04$). Additionally, for each 1% reduction in chin volume, the magnitude of improvement in facial satisfaction increased by 0.27 ($p = 0.04$). A statistically significant correlation was also found between the change in gonial surface area and improvement in facial satisfaction; for every 1 mm^2 decrease in surface area, improvement in satisfaction increased by 0.011 ($p = 0.0166$).

Conclusion: This study demonstrates that FFS significantly enhances patient-reported outcomes. To our knowledge, it is the first to establish correlations between specific cephalometric changes and improvements in facial satisfaction and reductions in gender dysphoria. These findings underscore the critical role of FFS in improving quality of life for transgender patients and highlight the need for further research with larger patient cohorts. With the availability of a validated PROM tool for transgender patients,

future research can focus on refining surgical planning to optimize aesthetic and functional outcomes, ultimately enhancing patient satisfaction and well-being.

Mandibular Distraction Osteogenesis Timing and Velopharyngeal Outcomes in Robin Sequence: Insights from a 20-Year Study

Abstract Presenter: Anika Kim

Abstract Co-Author(s): Valeria Mejia, Erin Wolfe MD, Melanie Bakovic, Asli Pekcan, Raina Patel, Pasha Shakoori MD, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Robin Sequence (RS) is a triad of micrognathia, glossoptosis, and upper airway obstruction, often causing breathing, feeding, and speech problems. Up to 90% of patients with RS have a cleft palate (CP), and about 41% are diagnosed with velopharyngeal insufficiency (VPI). These patients require multiple surgeries throughout their lives. The impact of early mandibular distraction osteogenesis (MDO) on VPI outcomes remains unknown. This study aims to evaluate the impact of surgical timing on VPI correcting surgery following MDO.

Methods: A retrospective review of RS patients who underwent MDO at a major children's hospital between 2004 and 2023 was conducted. A sensitivity analysis was performed to determine the age at which MDO surgery was associated with the lowest incidence of VPI surgery. Length of follow-up, surgical technique, and subsequent interventions including CP repair, VPI surgery, and tracheostomy were recorded. MDO failure was defined as tracheostomy after MDO. Primary outcomes included VPI surgery and postoperative palatal fistulas. Statistical analyses were performed using Pearson's chi-squared test, Student's t-test, and Mann-Whitney U test.

Results: A total of 115 PRS patients underwent MDO, of which 16 (14%) patients were diagnosed with VPI after CP repair. Overall MDO success was 97.4%. Mean follow-up time was 6.5 ± 5.2 years. Sensitivity analysis identified a threshold age of six weeks, after which VPI correcting surgery rates were significantly higher ($p<0.05$). Both cohorts had similar rates of VPI diagnosis on speech evaluation (6.1% vs 16.0% $p=0.087$). Fifty patients who underwent MDO surgery after six weeks of age also had higher rates of postoperative fistulas ($p<0.05$). All VPI patients received speech therapy. The late cohort was 4.7 times more likely to have VPI surgery than the early cohort. There was

no significant difference in time between MDO to CP repair, to VPI surgery, or MDO failure between cohorts.

Conclusion: Our study demonstrates that patients who underwent MDO before six weeks of birth were less likely to undergo VPI surgery. After CP repair, the younger cohort also experienced fewer postoperative fistulas. MDO may benefit speech by improving airway patency and overall health. The findings of this study suggest that early MDO could further reduce the need for speech-correcting surgery and postoperative fistula repair.

Integra Dermal Regeneration Template in Head and Neck Reconstruction: A Systematic Review of Patient Outcomes and Clinical Applications

Abstract Presenter: Martin Buta MD, MBA, MS, MS

Abstract Co-Author(s): Josip Plascevic Mbchb, Anne Kim, Katya Remy MD, Alexis Buckley, Branko Bojovic MD

Introduction: Options for reconstructive surgery of head and neck defects following oncologic resection, trauma, or burns include skin grafting, locoregional flaps, staged tissue expansion, and vascularized tissue transfer. Skin substitutes, such as Integra dermal regeneration template, have emerged as a potential alternative, particularly for patients in whom autologous tissue is unavailable or contraindicated. Despite Integra's growing clinical use, the literature on its application to head and neck defects is limited primarily to case reports and studies focused on specific anatomical regions. This systematic review addresses knowledge gaps in our understanding of Integra's role in head and neck reconstruction by comprehensively examining patient factors, surgical techniques, and postoperative outcomes.

Methods: A systematic literature search was conducted following PRISMA guidelines across PubMed/MEDLINE, Embase, Web of Science, and Cochrane databases. Studies were included if they involved adult patients with head and neck defects reconstructed using Integra. Case reports and small case series, among other publications, were excluded. Extracted data included patient demographics, comorbidities, defect characteristics, intraoperative details, complications, and postoperative outcomes. Due to heterogeneity in study design and outcome measures, a meta-analysis was not performed.

Results: A total of 3,828 articles were screened, of which 44 met inclusion criteria. These studies included 1,431 patients (mean age 69±14 years). The majority of articles (34, or 1199 patients) reported only post-oncologic reconstruction. Only 3 articles (28 patients) focused on using Integra in burn reconstruction and 2 articles (21 patients) in trauma reconstruction. Five articles (183 patients) reported a mix of oncologic, burn, and trauma reconstruction. Amongst studies reporting comorbidities, hypertension (52% of patients), diabetes (20%), and peripheral arterial disease (15%) were the most common. In studies focused on post-oncologic reconstruction, the most common diagnoses were squamous cell carcinoma (39% of patients), basal cell carcinoma (29%), and melanoma (24%), with a mean defect size of 43±37 cm^2. The majority of post-oncologic defects were on the scalp (70% of patients) and nose (16%). For trauma studies, the mean defect size was 101±33 cm^2; the burn-focused studies did not report defect size. Amongst all studies, 14 reported 1-stage reconstruction with Integra, 21 reported 2-stage reconstruction, and 9 reported a mix of 1- and 2-stage reconstruction. Infection was the most common complication, found in 10% of patients in studies in which it was reported, followed by Integra failure (2%) and partial or total loss of skin graft (2%). The average follow-up period was 17.7±9.5 months.

Conclusion: This systematic review summarizes published patient characteristics, surgical techniques, and postoperative outcomes for Integra-based reconstruction of head and neck defects resulting from burns, trauma, or oncologic surgery. The evidence supports the feasibility of Integra for such defects, however, most of the literature is focused on oncological defects, with limited data on traumatic and burn-related applications. Standardized reporting of relevant preoperative, intraoperative, and postoperative factors will help further characterize Integra's role in head and neck reconstruction and facilitate comparison with reconstruction techniques involving autologous tissue and other skin substitutes.

An Algorithmic Approach to Maxillofacial Giant Cell Lesions in the Pediatric Patient: A 21-Year Review

Abstract Presenter: Asli Pekcan

Abstract Co-Author(s): Raina Patel, Melanie Bakovic, Valeria Mejia, Priyanka Naidu MD, Pasha Shakoori MD, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Maxillofacial giant cell lesions (GCLs) are often aggressive, disfiguring tumors in children. The functional deficits and psychosocial impact necessitate urgent treatment; however, a consensus on management is lacking given the rarity and the variable presentation in children. The purpose of this study is to evaluate the treatment and outcomes of unifocal and multifocal pediatric maxillofacial GCLs and to elucidate an optimal approach to management.

Methods: A retrospective review of patients with histologically confirmed maxillofacial GCLs at a tertiary children's hospital from February 2003 to December 2024 was performed, excluding those with incomplete documentation and less than six months of followup. Tumors were classified as aggressive or nonaggressive using Chuong et al.'s criteria, modified by Kaban et al (1,2). Outcomes included local recurrence and final disease status (remission, progressive, or non-progressive). Univariate and bivariate statistics were used to compare treatment characteristics and outcomes between syndromic and non-syndromic cohorts, with statistical significance determined by p-values < 0.05.

Results: Twenty-eight patients met inclusion criteria, 16 non-syndromic with unifocal lesions and 12 syndromic, of which 11 had multifocal lesions. Mean age at presentation was 10.7 ± 4.8 years and the mean follow-up time was 5.4 ± 4.2 years. Overall, 96.4% of lesions were aggressive, with 89.3% exhibiting rapid growth, 100% dental displacement, and 44.0% cortical perforation. Non-syndromic subjects were more frequently treated with adjuvant pharmacologic therapy compared to syndromic subjects (75.0% vs. 25.0%, $p=0.020$). Recurrence occurred in one non-syndromic subject (6.2%) and 50% of syndromic subjects ($p=0.008$). Remission was achieved in 100% of the non-syndromic cohort and only 8.3% of the syndromic cohort ($p<0.001$).

Conclusion: Maxillofacial GCLs are highly morbid, resulting in significant facial disfigurement and mass effect. Our results showed that syndromic and multifocal cases exhibited the highest recurrence and lowest remission rates, warranting a more aggressive treatment approach and consideration of a targeted approach with neoadjuvant or adjuvant denosumab. We present our institution's management algorithm to guide optimal management of pediatric maxillofacial GCLs.

References:

1. Chuong R, Kaban LB, Kozakewich H, Perez-Atayde A. Central giant cell lesions of the jaws: a clinicopathologic study. J Oral Maxillofac Surg. 1986;44(9):708-713. doi:10.1016/0278-2391(86)90040-6

2. Kaban LB, Troulis MJ, Wilkinson MS, Ebb D, Dodson TB. Adjuvant antiangiogenic therapy for giant cell tumors of the jaws [published correction appears in J Oral Maxillofac Surg. 2007 Nov;65(11):2390. Wilkinson, Michael J [corrected to Wilkinson, Michael S]]. J Oral Maxillofac Surg. 2007;65(10):2018-2024. doi:10.1016/j.joms.2007.03.030

Stability of Septal Cartilage as the Sole Graft Source for Mature Cleft Rhinoplasty

Abstract Presenter: Lucas Perez Rivera

Abstract Co-Author(s): Matthew Brett DO, David Staffenberg MD, DSc (Honoris Causa), Roberto Flores MD

Purpose: Septal cartilage is a common source of graft material used for mature cleft rhinoplasty. However, some surgeons advocate for rib cartilage due to concerns for the ability of septal cartilage to achieve stable changes to nasal morphology. The purpose of this study is to evaluate long term nasal morphological outcomes of mature cleft rhinoplasty when septal cartilage is utilized as the exclusive graft source.

Methods: A single-institution retrospective review was performed on all patients with non-syndromic unilateral cleft lip who underwent mature cleft rhinoplasty from May 2015 to December 2023, using septal cartilage as the exclusive graft source. Facial maturity was defined at fifteen years of age. Patient demographics including age, sex, and diagnosis, were recorded.
Preoperative and postoperative (minimum six-month follow-up) photographs were analyzed to identify the quantitative effects of surgery on nasal morphology. Nasal symmetry was assessed using both frontal and worm's-eye view photographs. Frontal view photographs were used to measure alar cant, alar height angle, nasal tip deviation, and vertical alar height, while worm's-eye view photographs were analyzed to calculate the columellar angle and nostril height. Sagittal view photographs were used to calculate the nasofacial angle and nasolabial angle.
Vertical alar height and nostril height were calculated as ratios of the affected to the unaffected side, while all other parameters were calculated as angles. For each study parameter, a preoperative and postoperative populational mean was calculated. A Student's t-test was performed to compare the means before and after surgery, with statistical significance defined as $p < 0.05$.

Results: Seventy-five patients were included in the study analysis. The average age of patients was 20.9 years (ranging from 15 to 51 years of age). Forty-five patients had available preoperative and postoperative photographs. The mean changes following mature cleft rhinoplasty were: alar cant 1.84 to 0.98 ($p < 0.0001$), alar height angle 1.81 to 1.18 ($p = 0.0006$), nasal tip deviation 2.87 to 2.10 ($p = 0.0004$), vertical alar height ratio 0.95 to 0.96 ($p = 0.3$), nasofacial angle 28.10 to 30.42 ($p = 0.002$), nasolabial angle 81.90 to 87.82 ($p = 0.0004$), columellar angle 7.90 to 2.90 ($p < 0.0001$), and nostril height ratio 0.80 to 0.87 ($p < 0.0001$).

Conclusions: This study supports the usage of septal cartilage as a stable graft source for mature cleft rhinoplasty. Surgeons may utilize their clinical judgement when choosing their graft source depending on the severity and characteristics of the nasal deformity unique to the patient. Septal cartilage can be a reliable option to minimize donor site morbidity in mature cleft rhinoplasty procedures while achieving a restoration of nasal symmetry, nasal tip projection, and upward nasal tip rotation.

Development and Validation of a 3D Printed Mandible Model for Bilateral Sagittal Split Osteotomy Surgical Simulation

Abstract Presenter: Katherine Zhu

Abstract Co-Author(s): Jacob Hammond, Xianshi Meng, Jesse Haworth, Andy Ding, Kristen Pan MD, Jordan Gornitsky MD, Russell Taylor, Robin Yang MD

Background: Mandibular bilateral sagittal split osteotomy (BSSO) is a common procedure used in orthognathic surgery. The greatest risk of BSSO is damage to the inferior alveolar nerve (IAN), resulting in facial numbness and poor quality of life. A lack of surgical experience is associated with a higher risk of complications, and as a result, BSSO surgical training is critical. Existing training tools, like cadavers and anatomical models, may be expensive, limit options for repeated training, and are not patient-specific. This study aimed to create a low-cost, biomechanically accurate mandibular model for surgical training to prevent such complications.

Methods: A virtual 3D model of a human mandible was segmented from computed tomography scans and printed using 9 different resin mixtures. Two residents and two attending surgeons performed user testing to determine which resin mixture had the most realistic haptic feedback. Tensile testing was performed to determine

biomechanical properties, like tensile strength, yield strength, and Young's modulus, of each resin mixture. After the best resin mixture was selected, testing in mock-operative conditions was performed to determine the amount of force required to cut through the model, a human cadaveric mandible, and commercially available model.

Results: A mix of 45% Anycubic Colored UV Resin and 55% Siraya Tech Tenacious was found to best mimic human bone. Surgeons reported feeling an accurate proprioceptive transition between cancellous and cortical bone layers of the 3D printed mandible. The osteotomy force profiles were similar across our 3D printed (2.8 +/- 1.7 N), cadaveric (2.6+/- 1.6 N), and commercial (2.9 +/- 1.8 N) mandibles. On maximal force testing, our model (5.6 N) closely resembled the cadaveric mandible (5.3 N) compared to the commercially available model (6.3 N). The total cost per 3D printed mandible was $2.48.

Discussion: A low-cost 3D printed mandible was developed and validated for surgical simulation in BSSO. Future applications include resident education and pre-operative planning to prevent operative complications.

Modernizing Microtia Reconstruction by Use of Augmented Reality and 3D Printing to Aid in Surgical Planning and Auricular Placement

Abstract Presenter: Diego Gomez

Abstract Co-Author(s): Kiana Hashemi, Ishpriya Sharma, Juan Oberto, Pushpak Patel, Brian Kellogg MD, Joseph Dusseldorp, Angelo Leto Barone MD

Purpose: Microtia reconstruction remains a complex procedure requiring precision in both the positioning of the reconstructed ear and the harvesting of rib cartilage. Current surgical techniques for autologous reconstruction employ projection paper or transparent templates for ear placement, lacking accuracy and relying on manual measurements. Furthermore, manual palpation for rib harvesting can be challenging, particularly in patients with higher body mass index (BMI). This study explores the integration of 3D printing technologies and Augmented Reality (AR) to enhance preoperative planning and intraoperative execution, providing improved precision and reducing operative time and morbidity in microtia reconstruction.

Methods: Two technological innovations were recently integrated into our microtia practice: (1) patient-specific 3D-printed positioning masks (hEARo masks) to optimize ear framework placement during cartilage repair (n=9) and (2) augmented reality (AR)-assisted costal cartilage incision planning for rib harvest, utilizing the Microsoft HoloLens to project 3D-CT data onto the surgical field in a selected patient (n=1). HEARo masks were designed from 3D facial imaging using 3dMD technology following cephalometric analysis and customized to mirror the unaffected ear, ensuring accurate ear placement and symmetry. In one obese patient, rib harvest was performed by overlaying 3D rib data on the patient's chest using AR, facilitating precise incision planning.

Results: The integration of 3D printing and AR aims to improve the precision of auricular framework positioning and rib cartilage harvest in selected cases. The hEARo mask consistently demonstrates high accuracy in replicating the contralateral ear's position, ensuring symmetric ear placement. Remote preoperative planning was also feasible for one patient, facilitated by 3D printing of patient-specific models, allowing for accurate surgical planning and alignment of auricular constructs during an inter-institutional collaboration. In patients with higher BMI, AR-guided incision placement may facilitate cartilage harvest and possibly result in reduced operative time by guiding intraoperative decisions.

Conclusions: The use of 3D printed positioning guides (hEARo masks) and AR in microtia reconstruction has the potential to improve auricular framework positioning and incision placement for rib cartilage harvesting in especially challenging cases secondary to obesity. Enhancements in pre-operative planning techniques aim to streamline the surgical process and enhance patient outcomes. Future studies will focus on long-term outcomes, objective measurements of ear symmetry, and further refinement of these techniques.

Incidence of Facial Trauma Before and After the Covid-19 Pandemic: A Cohort Study

Abstract Presenter: Isabel Cylinder MD

Abstract Co-Author(s): Alexa Stefanko, Erik Wolfswinkel MD, Lori Howell MD

Purpose: The COVID-19 pandemic and its associated challenges, including increased unemployment, rising inflation, and increased barriers to pre-existing public health resources, have significantly impacted community health and well-being. In Oregon, these pressures coincided with the implementation of Measure 110 in early 2021, which decriminalized the possession of small amounts of certain controlled substances. This study examines incidence of facial trauma in an urban academic Level 1 Trauma Center in Oregon before and after the pandemic, as well as its relationship to socio-economic stressors.

Methods and materials: We conducted a retrospective analysis comparing two time periods: Pre-COVID (11/15/2016-3/15/2020) and Post-COVID (1/1/2021-4/30/2024), a period also aligning with the enactment of Measure 110. We utilized chi-square, Mann-Whitney U tests, student t-test, and OLS regression to analyze data from patient encounters involving facial trauma.

Results/Complications: Our findings indicate a statistically significant increase in the overall incidence of both operative and non-operative facial trauma in the post-COVID period ($p<0.0001$) (Fig 1). A regression analysis revealed a significant relationship between substance use and facial trauma (OR=2.96, $p<0.0001$), with roughly 1/3rd of the monthly facial trauma patients having a concurrent and active substance use diagnosis as of July 2024. Overall, a greater percentage of patients with facial trauma had a concurrent substance use diagnosis in the post-COVID period ($p<0.0001$). Moreover, patients using substances and individuals experiencing houselessness showed a disproportionately higher increase in facial trauma incidence compared to the general population in the post-COVID era ($p<0.001$).

Conclusion: This study underscores the complex interplay between socio-economic factors and health outcomes, namely facial trauma in our investigation. Our results demonstrate a significant increase in the incidence of facial trauma coinciding with the COVID-19 pandemic and the subsequent rise in unemployment, inflation, and utilization of SNAP benefits, as well as the enactment of Measure 110 in Oregon. The overlapping timelines of these events pose challenges in distinguishing their individual impacts on the incidence of facial trauma. The complexity of this landscape highlights the need for further research to distinguish these influences with greater clarity.

Successful Perioperative Management Strategies in Cranial Vault Reconstruction for the von Willebrand's Patient

Abstract Presenter: Sam Girian

Abstract Co-Author(s): Reece Moore MD, Hanna Pfershy MD, Hamed Moshref, Brooke Dudick, John Girotto MD, Anna Carlson MD

Purpose: Cranial vault reconstruction (CVR) may involve significant blood loss, and patients with von Willebrand disease (vWD) require additional perioperative and intraoperative interventions for hemostasis and management of blood loss. This study characterizes the prevalence of von Willebrand disease in patients with craniosynostosis, and describes the management of patients with vWD who require CVR.

Methods: This is a retrospective cohort study of 211 patients that underwent CVR between January 2015 to May 2024 performed by our institution's pediatric plastic surgery division. Patients were followed prior to (controls, n=20) and after (study population, n=191) initiation of a blood management protocol. In the blood management cohort, patients underwent screening labs for relative anemia, anemia, and vWD. Patients who screened positive for vWD received Hematology & Oncology (H/O) referral, preoperative Antihemophilic Factor/von Willebrand Factor Complex infusion, and postoperative oral Aminocaproic Acid. vWD diagnosis was made by H/O with consideration of bleeding history, confirmatory ristocetin cofactor assay, and glycoprotein 1bM binding assay. Univariate analysis was employed to compare transfusion volumes between patients with vWD and patients who underwent relative anemia and anemia protocols.

Results: 6.8% (n=13) of patients (9 male, 4 female) were diagnosed with vWD. Phenotypic distribution of patients with vWD included 38.5% sagittal, 38.5% coronal, 15% lambdoid, and 8% metopic. Patients underwent fronto-orbital expansion (40%), posterior vault reconstruction (27%), total cranial vault reconstruction (20%), or other procedures (13%). Intraoperatively, patients with vWD received infusions of tranexamic acid (93%), crystalloid (100%), packed red blood cells (PRBC, 27%), and fresh frozen plasma (FFP, 7%).

Compared to patients without vWD, patients with von Willebrand Disease demonstrated no statistical difference in intraoperative and total transfusion volumes of PRBC, FFP, and platelets. There was also no difference in intraoperative estimated blood loss nor crystalloid volumes. Continuity of care for patients with vWD comprised annual H/O follow-up or prior to surgical procedures, use of medical alert bracelets, and avoidance of high-risk sports, ibuprofen, and aspirin.

Conclusion: Von Willebrand Disease prevalence in our craniosynostosis population was 5.8x greater than the approximate 1% of the general American population (1). Patients with vWD demonstrated no difference in intraoperative and total transfusion volumes compared to patients without vWD who underwent blood management protocol.

References:
1. Flood VH, Gill JC, Friedman KD, Bellissimo DB, Haberichter SL, Montgomery RR. Von Willebrand disease in the United States: a perspective from Wisconsin. Semin Thromb Hemost. 2011;37(5):528-534. doi:10.1055/s-0031-1281039

Occlusal Plane Stability after Curvilinear Mandibular Distraction Osteogenesis

Abstract Presenter: Kirin Naidu

Abstract Co-Author(s): Isabel Ryan BS, Ashley Chang BA, Philip Tolley MD, Nicholas Han, Allison Hu MD, Scott Paul Bartlett MD, Jordan Swanson MD, MSc, Hyun-Duck Nah MD, DMD, PhD, Jesse Taylor MD

Background: Curvilinear mandibular distraction osteogenesis (MDO) allows for mandibular lengthening in both the sagittal and vertical planes. However, the stability of these movements is less well known. This study aims to examine the stability of the occlusal plane changes seen in patients who have undergone curvilinear mandibular distraction, with and without peri-operative orthodontics at extended follow-up.

Methods: A retrospective review of demographic, perioperative, and distraction data was performed on all patients who underwent isolated curvilinear MDO at our institution from January 2011 - December 2023. Cephalometric analysis was conducted on pre-operative, immediate post-operative, and extended post-operative lateral cephalograms, lateral radiographs, or computed tomography scans with special attention paid to Sella-nasion-B point angle (SNB), SN-mandibular plane angle (MPA), and SN-occlusal plane angle (OPA). Paired t-tests, student's t-tests, and repeated measures ANOVA were used to compare pre-operative, immediate post-operative, and extended post-operative cephalometrics.

Results: 25 patients underwent curvilinear MDO in mixed dentition and had requisite pre-op and immediate post-op imaging, of which 15 had adequate extended post-operative imaging for analysis. Average age at surgery was 8±5 years, with an average follow-up of 4±3 years. The most common diagnoses in the cohort were Treacher Collins (24.0%, n=6), followed by Hemifacial Microsomia (12.0%, n=3), Goldenhar Syndrome (12.0%, n=3), and Pierre Robin Sequence (12%, n=3). 32% (n=8) of patients were tracheostomy dependent pre-operatively, with 50.0% (n=4) decannulated post-operatively. Average distraction distance was 30±8 millimeters. 56% (n=14) underwent post-operative orthodontic treatment. The average SNB angle improved from 69±6º pre-op to 75±7º postop ($p<0.001$) and maintained at 73±7º at 4-year follow-up ($p<0.001$). MPA improved from 57±12º pre-op to 48±11º postop ($p<0.001$) and 53±12º at 4-year follow up ($p=0.003$). Preop OPA changed from 30±11º pre-op to 23±6º postop ($p<0.001$) and 26±6º at 4-year post-operative evaluation ($p=0.005$). When comparing patients with HFM and Treacher Collins, patients with Treacher Collins tended to have greater relapse than patients with HFM at extended follow-up (1.9±4.4 vs. 1.2±6.2, $p=0.8$), though this failed to reach significance. OPA relapse was similar between patients who did and did not undergo post-operative orthodontics ($p>0.05$).

Conclusions: Curvilinear MDO results in significant cephalometric improvements in SNB, MPA, and OPA. While there is some expected relapse in these measurements at extended follow-up, these improvements remain significantly improved at 4-year follow-up. Further investigation into relapse differences of long-term results is needed to understand the optimal patient selection.

Comparing the Chondrogenic Potential of Microtia versus Costal Chondrocytes for Microtia Reconstruction

Abstract Presenter: Lana Mamoun

Abstract Co-Author(s): Thomas Gasbeck, Ashton Rosenbloom, Nikhil Prabhakar, Mary Ziegler MD, PhD, Alan Widgerow MD, Miles Pfaff MD, MHS

Background: Microtia reconstruction traditionally relies on autologous costal cartilage, yet challenges remain in achieving optimal biomechanical properties and minimizing donor site morbidity. Tissue engineering utilizing patient-derived chondrocytes presents a solution to overcome these limitations. However, the ideal source of chondrocytes needs to be defined. Auricular chondrocytes from microtia patients may possess unique

chondrogenic properties compared to costal chondrocytes while using a decellularized cadaveric scaffold presents a promising approach for structural support and cellular incorporation (1-3). This study compared the chondrogenic potential of microtia-derived auricular chondrocytes (MCs) and costal chondrocytes (CCs) in four settings. This research will provide insight into novel strategies for improving microtia reconstruction.

Methods: The chondrogenic properties of CCs and MCs were assessed in: 1) native tissue, 2) 2D-in vitro culture, 3) pellet culture, and 4) on a decellularized scaffold. CCs and MCs were isolated from costal and microtia cartilage of pediatric donors undergoing autologous microtia reconstruction by digesting the tissue in type II collagenase. The chondrogenic properties of the cells were assessed via immunohistochemistry (IHC), immunofluorescence (IF), and cell proliferation assays using the Cell Counting Kit-8 (CCK-8). Auricular cadaver tissue was decellularized and combined with MCs and CCs, then cultured for 3 weeks. The tissue was fixed and processed to detect collagen by Masson's Trichrome, glycosaminoglycans (GAGs) by Alcian blue or collagen type II expression by immunohistochemistry. Assays were quantified using ImageJ, and descriptive and inferential statistical analyses were conducted using SPSS.

Results: The cellular yield averaged 3.30x10^6 cells/gram from microtia cartilage and 9.79x10^5 cells/gram from costal cartilage. Adding MCs or CCs to decellularized auricular tissue induced comparable levels of collagen, GAG formation and the expression of collagen type II. Also, there was no significant difference in collagen type II expression in IHC ($p=0.80$) or IF assays (0.59). The pellet culture suggested that MCs hold greater collagen type II expression. There was no significant difference in the proliferative capacity of MCs and CCs at 3hr, 24hr, 48hr and 72 hr timepoints.

Conclusion: This study demonstrates that MCs and CCs exhibit comparable chondrogenic potential across all tested conditions, including native tissue, in vitro culture, and pellet culture. When integrated into a decellularized auricular scaffold, both MCs and CCs contributed similarly to collagen and glycosaminoglycan formation and collagen type II expression. These findings suggest that CCs, as a more readily available source, may be a viable alternative to MCs for microtia reconstruction, particularly in tissue-engineering approaches utilizing decellularized scaffolds. Further research is warranted to explore long-term viability and functional outcomes in vivo.

References:

1. He A, Ye A, Song N, et al. Phenotypic redifferentiation of dedifferentiated microtia chondrocytes through a three-dimensional chondrogenic culture system. Am J Transl Res. 2020;12(6):2903-2915. Published 2020 Jun 15.

2. Baluch N, Nagata S, Park C, et al. Auricular reconstruction for microtia: A review of available methods. Plast Surg (Oakv). 2014;22(1):39-43.

Utilization of Nasoalveolar Molding Stratified by Social Vulnerability Index, Race, and Urbanicity

Abstract Presenter: Sara Islam MD

Abstract Co-Author(s): Anna Boydstun, Samantha Morin, Laura Humphries MD
Ian Hoppe M

Background: While Nasoalveolar Molding (NAM) is considered the standard of care in many cleft centers, it has been associated with an increased burden of care due to access, cost, and frequent follow-up appointments. As of 2012, just over one-third of cleft centers offered NAM to patients with cleft deformities. This study aims to depict the socioeconomic stratification of patients who received NAM compared to those who did not based on Social Vulnerability Index (SVI), race, and urbanicity.

Methods: A retrospective analysis was performed using Epic Cosmos, a national deidentified database from Epic electronic health record. Patients under 6 months with cleft lip or cleft lip and palate from 2016-2023 were included in the study. The rate of NAM was compared across sociodemographic cohorts based on SVI quartiles, race, and urbanicity. Statistical analyses were performed using chi-square.

Results: 14,212 patients were included in the study. A total of 446 (3.14%) patients were identified as having been treated with NAM versus a total of 13,766 (96.86%) without NAM. The implementation of NAM was significantly associated with the highest SVI quartile, White race, and metropolitan populations ($p < 0.05$).

Conclusion: Sociodemographic factors influence treatment options for cleft care. In a nationwide database analysis, very few patients were treated with NAM. However, its usage was significantly associated with the highest social vulnerability, white race, and metropolitan populations. These results indicate that access to NAM is limited to urban areas where the largest craniofacial/cleft centers are located. Expanding access to NAM for all patients is crucial to increasing its utilization across the United States.

Strain-Based 4D Image Analysis for Quantifying Facial Asymmetry in Pediatric Facial Palsy

Abstract Presenter: Whitney Stanton

Abstract Co-Author(s): Kayla Prezelski, Ragan Edison, Jonathan Cheng MD, Rami Hallac PhD

Background: Facial paralysis (FP) affects both function and aesthetics, leading to asymmetry, altered muscle activation, and soft tissue imbalance. Strain analysis provides a quantitative measure of soft tissue deformation, capturing regional stretch and compression patterns that define facial motion. Three-dimensional motion tracking was employed to quantify the displacement of individual surface landmarks and evaluate their dynamic spatial relationships with adjacent points. By analyzing strain distribution in 3D dynamic images, we can better understand how FP impacts facial dynamics, particularly in key regions such as the nasolabial fold, cheek, and orbit.

Purpose: This study applies strain tensor analysis to 4D images to objectively evaluate facial movement asymmetry in patients with FP.

Methods: Dynamic facial expressions, from rest to maximum smile, were captured using a 4D imaging system in pediatric patients with FP (n=9) and age- and sex-matched controls (n=9). Facial surfaces were tracked using a standardized mesh template in Tempus software (3dMD), ensuring full-face correspondence across frames. Strain analysis was performed on 4D video sequences from neutral to maximum smile for each vertex. Strain tensor fields were derived from local mesh deformations to capture directional changes in facial structure. Strain magnitudes were quantified using the Frobenius norm, which provides a single scalar measure of overall deformation by incorporating both stretching and shear effects. The resulting strain distribution was visualized as a color-coded heatmap to assess spatial deformation patterns. Additionally, mesh displacement analysis and nasolabial fold curves were extracted from each 3D hemiface to quantify excursion and asymmetry between affected and unaffected sides in patients with FP and controls.

Results: Strain and displacement analysis revealed distinct differences in mechanical deformation between individuals with FP and those with normal facial function. In patients with FP, strain distribution was highly asymmetric with greater deformation localized to one side of the nasolabial fold and perioral region. Similarly, the malar

region exhibited heterogeneous strain propagation between the affected and unaffected sides, indicative of impaired muscle activation and distinct patterns of soft tissue displacement. In contrast, control subjects demonstrated a symmetric strain pattern, with high-strain regions evenly distributed around the lips and oral commissures. Strain remained balanced across the nasolabial folds with minimal asymmetry in deformation intensity or spread. High-strain zones coincided with muscle insertion sites, underscoring the mechanical role of these areas in facial movement.

Conclusions: We present a novel mathematical model using patient-specific 3D meshes to quantify dynamic facial movements in patients with FP. Strain analysis revealed both the unaffected and affected sides of the face exhibit abnormal strain in patients with FP. It remains to be determined if the increased strain on the unaffected side of the face in patients with FP is due to a lack of motion on the affected side or due to overcompensation on the unaffected side. Providers may choose to address both sides of the face during treatment, as the unaffected side also undergoes significant changes.

Face transplantation long-term patient and graft survival: how do they compare to renal transplant data? A systematic review.

Abstract Presenter: Bassem Chamma

Abstract Co-Author(s): Sarah Chung, Andrew Hannoudi, Karam Hadid, Kylie Nikolli, Ahmed Hashem Mbbch, Msc, MD

Background/Purpose: Face transplantation (FT) is a groundbreaking procedure that offers transformative benefits to patients with severe facial disfigurements. As of 2024, 50 FT procedures, including two re-transplants, were documented globally. Despite numerous publications, total patient and graft survival rates are unknown. In contrast, outcomes of solid organ transplants are routinely evaluated as such. Despite numerous publications, patient and graft survival rates remain relatively unstudied. This systematic review aims to describe patient and graft survival among FT recipients worldwide. These are compared with US (United States) national data for renal transplants. In addition, graft loss, rejection, major complications, and mortality are analyzed.

Methods: Adhering to PRISMA guidelines, a systematic review of FT cases sourced from PubMed, Medline, Google Scholar, and Google search was conducted. Data on

patient and graft survival, graft loss, rejection, complications, and mortality were extracted. Kaplan-Meier estimates were used to determine patient and graft survival. Further data were described as percentages. Data for US national cadaveric kidney transplant outcomes were derived from the United Network of Organ Sharing.

Results: The search yielded 346 reports, of which 76 were included. Fifty transplants were performed in 48 patients. Patient survival was 96% at 1 year, 93.9% at 3 years, and 89.6% at 5 and 10 years. Graft survival was 94% at one, 3, and 5 years, and 82.5% at 10 years. In contrast, US cadaveric kidney transplant patient/graft survival rates are 96.3%/93.2% at 1 year, 91.3%/85.1% at 3 years, and 83.6%/74.4% at 5 years.
Graft loss (7 patients, 14%) was managed with free flap reconstruction (4 patients) or re-transplantation (2 patients), while one patient died from sepsis.
Acute and chronic rejections were identified in 37 (74%) and 6 (12%) transplants respectively. Major complications requiring prolonged hospitalizations (29 patients - 60.4%) were mostly secondary to infectious complications, followed by immunosuppressant side effects and malignancies.
Mortality occurred in ten patients (20.8%) due to infectious complications (4 patients, 8.3%), malignancies (3 patients, 6.3%), non-compliance with immunosuppression (1 patient, 2%), and suicide (1 patient, 2%).

Conclusion: Long-term (10-year) patient and graft survival following FT is 89.6% and 82.5%, respectively, and compares favorably with US cadaveric renal transplant outcomes. Graft loss (seven patients, 14%) was managed with free flap reconstruction in 4 patients and re-transplantation of 2 recipients. Infectious complications remain the major cause of morbidity and mortality.

Eliminating Post-Operative Pain with Intercostal Nerve Cryoablation during Rib Cartilage Harvest for Total Microtia Construction

Abstract Presenter: Hannah Soltani

Abstract Co-Author(s):Sophia Allison, Akira Yamada MD, FACS, PhD

Background: Microtia reconstruction using the Nagata technique which utilizes autologous rib cartilage remains the gold standard. However, rib cartilage harvest is associated with significant post-operative pain, leading to increased opioid requirements and longer hospital stays. Despite advances in analgesia, including local infiltration,

nerve blocks, and systemic pain control, optimal pain management remains challenging. Cryoablation, successfully used for pain control in pectus excavatum repair, offers a potential solution by temporarily disrupting nerve transmission through extreme cold application. Our case series presents the novel use of cryoablation during rib cartilage harvest in microtia reconstruction and investigates its impact on pain management.

Methods: Three patients, aged 10–15 years, undergoing microtia reconstruction with autologous rib cartilage harvest were included. Under ultrasound guidance, cryoablation was performed at the donor site targeting the intercostal nerves beneath the 6th–9th ribs. A freeze cycle of ten minutes followed by a five-minute thawing process was applied, with real-time ultrasound monitoring to prevent thermal injury. Post-operative pain scores, opioid consumption, and time to resumed ambulation were collected.

Results:
• Case 1: A 15-year-old female required 2.4 mg IV hydromorphone via patient-controlled analgesia (PCA), which was discontinued on post-operative day (POD) 1. She received a total of 10 mg oral oxycodone and transitioned to non-opioid analgesia by POD 2. She was discharged on POD 3, reporting 1/10 pain with resumed ambulation.
• Case 2: A 12-year-old male had 2.8 mg IV hydromorphone PCA discontinued on POD 2, with a total of 90 mg IV Toradol and 3.8 mg oral oxycodone administered. By POD 3, he reported 0/10 pain and was discharged with resumed ambulation.
• Case 3: A 10-year-old male was given 1.1 mg IV hydromorphone PCA, discontinued on POD. He received a total of 90 mg IV Toradol. He reported 3/10 pain at the donor site on POD 1 and was discharged on POD 2 with resumed ambulation.

All patients demonstrated early time to ambulation (average: 2 ±1 days), short length of stay (2.7±0.6 days), and reduced opioid requirements (2.1± 0.9 mg IV hydromorphone, 4.6±4.3 mg oral oxycodone, 90mg IV Toradol). Patients typically experience moderate to severe pain at the donor site for several weeks post-operatively; however, those undergoing cryoablation achieved pain-free ambulation as early as POD 1. While this study is limited by a small sample size, the results suggest that cryoablation may enhance pain control without additional surgical risk or prolonged operative time.

Conclusion: We highlight the first application of intercostal nerve cryoablation for rib cartilage harvest in microtia reconstruction. The observed reduction in post-operative pain and opioid consumption suggests a potential paradigm shift in pain management for these patients. Future studies will compare pain scores, opioid use, and length of stay between cryoablation and traditional pain management to further validate its clinical efficacy. Cryoablation may represent a significant advancement in optimizing patient recovery following microtia reconstruction.

The Impact of Area Deprivation Index in Surgical Care of Patients with Craniosynostosis

Abstract Presenter: Manasa Kalluri

Abstract Co-Author(s): Aidan O'Shea, Daniel Chu, Mary Carbullido MD, Catharine Garland MD, Daniel Cho MD, PhD, Jessica Blum MD

Purpose: Surgical treatment of craniosynostosis can be performed via an endoscopic or open approach, with endoscopic surgery generally available to patients presenting before 5 months of age. A growing body of evidence points to superior outcomes with endoscopic surgery, but the limited window of eligibility and requirement for additional postoperative interventions can pose access challenges. This study assesses the relationship between surgical approach, age at presentation, age at surgery, and the wait time between presentation and surgery and relative neighborhood-level socioeconomic deprivation, as assessed by the Area Deprivation Index (ADI).

Methods: A retrospective chart review of patients with nonsyndromic craniosynostosis at American Family Children's Hospital between 2010 and 2023 was performed. Patient addresses were used to calculate a state-based ADI quintile using the University of Wisconsin's Neighborhood Atlas. Sex, ethnicity, race, age at the time of presentation, age at primary reconstructive surgery, operative technique, and wait time between presentation and surgery were abstracted from charts. Patients lost to follow-up, those with unavailable medical records, or those who resided outside of WI were excluded. Descriptive statistics and univariate analyses were used for binary variables and ANOVA and Spearman-ranked correlation were used to analyze continuous variables ($p<0.05$).

Results: Our cohort included 126 patients. Patients with the least relative disadvantage represented 26% of patients, while patients with the most disadvantage represented 11% of patients. A higher ADI quintile, indicating greater socioeconomic disadvantage, was associated with an increased likelihood of undergoing open rather than endoscopic surgery (OR 1.615, 95% CI 1.191 – 2.191, p=0.002). Age at time of presentation (95% CI -0.082 – 0.265, p=0.306, Spearman's ρ=0.092) and age at time of primary surgery (95% CI -0.006 – 0.333, p=0.066, Spearman's ρ=0.164) were not significantly associated with ADI quintile. A higher ADI quintile was associated with an increased wait

time between presentation and primary reconstructive surgery (95% CI 0.013 – 0.351, p=0.041, Spearman's ρ=0.182).

Conclusions: Greater socioeconomic disadvantage was associated with a higher likelihood of receiving open surgery and an increased wait time between presentation and surgery, but not with age at initial surgery. This suggests that factors beyond age at presentation contribute to the choice of surgical approach in patients from more disadvantaged areas. Additionally, such patients may experience barriers in receiving prompt surgical treatment following their initial presentation. Open techniques are associated with inferior perioperative outcomes and less aesthetically favorable results, with emerging evidence suggesting it may be associated with inferior neurocognitive outcomes and increased reoperation rates. However, a relative benefit of open surgery over endoscopic surgery is that it does not require additional postoperative interventions including regular appointments for helmet therapy or a second surgery for spring removal, which can be burdensome. Further outreach and advocacy efforts to improve equitable access to endoscopic surgery and the interventions that make its outcomes most optimal are likely to help alleviate socioeconomic disparities in perioperative and long-term outcomes for patients with craniosynostosis.

Conservative Treatment of Radiated Chronic Scalp Wounds with Exposed Bone

Abstract Presenter: Brian Paul

Abstract Co-Author(s): Travis Holcombe, Garrison Leach MD

Chronic scalp wounds with exposed bone in patients with prior radiation therapy present a significant reconstructive challenge. These wounds can be treated conservatively with excellent results when the wound has not been previously radiated; however, conservative treatment of chronic scalp wounds with exposed bone and prior radiation therapy is not well established and demonstrates varying levels of success in the limited literature (1-3). The purpose of this study is to examine the safety and efficacy of treating these complex wounds conservatively.
Patients with radiated chronic scalp wounds with exposed bone that persist despite reconstructive efforts with local flaps, split-thickness skin grafts, skin substitutes, or free flaps must often rely on conservative management and secondary intention healing (4). We retrospectively reviewed 10 patients with previously radiated chronic scalp wounds with exposed bone treated conservatively from December 2014 to December 2024. Our

cohort had either exhausted reconstructive options or elected to decline further surgical intervention. They received structured wound care instruction, a regimen of regular application of Silvadene and Aquaphor, and followed closely. The duration of treatment varied with a range of 1-73 months (mean=29.4 months). The area of exposed bone in 7 individuals decreased (70%), with 3 (30%) achieving complete wound resolution with reepithelialization. Conversely, the area of exposed bone increased in 3 patients (30%). At the time of data collection, 8 patients remained stable, while 2 had passed away from unknown causes. To our knowledge, no patients experienced any major complications or significant bleeding with this approach.
Our results demonstrate the relative safety of conservative management of radiated chronic scalp wounds with exposed bone when all prior reconstructive interventions have failed or when patients are not candidates for further surgery.

1. Patel P, Young J, McRae M, et al. (June 21, 2020) A Retrospective Cohort and Systematic Review of Non-Operative Management of Exposed Calvaria Post-Radiotherapy. Cureus 12(6): e8751. doi:10.7759/cureus.8751
2. Wong N, Zloty D. Secondary Intention Healing Over Exposed Bone on the Scalp, Forehead, and Temple Following Mohs Micrographic Surgery. Journal of Cutaneous Medicine and Surgery. 2022;26(3):274-279. doi:10.1177/12034754221077903
3. BECKER, G. D., ADAMS, L. A., & LEVIN, B. C. (1999). Secondary intention healing of exposed scalp and forehead bone after Mohs surgery. Otolaryngology-Head and Neck Surgery, 121(6), 751–754. https://doi.org/10.1053/hn.1999.v121.a98216
4. Leedy, J. E., Janis, J. E., & Rohrich, R. J. (2005). Reconstruction of acquired scalp defects: an algorithmic approach. Plastic and reconstructive surgery, 116(4), 54e–72e. https://doi.org/10.1097/01.prs.0000179188.25019.6c

Bundling Variations in Craniosynostosis Billing Reveal the Need for Enhanced Billing Educational Interventions

Abstract Presenter: Allison Choe

Abstract Co-Author(s): Daniel Kwon, Keisha Montalmant MD, MPH, Jeffrey Russell MD, Jacquelyn Roth, Bernice Yu MD, Peter Taub MD

Purpose: Accurate reimbursement under the U.S. fee-for-service model necessitates precise coding for healthcare procedures. Inadequate educational resources have contributed to unclear definitions of current procedure terminology (CPT) which may

lead to inconsistencies in billing routines for procedures such as craniotomy and craniectomy in patients with craniosynostosis. As such, the present study sought to analyze the impact of unbundling and bundling trends in craniosynostosis treatment and outcomes to assess the need for educational interventions in billing practices.

Methods: The Pediatric National Surgical Quality Improvement Program (NSQIP) database was queried to identify cases recorded between 2013 to 2020. Bundled CPT code 21175 and the individual craniosynostosis-specific CPT codes 61550, 61552, 61556, 61557, 61558, and 61559 were utilized. The unbundled cohort was categorized by any number of the individual craniosynostosis-specific CPT codes and the bundled cohort by CPT code 21175. Length of stay (LOS), operative time, and surgical specialty were analyzed.

Results: A total of 8,817 patients were identified of which 5.9% patients were bundled, and 94.1% were unbundled. Operative time was significantly shorter in the unbundled cohort (177.6 ± 108.1 min) compared to the bundled cohort (249.1 ± 89.0 min, $p<0.001$). LOS was shorter in the unbundled group (3.05 ± 9.0 days) compared to the bundled group (3.60 ± 7.9 days, $p = 0.18$). Plastic surgeons were significantly more likely to bundle (11.6%) compared to neurosurgeons (1.3%, $p<0.001$).

Discussion: The majority of craniosynostosis treatment procedures were unbundled, which was associated with significantly shorter operative times compared to bundled cases. LOS was also shorter in the unbundled group, and plastic surgeons were significantly more likely to bundle procedures than other specialties. The findings suggest a need for a critical review of current coding guidelines and educational interventions to eliminate ambiguity in the treatment of craniosynostosis.

Characterizing Congenital Encephaloceles: Epidemiological Insights and Clinical Outcomes in a 12-Year Single-Center Study

Abstract Presenter: Austin Lignieres MD

Abstract Co-Author(s): Evan Bowen, Katherine Baker, Ian Hoppe MD

Background: Congenital encephaloceles are associated with high morbidity and mortality, which vary with defect location, size, and perinatal factors. Their rarity and

variable presentations contribute to an incomplete understanding, necessitating further research on clinical outcomes and management.

Methods: A retrospective review of congenital encephaloceles managed from 2012-2024 at a single institution was conducted. Data collected included demographics, perinatal history, comorbidities, radiological findings, defect characteristics, and therapeutic interventions. Descriptive statistical analyses were used to discern associations and trends.

Results: There were 17 total patients, with 12 (70.6%) females and 5 (29.4%) males; 12 (70.6%) Black/African American, 4 (23.5%) White, and 1 (5.9%) Hispanic/Latino. Seven patients (41.2%) are deceased. Posterior defects (n=15; 88.2%) were more common than anterior defects (n=2; 11.8%). The most frequent subtype of posterior encephalocele was occipital (n=11; 91.7%). All patients had neural tissue herniation, while 3 (23.1%) had ventricular herniation and 5 (38.5%) had major vascular involvement. Surgical closure was performed in 12 patients (70.6%). Among deceased patients, 3 (42.9%) had surgery, while 9 (90%) living patients underwent surgery. Birth weight was significantly different between living and deceased patients ($p<0.05$), but gestational age and head circumference were not.

Conclusions: Limited knowledge exists on factors influencing outcomes in patients with congenital encephalocele. This study characterizes the clinical profile and outcomes of congenital encephaloceles at our institution, enhancing our understanding of current management standards.

Long-Term Analysis of Revision and Reoperation in Unicoronal Craniosynostosis

Abstract Presenter: Julia Schmidt

Abstract Co-Author(s): Kiefer Forseth, Dr. Benjamin Massenburg MD, Margaret Seaton
Michael Levy
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Background: Unicoronal craniosynostosis (UCS) leads to altered craniofacial growth which requires a surgical correction to optimize both aesthetics and neurological development. While past literature has focused on preoperative morphological characteristics influencing UCS surgical outcomes, insight into specific predictors of

revision and reoperation remain limited. Additionally, prior studies demonstrated that overcorrection during initial surgery significantly reduced complications, such temporal hollowing, and led to better aesthetic results. This study aims to investigate patient and surgical factors associated with unplanned reoperation, with the goal of refining preoperative planning to improve long-term surgical outcomes in UCS.

Methods: We retrospectively analyzed 108 patients treated for UCS at a single institution between 2001-2024, with a median follow up of 5.30 ± 4.85 years. Demographic data, initial surgical approach, and reoperation details were collected. Chi squared was utilized to compare unplanned reoperation rates by gender and by approach and t-test were utilized to compare average age at initial surgery in no unplanned reoperations and unplanned reoperation cohorts.

Results: Our analyzed cohort predominantly included female (73.1%) and had a mean age of 10.45 ± 8.7 months at their first surgery. Front-orbital advancement (FOA) without distractors was the most common procedure (n=71, 65.7%), followed by fronto-orbital distraction osteogenesis (FODO, n=27, 25.0%), and by endoscopic suturectomy with helmeting (ENDO, n=10, 9.3%). All patients who underwent FODO had a planned reoperation to remove the cranial distractor devices. When looking at long-term unplanned reoperations, 50.7% of FOA patients required an unplanned reoperation at a mean of 4.8 ± 3.4 years postoperatively, 51% of FODO patients required an unplanned reoperation at a mean of 1.1 ± 0.2 years postoperatively, and 20% of ENDO patients required an unplanned reoperation at a mean of 4.93 ± 0.02 years postoperatively.
Of the unplanned reoperations, the leading reason was due to cranial defect / relapse of deformity (35%), followed by aesthetic concerns (33%),17% due to infection, and finally the combined indication of both persistent aesthetic and cranial defects (15%). Unplanned reoperations included infectious debridement (17.3%), soft tissue augmentation (9.6%), onlay cranioplasty (42.3%), inlay cranioplasty (9.6%), and total revision FOA (21.2%). 15.5% of FOA patients required a secondary FOA, with 2 of those FOA patients requiring two secondary FOA procedures, while no FODO patients or ENDO patients required additional FOA.
Statistical analysis showed that the average age at initial surgery did not differ significantly between patients who did and did not undergo an unplanned reoperation ($p = 0.7045$, t-test). Additionally, the rates of unplanned reoperation were not statistically different between the FOA and FODO surgical approaches ($p = 0.9193$, chi-squared test). Similarly, no significant difference was found in unplanned reoperation rates based on gender ($p = 0.39366$, chi-squared test).

Conclusions: These findings emphasize the critical role of further morphological assessment and preoperative planning to improve long-term craniofacial outcomes and minimize reoperations.

Effect of Cranioplasty Timing on Balance and Motor Coordination in a Model of Syndrome of the Trephined

Abstract Presenter: Ryan Enslow

Abstract Co-Author(s): Caroline Gillespie, Jude Kluemper, Abdulaziz Elemosho MD, Hallie Harris, James Orfila, Paco Herson, Kerry-Ann Mitchell MD, PhD

PURPOSE: Syndrome of the Trephined (SoT) involves neurological decline following segmental skull removal, that improves following cranioplasty. Decompressive craniectomy (DC) after TBI is frequently associated with SoT in patients. Cranioplasty repairs skull defects, protects the brain, improves aesthetics, and improves neurological function in SoT. This study uses a mouse model of decompressive craniectomy to examine SoT's neurological impact and the role of cranioplasty timing after traumatic brain injury (TBI).

METHODS: Adult C57BL/6 mice underwent craniectomy, with the calvarial bone cryopreserved and replaced in an early cranioplasty (ECP) at 2 weeks or delayed cranioplasty (DCP) at 10 weeks. Groups included: 1) ECP, 2) DCP, 3) TBI+ECP, and 4) TBI+ DCP. This study utilized a controlled cortical impact model of TBI, with an impact depth of 2mm. Balance and fine motor coordination were evaluated through balance beam testing at baseline and at weekly time points from 1 to 16 weeks after their craniectomy surgery.

RESULTS: As expected, all groups exhibited motor deficits in the early post-operative period. By week 4, the ECP group had nearly returned to baseline performance, while the DCP group continued to decline, experiencing significantly more foot slips from weeks 4 to 10 ($p < 0.02$). Between weeks 2 and 10, there was no significant difference in foot slips between the DCP and TBI+DCP groups, indicating that the lack of calvarial bone replacement leads to neurological dysfunction in balance and fine motor coordination, regardless of the presence of traumatic brain injury (TBI). However, following delayed cranioplasty at week 10, the DCP group showed marked improvement compared to the ECP group, highlighting the benefits of cranioplasty. Overall, the TBI

groups performed worse than the non-TBI groups, regardless of cranioplasty. Interestingly, TBI+ECP mice had significantly more foot slips than TBI+DCP mice for 10 out of 16 weeks, peaking at week 8 ($p = 0.0086$).

CONCLUSION: A key feature of the Syndrome of the Trephined is the improvement of neurological symptoms, such as balance and motor coordination, following cranioplasty. In this study, we demonstrate using a novel mouse model that cranioplasty can resolve these deficits even in the absence of traumatic brain injury (TBI), at both early and delayed time points. However, in cases of TBI, mice that underwent early cranioplasty performed worse, suggesting that premature bone replacement may hinder neurological recovery if brain swelling has not fully resolved. Ongoing studies aim to determine the optimal timing for cranioplasty after TBI, with the goal of maximizing recovery from TBI while alleviating symptoms associated with the Syndrome of the Trephined.

Cranioplasty Complications are Reduced with Plastic Surgery Involvement

Abstract Presenter: Cynthia Guo

Abstract Co-Author(s): Nidhi Shinde, Joshua Feler, Jung Ho Gong MD, Albert Woo MD

Purpose: Cranioplasty is commonly performed after craniectomies to provide structural protection of the cerebrum and restore cosmesis. Complications after cranioplasty are not insignificant and cause prolonged recovery and return to the operating room. While the procedure may be performed solely by neurosurgeons, plastic/reconstructive surgeons (PRS) are occasionally consulted in cranioplasties for implant placement and wound closure. The impact of PRS involvement on postoperative cranioplasty outcomes remains poorly researched. Similarly, the role of PRS in primary versus secondary cranioplasties is also underexplored.

Methods: A retrospective chart review was conducted examining all cranioplasties performed at a single institution between 2015 to 2024. No cranioplasty materials were excluded. PRS involvement as determined by operative notes, cranioplasty number (primary versus secondary), and postoperative complications requiring further imaging or workup were noted for each procedure. Logistic regression analyses were performed in RStudio (v.2023, Posit PBC) with statistical significance at $p<0.05$.

Results: A total of 364 cranioplasties were evaluated, with 154 (42.3%) involving PRS. Of the 364 cranioplasties, 304 (83.5%) were primary and 60 (16.5%) were revision cranioplasties. For all cranioplasties when adjusting for obesity, PRS involvement had a significantly lower rate of extra-axial fluid collection (OR 0.42, 95% CI 0.19-0.86, p=0.022). When examining only primary cranioplasties, PRS involvement also had significantly decreased rates of extra-axial fluid (OR 0.27, CI 0.09-0.67, p=0.009). While not significant, PRS involvement in primary cranioplasties had lower rates compared to no PRS involvement for overall any complication at 35.2% vs. 37.8% (OR 0.87, CI 0.52-1.41, p=0.566), pseudomeningocele/CSF leak at 5.6% vs. 7.7% (OR 0.66, CI 0.23-1.70, p=0.414), implant exposure/abscess at 5.6% vs. 6.1% (OR 0.84, CI 0.28-2.26, p=0.743), hydrocephalus at 5.6% vs. 6.1% (OR 0.98, CI 0.33-2.62, p=0.965), and overall any infection at 11.1% vs. 12.2% (OR 0.92, CI 0.42-1.90, p=0.825).

For secondary cranioplasties, PRS involvement had significantly lower odds of overall any complication (OR 0.19, CI 0.03-0.90, p=0.049), pseudomeningocele/CSF leak (OR 0.12, CI 0.01-0.67, p=0.022), and unplanned reoperation (OR 0.14, CI 0.02-0.68, p=0.022). PRS involvement in secondary cranioplasties had near significance for lower rates of implant exposure/abscess at 12.5% vs. 36.4% (OR 0.25, CI 0.05-1.29, p=0.093), hydrocephalus at 6.3% vs. 27.3% (OR 0.16, CI 0.02-1.15, p=0.073), overall any infection at 18.8% vs. 45.5% (OR 0.27, CI 0.06-1.21, p=0.085), and surgical site/tissue/wound infection at 18.8% vs. 45.5% (OR 0.27, CI 0.06-1.21, p=0.085). While not significant, PRS involvement in secondary cranioplasties also had lower rates compared to no PRS involvement for extra-axial fluid at 12.5% vs. 18.2% (OR 0.63, CI 0.10-5.09, p=0.623) and implant failure at 28.1% vs. 54.5% (OR 0.31, CI 0.07-1.30, p=0.112).

Conclusion: Cranioplasties can be associated with high postoperative morbidity, and thus exploring ways to minimize complications is critical. At this institution, PRS involvement was found to significantly improve postoperative outcomes for overall, primary, and secondary cranioplasties particularly in reducing development of extra-axial fluid collections, CSF leak, and unplanned reoperation. Further investigation is warranted to explore the benefits and potential of PRS involvement in cranioplasties.

The Impact of Obesity on Donor and Recipient Site Morbidity in Mandibular Reconstruction with Fibula Free Flap

Abstract Presenter: Jenny Chen

Abstract Co-Author(s): Ayana Cole-Price MD, MSc, Kyeong-Tae Lee MD, Lillian Boe, Geoffrey Hespe MD, Jennifer Wang, Ariel Gabay, Benjamin Wagner, Bracha Pollack, Farooq Shahzad MD, Jonas Nelson MD, Evan Matros MD, Robert Allen Jr., MD

Introduction: Obesity is a known risk factor for postoperative complications across surgical fields (1,2). However, its impact on mandibular reconstruction using the fibula free flap (FFF) remains underexplored. This study investigates the association between BMI and postoperative morbidity in patients undergoing mandibular reconstruction with FFF, focusing on complications and donor site ambulatory function.

Methods: This retrospective cohort study included patients who underwent mandibular reconstruction with FFF from 2000 to 2024. Patients aged 18 years or older were eligible. The primary outcome was the incidence of donor and recipient site complications. Secondary outcomes included physical therapy data such as gait distance, training duration, pain levels, session count, and follow-up. Patients were categorized by BMI: underweight (<18.5 kg/m²), normal weight (18.5–24.9 kg/m²), overweight (25–29.9 kg/m²), and obese (≥30 kg/m²). Statistical analyses included chi-square tests and multivariate regression to identify independent predictors of morbidity. Multivariate models adjusted for age, gender, smoking status, Charlson co-morbidity score, and timing of chemotherapy.

Results: Among 434 patients (median BMI: 24.4, IQR 20.7–27.4), 12.2% were underweight, 43.5% normal weight, 30.9% overweight, and 13.4% obese. Gender distribution varied by BMI, with a higher proportion of females in the underweight group (58%) and a male predominance in the normal weight, overweight, and obese groups (58%, 74%, and 67%, respectively; $p < 0.001$). Variables capturing the extent of the resection, such as number of fibula segments, flap area, and donor site closure (primary vs. skin graft), did not differ across BMI cohorts ($p = 0.9$, 0.6, 0.3). Donor site complications occurred in 29% of patients, with delayed wound healing being the most common. Donor site complication rates differed significantly across BMI cohorts. The underweight group had a significantly lower complication rate (11%) compared to the normal weight group (33%, $p = 0.02$). In contrast, complication rates in the overweight (27%, $p = 1.00$) and obese (41%, $p = 0.358$) groups did not differ significantly from the normal weight group. Recipient site complications and 90-day readmission, reoperation, and mortality did not differ across BMI categories. All physical therapy outcomes were similar. Multivariate analysis found that being underweight was protective against donor site morbidity (OR = 0.25, 95% CI 0.09–0.61, $p = 0.004$), while being overweight or obese were not significant predictors.

Conclusion: Underweight patients were found to have significantly lower rates of donor site complications compared to normal weight patients, which remained true in multivariate analyses. However, BMI did not predict recipient site morbidity or affect physical therapy outcomes, suggesting functional recovery may be independent of weight status. These findings highlight the nuanced role of BMI in FFF morbidity and underscore the need for further research to optimize patient selection and perioperative care.

REFERENCES:
(1) Pierpont YN, Dinh TP, Salas RE, et al. Obesity and Surgical Wound Healing: A Current Review. ISRN Obes. 2014;2014:638936. doi:10.1155/2014/638936
(2) Goltsman D, Warrier S, Mak C, Spillane A, Ascherman JA. Association between body mass index and adverse surgical outcomes of implant-based breast reconstruction: a prospective cohort study of 5,545 breast reconstructions. Ann Breast Surg. 2022;6(0). doi:10.21037/abs-21-2

Determinants of Local Recurrence, Metastasis, and Long-Term Survival in Pediatric Head and Neck Sarcoma

Abstract Presenter: Meryem Guler

Abstract Co-Author(s): Raina Patel, Melanie Bakovic, Valeria Mejia, Asli Pekcan, Marvee Turk MD, Alyssa Valenti MD, Mark Urata MD, Jeffrey Hammoudeh MD

Introduction: Sarcomas of the head and neck are relatively rare in the pediatric population. They are a heterogeneous group of malignancies, posing both diagnostic and therapeutic challenges. Prognostic indicators for long term outcomes including local recurrence and metastasis have yet to be established in this patient population. In this study, we describe long-term outcomes in children with head and neck sarcoma (HNS).

Methods: A retrospective review was conducted of patients with HNS treated at a tertiary children's hospital from 2006 to 2024. Patients who had a follow-up time of less than one year were excluded. Demographic data, tumor characteristics, and treatment modality were collected. Primary outcome measures included secondary surgical resection, incidence of local recurrence, occurrence of metastasis, and associated morbidity. Statistical analyses were performed using Pearson's chi-squared test,

independent samples t-test, and Wilcoxon-sign rank test. Multivariable logistic regression was also performed to assess the predictive value of individual determinants on primary outcome measures.

Results: A total of 61 children with HNS met inclusion criteria. Of them, 35 patients (57.3%) had rhabdomyosarcoma, 10 patients (16.4%) had fibrosarcoma, and 7 patients (11.5%) had osteosarcoma. The remaining 9 patients had Ewing sarcoma (6.6%), epithelioid sarcoma (4.9%), or synovial sarcoma (1.6%). The median age at diagnosis was 7.4 years [3.1-14.8] and the average follow-up time was 6.6 years. Mortality during the study period was 26.2%. Patients with rhabdomyosarcoma were 2 times less likely to require surgical re-resection compared to all other HNS types ($p=0.03$). Other protective factors against surgical re-resection were R0 margins at initial surgery ($p<0.001$) and adjuvant chemotherapy ($p=0.019$). In terms of recurrence rates, patients with histologic grade G1 tumors were 9 times less likely to have local recurrence compared to higher grade tumors ($p=0.015$). Additionally, patients without lymph node invasion were 2 times less likely to have local recurrence ($p=0.03$). Tumor size was not correlated with local recurrence ($p=0.136$). In terms of metastasis, tumor size less than 2 cm was 4 times less likely to be associated with metastatic disease ($p<0.001$). Finally, patients with osteosarcoma and high histologic grade G3-G4 tumors were more likely to develop metastases ($p=0.011$ and $p=0.014$, respectively). Finally, morbidity rates were significantly lower in patients with no metastatic disease ($p=0.006$) and who were surgically resected ($p=0.001$).

Conclusion: In this study, we identified critical factors influencing local and distant recurrence in pediatric patients with HNS. Adjuvant chemotherapy and small tumor size were both associated with a lower likelihood of surgical re-resection and distant metastasis, respectively. High histologic grade and lymph node involvement were significant predictors of local recurrence. These findings highlight the importance of early diagnosis and tailored therapeutic strategies to enhance long-term survivability in this vulnerable population.

Lessons from 800 Cleft Palate Repairs: Long-Term Outcomes and Risk Factors

Abstract Presenter: Caroline Kreh

Abstract Co-Author(s): Melanie Bakovic, Raina Patel, Asli Pekcan, Valeria Mejia, William Magee, III MD, DDS, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Patients undergoing cleft palate (CP) repair may require additional procedures for palatal fistulas, velopharyngeal insufficiency (VPI), and midface hypoplasia. This study examines trends in these outcomes and evaluates risk factors for secondary procedures at a single institution.

Methods: We retrospectively reviewed patients who underwent CP repair between 1994 and 2019 at a tertiary institution, excluding those with less than five years of follow-up. Outcomes included rates of post-CP-repair palatal fistulas, VPI surgeries, and orthognathic surgeries or recommendations for orthognathic surgery.

Results: Of the 812 patients who met inclusion criteria, 630 were non-syndromic. The median age at CP repair was 12.1 months, with a median follow-up of 11.8 years. Over time, rates of palatal fistulas ($\beta = -0.808$, $p<0.001$), VPI surgeries ($\beta = -0.395$, $p<0.001$), and orthognathic surgeries ($\beta = -4.612$, $p<0.001$) significantly decreased despite a rising trend in CP repairs ($\beta = 1.476$, $p<0.001$). In multivariate analysis, bilateral CP and older age at CP repair increased odds of postoperative palatal fistulas, while straight-line repair (SLR) palatoplasty was protective. Bilateral CP and palatal fistulas increased the risk of VPI surgery rate, while surgeon experience and SLR were protective. Bilateral CP, palatal fistulas, and palatal expansion increased the risk of orthognathic surgery, while SLR was protective

Conclusion: In high-volume institutions, factors like cleft type, repair timing, repair technique, and surgeon experience significantly influence outcomes, suggesting that targeted interventions may optimize long-term results.

Navigating the Facial Landscape: Topographic Mapping of Soft Tissue Thickness and Fat Compartments

Abstract Presenter: Alexander Andrew Argame

Abstract Co-Author(s): Anne Hall, Catherine Cascavita, Archi Patel, Justine Lee MD, PhD, FACS, Kaavian Shariati

Purpose: Sexual dimorphism in craniofacial skeletal structures has been thoroughly described. While differences in facial soft tissue structure have also been recognized, they have historically been appraised through qualitative or superficial anthropometric

analyses. Consequently, procedural guidelines for soft tissue intervention may lack the precision or dimensionality applied in osseous reconstruction. Modern imaging tools have improved quantification of subsurface soft tissue parameters, including depth, yet these data are seldom directly implemented in aesthetic practice. This systematic review investigates facial soft tissue thickness (FSTT) variability across sex, ethnicity, body mass index (BMI), and age, integrating findings with facial fat pad anatomy to predict fat pad contributions to FSTT and propose a guide informing fat grafting.

Methods: A systematic review and meta-analysis were performed following PRISMA guidelines. PubMed and Web of Science were searched for in vivo imaging-based studies in adult males and females with specified ethnicities. Data were extracted for mean FSTT (±SD) at 31 craniofacial landmarks, stratified by age and BMI where available. Landmarks were grouped into nine surface regions and aligned with 14 established fat compartments (11 superficial, 3 deep). Statistical analyses included multiple linear regression models and unpaired parametric t-tests with Welch corrections.

Results: 33 studies comprising 6,530 individuals (3,303 Male, 3,227 Female) across various ethnic categories-including South Asian (31.5%), Caucasian (25.2%), and East Asian (23.7%) individuals-met inclusion criteria. Males exhibited greater FSTT at most facial regions, with particularly higher magnitude at midline regions such as the perioral area (M=11.9±2.5mm, F=10.7±2.4mm, $p<0.001$), while females had thicker paramedian FSTT in only zygomatic (F=9.3±2.5mm, M=8.6±2.4mm, $p<0.001$) and infraorbital (F=9.9±2.8, M=9.3±2.7mm, $p<0.001$) regions. Increasing age and BMI reduced the magnitude of sexual FSTT dimorphism, and comparisons of ethnic groups revealed differential dimorphism that varied across landmarks. FSTT mapping to fat compartments suggested that female-dominant thickness occurs only in regions containing both deep and superficial fat pads. In pooled multiethnic analyses, deep fat pad regions were significantly thicker in females (F=13.1±3.4mm, M=12.6±3.3mm, $p<0.001$), while superficial fat pad regions were thicker in males (F=8.8±2.6mm, M=9.3±2.5mm, $p<0.001$). Age-stratified linear regression models for individuals with normal BMI (20-25) revealed significant FSTT variation in deep fat pad-aligned landmarks in females ($R^2=0.94$, $F=50.6$, $p<0.01$) but not males ($R^2=0.24$, $F=0.93$, $p<0.01$). No significant trends were found in non-fat pad regions or superficial-only compartments for either sex.

Conclusion: This study established the largest in vivo FSTT database, with several ethnicity, age, and BMI trends identified upon preliminary analyses, and alignment with fat pad anatomy for data-driven, personalized facial fat grafting. While sexual dimorphism at lateral or paramedian landmarks may be primarily due to fat pad

differences, that seen for midline landmarks unaligned with fat compartments may be a function of general subcutaneous thickness. The findings here further suggest sex-dependent aging patterns in fat compartments. Deep fat pad regions may undergo grafting for more dramatic facial reshaping, while superficial regions may be more appropriate for subtle recontouring. Further research may seek to refine clinical applications and directly validate fat pad dynamics.

Developmental Outcomes Following Open or Endoscopic Cranial Vault Remodeling for Isolated Sagittal, Metopic, and Coronal Craniosynostosis

Abstract Presenter: Ethan Paliwoda

Abstract Co-Author(s): Mason Horne, Ishan Patel, Avi Gajjar, Christina Rudolph MD, Matthew Adamo, Stephanie Bray MD, MS

Introduction: Craniosynostosis, characterized by the early closure of cranial sutures, can disrupt normal skull growth and potentially hinder brain development, resulting in developmental delays. This study evaluates developmental outcomes in patients with single-suture sagittal, metopic, or coronal craniosynostosis, comparing two surgical approaches: open cranial vault remodeling and endoscopic strip craniectomy.

Methods: A retrospective cohort analysis was performed at a tertiary pediatric surgery center, reviewing cases of single-suture craniosynostosis managed between 2013 and 2024. Patients diagnosed with sagittal, metopic, or coronal craniosynostosis were grouped based on their surgical treatment: open cranial vault remodeling or endoscopic strip craniectomy. Collected data encompassed patient demographics, intraoperative parameters, and postoperative outcomes. Developmental progress across behavior, cognition, social function as well as gross and fine motor was tracked using postoperative progress notes, with preexisting developmental delays serving as an exclusion criterion.

Results: A total of 69 patients with isolated sagittal (28 endoscopic vs. 17 open), metopic (6 endoscopic vs. 6 open), and coronal (5 endoscopic vs. 7 open) craniosynostosis were analyzed. Those treated endoscopically were younger (3.23 months (SD=0.65) & 6.36 kg (SD=1.69) vs. 9.98 months (SD=5.30) & 9.18 kg (SD=1.93), $p<0.001$), experienced less blood loss (63 mL (SD=37) vs. 126 mL (SD=79), $p<0.001$), fewer drains (0% vs. 63%, $p<0.001$), shorter procedure durations (97 minutes

(SD=24) vs. 242 minutes (SD=86), p<0.001), shorter stays (2.66 days (SD=0.82) vs. 3.73 days (SD=0.98), p<0.001), and fewer opioids at discharge (41% vs. 77%, p=0.004) compared to those treated openly.

Within the first year postoperatively, those treated endoscopically for isolated sagittal craniosynostosis experienced lower rates of social delay (0% vs. 19%, p=0.049) compared to those treated openly and experienced lower rates of cognitive delay (4% vs. 31%, p<0.001) within the first three years postoperatively. Within the first three years postoperatively, those treated endoscopically for isolated coronal craniosynostosis experienced greater rates of cognitive delay (60% vs. 0%, p=0.045) compared to those treated openly. Overall, no significant differences in general developmental outcomes were observed between the two surgical approaches across all suture types within 12 months, between 12 and 36 months, or up to 36 months postoperatively.

Conclusion: Endoscopic strip craniectomy demonstrates improved intraoperative metrics, reduced postoperative recovery times, and shorter hospital stays compared to open cranial vault remodeling. While sample size limits long-term developmental outcomes conclusions, the findings suggest a potential advantage for endoscopic treatment in select cases.

Oronasal Fistulas Over Time: A Systematic Review and Meta-Analysis of Reported Oronasal Fistula Rates in the Literature

Abstract Presenter: Kirin Naidu

Abstract Co-Author(s): Isabel Ryan BS, Nicholas Han, Ashley Chang BA, Alvin Yu, Philip Tolley MD, Allison Hu MD, Scott Paul Bartlett MD, Jesse Taylor MD, Jordan Swanson MD, MSc

Background: Oronasal fistula (ONF) is a well-known complication of primary cleft palate repair which can lead to worsened speech, oral hygiene, and maxillary growth. Secondary closure of ONFs can be quite challenging as well, making the prevention of this complication of great interest. As surgical techniques have become more refined and there has been increasing access to educational resources and care delivery throughout the world, we anticipate there to be a temporal change in ONF rates. Therefore, we sought to evaluate how reported ONF rates in the literature have

changed over time and whether site of care or other treatment factors influenced outcomes.

Methods: A systematic review and meta-analysis following PRISMA guidelines was performed of publications between January 1960 to November 2024 that reported fistula rate following cleft palate repair as a primary or secondary outcome. Case studies, case series with less than twenty patients, letters, surveys, and systematic reviews were excluded. Studies that reported a fistula repair rate rather than a fistula occurrence rate were also excluded. Studies reporting on secondary palatoplasty, secondary fistulas, submucous clefts, or syndromic patients were excluded. Study type, year of publication, treatment center type, continent, country, World Bank classification, cohort start and finish date, and fistula rates were all collected.

Results: 223 publications with a total of 71,238 patients met inclusion criteria. The average fistula rate across all studies was 11.3% (95% CI: 9.8-12.8%). Most studies in our cohort were published in high-income countries (133, 59.6%), with fewer studies coming from upper-middle-income (44, 19.7%), lower-middle-income (36, 16.1%), and low-income countries (7, 3.1%). Fistula rates were found to vary significantly within our cohort when separated by publication decade (ANOVA, p=0.005), with an initial downward trend in fistula rates over time followed by a trend toward increasing reported fistula rates over the past 20 years. Average reported fistula rate was lowest in studies published in the 2000s (7.25%, [95% CI: 4.54%, 9.97%]), increased in the 2010s (9.98%, [95% CI: 8.07%, 11.9%]), and further increased in the 2020s (14.3%, [95% CI: 11.0%, 17.5%]). The reported fistula rate in studies published in the 2020s was significantly higher than those published in the 2000s (p=0.002) and 2010s (p=0.006). Prior to 2000, all studies in our cohort originated from high- and upper-middle- income countries. Post-2000, there were increasing numbers of studies from low- and middle-income countries, though they remained a minority of studies included.

Conclusions: Rates of fistula following cleft palate repair declined from early reports in the 1960s through the 2000s as expected but have interestingly shown a recent increase over the last two decades, as suggested by study publication year. This may suggest that in the early 21st century, surgical techniques and care significantly improved, or that publication bias may have been present in terms of greater reporting positive outcomes, though this warrants further investigation. Additionally, the rise of global health efforts and publications may account for this increase in reported fistula rates, leading to a more accurate depiction of cleft care outcomes globally.

Public Insurance as a Predictor of Postoperative Emergency Department Utilization in Craniosynostosis Repair

Abstract Presenter: Artur Manasyan

Abstract Co-Author(s): Erin Wolfe MD, Raina Patel, Asli Pekcan, Melanie Bakovic, Valeria Mejia, Jeffrey Hammoudeh MD, Mark Urata MD

Background: Postoperative emergency department (ED) visits are common across various procedures, often due to surgical complications, pain, and patient uncertainty about normal surgical recovery.(1-3) While major postoperative complications such as infections or dehiscence require acute medical management in the ED setting, many post-operative visit reasons are driven by minor postoperative symptoms such as fever or swelling.(1-3) In this study, we aim to identify the most common reasons for acute visits to the ED within 30 days following craniosynostosis surgery, with the intent of guiding improvements in postoperative care instructions, reducing postoperative ED visits and improving healthcare utilization.

Methods: A retrospective chart review of patients who underwent surgical repair of craniosynostosis at a tertiary children's hospital between 2003 and 2023 was performed. Patients with incomplete documentation and those lost to follow-up were excluded. The primary outcome was incidence of ED visits within a 30-day period after surgery. Secondary outcomes included duration until ED visit, visit indication, and insurance status.

Results: Among 794 patients who underwent surgical craniosynostosis repair, 38 (4.8%) required hospital-based acute care in the ED within 30 days postoperatively. The mean patient age was 9.0±3.4 months, with the majority being male (n=25, 65.8%). All patients underwent calvarial vault remodeling, with 13 (34.2%) who additionally had fronto-orbital advancement. The median time from surgery to ED visit was 9.5±7.7 days. The most common reasons included fever (8 visits, 21%), vomiting (7 visits, 18%), swelling (6 visits, 16%), and surgical site issues such as drainage, redness, or infection (6 visits, 16%). Other indications included surgical site bleeding (2 visits, 5%), trauma (2 visits, 5%), suture check (1 visit, 2.6%), ear pain (1 visit, 2.6%), seizure (1 visit, 2.6%), and upper respiratory tract viral illness (1 visit, 2.6%). There was a higher proportion of patients with public insurance compared to private insurance in the ED cohort versus those with no ED visits (p=0.011).

Conclusion: Fever, vomiting, and surgical site concerns are the primary drivers of ED visits after discharge from craniosynostosis surgery. Specific measures, such as providing caregivers with a clear postoperative fever management algorithm, educating families on recognizing normal versus abnormal symptoms, and scheduling early follow-up visits could potentially reduce avoidable ED visits.

References:
1. Kocher KE, Nallamothu BK, Birkmeyer JD, Dimick JB. Emergency department visits after surgery are common for Medicare patients, suggesting opportunities to improve care. Health Aff (Millwood). 2013;32(9):1600-1607. doi:10.1377/hlthaff.2013.0067

2. Toth M, Holmes M, Van Houtven C, Toles M, Weinberger M, Silberman P. Rural Medicare Beneficiaries Have Fewer Follow-up Visits and Greater Emergency Department Use Postdischarge [published correction appears in Med Care. 2015 Oct;53(10):908]. Med Care. 2015;53(9):800-808. doi:10.1097/MLR.0000000000000401

3. Vashi AA, Fox JP, Carr BG, et al. Use of hospital-based acute care among patients recently discharged from the hospital. JAMA. 2013;309(4):364-371. doi:10.1001/jama.2012.216219

Predicting Nutritional Needs and Growth Patterns in Patients with Robin Sequence Following Mandibular Distraction Osteogenesis

Abstract Presenter: Asli Pekcan

Abstract Co-Author(s): Valeria Mejia, Artur Manasyan, Idean Roohani, Raina Patel, Melanie Bakovic, Marvee Turk MD, Pasha Shakoori MD, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Mandibular distraction osteogenesis (MDO) effectively treats airway obstruction in patients with Robin Sequence (RS), while promoting structural changes that facilitate more efficient feeding mechanisms and promote growth in infancy. Many children still require supplementation via gastrostomy tubes (G-tubes) and/or parenteral nutrition. Additionally, the temporal pattern of weight gain following MDO is poorly understood, particularly in the context of syndromic RS. The purpose of this study was to evaluate predictors of nutritional supplementation and weight trajectories of patients with syndromic and non-syndromic RS post-MDO.

Methods: A retrospective review was conducted of RS patients who underwent MDO at a major children's hospital from May 2004 to November 2023. Those with less than one year of follow-up were excluded. Demographics, syndromic diagnoses, and feeding routes were collected. Weight-for-length (WFL) percentiles were recorded at birth, at time of MDO, and at one, three, six, and twelve months post-operatively. Observed and expected average daily weight gain (ADWG) were calculated using each patient's nearest standardized weight-for-length growth curve from their birth percentile. The percent difference between observed and expected ADWG was determined, with a positive value indicating greater weight gain than expected.

Results: A total of 94 patients met inclusion criteria (20 in syndromic RS cohort, 74 in isolated RS cohort). Median corrected gestational age was 1.0 month at time of MDO surgery. Overall, 41.5% received a G-tube within the study period. Full oral intake was achieved at a median of 39 days post-MDO. Patients with syndromic RS required more time to achieve full oral intake than those with isolated RS (55 days vs. 37 days, p=0.039). Multivariable logistic regression revealed greater odds of G-tube placement in patients with sRS (p=0.011) and those born preterm (p=0.002). Initial mean WFL percentiles decreased from birth to time of MDO, but increased to above 50th percentile by 12 months post-MDO. At 12 months post-MDO, the syndromic RS cohort had significantly lower mean WFL percentiles (p=0.001). Despite this, the ADWG percent differences did not vary between syndromic and isolated RS cohorts from MDO to 12 months postoperatively (p=0.49).

Conclusion: This study revealed significant improvements in oral intake and weight gain in patients with RS who underwent MDO, with both isolated and syndromic RS patients demonstrating positive growth trajectories. However, patients with syndromic diagnoses and preterm birth had greater G-tube requirements and required more time to achieve full oral intake. While those with syndromic RS exhibited lower WFL percentiles postoperatively, their growth aligned with expected ADWG, suggesting that with appropriate support, favorable outcomes are attainable in this population. Ultimately, tailored postoperative nutrition plans and close monitoring are critical for high-risk patients, particularly those with syndromic RS. These findings provide valuable insights and will aid physicians in counseling families on anticipated feeding and growth trajectories for patients with RS following MDO.

Comparison of Clinical and Patient Reported Outcomes for Velopharyngeal Insufficiency after Cleft Palate Repair

Abstract Presenter: Meghana Bhaskara

Abstract Co-Author(s): Khoa Tran, Katelyn Makar MD

Purpose: After cleft palate repair, children are followed for clinical surveillance of velopharyngeal insufficiency (VPI), occurring in up to 30% of patients. While speech and language pathologists (SLP) clinically diagnose VPI, it may not always impact a patient's quality of life (QoL) enough to pursue additional management. In this study, we sought to determine if lower QoL, as measured by the validated Velopharyngeal Life Outcomes (VELO) instrument, is associated with the decision for further treatment of VPI.

Methods: An IRB-approved cross-sectional study was performed with English- and Spanish-speaking patients presenting for routine follow up at a single institution's multidisciplinary cleft clinic (8/12/2024-12/16/2024). Caregivers completed the VELO questionnaire in clinic. Clinical evidence of VPI was defined as documentation of VPI or hypernasality in the most recent SLP note. Demographic and clinical data were extracted from electronic medical records. Patients were grouped into the following three categories based on SLP recommendations: scope/medical management for VPI recommended but family was uninterested, scope/medical management planned for VPI, and no scope/medical management recommended. Bivariate tests were used to measure associations between VELO scores and clinically evident VPI, treatment recommendation, insurance type, sex, race, cleft severity, syndromic cleft, age at primary repair (< or > 12 months), and type of primary repair.

Results: In the final cohort (N=54), 51.9% were female and 88.9% White. Nearly half were insured by Medicaid (48.1%). Mean age at the time of the survey was 7.9 years (SD=3.0). More than half (55.8%) underwent palatoplasty before 12 months of age, and most (74.5%) underwent Furlow primary palatoplasty. Medicaid insurance ($p=0.02$) and clinical evidence of VPI ($p<0.01$) were associated with lower VELO scores. Among patients with clinical evidence of VPI, median VELO score of patients with scope/medical management planned was significantly lower (56.250) compared with those who were recommended scope/medical management but were uninterested (78.846) and those who were not offered scope or medical management (70.192) ($p = 0.049$). Median VELO scores were similar in the latter two groups ($p=0.80$).

Conclusion: The impact of VPI on QoL adds critical context for decisions surrounding secondary speech surgery. Patients who pursued additional treatment for VPI had lower QoL as measured by the VELO instrument. However, those whose QoL was less affected by their VPI did not pursue further treatment, despite recommendations by the SLP. This emphasizes the need for shared decision-making and reveals a potential role for standardized QoL measurement in routine cleft care. Additionally, payor status negatively impacts access to care and may create barriers to speech therapy and surgery, thus necessitating close monitoring to ensure optimal surgical care.

A Multi-Institution Analysis of Insurance Status Effects on Alveolar Bone Graft Timing

Abstract Presenter: Hanna Pfershy MD

Abstract Co-Author(s): Jonathan Richard, Ryan Badiee MD, Elizabeth Danial, Brooke Dudick, Anna Carlson MD, Jason Pomerantz MD, FACS, FAAP, Gregory Fulton, John Girotto MD

Objective: Prior studies have shown Medicaid insurance status as a predictor for delays in alveolar bone grafting (ABG) at single institutions (1,2). This study aims to study a larger cohort by combining data across three institutions to determine how insurance status, institutional factors, and patient demographics effect a patient's likelihood of receiving timely alveolar bone grafting. These institutions are in three cities and states with vastly different political leanings, median incomes, racial profiles, and population densities.

Methods: A retrospective analysis of all patients that received alveolar bone grafting was performed across three institutions. A total of 587 patients were included in the analysis, 251 from Institution #1, 225 from Institution #2, and 111 from Institution #3. Demographic data, insurance status, driving distance, and median income was collected. Age at surgery as a linear variable and binary variable of standard timing (<12 years) versus late timing (>12 years) was analyzed using Chi-Square, Cochran-Mantel-Haenszel Test, Factor Analysis of Variance, and multiple logistic regression with a significance assessed at $\alpha = 0.05$.

Results: Results showed 51% of the cohort was male, the average age at surgery was 10.5 years, 29% received ABG after age 12, and 44% had Medicaid insurance. There

were higher proportions of male (67% vs. 53%, p<0.01), Hispanic (23% vs 5.5%, p<0.0001), and Black/African American (11% vs 2%, p<0.0001) patients who had Medicaid rather than private insurance. Those with Medicaid were older 11.02 [9.73, 13.48] at the time of surgery compared to those with private insurance 10.28 [9.32, 11.71], p<0.0001. Those with Medicaid had a higher proportion of late surgeries compared to those with private insurance (38% vs 22%, p<0.0001). Those with Medicaid had lower absolute median income and lower household median income as a ratio to state median income (HI:SI), p<0.0001. Results of the logistic regression with late ABG timing as the outcome showed institution, gender, race, median income, and distance to center were not significant predictors, while insurance status and HI:SI were independently statistically significantly associated with having a delay (p = 0.0015, p= 0.0097).

Conclusion: Our results showed that Medicaid holders were more likely to be male, Hispanic or Black/African American, with lower median household income and have a later age at ABG. Results of this study support that regardless of the institution, patients with Medicaid are more likely to receive their alveolar bone graft after age 12 and that wealth is a predictor of timely care across the country. Further studies are needed to explore how to overcome the delay that patients with Medicaid are facing to provide this patient population with equitable care.

1. Bushong EE, Patmon D, Pfershy H, Huffman C, Carlson A, Girotto J. Timing of Alveolar Bone Graft and Barriers to Care. Cleft Palate Craniofac J. Published online April 4, 2024. doi:10.1177/10556656241242695
2. Badiee RK, Yang SC, Alcon A, Weeks AC, Rosenbluth G, Pomerantz JH. Disparities in Timing of Alveolar Bone Grafting and Dental Reconstruction in Patients With Clefts. Cleft Palate Craniofac J. 2023;60(5):639-644. doi:10.1177/10556656211073049

Geographic Challenges in Cleft Lip and Palate Care in Oregon: A Mixed-Methods Analysis of Travel Burden and Patient-Reported Challenges

Abstract Presenter: Alexa Stefanko

Abstract Co-Author(s): Isabel Cylinder MD, Erik Wolfswinkel MD, Lori Howell MD, Ellie Moeller MD

Purpose: Oregon, a state with a large geographic area and significant rural population, has only one academic medical center offering pediatric subspecialty care. As a result, equitable access to pediatric surgical services remains a public health challenge. The Lancet's Global Surgery 2030 (1) lists timely access to essential surgical services as a key indicator of a functioning health system. Access to some services, including pediatric craniofacial surgery in Oregon, is limited due to geographic and socioeconomic factors. To date, this burden has not been analyzed. This study analyzes geographic access to cleft lip and palate (CLP) care and patient-reported barriers to care in Oregon at an academic center with pediatric fellowship-trained surgeons.

Methods: Patients ages 0 - 2 years who received comprehensive CLP care from 2005 - 2023 at the single academic center in Oregon were included. The geographic distribution of each patient was recorded based on home address. Average one-way travel distance and number of visits were recorded. Additionally, a survey was sent by email to 380 families of past CLP patients to assess travel burden, financial costs, work leave required, and perceived difficulty of obtaining care. Univariate analysis and t-tests were performed to analyze cohort and survey results.

Results: 357 patients were included in the study. The mean distance each patient traveled one-way to receive CLP care was 94 miles. The median number of in-person visits required over the first two years of life was 10. The average cumulative travel per patient in the first two years exceeded 2,400 miles.

35 families completed the survey. Families who traveled more than 50 miles reported significantly greater perceived difficulty in obtaining care compared to those traveling less than 50 miles (mean difficulty scores: 25.7 vs. 9.7, $p<0.05$). These families also reported higher travel and related costs. 89% (n=31) of survey respondents missed work to seek care for their child. While 68% (n=15) of those traveling more than 50 miles indicated they would utilize outreach clinics, only 32% (n=7) reported access to one at the time of care.

Conclusion: Patients receiving CLP care in Oregon face a significant travel burden due to the state's large geographic area and rural makeup. Families travel an average of 2,400 miles in their child's first two years, incurring financial strain. This burden is likely intensified by economic hardship, as three of the top four counties of patient origin have poverty rates exceeding state and national averages (13.4% vs. 12.1% and 11.5%, respectively). Survey responses reinforce that families who must travel farther report greater financial strain and higher perceived difficulty in obtaining care, as well as necessitating valuable time off work. Though patients in Oregon are receiving timely CLP surgical care by pediatric fellowship-trained specialists, the logistical and financial

burden to families may mirror similar burdens seen in low- and middle-income countries. This study underscores the need for healthcare policies in Oregon that comprehensively support access to essential surgical care for families of children born with CLP.

References:
1) Global Surgery 2030: evidence and solutions for achieving health, welfare, and economic development
Meara, John G et al. The Lancet, Volume 386, Issue 9993, 569 - 624

Comparing Mechanisms of Craniomaxillofacial Gunshot Wound Injuries: Fracture Patterns in Self-Inflicted, Assault, and Accidental Craniomaxillofacial Gunshot Wounds

Abstract Presenter: Ronald Cornely MPH

Abstract Co-Author(s): Mariam Saad MD, MPH, Ricardo Torres-Guzman MD, Odette Abou Ghanem MD, William Lineaweaver

Introduction: Craniomaxillofacial gunshot wounds (GSWs) require complex surgical management, yet little is known about how fracture patterns vary by injury mechanism. This study compares fracture patterns among self-inflicted gunshot wounds (SIGSWs), assault-related GSWs, and accidental firearm injuries to inform reconstructive decision-making.

Methods: A retrospective review of 448 patients with craniomaxillofacial GSWs treated at a tertiary care center (2018–2024) was conducted. Patients were categorized by injury mechanism: SIGSWs (n=195), assault-related (n=214), and accidental (n=39). Fracture patterns were analyzed across 24 craniofacial sites using radiographic imaging. Statistical comparisons were performed using chi-square tests and a multivariate logistic regression.

Results: Fracture distribution varied significantly by injury mechanism ($p<0.05$). SIGSWs were more frequently associated with calvarial ($p=0.015$), temporal ($p=0.007$), cribriform plate ($p=0.025$), sphenoid ($p=0.03$), and frontal bone fractures ($p=0.010$). Assault-related injuries demonstrated the highest prevalence of mandibular fractures ($p=0.151$), while maxillary fractures were most common in accidental injuries ($p=0.236$).

Temporal (OR 5.42, p=0.001), cribriform plate (OR 5.34, p=0.025), and frontal sinus (OR 8.88, p=0.002) fractures were significantly associated with 30-day mortality.

Conclusion: Fracture patterns in craniomaxillofacial GSWs vary by injury mechanism, with SIGSWs more likely to involve critical cranial structures. These findings highlight the need for tailored reconstructive strategies based on injury etiology. Improved understanding of fracture distribution can optimize surgical planning and patient outcomes.

Understanding Psychosocial Outcomes in Pediatric Patients with Cleft Lip and/or Palate

Abstract Presenter: Medha Vallurupalli

Abstract Co-Author(s): Chizoba Mosieri, James Antongiovanni, Yash Mehta, Nikhil Shah MD, Andreina Urrutia Gonzalez, Sharon Vargas, Miles Pfaff MD, MHS, Raj Vyas MD

Intro: Children with cleft lip and/or palate often encounter challenges with speech, feeding, and appearance. While the physical sequelae of cleft conditions are well-documented, the psychosocial outcomes in this population remain underexplored. Given the potential for these challenges to impact emotional and social functioning, this study aims to evaluate psychosocial outcomes, including family relationships, peer relationships, anger, anxiety, depression, and stress, among children with cleft conditions.

Methods: Participants were recruited from a tertiary care academic children's hospital. Participants with cleft conditions (cleft lip, cleft palate, or cleft lip and palate) were compared to controls recruited from the general pediatric clinic well-child visits at the same institution. Psychosocial outcomes, including family and peer relationships, anger, anxiety, depression, and stress, were assessed using Patient-Reported Outcomes Measurement Information System (PROMIS) self-report forms. PROMIS is a validated tool that enables standardized assessment of emotional health across various populations. PROMIS measures range from 1 (never) to 5 (always). T-test analyses were conducted to compare differences in outcomes between groups.

Results: Of 704 total patients, 353 were included: 118 in the control group, 146 with cleft lip and palate, 66 with isolated cleft palate, and 23 with isolated cleft lip. Children

with isolated cleft palate had significantly higher anxiety scores than control patients (M = 2.21, SD = .80 vs. M = 1.95, SD = .70, p = .021); they also had higher depression scores (M = 2.17, SD = .82 vs. M = 1.63, SD = .70, p < .001) and higher psychological stress scores (M = 2.20, SD = .84 vs. M = 1.91, SD = .76, p = .018).
Similarly, children with cleft lip and palate also showed higher anxiety scores (M = 2.18, SD = .89 vs. M = 1.95, SD = .70, p = .024) and depression scores (M = 1.87, SD = .88 vs. M = 1.63, SD = .70, p = .018) compared to control patients. In contrast, patients with isolated cleft lip demonstrated no significant psychosocial differences in the assessed domains. Additionally, a subgroup analysis comparing patients with unilateral versus bilateral cleft lip and palate (n = 142) also revealed no significant differences in the assessed domains.

Conclusions: This study highlights the significant psychosocial challenges faced by pediatric patients with cleft conditions, particularly those with isolated cleft palate and comorbid cleft lip and palate. Elevated levels of anxiety, depression, and psychological stress were observed in these groups, suggesting that cleft palate may have a profound impact on emotional well-being. However, no significant differences were found in psychosocial outcomes between unilateral and bilateral cleft lip and palate cases, indicating that severity of cleft does not necessarily predict psychosocial distress. These findings underscore the need for integrated psychosocial support as part of comprehensive care for children with cleft palate to improve their overall quality of life and emotional health.

Impact of Multidisciplinary Treatment on the Quality of Life of Patients with Apert Syndrome: A Longitudinal Analysis Using the HUI-3

Abstract Presenter: Emily Sampaio

Abstract Co-Author(s): Felipe Goncalves, Ariadne Miranda, Nivaldo Alonso MD

Purpose: Apert syndrome is a rare genetic disorder characterized by craniosynostosis, midface hypoplasia, and complex syndactyly, leading to significant functional and psychosocial challenges (1). This study aimed to evaluate the impact of multidisciplinary treatment on the quality of life (QoL) of patients with Apert syndrome using the Health Utilities Index (HUI-3) questionnaire (2), identifying the most affected domains and areas for therapeutic improvement.

Methods: A retrospective, cross-sectional study was conducted on 20 patients diagnosed with Apert syndrome and treated at the Hospital das Clínicas, University of São Paulo, between 2000 and 2022. Patients aged ≥5 years who completed the HUI-3 questionnaire were included. The HUI-3 assesses eight QoL attributes: vision, hearing, speech, mobility, dexterity, emotion, cognition, and pain. Data were collected from clinical evaluations, photographic documentation, and medical records.

Results: The most affected domains were speech (mean score: 0.42), cognition (0.75), and emotion (0.64). Over 60% of patients exhibited severe speech impairments, limiting effective communication. Cognitive deficits significantly impacted daily functioning, with all adult participants being unemployed. Emotional well-being was also compromised, with 62.5% of patients reporting unhappiness. Conversely, mobility (0.94) and dexterity (0.77) demonstrated better outcomes, with surgical interventions, such as syndactyly correction, improving function. Pain was the least affected domain, with most patients reporting minimal discomfort.

Conclusion: Treatment significantly improves functional and aesthetic outcomes in patients with Apert syndrome; however, persistent deficits in speech, cognition, and emotional well-being highlight the need for comprehensive, long-term care (3). The findings emphasize the necessity of integrating speech therapy, cognitive rehabilitation, psychological support, and educational interventions into the treatment paradigm to enhance patient quality of life beyond surgical correction (4)(5).

References

1: Conrady CD, Patel BC, Sharma S. Apert Syndrome. 2023 Jun 1. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. PMID: 30085535.
2: Feeny D, Furlong W, Boyle M, Torrance GW. Multi-attribute health status classification systems. Health Utilities Index. Pharmacoeconomics. 1995 Jun;7(6):490-502. doi: 10.2165/00019053-199507060-00004. PMID: 10155335.
3: Raposo-Amaral CE, Denadai R, Oliveira YM, Ghizoni E, Raposo-Amaral CA. Apert Syndrome Management: Changing Treatment Algorithm. J Craniofac Surg. 2020 May/Jun;31(3):648-652. doi: 10.1097/SCS.0000000000006105. PMID: 31895846.
4: Alonso N, Fisher DM, Bermudez L, da Silva Freitas R. Cleft lip and palate treatment. Plast Surg Int. 2013;2013:372751. doi: 10.1155/2013/372751. Epub 2013 May 25. PMID: 23766900; PMCID: PMC3677641.
5: Lu X, Forte AJ, Sawh-Martinez R, Wu R, Cabrejo R, Gabrick K, Steinbacher DM, Alperovich M, Alonso N, Persing JA. Temporal Evaluation of Craniofacial Relationships in Apert Syndrome. J Craniofac Surg. 2019 Mar/Apr;30(2):317-325. doi: 10.1097/SCS.0000000000004836. PMID: 30358751.

Ophthalmic Pathologies in Craniosynostosis: Prevalence and Risk Factors in the United States from the National Inpatient Sample, 2016-2022

Abstract Presenter: Dylan Kim

Abstract Co-Author(s): Xin Xin (Samantha) Xing, Lauren Yeager, Jeffrey Ascherman MD, FACS

Purpose: Craniosynostosis may affect vision development in children. Known ophthalmic manifestations of craniosynostosis include strabismus, papilledema, refractive errors, and amblyopia. Although existing literature has thoroughly investigated such comorbid ophthalmic findings, these studies have been largely limited to small sample sizes. This study uses a national inpatient database to estimate the prevalence of these ocular manifestations of craniosynostosis in the last decade, as well as their associations with sociodemographic and clinical drivers.

Methods: Hospital discharges with diagnoses of craniosynostosis were identified in the 2016-2022 National Inpatient Sample. Concurrent ophthalmic diagnoses were identified by ICD-10 codes. Admissions were additionally characterized by sociodemographic variables, such as age, sex, race, and insurance status, as well as clinical variables, such as hydrocephalus, Chiari malformation, and syndromic vs. non-syndromic craniosynostosis. A multivariable logistic regression model was used to evaluate independent predictors of comorbid ocular pathology ($p<0.05$).

Results: After accounting for random sampling, the final cohort included 39,850 discharges with craniosynostosis diagnoses from 2016-2022. The median age was 0 [IQR 0-2] years. The overall rate of ocular pathologies was 4.5% (1,800 discharges), which was split to 3.7% in non-syndromic cases and 7.1% in syndromic cases ($p<0.001$). The most common pathology was strabismus (1.5%), followed by papilledema (1.2%), refractive errors (0.8%), optic atrophy (0.2%), amblyopia (0.2%), and multiple pathologies (0.6%). The distribution of ophthalmic pathologies was different depending on syndromic diagnoses. The rate changed from 4.8% in. 2016 to 5.0% in 2022 and did not significantly change over the study period ($p=0.13$). In a multivariable model, hydrocephalus (OR: 1.86, 95% CI: 1.35-2.57, $p<0.001$), Chiari malformation (OR: 1.78, 95% CI: 1.31-2.42, $p<0.001$), and syndromic craniosynostosis (OR: 1.82, 95% CI: 1.64-2.02, $p<0.001$) predicted higher odds of concurrent ocular pathologies. When controlled by these factors, Black (OR: 1.21, 95% CI: 1.04-1.41, $p=0.016$) and

Hispanic (OR: 1.24, 95% CI: 1.10-1.40, p<0.001) race/ethnicity, older age (OR: 1.03, 95% CI: 1.02-1.03, p<0.001), and Medicaid insurance status (OR: 1.15, 95% CI: 1.04-1.28, p=0.0095) predicted higher odds of ocular pathologies. The average hospital charge was significantly higher for patients with ocular comorbidities than those without such comorbidities ($107,552 [$55,548-$182,076] vs. $70,067 [$30,046-$136,818], p<0.001).

Conclusion: This study provides a novel estimate of prevalence for ophthalmic pathologies in craniosynostosis in the United States. The overall prevalence was approximately 4.5% with the majority of these cases comprising strabismus and papilledema. Risk factors for increased intracranial pressure, skull malformation, and orbital deformity predicts higher odds of ocular manifestations. Additionally, historically underserved populations, such as Black and Hispanic patients and publicly insured patients, may experience a disproportionate epidemiological, clinical, and financial burden from these comorbid conditions. Such findings emphasize the need for multidisciplinary partnership and early ophthalmology referral for both syndromic and non-syndromic craniosynostosis cases.

The Impact of BMI on Surgical Complications Following Head and Neck Free-flap Reconstruction

Abstract Presenter: Elizabeth Dominguez MD

Abstract Co-Author(s): Vanessa Mroueh, Mario Solari MD

BACKGROUND: Research has shown that in patients undergoing soft tissue microvascular reconstruction, obese BMI predisposes patients to increased complications. Prior head and neck research is scarce but has demonstrated increased risk of complications, such as post-operative bleeding and flap necrosis with a low pre-operative BMI. However, there is limited research assessing the relationship between BMI and post-operative complications for patients undergoing microvascular reconstruction for head and neck cancer. It is important to understand the impact of BMI on surgical outcomes to properly optimize and counsel patients pre-operatively. This study aims to assess if BMI extremes are a risk factor for complications following oncologic head and neck microvascular reconstruction.

METHODS: A prospectively maintained database was utilized to identify patients who underwent head and neck microvascular reconstruction following oncologic ablation between 2019 and 2024. Patients were categorized into six groups, according to CDC classifications of BMI based on their pre-operative BMI. Variables, including flap type, intraoperative complications, and post-operative medical and surgical complications were collected. Data were analyzed using SPSS software.

RESULTS: After controlling for reconstructions involving a skin paddle, 553 patients were included in the final cohort. The mean BMI was 26.5. The study included 55 underweight, 189 normal weight, 168 overweight, 82 obese, 41 severely obese, and 18 morbidly obese patients. Underweight patients had a significantly higher rate of salivary leak compared to other BMI categories (23.6% vs. 10%, $p = 0.02$). There were otherwise no significant differences in intraoperative complications, including anastomotic revision, thrombosis, neck hematoma, or airway issues. There were also no differences in post-operative flap compromise, hematoma, infection/cellulitis, dehiscence, or necrosis formation across BMI categories. Patients were further assessed according to flap donor site. The study included 311 thigh flap patients, 24 back flap patients, 119 fibula flap patients, and 96 forearm flap patients. Thigh flap patients with a severely and morbidly obese BMI had higher rates of overall recipient site complications (14.3% and 33.3% vs <10%, $p = 0.044$). Thigh flap patients with a severely obese BMI also had increased rates of flap loss (14.3% vs. <2.2%, $p < 0.001$) and dehiscence (12.5% vs. <10%, $p = 0.029$) compared to other BMI categories. Obese patients with a fibula flap had higher rates of salivary leak (15.4% vs. 6.1% or less), though this did not reach statistical significance ($p = 0.051$). There were no significant differences in complication rates across BMI groups for forearm flap patients.

CONCLUSIONS: Surgical complication rates in head and neck microvascular reconstruction vary depending on flap type and BMI. Patients at BMI extremes may face additional comorbidities that predispose to perioperative complications. It is unclear whether BMI alone is a risk factor for complications, or a proxy for additional comorbidities. Nonetheless, BMI extremes, both underweight and obese, correlate to increased perioperative complications, emphasizing the importance of preoperative optimization and pertinent patient counseling on surgical risks.

Examining Sociodemographic Disparities in Diagnostic Delays and Surgical Management of Craniosynostosis: A 10-Year Review

Abstract Presenter: Theodore Hyman MD

Abstract Co-Author(s): Liara S. Ortiz-Ocasio, Melanie Bakovic, Sofia Finestone, Jennifer Goldman, Kennedy Sun, Brandon Boyarsky, Lilliana Starsiak, Md Sohel Rana, Esperanza Mantilla Rivas MD, saige teti, Eduardo Torres-Rodriguez, robert keating, Albert Oh MD, Gary Rogers MD

Background: Socioeconomic status (SES) and non-White race have been associated with delayed surgery and more invasive procedures in patients with craniosynostosis.[1-3] While attention to sociodemographic (SD) factors in craniosynostosis care has increased, literature on their impact on diagnostic delays, complications, and hospital stays remains limited and inconclusive. This study examines the influence of SD variables on surgical management and outcomes in a diverse population at a tertiary care center.

Methods: We conducted a retrospective review of patients with craniosynostosis undergoing surgical intervention from 2019 to 2023 at a pediatric tertiary hospital. Patients with craniofacial syndromes or prior craniosynostosis surgery were excluded. Data on patient demographics, dates of diagnosis, surgical management, and postoperative outcomes were collected. SES was measured using the Area Deprivation Index (ADI). Primary outcomes included time intervals from first plastic surgery or neurosurgery appointment, diagnosis, and surgery, along with hospital stay and postoperative complications. Statistical analyses were performed using the Mann-Whitney U test and Chi-squared/Fisher's Exact tests.

Results: Of the 170 patients, 49.7% were White, 85.3% primarily spoke English, 71.6% had private insurance, 73.5% had a low ADI score, and 65.9% underwent minimally invasive procedures. Patients who underwent open procedures were older at the time of first specialty appointment (9.3 vs. 1.9 months, $p<0.001$), diagnosis (9.6 vs. 2.2 months, $p<0.001$), and surgery (14.0 vs. 3.0 months, $p<0.001$). Hispanic/Latino and Black/African American patients were more likely to undergo open procedures (52.6% and 52.4%, respectively, vs. 21.4% White, $p=0.004$). Publicly insured patients were also more likely to undergo open procedures (47.9% vs 28.1%, $p = 0.014$). There was no significant difference in patients undergoing open vs minimally invasive procedures across ADI categories, primary language, or interpreter requirements. Length of hospital stay was longer for patients undergoing open procedures (3 vs. 1 day $p<0.001$), publicly insured patients (1.5 vs. 1 day, $p=0.027$), Hispanic/Latino patients (2 vs. 1 day, $p=0.006$), and Black/African American patients (2 vs. 1 day, $p=0.006$). No significant differences were observed in complication rates across procedure types, interpreter requirements, race/ethnicity, or insurance types.

Conclusion: Our study highlights that patients from lower SES, particularly Hispanic/Latinos, Black/African Americans and those publicly insured, experience longer referral delays to specialists, leading to later age at surgery and a higher likelihood of undergoing more invasive open procedures. These delays likely cause patients to miss the window for minimally invasive treatments, and they may be attributed to SD barriers, such as limited access to care, language barriers, or disparities in healthcare navigation.

References

1. Washington DM, Curtis LM, Waite K, Wolf MS, Paasche-Orlow MK. Sociodemographic Factors Mediate Race and Ethnicity-associated Childhood Asthma Health Disparities: a Longitudinal Analysis. J Racial Ethn Health Disparities. 2018;5(5):928-938. doi:10.1007/s40615-017-0441-2
2. Liu X, Rosa-Lugo LI, Cosby JL, Pritchett CV. Racial and Insurance Inequalities in Access to Early Pediatric Cochlear Implantation. Otolaryngol Neck Surg. 2021;164(3):667-674. doi:10.1177/0194599820953381
3. Lynn JV, Ranganathan K, Bageris MH, Hart-Johnson T, Buchman SR, Blackwood RA. Sociodemographic Predictors of Missed Appointments Among Patients With Cleft Lip and Palate. Cleft Palate Craniofacial J. 2018;55(10):1440-1446. doi:10.1177/1055665618764739

Reducing Cartilage Warp in Nasal Reconstruction: The Role of Collagen and Proteoglycans

Abstract Presenter: Saba Rafieian

Abstract Co-Author(s): Jeffrey Fialkov MD, Cari Whyne

Background: The use of costal cartilage in nasal reconstruction is often limited by its tendency to warp when cut. This study investigates the role of collagen fiber orientation and proteoglycan (PG) distribution in cartilage warp. Additionally, it evaluates the effectiveness of pre-treatment with hyperosmotic saline and collagen crosslinking in reducing warp.

Methods: Human costal cartilage specimens from the synchondrosis of rib 6 were scanned using a 7 Tesla MRI with optimized Diffusion Tensor Imaging parameters to map collagen fiber orientation. Histological analysis was used to map PG distribution. Resultant warp was quantified in transverse cartilage slices from the synchondrosis of 11 patients following immersion in isotonic saline (control), hyperosmotic saline, or methylglyoxal (MGO) for 24 hours.

Results: Distinct patterns of collagen fiber orientation were found in the synchondrosis, with anterior-posterior fibers in the mid/deep zones and a circumferentially oriented ring of fibers in the superficial layers. Histological analysis showed higher PG concentrations in the mid/deep zones. Pre-treatment with hyperosmotic saline significantly reduced warping immediately after slicing, and specimens maintained reduced warping up to 120 hours. MGO crosslinking at 4M concentration also significantly reduced warping immediately after sectioning, with a trend toward greater linearity at 120 hours.

Conclusions: This study describes the role of collagen fiber orientation and PG distribution in cartilage warping. Asymmetric disruption of the outer circumferential collagen ring combined with differential expansion of cartilage with higher PG concentration in deeper zones may result in differential expansion and therefore warp. Pre-treatment with hyperosmotic saline or collagen crosslinking reduces warping by balancing internal stresses and reinforcing the collagen network. These findings provide insights into minimizing cartilage warp post-sectioning and improving surgical outcomes.

Disparities in the Timing of Cleft Surgeries Based on Insurance Coverage

Abstract Presenter: Rachel Lee

Abstract Co-Author(s): Hanna Pfershy MD, Brooke Dudick, Anna Carlson MD, John Girotto MD

Introduction: The timing of cleft-related surgeries, including lip repair, palate closure, and alveolar bone grafting (ABG), is critical for speech development, dental eruption, and overall facial growth. Prior studies have established a relationship between public insurance and delayed care (1). This study aims to investigate the timeline of care for patients with private versus public insurance, to determine when patients are experiencing the greatest delay.

Methods: A retrospective analysis was conducted on patients who completed all cleft-related surgeries, up to and including ABG at a primary cleft center since 2012. Patients were categorized based on public or private insurance status. Data collected included age at first appointment, age at ABG, number of missed appointments, cancellations, completed appointments, and reasons for missed appointments. Timing intervals were analyzed between first appointment to first surgery, lip repair to palate closure, and palate closure to ABG. Statistical analysis included Wilcoxon Rank Sum tests, chi-square tests, and Fisher Exact tests to compare outcomes between insurance groups.

Results: A total of 127 patients were included, with 48 (37.8%) publicly insured and 79 (62.2%) privately insured. Compared to privately insured patients, patients with public insurance were older at the time of their first cleft appointment (27.74 vs. 21.54 days, $p=0.044$) and at the time of their ABG (11.48 vs. 10.29 years, $p=0.0029$). The interval between first appointment to first surgery and the interval between lip repair to palate closure were comparable between groups ($p=0.518$ and $p=0.779$, respectively). However, publicly insured patients experienced a delay from palate closure to ABG (10.52 vs. 9.35 years, $p=0.004$). They were also more likely to have at least one no-show appointment (77.08% vs. 36%, $p=0.0005$) and have a higher number of no-show appointments (2 vs. 0, $p<0.001$). Additionally, publicly insured patients were more likely to have a cancelled appointment due to transportation issues (25% vs. 6%, $p=0.0064$). Total number of completed appointments between insurance groups were comparable (18.5 vs. 20, $p=0.217$).

Conclusion: While the timing of early-stage surgeries such as lip repair and palate closure was comparable between insurance groups, publicly insured patients experienced delays in establishing cleft care and during the longer interval between palate closure and ABG when orthodontics are completed. These delays may be exacerbated by systemic barriers including higher rates of missed appointments and transportation issues, despite a comparable number of completed appointments across insurance groups. These findings highlight disparities in access to timely cleft care for publicly insured patients, emphasizing the need for improved continuity of care, particularly during extended surgical gaps.

References:

1. Bushong EE, Patmon D, Pfershy H, Huffman C, Carlson A, Girotto J. Timing of Alveolar Bone Graft and Barriers to Care. Cleft Palate Craniofac J. Published online April 4, 2024. doi:10.1177/10556656241242695

Two Decades of Mandibular Distraction Osteogenesis: How Age Influences Surgical Outcomes

Abstract Presenter: Mark Urata MD

Abstract Co-Author(s): Melanie Bakovic, Asli Pekcan, Raina Patel, Valeria Mejia, Marvee Turk MD, Alyssa Valenti MD, Jeffrey Hammoudeh MD

Background: Mandibular distraction osteogenesis (MDO) is an effective treatment for life-threatening upper airway obstruction in pediatric patients with micrognathia. However, recent data on how age at the time of distraction affects complication rates is limited. This study seeks to fill this gap by evaluating age-related risks associated with MDO and offering updated insights into complication rates based on patient age at the time of surgery.

Methods: A retrospective review on patients who underwent MDO between 2004 and 2023 at a tertiary institution was conducted. Patients with less than 6 months of follow-up were excluded from the analysis. The study population was divided into three equal groups by age at surgery: less than 3 weeks old, 3–14 weeks old, and greater than 14 weeks old at time of MDO. Primary outcomes assessed were 30-day postoperative infection rates, major complications (defined as those requiring rehospitalization or reoperation), and minor complications (defined as self-resolving or medically managed issues that did not require hospitalization or general anesthesia). Statistical analyses were performed using Fisher's exact test, Pearson's chi-squared test, and the Mann-Whitney U test.

Results: A total of 133 patients met the inclusion criteria, with a median age of 5.6 weeks at the time of surgery and a median follow-up of 6.1 years. Preoperative tracheostomy was only observed in the oldest cohort (9.3%, p=0.16). There were no significant differences across cohorts in the presence of craniofacial syndromes, total distraction distance, distraction rate, or activation duration. Postoperative outcomes revealed no significant differences in major complications or 30-day infection rates. However, minor complication rates were highest in the youngest cohort at 53.5%, followed by 39.5% in the 3–14 weeks cohort, and 20.9% in the oldest cohort (p=0.008). Specifically, wound dehiscence that did not require surgical intervention was most prevalent in the youngest cohort (20.9%), this was significantly higher than the 2.3% rate in the 3–14 weeks cohort and the 4.7% in the oldest cohort (p=0.005). No significant differences were observed in need for postoperative tracheostomy or oxygen requirements across cohorts.

Conclusion: Age does not significantly affect major complications following MDO, however, younger patients may be at a higher risk for minor complications, such as wound dehiscence. Overall, MDO remains a safe and effective procedure for patients of all ages, though attention to wound care and nutrition is especially critical for those who undergo surgery before three weeks of age.

The Impact of Neighborhood Socioeconomic Deprivation on Pediatric Head and Neck Free Flap Reconstruction

Abstract Presenter: Artur Manasyan

Abstract Co-Author(s): Jeffrey Hammoudeh MD, Asli Pekcan, Melanie Bakovic, Valeria Mejia, Raina Patel, Marvee Turk MD, Priyanka Naidu MD, Mark Urata MD

Background: Recent studies have identified various socioeconomic disparities in postoperative outcomes among adults undergoing head and neck (H&N) microsurgical reconstruction (1, 2). This dynamic has yet to be rigorously evaluated within the pediatric context. This study aimed to measure the impact of socioeconomic factors on outcomes of H&N free tissue transfer in a pediatric population.

Methods: A retrospective review was conducted of children who underwent H&N free tissue transfer (FTT) at a tertiary children's hospital from May 2007 to May 2024. Patients were grouped into cohorts according to the Area Deprivation Index (ADI) associated with their household zip code. ADI is a composite measure designed to quantify the geographic distribution of socioeconomic deprivation on a 10-point scale. Cohorts were defined as low deprivation for ADI 1-5 and high deprivation for ADI 6-10. Patients were further characterized by race, insurance status, and primary diagnosis. Outcomes included flap failure, flap dehiscence, flap revision, and duration of hospitalization.

Results: A total of 59 patients, undergoing 75 FTTs, met inclusion criteria, among whom 43.1% were considered low deprivation and 56.9% high deprivation. Mean age at surgery was 11.8 ± 4.8 years. Overall flap survival was 97.3%. Rates of flap failure, unanticipated revision, and readmission did not differ between cohorts. However, flap dehiscence was significantly more likely among high deprivation patients (25.6% vs.

6.2%, p=0.034). Furthermore, every 1 point increase in ADI over 5 was associated with a 7.8% increase in the odds of flap dehiscence ($p<0.05$).

Discussion: Neighborhood socioeconomic deprivation was independently predictive of flap dehiscence among children undergoing H&N FTT, but was not associated with flap failure, flap revisions, or 30-day readmissions. This finding underscores the broader impact of socioeconomic factors on pediatric health outcomes, particularly surgical wound healing. Poor nutrition, lower health literacy, and limited resources may drive this dynamic within our study population. Integrating socioeconomic considerations into pediatric microsurgical care may optimize outcomes for vulnerable patients after head and neck free flap reconstruction.

References

1. Njoroge MW, Karwoski AS, Gornitsky J, et al. Socioeconomic Disparities in Postoperative Outcomes of Osteocutaneous Fibula Free Flaps for Head and Neck Reconstruction. Ann Plast Surg. 2024;92(4S Suppl 2):S167-S171. doi:10.1097/SAP.0000000000003869

2. Goldberg ZN, Jain A, Wu R, Cognetti DM, Goldman RA. Social Determinants of Health Impact Complications Following Free-Flap Reconstruction for Head and Neck Cancer.

Enhancing Tissue Coverage Over Implants in Free Fibula Mandibular Reconstruction: An Osteotomy Approach to Minimize Implant Exposure

Abstract Presenter: Samarth Gupta MBBS, MS

Introduction: Since its introduction by Hidalgo in 1989, the free fibula flap has been the gold standard for mandibular reconstruction following oncologic resections. Despite advancements such as fibula-cutting guides, implant exposure remains a major complication, leading to increased patient morbidity and healthcare costs. Plate exposure rates in the literature range from 10% to 15%, with surgical site infections identified as a significant risk factor. While negative pressure dressings and local flap coverage may mitigate exposure, severe cases often necessitate implant removal and secondary reconstruction. This study presents a novel osteotomy technique designed to improve implant coverage, reduce long-term exposure, and enhance outcomes, particularly in the setting of postoperative radiotherapy.

Materials and Methods: A retrospective review of 580 free fibula flaps performed for mandibular reconstruction between January 2018 and December 2024 was conducted. Patients undergoing primary unilateral mandibular reconstruction were included, while those receiving double free flaps, secondary reconstructions, or treatment for recurrence were excluded. Patients were categorized into two groups: Group A (implant exposure) and Group B (no implant exposure). Demographic variables, comorbidities, pre- and postoperative radiotherapy, ischemia time, soft tissue coverage, flap complications, and reconstructive outcomes were analyzed. Statistical analysis included univariate and multivariate logistic regression to identify independent risk factors for implant exposure.

Results: Implant exposure occurred in 9 out of 580 cases (1.55%). Group A patients were significantly older (mean age: 58.11 years vs. 51.81 years, $p = 0.027$) and more likely to have undergone central segment reconstruction ($p = 0.004$). Adequate muscle coverage over the implant was significantly lower in Group A (33.33%) compared to Group B (97.02%, $p < 0.0001$), highlighting the importance of soft tissue protection. Postoperative chemoradiotherapy (CTRT) was significantly lower in Group A (33.33%) compared to Group B (76.53%, $p = 0.008$), suggesting a protective effect of adjuvant therapy. Total flap ischemia time was also lower in Group A (35 minutes vs. 41 minutes, $p < 0.0001$). Multivariate analysis identified age ≥65 years (OR = 7.263, $p = 0.023$), central segment reconstruction (OR = 43.357, $p = 0.001$), and inadequate muscle cover (OR = 22.669, $p < 0.0001$) as independent risk factors for implant exposure.

Discussion: Insufficient soft tissue coverage is a primary contributor to implant exposure and osteoradionecrosis (ORN). Our technique incorporates the flexor hallucis longus (FHL) muscle for additional coverage, significantly reducing implant exposure. Central segment reconstructions demonstrated the highest exposure risk, likely due to difficulty in achieving adequate muscle coverage in this region. Modifications such as harvesting a longer FHL muscle or discarding the distal 2–3 cm of fibula may enhance implant protection. While smoking and preoperative radiation are known risk factors for poor wound healing, they were not significantly associated with exposure in our study.

Little Faces, Big Challenges: A Two-Decade Analysis of Pediatric Midface Fractures

Abstract Presenter: Mark Urata MD

Abstract Co-Author(s): Valeria Mejia, Asli Pekcan, Melanie Bakovic, Raina Patel, Medha Vallurupalli, Alyssa Valenti MD, Mark Urata MD, Jeffrey Hammoudeh MD

Background: Trauma is a major cause of injury and mortality in children, and facial fractures in pediatric patients can lead to significant aesthetic, functional, and psychosocial issues. However, mechanisms and management of pediatric midface fractures, especially maxillary fractures, have not been extensively studied. This study analyzes injury mechanisms and treatment approaches for maxillary fractures in children and adolescents over two decades.

Methods: A retrospective review was conducted on patients with maxillary fractures treated at a major children's hospital from 2005 to 2024. Inclusion criteria focused on patients with Le Fort, dentoalveolar, or maxillary wall fractures confirmed by CT. Data collected included age, gender, fracture mechanism, type, referral, dental complications, and treatment. Patients were categorized into two age groups: children (0-12 years) and adolescents (13-18 years).

Results: Of 2401 patients with maxillofacial fractures, 176 had maxillary fractures. The mean age was 7.5 ± 3.5 years in children (89 patients) and 15.9 ± 2.5 years in adolescents (87 patients), with a male-to-female ratio of 2.75:1. Falls were the most common cause, followed by baseball injuries. Adolescents were 9 times more likely to sustain fractures from assault than children (18.4% vs. 2.7%, $p<0.05$). Most fractures were managed conservatively, while 24% required open reduction and fixation. Management methods, dentoalveolar fractures, tooth injuries, and referral types did not vary significantly between the age groups.

Conclusions: Falls were the primary cause of maxillary fractures across both age groups, with a higher male incidence. Adolescents were more likely to suffer fractures from assault compared to younger children. While conservative treatment prevailed, open reduction and fixation were effective for severe cases. These findings underscore the need for tailored strategies to prevent and manage midface fractures in pediatric patients, especially in adolescents affected by interpersonal violence.

Effect of orbital volume augmentation by Craniofacial procedures for Craniofacial syndromes: An experience from tertiary care centres

Abstract Presenter: Madhubari Vathulya M.S, Mch

Introduction: Craniofacial deformities, including craniosynostosis, midface underdevelopment, and orbital asymmetries, can result in both aesthetic and functional complications such as proptosis and distorted orbital geometry. Surgical techniques such as subcranial Lefort III osteotomy, fronto-orbital advancement (FOA), and periorbital osteotomies are designed to address these abnormalities by reshaping skeletal structures. However, their secondary effects on orbital volume augmentation are not well-documented.

Methodology: This study analyzed orbital volume changes in eight following craniofacial surgeries. Orbital volumes were assessed pre- and postoperatively using DICOM-based CT imaging processed with InVivo Anatomage software. Results were compared with age- and sex-specific normative data to determine both absolute and normalized volume changes. Surgical procedures included one subcranial Lefort III osteotomy, three FOA cases, and four periorbital osteotomies.

Results: All procedures demonstrated improvements in orbital volume, with subcranial Lefort III osteotomy producing the most significant increases. FOA primarily enhanced the superior orbital region, yielding moderate volume restoration. Periorbital osteotomies, including box and segmental osteotomies, provided localized adjustments to correct asymmetries with subtle improvement in volume. Younger patients exhibited greater relative volume increases, highlighting the effectiveness of early interventions in achieving substantial corrections.

Conclusion: This study underscores the unintentional yet impactful role of these surgeries in enhancing orbital volume alongside skeletal realignment. By demonstrating these additional benefits, it lays the groundwork for future investigations into optimizing craniofacial procedures for both functional and aesthetic outcomes through personalized surgical strategies and advanced planning tools.

References:

1. Katzen JT, McCarthy JG. Syndromes involving craniosynostosis and midface hypoplasia. Otolaryngol Clin North Am. 2000 Dec;33(6):1257-84, vi. doi: 10.1016/s0030-6665(05)70280-2. PMID: 11449786.
2. Richardson, D., Thiruchelvam, J. Craniofacial surgery for orbital malformations. Eye 20, 1224–1227 (2006). https://doi.org/10.1038/sj.eye.6702475
3. Grauer D, Cevidanes LS, Proffit WR. Working with DICOM craniofacial images. Am J Orthod Dentofacial Orthop. 2009 Sep;136(3):460-70. doi: 10.1016/j.ajodo.2009.04.016. PMID: 19732681; PMCID: PMC2761026.

4. Tiwana PS, Turvey TA. Subcranial procedures in craniofacial surgery: the Le Fort III osteotomy. Oral Maxillofac Surg Clin North Am. 2004 Nov;16(4):493-501. doi: 10.1016/j.coms.2004.08.001. PMID: 18088750.
5. Mendonca, Derick; Gejje, Somashekar; Kaladagi, Nitin. Fronto-orbital advancement: Revisited. Journal of Cleft Lip Palate and Craniofacial Anomalies 2(1):p 20-26, Jan–Jun 2015. | DOI: 10.4103/2348-2125.150739

Determinants of Shape Maintenance after Fronto-Orbital Advancement for Metopic Synostosis

Abstract Presenter: Dr. Srinivas Susarla MD, DMD, MPh

Abstract Co-Author(s): Dorsa Toghani, Ezgi Mercan, Craig Birgfeld MD, Amy Lee, Richard Ellenbogen, Richard Hopper MD

Background: Overcorrection for trigonocephaly has been reported to achieve better shape outcomes for trigonocephaly.1 The aim of this study was to quantify cranial shape and measure the effect of fronto-orbital advancement (FOA) on 2-year bandeau shape in metopic craniosynostosis (MCS).

Methods: A retrospective chart review was conducted to identify patients who underwent FOA for metopic synostosis. Patients with inadequate imaging were excluded. A control cohort of age-matched patients with no craniofacial abnormalities were used as shape comparison. Preoperative, immediate postoperative and 2-year postoperative computed tomography (CT) scans were annotated, cephalometric measurements and axial vectors at the level of bandeau were automatically calculated. A circularity measure was devised to evaluate the axial contour at the level of bandeau. On postoperative CTs, the advancement distances at the osteotomy were recorded near both zygomaticofrontal (ZF) sutures and nasion. Bivariate and multiple linear regression analyses were completed. A p-value < 0.05 was considered significant.

Results: CT data at 3 timepoints for 88 patients with MCS, 84 CT scans for control and 74 scans for 2-yr control cohorts were included. Age at FOA was 10.7 months (±2mo). Preoperatively, MCS group had significantly lower circularity score than matched controls. After FOA, the circularity of MCS group increased but relapsed slightly at 2-year follow-up. At 2-year follow-up MCS group still had higher circularity scores than matched control cohort, indicating rounder forehead shape. In linear regression models,

preoperative circularity score was a significant predictor of 2-year circularity score (p=0.02), while advancement distance and age were not (p=0.60 and p=0.88). Further analysis revealed that, advancement distance was negatively correlated with preoperative circularity (correlation coefficient=-0.33, p=0.004).

Conclusions: FOA is effective in normalizing cranial shape in metopic synostosis with favorable morphometric outcomes at 2-year follow-up. We utilized a circularity score to quantify the forehead shape. Cranial shape improved from preop to postop across MCS and comparable to controls at 2-year postop even with a slight relapse. Our longitudinal analysis found that the magnitude of advancement and shape correction negatively correlated with preoperative severity, where more severe trigonocephaly indicated further advancement and reshaping of the bandeau. Our multi-variable regression models revealed that preoperative severity was predictive of 2-year postoperative shape.

References:
1. Patel KB, Skolnick GB, Mulliken JB. Anthropometric Outcomes following Fronto-Orbital Advancement for Metopic Synostosis. Plast Reconstr Surg. 2016 May;137(5):1539-1547.

Anatomical Variations of the Nerve to the Extensor Hallucis Longus Muscle and Strategies for Minimizing Postoperative Great Toe Weakness in Free Fibula Flap Harvest: A Study of 62 Cases

Abstract Presenter: Samarth Gupta MBBS, MS

Background: The free fibula osteocutaneous flap has become a cornerstone in reconstructive head and neck surgery, particularly for mandibular and maxillary reconstructions. While the procedure is known for its reliability and low complication rate, donor site complications, such as motor weakness in the great toe, have been reported. This weakness is typically due to damage to the nerve supplying the extensor hallucis longus (EHL) muscle, responsible for dorsiflexion of the great toe. This study aims to investigate anatomical variations of the nerve to the EHL and evaluate strategies for minimizing nerve injury during flap harvest.

Methods: A prospective study was conducted at a tertiary cancer care institute between January 2024 and June 2024, involving 62 patients who underwent free fibula flap

harvest for mandibular or maxillary reconstruction. The course of the deep peroneal nerve and its branches to the EHL muscle were identified using a nerve stimulator to facilitate precise nerve preservation. Key anatomical measurements were recorded, and postoperative functional assessments of the great toe were performed. For comparative analysis, a retrospective cohort of 580 patients who underwent fibula flap harvest without nerve identification (Group B) was also included.

Results: The study revealed significant anatomical variability in the nerve supply to the EHL, with the nerve located most frequently on the tibial side (48.3% for the first branch and 53.5% for the second branch). Postoperative isolated EHL weakness occurred in only 1 patient (1.6%) in the experimental cohort, with full recovery within 6 months. In contrast, in the retrospective cohort, 2.06% of patients developed EHL weakness, with 0.86% experiencing complete recovery. Statistical analysis showed no significant difference between the two groups (p=0.11).

Conclusions: This study demonstrates that careful identification and preservation of the nerve to the EHL significantly reduces the risk of postoperative functional deficits after free fibula flap harvest. Despite low incidence of weakness, our results emphasize the importance of understanding the nerve's anatomical variations and employing meticulous surgical techniques to protect it, thus enhancing patient outcomes and minimizing motor deficits. Further refinement of surgical strategies and individualized approaches may further optimize outcomes in future cases.

Intraoperative Facial Nerve Monitoring during Mandibular Distraction Osteogenesis in Infants with Robin Sequence

Abstract Presenter: Athena Zhang MD

Abstract Co-Author(s): Nicole Episalla MD, Hoang-Viet Tran, Esperanza Mantilla Rivas MD, Md Sohel Rana, Haley Oh, Juan Rojas Cortez, Matthew Eccher, Gary Rogers MD, Albert Oh MD

Introduction: Mandibular distraction osteogenesis (MDO) is a critical intervention for addressing severe upper airway obstruction in infants with Robin Sequence (RS). Nevertheless, this procedure carries a risk of facial nerve dysfunction (FND), particularly affecting the marginal mandibular nerve (MMN). Since 2019, our group has routinely monitored real-time facial nerve conduction using electroneuronography (ENoG) during

MDO procedures. This pilot study evaluates nerve conduction changes during MDO procedures and their potential association with postoperative clinically visible FND.

Methods: Nine infants with RS undergoing MDO from 2019 to 2024 were randomly selected. ENoG recorded motor responses from the orbicularis oculi and mentalis muscles. Significant changes were defined as peak latency increase of ≥10% or an amplitude decrease of ≥60% from baseline.

Results: Twenty-five unilateral procedures [osteotomy/placement of hardware (18); hardware removal (6); revision (1)] were analyzed by a certified ENoG technician. Median age at surgery was 11.4 months (IQR 2.4, 42.7). Retraction during osteotomy was the surgical step most associated with a significant amplitude decrease in 83.3% of cases, while device activation caused the most frequent peak latency increase in 44.4% of cases. Temporary MMN dysfunction was observed in 4 postoperative clinical exams (16.7%). Sensitivity/Specificity were 17.6%/87.5% while NPV was 84.8%.

Conclusion: This pilot study suggests that the intraoperative risk of MMN injury during MDO is greatest during retraction during osteotomy and device activation. With a NPV of 84.8%, ENoG shows promise in reliably predicting the absence of postoperative FND. Further research is necessary to confirm its utility in mitigating FND risks.

Comparative 3-Dimensional Analysis of Isolated Squamosal Craniosynostosis

Abstract Presenter: Alexander Velazquez

Abstract Co-Author(s): Michael Lebhar MD, Bradley Hathaway Jr., Laura Humphries MD, Ian Hoppe MD

Purpose: Squamosal craniosynostosis (SQS) is a rare form of craniosynostosis characterized by the premature fusion of the minor squamosal suture. Unlike more commonly studied forms of craniosynostosis, SQS remains poorly understood due to its limited reported incidence. Consequently, its pathological effects on cranial morphology and intracranial volume (ICV) have not been thoroughly examined. This study aims to assess the volumetric effects of squamosal craniosynostosis on intracranial compartments using three-dimensional computed tomography (CT) analysis to identify anatomical regions most affected by this condition and provide a foundation for targeted reconstructive strategies.

Methods: A retrospective analysis was conducted on patients diagnosed with SQS at a single institution between 2012 and 2024. Eight patients with confirmed squamosal craniosynostosis were identified and matched to age- and sex-matched controls selected from a normative cranial imaging database. High-resolution head CT scans were obtained for all subjects, and volumetric analyses were performed using Syngo.via software. Cranial indices (CI) and intracranial volume measurements, including total intracranial volume and compartmental volumes (anterior, middle, and posterior cranial compartments), were extracted for comparison. Paired t-tests were employed to assess statistical differences between patients with SQS and their respective control counterparts.

Results: Analysis of cranial indices and intracranial volumes revealed an overall trend of lower cranial indices and reduced intracranial volumes in patients with squamosal craniosynostosis compared to age-sex-matched controls. However, while reductions in volume were observed across multiple compartments, only specific volumetric measurements demonstrated statistically significant differences. The most pronounced reductions were found in the middle and posterior cranial compartments, as well as in the total intracranial volume. The middle compartment volume was significantly decreased in patients with SQS compared to controls ($p = .03$). Similarly, the posterior cranial compartment volume was significantly lower in affected patients ($p = .006$). Finally, total intracranial volume was significantly lower in patients with SQS compared to their matched controls ($p = .03$).

Conclusions: Our preliminary findings demonstrate that squamosal craniosynostosis is associated with a significant reduction in intracranial volume, primarily affecting the middle and posterior cranial compartments. These findings suggest that SQS may alter normal skull development in ways that could have clinical implications, particularly regarding cranial vault expansion and potential elevations in intracranial pressure. While the clinical significance of these volume deficits remains to be fully elucidated, the results of this study provide an anatomical basis for considering targeted surgical intervention when indicated. Future research with larger patient cohorts and long-term neurocognitive assessments will be necessary to further define the implications of these findings and refine treatment strategies for this rare craniosynostosis subtype.

Wagner C, Pontell M, Reddy N, Salinero L, Barrero C, Swanson J, Taylor J, Bartlett SP. Isolated Squamosal Craniosynostosis: Considerations of Presentation, Intracranial Pressure, and Management. Plast Reconstr Surg Glob Open. 2023 Oct 18;11(10 Suppl):140-141. doi: 10.1097/01.GOX.0000992636.42120.95. PMCID: PMC10566778.

Fallahian F, Meyer A, Tadisina KK, Lin AY. Surgical Management in Isolated Squamosal Craniosynostosis: A Systematic Review. Ann Plast Surg. 2023 Oct 1;91(4):493-496. doi: 10.1097/SAP.0000000000003642. Epub 2023 Aug 12. PMID: 37553899.

Characterizing Antibiotic Practices in Cranial Vault Remodeling Surgery

Abstract Presenter: Alexander Velazquez

Abstract Co-Author(s): Pierce Hollier, Mikaela Kislevitz MD, Richard Cinclair MD, Lucas Harrison MD, Alex Kane MD, Paymon Sanati-Mehrizy MD

Purpose: The purpose of this study was to characterize antibiotic prophylaxis practices in pediatric patients who have received cranial vault remodeling surgery and understand how these practices impact 30-day postoperative infection rates.

Methods: This was a retrospective cohort study using the National Surgical Quality Improvement Program Pediatric database for years 2021 and 2022. Patients 18 years of age or younger who received cranial vault remodeling were included. Current Procedural Terminology (CPT) codes used included 61558, 61559, 61550, 61552, 61557, and 21175. The outcome of interest was 30-day postoperative surgical site infection (SSI), deep, and organ or space levels. Fisher's exact test and multivariable regression analysis were used to analyze the impact of intravenous antibiotic prophylaxis, intraoperative intravenous antibiotic redosing, postoperative antibiotic prophylaxis, and various antibiotic prophylaxis regimens.

Results: A total of 2,598 patients were included in this study, of which 2,565 (98.7%) received preoperative IV antibiotic prophylaxis, while 644 (25.1%) underwent intraoperative antibiotic redosing, and 1,789 (69.7%) had postoperative antibiotics continued after the procedure. The most commonly used primary antibiotics were Cefazolin (92.1%), Clindamycin (2.4%), Cefuroxime (1.5%), and Vancomycin (1.1%). A total of 49 instances of SSIs were observed, resulting in an overall infection rate of 1.88%, with 36 being superficial, 11 deep, and 2 organ-space infections. All patients with infections had received preoperative antibiotics, but none had received intraoperative redosing.

Statistical analysis revealed that preoperative IV antibiotic prophylaxis was not significantly associated with a reduction in SSIs, as demonstrated by the following p-

values: Superficial SSI (p = 0.433), Deep Incisional SSI (p = 0.719), and Organ-Space SSI (p = 0.873). Similarly, intraoperative antibiotic redosing (p = 0.719) and postoperative antibiotic continuation (p = 0.433) did not significantly alter SSI rates. Multivariable logistic regression adjusting for age, sex, and procedure type further confirmed that none of the antibiotic regimens significantly reduced the likelihood of developing a postoperative SSI (adjusted OR = 1.03, 95% CI: 0.76–1.39, p = 0.873).

Conclusions: We found that prophylactic IV antibiotic use did not significantly alter the rates of 30-day surgical site infections in pediatric cranial vault remodeling procedures. Results from this study can serve as the basis for further investigation to standardize antibiotic use and stewardship in pediatric craniofacial care.

Building a Face Transplantation Program: Lessons Learned from the First Two Decades of Vascularized Composite Allotransplantation

Abstract Presenter: Stav Brown MD

Abstract Co-Author(s): Felix Klimitz MD, Martin Kauke-Navarro MD, Olivier Noel MD, PhD, Yizhuo Shen, Siba Haykal MD, PhD, FRCSC, FACS, Bohdan Pomahac MD

Purpose: Facial Vascularized Composite Allotransplantation (fVCA) has emerged as a transformative solution for patients with severe facial disfigurement. Current Department of Defense funding aims to standardize indications, management, and outcomes collection in hand and face transplantation. With the 20th anniversary of the first face transplantation in November 2024, we aim to provide a comprehensive overview of our institutional protocol for face transplantation based on decades of clinical and research experience and the largest cohort of transplant patients, aiming to support this effort.

Methods: We outline the essential components of the authors' protocol for face transplantation, including a step-by-step guide for program establishment, patient selection, donor screening, preoperative evaluation, surgical planning, immunosuppression and prophylactic therapy regimens, and long-term follow-up for patient outcomes.

Results: The development of our face transplantation program is anchored in a robust multidisciplinary collaboration. Key program components include rigorous patient and donor selection criteria, meticulous surgical planning using 3D cutting guides, and

comprehensive immunosuppressive and antimicrobial regimens pre and post-transplant. Our protocol also emphasizes long-term follow-up, focusing on functional recovery, aesthetic outcomes, and psychological well-being, and a comprehensive rehabilitation regimen.

Conclusions: Despite substantial progress, challenges remain in optimizing immunosuppressive protocols, improving rejection detection, and establishing standardized guidelines for follow-up care. Future research should focus on personalized immunosuppressive strategies and refining long-term outcome tracking. Collaborative efforts across institutions are necessary to establish evidence-based practices and further enhance the success of face transplantation programs globally.

Electronic Micro-mobility Craniofacial Trauma trends with Operators and Pedestrians

Abstract Presenter: Matthew Brett DO

Abstract Co-Author(s): Allison Diaz, Roberto Flores MD, Natalie Plana MD, Alexandra Lin, Dominika Pullmann-Carpio MD, Jasmina Abdalla

Purpose: Electric bicycle and scooter use has greatly expanded in major urban areas changing the public transit landscape and intersection traffic. This study reports injury patterns associated with micromobility vehicles treated at Level I trauma center located in a large urban city. This analysis includes incidence and nature of these injuries related to both the operators of the vehicles and the pedestrians stuck.

Methods: A single-institution, retrospective review of all patients presenting to an urban level I trauma hospital from January 2022 to December 2024 with an injury associated with a micromobility vehicle. Patients were identified from the trauma registry and only patients with craniomaxillofacial injuries were included. Patients' medical records were reviewed to assess age, gender, ethnicity, type of device, mechanism, use of protective gear, speed, Injury Severity Score (ISS), substance abuse, alcohol use, disposition from emergency department, operative intervention(s), hospital length of stay, and ICU length of stay. In addition to the operators of the micromobility vehicles, pedestrians stuck were also included in this analysis.

Results: 91 patients were included in the study over a two-year period: 17 electronic bike operators, 24 electronic scooter operators, and 50 pedestrians struck. Electronic bike operators had an average age of 32.3, 88% male, averaged 13.35 injury severity score, and 35% were helmeted. Of the patients with craniofacial trauma, injuries included: intracranial bleed (41%), skull fracture (35%), facial fracture (47%), and craniofacial laceration (35%). Electronic scooter operators had an average age of 42.5, 88% male, Injury severity score of 13.6, and 21% helmeted. Of the patients with craniofacial trauma, injuries included: intracranial bleed (58%), skull fracture (16%), facial fracture (29%), and craniofacial laceration (70%). Subset analysis of patients for helmet use across all micromobility operators demonstrated that helmets reduced: injury severity score, ICU length of stay, hospital length of stay, intubation rate on arrival, intracranial hemorrhage rates, and skull fracture rates. 5 E-scooter patients required decompressive craniotomy compared to 1 E-bike patient. Additionally, 2 E-scooter patients required mandibular fixation, and 1 E-bike patient required zygomatic fracture fixation. Of note, only non-helmeted patients required surgical intervention for craniofacial injuries. Pedestrian struck patients had an average age of 50.22, 48% male, ISS 13.62. Injury patterns included the highest rates of intracranial trauma: 38 intracranial bleeds (76%), 20 skull fractures (40%), and 11 facial fractures (22%). 2 patients underwent decompressive craniotomy.

Conclusions: Motorized micromobility vehicles are associated with significant injuries. The frequent occurrence of concomitant injuries to the craniomaxillofacial region highlights substantial safety concerns. Helmet use reduced injury severity score, length of stay, ICU stay, and risk to intracranial injury. Pedestrians account for over 50% of occurrences and include the highest rate of intracranial injury.

Step Genioplasty Using Trapezoid Osteotomy

Abstract Presenter: Yoshitsugu Hattori MD

Abstract Co-Author(s): Takanobu Mashiko, Shoichi Imai, Yorikatsu Watanabe, Ryo Nagahama

Purpose: Chin is the most prominent feature of the lower face, and it considerably affects the overall facial attractiveness and harmony.[1,2] A broad and square chin is considered aesthetically unpleasing, and a small and slightly protruded chin is deemed attractive among East Asian women.[3-5] Therefore, advancement and narrowing

genioplasty is often performed. We have adopted the step genioplasty using trapezoid osteotomy for this purpose, where trapezoid-shaped osteotomized chin bone is placed onto the cephalic bony step. We present the surgical procedures and evaluate the outcomes.

Methods: We retrospectively reviewed consecutive patients who received genioplasty between January 2019 and December 2023. Details regarding patient demographics, surgical procedures, and postoperative complications were collected. Lateral cephalometric images were obtained before, immediately after, and at least 6 months after the genioplasty, and measured to evaluate the relapse rate and soft tissue response ratio.

Results: A total of 145 patients (127 females and 18 males) received the step genioplasty using trapezoid osteotomy during the study period, with the mean age of 31.0 ± 7.9 years at the time of operation. The mean followed-up period was 17.4 ± 12.8 months postoperatively. Seventy-five patients underwent bimaxillary surgery simultaneously, and 36 patients received other facial bone contouring procedures concomitantly. The remaining 34 patients had genioplasty with or without plate removal. The amount of chin advancement and shortening were 5.3 ± 2.0 and 3.4 ± 1.4 mm, respectively. No patient developed major complications, such as infection, intraoperative or postoperative bleeding, or permanent paresthesia of the chin. Some patients reported mild neurosensory disturbance postoperatively. Lateral cephalogram showed that the efficacy of the genioplasty on chin advancement: the mean soft-to-hard tissue ratio was 0.93:1, and bony relapse was minimal with only 3.0%.

Conclusion: The step genioplasty using trapezoid osteotomy was considered to be a highly effective technique with several advantages. The bony step served as a stay and facilitated intraoperative assessment. It also supported to stabilize the bony segment, reducing the risk of postoperative bony relapse. The trapezoid-shaped osteotomy enabled to narrow the chin sufficiently, maintaining the vascularity to the osteotomized bone. This method is a viable option for advancement and narrowing osseous genioplasty.

1. Guyuron B. MOC-PS(SM) CME article: Genioplasty. Plast Reconstr Surg. 2008;121:1-7.
2. Naran S, Steinbacher DM, Taylor JA. Current concepts in orthognathic surgery. Plast Reconstr Surg. 2018;141:925-936.
3. Park S, Noh JH. Importance of the chin in lower facial contour: Narrowing genioplasty to achieve a feminine and slim lower face. Plast Reconstr Surg. 2008;122:261-268.

4. Rohrich RJ, Sanniec K, Afrooz PN. Autologous fat grafting to the chin: A useful adjunct in complete aesthetic facial rejuvenation. Plast Reconstr Surg. 2018;142:921-925.
5. Sati S, Havlik RJ. An evidence-based approach to genioplasty. Plast Reconstr Surg. 2011;127:898-904.

A Comparative Analysis of Lesional Skin, Sentinel Flap, and Mucosal Biopsies in Assessing Acute Face Transplant Rejection

Abstract Presenter: Felix Klimitz MD

Abstract Co-Author(s): Leonard Knoedler, Samuel Knoedler, Stav Brown MD, Bohdan Pomahac MD, Martin Kauke-Navarro MD

Background: Face transplant rejection is primarily monitored through skin biopsies, but mucosal biopsies may detect immune rejection events missed by skin samples, raising concerns about relying solely on cutaneous assessments. This study evaluates the correlation between rejection grades in mucosal, facial skin, and sentinel flap biopsies, aiming to improve rejection monitoring protocols in facial vascularized composite allotransplantation (fVCA).

Methods: A retrospective review of 47 paired mucosal and facial skin biopsies and 37 paired facial skin and sentinel flap biopsies was conducted from nine face transplant recipients. Rejection was graded using the 2007 Banff classification for skin and an adapted grading system for mucosa. Statistical analysis included correlation assessments, sensitivity and specificity metrics, and predictive value calculations.

Results: Mucosal and facial skin rejection grades correlated strongly ($r=0.72$, $p<0.0001$), with mucosal biopsies demonstrating a negative predictive value (NPV) of 0.85 for skin rejection. Mucosal biopsies identified rejection in 10 cases missed by facial skin biopsies, while isolated skin rejection was rare and clinically insignificant. Sentinel skin biopsies correlated well with facial skin biopsies but had an NPV of 0.76, missing 25% of rejection cases.

Conclusion: Mucosal biopsies may offer greater sensitivity in detecting immune activity compared to skin biopsies. However, as mucosal rejection did not invariably precede skin rejection in all patients, mucosa may serve as an early marker, though its long-term

clinical significance remains uncertain. Our findings thus support integrating mucosal biopsies into routine rejection monitoring while maintaining the relevance of skin biopsies. Given the limited reliability of sentinel skin biopsies in predicting facial skin rejection, their necessity warrants reconsideration.

Antibiotic Prophylaxis in Gun Shot Wound (GSW)-related Mandibular Fractures: A Retrospective Chart Review and A Plea for Guideline Revision

Abstract Presenter: Barite Gutama MD

Abstract Co-Author(s): Ayush Saha, Ronald Cornely MPH, William Lineaweaver, Matthew Pontell MD, Izabela Galdyn

Purpose: Current guidelines recommend < 24 hours of antibiotic prophylaxis (AP) for operative mandibular fractures. However, these guidelines are based on limited patient populations and weak evidence. This study evaluates the effects of AP in GSW-related mandibular fractures.

Methods: Patients with GSW-related mandibular fractures who presented to a level 1 trauma center (2013-2024) were included. Demographics, clinical characteristics, AP use, and infection rates were collected. Patients were grouped into non-AP and AP cohorts.

Results: A total of 133 patients were included: 51 (38.3%) had isolated mandibular fractures and 82 (61.6%) had mandibular and concurrent craniofacial fractures. Of these patients, 114 (85.7%) had AP, while 19 (14.2%) had no AP. Both cohorts had similar demographics: mean age 33 (non-AP) vs. 37.4 years (AP) and male predominance (82.7% (non-AP) and 85.2% (AP)).

The overall infection rate was 15% (n = 20/133). The non-AP cohort had higher infection rates than the AP cohort (57.9% vs. 7.89%, $p < 0.001$). In the isolated mandibular fractures, the total infection rate was 13.7% (n = 7). The non-AP cohort had a a higher infection rate than the AP cohort (50% vs. 8.8%, $p = 0.028$). Similarly, for mandibular with concurrent craniofacial fractures, total infection rate was 15.9% (n = 13) and the non-AP cohort had higher infection rates than the AP cohort (61.5% vs. 7.25%, $p < 0.001$).

Conclusions: In this study, GSW-related mandibular fractures have a 50 - 60% risk of infection without AP. AP significantly reduces infection rates, warranting guideline revision for this population.

Arrow Palatoplasty: A Technique of Concurrent Soft Palate Revision and Lengthening for Patients with Velopharyngeal Insufficiency and a Large Pharyngeal Gap

Abstract Presenter: Rebecca Lisk

Abstract Co-Author(s): Kshipra Hemal MD, Natalie Plana MD, Rami Kantar MD, MPH, Margaret Lico, Roberto Flores MD

Background: Up to 30% of patients undergoing primary palatoplasty require secondary surgery due to velopharyngeal insufficiency. In patients with a large pharyngeal gap seen on nasoendoscopy, surgical intervention may risk the development of obstructive sleep apnea. This study reports a novel Arrow Revision Palatoplasty (ARP), a technique that combines revision palatoplasty and buccal flaps to concurrently reconstruct the levator sling and lengthen the palate without the creation of obstructive flaps within the pharynx.

Methods: A retrospective chart review of all patients undergoing ARP by the senior author between 06/2021 and 06/2024 was performed. Preoperative video speech nasopharyngeal endoscopy were rated by a certified speech language pathologist who also performed perceptual speech analysis on all patients, and rated their hypernasality, hyponasality, and audible nasal emission in accordance with the Americleft Speech Clinical Rating Form.
Speech scores were described using median (IQR), and postoperative scores for patients were treated as paired data and assessed using paired samples Wilcoxon test. $p<0.05$ was considered statistically significant.

Results: Eleven patients were included in this study. Average age at time of ARP was 16 (SD 7) years. Patients on average underwent 1.5 (SD 0.7) prior palatal surgeries. Nasoendoscopies were available for 9 (82%) patients preoperatively and 6 (55%) patients postoperatively. The median ratio of velopharyngeal sphincter closure was 0.4 preoperatively and increased to 0.95 postoperatively (Figure 1).

Perceptual speech analysis was available for 4 (36%) patients preoperatively and 7 (64%) patients postoperatively. Median preoperative hypernasality was 2.25, which corresponds to mild-moderate hypernasality and improved to 1 (borderline/minimal) postoperatively. Hyponasality was consistently 0 (absent) for all patients. Median audible nasal emission was 2 (frequently noted) preoperatively and improved to 1 (occasionally/seldom noted) postoperatively.

Conclusion: Arrow revision palatoplasty can improve pharyngeal gap and speech outcomes in patients with a cleft and velopharyngeal insufficiency associated with a large pharyngeal deficiency. This technique should be considered for patients with challenging velopharyngeal insufficiency that is at higher risk for developing surgical-induced obstructive sleep apnea.

Three-Dimensionally-Printed Bioactive Ceramic Scaffolds Containing Interconnected Porous Architecture: Is Dura-mediated Osteoinduction Required for Calvarial Bone Replacement?

Abstract Presenter: Matthew Brett DO

Abstract Co-Author(s): Roberto Flores MD, John Muller Jr., MD, MS, Lukasz Witek, edmara bergamo, Bruno Silva, Nick Tovar

Purpose: Three-dimensional printed (3DP) bioceramic scaffolds composed of beta-tricalcium phosphate (β-TCP), which possess an interconnected porous architecture, have previously demonstrated the ability to promote bone regeneration across critically-sized calvarial defects. Cranioplasty procedures, however, are often performed when the dura mater is scarred, compromised, or absent, reducing the potential for dura-mediated osteoinduction. This study evaluates whether the interconnected porosity of 3DP β-TCP scaffolds alone is sufficient to support bone regeneration across critically-sized calvarial defects in the absence of dura-mediated osteoinduction.

Methods: Critical-sized, 11mm unilateral calvarial defects were created in skeletally mature rabbits (n=11). Following defect creation, each rabbit received one of two scaffold designs in the defect: (i) a 3DP β-TCP scaffold with a solid, nonporous cap on the inferior surface, preventing direct contact between the scaffold's porous structure and the dura mater, or (ii) a scaffold with a fully porous inferior surface, allowing direct interaction with the dura and enabling dura-mediated osteoinduction. The animals were

euthanized 8 weeks postoperatively, and calvarial samples were harvested for analysis. Qualitative morphometric and quantitative volumetric analysis was performed using histology and micro-computed tomography (μCT) imaging, respectively, to evaluate bone, soft tissue, and scaffold. Data was analyzed using generalized linear mixed model, with fixed factor variable of scaffold design (closed versus open), reported as mean and 95% confidence interval.

Results: Volumetric analysis revealed no significant differences between scaffold designs regarding bone volume (open: 9.3% ± 4.5 vs. closed: 10.2% ± 4.5; p=0.71), soft tissue volume (open: 58.5% ± 7.0 vs. closed: 52.5% ± 2.0; p=0.07), or scaffold volume (open: 32.3% ± 3.4 vs. closed 37.3% ± 4.3; p=0.92). Both scaffold designs demonstrated successful bridging bone across the calvarial defects, irrespective of the scaffold design. Qualitative histological analysis revealed vascularized bone within the scaffold with presence of Haversian canals.

Conclusion: This pilot study demonstrated that 3DP β-TCP scaffolds with an interconnected porous architecture facilitate bone regeneration across critically-sized calvarial defects, even without dura-mediated osteoinduction. Both scaffold designs, whether a porous or solid cap, resulted in analogous levels of bone formation, indicating that osteoconduction through the scaffold's interconnected pores is a sufficient mechanism to support bone regeneration. These findings suggest that 3DP bioceramic scaffolds have the potential to serve as an effective alternative to traditional bone grafts in cranioplasty procedures, particularly when the dura is absent or compromised. The results from this pilot study could inform future designs of tissue-engineered scaffolds for cranial reconstruction, offering a potential solution for patients with scarred or missing dura.

Can We “Overcorrect” Our Way to Normal Appearance in Metopic Craniosynostosis?: A Single-Center’s 33 Year Odyssey

Abstract Presenter: Allison Hu MD

Abstract Co-Author(s): Carrie Morales MD, Dominic Romeo MD, Philip Tolley MD, Nicholas Han, Isabel Ryan BS, Jordan Swanson MD, MSc, Scott Paul Bartlett MD, Jesse Taylor MD

Introduction: To better expand the anterior cranial fossa and account for growth and relapse after traditional front-orbital advancement (FOA), an intentional "overcorrection" technique was adopted by our institution in 2012. This study compares the complications, revisions, and long-term aesthetic outcomes between the "traditional" FOA (T-FOA) and "overcorrection" FOA (O-FOA) approaches for isolated metopic craniosynostosis.

Methods: A retrospective review was performed of all children who underwent FOA for isolated metopic craniosynostosis from 1987 to 2020 at our institution. Patients with ≥4 years follow-up were included. The Whitaker classification system (I being highest suggesting no revision, IV being lowest suggesting need for major revision) was used for aesthetic assessment.

Results: Of the 270 patients who underwent surgical correction of isolated metopic synostosis, 161 (61.5%) patients met inclusion criteria (n=100 (60.2%) T-FOA and n=66 (39.8%) O-FOA). Mean age at surgery was 10.9±6.3 months with follow-up of 9.5±4.1 years. The O-FOA cohort had similar preoperative (73.5±7.6 vs 75.6±6.1 mm, p=0.098) bitemporal widths, however postoperative (100.1±6.9 vs 91.9±7.5, p<0.001) and absolute difference in increase in bitemporal width (18.0±5.1 vs 24.8±5.4, p<0.001) were higher in the O-FOA cohort. There were 13 (7.8%) surgical complications, and 40 (24.1%) patients underwent at least one secondary surgery, more commonly in the T-FOA cohort (35.0% vs 7.6%, p<0.001). In the intermediate term, patients who underwent T-FOA had higher Whitaker scores (2.2±1.0 vs 1.5±0.8, p<0.001) and were more likely to have palpable bony irregularities (64.0% vs 21.2%, p<0.001), visible irregularity (68.0% vs 48.5%, p=0.012), and lateral orbital retrusion (48.0% vs 15.2%, p<0.001) compared to O-FOA. However, in subgroup analysis of patients ≥10 years old postoperatively (n=85), aesthetic outcomes (Whitaker 2.1±1.0 vs 2.4±1.0, p=0.167) and revisions (48.6 vs 26.7%, p=0.122) were comparable between the two cohorts. Follow-up time was found to be predictive of need for revision (β=0.054, p<0.001), higher Whitaker score (β=0.079, p<0.001), and temporal hollowing (β=0.038, p=0.001) independent of age at intervention, surgical technique, use of interpositional grafts, lateral canthopexy, or resorbable fixation, surgeon, and demographic factors.

Conclusion: Despite incorporation of a more aggressive attempt to bitemporally "overcorrect" metopic deformity at time of frontal orbital advancement, similar levels of aesthetic deterioration were seen in patients 10 years or older at follow-up. Though safe and effective at achieving its primary surgical goals with improved aesthetic scores in the intermediate-term follow-up, the FOA technique, even with overcorrection, is associated with a high incidence of aesthetic deformity over time.

Secondary Glymphatic Drainage Utilizing Vascularized Lymph Node Transfer in a Rat Model

Abstract Presenter: Braden Jensen MD

Abstract Co-Author(s): Terry Yin, Brian Andrews MD

Objectives: Impaired glymphatic drainage causes a glymphedema, a condition similar to lymphedema elsewhere in the body(1). Glymphatic dysfunction has been recently associated with neurodegenerative disease (ND) such as Alzheimer's disease, Parkinson's disease, and several other entities(2). Vascularized lymph node transfer has shown benefits to lymphatic drainage outside the central nervous system in both human and animal models(3,4). We hypothesize that vascularized lymph node transfer (VLNT) can be utilized to develop a secondary means of glymphatic drainage and may provide a surgical option for the treatment of ND in the future.

Methods: Long Evans adult male rats were studied using VLNT transfer from the axillary/cervical lymph node basin and placed over the dura/meninges following vertex hemi-craniectomy. After allowing one week for maturation, 100 µl of Evans blue dye (EBD) was injected into the cisterna magna and glymphatic drainage was measured at 4 hours post-EBD injection. Rat brains were sectioned into the right and left hemispheres, and the cerebellum and lysed using radioimmunoprecipitation (RIPA) buffer. Lysate color absorbances were measured at 608 nm (EBD wavelength) for each of the 3 experimental central nervous system (CNS) locations and compared to control rats.

Results: Six rats were investigated. 608 nm color absorbance measures were performed for the left hemisphere brain lysates measuring 0.11 ± 0.02 absorbance units (AU) in VLNT group and 0.19 ± 0.04 AU in controls. For the right hemisphere lysates,608 nm color absorbance measured 0.11± 0.02 AU in VLNT samples versus 0.18 ± 0.01 AU in controls. Cerebellum absorbance measures were 0.18± 0.03 AU in VLNT samples in comparison to 0.31 ± 0.06 AU in controls. Statistical analysis using a two-tailed T-test indicated a significant reduction in the right hemisphere EBD levels ($p= 0.03$), with other regions demonstrating trends approaching significance. There was detectable EBD content in the transferred lymph node, with an EBD absorbance of 0.13 ± 0.04 AU, indicating passage of glymphatic EBD from the CNS to the VLNT.

Conclusion: Our study demonstrates that VLNT augments glymphatic drainage of the CNS. This proof-of-concept study suggests that VLNT could be used as a potential surgical option for the treatment of glymphedema and its associated neurodegenerative disorders.

References:
1. Louveau A, Smirnov I, Keyes TJ, et al. Structural and functional features of central nervous system lymphatic vessels [published correction appears in Nature. 2016 Feb 24;533(7602):278. doi: 10.1038/nature16999.]. Nature. 2015;523(7560):337-341. doi:10.1038/nature14432
2. Nedergaard M, Goldman SA. Glymphatic failure as a final common pathway to dementia. Science. 2020;370(6512):50-56. doi:10.1126/science.abb8739
3. Raju A, Chang DW. Vascularized lymph node transfer for treatment of lymphedema: a comprehensive literature review. Ann Surg. 2015;261(5):1013-1023. doi:10.1097/SLA.0000000000000763
4. Ramos M, Burdon Bechet N, Battistella R, et al. Cisterna Magna Injection in Rats to Study Glymphatic Function. Methods Mol Biol. 2019;1938:97-104. doi:10.1007/978-1-4939-9068-9_7

Prevalence of Obstructive Sleep Apnea in Patients with Cleft Lip and Palate Undergoing Orthognathic Surgery: A Retrospective Analysis

Abstract Presenter: Alexander Velazquez

Abstract Co-Author(s): Ryan Dominguez, Ethan Lumongsud, Pierce Hollier, Alex Kane MD, Paymon Sanati-Mehrizy MD, Jessica May MD

Background: Patients with cleft lip and/or palate (CL/P) frequently present with maxillofacial skeletal deficiencies that can predispose them to upper airway obstruction and an increased risk of obstructive sleep apnea (OSA). While orthognathic surgery is often performed to improve facial aesthetics and function in these patients, the prevalence of OSA at the time of surgery remains poorly characterized. This study aims to evaluate the rates of OSA in patients with CL/P undergoing orthognathic surgery.

Methods: A retrospective chart review was conducted on 819 patients who underwent orthognathic surgery between 2012 and 2024. A total of 202 patients met the inclusion criteria of undergoing surgery in the setting of non-syndromic CL/P. Data collected

included demographic information, cleft laterality, and pre-operative sleep study data were collected. Patients with clinical concern for OSA were identified, and apnea-hypopnea index (AHI) scores from sleep studies were analyzed. Patients were categorized as OSA-positive or OSA-negative based on sleep study results, and AHI values were compared between groups. Statistical analyses included chi-square testing for categorical variables and independent t-tests for continuous variables, with significance set at $p < 0.05$.

Results: Of the 202 included patients, 92 (46%) were male and 110 (54%) were female, with the majority identifying as White (74%), followed by Black (10%), Asian (7%), and Other (10%). Clinical concern for OSA prompted 55 patients (54%) to undergo a pre-operative sleep study. Among these, 24 patients (43.6%) met diagnostic criteria for OSA, while the remaining 31 (56.4%) did not. The mean AHI for OSA-positive patients was 16.25 events/hour, significantly higher than the mean AHI of 5.85 events/hour in OSA-negative patients ($p < 0.01$). Notably, cleft phenotype appeared to be associated with OSA diagnosis. Of the 24 patients diagnosed with OSA, 18 (75%) had bilateral CL/P, while only 6 (25%) had unilateral involvement. In contrast, among the 31 patients who underwent a sleep study but did not receive an OSA diagnosis, the majority (28/31, 90.3%) had unilateral CL/P, with only 3 (9.7%) presenting with bilateral clefts ($p < 0.01$). These findings suggest that patients with bilateral clefts may have a higher predisposition for OSA compared to those with unilateral clefts.

Conclusion: This study demonstrates a high prevalence of OSA in patients with CL/P undergoing orthognathic surgery, with 43.6% of patients who underwent a sleep study meeting diagnostic criteria for OSA. The significant difference in AHI scores between OSA-positive and OSA-negative patients suggests that undiagnosed OSA may be underrecognized in this population. Furthermore, the strong association between bilateral CL/P and OSA diagnosis highlights a potential anatomical predisposition to airway obstruction in these patients.

Reconstruction of Complex Cheek and Nasal Defects: A 30-Year Experience with Staged Cheek Advancement and Forehead Flaps

Abstract Presenter: Allison Hu MD

Abstract Co-Author(s): Jacob Thomas, Isabel Ryan BS, Meagan Wu, Philip Tolley MD

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Background: The paramedian forehead flap is a well-established and robust option for reconstruction of complex nasal defects. Conventionally, forehead flaps are utilized to reconstruct large composite defects affecting multiple aesthetic subunits of the nose as they can support both structural and internal lining grafts. However, when defects involve the alar-facial groove or extend to the adjacent cheek, forehead flaps alone are unable to provide sufficient tissue coverage and recreate the natural contours of affected areas. Here, we present our experience with combined cheek and nasal defects treated with a staged reconstruction approach involving an initial cheek advancement flap followed by a staged forehead flap. The various nuances and guiding principles of this approach relating to staging, defect and template preparation, and flap design, elevation, and inset are discussed.

Methods: This is a retrospective cohort study of all patients who underwent combined cheek advancement and paramedian forehead flaps from 1994-2024. Suture technique, contralateral templating, and stacked cartilage grafts were modified to improve function and aesthetics and will be demonstrated.

Results: A total of 38 patients underwent combined cheek advancement flap with staged forehead flap for complex defects involving the cheek and nose from 1994 to 2024. Patients were more often female (n=26, 68.4%). Average age at surgery was 66.3±15.2 years and patients underwent prior Mohs excision (n=34, 89.5%) or wide local excision (n=4, 10.5%). Patients were treated for basal cell carcinoma (n=25, 65.8%), melanoma (n=8, 21.1%), and squamous cell carcinoma (n=6, 15.8%). Average defect size was 18.6±19.2cm2. A cheek advancement flap was performed at time of first stage forehead flap in the majority of patients (n=27, 71.1%) or a preliminary separate stage in large or deep defects (mean 10.7±8.8 vs 31.5±25.4 cm2, p=0.019) to prevent drift. Forehead flap was most often performed in 2 stages (n=22, 57.9%) and were more commonly ipsilateral to the defect (n=21, 55.3%). Most patients required cartilage grafting (n=30, 78.9%) while few required tissue expansion (n=3, 7.9%). Nasal stents or xeroform stents were used to ensure patency in all patients. At mean follow-up of 17.5±30.7 years, 4 (10.5%) patients had minor soft tissue infections, 2 (5.3%) required revision, 1 (2.6%) had partial flap necrosis, and 1 (2.6%) had disease recurrence.

Conclusions: The cheek advancement flap creates a stable platform on which further reconstruction can be built upon, and when combined with a forehead flap, offers a durable treatment option that allows the functional and aesthetic resurfacing of complex multi-unit defects of the cheek and nose.

Craniosynostosis and Neuropsychological Disorders: Cognitive and Behavioral Impacts

Abstract Presenter: Lucas Harrison MD

Abstract Co-Author(s): Alexander Velazquez, Rami Hallac PhD, Alex Kane MD, Paymon Sanati-Mehrizy MD

Purpose: Craniosynostosis is associated with a range of neurological and psychological challenges. This study aimed to investigate the epidemiology of associated neurophysiological disorders in patients with craniosynostosis, stratified by suture involvement and syndromic diagnosis.

Methods: Using TriNetX, a de-identified global health research network, 12,870 patients diagnosed with craniosynostosis were identified. Patients were categorized based on craniosynostosis subtype (sagittal, coronal, metopic, lambdoid, multi-suture) and syndromic diagnosis. Neuropsychological outcomes were assessed using diagnostic codes for attention-deficit hyperactivity disorder (ADHD), conduct disorder, anxiety disorder, intellectual disability, autism, and speech, motor, and scholastic developmental disorders. Statistical analysis was performed to compare the prevalence of these conditions across subgroups.

Results: The cohort included 4,685 sagittal, 4,570 coronal, 2,896 metopic, 265 lambdoid, and 454 multi-suture patients. The overall rates of neuropsychological disorders were ADHD (4.71%), conduct disorder (1.83%), anxiety disorder (2.98%), intellectual disability (2.00%), autism (4.27%), and speech (16.81%), motor (7.44%), and scholastic (2.76%) developmental disorders. Speech developmental disorder was the most common diagnosis in all suture subtypes. Multi-suture involvement had significantly higher rates than single-suture in ADHD (8.15% vs. 4.58%, $p<0.001$), conduct disorder (3.52% vs. 1.76%, $p=0.01$), anxiety disorder (9.03% vs. 2.75%, $p<0.001$), intellectual disability (7.05% vs. 1.81%, $p<0.001$), autism (6.61% vs. 4.18%, $p=0.017$), speech disorder (27.75% vs. 16.41%, $p<0.001$), motor disorder (11.67% vs. 7.28%, $p<0.001$), and scholastic disorder (5.73% vs. 2.65%, $p<0.001$). Among single-suture patients, those with metopic craniosynostosis had the highest rate of conduct disorder (2.87%), anxiety disorder (3.35%), intellectual disability (2.76%), autism (5.70%), and speech (21.51%), and motor (9.01%) developmental disorders. Syndromic

patients (n=314) had a significantly higher prevalence of anxiety disorder (6.37% vs. 2.89%, p<0.001), intellectual disability (5.41% vs. 1.89%, p<0.001), as well as speech (32.80% vs. 16.27%, p<0.001), motor (15.92% vs. 7.17%, p<0.001), and scholastic (6.69% vs. 2.56%, p<0.001) developmental disorders.

Conclusions: This study highlights the significant burden of neuropsychological conditions among patients with craniosynostosis, particularly those with multi-suture and syndromic presentations. Multi-suture involvement had a significantly higher rate of all evaluated disorders compared to single-suture involvement. Those with syndromic diagnosis had a significantly higher rate of anxiety disorder, intellectual disability, and speech, motor, and scholastic development. Speech developmental disorder was the most associated condition in all suture types. These findings underscore the need for multidisciplinary care models to address these associated neuropsychological disorders.

Revolutionizing sentinel node biopsy in head and neck melanoma: from Dr Morton to Agent Green

Abstract Presenter: Aenone Harper-Machin FRSCPlast

Abstract Co-Author(s): Rini Vyas Mbchb (U.K. Equivalent To MD), Christopher jones

Introduction: Lymph node status is an important prognostic factor in cutaneous head and neck melanomas, with sentinel lymph node biopsies (SLNBs) used to determine occult disease. While traditional techniques use dual modality based on radiocolloid lymphoscintigraphy in combination with blue dye, or more recently near-infrared imaging with indocyanine green (ICG) dye, no studies to date have examined the technique of using ICG as a single modality. This study examined the feasibility of ICG as a single modality for detecting sentinel nodes in cutaneous head and neck melanomas.

Methods: A prospective study was performed of all consecutive cutaneous head and neck melanomas patients between August 2023 and October 2024 undergoing SLNB at a single supraregional skin cancer centre in the U.K. Three cohorts were formed: group A (ICG-only); group B (ICG and radiocolloid); and group C (radiocolloid and blue dye). ICG technique involved intraoperative injection of ICG dye at the melanoma site and real time tracking of lymph drainage to the sentinel node(s) to guide surgical dissection. Statistical analyses were performed using Fisher's exact test.

Results: 182 nodes were obtained from 67 patients: 29 patients (71 nodes) in group A, 22 patients (61 nodes) in group B, and 16 patients (49 nodes) in group C.
Where each technique was utilised, 100% of nodes were detected by ICG; 84.5% by radiocolloid; and 79.6% by blue dye. There was a failure to detect any sentinel nodes by radiocolloid in three patients and by blue dye in four patients. In group B, ICG detected significantly more nodes than radiocolloid (P=0.0001); in group C, there was no difference between radiocolloid and blue dye (P=0.1471). Twelve sentinel nodes were positive for melanoma: 100% were ICG positive, 88.9% were radiocolloid positive and 50% were blue dye positive.

Conclusion: Single modality ICG is a feasible technique for detecting sentinel nodes in cutaneous head and neck melanomas, with nodal detection and metastases detection rates superior to radiocolloid and blue dye. As an intraoperative surgeon-led technique, ICG-alone negates the need for preoperative lymphoscintigraphy with its associated radiation risk and nuclear medicine resource requirements. This feasibility study provides the evidence base for future randomised controlled trials to investigate the role of single modality ICG as a gold standard technique.

Technique to Enhance Central Vermilion Augmentation During Unilateral Cleft Lip Repair

Abstract Presenter: Lindsey Teal MD

Abstract Co-Author: Russell Ettinger MD

Purpose: A common approach for improving vermilion on the cleft side of the lip is to advance the vermilion triangular augmentation flap from the lateral lip between the wet-dry border of the vermillion of the medial lip. The tip of the triangular augmentation flap on the lateral lip is typically advanced to the midline of the medial lip, stopping at Cupid's bow. However, this can lead to under projection of the central vermilion and lack of a central lip tubercle. The objective of this study was to analyze the central vermilion projection with a new technique aimed to improve the augmentation of the central vermillion.

Method: A retrospective cohort study was performed on all patients with history of unilateral cleft lip who underwent primary unilateral cleft lip repair from October 2020-

September 2024 by a single surgeon. Primary unilateral cleft lip repair procedures included complete, incomplete, and microform cleft lip repairs. Cases prior to January 2024 implemented the standard vermilion triangle augmentation technique, where the advancement was brought to midline at the level of Cupid's bow. Cases after January 2024 implemented the new technique to enhance the central vermilion. In these cases, the vermilion triangle augmentation flap from the lateral lip was carried across midline and inset between the wet-dry border of the vermilion at the level of the peak of Cupid's bow on the non-cleft side. Quantitative image analysis was used to examine the projection of the central vermilion before and after implementation of the technique for central vermilion augmentation.

Results: There were 47 patients included in the database who underwent unilateral cleft lip repair, 35 underwent the standard technique for vermilion augmentation and 12 underwent the new technique to improve central vermilion fullness. Quantitative image analysis demonstrated an improvement in central vermilion projection after implementation of the new central vermilion augmentation technique.

Conclusions: The implementation of the technique used to augment the central vermilion is an effective method of improving the projection and height of the central vermilion to create a central lip tubercle at the time of primary unilateral cleft lip repair.

Field Sterility to Reduce Operative Waste in Cleft Surgery

Abstract Presenter: Bernice Yu MD

Abstract Co-Author(s): Nargiz Seyidova MD, Jacquelyn Roth, Peter Taub MD

Introduction: Field sterility is a practice used frequently in ambulatory skin and minor hand surgeries. The concept challenges the notion that a fully sterile environment is necessary in every instance to prevent superficial site infection. The benefits are a reduction in medical waste and an improvement in cost-efficiency. A prior literature review found no increase in infection rate in ambulatory procedures using field sterility compared to those performed in the main operating room. The present study is the first to apply field sterility in cleft-related procedures.

Methods: A prospective cohort study was conducted on patients undergoing specific cleft procedures between January 2022 and June 2024. The procedures included lip

repair, primary or secondary palate repair and pharyngoplasty. It omitted alveolar bone grafting and cleft-related orthognathic surgery. The operative field was maintained with sterile blue towels, sterile gloves, and sterile instruments without the use of full drape packs or surgical gowns. Patient demographics, surgical procedure, and postoperative outcomes were collected. Descriptive statistics were used for analysis.

Results: A total of 74 unique patients were identified for cleft repairs. Of which, 20 patients underwent unilateral cleft lip repair had a mean age of 7.1 months (range: 2.5 – 8.2 months), while 8 patients underwent bilateral cleft lip repair with mean age of with a mean age of 4.5 months (range: 3.1 – 8.0 months). Additionally, 10 patients underwent secondary lip repair with mean age of 8.3 years (range: 3.6 – 21.0 years). For cleft palate repairs, 24 patients with mean age of 14.9 months (range: 10.0 – 26.4 months) were included in addition to 6 secondary cleft palate repair patients with mean age of 2.1 years (range: 1.0 – 4.5 years). 6 patients underwent pharyngoplasty at a mean age 21.9 years (range: 6.7 – 47.8 years). There was no evidence of superficial surgical infection across all cohorts. There were no complications reported in the unilateral, bilateral or secondary cleft lip repairs. One complication of a palatal fistula occurred in the cleft palate cohort and no complications in the secondary palate repairs or pharyngoplasty groups.

Conclusion: The present study showed limited draping and gowning is a safe alternative to standard operating room sterility for several cleft-related procedures. Despite the presence of high microbial flora in the oral cavity, complication rates in cleft lip and palate repairs remain low, consistent with that reported in the literature. By reducing operative waste and medical cost, the use of field sterility in cleft procedures has significant potential to improve efficiency.

Genetic Referral Patterns and Outcomes in Patients Diagnosed with Pierre Robin Sequence: A 21-Year Study

Abstract Presenter: Janina Kueper MD

Abstract Co-Author(s): Mary Wilding, Tobi Somorin, Jesse Goldstein MD, Viraj Govani

PURPOSE: Pierre Robin Sequence (PRS) is a craniofacial anomaly characterized by micrognathia, glossoptosis, and airway obstruction, often associated with syndromic conditions. While traditionally categorized as isolated or syndromic, this classification

remains debated due to overlapping phenotypic and genetic features. This study aims to characterize the clinical presentation, comorbidities, and surgical interventions of these patients and connect them with genetic evaluation patterns and genetic findings in PRS patients over a 21-year period.

METHODS: A retrospective review of 292 patients diagnosed with PRS from 2002 to 2023 was conducted. Data included demographics, medical and surgical history, genetic testing results, and clinical outcomes. Variants of unknown significance were classified using ClinGen, gnomAD, GTEx, OMIM, and Orphanet. Statistical analyses included t-tests for continuous variables, χ^2 tests for categorical variables, and logistic regression to identify predictors of pathogenic genetic findings.

RESULTS: Nearly half of the patients (43.13%) were delivered via C-section, with 34.42% experiencing birth complications, including emergent C-sections (5.21%) and nuchal cord (4.72%). The majority (85.65%) required NICU admission, with an average stay of 45.54 days, and 27.00% required intubation at birth. Inpatient consultation was found to be the most common form of presentation, occuring in 54.58% of cases, at an average age of 8.12 days. Genetic evaluation was conducted in 66.90% of patients, with 77.08% of that cohort undergoing genetic testing. Of those tested, 34.68% had a pathogenic variant, 20.72% had a variant of uncertain significance (VUS), and 51.35% had normal results. COL2A1 (32.14%), CHD7 (5.36%), COL11A1 (3.57%), SECISBP2 (3.57%), and SF3B4 (3.57%) were the most frequently implicated genes. Patients with pathogenic variants exhibited higher rates of concomitant comorbidities such as developmental delay (61.04% vs. 37.24%, p=0.001) and congenital heart defects, including patent ductus arteriosus (23.38% vs. 11.03%, p=0.019). Overall, surgical interventions were common, with 87.97% undergoing myringotomy and tube placement, 37.33% requiring palatoplasty, and 36.21% undergoing mandibular distraction osteogenesis. Common long-term outcomes included speech/language delay (63.41%), developmental delay (39.66%), gastroesophageal reflux disease (39.04%), and obstructive sleep apnea (37.33%).

CONCLUSION: A significant proportion of PRS patients harbor pathogenic genetic variants, reinforcing the need for routine genetic evaluation. The high prevalence of associated anomalies supports a spectrum-based classification rather than a strict isolated diagnostic dichotomy. Genetic findings have the potential to enhance personalized treatment strategies, guiding airway management, feeding interventions, educational support and surgical planning, and should be a strong focus point in future research.

Hypotelorism in Metopic Craniosynostosis: Persistent Undercorrection After Open Cranial Vault Repair (CVR)

Abstract Presenter: Emily George MD

Abstract Co-Author(s): Eric Basappa, Kyle Atcheson, Gabrielle Rodriguez MD, Anitesh Bajaj, Parul Rai, Kathryn Reisner, Arun Gosain MD

Introduction: Frontoorbital advancement (FOA) surgery aims to normalize cranial vault parameters affected in metopic craniosynostosis. While FOA can improve cranial shape and alleviate brain growth restriction, hypotelorism, characterized by a narrowed interdacryon distance, is typically not addressed with standard surgical techniques. This study aims to examine the changes in interdacryon distance, and other key parameters, following traditional open FOA/CVR.

Methods: After IRB approval, this single institution study evaluated 20 patients with metopic synostosis undergoing FOA. Preoperative and postoperative CT scans were evaluated by institutional radiologists who measured four key parameters: Interdacryon distance, endocranial bifrontal angle, inter-zygomaticofrontal (inter-ZF) suture distance, and orbital rim angles. These measurements were compared before and after surgery for each patient, as well as against age matched controls with normal cranial morphology. Patients were stratified into two groups based on the time between the repair and post operative imaging: 0-13 months (one-year group) and 13-24 months (two-year group). Student's t-test was used to assess differences between the patient groups and their respective matched controls.

Results: The average age at the time of surgery was 212 days (7 months). Both groups exhibited a persistent undercorrection of interdacryon distance despite cranial vault repair (one-year group $p = <0.001$; two year group $p= 0.0005$). Post operatively, the one-year group exhibited an average interdacryon distance that was 4mm smaller than that of age matched controls, while the two-year group demonstrated an average reduction of 3.6mm. When compared to preoperative images, inter-ZF suture distance and right orbital rim angle were found to significantly increase following repair. Increases in endocranial bifrontal angle and left orbital rim angle after repair did not approach significance.

Conclusions: Open FOA/CVR, involving remodeling of the supraorbital bandeau and frontal bones, results in improvement but not complete correction of hypotelorism when

re-evaluated at one and two years postoperatively. This may suggest that intrinsic developmental factors may be contributing beyond premature suture fusion, though more research is needed to better characterize this phenomenon. The present study challenges the assumption that hypotelorism may spontaneously improve with growth after repair. These insights play a crucial role in informing clinical decisions and optimizing surgical plans to prevent the need for additional procedures to correct this persistent deformity.

Patient Satisfaction After Secondary Cleft Rhinoplasty: Long-Term Aesthetic and Functional Outcomes

Abstract Presenter: Sohaib Elmetaafy MD

Abstract Co-Author(s): Omar sSalah, Amr Gomaa, Mohamed Albadawy, Osama Antar, Ahmed Aboelnaga

Background: Nasal deformities in cleft lip patients are highly stigmatizing, often causing asymmetry, deviation, and reduced projection. Secondary rhinoplasty in these patients is particularly challenging due to severe anatomical deviations, pre-existing scars, and the need for both structural correction and aesthetic refinement. While most studies on secondary cleft rhinoplasty outcomes focus on surgeons' perspectives, research on patient satisfaction remains limited.(1) This study aims to bridge that gap by evaluating patient perceptions of secondary cleft rhinoplasty outcomes.

Methods: This prospective, self-controlled clinical trial was conducted at Suez Canal University Hospital between October 2021 and October 2024. Patient satisfaction following secondary cleft rhinoplasty was evaluated using the validated Arabic version of the Rhinoplasty Outcome Evaluation (ROE) questionnaire.(2,3) A total of 36 patients (21 females, 15 males), aged 15 to 40 years, were selected through convenience sampling. They completed the questionnaire preoperatively and again at six months and two years postoperatively.

Results: Patient satisfaction significantly improved, with the mean total ROE score increasing from 30.21% preoperatively to 71.18% at 6 months and 80.90% at 2 years ($p < 0.001$). The most significant improvements were observed in nasal appearance ($p < 0.001$) and breathing function ($p < 0.001$), while the need for revision surgery decreased substantially. Improvements in social confidence and professional interactions highlight

the broader impact of rhinoplasty beyond aesthetics. Satisfaction remained high over time, with a slight but significant increase between 6 months and 2 years postoperatively ($p = 0.013$), indicating sustained and progressive benefits. Patients in whom septal cartilage grafts were used reported significantly higher satisfaction compared to those with conchal or rib grafts ($p = 0.047$). Additionally, satisfaction was highest among patients with normal occlusion, whereas those with class III malocclusion reported the lowest satisfaction ($p = 0.002$). Literacy level also significantly influenced postoperative satisfaction ($p = 0.031$), while gender, age, marital status, cleft type, cleft palate presence, and lip revision surgery showed no significant impact. Patients with the lowest preoperative satisfaction experienced the most significant postoperative improvement, while those with moderate dissatisfaction had more varied outcomes.

Conclusion: Secondary cleft rhinoplasty significantly improves patient satisfaction, particularly in nasal appearance, breathing function, and overall quality of life. Beyond aesthetics, the procedure enhances social confidence and professional interactions. These findings highlight the functional and psychosocial benefits of cleft rhinoplasty, reinforcing its importance in comprehensive cleft care.

References:

1. Hens G, Picavet VA, Poorten V Vander, Schoenaers J, Jorissen M, Hellings PW. High patient satisfaction after secondary rhinoplasty in cleft lip patients. Int Forum Allergy Rhinol. 2011;1(3):167-172. doi:10.1002/alr.20023
2. Alsarraf R. Outcomes research in facial plastic surgery: A review and new directions. Aesthetic Plast Surg. 2000;24(3):192-197. doi:10.1007/s002660010031
3. Mulafikh DS, Alharethy SE, Alqabbani AA, Mesallam TA. Validation and clinical application of the Arabic rhinoplasty outcomes evaluation questionnaire. Saudi Med J. 2021;42(6):655-659. doi:10.15537/smj.2021.42.6.20210038

Outcomes Analysis of Pediatric Alloplastic Cranioplasty

Abstract Presenter: Michele Ryan MD

Abstract Co-Author(s): Emily Yanoshak, Patrizia Manziano, Nala Mckie, Hibo Wehelie, Shaina Twardus, Jonathan Black MD

Background: Pediatric cranioplasties pose a unique set of reconstructive challenges due to considerations for skull growth (1,2). Autologous reconstruction has been

regarded as the gold standard for repair, but is complicated by bone resorption, donor morbidity, and need for revision (3,4). Several reconstructive materials exist for alloplastic cranioplasty, however, insufficient data exists to support its use in the pediatric population (5).

Objective: The purpose of this study was to assess outcomes of pediatric alloplastic cranioplasties and compare them to documented complications in published literature.

Methods: This was a single-institution, retrospective, cohort study of all patients less than 18 who underwent cranioplasty with an alloplastic material between July 1996 and July 2024. Patients were excluded due to lack of appropriate documentation or failure to follow-up post-operatively. Patients were identified by their CPT code. Data collected included: demographic information, defect etiology, defect size, defect location, implant material, follow-up duration, interval between original surgery and reconstruction, and age at original surgery and definitive reconstruction. Outcomes included infection, implant exposure, revision rate, implant removal, indication for removal, and growth restriction.

Results: During this 28-year period, 69 pediatric patients were identified. The average age was 8.29 years at the time of cranioplasty. The most common alloplastic materials used for reconstruction included porous polyethylene/titanium (n=12), porous polyethylene (n=11), methyl methacrylate (n=10) and titanium mesh with methyl methacrylate overlay (n=10). Mean follow-up duration was 3.6 years. We found an exposure rate of 4.3% (n=3) and an infection rate of 5.8% (n=4). A total of 8 patients (11.5%) underwent implant removal with indications including infection, fluid collection, hardware malfunction, and implant exposure. Eleven patients required additional revisions (15.9%) including additional cranioplasty, fluid collection drainage and hardware manipulation. Thirty patients had adequate charting to evaluate growth restriction with no evidence of growth restriction identified on head circumference measurements.

Conclusions: Our data demonstrates low rates of infection, implant exposure, and growth restriction in pediatric patients undergoing alloplastic reconstruction with a variety of synthetic materials. Existing literature demonstrates pediatric cranioplasty infection rates of 9-10% with bone resorption rates of 10-50% in autologous reconstructions, necessitating revision. Our revision rate of 15.9% and explant rate of 11.5% falls within the lower range of this spectrum. Our data suggests that pediatric alloplastic cranioplasty demonstrates acceptable outcomes. Future research should aim to identify the ideal alloplastic implant for this population.

References
1. Frassanito P et al. Problems of reconstructive cranioplasty after traumatic brain injury in children. Childs Nerv Syst. 2017 Oct;33(10):1759-1768. doi: 10.1007/s00381-017-3541-8.
2. Rocque BG et al. Complications following pediatric cranioplasty after decompressive craniectomy: a multicenter retrospective study. J Neurosurg Pediatr. 2018 Sep;22(3):225-232. doi: 10.3171/2018.3.PEDS17234.
3. Hersh DS et al. Bone flap resorption in pediatric patients following autologous cranioplasty. Oper Neurosurg (Hagerstown). 2021 Apr 15;20(5):436-443. doi: 10.1093/ons/opaa452.
4. Klieverik VM et al. Cranioplasties following craniectomies in children-a multicenter, retrospective cohort study. Childs Nerv Syst. 2019 Sep;35(9):1473-1480. doi: 10.1007/s00381-018-4024-2.
5. Lam S, et al. Cranioplasty for large-sized calvarial defects in the pediatric population: a review. Craniomaxillofac Trauma Reconstr. 2015 Jun;8(2):159-70. doi: 10.1055/s-0034-1395880.

Orthognathic Surgery in the Previously Distracted Patient

Abstract Presenter: Daniella Cordero MD

Abstract Co-Author(s): Lindsey Teal MD, Hitesh Kapadia, Richard Hopper MD, Dr. Srinivas Susarla MD, DMD, MPh

Purpose: Distraction osteogenesis (DO) is an important tool for addressing the severely hypoplastic mandible and/or midface, allowing advancement of the craniofacial skeleton and its overlying soft tissues without adjunctive bone grafting. There is an expected period of relapse after DO, followed by altered growth of the facial skeleton (1). Many patients will have continued craniofacial discrepancies following completion of skeletal growth that require subsequent orthognathic surgery. Here we describe the characteristics and outcomes of patients with a history of DO undergoing orthognathic surgery at skeletal maturity.

Methods: This retrospective study included all patients with a history of maxillofacial DO who underwent orthognathic surgery at skeletal maturity. Variables of interest included age, sex, type of distraction, primary diagnoses, severity of the current deformity,

magnitude of correction, use of bone grafts, osteotomy designs, ICU admission, hospital length of stay (LOS), and 30-day complications.

Results: Eighteen patients met the inclusion criteria. Of these, 8 underwent prior midface distraction, 8 underwent mandibular distraction, and 2 underwent simultaneous midface and mandibular distraction.

Among patients with prior mandibular distraction (n=10), 100% had a diagnosis of obstructive sleep apnea (OSA), 50% had an underlying syndromic diagnosis, and 40% had a diagnosis of Robin Sequence. Pre-operative SNA and SNB angles were 76.1 +/- 5.9 and 71.1 +/- 7.9, respectively. Ninety percent underwent bimaxillary surgery, and all underwent concurrent genioplasty. Thirty-three percent required segmental maxillary osteotomies, 90% required mandibular bone grafting and 30% required maxillary bone grafting. Most patients (80%) presented with atypical ramus morphology (no medullary space within ramus above the lingula) or an abnormal course of the inferior alveolar nerve (<5 mm from buccal plate or inferior border in molar region) on at least one side necessitating revision of the osteotomy design. Eighty percent required ICU admission post-operatively, but with a relatively short hospital LOS (1.6 +/- 0.7 days). There were no complications within 30 days for this group.

Among patients with prior midface distraction (n=10), 50% had a diagnosis of OSA and 80% had an underlying syndromic diagnosis. The SNA and SNB angles pre-operatively were 74.2 +/- 7.3 and 78.8 +/- 7.3, respectively. Sixty percent underwent bimaxillary surgery and 60% underwent concurrent genioplasty. Thirty percent required segmental maxillary osteotomies, 80% required maxillary bone grafting, and 30% required mandibular bone grafting. Fifty percent required ICU admission post-operatively, with a similarly short hospital LOS (1.5 +/- 0.7 days). One subject experienced early hardware displacement necessitating revision within 30 days of surgery and one subject experienced a surgical site infection, which was treated with antibiotics.

Conclusions: Prior craniofacial distraction poses unique challenges, with most patients requiring bimaxillary surgery at skeletal maturity with bone grafting to the previously distracted region and revision of the standard osteotomy designs. Despite these challenges, orthognathic surgery can be safely performed in this population with relatively short hospital LOS and favorable complication profile.

References:
1. Peacock ZS, Salcines A, Troulis MJ, Kaban LB. Long-Term Effects of Distraction Osteogenesis of the Mandible. J Oral Maxillofac Surg. 2018;76(7):1512-1523.

Incarceration Status Significantly Impacts Surgical Management in Mandible Fractures

Abstract Presenter: Jane McLarney MD

Abstract Co-Author(s): Rachel Lister MD, Anam Furrukh, Uma Agrawal, Courtney Heitmiller, Spoorthi Balu, Janice Lalikos MD

Introduction: Mandible fractures are common facial injuries in the U.S., often caused by assaults, motor vehicle crashes, and falls. Individuals with a history of incarceration may face unique challenges, including delayed care, increased exposure to violence, and higher rates of medical comorbidities. This study explores fracture patterns, treatment disparities, and the impact of incarceration on outcomes.

Methods: A single-center retrospective review of mandible fracture patients from 2017 to 2024 compared incarcerated and non-incarcerated groups. Patients evaluated at our institution were included, excluding minors and those initially assessed elsewhere with no intervention here. Data on demographics, injury characteristics, management factors, and outcomes were collected, and group comparisons were made using Fisher's exact and T-tests ($p < 0.05$). Descriptive statistics and regression analyses were conducted in RStudio.

Results: Of 349 patients, 291 met inclusion criteria, of which 48 (19.75%) had a history of incarceration. Incarcerated patients were more likely to have assault-related injury (OR = 3.34, p = 0.0002) and less likely to have non-assault trauma injuries (OR = 0.30, p = 0.0002). Regarding management, similar proportions of incarcerated and non-incarcerated patients were recommended for surgery (80.2% vs 88.7%, p = 0.172). Of those recommended for surgery, significantly fewer incarcerated (87.2%) than non-incarcerated patients (95.3%) actually received surgery (Z = -2.05, p = 0.0408). Overall, regardless of management recommendations, non-incarcerated patients were 2.94 times more likely to receive surgery than incarcerated patients, while incarcerated patients were 66% less likely to receive surgery (OR = 0.34, p = 0.0516), though this was not statistically significant. Incarcerated patients were also nearly twice as likely to be lost to follow-up (OR = 1.89, p = 0.04236). Between incarcerated and non-incarcerated groups, there were no significant differences in time from presentation to surgery ($\beta = -3.06$, p = 0.472), time from injury to surgery (p = 0.6567), or likelihood of

unfavorable outcomes (nonunion (p = 0.728), malunion (p = 0.374), persistent pain (p = 0.947), re-operation (p = 0.374), and infection (p = 0.337)).

Conclusion: This study highlights disparities between incarcerated and non-incarcerated adults with mandible fractures, including lower surgery rates, higher rates of loss to follow up, substance abuse, and a greater likelihood of assault-related injuries. However, incarceration status did not significantly impact time to surgery or postoperative outcomes. These findings underscore the need for further research into the factors driving these treatment differences. Data collection on functional outcomes is ongoing.

Developing a Three- Dimensional Data Driven Model of the Unilateral Cleft Lip Nasal Deformity in Early Mixed Dentition

Abstract Presenter: Ruth Tevlin MD

Abstract Co-Author(s): Clay Collisson, Riley Lehmann, Ezgi Mercan, Raymond Tse MD

Background: Optimal treatment of the unilateral cleft lip nasal deformity (uCLND) continues to be a challenge, and an incomplete understanding of the complex three-dimensional nasal deformity hampers clinical progress. Our group recently examined the uCLND present in infants prior to cleft lip and palate repair by developing a three-dimensional data driven model of the primary unrepaired osseocartilaginous skeleton of the nasomaxillary complex. This demonstrated the presence of a collapsing twist of the cleft side aperture and medialization of the bony margin of the nasal airway with deviation of the nasal bone complex toward the non-cleft side 1, contradicting many previously published descriptions. We hypothesize that the uCLND continues to evolve secondary to growth and in response to surgical intervention. The purpose of the current study is to develop a data-driven model of the osseocartilaginous skeleton in uCLND in early mixed dentition, focusing on the septum and bony nasal vault.

Methods: Computed tomographic (CT) scans of 49 unilateral patients with a history of repaired unilateral cleft lip and/or palate in early mixed dentition were identified from the institutional Craniofacial database. A retrospective chart review was then performed for demographics, clinical, and operative variables. For comparison, CT scans of 49 control patients with no craniofacial anomalies were identified. CT scans were analyzed using 3D Slicer2 and soft tissue and osseous landmarks were manually plotted in both the

control and study cohort. Osseous landmark deviation in subjects with clefts was compared to controls. Segmentation of the osseocartilaginous septum was also manually performed, and deformational differences were calculated between cleft and non-cleft cohorts.

Results: Forty-nine patients with a unilateral cleft lip and palate deformity were identified. The average age at time of CT scan was 7 years (median 7 years, range 5-12 years). The majority of the patients had a history of a complete cleft lip and palate deformity (n=38). All patients had undergone repair of the cleft lip and/or palate in infancy. Four patients had a history of intermediate rhinoplasty, and five patients had a history of alveolar bone grafting. A three-dimensional data driven model of the osseocartilaginous skeleton of the nasomaxillary complex was generated. Notably, there was divergence of the skeletal piriform margins away from the midline. Segmentation of the septum revealed anterior deviation towards the non-cleft side.

Conclusions: Herein, we developed an objective three-dimensional data driven model of the uCLND in early mixed dentition. These analyses will allow us to better define goals of treatment and to optimize our surgical approach to the uCLND to optimize functional respiration and aesthetic outcomes. Further analysis will be performed to determine if cleft severity or history of septorhinoplasty influence the anatomical morphology of the uCLND in early mixed dentition.

Reference:
1. Linkugel, A.D., et al. "The Septum and Nasomaxillary Vault Associated with Unrepaired Unilateral Cleft Lip and Palate: A Data-Driven 3D Model". Plast Reconstr Surg (2024).
2. Fedorov, A., et al. 3D Slicer as an image computing platform for the Quantitative Imaging Network. Magn Reson Imaging 30, 1323-1341 (2012).

One and Done: Combining Alveolar Bone Grafting with Revision Palatoplasty

Abstract Presenter: Robert Tung MD

Abstract Co-Author(s): Kylie Swiekatowski, Ellen Wang, Jessica Nye, Jose Barrera, Kate Liao, David Mitchell MD, Jackson Green, Michael Talanker MD, Chioma Obinero MD, Danielle Sobol MD, Matthew Greives MD

Background: Patients with cleft lip and cleft palate (CLCP) require multiple interventions to address structural and functional deficits. Patients may undergo revision palatoplasty during childhood to treat velopharyngeal insufficiency (VPI). Some patients may also require alveolar bone grafting (ABG) during mixed dentition to stabilize the maxillary arch and to facilitate closure of oronasal fistulas. This study evaluates the safety and efficacy of combining revision palatoplasty with ABG.

Methods: A retrospective review of pediatric patients with CLCP who underwent ABG and/or revision palatoplasty at a large academic children's hospital (January 2017 to January 2024) was conducted. Records were reviewed for age at surgery, Veau classification, revision indications, grafting method, concurrent procedures, surgery duration, and length of hospital stay. Patients were divided into three groups based on the procedure(s) performed: ABG alone (ABG), revision palatoplasty alone (Palate), and revision palatoplasty with concurrent ABG (ABG + Palate). Bone graft success was confirmed by imaging ≥ 6 months postoperatively, and revision success (VPI improvement or fistula closure) was assessed via speech-language pathology evaluation.

Results: A total of 180 patients met our inclusion criteria: 100 (55.6%) in the ABG group, 66 (36.7%) in the Palate group, and 14 (7.8%) in the ABG + Palate group. Grafting methods and graft success rates were similar between the ABG (63.0%) and ABG + Palate groups (78.6%; p=0.21). Although the age at VPI diagnosis was significantly higher in the ABG + Palate group (8 years [IQR: 7-9]) compared to the Palate group (5 years [IQR: 3-9]) (p=0.02), there was no difference in the time from diagnosis to revision (4 months). Both the Palate and ABG + Palate groups showed similar rates of VPI success (83.7% vs 88.9%, respectively) and fistula closure (92.3% vs 100%), as well as improved speech scores (improvement from moderate to mild hypernasality in both groups).

Conclusion: While we aim to avoid delaying VPI surgeries, patients who present with VPI at a later stage may benefit from concurrent procedures. Our study demonstrates that revision palatoplasty can be safely combined with ABG without compromising graft survival or speech outcomes, providing an opportunity to potentially minimize surgeries in this complex patient population.

Gender Affirmation

The Impact of Tranexamic Acid Use in Gender-Affirming Mastectomy: A Nationwide Retrospective Cohort Study on Postoperative Complications

Abstract Presenter: Justin Cordero

Abstract Co-Author(s): Morvarid Mehdizadeh, Lacey Foster, Noelle Garbaccio, Jade Smith, Dorien Schonebaum, Dr. Samuel Lin MD

Background: Research across surgical subspecialties has demonstrated inconsistent results regarding the effectiveness of the antifibrinolytic agent tranexamic acid (TXA) in reducing hematoma and seroma rates, with few studies focusing on gender-affirming mastectomies. With no consensus on routine usage, this study evaluates gender-affirming mastectomies with and without TXA and reviews postoperative complications.

Methods: A retrospective cohort study, using the TrinetX 20-year database of 133 million U.S. medical records, identified patients undergoing gender-affirming mastectomies. Patients were separated according to the intraoperative use of TXA. Demographics and postoperative outcomes were evaluated including seromas, hematomas, infections, and thromboembolisms.

Results: There were 951 gender-affirming mastectomies performed with TXA and 7,929 without. After propensity-score matching, 951 patients remained in each cohort. The mean age was 26.6, and mean body mass index was 29.1. The TXA cohort had a lower rate of hematoma (1.8% versus 2.3%, respectively; p=0.4) and seroma (0.8% versus 1.4%, respectively; p=0.1) but with no significant difference. TXA use was not associated with an increased risk of thromboembolisms (p=0.9) or infections (p=0.6). The TXA cohort had a significantly lower incidence of emergency room visits within three months post-mastectomy (4.0% versus 6.0%, respectively; p=0.046).

Conclusion: Gender-affirming mastectomies are safe and effective treatment options. TXA usage was not associated with an increased risk of hematomas, seromas, or thromboembolisms, but had a lower incidence of emergency room visits post-mastectomy, which may be due to the lower rate of overall postoperative complications. Surgeons may consider prescribing TXA in gender-affirming mastectomies in specific individuals based on clinical judgment.

Impact of BMI on Sensory Recovery after Targeted Nipple Areolar Complex Innervation in Gender Affirming Mastectomy

Abstract Presenter: Kassandra Carrion

Abstract Co-Author(s): Meg Quint, Nitya Devisetti, Athena Le, Branden Barger, Allison Hu MD, Dung Nguyen MD

Purpose: Top surgery, which is one of the most common gender-affirming procedures, has been shown to increase body image satisfaction, improve gender congruence, decrease gender dysphoria, and is rarely regretted. Reinnervation techniques have been shown to improve sensation outcomes for the NAC and throughout the chest wall. Historically, Body Mass Index (BMI) has been a challenging topic amongst TGD patients and gender-affirming surgeons as existing research has shown mixed outcomes of BMI impact on postoperative outcomes. As such, some providers may hold stringent BMI cutoffs that limit access to life changing procedures. This is the first study to illustrate, in detail, the complications correlated with various BMI groups following reinnervation in female to male gender affirming mastectomy.

Methods: A retrospective chart review was conducted on 122 total patients who underwent FTM gender-affirming mastectomy with targeted NAC innervation. BREASTQ was sent to patients post-operatively. Semmes-Weinstein monofilament testing was used to measure sensation in the nipple, areola, and breast skin within 2cm of the NAC to total 9 segments.

Results: A total of 118 patients were included in our chart review. The average BMI of this cohort was 25.1±5.16 kg/m2 (range 18.2 - 49.0). Most patients fell into the healthy weight category (54, 45.8%) or had Class I Obesity (13, 11.0%). Our cohort showed no significant impact of BMI on restoration of sensation in the first 1-6 months, or 12-24 months in any breast region. Log regression results demonstrated that overweight($p=0.51$), Class I($p=0.34$), and Class 3 ($p=0.997$) patients did not have significantly lower restoration of sensation than patients in the normal weight class. This trend held up to 24 months post operatively. Furthermore, multivariate regression analysis of BMI class revealed no statistically significant association between BMI class and postoperative complications within the first 30 days($p=0.56$) or revision surgeries($p=0.32$).

Conclusions: This study demonstrated that BMI is not a significant predictor for restoration of sensation following gender affirming mastectomy with targeted NAC innervation regardless of post-operative time point. It is also consistent with prior research indicating that BMI may not be an accurate predictor of post-operative complications in the setting of adequate patient education. As investigations into optimizing outcomes for gender affirmation surgery continue, our group suggests a wholistic approach to patient evaluation for gender affirming mastectomy.

From Posts to Perceptions: How Reddit Users Feel About Phalloplasty and Metoidioplasty

Abstract Presenter: Evan Rothchild BE

Abstract Co-Author(s): Caitlin Foster, Joseph Ricci MD

Background: Gender-affirming surgery, including phalloplasty and metoidioplasty, is an effective and necessary treatment for patients with gender dysphoria.(1-4) This study aims to better describe the needs and priorities of patients undergoing these procedures by using social media as a lens to analyze patient sentiment.

Methods: We utilized Pushshift.io, an archive of Reddit data, to extract all posts and comments from the r/Metoidioplasty and r/Phalloplasty subreddits since their inception. These posts were analyzed using natural language processing and VADER sentiment analysis. Posts with extreme sentiment scores were manually reviewed for theme classification and qualitative analysis.

Results: A total of 4,236 r/Metoidioplasty posts, 37,347 r/Metoidioplasty comments, 12,837 r/Phalloplasty posts, and 122,489 r/Phalloplasty comments were analyzed. The number of posts and comments in both subreddits increased significantly over time. The mean sentiment score for r/phalloplasty comments was significantly higher than the mean sentiment score for r/metoidioplasty comments. The average monthly sentiment score for r/Phalloplasty posts and comments has decreased significantly since the subreddit's inception. 1,347 posts (340 from r/Metoidioplasty and 1,007 r/Phalloplasty) with extreme sentiment scores above 0.95 or below -0.95 were identified. A total of 42 overarching themes were identified. The most frequent themes included the healing/recovery process, sensation and sexual function, and preoperative planning and consultation.

Conclusions: Our findings reveal an increase in online engagement over time within the r/Metoidioplasty and r/Phalloplasty Reddit communities. This suggests a growing interest in these gender-affirming surgeries and the need for increased patient support. The decrease in phalloplasty sentiment scores may reflect rising concerns or negative experiences among patients. Frequent topics of discussion with extreme sentiment scores identify potential target areas for increased education and patient-physician discussion. Ultimately, this study offers valuable insights into the real-time concerns and priorities of patients undergoing gender-affirming surgery. While Reddit offers a rich source of qualitative data, the limitations of using social media, such as selection bias and the potential for extreme viewpoints to dominate discussions, must be acknowledged. Future studies integrating social media data with traditional clinical outcomes and patient reported outcomes could help develop a more comprehensive understanding of patient experiences, improving both surgical practices and support systems for transgender individuals.

1. McNichols CHL, O'Brien-Coon D, Fischer B. Patient-reported satisfaction and quality of life after trans male gender affirming surgery. Int J Transgend Health. 2020;21(4):410–417. https://pubmed.ncbi.nlm.nih.gov/34993519/. Accessed Oct 20, 2024. doi: 10.1080/26895269.2020.1775159.
2. Standards of care for the health of transsexual, transgender, and gender nonconforming people. The World Professional Association for Transgender Health. . https://www.wpath.org/media/cms/Documents/SOC%20v7/SOC%20V7_English.pdf. Accessed Oct 14, 2024.
3. Black CK, Fan KL, Economides JM, Camden RC, Del Corral GA. Analysis of chest masculinization surgery results in female-to-male transgender patients: Demonstrating high satisfaction beyond aesthetic outcomes using advanced linguistic analyzer technology and social media. Plast Reconstr Surg Glob Open. 2020;8(1):e2356. https://pubmed.ncbi.nlm.nih.gov/32095382/. Accessed Oct 20, 2024. doi: 10.1097/GOX.0000000000002356.
4. Wright JD, Chen L, Suzuki Y, Matsuo K, Hershman DL. National estimates of gender-affirming surgery in the US. JAMA Network Open. 2023;6(8):e2330348. https://pmc.ncbi.nlm.nih.gov/articles/PMC10448302/. Accessed Oct 20, 2024. doi: 10.1001/jamanetworkopen.2023.30348.

Body Mass Index is Not an Independent Risk Factor for Complications in Facial Feminization Surgery: An Institutional Cohort and NSQIP Analysis

Abstract Presenter: Alexis Gursky

Abstract Co-Author(s): Hailey Wyatt MD, Sachin Chinta, Alay Shah MD, Eduardo Rodriguez MD

Background: Most research on body mass index (BMI) in plastic surgery focuses on general reconstructive procedures, with limited data available on its impact on facial aesthetics and gender-affirming surgeries. Facial feminization surgery (FFS) is a set of procedures designed to modify facial features to appear more feminine. Given that obesity is a well-established risk factor for complications in various surgical fields, this study investigates whether similar risks apply to FFS to better inform surgical decision-making and reduce unnecessary barriers to care.

Methods: A retrospective analysis was conducted on transfeminine patients who underwent FFS at our institution to evaluate the relationship between BMI and postoperative complications. A parallel analysis was performed using the National Surgical Quality Improvement (NSQIP) database from 2009 to 2023, identifying patients with International Classification of Diseases-10 (ICD-10) codes for gender dysphoria and Concurrent Procedural Terminology (CPT) codes related to FFS. In both cohorts, BMI was classified as normal weight (18.5 to 24.9 kg/m2), overweight (25.0-29.9 kg/m2), and obese (≥30.0 kg/m2). Multivariate logistic regression, with comorbidities as covariates, was used to assess associations between BMI category, overall postoperative complications, and specific complication types.

Results: Our institutional cohort included 350 FFS patients with the following BMI distribution: 72 obese (20.6%), 119 overweight (34.0%), and 135 normal weight (38.6%). The overall postoperative complication rate was 10.0%. Multivariable logistic regression showed no significant association between BMI category and overall complications or specific complications, including infection, dehiscence, and hematoma. To validate these findings, we analyzed an NSQIP cohort of 597 FFS patients with a similar BMI distribution: 150 obese (25.1%), 175 overweight (29.3%), and 247 normal weight (41.4%). The overall complication rate was low at 3.11%. Consistent with our institutional data, multivariate analysis of the NSQIP cohort found no significant association between BMI and any postoperative complication, including superficial surgical site infection (SSI), deep incisional SSI, or dehiscence.

Conclusion: Our findings provide robust, multi-institutional evidence that BMI should not be a contraindication for FFS, and that FFS is safe in each category of BMI. Reducing BMI-related barriers can improve access to gender-affirming care. Further

research is needed to explore additional factors influencing postoperative outcomes in this population.

Association of Body Mass Index With Postoperative Complications After Chest Masculinization Surgery: An Updated Analysis

Abstract Presenter: Camille Blackman

Abstract Co-Author(s): Margaret Wang, Bashar Hassan MD, Calvin Schuster, Fan Liang MD

Purpose: Preoperative body mass index (BMI) cut-offs for chest masculinization surgery (CMS) are institution-specific and based on limited data. Our prior NSQIP research showed that while higher BMI increased the odds of minor surgical complications, no patients experienced severe morbidity or mortality. This study re-evaluates this association at a single institution to inform preoperative planning and patient counseling for transgender and non-binary individuals.

Methods: We conducted a retrospective cohort study of patients who underwent CMS with double incision mastectomy and free nipple grafting between March 2022 and January 2025 by the senior author. Patients undergoing other CMS techniques were excluded. The primary outcome was incidence of postoperative surgical complications and adverse aesthetic outcomes. Surgical complications included infection requiring antibiotics or washout, hematoma or seroma requiring drainage, wound dehiscence requiring intervention, skin necrosis, nipple graft failure, pulmonary embolism or venous thromboembolism, blood transfusion, acute kidney injury, urinary tract infection, pneumonia, or sepsis. Adverse aesthetic outcomes included scar widening and/or hypertrophy, dog ear revision, and scar revision surgery.

BMI (kg/m²) was analyzed as a continuous and categorical variable per WHO guidelines: healthy weight (18.5–24.9), overweight (25.0–29.9), Class I obesity (30.0–34.9), Class II obesity (35.0–39.9), Class III obesity (40.0–49.9), and Class IV obesity (≥50). Associations between BMI and complications were assessed using bivariate and regression analyses, controlling for past medical history, anticoagulant use, and connective tissue disorders.

Results: Among 92 patients who fulfilled inclusion criteria, the average (standard deviation) age was 27.3 (7.7) years old, and mean (SD) BMI was 32.2 (7.3) kg/m². BMI distribution was: 14.1% healthy weight (n=11), 28.3% overweight (n=26), 25.0% class I obesity (n=23), 16.3% class II obesity (n=15), 13.0% class III obesity (n=12), and 3.3% class IV obesity (n=3). The mean (SD) follow-up duration was 5.2 (4.1) months postoperatively.

BMI was not significantly associated with any surgical complications except wound dehiscence. Patients with a BMI >50 kg/m2 were significantly more likely to experience wound dehiscence compared with patients with a BMI 25 - 29.9 kg/m2 (1/3 [33.3%], 0/26 [0%], P=0.01). Adverse aesthetic outcomes occurred in 29.3% (n=27) of patients. BMI was not significantly associated with any individual aesthetic outcome. However, BMI was significantly associated with the composite outcome of experiencing at least one aesthetic complication. Patients with BMI ≥40 kg/m² had significantly greater odds of at least one aesthetic complication than those with BMI <25 kg/m² (BMI 40–49.9 kg/m²: aOR 16.800, 95% CI 1.617–>100, P=0.018; BMI ≥50 kg/m²: aOR 24.000, 95% CI 1.028–>100, P=0.048).

Conclusions: Higher BMI was associated with greater odds of wound dehiscence and experiencing an adverse aesthetic complication following CMS. However, the incidence of major postoperative complications was negligible.

Bridging the Knowledge Gap: Evaluating Information Access and Resource Effectiveness in Gender-Affirming Bottom Surgery

Abstract Presenter: Bradley Colarusso

Abstract Co-Author(s): Tricia Mae Raquepo, Micaela Tobin, Mohammed Yamin, Audrey, Mustoe BA, Anirudh Kulkarni, Sophia Ahn, Stephanie Preston MD, Marissa Kent, Ryan Cauley MD MPH

Purpose: Access to reliable, high-quality, and inclusive information and resources is crucial for individuals considering gender-affirming surgery, as it directly impacts their ability to make informed decisions about their care. Many patients turn to a broad range of resources, including online forums, social media, medical websites, and academic literature, to gather information about surgical options, risks, and recovery expectations, and long-term outcomes. However, the quality and accessibility of these resources can

vary widely, creating potential gaps in patient education. This study examines the types of information patients seek regarding gender-affirming bottom surgery, their preferred sources, and the perceived quality of available resources.

Methods: An IRB-approved survey assessing the availability and perceived difficulty of educational resources for gender-affirming bottom surgery was distributed across Reddit gender-based platforms. Participants were categorized based on their interest in either vaginoplasty or phalloplasty/metoidioplasty. Depending on their stated surgical preferences, survey respondents received an information sheet on vaginoplasty or phalloplasty/metoidioplasty and were asked to rate their difficulty and key aspects. Group differences were analyzed using t-tests and chi-squared tests, with statistical significance at $p<0.05$.

Results: A total of 348 individuals were included. Online forums and departmental websites were the most utilized resources for both vaginoplasty and phalloplasty/metoidioplasty. YouTube was rated the easiest to understand for vaginoplasty-related information, while academic journals and textbooks were perceived as the most challenging for both procedures. Notably, participants interested in phalloplasty reported significantly greater difficulty understanding educational websites than those seeking vaginoplasty ($p<0.0001$). When evaluating the provided information sheets, respondents generally found the sheet very easy to understand and relatively helpful in deciding preferred surgical techniques. Patients interested in vaginoplasty found the procedure description most helpful, while those interested in phalloplasty found the comparative tables most useful.

Conclusions: While online forums and educational sites were the most accessible resources, their usability varied with phalloplasty-related materials presenting greater accessibility challenges than vaginoplasty resources. YouTube was identified as an easy-to-understand medium. These findings highlight the need to develop patient-friendly educational materials like the provided information sheets that effectively communicate gender-affirming bottom surgery options. Future research should focus on enhancing the usability of educational materials to support informed decision-making across all gender-affirming bottom surgery types.

Comparison of Medical and Surgical Transition Goals between Transgender and Nonbinary Individuals

Abstract Presenter: Calvin Schuster

Abstract Co-Author(s): Danielle Sim, Bashar Hassan MD, Shep Heaton, Ferris Zeitouni, Eric Resnick, Fan Liang MD

Purpose: Nonbinary people, who identify outside the traditional gender binary, are estimated to comprise 38% of the gender diverse population in the United States . However, the specific transition goals of nonbinary individuals remain largely unexplored. Preliminary data indicates that nonbinary people may have distinct preferences regarding medical and surgical transition options compared with their transgender counterparts, but there are no studies that directly compare transition goals between these groups. This study aims to characterize differences in medical and surgical transition goals between transgender and nonbinary individuals.

Methods: Individuals who completed an initial intake form at our gender-affirming health center between January 2017- December 2019 were included. Our primary outcome was the frequency of desired and undertaken medical and surgical transition options. Demographic information, desired procedures, medical and surgical history were extracted from the intake form and medical chart. Chi-squared tests were used to compare outcomes between transgender and nonbinary individuals.

Results: Among 1402 patients, 1275 (91%) were binary and 127 (9%) were nonbinary. The median (IQR) follow-up duration after intake was 3 (1-4) years. Of 807 (58%) patients who were assigned female at birth, 709 (88%) were transgender men and 98 (12%) were transmasculine nonbinary individuals. Of 595 (42%) patients who were assigned male at birth, 566 (95%) were transgender women and 29 (4.8%) were transfeminine nonbinary individuals. Compared with transgender men, transmasculine nonbinary individuals were significantly less likely to be on gender-affirming hormone therapy (GAHT) (621/709 [87%] versus 62/98 [63%], $p<0.001$) and desire future GAHT (69/88 [78%] versus 17/36 [47%], $p<0.001$). They were also significantly less likely to request phalloplasty compared with transgender men (23/98 [24%] versus 374/694 [54%], $p<0.001$). Interest in chest masculinization surgery, however, was similar between the two transmasculine cohorts. Both binary and nonbinary transfeminine individuals expressed similar interest in GAHT. However, transfeminine nonbinary individuals were significantly less likely than transgender women to request vaginoplasty (8/29 [27%] versus 376 [69%], $p<0.001$).

Conclusion: Significant differences in transition goals exist between nonbinary and binary transgender individuals presenting to our gender-affirming health center. Nonbinary individuals were found to pursue GAHT less frequently than transgender

individuals. While there was a similar interest in top surgery between transmasculine nonbinary individuals and transgender men, bottom surgery was more often requested by transgender men and transgender women compared to their nonbinary peers. These findings emphasize that nonbinary individuals may have unique transition goals, and providers should recognize that gender identity is an important component of patient-centered care.

Introitus Dehiscence is Strongly Associated With Increased Revision Rate Following Primary Vaginoplasty

Abstract Presenter: Sky Kihuwa-Mani

Abstract Co-Author(s): Subha Karim, Chelsia Melendez, Grace Travers, Bella Avanessian MD, John Henry Pang MD, Jess Ting MD, Elan Horesh MD

Purpose: Dehiscence of the posterior introitus following primary vaginoplasty is serious and disfiguring, resulting in visually unappealing scars and loss of labia minora definition. Dehiscence is also common, with rates reported up to 33% in previous studies.(1) Despite its frequency, the underlying causes remain poorly understood. We sought to assess the proportion of patients with dehiscence at our center and to identify characteristics that may be associated with this significant complication.

Methods: Wound dehiscence was documented in post-operative appointment notes from October 2016 to July 2023 and recorded as a binary response variable. We performed univariate and multivariate binary logistic regression with the following variables: age, BMI, chronic disease (HTN, DM, cardiac disease, peripheral vascular disease, and renal disease), type of closure used at the posterior incision, "tucking" habit, number of flights of stairs at home, pre-operative penile length, pre-operative skin elasticity, pre-operative scrotal skin excess, post-operative wounds (any), vaginal dilator size being used at 1 month, 3 months, and after 3 months post-operation, post-operative Body Congruence Index (BCI; formerly Gender Dysphoria Index), difference between pre- and post-operative BCI, post-operative hematoma, revision surgery, and revision labiaplasty. All statistics were performed in IBM SPSS (v28.0.1.1).

Results: A total of 667 patients who underwent primary vaginoplasty at our center were included in this study. Of these we found 16.2% (n = 108) of patients had postoperative dehiscence. We found that wound dehiscence was strongly associated with revision

surgery (p=0.004, OR=2.095, 95%CI:1.268-3.462) and peripheral vascular disease (p=0.029, OR=13.316, 95%CI:1.306-137.78). Conversely, wound dehiscence was strongly inversely associated with 1.5" diameter dilator size at 3 months post-op (p=0.006, OR=0.304, 95%CI:0.130-0.715) and 1.5" diameter dilator size after 3 months post-op (p=0.004, OR=0.332, 95%CI:0.158-0.699). The use of simple running 3-0 Chromic closure (p=0.026, OR=0.376, 95%CI:0.160-0.888), and flights of stairs at home (p=0.011, OR=0.694, 95%CI:0.523-0.921) were also associated with a lower incidence of dehiscence. To account for differences in surgeon documentation, we combined dehiscence with wound (any) and found the combined variable was strongly associated with revision surgery (p<0.001, OR=2.335, 95%CI:1.465-3.721) and post-operative hematoma (p=0.016, OR=1.838, 95%CI:1.121-3.014). No other variables were strongly associated with or against dehiscence.

Conclusions: Our results highlight that patients with dehiscence are more likely to seek revision surgery, more likely to have hematomas, and less likely to increase their dilator size. The strong association between PVD and dehiscence also suggests that adequate blood flow to the vaginal introitus is imperative for minimizing dehiscence. Interestingly, patients with stairs at home were less likely to experience dehiscence. This may be reflective of stricter counseling and bedrest adherence or benefits of mild physical activity and warrants further investigation.

Sources

1. Rossi Neto R, Hintz F, Krege S, Rubben H, Vom Dorp F. Gender reassignment surgery--a 13 year review of surgical outcomes. Int Braz J Urol. 2012;38(1):97-107. doi:10.1590/s1677-55382012000100014

It’s Not That Simple: Patient-Reported Outcomes with Dilation After Penile Inversion Vaginoplasty

Abstract Presenter: Diego Gomez

Abstract Co-Author(s): Makenna Ley BS, Allison Hu MD, Breanna Jedrzejewski MD, Dev Gurjala MD, Thomas Satterwhite MD, John Henry Pang MD

Background: Penile inversion vaginoplasty is a widely performed gender-affirming procedure aimed at constructing a functional neovagina. Postoperative vaginal dilation is essential to prevent stenosis, but many patients report challenges related to

discomfort, inconvenience, and adherence to dilation protocols. This study aims to characterize patient-reported experiences with vaginal dilation, identifying barriers and trends over time.

Methods: Patients who underwent penile inversion vaginoplasty at a single institution between March 2024 and June 2024 were invited to complete weekly postoperative surveys over a seven-month period. Survey questions addressed dilation frequency, depth, duration, and any encountered challenges. Univariate analyses were conducted to assess temporal trends in patient-reported challenges.

Results: Eighteen out of 24 patients responded to the survey (71% response rate), providing a total of 202 weekly responses. The average reported dilation frequency was 6.95 ± 0.17 days per week, with an average of 2.97 ± 0.46 sessions per day. Dilation sessions lasted 35.9 ± 9.7 minutes on average. The mean depth achieved was 4.2 ± 0.49 on a standard dilator set, with a small but statistically significant decrease over the seven-month period (4.9 vs. 4.1; p=0.003). All respondents reported at least one challenge with dilation during the study period, including pain (83%), tightness (83%), bleeding (72%), discharge (61%), and time or personal constraints (56%). On univariate analysis, the frequency of reported complications did not significantly differ throughout the study period.

Conclusion: This study is the first to longitudinally assess patient-reported experiences with vaginal dilation following penile inversion vaginoplasty. While adherence to dilation protocols remains high, patients face significant challenges, particularly pain, tightness, and bleeding, which should be addressed during preoperative counseling. Tailored dilation regimens and targeted pain management strategies are critical to improving postoperative outcomes and patient satisfaction.

Ehlers-Danlos Syndrome And Gender Dysphoria: Differences In Surgical Outcomes And Prevalence Of The Dual Diagnosis

Abstract Presenter: Esther Ochoa

Abstract Co-Author(s): Tara Sara Saffari MD, MS, Sophia Chryssofos, Katherine Long, Jonah Orr MD, Daehee Jeong, Danielle Serota, Gary Skolnick MBA, Trina Ebersole MD, Marissa Tenenbaum MD

Introduction: Ehlers-Danlos Syndrome (EDS) is a family of connective tissue disorders that includes 13 subtypes. EDS largely affects the joints, skin, and vasculature and is known to cause surgical complications like poor wound healing. According to DSM-5, gender dysphoria (GD) is characterized by incongruence between one's gender and sex, and a strong desire for the primary and/or secondary sex characteristics of the other gender. At our institution, there seemed to be a high prevalence of patients seeking gender affirming chest surgery that have EDS diagnoses, but there is paucity in the literature characterizing this association. Thus, we aimed to study both prevalence and differences in surgical outcomes of this dual diagnosis through retrospective chart review and the Data, Inclusion, Collaboration, and Excellence (DICE) Ehlers-Danlos Syndrome and Hypermobility Syndrome Global Registry.

Methods: A retrospective chart review was performed from April 2018 to September 2024 of patients with GD at a single institution and reviewed for EDS diagnosis. Data on patients undergoing chest masculinization surgery were collected regarding demographics, past medical history, surgical details, and surgical outcomes. Patients with Hypermobility Spectrum Disorder (HSD) and surgical indications beyond GD were excluded. Recorded biological sex, gender identity, and diagnosis information were collected from the Registry. Incomplete survey responses and non-clinical and/or HSD diagnoses were excluded. Analyses of prevalence and all Registry analyses were done using descriptive statistics. Surgical outcome related statistical analysis was conducted in R Studio 4.4.1 and included Shapiro-Wilk's Normality, Mann-Whitney U, t-test, and Fisher's Exact.

Results: A total of 775 charts of patients with GD were identified, of which 19 (2.45%) were diagnosed with EDS, and 8 patients (1.03%) were diagnosed with Hypermobility Spectrum Disorder. Of those 775 with GD, 437 underwent chest masculinization and were included in outcome analysis. All baseline characteristics between groups were found to be equal ($p>0.05$), except for the incidence of Postural Orthostatic Tachycardia Syndrome (POTS), which was significantly higher amongst those with EDS ($p=0.01$; 95% CI 1.53, 146.93). Regarding negative surgical outcomes, there were no statistically significant differences between patients regarding EDS diagnosis ($p>0.05$). A total of 4132 patients in the Registry met criteria, with 343 (8.3%) identified as having GD.

Conclusions: The national prevalence of EDS ranges depending on subtype with the most common being Hypermobile EDS at 1:50-320. We observed a greater prevalence of EDS amongst those with GD (1:40). This is confirmed by the observed GD prevalence amongst those with EDS compared to national averages (8.30% vs 0.5% nationally). We hypothesize that these results reflect the unique awareness of one's body amongst gender non-conforming people, and their more frequent and earlier

interactions with healthcare that might lend to more clinical diagnoses. We identified no significant differences in surgical outcomes per EDS diagnosis. These findings highlight that patients with EDS should not be excluded from accessing gender-affirming surgeries. Gender non-conforming patients already face significant barriers to receiving this life-saving care. Future research is needed to identify underlying genetic and molecular factors in EDS patients that are associated with GD.

Standardizing Sensation: A Comprehensive Approach to Sensory Evaluation in Gender-Affirming Bottom Surgery

Abstract Presenter: Audrey Mustoe BA

Abstract Co-Author(s): Micaela Tobin, Charlotte Thomas, Bradley Colarusso, Tricia Mae Raquepo, Sarah Karinja MD, Jonna Peterson, A. Lee Dellon MD, Bernard Lee MD, MBA, MPH, Marissa Kent, Ryan Cauley MD MPH

Background: In gender-affirming bottom surgery, sensory outcomes significantly impact postoperative well-being, greatly contributing to surgical choice of donor site. Yet sensory assessment methods vary widely without standardization. This study aimed to characterize the techniques for assessing sensation following trans-masculinizing and trans-feminizing gender-affirming bottom surgery by describing available methods, evaluating outcomes across sensory modalities and patient-reported outcome measures (PROMs), and identifying optimal assessment timelines.

Methods: A comprehensive search of PubMed, Embase, and Cochrane Library was conducted in January 2025 in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analysis Scoping Review (PRISMA-ScR) guidelines. Articles were screened in a two-stage process. Inclusion criteria were randomized control trials, observational studies, surveys, and interviews that evaluated sensory outcomes with provider-administered sensory testing after gender-affirming bottom surgery. Abstracts, commentaries, editorials, systematic reviews, and non-English studies were excluded.

Results: Among the 2234 articles screened, thirteen studies were included. Eight studies (61.5%) assessed phalloplasty, four (30.8%) evaluated vaginoplasties, and one (7.7%) examined both procedures. Semmes-Weinstein monofilaments were the most commonly used assessment tool employed in 7 studies (53.8%) to measure pressure and tactile perception. Other assessment methods included vibratory testing (38.5%),

thermal sensitivity (23.1%), two-point discrimination (15.4%), and sharp blunt discrimination (7.7%). Testing locations varied by procedure type, with the neophallus measurement typically divided into proximal, distal, dorsal, ventral and quadrant-based measures, while the neovaginal assessment focused on the neoclitoris, labia, and vaginal entrance. Five studies (38.5%) included preoperative baseline measurements using a variety of different reference sites. Follow-up timing ranged between one week and seven years postoperatively, with most studies initiating assessment with the same testing modalities between one and three months after surgery. Eight studies (61.5%) initiated patient-reported outcomes alongside objective sensory testing.
Compared to other types of sensation, tactile sensation was most easily perceived and also exhibited progressive improvement over the first year postoperatively. In phalloplasties, proximal regions recovered sensation earlier than more distal regions. Additionally, the effect of flap type on sensation remained unclear. In both phalloplasties and vaginoplasties, perceptual thresholds varied by sensory modality. Of the articles that reported PROMs, the most commonly assessed were the ability to orgasm (75% of studies) and sexual satisfaction (62.5% of studies). Among studies that assessed ability to orgasm, between 79.5-100% of phalloplasty patients and 80-86% of vaginoplasty patients reported success. Additional outcomes included satisfaction with aesthetic results of the neogenitalia, functional results, ability to have penetrative sexual intercourse, and current sex life. The correlation between sensation testing and PROMs remains unclear.

Conclusion: This study highlights the heterogeneity of sensory assessment techniques following gender-affirming bottom surgery. Given the variation in results across modalities, sensory evaluation requires a comprehensive approach incorporating multiple modalities including pressure perception, vibratory testing, thermal sensitivity, and two-point discrimination. Baseline measurements, ideally in preoperative testing, are essential for interpreting postoperative sensory outcomes and evaluating changes across time. Finally, the correlation between provider-administered sensory testing and patient-reported outcomes remains necessary for understanding the relationship between quantifiable sensibility and functional satisfaction.

IRL vs. URL: Comparing Top Surgery Perspectives in Clinic Patients and Reddit Users

Abstract Presenter: Sophia Ahn

Abstract Co-Author(s): Tricia Mae Raquepo, Micaela Tobin, Mohammed Yamin, Sophia Ahn, Anirudh Kulkarni, Bradley Colarusso, Adam Tobias MD, Ryan Cauley MD MPH

Background: Access to gender-affirming chest masculinization (top surgery) is a critical aspect of healthcare for transgender and gender-diverse individuals. Many individuals turn to online platforms like Reddit to seek support and navigate their journeys. As traditional research may not fully capture patient perspectives, some studies have used these platforms to understand how individuals discuss surgical decision-making outside clinical settings. Our study aims to compare top surgery preferences and perspectives between Reddit users and clinic patients.

Methods: A survey was distributed via Reddit gender-based platforms and a plastic surgery clinic, collecting demographics, experiences, and perspectives on top surgery care. A two-way chi-square test assessed interactions between platforms (Reddit vs. clinic) and gender identity. Three gender identity groups were studied: transgender males, non-binary individuals, and other gender-diverse groups, which consisted of those identifying as agender, genderfluid, genderqueer, prefer not to say, or other. Significance was set at $p<0.05$.

Results: A total of 537 respondents were included, with 428 online and 109 clinic responses. Non-binary individuals were more prevalent in the clinic (43.12% vs. 28.97%, $p=0.04$), while agender individuals were primarily captured in online responses (7.01% vs. 0.92%). Transgender men were the largest group (~42%) across both platforms. Older adults (>45) were nearly absent from clinic responses but present online ($p<0.0001$). Race and ethnicity did not differ between groups. BMI categories (<18.5 and >35) were more common online ($p=0.003$). Online participants had lower educational attainment ($p=0.02$), lower income ($p=0.01$), and greater socioeconomic diversity. Of 537 respondents, 509 were either seeking or had completed top surgery. Reddit respondents were less likely to discontinue surgery due to conflicts ($p<0.001$). Reddit users, particularly non-binary and OGD groups, felt that they needed to educate providers about non-standard options more often (non-binary 8.13% vs. 2.13%; OGD 10.48% vs 0%, $p<0.001$). Regarding surgical preferences, Reddit non-binary and OGD groups were more likely to desire a breast mound compared clinic non-binary and clinic OGD groups ($p=0.02$). Compared to Reddit non-binary and OGD groups, clinic non-binary and OGD groups were more likely to desire an NAC (~65% vs ~35%, $p=0.02$) and placed less priority on NAC sensation ($p=0.01$). Both groups reported similar patterns of resource utilization.

Conclusion: This study highlights the value of online platforms like Reddit as a tool for understanding gender-affirming surgery preferences and perspectives. While clinic-

based surveys are limited by the demographics of the surrounding area, online platforms are more inclusive of individuals with lower income, lower education, and those in the earlier stages of their gender-affirming care. By reaching underrepresented individuals who may lack healthcare access, Reddit can provide insights into surgical decision-making and barriers to care. Notably, online discussions revealed non-binary and gender-diverse individuals report greater variability in surgical preferences, particularly regarding NAC and breast mound. Plastic surgeons should consider expanding conversations to encompass the preferences among these gender-diverse populations while incorporating insights from online discussions to improve gender-affirming care.

BMI as an Indicator for Morbidity in Gender Affirming Vaginoplasty: A NSQIP Analysis

Abstract Presenter: Sachin Chinta

Abstract Co-Author(s): Alexis Gursky, Alay Shah MD, Hailey Wyatt MD, Eduardo Rodriguez MD

Introduction: With the rising prevalence of obesity in the U.S., understanding its impact on postoperative outcomes in gender-affirming surgeries is critical. Despite evidence linking obesity with complications in transfeminine procedures, its effect on neovaginoplasty outcomes remains unclear. This study aims to assess the relationship between BMI and postoperative complications, including revision rates, in patients undergoing various neovaginoplasty techniques.

Methods: A retrospective review of the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database was conducted to identify patients who had undergone neovaginoplasty from the years of 2018-2022. Diagnosis codes for gender identity disorders and male-to-female vaginoplasty were used to identify the cohort. Adverse events that occurred within 30-days postoperatively were identified, and multivariate regression was utilized to delineate statistically significant relationships that existed between BMI and complications of interest.

Results: A total of 499 patients met inclusion criteria. The mean age was 36.44 ± 13.45 and racial demographics were as follows: 77% White, 7.2% Black or African American, 4.4% Asian, and 8.6% Unknown/Not Reported. Average BMI was found to be 27.48 ±

6.78 kg/m2. After controlling for age, race, smoking status, and diabetes, multivariate analysis revealed that increased BMI was significantly associated with higher odds of postoperative complications, including dehiscence (OR: 1.10; p=0.0188), UTI (OR: 1.09; p=0.0105), reoperation within 30 days (OR: 1.05; p=0.0391), and readmission within 30 days (OR: 1.05, p=0.0011).

Conclusions: This study, the largest to date on the impact of BMI on neovaginoplasty outcomes, reveals a significant association between increased BMI and higher odds of complications, including dehiscence, UTI, reoperation, and readmission within 30 days. Given the conflicting literature on the effects of obesity in gender-affirming surgeries, our findings provide critical insight into optimizing care for this population. Preoperative counseling and tailored perioperative strategies for patients with higher BMI are essential to improving outcomes and reducing postoperative complications in neovaginoplasty.

Safely Expanding Body Mass Index Limits in Gender Affirming Vaginoplasty

Abstract Presenter: Paul Won MD

Abstract Co-Author(s): Ellen Wang, Jackson Green, Kylie Swiekatowski, Kristen Slaughter MD, Matthew Greives MD, Rachel Goldstein DO, Daniel Freet MD

Introduction: Gender affirming vaginoplasty (GAV) provides significant benefits to those with gender dysphoria by creating a functional and sensate vaginal canal and external genitalia for improved self-esteem, body satisfaction, and gender congruence (1,2,3). Because elevated body mass index (BMI) is often associated with increased complications, some surgical centers limit offering GAV to patients with BMI of a certain upper limit, such as 30 or 35 (4,5). This study will investigate BMI as a risk factor for complications in GAV to determine whether patients with obesity can safely undergo the procedure.

Methods: This study is a retrospective cohort study from March 2019 to December 2022. Patients undergoing gender affirming vaginoplasty were collected from the electronic medical records and categorized by surgical approach. Data collected included demographics, surgical and medical history, operative information, and postoperative outcomes. Complications analyzed included urethral stenosis, strictures, flap necrosis, urethral fistulas, infections, and wound dehiscence.

Results: A total of 56 individuals were included in the cohort, with 42 (75%) undergoing penile inversion vaginoplasty (PIV), eight (14.3%) undergoing colonic vaginoplasty, and six (10.7%) undergoing peritoneal lining vaginoplasty. Twenty-two (39.3%) patients experienced postoperative complications with six (10.7%) patients of the total cohort requiring readmissions. In those with complications, the median body mass index (BMI) was higher than those without complications, but this difference was not statistically significant (30.0 vs 26.0, p=0.2). The range of BMI in the patient cohort was 18.0 - 44.0 with an interquartile range of 23.0 - 33.0. BMI, a past medical history of diabetes, hypertension, depression, and human immunodeficiency virus (HIV) were not significantly associated with complications on univariate and multivariate analysis. Race, insurance status, and age were also not significantly associated with complications.

Conclusion: This study suggests patients with higher BMI may still undergo GAV safely and with good outcomes. Our institution aims to offer gender affirming surgery to patients who seek it without using BMI as a strict cut-off. Surgeons who perform gender affirming surgery should have shared decision-making with their patients regarding their risk profile and individual goals. Because BMI was not significantly associated with GAV complications, we recommend expanding BMI cut-offs for the procedure or evaluating each patient on a case-by-case basis.

1. Massie JP, Morrison SD, Van Maasdam J, Satterwhite T. Predictors of patient satisfaction and postoperative complications in penile inversion vaginoplasty. Plast Reconstr Surg. 2018;141(6):911e-921e. doi:10.1097/PRS.0000000000004427
2. Kilmer LH, Chou J, Campbell CA, DeGeorge BR, Stranix JT. Gender-Affirming Surgery Improves Mental Health Outcomes and Decreases Anti-Depressant Use in Patients with Gender Dysphoria. Plast Reconstr Surg. February 2, 2024. doi:10.1097/PRS.0000000000011325
3. Bouman M-B, van der Sluis WB, van Woudenberg Hamstra LE, et al. Patient-Reported Esthetic and Functional Outcomes of Primary Total Laparoscopic Intestinal Vaginoplasty in Transgender Women With Penoscrotal Hypoplasia. J Sex Med. 2016;13(9):1438-1444. doi:10.1016/j.jsxm.2016.06.009
4. Bustos SS, Bustos VP, Mascaro A, et al. Complications and Patient-reported Outcomes in Transfemale Vaginoplasty: An Updated Systematic Review and Meta-analysis. Plast Reconstr Surg Glob Open. 2021;9(3):e3510. doi:10.1097/GOX.0000000000003510

5. O'Dwyer C, Kumar S, Wassersug R, et al. Vaginal self-lubrication following peritoneal, penile inversion, and colonic gender-affirming vaginoplasty: a physiologic, anatomic, and histologic review. Sex Med Rev. 2023;11(3):212-223. doi:10.1093/sxmrev/qead015

Recipient Vessels in Phalloplasty: A Systematic Review

Abstract Presenter: James Gaston

Abstract Co-Author(s): R'ay Fodor, Antonio Rampazzo MD, Michele Fascelli, Bahar Bassiri Gharb MD, PhD

Purpose: Phalloplasty addresses both functional and aesthetic aspects of penile reconstruction, contributing to improved quality of life for many individuals. Selection of recipient vessels is challenging due to the absence of adequate vessels in the immediate proximity. Despite technical refinements in microsurgical penile reconstruction, flap-related complications, often due to vascular complications, remain high at 25.9% (1). Currently, there is no consensus on the appropriate vessel selection. This systematic review consolidates research on recipient vessels in phalloplasty and examines their correlation with postoperative outcomes. We hypothesized that the selection of recipient vessels in phalloplasty significantly impacts surgical outcomes, including complications and flap survival.

Methods: A systematic review of literature was performed according to PRISMA guidelines, from 1949 to January 2024, across Ovid-MEDLINE/PubMed, Embase, and CENTRAL, yielding 958 articles after removal of duplicates. Forty -six articles met the inclusion criteria, detailing recipient vessels, surgical outcomes, and complications. Collected data included patient demographics (age, sex, BMI), surgical details (indications, techniques, free flap type, and flap size), donor and recipient vessels, anastomosis technique, number of venous anastomoses, postoperative outcomes (complications and treatments), and follow-up duration. A random effects model was employed to calculate pooled proportions of complications. Subgroup analysis was conducted to explore the effects of recipient artery, anastomosis technique, recipient vein(s), number of venous anastomoses, flap type, and surgical indications on surgical outcomes.

Results: The included articles represent 1,976 phalloplasty cases (1,585 gender-affirming and 391 non-gender-affirming). The predominant flap configuration was the

tube-within-a-tube design, utilized in 52.4% of cases. Radial forearm flap was the most common free flap, used in 1,008 cases (51.1%). The most common recipient artery was the deep inferior epigastric artery (DIEA) (71.5%, 1,413 cases), followed by the superficial femoral artery (9.2%, 181), common femoral artery (7.8%, 154), circumflex femoral artery (1.4%, 28), and deep femoral artery (0.8%, 15). The most common transposed recipient vein was the deep inferior epigastric vein (DIEV) & Great Saphenous vein or branches (GSV) (34.4%, 679), followed by the DIEV alone (34.3%, 677), and the GSV alone (26.6%, 526).
The overall rates of arterial and venous thrombosis were 2.1% and 2.3%, respectively. The use of interpositional vein grafts with the femoral artery resulted in significantly higher thrombosis at 16.7% compared to 0.1% for the femoral artery with direct anastomosis and 1.2% for DIEA with direct anastomosis ($p<0.001$). The overall rates of partial and total flap necrosis were 6.7% and 1.5%, respectively. Direct anastomosis with the femoral artery demonstrated significantly lower partial flap necrosis at 0.5% compared to 5.4% for DIEA ($p=0.026$).

Conclusions: The choice of recipient vessels plays a crucial role in the success of phalloplasty. Current literature indicates that the deep inferior epigastric vessels exhibit the lowest proportion of vascular complications and anastomosis revisions. However, the higher proportion of arterial thrombosis observed with the femoral artery may be significantly attributable to the incorporation of an interpositional vein graft. Despite their lower thrombosis rates, the use of the deep inferior epigastric vessels was associated with higher rates of partial flap necrosis when the vessels remained patent.

References
(1) Falcone M, Preto M, Timpano M, et al. The surgical outcomes of radial artery forearm free-flap phalloplasty in transgender men: single-centre experience and systematic review of the current literature. Int J Impot Res. 2021;33(7):737-745. doi:10.1038/s41443-021-00414-x

Marijuana Use Does Not Increase Complications in Facial Feminization Surgery Outcomes: A Propensity Score Matched Analysis

Abstract Presenter: Alexis Gursky

Abstract Co-Author(s): Hailey Wyatt MD, Alay Shah MD, Sachin Chinta, Eduardo Rodriguez MD

Background: Marijuana use has been increasing due to changes in legal status and growing social acceptance. However, its effect on surgical complications remains largely unknown. Some surgical subspecialties have reported an association between marijuana use and a modest increase in perioperative morbidity and mortality following major elective surgery (1). However, no studies have examined its impact on outcomes in facial feminization surgery (FFS). Therefore, this study aims to assess the prevalence of marijuana use in our institutional FFS cohort and evaluate its effect on postoperative complications.

Methods: A retrospective analysis of patients undergoing FFS at our institution between 2017 and 2024 examined demographics, comorbidities, marijuana use and other recreational drugs, and postoperative complications. Current marijuana users were included, excluding former users. Propensity score matching using 1:1 nearest neighbor matching was employed to minimize confounders, matching marijuana users and non-marijuana users based on age, race, body mass index, comorbidities, and other drug use. Bivariate statistical analyses were performed using Mann-Whitney U and Chi-square tests. Multivariate logistic regression was conducted to evaluate the independent association between marijuana use and postoperative complications in both cohorts.

Results: A total of 300 patients underwent FFS, including 85 current marijuana users (28.3%) and 193 non-users (64.3%). The cohort median age was 33.0 years, with a median follow-up of 3.0 months. Overall complication rates were low, with infection at 3.3%, hematoma at 3.0%, and dehiscence at 0.70%. No significant differences were observed between users and non-users across all complications. Multivariate logistic regression also found no significant association between marijuana use and increased likelihood of postoperative complications. Propensity score matching was performed, yielding 162 patients, including 76 marijuana users (46.9%). Similar to the unmatched cohort, no significant associations were observed between cannabis users and non-users across all variables. Multivariate logistic regression further confirmed no increased likelihood of postoperative complications.

Conclusion: This study demonstrated that current marijuana use does not significantly impact FFS surgical outcomes, with comparable complication rates between users and non-users. Propensity score matching controlled for confounders, enhancing the study's generalizability. These findings support the safe inclusion of marijuana users undergoing FFS and provide evidence to help guide perioperative counseling. However, further research is warranted to develop more comprehensive guidelines for this patient population.

1. Potnuru PP, Jonna S, Williams GW. Cannabis Use Disorder and Perioperative Complications. JAMA Surg.2023;158(9):935–944. doi:10.1001/jamasurg.2023.2403

The Impact of Gender-Affirming Cross-Sex Hormone Therapy on Primary Headaches in Transgender and Gender Diverse (TGD) Individuals

Abstract Presenter: Calvin Schuster

Abstract Co-Author(s): Danielle Sim, Bashar Hassan MD, Samarth Krishna, Tanisha Martheswaran, Fan Liang MD

Purpose: Many surgeons require patients to undergo twelve consecutive months of gender-affirming hormone therapy (GAHT) before certain gender-affirming surgeries. Surgical stress and general anesthesia can provoke perioperative migraines, and sex hormones significantly influence primary headaches. Migraines are more prevalent in cisgender women than cisgender men, and changes in estrogen and testosterone levels can influence migraine prevalence. This study aims to describe a cohort of transgender and nonbinary patients with primary headaches who are utilizing GAHT. Headache symptoms and health care resource utilization are compared one year before versus one year after GAHT initiation.

Methods: A single-institution, retrospective review of adult patients with a history of a primary headache disorder who initiated GAHT between January 2017 and October 2023 was conducted. The primary outcomes were prevalence of headache symptoms and seeking care for headaches. The McNemar, Fisher's exact, and Wilcoxon signed rank tests were used to compare these outcomes one year before versus one year after GAHT initiation.

Results: This study includes 64 patients with a median age of 23 (IQR 18-30). The prevalence of headache in this population regardless of GAHT initiation is 7.7% (n=307). Migraine is the most common headache type (n=47, 73%) and 13 patients (20%) have a history of aura. Most are transmasculine, or assigned female at birth (n=48, 75%). There is no significant difference in the proportion of patients with headache symptoms one year before versus one year after initiating testosterone (n=19, 40% versus n=22, 46%; p=0.48) or estrogen (n=5, 50% versus n=11, 69%; p=0.55) and no significant difference in the proportion of individuals who sought outpatient or hospital care for headaches one year before versus after initiating

testosterone (n=16, 33% versus n=18, 37%; p=0.45) or estrogen (n=5, 31% versus n=5, 31%; p=1). There is no significant difference in the average (standard deviation [SD]) number of health care visits for headache one year before versus after initiating GAHT in transmasculine or transfeminine patients (0.67 [1.3] versus 0.73 [0.43], p=0.81; 0.63 [1.0] versus 0.44 [0.73], p=0.55). There is no significant difference between transdermal, oral, subcutaneous, or intramuscular GAHT administration and incidence of symptoms or healthcare resource utilization for headaches for transmasculine or transfeminine patients. However, transfeminine patients with aura are more often started on transdermal estrogen compared with transfeminine individuals without aura ($p < 0.01$). The median follow-up after initiation was 36 (IQR 22-58) months and no thromboembolic events occurred.

Conclusion: This is the first study of headache prevalence and progression following initiation of GAHT in adults with pre-existing primary headaches. These findings suggest that GAHT may have limited impact on headache symptoms and healthcare resource utilization in both transmasculine and transfeminine individuals. However, the route of GAHT administration may play a role in the development of migraine characteristics. Therefore, transfeminine patients who develop migraines with aura after the initiation of transdermal patches should consider other routes of GAHT administration. These findings can help guide patient-physician decision-making for patients with primary headaches and concern for exacerbation of symptoms following initiation of GAHT.

Priorities in Feminizing Bottom Surgery: The Influence of Operative Status

Abstract Presenter: Micaela Tobin

Abstract Co-Author(s): Tricia Mae Raquepo, Mohammed Yamin, Audrey Mustoe BA, Stephanie Preston MD, Marissa Kent, Ryan Cauley MD MPH, Bradley Colarusso

Purpose: Feminizing bottom surgery encompasses various techniques aimed at aligning physical anatomy with gender identity for transgender women and gender-diverse individuals. Despite the importance of these procedures in gender-affirming care, there remains limited research comparing the priorities and experiences of individuals before and after undergoing these surgeries. Understanding these perspectives is essential for improving patient education, surgical decision-making, and postoperative satisfaction. Therefore, this study sought to identify potential gaps

between preoperative expectations and postoperative realities by directly comparing these two populations.

Methods: An IRB-approved survey was distributed through Reddit gender-based forums to collect data on demographics, surgical preferences, priorities, and experiences related to feminizing bottom surgery. Participants were categorized into two groups: those interested in but who had not yet undergone feminizing bottom surgery (preoperative) and those who had already received such procedures (postoperative). Group differences were assessed using t-tests and chi-squared tests with significance set at $p<0.05$.

Results: The study included 211 respondents who met inclusion criteria, with 164 (77.73%) in the preoperative group and 47 (22.27%) in the postoperative group. The majority of participants identified as transgender women (88.41% preoperative, 95.74% postoperative). Both groups demonstrated similar demographics across age, BMI, education level, and income, with the only significant difference being that postoperative individuals were more likely to have undergone other gender-affirming surgeries (38.30% vs. 12.72%, $p<0.001$).
Regarding surgical preferences, both groups favored penile inversion and peritoneal vaginoplasties over intestinal or minimal-depth techniques. Functional outcomes-specifically orgasmic capability and preservation of erotic sensation were consistently prioritized above aesthetic and anatomical considerations across both cohorts. However, significant differences emerged in two areas: preoperative individuals placed higher priority on self-lubrication ($p<0.05$), while postoperative individuals assigned greater importance to vaginal width ($p<0.001$).
Among the 73 participants who had consulted with surgeons, only 60% reported that their surgeons discussed different surgical techniques and their respective advantages and disadvantages. Penile inversion was the most commonly discussed technique (84.78%), while intestinal vaginoplasty was the least discussed (26.09%, $p<0.001$). Notably, minimal-depth vaginoplasty was discussed in only 55.17% of preoperative and 40.43% of postoperative consultations.

Conclusions: This study reveals shifting priorities between preoperative and postoperative patients in feminizing bottom surgery. While functional outcomes remain a priority, specific anatomical priorities shift. Additionally, discrepancy in surgical counseling, particularly the limited discussion of minimal-depth and intestinal approaches, indicates an opportunity to enhance preoperative education. Such improvements could optimize decision-making with a broader discussion and enhanced counseling between patients and providers.

Navigating Top Surgery: A Pictorial Algorithmic Approach to Gender-Affirming Top Surgery Choices for Gender-Diverse Individuals

Abstract Presenter: Tricia Mae Raquepo

Abstract Co-Author(s): Micaela Tobin, Mohammed Yamin, Sophia Ahn, Bradley Colarusso, Adam Tobias MD, Ryan Cauley MD MPH, Anirudh Kulkarni

Purpose: Preferences for gender-affirming chest masculinization or top surgery vary among gender-diverse patients. As the demand for top surgery continues to grow, it is increasingly crucial to foster discussions that promote tailored care and collaboration among patients and surgeons to achieve desired surgical outcomes. A previous study introduced an institutional pictorial algorithm, with visual representations of both standard and non-standard top surgery options, to help gender-diverse patients better understand their choices (1). The present study aimed to evaluate the use of this published pictorial algorithm on patient perspective regarding top surgery surgical options and preferences.

Methods: A survey was administered to patients pursuing or who had previously undergone top surgery at a plastic surgery clinic. The survey consisted of demographic information, top surgery experiences, top surgery preferences, and an algorithmic questionnaire. Group differences among transmasculine, non-binary, and other gender-diverse (OGD) groups (defined as prefer not to say, genderfluid, genderqueer, agender, or other) were analyzed using chi-squared tests, Fisher's exact test, and ANOVA, with statistical significance set at $p<0.05$.

Results: We had a total of 107 respondents, including 46 transgender males, 47 non-binary, and 14 OGD. Compared to transgender males, non-binary and OGD individuals had higher education levels ($p<0.005$) without any significant differences among household income levels. Before reviewing the pictorial algorithm, 100% of transmasculine individuals sought only standard top surgery options, while OGD (42.86%) and non-binary individuals (19.15%) were more likely to seek "non-standard" options for top surgery, including near total mastectomy or radical breast reduction ($p<0.0001$). However, after viewing the pictorial algorithm, a greater proportion of transmasculine individuals stated they were "unsure" of their exact preferences for NAC, compared to non-binary and OGD groups ($p=0.002$). Regarding communication with surgeons, there was a trend toward non-binary and OGD respondents feeling less

comfortable discussing "non-standard" options with their surgeons and discussing nipple position. Overall, transmasculine individuals found the algorithm more helpful than OGD and non-binary individuals (4.30±0.76 vs. 3.79±0.58 vs. 3.59±1.07, p=0.001). Written feedback from respondents included more representation of scar contour, nipple size and placement, and NAC-free surgical options.

Conclusion: These findings highlight the diverse surgical preferences among patients seeking gender-affirming top surgery. "Non-standard" options appear to be more relevant for non-binary and OGD individuals than for transmasculine patients, while transmasculine patients initially expressed strong preferences for standard top surgery. The more specific questions in the pictorial algorithm appeared to result in transmasculine individuals expressing more uncertainty regarding their preferred surgical approach, particularly regarding NAC preferences. This underscores the need for more-in depth preoperative discussions, with the pictorial algorithm serving as a valuable tool. Future efforts should focus on refining the algorithm to better address the needs of non-binary and other gender-diverse populations, ensuring a more-inclusive approach to top surgery counseling.

References:
Garvey SR, Friedman R, Nanda AD, Boustany AN, Lee BT, Lin SJ, et al. Along the continuum from reduction to mastectomy: An algorithmic approach to the gender diverse top surgery patient. J Plast Reconstr Aesthet Surg. 2023;83:246-9.

OusterhIN or OusterhOUT: does the Ousterhout forehead feminization classification system stand the test of time?

Abstract Presenter: Alexander Andrew Argame

Abstract Co-Author(s): Iris Deng, Kaavian Shariati, Stacey Francis MD

Purpose: Facial feminization surgery (FFS) often includes forehead procedures, such as forehead setback and/or contouring. The original Ousterhout classification used lateral cephalograms to define frontal sinus anatomy into 4 types and plan the frontal bone procedure. References to these types are commonly used by the literature, patients, and surgeons when planning FFS. However, since the original publication in 1987, no study has used CT scan to validate these, nor determine frequency of each and whether it correlates with surgical procedure. The aim of our study is to investigate

whether specific CT scan measurements validate the differences in frontal sinus anatomy originally described by Ousterhout, with what frequency each occurs and whether the frontal bone surgical procedures indicated correlate with such measurements.

Methods: A retrospective chart review was conducted of patients undergoing FFS from 2018-2024 within a large integrated healthcare system. Data collected included relevant CT scan measurements and type of forehead procedure received. CT scans of facial bones were analyzed in axial, coronal, and sagittal view to obtain frontal sinus measurements relevant to the Ousterhout descriptions. Two independent reviewers (AA and ID) captured measurements, which were then applied to Ousterhout descriptions and each patient was designated an Ousterhout type. Statistical analysis included chi-square Test of independence to examine relationship between Ousterhout classification and type of FFS forehead procedure, as well as One-Way ANOVA to determine if there was statistically significant difference between the frontal sinus measurements between Ousterhout classifications.

Results: A total of 155 patient charts were reviewed. One-Way ANOVA showed statistically significant difference between Ousterhout classifications in the following CT scan frontal sinus measurements: left anterior table thickness, left depth ($p < 0.001$), left projection ($p < 0.001$), right anterior table thickness ($p < 0.001$), right depth ($p < 0.001$), right projection ($p = 0.002$), height ($p < 0.001$), and width ($p < 0.001$). Frequency of each Ousterhout classification type assigned compared with the original description are as follows: 18% type 1 (compared to 9%), 7% type 2 (compared to 8%), 40% type 3 (compared to 82%), no type 4, and 34% that did not easily fall under an Ousterhout classification. In evaluating the procedure performed, most patients with type 3 underwent setback while most patients with combined type 1 and 2 underwent contouring only. Chi-square test of independence showed statistical significance ($p < 0.001$) between Ousterhout classification and type of procedure.

Conclusion: Our study concludes that CT scan measurements of relevant frontal sinus anatomy including anterior table thickness, projection, depth, height, and width validate the significant differences in frontal sinus types originally described by Ousterhout. It also validates that the frontal bone surgical procedure indicated and performed correlates with Ousterhout original classification. However the frequency with which each type occurs deviates significantly with his original description as well as many that do not fit in any type described. Based on this, we propose that contouring only may be a valid option in more patients than originally described, which is helpful in discussions with patients and surgical planning.

Propensity-Adjusted Analysis Evaluating Early Discharge within 2 Days After Gender-Affirming Vaginoplasty: Insights from a Decade-Long National Surgical Quality Improvement Database

Abstract Presenter: Tricia Mae Raquepo

Abstract Co-Author(s): Mohammed Yamin, Micaela Tobin, Samantha Won, Sophia Ahn, Bradley Colarusso, Anirudh Kulkarni, Marissa Kent, Ryan Cauley MD MPH

Purpose: While gender-affirming vaginoplasty (GAV) has become more common, optimal postoperative length of stay (LOS) remains unclear, with recommendations ranging from 3 to 9 days. Prolonged hospitalization can increase healthcare costs and expose patients to hospital-related complications, yet, the safety of early discharge is not well established. As access to gender-affirming care expands, establishing standardized postoperative care is critical. Using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database, this study examines predictors of prolonged length of stay in gender-affirming vaginoplasty and evaluates the safety of discharging patients within 2 days.

Methods: We identified patients who underwent gender-affirming vaginoplasty from 2012 to 2022 in the ACS-NSQIP database using procedure-specific CPT codes. Patients were stratified into two groups based on length of stay: early discharge (≤2 days) and prolonged (>2 days). Group differences were assessed using Chi-square or Fisher's exact tests for categorical variables and Student's t-test or Wilcoxon Rank-Sum for continuous variables. Multivariate analysis with logistic regression and propensity adjustment was performed to identify independent predictors of prolonged LOS. Statistical significance was set at $p<0.05$.

Results: A total of 663 patients were included. Patients with early discharge were significantly older (38.22±11.22 vs. 35.90±12.73, p=0.03). Significant differences between groups were also observed for race, surgical specialty, and American Society of Anesthesiologists (ASA) classification (p=0.03, 0.001, and 0.02, respectively). Patients with prolonged LOS had higher preoperative hematocrit values (41.04±3.50 vs. 39.99±3.26, p=0.01) and longer operative times (289.87±108.22 vs. 164.40±103.61, p<0.0001). Notably, early discharge had fewer total complications (5.68% vs. 13.74%, p=0.03), with trends toward reduced readmissions (2 vs. 25), and reoperations (4 vs. 25), although the latter two did not reach statistical significance. On univariate analysis,

preoperative hematocrit, operative time, and surgical specialty predicted prolonged LOS. However, after multivariate adjustment, only operative time remained a significant predictor. In the propensity-adjusted model, prolonged LOS was associated with a threefold increase in the odds of complications (OR 3.28, CI: 1.24-8.75, p=0.02).

Conclusion: Among patients undergoing gender-affirming vaginoplasty, longer operative time was the strongest predictor of prolonged hospitalization. Significant associations with age, race, surgical specialty, ASA classification, and hematocrit levels highlight key areas for targeted intervention in perioperative optimization. Discharge within 2 days was associated with significantly fewer complications and showed trends toward lower readmission and reoperation rates, supporting early discharge as a safe and feasible option in selected patients.

The Synergistic Effect of Preoperative Gabapentin and Intraoperative Acetaminophen on Postoperative Opioid Requirements in Patients Undergoing Gender-Affirming Mastectomy

Abstract Presenter: Aidan O'Shea

Abstract Co-Author(s): Emily Zona, Keenan Fine, Armin Edalatpour MD, Katherine Gast MD

PURPOSE: Preoperative gabapentin has shown promise in reducing postoperative pain, opioid requirements, and nausea and vomiting in breast cancer surgery. (1) The use of preoperative gabapentin has also been explored in other domains, including facial plastic surgery, orthopaedic surgery, general surgery, and urology, to variable results. However, its efficacy in transgender, non-binary, and gender-expansive (TNG) patients undergoing gender-affirming surgery has not been established. This study seeks to examine the effect of preoperative gabapentin and intraoperative acetaminophen, alone and in combination, as part of a multimodal, opioid-sparing analgesic approach to gender-affirming mastectomy.

METHODS: A retrospective chart review was conducted of patients undergoing gender-affirming mastectomy with a single plastic surgeon between 2022 and 2024. Charts were reviewed for age at surgery, body mass index (BMI), and records of perioperative medication administration. Specifically, receipt of a single 1200-mg dose of gabapentin in the preoperative holding area, receipt of acetaminophen intraoperatively, and receipt

of antiemetics and opioid analgesics in the postanesthesia care unit (PACU) were noted.

Patients were grouped based upon types of non-opioid pain medication received: 1) neither preoperative gabapentin nor intraoperative acetaminophen (NONE), 2) intraoperative acetaminophen alone (ACE), 3) preoperative gabapentin alone (GABA), and 4) preoperative gabapentin and intraoperative acetaminophen (BOTH). Binary logistic regression was employed to compare analgesia modalities in assessing the likelihood of requiring opioid therapy in the PACU while controlling for age and BMI. Additionally, multivariable linear regression was conducted, using the same covariates, to compare modalities for the outcome of postoperative opioid requirement, in morphine milligram equivalents (MME).

RESULTS: A total of 167 patients met inclusion criteria, with 30 patients (18.0%) receiving preoperative gabapentin. A binary multivariate logistic analysis demonstrated that, relative to the NONE group, the GABA group was significantly less likely to require opioid therapy in the PACU (OR=0.148, 95% CI: 0.035 – 0.531, p=0.005). The ACE group (OR=0.082, 95% CI: 0.029 – 0.203, p<0.001) and BOTH group (OR=0.043, 95% CI: 0.002 – 0.261, p=0.004) were also significantly less likely to need opioids in the PACU. There was no association between analgesia modality and postoperative nausea and vomiting, as measured by requiring an antiemetic in the PACU.

Multiple linear regression, controlling for age and BMI, revealed that the GABA group (β= - 5.21, 95% CI -0.16 – -10.26, p=0.043), ACE group (β= - 7.25, 95% CI -3.80 – -10.70, p<0.001), and BOTH group (β= - 10.07, 95% CI -3.72 – -16.43, p=0.002) all required significantly fewer MMEs in the PACU.

CONCLUSIONS: Our results demonstrate a synergistic relationship between preoperative gabapentin and intraoperative acetaminophen as part of a multimodal, opioid-sparing analgesic approach in gender-affirming mastectomy. Of note, a significant effect on postoperative nausea and vomiting was not demonstrated. Further research into the efficacy of standardized, multimodal analgesia practices for patients undergoing gender-affirming surgery is needed.

(1) Jiang Y, Li J, Lin H, et al. The efficacy of gabapentin in reducing pain intensity and morphine consumption after breast cancer surgery: A meta-analysis. Medicine (Baltimore). 2018;97(38):e11581. doi:10.1097/MD.0000000000011581

Reductive Genioplasty for Facial Feminization Surgery

Abstract Presenter: Eric Bao

Abstract Co-Author(s): Stephanie Rothberg, Emily Orsino, Ilexa Schechter, Nicholas Bastidas MD

Introduction: Genioplasty is a crucial component of facial feminization surgery since feminine chins are noticeably narrower, with a more rounded appearance than masculine chins. This is traditionally achieved with a central wedge excision and two-piece ostectomy that is then fixated. However, implants can be niduses of infection, especially in the mouth. A reductive genioplasty with in-situ bilateral ostectomies to narrow the chin can eliminate the need for rigid fixation while still providing a feminine appearance. This study analyzes the outcomes of the two-piece reduction with plating versus in-situ reductive genioplasty under a single surgeon.

Methods: The study analyzed 188 patients from January 2020 to July 2024. Patients were categorized into two-piece with plating or in-situ reductive genioplasties. Both techniques were performed according to virtual surgical planning guides. Patient age, BMI, HIV status, post-operative complications, and revision rates were collected and compared among the two groups utilizing an independent t-test with a significance value of 0.05.

Results: There were 136 patients (72.3%) in the plating group and 42 patients (22.3%) in the reductive group. The mean age of the plating group was 31.4 years old compared to the 30.9 of the reductive group ($p = 0.72$) with a mean BMI of 25.7 for both groups. The plating group had 10 cases of abscess (7.4%) and 2 cases of osteomyelitis (1.5%), whereas the in-situ reductive group did not have any cases of abscess or osteomyelitis. HIV status was not a significant determinant of whether a patient developed infection. Both groups had one instance of hematoma. The plating group had 17 patients (12.5%) undergo revision surgery for asymmetry, hardware removal or other reason, while the in-situ reductive group had no patients undergo revision surgery ($p = 0.008$).

Conclusions: In-situ reductive genioplasty may be a better alternative to the central wedge excision and two-piece ostectomy with fixation genioplasty for facial feminization surgery as it results in fewer post-operative complications and greater patient satisfaction.

A Comparative Study of Subfascial Breast Augmentation Outcomes in Cisgender and Transgender Populations

Abstract Presenter: Xinfei Miao

Abstract Co-Author(s): Hamzah Almadani, Madeleine Givant, Javier Gonzalez, Ariel Ourian MD, Edward Ray MD, FACS

Purpose: Breast augmentation techniques have evolved to optimize aesthetic and functional outcomes. The subfascial plane has received attention for its ability to provide a natural aesthetic with the potential to minimize capsular contracture and malposition. However, studies have yet to compare the clinical outcomes of the subfascial approach in cisgender and transgender patients. The aim of this study is to compare the surgical outcomes of subfascial plane breast augmentation between these two patient populations.

Methods: A single institution retrospective review of cisgender and transgender patients that underwent subfascial primary breast augmentation by two surgeons between July 2017 and August 2024 was performed. Two cohorts of patients were matched using propensity scores to ensure comparable baseline characteristics. Short-term outcomes such as seroma/hematoma, return to the OR, surgical site infection, wound dehiscence, and long-term complications such as capsular contracture, malposition, and poor aesthetic outcomes were collected and compared between the two cohorts using unpaired t-test and Fisher's Exact test. Data analysis was conducted using IBM SPSS 24 and a p-value of < 0.05 was considered significant.

Results: A total of 41 patients were included in the study: 19 cisgender and 22 gender affirming patients. The cisgender cohort had a mean age of 38.3 years compared to 34.1 in the gender-affirmation cohort ($p = 0.21$). The cisgender cohort had a mean BMI of 22.9 compared to 34.1 in the gender- affirmation cohort ($p = 0.13$). Standardized mean differences for both age and BMI were 0.50 and 0.55 respectively, revealing imbalance. Two patients within the cisgender cohort experienced complications. One

patient required surgical evacuation of a hematoma on post-operative day one and another required surgical intervention for grade IV capsular contracture 584 days after the initial procedure. Two patients within the gender-affirmation cohort developed synmastia and underwent surgical revision. No statistical significance in short or long-term complication rate between the cisgender (10.5%) and gender-affirmation (9.1%) cohorts was observed ($p = 0.99$).

Conclusion: Despite imbalances in mean age and BMI between the cisgender and transgender cohorts, no statistically significant difference in complication rates was found. The low overall complication rates in both groups suggests that subfascial breast augmentation is a safe and effective technique regardless of gender identity. However, the observed variations in complications-hematoma and capsular contracture in cisgender patients versus synmastia in gender-affirming patients-warrant further investigation to optimize surgical planning and patient outcomes in gender-affirming care.

References

1. Nicole Sanchez Figueroa, Doga Kuruoglu, Vahe Fahradyan, Nho Tran, Basel Sharaf, Jorys Martínez-Jorge, Feminizing Gender Affirming Breast Surgery: Procedural Outcomes at a Single Academic Institution, Aesthetic Surgery Journal Open Forum, Volume 6, 2024, ojae032, https://doi.org/10.1093/asjof/ojae032
2. Kanjoor, J.R., Khan, T.M. Chest Feminization in Transwomen with Subfascial Breast Augmentation-Our Technique and Results. Aesth Plast Surg 48, 2447–2458 (2024). https://doi.org/10.1007/s00266-023-03726-z
3. Bekeny JC, Zolper EG, Manrique OJ, Fan KL, Del Corral G. Breast augmentation in the transgender patient: narrative review of current techniques and complications. Ann Transl Med 2021;9(7):611. doi: 10.21037/atm-20-5087

Single vs. Xi Robot Use in Robotic-Assisted Peritoneal Flap Vaginoplasty

Abstract Presenter: Jennifer Goldman

Abstract Co-Author(s): Jessica Pawly MD, Emily Yanoshak, John Stranix MD, Abhishek Kumar, Abhinav Kareddy

Introduction: Robotic-assisted surgery has significantly advanced the field of reconstructive procedures, offering greater precision, reduced recovery times, and

improved patient outcomes. One area where this technology has shown particular promise is in peritoneal flap vaginoplasty (PFV), a gender-affirming surgery for transgender women. Both single-port and multi-port robotic systems have been employed to perform this complex procedure. However, there remains ongoing debate regarding the comparative efficacy, safety, and overall patient benefits of these two approaches. This paper aims to evaluate the outcomes of single-port versus multi-port robotic systems in PFV, focusing on operative efficiency and patient safety.

Methods: This study was designed as a retrospective review of all patients who underwent robotic-assisted peritoneal flap vaginoplasty (PFV) at a single institution between September 2021 and May 2024. All procedures were led by the same surgical team, consisting of one plastic surgeon and one urologist, who worked together during each procedure. Demographic and postoperative data were collected from patient medical records. Data on operative details, such as the type of robotic system used (single-port vs. multi-port), procedure length, and total OR cost were also recorded. The primary outcomes of interest were the comparison of total operative time and total cost between the single-port and multi-port robotic procedures. Statistical analysis was conducted using IBM SPSS software and p-values of <0.05 were considered statistically significant for all analyses.

Results: A total of 48 patients underwent full-depth PFV. Average age of this cohort was 35 with an average BMI of 28.96 (SD=6.56). 25 patients underwent PFV with the assistance of a multiport robot and 23 patients underwent PFV with the assistance of a single-port robot. Demographic analysis showed no statistical difference between groups ($p>0.05$). Mean operative time of our multiport cohort was 269 minutes compared to a mean procedure length of 204 minutes in the single-port cohort ($p<0.001$). Average cost of the multiport robot vaginoplasty procedures was $31,268.96 and the average cost of the single-port robot procedures was $23,709.39 ($p<0.001$) There was no statistically significant difference in acute postoperative complications between cohorts.

Conclusion: This retrospective review demonstrates that single-port robotic-assisted peritoneal flap vaginoplasty (PFV) is associated with significantly shorter operative times and lower total costs compared to multi-port procedures. These findings suggest that the single-port approach may offer enhanced surgical efficiency without compromising patient safety.

The Addition of Betamethasone Suppositories to Silver Nitrate Treatment for Hypergranulation Tissue following Vaginoplasty: A Cohort Study

Abstract Presenter: Aidin Gharavi

Abstract Co-Author(s): Nicole Sanchez Figueroa MD, Msc, Anna Lin, Vahe Fahradyan MD, Jorys Martinez-Jorge MD

Introduction: Penile inversion vaginoplasty (PIV) is a gender-affirming surgical procedure to construct a neovagina in transgender women. The procedure is associated with excellent patient satisfaction, but also high complication rates (1). Hypergranulation tissue - excess granulation tissue which causes bleeding and discomfort - is a common complication often requiring repeated in-clinic treatment with Silver Nitrate (SN) using a speculum to access the inside of the neovagina (2). Corticosteroids have been shown to reduce hypergranulation tissue by modulating fibroblast activity and inflammation (3). By creating a steroid suppository, it is possible for patients to insert the medication into the vagina canal at home and treat the hypergranulation in between clinic visits. In this study, we review a cohort of patients treated with supplemental Betamethasone (BTM) suppositories alongside SN and compare them to those treated with SN alone to determine if BTM is an efficacious tool to reduce clinic visits and promote comfort in patients experiencing hypergranulation tissue post-PIV.

Methods: A retrospective chart review was conducted on patients who received BTM suppositories formulated by the Mayo Clinic pharmacy in addition to standard SN treatment between January 2023 and December 2024. This cohort was compared to a cohort of randomly selected patients with identical procedure profiles during the same period who were treated with SN alone. Data collected included the number of treatments, outcomes, severity of the hypergranulation tissue (assessed by quantity and diffuseness), and the need for further surgical intervention. These factors were analyzed to determine the effectiveness of BTM in treating hypergranulation tissue.

Results: There were 18 patients in the Silver Nitrate only group (SN groups) and 18 patients in the BTM and SN group (BTM +SN group): 13 patients had primary PIV while 5 had revision vaginoplasty in each group. The mean follow-up was 8 months in the SN group and 7 months in the BTM + SN group. Both groups had the same median number of treatments per patient for hypergranulation tissue (median: 3). Patients with moderate hypergranulation tissue in the BTM + SN group needed less treatments than those in the SN group (median 2 vs 4). Patients with severe hypergranulation tissue in the BTM + SN group had higher resolution rates at last follow-up compared to the SN group (44% vs 25%). Patients prescribed BTM at the time of their first treatment with SN had

higher resolution rates compared to patients prescribed BTM at a later appointment (88% vs 63%).

Conclusion: BTM is an effective addition to SN for the treatment of hypergranulation tissue. Patients with moderate hypergranulation tissue prescribed BTM suppositories had a fewer median number of treatments, and patients with severe hypergranulation tissue had higher resolution rates. Additionally, patients who were prescribed BTM early had improved outcomes. Our results indicate BTM is a helpful addition to treat hypergranulation tissue in patients who experience hypergranulation tissue post-PIV.

1. Hontscharuk R, Alba B, Hamidian Jahromi A, Schechter L. Penile inversion vaginoplasty outcomes: Complications and satisfaction. Andrology. 2021/11/01 2021;9(6):1732-1743. doi:https://doi.org/10.1111/andr.13030
2. Hirotsu K, Kannan S, Brian Jiang SI. Treatment of Hypertrophic Granulation Tissue: A Literature Review. Dermatol Surg. Dec 2019;45(12):1507-1516. doi:10.1097/dss.0000000000002059
3. Shalom A, Wong L. Treatment of Hypertrophic Granulation Tissue with Topical Steroids. The Journal of Burn Care & Rehabilitation. 2003;24(suppl_2):S113-S113. doi:10.1097/00004630-200303002-00141

Navigating the Effect of Gender Identity on Preferences and Experiences in Masculinizing Bottom Surgery: A Survey-Based Study

Abstract Presenter: Anirudh Kulkarni

Abstract Co-Author(s): Micaela Tobin, Tricia Mae Raquepo, Mohammed Yamin, Audrey Mustoe BA, Stephanie Preston MD, Marissa Kent, Ryan Cauley MD MPH, Bradley Colarusso

Purpose: While various surgical options have been studied and documented in masculinizing bottom surgery, there is limited understanding of the diverse needs and preferences across different gender identities. Additionally, a lack of thorough communication between surgeons and patients about the range of available surgical techniques can complicate decision-making. This study therefore assesses the experiences and preferences of transmasculine and gender-diverse individuals in masculinizing bottom surgery.

Methods: An IRB-approved survey was distributed across multiple Reddit gender-based forums. Participants who had either undergone or expressed interest in masculinizing bottom surgery were included and categorized based on their self-reported gender identity as either transmasculine or gender-diverse (including genderfluid, genderqueer, agender, and other gender identities). Statistical analysis used t-tests and chi-squared tests with significance set at $p<0.05$ to assess differences between groups regarding demographics, surgical preferences, and experiences with healthcare providers.

Results: The study included 137 individuals (97 transmasculine, 40 gender-diverse) with comparable demographic profiles between groups. A significant difference was found in hormonal therapy usage, with 86.5% of transmasculine compared to 62.5% of gender-diverse participants concurrently receiving hormonal treatment ($p<0.01$).

Regarding surgical preferences, transmasculine individuals showed a stronger preference for phalloplasty (38.1% vs 27.5%), while gender-diverse participants more frequently selected "other" non-traditional options (7.5% vs 0%) or expressed uncertainty about their preferred surgical approach (32.5% vs 25.8%). Both groups prioritized tactile sensation and general appearance in their surgical goals, although transmasculine individuals placed higher importance on general appearance ($p<0.05$) and showed a trend toward greater emphasis on standing urination ($p=0.06$).

Among the 13 participants who consulted with surgeons, fewer than half (38.5%) reported that their surgeons discussed different surgical techniques and their advantages and disadvantages. Donor site options were inconsistently presented, with forearm and anterolateral thigh being the most commonly discussed (38.5% each).

Conclusion: While transmasculine and gender-diverse individuals share many surgical priorities, significant differences exist in their preferences and certainty regarding surgical options. Gender-diverse individuals demonstrate greater uncertainty and more interest in non-traditional approaches compared to transmasculine patients. These findings highlight the need for more comprehensive, individualized discussions between patients and surgeons that address the full spectrum of available options, acknowledge the influence of gender identity on surgical goals, and provide adequate resources to support informed decision-making in masculinizing bottom surgery.

A Systematic Review and Meta-Analysis of Perioperative Hormone Management in Gender-Affirming Surgery: No Difference Between Continuation and Cessation

Abstract Presenter: Mohammed Yamin

Abstract Co-Author(s): Tricia Mae Raquepo, Micaela Tobin, Sophia Ahn, Bradley Colarusso, Anirudh Kulkarni, Matthew Bridgeman, Marissa Kent, Ryan Cauley MD MPH

Purpose: As gender-affirming surgeries (GAS) become more common, recommendations for perioperative hormone management remain unclear, with many advising discontinuation due to thromboembolic risk. However, acute cessation of hormones can cause undesirable effects and exacerbate gender dysphoria in the perioperative period. This systematic review aims to evaluate the outcomes of continuation versus cessation of gender-affirming hormone therapy (GAHT) before gender-affirming surgeries to inform guidelines and improve patient care.

Methods: A systematic review was conducted in December 2024 following PRISMA guidelines. Articles were screened through a two-stage process, with inclusion criteria focusing on studies related to perioperative hormone therapy before GAS. Exclusion criteria included non-English articles, commentaries, reviews, and conference abstracts. A difference in proportion meta-analysis was performed to compare the occurrence of postoperative complications such as hematoma, seroma, wound dehiscence, graft necrosis, infection, granulation tissue, and venous thromboembolism.

Results: Of 3,829 citations screened, 8 studies were included, analyzing 2,382 patients and 1,067 cases. In this cohort, 1,392 patients and 576 cases continued GAHT, 681 patients and 483 cases discontinued, and 112 patients and 8 cases had dose reductions. Five studies focused on estrogen, and three focused on testosterone. The reported rate of complications was similar between cohorts, regardless of hormone therapy continuation or cessation. A difference in proportion meta-analysis showed no significant difference in complications between groups who continued and those who ceased hormone therapy for both estrogen and testosterone groups.
Hematoma, the most common complication, had a rate of 2.6% in the cessation group and 1.1% in the continuation group, with an average lower limit of -0.052 and an average upper limit of 0.044 in the estrogen use articles, with a 95% confidence interval. Some Pdiff values trended negatively for most articles, showing no difference or a slight preference toward discontinuation, with the exception of venous thromboembolism, where Pdiff for the majority of articles showed a slight positive trend, indicating a small risk in the discontinuation group. However, the differences in all complication categories were not statistically significant.

Conclusion: Overall, meta-analysis demonstrates there is no significant difference in risk between patients who cease hormone therapy and those who continue it. In light of the known detrimental effects of disrupting hormone therapy in patients with gender dysphoria, these findings suggest that continuation of hormones in the perioperative setting should be strongly considered.

ChatGPT and Gender-Affirming Surgery: A Pilot, Expert-Reviewed Assessment of Content Quality

Abstract Presenter: Ananya Shah

Abstract Co-Author(s): Diego Gomez, Zain Aryanpour MD, Brielle Weinstein MD, Jens Berli MD, Rachel Bluebond-Langner MD, John Henry Pang MD, Christodoulos Kaoutzanis MD

Background: Artificial intelligence (AI) is transforming patient education in all areas of medicine, and its potential applications in the field of plastic surgery are being increasingly reported. Patient education plays a significant role in enabling individuals to make informed decisions about their healthcare, particularly in sensitive and specialized areas such as gender-affirming surgery. Traditionally, patient education for such surgeries has relied on consultations, brochures, and digital resources. However, the emergence of conversational AI, such as Chat Generative Pre-training Transformer (ChatGPT), opens a new avenue for personalized patient education, while potentially alleviating provider burden.

Objectives: This study investigates the utility of ChatGPT as a tool for patient education in the context of gender-affirming surgery, examining its ability to provide accurate and comprehensive information.

Methods: ChatGPT 4.0 was used to generate a Frequently Asked Questions (FAQ) sheet for seven common gender-affirming surgery procedures. The FAQ sheets were inputted into a survey and distributed to five plastic surgeons that practice the full spectrum of gender-affirming surgery. Each question of every FAQ sheet was then assessed for accuracy and comprehensiveness using a standardized five-point Likert scale. Continuous variables were reported as means and standard deviations.

Results: The ChatGPT-generated FAQ sheets were more accurate than comprehensive across all surgical procedures. The mean overall accuracy was 68.4% (standard deviation [SD] = 5.8%) and the mean overall comprehensiveness was 56.8% (SD = 5.6%). All FAQ sheets were at least 'somewhat accurate,' with all mean scores exceeding 3 on the Likert scale. In terms of comprehensiveness, all FAQ sheets were deemed 'adequate,' with scores above 3 on the Likert scale.

Conclusions: Our study demonstrates the likely utility of ChatGPT in introductory and, in some cases, comprehensive patient education. However, ChatGPT's limitations stem from its reliance on existing internet resources; therefore, information provided by the AI should be verified and supplemented by gender-affirming surgeons. ChatGPT can serve as a foundational tool, streamlining the creation of educational materials and potentially increasing office visit efficiency. By leveraging conversational AI as a supplementary resource, physicians may provide tailored patient education in gender-affirming care, particularly as the technology continues to evolve.

The Effect of Early Hormone Therapy on Frontal Sinus Anatomy in Patients Presenting for Facial Feminization Surgery

Abstract Presenter: Alexander Andrew Argame

Abstract Co-Author(s): Iris Deng, James Lee MD

Purpose: Feminizing hormone therapy (HT) is an important adjunct to surgical intervention in the treatment of gender dysphoria for transfeminine individuals. While the effects of hormone therapy on the breast and body are well-described, the early hormone therapy impact on craniofacial anatomy has not been explored in the literature. Frontal sinus anatomy is particularly pertinent in patients presenting for frontal bone setback and contouring as part of facial feminization surgery (FFS). This anatomical study is the first of its kind to quantify the multidimensional differences in frontal sinus anatomy associated with early hormone therapy exposure.

Methods: A retrospective review of all patients presenting for FFS from 2018 to 2024 in a multi-institutional integrated healthcare system was performed. Patient history including age at HT initiation, duration of HT, surgical history, and demographic data were obtained. Patients were categorized into early and late HT groups and matched by duration of HT, with early defined as initiation of estrogen before 21 years old and late

defined as HT started at 21 years of age or older. Multidimensional preoperative CT scan measurements of the facial bone anatomy was performed by two independent investigators. Measurements included nasofrontal angle, nasofrontal suture to mid-sellar distance, anterior table thickness/depth/projection of left and right frontal sinuses, height, and width. Statistical analysis included Multivariable Regression Analysis, Chi-Square tests, Independent Samples t-test, and Mann-Whitney U test as appropriate.

Results: A total of 104 patients were included in the study, with 52 patients per group. Mean age at CT scan was 24.6 ± 8.1 years for the early group and 41.1 ± 13.2 for the late group. Median duration of HT was 2.6 years in the early group vs 3.0 years in the late group. Late HT patients demonstrated significantly greater left anterior table thickness (3.1 ± 1.1 mm early vs 3.8 ± 1.6 mm late, $p=0.02$), left sinus projection (17.6 ± 3.8 mm early vs 21.6 ± 6.7 mm late, $p<0.001$), right sinus depth (14.6 ± 4.5 mm early vs 12.2 ± 3.2 mm late, $p=0.004$), and right sinus projection (17.7 ± 4.3 mm early vs 19.9 ± 4.9 mm late, $p=0.01$). There was no significant difference in nasofrontal angle, nasofrontal suture to mid-sellar distance, left sinus depth, right anterior table thickness, sinus height, or sinus width between the two groups. Frontal sinus aplasia was observed in 10 (19.2%) patients in the early group and 4 (7.7%) patients in the late group ($p=0.09$). Regression analysis demonstrated that age at CT was not an independent predictor of frontal sinus depth or projection.

Conclusion: Early feminizing hormone treatment was significantly associated with decreased bilateral frontal sinus projection, right sinus depth, and left sinus anterior table thickness in patients presenting for FFS. This may result in less indications for or a smaller degree of frontal sinus setback in patients seeking gender-affirming facial surgery. These data support the early initiation of feminizing hormone treatment prior to 21 years of age in transfeminine individuals as a way to minimize the development of masculine frontal sinus characteristics.

Clearing the Haze: Tobacco and Marijuana May Not Be Significantly Associated with Postoperative Complications Following Chest Masculinization Surgery

Abstract Presenter: Margaret Wang

Abstract Co-Author(s): Camille Blackman, Bashar Hassan MD, Calvin Schuster, Eric Resnick, Fan Liang MD

Purpose: Compared to the general population, transgender and gender-diverse individuals exhibit a higher prevalence of tobacco and drug use (1,2). Despite the well-established negative impact of tobacco smoking on wound healing and surgical outcomes (3,4), limited research has analyzed its effects in the context of gender-affirming surgery. This study evaluates the association between tobacco, marijuana, and vape use on postoperative outcomes following chest masculinization surgery (CMS).

Methods: We conducted a retrospective cohort study of transgender and non-binary patients who underwent CMS with double incision mastectomy and free nipple grafting between March 2022 and January 2025 by the senior author. The primary predictors were tobacco and marijuana smoking, defined as cigarette/cigar/joint smoking and vaping. Primary outcomes were defined as surgical complications requiring intervention (venous thromboembolism (VTE), sepsis, acute kidney injury (AKI), urinary tract infection, infection requiring antibiotics or surgical washout, wound dehiscence, hematoma or seroma requiring intervention, skin necrosis, nipple graft failure) and adverse aesthetic outcomes (scar widening or hypertrophy, revision surgery for standing cone deformity or scars). The association between smoking behaviors and postoperative outcomes were analyzed using bivariate statistical analysis.

Results: Of 92 patients meeting inclusion criteria, the average (standard deviation, SD) age was 27.3 (7.7). Over half (54.3%, n=50) had a history of smoking or vaping, including tobacco (37.0%, n=34) and marijuana (42.4%, n=39). At time of consultation, 38.0% (n=35) of patients were active smokers, with 17.4% (n=16) using tobacco and 32.6% (n=30) using marijuana. Despite smoking cessation counseling, preoperative nicotine and cotinine tests were positive in 10.9% of patients (n=10). The mean (SD) follow-up duration was 5.2 (4.1) months postoperatively.

Overall, surgical complications occurred in 25.0% (n=23), while 29.3% (n=27) experienced adverse aesthetic outcomes. There were no significant differences in frequency of surgical and adverse aesthetic outcomes between active, previous and never tobacco users. Similar results were obtained when tobacco users were stratified into cigarette smokers and nicotine vapers. There was no difference in complications between those with positive preoperative nicotine/cotinine tests and those without. Marijuana use (smoking or vaping) was also not significantly associated with adverse surgical or aesthetic outcomes. Within our cohort, there were no major surgical complications including sepsis, VTE or AKI. Other surgical complications included infection requiring antibiotics (16.3%, n=15), infection requiring washout (4.4%, n=4), wound dehiscence (4.3%, n=4), skin necrosis (2.2%, n=2), hematoma (2.2%, n=2), seroma (2.2%, n=2), and nipple graft failure (1.1%, n=1). Adverse aesthetic outcomes

included scar widening/hypertrophy (29.3%, n=27), and revision surgery for standing-cone deformities or scarring (11.9%, n=11).

Conclusion: Active smoking or vaping of tobacco, nicotine or marijuana may not be associated with significant complications following CMS. While smoking should not be encouraged, we acknowledge the difficulty of quitting. Our findings suggest that smoking should not be a reason to deny or delay treatment. Future, larger cohort studies may further delineate the association between smoking and gender-affirming surgery outcomes.

References

1. Sawyer AN, Bono RS, Kaplan B, Breland AB. Nicotine/tobacco use disparities among transgender and gender diverse adults: Findings from wave 4 PATH data. Drug Alcohol Depend. 2022 Mar 1;232:109268. doi: 10.1016/j.drugalcdep.2022.109268. Epub 2022 Jan 10. PMID: 35038608; PMCID: PMC8885914.

2. Hughto JMW, Quinn EK, Dunbar MS, Rose AJ, Shireman TI, Jasuja GK. Prevalence and Co-occurrence of Alcohol, Nicotine, and Other Substance Use Disorder Diagnoses Among US Transgender and Cisgender Adults. JAMA Netw Open. 2021;4(2):e2036512. doi:10.1001/jamanetworkopen.2020.36512

3. Fan Chiang YH, Lee YW, Lam F, Liao CC, Chang CC, Lin CS. Smoking increases the risk of postoperative wound complications: A propensity score-matched cohort study. Int Wound J. 2023 Feb;20(2):391-402. doi: 10.1111/iwj.13887. Epub 2022 Jul 9. PMID: 35808947; PMCID: PMC9885463.

4. Sørensen LT. Wound Healing and Infection in Surgery: The Clinical Impact of Smoking and Smoking Cessation: A Systematic Review and Meta-analysis. Arch Surg. 2012;147(4):373–383. doi:10.1001/archsurg.2012.5

Patterns and Predictors of Revision Surgery in Facial Feminization Procedures: Insights from the TriNetX Database

Abstract Presenter: Xenab Ahmadpoor

Abstract Co-Author(s): Emmi Deckard, Alvin Nguyen, Yash Mehta, Daniel Novak, Yunfeng Xue, Dr. Benjamin Massenburg MD

Background: Facial feminization surgery (FFS) is a specialized and complex gender-affirming procedure that has been shown to improve self-perception and social integration among those who identify as transgender or non-binary. Despite the growing popularity of FFS, data on patient demographics, surgical outcomes, and factors contributing to patient satisfaction and the pursuit of revision procedures remain limited. Thus, the purpose of this study was to identify factors associated with revision surgery in FFS to provide valuable insights to optimize surgical planning and improve patient-reported outcomes.

Methods: Data from 69 healthcare organizations included in the US Collaborative TriNetX network was analyzed. Fourteen facial feminization procedures were identified using CPT codes including blepharoplasty, rhytidectomy, genioplasty, frontal sinus setback, orbital contouring, facial bone contouring, malar augmentation, rhinoplasty, chondrolaryngoplasty, browlift, otoplasty, lipectomy, midface reconstruction, and autologous facial grafts. Cohorts were created based on a diagnosis of gender identity disorder and subsequent incidence of at least one of these cosmetic surgeries. Multiple cohorts were created including total incidence of FFS, total incidence of revision, and surgeries with greater than 10 instances of revision and analyzed using the Advanced Explore Cohort feature.

Results: A total of 1,171 adult patients were diagnosed with gender dysphoria and underwent at least one facial feminization procedure. The majority of patients were white (69%), non-hispanic or latino (73%) with a mean age of 36.2 ± 12.8 years. The most commonly performed surgeries were frontal sinus setback (n=547, 47%), rhinoplasty (n=536, 46%), chondrolaryngoplasty (n=411, 35%), and browlift (n=400, 34%). In total, the revision rate was 9% with 107 patients undergoing revision surgeries. Of these, facial bony contouring (n=30, 7.8%) had the highest rate of revision followed by genioplasty (n=20, 5.3%), chondrolaryngoplasty (n=21, 5.1%), and rhinoplasty (n=21, 3.9%). Pearson's chi-square test did not demonstrate statistically significant differences in these revision rates (p=0.08). The average time to revision facial feminization surgery was 0.95 years based on mean age at time of primary surgery and revision, which varied by procedure. Genioplasty (0.6 years), facial bone contouring (0.7 years), and chondrolaryngoplasty (0.9 years) were revised on average within the first year post-operatively, while rhinoplasty revisions took place at a mean 1.7 years post-operatively.

Conclusion: This large-scale TriNetX study demonstrates that revisionary surgery following facial feminization occurs in 9% of patients, with facial bony contouring having the highest rate of revision. This characterization of FFS can help guide the surgeon-patient discussion regarding post-operative expectations following facial feminization.

Further research is warranted to determine the patient and surgical factors which lead to revision in facial feminization surgery.

Quantification of Similarity Between Planned Facial Feminization Surgery and Assigned Female at Birth Subjects

Abstract Presenter: Albert Rancu

Abstract Co-Author(s): Paula Flores Perez, Samira Glaeser-Khan, Omar Allam MD, Martin Kauke-Navarro MD, Michael Alperovich MD, MSc

Background: Facial feminization surgery (FFS) describes a set of procedures that alter the craniofacial skeleton to reduce incongruence between self-identified gender and physical appearance. Given the complex bony alterations, three-dimensional virtual surgical planning (VSP) has become increasingly utilized for these procedures to create personalized and accurate postoperative results. However, few studies have evaluated the similarity between these plans and assigned-female-at-birth (AFAB) skulls.

Methods: Patients who underwent FFS procedures including frontal sinus setback, suprabrow contouring, genioplasty, and gonial angle reduction at a single academic institution were identified. Materialise (Leuven, Belgium) 3D virtual surgical plans were designed prior to the operation, and computed tomography (CT) scans for AFAB subjects were provided upon request by the New Mexico Decedent Imaging Database (NMDID). These subjects were randomly selected and approximated the age distribution of the patient cohort.

Craniofacial landmarks to isolate the forehead, chin, and gonial angle regions were placed using Mimics (Materialise, Leuven, Belgium). Surface area, volume, and region-specific morphometric values were calculated. Measurements of planned osseous changes were compared to benchmark values derived from the group of five AFAB subjects to determine the degree of similarity between the surgical plan and anthropomorphically feminine features. Inherent differences in skull size between AFAB subjects and transgender female patients were investigated by comparing the bizygomatic width of each group using a two-sample t-test.

Surface area and volume AFAB similarity for each region were compared using an ANOVA analysis. Statistically significant differences between groups were subsequently determined using pairwise t-tests with a Bonferroni correction.

Results: A total of 80 patients and 188 FFS procedures (69 forehead operations, 74 genioplasties, 45 bilateral gonial angle reductions) were included in this study. The cohort had a mean age at surgery of 34.3 ± 10.1 years old compared to a mean age at time of imaging of 34.0 ± 6.1 years for the five AFAB control subjects. The mean bizygomatic width of the AFAB subjects was 128.9 ± 9.9 millimeters in comparison to 134.1 ± 5.2 millimeters for the patient cohort. This difference was statistically insignificant ($p=0.3118$).

Regarding surface area changes, both forehead (86.5% ± 11.0%, $p<0.05$) and genioplasty procedures (88.4% ± 10.9%, $p<0.005$) were found to have a greater AFAB similarity score than gonial angle reduction (81.0% ± 11.7%). Conversely, planned genioplasty volume (85.5% ± 11.5%) had a significantly greater similarity to anthropomorphically feminine measurements than forehead procedures (74.7% ± 20.7%, $p<0.0005$) or gonial angle reduction (70.3% ± 16.7%, $p<0.0001$).

Conclusions: Virtual surgical plans are an increasingly utilized tool during facial gender-affirming surgery to provide patients with more feminine characteristics. This study presents, to our knowledge, the largest and most comprehensive analysis of how well these plans approximate AFAB craniofacial features. By introducing this framework for analysis, this study provides insight into improving FFS preoperative planning and patient counseling.

Assessing the Current Knowledge Base of Breast Cancer Screening Recommendations in the Transgender Population: A Survey-Based Study of Patients Receiving Gender-Affirming Care

Abstract Presenter: Cameron Duello

Abstract Co-Author(s): Andrew Brown DO, Niaman Nazir, Rebecca Farmer, Christa Balanoff MD

Background: Information regarding current breast cancer screening guidelines for the transgender population is scarce and often contradictory within the medical literature,

leading to inconsistent recommendations from healthcare providers. Additionally, the knowledge that transgender patients possess regarding their breast health and their understanding of current breast cancer screening recommendations remains widely unknown.

Methods: A survey-based study was designed to assess the level of understanding that transgender patients have about their future breast cancer screening needs. The survey was distributed to patients receiving gender-affirming care in a single institution's Department of Plastic Surgery and medical-student-run free clinic. Patients were surveyed about their use of hormone replacement therapy, interest in or prior exposure to top surgery, and understanding of breast cancer screening guidelines. Patients were also asked about their reported level of education regarding their future breast cancer screening needs.

Results: Of the 68 survey respondents, 70% indicated either previously having top surgery or future interest in pursuing top surgery. However, only 26.67% of transgender females, 9.52% of transgender males, and 9.09% of non-binary or gender-fluid respondents reported that they felt educated regarding their future breast cancer screenings. Notably, only 32.3% of respondents reported receiving education about breast cancer screening from a healthcare professional. In contrast, 77.4% of all respondents reported being educated about breast cancer screenings from another source (e.g., social media, Google search, etc.).

Conclusions: Our study demonstrates the gaps in knowledge that exist among transgender individuals regarding their breast health and highlights the urgent need for healthcare providers to educate their patients about breast cancer screening recommendations. This knowledge can be used to develop educational resources that aim to decrease the incidence of breast cancer within the transgender population and to raise awareness of appropriate screening measures.

Design and Pilot Evaluation of a Web-Based Visualization and Decision-Making Tool for Gender-Affirming Top Surgery

Abstract Presenter: Makenna Ley BS

Abstract Co-Author(s): Bahaa Abdulraheem, Alisa Girard MD, Arya Akhavan MD, Allison Hu MD, Thomas Satterwhite MD, John Henry Pang MD

Background: Chest and breast procedures are the most common form of gender-affirming surgery (GAS) performed in the U.S.. Current literature varies widely on the shape and placement of the incision and nipple-areola complex (NAC). As such, our group developed a new web-based decision-making tool that allows the patient to choose a skin tone, body type, scar incision pattern, and NAC placement based on size, shape, and position on the chest. The purpose of this study is to assess the implementation and feasibility of a virtual tool for GAS in a clinical setting.

Methods: A pilot study was conducted of patients undergoing initial pre-operative consultation for chest masculinization surgery at our institution. Patients were surveyed regarding their experience using the tool. Surgeons and staff members were asked to use the tool to create multiple possible chest configurations and were surveyed on the implementation and perceived usefulness of the tool in a clinical setting.

Results: A total of 8 clinicians and 43 patients used the tool and completed the survey. 6 (75%) of the clinicians strongly agreed that the tool would improve their understanding of a patient's desired outcomes while 4 (50%) agreed that this tool would be more useful for pre-surgical planning than patient-brought photos. Patient assessments were generally positive. 29 (67%) of patients strongly agreed that the tool could help patients make decisions about their desired top surgery results, and 28 (65%) strongly agreed that the tool was easy to use. Clinician feedback expressed concern that the tool may cause patients to expect results unachievable with the patient's pre-surgical anatomy and recommended a modifiable lateral view of the chest to determine desired tissue volume. Both clinicians and patients requested more diversity in body shapes and skin color.

Conclusion: Both patients and clinicians found the visualization tool for GAS to be helpful and feasible in a clinical setting. Further refinements of the tool with additional views, body types, and skin colors are necessary to optimize its use.

Patient Perspectives and Motivations in Minimal-Depth vs Full-Depth Vaginoplasty: A Web-Based Qualitative Analysis

Abstract Presenter: Tricia Mae Raquepo

Abstract Co-Author(s): Morvarid Mehdizadeh, Micaela Tobin, Noelle Garbaccio, Macie Gettings, Mohammed Yamin, Lacey Foster, Marissa Kent, Dr. Samuel Lin MD, Ryan Cauley MD MPH

Purpose: Recent legislative advancements for gender-affirming surgery (GAS) coverage have led to a significant increase in patients undergoing vaginoplasty. Although less commonly selected compared to full-depth vaginoplasty, minimal-depth vaginoplasty presents benefits, including fewer complications, quicker recovery, high patient satisfaction, and reduced postoperative demands. A notable gap exists in the literature regarding motivations behind patient decision-making in this context. Social media platforms have emerged as sources of support and information sharing among patients considering GAS. This study aims to explore public perception and discourse surrounding gender-affirming vaginoplasty by systematically analyzing discussion boards to understand the information needs, motivations, concerns, and outcomes of patients choosing between minimal-depth and full-depth vaginoplasty.

Methods: The Python Reddit API Wrapper (PRAW) was employed to identify original threads (posts and comments) from December 2015 to August 2024 containing the terms "vaginoplasty," "vulvoplasty," or "depth" on six subreddits: "Nonbinary," "translator," "MtF," "transgender," "ask_transgender," and "asktransgender." Threads were filtered by keywords related to minimal-depth and full-depth vaginoplasty procedures, followed by a two-stage screening process. In stage one, two screeners independently reviewed all threads for inclusion. In stage two, two screeners manually coded relevant threads into themes, including dysphoria, immediate post-operative concerns, long-term considerations, sexual preferences, support systems, healthcare access, financial concerns, cosmetic considerations, comorbidities, and information barriers regarding procedure options. Any discordance was resolved through discussion.

Results: 219 out of the 450 screened threads met inclusion criteria. The most frequently cited themes include immediate post-operative recovery and complications (73 threads), bottom dysphoria (59), healthcare access (51), sexual preferences (44), long-term considerations (43), financial concerns (34), future surgical flexibility (25), cosmetic considerations (22), individual comorbidities (18), support systems (16), and information barriers (9). Reasons for considering minimal-depth included lack of interest in penetration (9.7%) and medical contraindications (2.4%). Barriers included concerns regarding possible depth augmentation (8.3%) and lack of information (4.4%). Full-depth preferences were driven by alleviating dysphoria (15.0%) and the desire for penetrative intercourse (7.3%). Concerns cited postoperative dilation/douching (15.1%), risk of infection (2.4%), and surgical complexity (2.4%). Additionally, 6.8% of patients

cited the ability or quality of orgasm as an important factor. Among patients who underwent minimal-depth or full-depth vaginoplasty, 74% reported positive sentiments regarding their experience.

Conclusions: This study offers the first evidence of public perception and discourse on minimal-depth versus full-depth vaginoplasty, emphasizing the influence of platforms on patient decision-making. Understanding the information present on social media is critical for plastic surgeons navigating patient consultations. These insights can help tailor preoperative counseling, enhance patient education, correct misconceptions, and promote informed, patient-centered decision-making, ultimately improving surgical outcomes.

Obesity and Vaginoplasty: A Comparative Analysis of Sigmoid Colon and Peritoneal Flap Techniques

Abstract Presenter: Sami Ferdousian

Abstract Co-Author(s): Isabel Snee, Rachel Rohrich, Ryan Lin MD, Anusha Singh MD, Kenneth Fan MD, Gabriel Del Corral MD

Background: Robotic sigmoid colon vaginoplasty (SCV) and peritoneal flap vaginoplasty (PFV) are increasingly utilized in transgender and non-binary (TGNB) individuals seeking genital reconstruction. These procedures offer self-lubricating mucosa, sufficient neovaginal depth, and enhanced sexual function while potentially lowering the risk of neovaginal stenosis and reoperation. Despite their growing popularity, data on how body mass index (BMI) influences outcomes after SCV and PFV remain sparse. This study aims to investigate the effects of elevated BMI on postoperative results in patients undergoing SCV versus PFV.
Methods: We conducted a single-center retrospective review of TGNB individuals who underwent SCV and PFV between December 2020 and February 2024. Patients with a BMI ≥30 kg/m² were categorized into SCV or PFV cohorts. Demographic information, surgical details, and postoperative outcomes were analyzed and compared. Short-term complications were defined as those occurring within 30 days postoperatively, while long-term complications were classified as those emerging after 30 days.

Results: A total of 85 patients were included, with 46 (54.1%) undergoing SCV and 39 (45.9%) undergoing PFV. The median age was 35 years (IQR: 11), and the median BMI

was 33.9 kg/m² (IQR: 4.5). There were no significant differences between the groups in terms of diabetes, hyperlipidemia, smoking status, or Charlson Comorbidity Index. The median duration of hormone therapy use was 52 months (IQR: 79). Among the 33 patients (38.8%) undergoing revision vaginoplasty, 22 (47.8%) had SCV and 11 (28.2%) had PFV (p=0.064). Revision rates may have influenced differences in operative duration, which was shorter for SCV (208 minutes, IQR: 91.2) compared to PFV (246.5 minutes, IQR: 80), p=0.001. Hospital length of stay (median 5 days, IQR:2) and time to mobilization (median 3 days, IQR:0) were similar between groups, but the time to first dilation was shorter for SCV (3 days, IQR: 1) than PFV (4 days, IQR: 1), p<0.001. In total, 23 (27.1%) patients experienced at least one short-term complication, including full-thickness dehiscence (14.1%), ileus (5.9%), and vaginal bleeding (3.5%). Five patients (5.9%) required reoperation within 30 days. Long-term complications were observed in 20 (23.9%) patients, including vaginal prolapse (5.9%), vaginal stenosis (8.2%), and full-thickness dehiscence (3.0%). Delayed healing with hypergranulation tissue occurred more frequently in the PFV cohort (12.8%) compared to none in the SCV group (p=0.018), though this was not significant on multivariate analysis. A total of 15 (17.7%) patients required reoperation, predominantly for vaginal prolapse or stenosis (14.1%). The median follow-up time was 10.2 months (IQR: 9.2). There were no significant differences between cohorts in terms of overall complication rates or other perioperative details.

Conclusion: Elevated BMI did not significantly influence postoperative outcomes between SCV and PFV. Both procedures demonstrated acceptable complication rates, providing sufficient neovaginal lubrication and depth, and are viable options for revision vaginoplasty. Understanding the role of BMI and obesity in these intra-abdominal surgeries is crucial, as our findings suggest that SCV and PFV are safe and effective for TGNB individuals with higher BMI.

Meeting the Demand: Analyzing Gaps and Regional Imbalances in Gender-Affirming Surgery Training Opportunities Between Plastic Surgery Versus Urology Residents

Abstract Presenter: Lana Mamoun

Abstract Co-Author(s): Ashley Choi, Madeleine Givant, Xinfei Miao, Youssef Aref, Emmanuelle Morin

Background: Gender-affirming (GA) surgeries increased in the last decade, yet GA training remains limited for plastic surgery residents. A recent survey of plastic surgery program directors indicated greater resident exposure to facial and top (chest) GA surgery than bottom (genital) surgery (1). Despite the rising demand for GA procedures, plastic surgery residents receive minimal training in genital reconstruction. While plastic and reconstructive surgery is a cornerstone of GA care, urology also plays a critical role in GA genital reconstruction. This study compares the GA genital surgery training between urology and plastic surgery (PRS) programs, their GA clinics or patient services, the national distribution, and summarizes the emergence of GA fellowships in plastic surgery.

Methods: U.S.-based accredited integrated PRS and urology residency programs were identified using ACGME and American Urology Association (AUA) databases. Residency and institutional websites were reviewed to confirm program presence, rotation schedules, GA fellowship opportunities, and mentions of GA surgical services related to genital reconstruction. Unaccredited fellowships in urogenital or genitourinary reconstruction were included if they trained plastic or urologic surgeons in genital reconstruction. Fellowships without genital reconstruction or those excluding plastic or urologic surgeons were excluded. Geographic distribution was categorized into four U.S. regions: West, Midwest, South, and Northeast. Descriptive and inferential analysis was conducted using SPSS version 28.0.1.

Results: 232 U.S.-based, accredited, residency programs were confirmed, 88 PRS and 144 urology. 8 PRS residency institutions provided GA fellowship (9.1%) versus and 9 with urology residency programs also offered a GA fellowship (6.3%) ($p = 0.42$). PRS residency programs that offered a microsurgery fellowship were 33 times more likely to have an associated GAS fellowship. A subanalysis of urology programs that offer genital reconstruction fellowships was assessed and nearly 41% (n=59) offered a fellowship that encompasses genital reconstruction and this was significantly greater than PRS GA fellowships ($p<0.001$). Geographically, no significant difference between region and origin of genital reconstruction fellowships (PRS versus urology) was observed. 28 (41.2%) programs that had a GAS fellowship did not advertise offering GA surgical services. Programs that didn't have a GA fellowship were more likely to advertise providing GA surgical services (n=79, 46.7%) ($p<0.001$). GA fellowships in PRS have expanded since 2017, beginning with Mount Sinai's program. Key milestones include OHSU (2018), Cleveland Clinic (2019), RUSH (2020), Michigan and Brigham & Women's (2022), and Johns Hopkins (2023). Upcoming programs include Utah, UCLA and Kansas Medical Center reflecting continued growth.

Conclusion: While PRS residency programs provide foundational reconstructive skills, only a limited number of programs provide exposure to GA genital reconstruction, and urology training opportunities in genital reconstruction exceed PRS. There remains a need for more training opportunities in genital reconstruction for plastic surgeons.

References:
1.Magoon KL, LaQuaglia R, Yang R, Taylor JA, Nguyen PD. The Current State of Gender-Affirming Surgery Training in Plastic Surgery Residency Programs as Reported by Residency Program Directors. Plast Reconstr Surg. 2020;145(2):567-574. doi:10.1097/PRS.0000000000006426

Systematic Review of Uterine Transplantation: Patient Characteristics and Obstetric Outcomes

Abstract Presenter: Ian Nolan MD

Abstract Co-Author(s): Alireza Hamidian Jahromi MD, Sydney Arnold MD, Jennifer Ferraro, Natalia Whitney, Liza Johannesson, Amir Dorafshar MD, FACS, Loren Schechter MD, Ashton Rosenbloom

Introduction: Uterus transplantation (UTx) has emerged as a groundbreaking surgical solution, allowing conception for individuals with absolute uterine factor infertility (AUFI). To date, UTx has been performed primarily for patients with Mayer-Rokitansky-Kuster-Hauser syndrome or hysterectomy (1). However, UTx may also be an upcoming frontier in gender affirming surgery, as conception is often affirming of female gender. Previous systematic reviews of UTx have focused on surgical, maternal, and perinatal outcomes. This review updates previous syntheses of published UTx cases worldwide, emphasizing recipient characteristics and pregnancy outcomes.

Methods: A systematic review was conducted utilizing PubMed, Embase, and Cochrane CENTRAL according to PRISMA 2020 guidelines. Search terms related to "uterine transplantation," or "uterine graft" or "organ transplantation" were used. Studies reporting surgical outcomes, obstetric outcomes, or neonatal outcomes in the context of UTx were included. Review articles combining multiple studies and studies that did not include patient outcomes were excluded.

Results: Our search yielded 2,387 citations, of which 64 met the inclusion criteria. Across all studies, 86 cases of UTx for hysterectomy (n=5), MRKH (n=80), and Asherman's Syndrome (n=1) were reported. Uterine grafts were procured from living donors (LD) in 68/86, while deceased donors (DD) accounted for 18/86 of the transplants. There were a total of 16 graft failures, 11 being from LD (16% of LD) and 5 from DD (28% of DD). Graft rejection was also reported in 32 cases, 26 (38% of LD) and 6 from DD (33% of DD). Graft thrombosis occurred in 13 cases, 11 (16% of LD) and 2 from DD (11% of DD). The average time between UTx and menstruation was 5.3 weeks (SD = 3.4), and time between UTx and embryo implantation was 8.9 months (SD = 3.9). Out of 42 patients who became pregnant, a total of 49 live births were reported. Average birth weight was 2506.8g (SD = 556). The most common pregnancy complications included preterm labor (11, 22%), gestational hypertension (6, 12%), gestational diabetes (6, 12%), and PPROM (6, 12%). The most common neonatal complications were respiratory complications (6, 12%), jaundice (1, 2%), and hypoglycemia (1, 2%).

Conclusion: This study provides the most comprehensive synthesis of global data on UTx and associated live births. Programs offering UTx have achieved notable success and have offered individuals without childbearing potential an enhanced quality of life. However, the implementation and accessibility of UTx are primarily constrained by the resources and clinical infrastructure required to perform these complex procedures (2). Continued advancements and resource allocation are essential to broaden access to this innovative treatment.

References

1. Wall AE, Johannesson L, Sok M, Warren AM, Gordon EJ, Testa G. The journey from infertility to uterus transplantation: A qualitative study of the perspectives of participants in the Dallas Uterus Transplant Study. BJOG. 2022 Jun;129(7):1095-1102. doi: 10.1111/1471-0528.17052. Epub 2021 Dec 27. PMID: 34889028.
2. Ayoubi JM, Carbonnel M, Racowsky C, de Ziegler D, Gargiulo A, Kvarnström N, Dahm-Kähler P, Brännström M. Evolving clinical challenges in uterus transplantation. Reprod Biomed Online. 2022 Nov;45(5):947-960. doi: 10.1016/j.rbmo.2022.06.020. Epub 2022 Jul 1. PMID: 35999148.

A National Estimate of the Gap between Demand for Gender-Affirming Surgery and Workforce Capacity through 2035

Abstract Presenter: Amitai Miller

Abstract Co-Author(s): Sarah Karinja MD, Bernard Lee MD, MBA, MPH, Oren Ganor MD

Introduction: The demand for gender-affirming surgery (GAS) has risen significantly over the past decade with an increasing number of people openly identifying as transgender or gender-diverse (TGD). However, the lack of available GAS providers is frequently cited as a barrier to accessing these procedures. The purpose of this study is to estimate the gap between those who will desire GAS and the surgical workforce capable of meeting this demand through 2035.

Methods: We constructed a model based on several assumptions. We utilized data from the 2023 U.S. Household Pulse Survey to estimate the size of the TGD population. We referenced findings from the 2015 U.S. Transgender Survey to assess interest in undergoing each procedure type, and held that interest level constant into the future. Additionally, we estimated that all individuals who have indicated they desire GAS will seek it within a decade. There were 660 gender-affirming surgeons in the U.S. in 2020, and we assumed an annual growth rate of 3% since and in the future. Our model assumed that GAS providers dedicated an average of one day per week to operating on TGD patients.

Results: The TGD population aged 13 years and older is projected to reach 1.9M by 2035. The total demand for GAS during this period is estimated to be 1.9M, including 434K vaginoplasty, 376K facial feminization, 348K breast augmentation, 309K chest masculinization, 89K metoidioplasty, and 65K phalloplasty procedures.

Over the study period, approximately 59.8% of demand of the total GAS demand will be met. Chest masculinizations stand out as the only procedures for which demand is entirely fulfilled. The majority of desired breast augmentations and tracheal shaves are anticipated to be feasible (88.7% and 71.2%, respectively). However, only 52.0% of metoidioplasty and 41.3% of phalloplasty procedures are expected to be met. Notably, 33.0% of the facial feminization and 8.3% of vaginoplasty demand is projected to be met.

Conclusions: The findings underscore a concerning misalignment between the growing demand for GAS and the surgical workforce capable of meeting these needs, especially for facial feminization and genital surgeries. This study did not take into account the skewed geographic availability of GAS providers, and the availability-demand mismatch is likely more drastic in many parts of the U.S. nondiscrimination protection policy

reform, expanding telehealth opportunities, and increasing education and surgical exposure to GAS for surgical residents would continue to build the workforce capable of meeting the demand.

Body Mass Index as a Predictor of Surgical Outcomes in Vaginoplasty Procedures: A Nationwide Analysis

Abstract Presenter: Erin Wolfe MD

Abstract Co-Author(s): Jacqueline Stoneburner MD, Idean Roohani, Artur Manasyan, Eloise Stanton MD, Michael Kim, Rob Travieso

Background/Purpose: Body mass index (BMI) is a critical metric in assessing adiposity relative to height and weight, often useful in evaluating surgical risks. Obesity in the context of gender-affirming vaginoplasty can increase surgical complexity and risks such as wound healing complications and infection rates. However, no universally established cutoff for surgical candidacy or fully elucidated role of BMI in vaginoplasty currently exists. In this study, we seek to identify the relationship between BMI and postoperative outcomes following vaginoplasty in transgender patients.

Methods: A retrospective analysis was performed using the National Surgical Quality Improvement Program (NSQIP) datasets from 2005–2022. Adult patients with an ICD-9/10 code diagnosis of gender dysphoria who underwent gender-affirming vaginoplasty were included. Patients were stratified based on BMI as Underweight (BMI<18.5), Healthy Weight (BMI 18.5-24.9), Overweight (BMI 25.0-29.9), Obesity Class I–III (BMI 30-34.9, BMI 30-39.9, and BMI≥40). Primary outcomes included 30-day readmission, reoperation, and postoperative complication rates. Multivariable logistic regressions were performed to assess the impact of BMI on surgical outcomes. Covariates were selected using forward selection based on minimizing the Akaike information criterion and clinical relevance. All regression models demonstrated good fit with adjusted pseudo-R2 values ranging from 0.190–0.437 (all p<0.001).

Results: Among 11,574,114 patients in the NSQIP database, 312 patients underwent gender-affirming vaginoplasty. BMI cohorts included 13 (6.0%) Underweight, 78 (35.9%) Healthy Weight, 60 (27.6%) Overweight, 35 (16.1%) Obesity Class I, 18 (8.3%) Obesity Class II, and 13 (6.0%) Obesity Class III (BMI range: 15.6–49.5). Patients among the more severe obesity classes demonstrated higher rates of 30-day readmissions

(p<0.001), 30-day reoperations (p<0.001), operating room takebacks (p<0.001), and wound dehiscence (p<0.001; Table 1). Upon multivariable regression analysis, Obesity Class II and Class III diagnoses significantly increased patients' risk of 30-day readmissions (OR 33.6, p=0.008; OR 69.1, p=0.001), 30-day reoperations (OR 25.3, p=0.011; OR 61.4, p=0.001), and operating room takebacks (OR 25.3, p=0.011; OR 61.4, p=0.001). The risk of wound dehiscence was significantly higher for Obesity Class III patients (19.5, p=0.004), but not for Obesity Class II (OR 3.3, p=0.377). All other BMI strata were not associated with any of these complications (p>0.05; Table 2).

Conclusion: Patients with class III obesity undergoing gender-affirming vaginoplasty have poorer postoperative outcomes, including higher rates of wound dehiscence, reoperation, and readmission. However, further research is warranted to confirm these findings, preferably in the form of prospective studies in larger cohorts. Plastic surgeons should consider these risks carefully and implement tailored strategies to mitigate complications in this patient population.

Acellular Dermal Matrix Combined with Primary Robotic-Assisted Peritoneal Flap Vaginoplasty to Create the Neovagina in Patients with Inadequate Genital Tissue

Abstract Presenter: David Le

Abstract Co-Author(s): Zain Aryanpour MD, Ty Higuchi, Christodoulos Kaoutzanis MD

Background: Full depth vaginoplasty is a common procedure performed for individuals with gender dysphoria seeking feminizing genital reconstruction. Various surgical approaches have been described with the most common being standard penile inversion vaginoplasty (PIV) and robotic-assisted peritoneal flap vaginoplasty (RAPFV). The RAPFV is also commonly used in revision cases of primary PIV complicated by vaginal stenosis and has shown excellent clinical outcomes. Recently, tissue substitutes, such as acellular dermal matrix (ADM), have been used to bridge the introitus to the peritoneal flap when RAPFV is used for revision of primary PIV. To date, no study has evaluated utilizing tissue substitutes in primary RAPFV. We present our experience with primary RAPFV utilizing ADM for patients with inadequate genital tissue.

Methods/Technique: This is a retrospective case series of three patients with inadequate genital tissue underwent RAPFV with ADM. RAPFV started with standard

PIV techniques. Following vaginal canal dissection, all patients required additional tissue to bridge the gap between the penile skin and peritoneal flap and the scrotal skin was inadequate. A piece of ADM was tubularized using the orange 25 mm dilator and sewn to the penile skin flap. For the 3 patients, the ADM dimensions were 7 cm x 12 cm, 8 cm x 12 cm, and 6 x 12 cm respectively. This structure was then inverted into the neovaginal canal. The penile skin flap – ADM construct was scored with cautery and trimmed by the external surgeon. The ADM was then sewn to the peritoneal flaps using the DaVinci Xi robotic system. The rest of the RAPFV was completed in a standard fashion.

Results/Outcomes: For the 3 patients included, the age at the time of surgery was 20, 33, and 39, and the age at the start of hormone therapy was 13, 30, and 35, respectively. The preoperative penile length was 4, 6.5 and 8.5 cm, respectively. The scrotal skin was small in all cases. Total operative time was 300, 313, and 48 minutes, respectively. There were no intraoperative complications. There were no immediate postoperative complications. One patient required sharp dissection of granulation tissue and collagenase ointment. Otherwise, there have been no major vaginal canal complications, and all patients are using the 35 mm dilator to the last dot. To date follow-up was at postoperative day 213, 103, and 66, respectively.

Conclusion: Inadequate genital tissue may be present in transgender and gender-diverse adults requesting feminizing genital reconstruction for gender affirmation. In addition, pre-pubertal gender affirming hormonal blockade is becoming increasingly common and is associated with genital hypoplasia. ADM is an option that does not require a secondary donor site for the creation of the neovagina in cases of inadequate native genital tissue. We report the successful use of ADM in patients with inadequate genital tissue undergoing primary RAPFV.

Association of Socioeconomic Deprivation Indices and Psychosocial Outcomes Following Facial Feminization Surgery

Abstract Presenter: Alexander Andrew Argame

Abstract Co-Author(s): Kaavian Shariati, Catherine Cascavita, Anne Hall, Justine Lee MD, PhD, FACS

Purpose: Facial feminization surgery (FFS) improves mental health in transgender and gender non-binary (TGNB) individuals, but the influence of social risk factors on outcomes is unclear. The Area Deprivation Index (ADI) and Social Vulnerability Index (SVI) measure socioeconomic deprivation through U.S. Census Bureau data. This study examines whether ADI or SVI score severity may be associated with substandard improvement of psychosocial functioning after gender-affirming FFS.

Methods: 185 TGNB adults undergoing FFS at a single institution between 2020-2025 were prospectively enrolled to complete preoperative and postoperative Patient-Reported Outcomes Measurement Information System (PROMIS) instruments for anxiety, anger, depression, global mental health, global physical health, and global total health, positive affect, emotional support, social isolation, companionship, and meaning and purpose. The impact of ADI/SVI on PROMIS scores was analyzed via multivariable regression. Insurance type, preexisting mental health diagnoses, and preoperative depression PROMIS scores were also included in the model.

ADI quantifies socioeconomic disadvantage based on factors including poverty level, income, education, housing, and access to utilities, transportation, and healthcare. Scores (0-100) represent percentiles ranking neighborhoods at census block group level relative to others nationwide. Higher ADI score indicates greater disadvantage.

SVI measures vulnerability to external stressors on health and well-being such as disasters and disease outbreaks. Scores (0-1) represent percentiles ranking neighborhoods at the census tract level relative to others nationwide. Neighborhoods are classified into four quartiles: lowest (0-0.25), moderate (0.26-0.50), high (0.51-0.75), and highest vulnerability (0.76-1.00). SVI captures scores for separate domains, with higher scores indicating greater vulnerability: Socioeconomic Status (higher poverty and unemployment rates, lower income, and fewer residents with higher education), Household Composition (higher proportions of older adults, children, individuals with disabilities, and single-parent households), Racial & Ethnic Minority Status (higher percentages of racial/ethnic minority populations and households with limited English proficiency), and Housing Type & Transportation (higher rates of overcrowding, mobile or multi-unit housing, and lack of vehicle access).

Results: 185 TGNB patients (mean age: 33.1 ± 10 years) were included. Mean ADI score was 12.6 ± 11.3. Mean scores for each SVI domain are reported: Socioeconomic Status 0.5575 ± 0.2838, Household Characteristics 0.3576 ± 0.2725, Racial & Ethnic Minority Status 0.6725 ± 0.1992, Household Type and Transportation 0.6388 ± 0.2667. No significant correlations were found between ADI/SVI scores and preoperative or postoperative PROMIS scores. Changes in PROMIS scores (postoperative minus

preoperative) showed significant associations with SVI scores across multiple domains. Differential PROMIS scores were used as outcome variables in the multivariable regression analysis. Household Type and Transportation SVI domain significantly predicted postoperative change in depression (B=-6.2, 95%CI -11.5,-0.91, P= 0.02), social isolation (B=-6.3, 95%CI -11.8,-0.74, P=0.03), and companionship (B=6.6, 95%CI 1.3,11.9, P=0.02), with trends towards significance for global total health (B=7.6, 95%CI -0.58,15.8, P=0.07).

Conclusion: Housing type and transportation vulnerability may enable prediction of associated outcome variance, significantly influencing psychosocial outcomes after FFS. Other SVI domains were not significant, suggesting that structural factors like housing stability and transportation access uniquely impact psychosocial recovery, emphasizing the need for targeted interventions to support TGNB individuals postoperatively.

Assessing the Landscape of Insurance Policies for Gender Affirming Surgery: A Survey-Based Analysis

Abstract Presenter: Viraj Govani

Abstract Co-Author(s): Alexander Comerci, Tobi Somorin, Nicolas Kass, Aaliyah Riccardi, Janina Kueper MD, Ashley Rogers MD, Jesse Goldstein MD

Introduction: Gender-affirming surgeries (GAS) play a critical role in the well-being of transgender and gender-diverse (TGD) individuals by alleviating gender dysphoria and improving mental health outcomes (Almazan 2021) Despite increased demand, access remains hindered by inconsistent insurance coverage and policy limitations (Dozier 2023). This study examines the landscape of insurance policies for GAS, barriers to coverage, and the impact of policy changes on patient access and surgical outcomes at a major transgender care center.

Methods: An IRB-approved Qualtrics survey was distributed to patients treated at a transgender care center from 2020-2024. Survey questions were adapted from the 2015 National Transgender Survey and supplemented with original items assessing insurance status, surgical access, and experiences with coverage denials. Descriptive statistics and chi-squared analyses ($p<0.05$) were performed using Stata SE.

Results: A total of 214 respondents (64.07% response rate) participated. Of these, 77.36% were assigned female at birth, and 68.69% identified as transgender. Most (70.95%) had private insurance, while 24.76% were publicly insured. Insurance denials for GAS were reported by 10% of participants, with nonbinary individuals experiencing disproportionately high denial rates for hormone therapy (8.11%, $p<0.001$). Partial insurance coverage for GAS was reported by 29.47% of patients ($p=0.034$), and 7.35% noted the absence of in-network providers for gender-affirming surgery ($p<0.001$).

Transgender women were more likely to experience partial insurance coverage for their procedures (44.12%) compared to transgender men and nonbinary individuals ($p=0.034$). Additionally, 32.35% of transgender women reported a lack of in-network providers despite insurance coverage for surgery, significantly more than other groups ($p<0.001$). The 2021 expansion of GAS coverage by our institutional health plan significantly influenced the insurance choices of 45.45% of transgender women ($p=0.023$), yet 63.64% of transgender men were unaware of this policy change. Among those insured by our institution, 57.6% expressed increased interest in additional GAS following coverage expansion. Patients cited long wait times, aesthetic dissatisfaction, and financial burdens as primary barriers to satisfaction with care.

Conclusion: While expanded insurance coverage has improved access to GAS, disparities persist, particularly among transgender women and nonbinary individuals, who face higher rates of denials due to restrictive eligibility criteria and cosmetic classifications. The findings underscore the need for standardized policies ensuring equitable access to all gender-affirming procedures. Additionally, increased provider networks, clearer policy communication, and patient navigators could help mitigate existing barriers. Financial burdens and lack of in-network specialists continue to hinder access, emphasizing the need for ongoing policy reform. Further advocacy, healthcare provider training, and research are necessary to ensure that gender-affirming care is comprehensive, inclusive, and accessible to all who need it.

References:

1. Almazan AN, Keuroghlian AS. Association Between Gender-Affirming Surgeries and Mental Health Outcomes. JAMA Surg. 2021;156(7):611-618. doi:10.1001/jamasurg.2021.0952
2. Dozier R. How Navigators Influence Insurance Coverage for Gender-Affirming Surgeries: A Qualitative Study. Perm J. 2023 Mar 15;27(1):72-76. doi: 10.7812/TPP/22.115. Epub 2023 Mar 14. PMID: 36916175; PMCID: PMC10013711.

The Role of Psychotherapy Prior to Facial Gender-Affirming Surgery on Patient Outcomes

Abstract Presenter: Anne Hall

Abstract Co-Author(s): Kaavian Shariati, Catherine Cascavita, Justine Lee MD, PhD, FACS

Background: Preoperative mental health is being increasingly recognized for its impact on surgical outcomes, namely length of stay, complications, postoperative pain, and opioid use. Among vulnerable surgical populations, transgender and gender-diverse (TGD) patients experience a high prevalence of mental health comorbidities, with 58-77% of individuals known to carry a mental health diagnosis per our institutional cohort of patients and national estimates. Facial gender affirming surgery (FGAS) is an important procedure for TGD individuals who experience dysphoria from their facial features and has been shown to independently improve mental health quality of life outcomes. However, baseline psychosocial functioning plays a significant role in postoperative recovery, with preoperative depression independently predicting worse postoperative outcomes. Therefore, given the importance of mental health prior to surgery, the aim of the current work is to investigate the impact of psychotherapy prior to FGAS on both surgical and mental health quality of life outcomes.

Method: Adults registered male at birth undergoing deo novo FFS from 2020-2024 were retrospectively reviewed. Patient-reported outcomes utilizing the Patient-Reported Outcomes Measurement Information System (PROMIS) were evaluated preoperatively and postoperatively at three to six months and/or 12 to 18 months. Patients were excluded from the study if they did not complete a preoperative assessment and at least one postoperative assessment. A retrospective chart review was performed to collect demographic information, past medical history, psychiatric history, surgical history, and hospital course, including operative time, hospital length of stay, average self-reported pain score, and opioid use. Generalized linear models, binary logistic regression, and maximum likelihood estimation were used to calculate outcomes.

Results: 191 TGD patients were included. Using generalized linear models, mental health diagnoses increased the length of stay by 2545.9% (B=3.237; 95% CI: 2.456, 4.018; $p<0.001$). Length of stay was reduced by 94.8% when assessing the interaction of therapy and mental health diagnoses (B=-2.906; 95% CI: -4.100, -1.713; $p<0.001$). Similarly, the presence of mental health diagnoses increased the total opioid use by 2518.4% (B=3.265; 95% CI: 1.839, 4.691; $p<0.001$). Lastly, therapy was found to

mitigate the impact of mental health diagnoses on patient-reported outcomes, particularly in the anxiety and social isolation of generalized linear mixed models.

Conclusion: This study demonstrates that preoperative mental health diagnoses influence hospital length of stay and postoperative opioid use, while a history of psychotherapy before FGAS serves as an important mitigator of these outcomes. These findings demonstrate the importance of optimizing preoperative mental health among TGD patients undergoing FGAS to improve both surgical and mental health quality of life outcomes. Psychological prehabilitation and other preoperative interventions may offer additional benefits, however, further research is needed to determine the most effective type, modality, timing, and duration of psychotherapy interventions, specifically in the setting of gender-affirming surgery.

Measuring Aesthetic Outcomes of Brow Lift and Forehead Advancement in Facial Feminization: A Photometric Study

Abstract Presenter: Isabel Snee

Abstract Co-Author(s): Rachel Rohrich, Ryan Lin MD, Sami Ferdousian, Anusha Singh MD, Nicole Episalla MD, Elena Galvano, Gabriel Del Corral MD

Background: Despite a large body of evidence and techniques described in the cisgender brow lift literature, there remains a paucity of objective outcome data pertaining to transgender patients undergoing upper-third FFS for gender dysphoria. The current study therefore presents our surgical approach to brow lift in FFS and a series of objective outcomes.

Methods: A retrospective review was conducted for patients who underwent facial feminization brow lift between December 2020 and December 2024. Inclusion criteria required pre- and postoperative photographic documentation. Data collection included demographics, surgical details, and postoperative outcomes. Three brow lift techniques were utilized: (1) endoscopic brow lift with Endotine fixation, (2) suture suspension, and (3) direct brow-to-bone suspension. Objective outcomes were assessed using pixel-based photometric analysis in ImageJ, standardizing measurements based on interpupillary axis and iris diameter.

Results: Sixty-four patients met inclusion criteria, with a median age of 35.1 years [IQR: 16.3] and BMI of 27.5 kg/m² [IQR: 4.9]. All patients had received hormone therapy for over 12 months. The most common concurrent procedures were forehead contouring (96.9%), genioplasty (76.6%), and hairline advancement (70.3%). The primary brow lift technique was Endotine fixation (91.9%). Mean operative duration was 292.6 ± 82.7 minutes. At a mean of 3.8 ± 4.4 months postoperatively, photographic analysis demonstrated significant reductions in hairline position at the right (-3.3 ± 8.1 mm, p=0.002), center (-4.5 ± 8.4 mm, p<0.001), and left (-3.8 ± 8.5 mm, p<0.001) landmarks. Forehead height similarly decreased at the right (-3.5 ± 7.2 mm, p<0.001), center (-4.0 ± 7.6 mm, p<0.001), and left (-3.4 ± 7.1 mm, p<0.001) regions. Statistically significant increases in measurements were observed at the left midbrow (+0.6 ± 1.9 mm, p=0.020) and left lateral brow (+0.6 ± 2.2 mm, p=0.043). Changes at other brow landmarks were not significant. One patient (1.6%) developed a postoperative hematoma, and five patients (7.8%) underwent revision for aesthetic purposes.

Conclusion: Our results demonstrate that the three brow lift techniques outlined (endoscopic with Endotine fixation, suture suspension, and direct brow-to-bone suspension) offer safe and consistent approaches to upper-third facial feminization in transgender patients, with objectively measured improvements in brow height and hairline position. These findings provide valuable outcome data for clinicians and patients seeking evidence-based strategies to optimize facial feminization.

Patient-reported Outcomes For Non-binary Patients Seeking Gender-affirming Care

Abstract Presenter: Ronald Cornely MPH

Abstract Co-Author(s): Erin Abbott, Barite Gutama MD, Anvith Reddy, Benjamin Savitz, Patrick Assi MD

Purpose: In the United States, approximately 1 in 200 individuals identifies with a gender different from their sex assigned at birth.1 Current research on gender-affirming care (GAC) primarily addresses binary identities, often overlooking non-binary individuals.1,2 Although qualitative studies provide insights into non-binary perspectives, there is a lack of research utilizing validated clinical tools to assess outcomes in non- binary populations.1 This study aims to address this gap using a

validated psychometric tool to objectively measure outcomes in non-binary individuals seeking gender-affirming surgery (GAS).

Methods: The Vanderbilt Mini Patient-Reported Outcomes Measures-Gender (VMP-G), a validated tool with scores ranging from 20 to100, in which higher scores indicate better outcomes.3 The tool assesses patient-reported outcomes measures (PROMs) across five scales (quality of life, self-concept, satisfaction, gender dysphoria, and regret). Data were collected from non-binary patients undergoing GAS between September 2022 and October 2024 via EPIC survey prompts during preoperative visits and post-surgical timepoints.

Results: 108 patients (median age 28.4 [19.0, 53.0]) were included, of whom 39% had undergone GAS. Post-operative VMP-G scores increased significantly across multiple measures, reflecting positive outcomes. GLM analysis revealed that overall VMP-G ($p<0.0001$), quality of life ($p<0.0001$), satisfaction ($p<0.0447$), and self-concept ($p<0.0001$), and gender dysphoria ($p<0.0001$) scores improved significantly. Notably, linear regression indicated significant differences in overall VMP-G scores at various postoperative periods compared to baseline, with adjusted p-values remaining significant for early (1-3 months) and later (7-9, 10-12 months) postoperative periods.

Conclusion: These findings highlight significant improvements in well-being and reduced dysphoria following gender-affirming surgery in non-binary individuals, underscoring the intervention's effectiveness in this gender-diverse population.

1. Agochukwu-Mmonu N, Radix A, Zhao L, et al. Patient reported outcomes in genital gender-affirming surgery: the time is now. J Patient Rep Outcomes. 2022;6(1). doi:10.1186/s41687-022-00446-x
2. Koehler A, Eyssel J, Nieder TO. Genders and Individual Treatment Progress in (Non-)Binary Trans Individuals. Journal of Sexual Medicine. 2018;15(1):102-113. doi:10.1016/j.jsxm.2017.11.007
3. Hung YC, Park BC, Assi PE, Perdikis G, Drolet BC, Kassis SA. Multidimensional Assessment of Patient-Reported Outcomes After Gender-Affirming Surgeries Using a Validated Instrument. Ann Plast Surg. 2023;91(5):604-608. doi:10.1097/SAP.0000000000003652

Race, Ethnicity, and Complications Following Gender-Affirming Surgery: A NSQIP Analysis

Abstract Presenter: Yu Jui Kung

Abstract Co-Author(s): Bashar Hassan MD, Claudia Taccheri, Essie Ghafoor, Mona Ascha MD, Fan Liang MD

Background: Transgender and non-binary (TGNB) individuals face disproportionately limited access to gender-affirming surgery (GAS) due to systemic inequities. This study examines how these inequities, such as race and ethnicity, impact the utilization of GAS and associated surgical complications across different GAS subtypes.

Methods: Using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database, we retrospectively reviewed TGNB individuals who underwent GAS from 2012 to 2021. The primary outcome was the incidence of major complications (e.g., unplanned reoperation and readmission) and minor complications (e.g., wound complications) within 30 days postoperatively. Bivariate and multivariable tests were used to compare the frequency of GAS and complications across racial and ethnic groups.

Results: Among n=6013 TGNB individuals, most were White (n=3994, [66.4%]), followed by Black (n=880 [14.6%]) and Hispanic (n=788, [13.1%]). Chest masculinization surgery was the most common procedure (n=2395 [39.8%]), followed by genital masculinization surgery (n=1298 [21.6%]), genital feminization surgery (n=958 [15.9%]), chest feminization surgery (n=843 [14%]), and facial feminization surgery (n=396 [6.6%]). White individuals were significantly more likely to undergo chest and genital masculinization surgery than Hispanic and Black individuals. Black individuals undergoing chest masculinization surgery had a higher frequency of unplanned reoperation (n=14 [4.5%], n=28 [1.7%]; P = 0.042) and readmission (n=7 [2.3%], n=8 [0.5%]; P = 0.048) compared with White individuals. For genital feminization surgery, Hispanic and Black individuals experienced significantly higher frequencies of wound disruption than White individuals (n=12 [9.8%], n=12 [8.7%], n=21 [3.3%]; P = 0.006). No significant disparities were observed for chest feminization, genital masculinization, or facial feminization surgeries.

Conclusion: Racial and ethnic disparities exist in surgical utilization and complications among TGNB individuals, highlighting the need for additional research and possibly targeted interventions to address these inequities.

Use of the Subfascial Plane for Gender Affirming Breast Augmentation: Surgical Outcomes and Patient Follow-up based on Insurance

Abstract Presenter: Javier Gonzalez

Abstract Co-Author(s): Hamzah Almadani, Xinfei Miao, Madeleine Givant, Youssef Aref, Nance Yuan MD, Edward Ray MD, FACS

Background: Surgical approaches to breast augmentation have been well-described in the cisgender population but are limited for transgender patients. This study aims to characterize the outcomes and complications following implant-based gender-affirming breast augmentation using the subfascial plane while comparing follow-up periods between those with private and public insurance.

Methods: A retrospective chart review was conducted on transgender women that underwent subfascial breast augmentation from June 2017 to August 2024 at a single institution under the care of the senior author. Patient demographics, comorbidities, postoperative outcomes, and follow-up time were collected. Data was analyzed to determine predictors of short and long-term complications as well as revision rates using IBM SPSS 24. A p-value of < 0.05 was considered significant.

Results: A total of 65 patients with a mean age of 40.2 years, mean implant volume of 505 cc, and mean follow-up of 212 days were assessed. Within 30 days (n = 60), seven patients (11.7%) had at least one incident/complication with one (1.7%) of these patients requiring revision surgery. Two patients developed infection (one managed surgically, one managed non-surgically). The remaining five (8.3%) patients developed malposition. Outside of 30 days (n = 51), 10 patients (16.7% of the total population, 19.6% of the > 30-day follow-up population) had at least one incident/complication that required further management. These incidents/complications included 5 instances of malposition, 5 asymmetries, and 3 capsular contractures all requiring further management. Overall, five patients (7.6% of all patients, 9.8% of the > 30-day follow-up population) underwent revision operations for incidents/complications. Diabetes, increased implant profile and greater duration of hormone therapy were each found to be significantly associated with complications($p < 0.05$). A statistically significant difference in follow-up between patients with public and private health insurance was also observed($p < 0.05$). Those with public health insurance (n = 38) were found to have a mean follow-up period of 294 days compared to 58.4 days for those with private health insurance (n = 32).

Conclusion: The subfascial plane offers a chest contour free from the lateralizing and flattening influence of the pectoralis major muscles, potentially allowing for a more feminine result for those seeking gender-affirming breast surgery. Poor patient follow-up has been shown to be correlated with use of private health insurance, while public health insurance are more likely to follow up with their physicians as reflected in our study1. In cisgender patients, fluctuations in endogenous hormones have been shown to affect capsular contracture risk and a similar effect may be observed in those receiving gender-affirming breast augmentation. Overall, subfascial plane outcomes appear to be comparable to other techniques reported in the literature. However, further prospective investigation with larger, matched cohorts and longer follow-up may better delineate differences in outcomes between breast augmentation techniques, as well as the role of hormone therapy in capsular contracture and other complications.

1. Wray CM, Khare M, Keyhani S. Access to Care, Cost of Care, and Satisfaction With Care Among Adults With Private and Public Health Insurance in the US. JAMA Netw Open. 2021;4(6):e2110275. doi:10.1001/jamanetworkopen.2021.10275

Impact of State Legislation on Regional Availability of Gender Affirming Surgeons

Abstract Presenter: David Febre AlemaÃ±y

Abstract Co-Author(s): Jacqueline Ihnat, Melanie Vassallo, Paula Flores Perez, Sasha Wood, Sacha Hauc MD, Omar Allam MD, Michael Alperovich MD, MSc

Purpose: Access to gender-affirming care has dramatically shifted over the past few decades as a result of policy changes in the United States (US). A shortage of providers represents one of the main barriers to care, with profound but poorly defined geographic differences. This study explores the current geographic availability of surgeons offering gender-affirming surgeries in the US, with a study of variations based on state legislation.

Methods: Five databases were queried to identify gender-affirming surgeons and the procedures offered in the US. An isochrone API software mapped all counties within a 2-hour drive of each surgeon. US Census Bureau and transgender population data were used to calculate the surgeon: transgender ratio per state. Access to gender-affirming care based on related state legislation was assessed.

Results: The number of surgeons per 10,000 transgender individuals varies from 0 to 13.6, with 12 states having none for the five procedures studied. While 31.6% of counties, covering 64.8% of the U.S. population, have access to at least one FFS surgeon, only 5.5% of counties, representing 22.7% of the population, offer voice feminization or masculinization. States with restrictive laws average 1.76 surgeons per 10,000 transgender individuals, compared to 2.18 in neutral states, 3.81 in protective states, and 4.01 in states with shield laws.

Conclusion: The majority of the US population has inadequate access to GAS, especially in rural areas. States with legislation that restrict access to gender-affirming care have a lower surgeon density, while states that protect access have a higher surgeon density.

Perioperative Estrogen Therapy and Thromboembolic Risk in Transgender Patients Undergoing Facial Feminization Surgery: A Retrospective Analysis

Abstract Presenter: Iris Deng

Abstract Co-Author(s): Alexander Andrew Argame, Stacey Francis MD

Intro: Transgender and gender-diverse (TGD) patients often use estrogen as part of their gender affirming hormone therapy (GAHT). Estrogen is known to increase the risk of venous thromboembolism (VTE) and pulmonary embolism (PE). As part of their gender-affirming care, these patients can also undergo facial feminization surgery (FFS), which can last upwards of 8-11 hours. Historically, surgeons have advised stopping hormones preoperatively to mitigate this risk. However, this can pose a psychological burden for patients. Recent guidelines suggest that GAHT in therapeutic dosages may not increase risk of VTE. This study retrospectively evaluates incidence of VTE/PE in TGD patients undergoing FFS, comparing outcomes between those who discontinued or continued GAHT before surgery.

Methods: A retrospective chart review of all TGD patients who underwent FFS at our institution between 2018-2024 were included. Patients were divided into those that stopped GAHT preoperatively (2018-4/2021) and those instructed to continue GAHT until the day of surgery (4/2021-onwards). Patient demographics, operative details, postoperative complications were reviewed. DVT/PE within 3 months of surgery were

included. T tests were performed to evaluate for differences between groups. Statistical significance was set at $p<0.05$.

Results: A total of 420 patients were included, of which 174 paused GAHT and 246 continued GAHT. There was no difference in the mean age (38.3 years old vs 36.9, respectively, $p=0.24$) or body mass index (26.8 kg/m2 vs 26.6 kg/m2, $p=0.76$) between the two cohorts. The two groups did differ significantly in mean length of stay (0.6 days vs 0.1 days, $p<0.001$) and surgical duration (5.3 hours vs 6.5 hours, $p<0.001$). There were no incidences of DVT or PE recorded in either cohort.

Conclusion: Continuing GAHT perioperatively does not seem to increase the risk of DVT or PE in TGD individuals undergoing FFS. Given the potential negative psychological effects of discontinuing hormones, these findings support a shift in clinical practice. Further studies looking at other gender-affirming surgeries should be performed.

Physician Exposure to Litigation in Gender Detransition Medical Malpractice Cases

Abstract Presenter: Sai Shanthanand Rajagopal

Background: Medical malpractice lawsuits in gender-affirming care have garnered significant media attention, already leading to increases in insurance premiums in the space.1 This study sought to analyze medical malpractice complaints in the United States dealing with the specific phenomenon of gender detransition, of which nearly all lawsuits have been filed since 2022. While past review articles have sought to analyze malpractice cases related to gender affirming care, they have yielded smaller sample sizes (n = 5).2

In this study, 16 cases with sufficient information were analyzed (n = 16). Collected data included defendant specialty, location, year, stated medications prescribed and procedures performed in lawsuit, and status/outcome of litigation where applicable.

Methods: The Bloomberg Law Database was queried for all time using the keywords gender, de-transition or detransition, and malpractice. Out of the 60 cases, cases relating to employment, prisoner rights, health care coverage, or civil rights were excluded yielding 3 relevant cases. The list was combined with two published

detransition lawsuit trackers with duplicates and two wrongful death lawsuits excluded to yield 20 lawsuits.3,4 Of these 20, 16 had sufficient complaint information on the legal websites Trellis, Justia, Bloomberg Law, or downloadable County Clerk Documents to analyze. Plaintiff Name was cross referenced with specialty through Physician's Hospital Webpages. The complaints were analyzed for medications and medical procedures listed in the lawsuits. For each case, the corresponding legal history was sought on Trellis, Justia, Bloomberg Law, or County Clerk offices to determine if the case was decided in favour of the plaintiff or defendant and if compensatory damages were awarded.

Results: Of the 46 individually named defendants in the queried cases, 63% were MD or DO physicians and 37% were non-MD nurses, nurse practitioners, therapists, and social workers. The MD Physician Breakdown was as follows: 37.9% plastic surgery, 13.8% obstetrics and gynecology, 10.3% endocrinology, 6.9% pediatrics, 6.9% internal medicine, 6.9% psychiatry, 6.9% urology, 3.4% Pediatrics and Psychiatry, 3.4% Otolaryngology, 3.4% General Surgery. All lawsuits were filed after 2022.

100% of cases cited improper mental health evaluation in their complaints. 56.25% of the cases cited double mastectomy had been performed in their complaint. 87.5% stated transgender hormone therapy (either testosterone or estrogen) was prescribed in their complaint, while only 18.75% of cases stated puberty blockers were prescribed in their complaint. 1 complaint stated a facial feminization, vaginoplasty, clitoroplasty, perineal urethroplasty, and bilateral orchiectomy had been performed. 1 complaint stated a hysterectomy and oophorectomy had been performed.

Of the 16 cases, none have been exclusively decided in favor of the plaintiffs in the courts. 12.5% of cases have been dismissed by plaintiffs, with possible binding arbitration in one. One more case has been requested to be dismissed by the plaintiffs. 81.25% of cases are either pending or do not have updated court dockets indicating pending dismissal. Notably, a number of the cases are being dismissed against specific defendants, a common practice in medical malpractice law. As of date in February 2025, no court compensatory damages have been required of the plaintiffs, although plaintiffs may choose to settle outside of court.

Discussion: The number of detransition cases is in fact small, and no fault to date has been found with the defendants. The plurality of the individually named defendants are plastic surgeons (37.9%), demonstrating an increased risk exposure to lawsuits for this specialty in this space.

Citations

1. Nowell, C. (2023, December 21). Malpractice premiums are blocking gender-affirming care for minors. Time. https://time.com/6549690/rising-malpractice-premiums-price-small-clinics-out-of-gender-affirming-care-for-minors/
2. Brozynski M, Oleru O, Seyidova N, Rew C, Nathaniel S, Taub PJ. Litigation in gender affirming surgery: Reviewing five decades of the medical malpractice landscape. J Plast Reconstr Aesthet Surg. 2024 Jun;93:190-192. doi: 10.1016/j.bjps.2024.04.036. Epub 2024 Apr 16. PMID: 38703709; PMCID: PMC11147691.
3. U.S. detransitioner cases. Themis Resource Fund. (2025a, February 19). https://themisresourcefund.org/detransitioner-cases/ Home.
4. Transition Justice Lawsuit Tracker. (n.d.). https://www.transitionjustice.org/

Construct Validation of GENDER-Q Scales Measuring Surgical Outcomes for Facial Feminization

Abstract Presenter: Manraj Kaur PhD

Abstract Co-Author(s): Charlene Rae, Shane Morrison MD, MS, Alexis Laungani MD, Pierre Brassard MD, FRCS, Natasha Johnson, Tim van de Grift, Margriet Mullender, Danny Young Afat, Sylvie Cornacchi, Andrea Pusic MD, MHS, FACS, FRCSC, Anne Klassen PhD

Purpose: GENDER-Q is a comprehensive patient-reported outcome measure (PROM) that includes 56 scales and checklists that measure outcomes of gender-affirming care, including facial surgery and procedures.
Aim: To assess the construct validity of 12 GENDER-Q face, neck and hairline appearance scales and 5 health-related quality of life (HRQL) scales for use in facial feminization surgery.

Methods: Between 2022 and 2024 an international field-test was undertaken to collect psychometric data to validate the GENDER-Q, a modular patient-reported outcome measure. Scales for facial feminization measure appearance of Face Overall, Facial Features, Upper Face, Eyebrows, Cheeks, Nose, Nostrils, Lips, Chin, Jawline, and Adam's Apple and Hairline. The HRQL scales measure Body Image, Gender Dysphoria, Social Acceptance, Psychological Distress and Psychological Well-being. Scales are scored from 0 (worst) to 100 (best). Participants in the GENDER-Q survey were asked to report if they had or wanted surgery to change the appearance of their face (brow, eyes, nose, lips, cheeks, chin or jawline), hairline and/or Adam's apple. Construct

validation was tested using pre-defined hypotheses of known or expected group differences. Acceptance of at least 75% of hypotheses was considered sufficient evidence of validity.

Results: From the international GENDER-Q field-test, 2040 participants wanted a more feminine facial appearance. Participants identified as women (86%), non-binary (10%) or other (4%). Most participants were white (80%), lived in USA (41%) or Canada (33%), and ranged in age from 18 to 83 years of age (mean=38 yrs; sd=14). Of the 2040 participants, 12% did not want any form of facial surgery, 43% wanted but had not yet had any facial surgery, 29% had undergone from 1 to 9 different facial surgeries, and 17% were unsure or had minimally invasive treatment only. Of those who had undergone at least one surgery, the most commonly reported procedures were browlift (76%) and/or rhinoplasty (62%). Mean scores on the Face Overall and Facial Feature scales decreased as participants reported they wanted more surgeries ($p<0.001$). The mean scores for those who did not want facial surgery or had completed surgery were significantly higher than scores for participants who wanted surgery or needed more surgery ($p<0.001$). For the scales that measure specific facial areas, those that wanted surgery scored significantly lower than those who have had at least one facial surgery: Adam's Apple (50±22 vs 86±21), Hairline (42±15 vs 60±19), Upper Face (33±19 vs 65±20), Eyebrow (52±20 vs 68±20), Jawline (31±18 vs 64±21), Chin (29±17 vs 67±23), Cheeks (38±18 vs 70±24), Nose (34±17 vs 66±22), Nostrils (45±23 vs 66±23), Lips (37±17 vs 63±21). In terms of HRQL, mean scores were significantly lower for those who wanted surgery versus those who had at least one facial surgery for Body Image (50±23 vs 60±23), Gender Dysphoria (57±20 vs 65±21), Social Acceptance (71±18 vs 76±18), Psychological Distress (59±20 vs 67±20), and Psychological Well-being (59±20 vs 64±20).

Conclusion: GENDER-Q's face, neck and hairline appearance scales and HRQL scales evidenced construct validity for use in people undergoing gender-affirming facial feminization surgery.

Negative Pressure Wound Therapy vs. Standard Dressings in Penile Inversion Vaginoplasty: Provider Perspectives on Challenges, Benefits, and Workload.

Abstract Presenter: Nicole Sanchez Figueroa MD, Msc

Abstract Co-Author(s): Maria Rios Sanchez, Jorys Martinez-Jorge MD, Vahe Fahradyan MD

Introduction: The Traditional wound coverage following penile inversion vaginoplasty consists of bolsters. Incisional Negative Pressure Wound Therapy has been implemented at our institution for wound dressing following PIV. While the benefits of NPWT are well known, utilizing it at perineal wounds can be cumbersome due to anatomical location. This can result in NPWT failures. This study aims to assess the experiences of nurses with NPWT and standard dressings in PIV patients, focusing on the challenges encountered and problem-solving strategies employed.

Methods: This is a single-institution, IRB-approved study. The survey was set up, designed, and distributed via REDCap to the 27 nurses at our institution who work in plastic surgery and care for PIV patients. Two reminder emails were sent at 10-day intervals to encourage participation. The questionnaire collected data on provider experience, perceived challenges, problem resolution strategies, satisfaction, and workload comparison between NPWT and standard dressings. Descriptive statistics were used to summarize the responses using BlueSky Statistics © 2025. Open-ended responses were analyzed for qualitative themes.

Results: The response rate was 59.25%, with 86.7% of respondents being female, and the median age was 29 years (range 22–51). Experience in transgender care varied, with most having ≥3 years (62.5%). Similarly, NPWT experience was diverse, with 43.8% having ≥3 years. 81.3 % reported that the most common challenges associated with NPWT included device malfunction or failure, 50 % responders mentioned skin irritation or damage, and 43.8% reported patient discomfort. Problem resolution strategies primarily included improved seal techniques (58.3%), increased patient monitoring (50.0%), and enhanced staff training (31.2%). Open-ended responses highlighted both the benefits and challenges of NPWT. Providers noted reduced dressing changes, improved hygiene, and better patient comfort with NPWT compared to bolster dressing changes. However, some patients experienced anxiety due to the inability to visualize the wound, while staff reported frequent air leaks, difficulty maintaining dressing integrity in high-friction areas, and occasional exudate management issues. Certain providers also cited staff training gaps and the need for improved device reliability.
Satisfaction with NPWT was high, with 81.0% of respondents being satisfied or very satisfied and none reporting dissatisfaction. Workload was perceived as low (50.0%) or moderate (50.0%), with 46.7% indicating NPWT reduced workload compared to standard dressings. Open-ended feedback suggested that NPWT required more initial

troubleshooting but ultimately reduced dressing maintenance and the overall burden on staff.

Conclusion: Providers reported high satisfaction with NPWT, citing advantages in hygiene, reduced dressing changes, and increased patient comfort. However, technical challenges, patient anxiety, and skin irritation remain concerns. Qualitative responses emphasized the need for better training, enhanced sealing techniques, and improved patient education to mitigate anxiety and optimize NPWT use. Future efforts should focus on refining device reliability, addressing troubleshooting concerns, and ensuring comprehensive staff training to enhance NPWT efficacy in transgender surgical care.

Decision and Social Support Needs in Patients Undergoing Gender Affirming Mastectomy

Abstract Presenter: Hyesong Joung

Abstract Co-Author(s): Jennifer Goldman, John Stranix MD, Randy Jones, Sujeong Go, Crystal Chu

Purpose: Transgender and nonbinary (TGNB) adults face complex healthcare decisions for gender-affirming care (GAC) yet decision support resources are limited. Despite the benefits of GAC, factors (e.g. resource access, social network, and state policies) can influence outcomes. While decisional regret after gender-affirming mastectomy (GAM) is rare, it is associated with increased risk of depression and suicidality. This study explored the decision-making process, social support needs, and decisional regret post-GAM.

Methods: Participants who were post-GAM within the last 12 months were recruited via email from the University of Virginia Plastic Surgery Clinic. Data collection included semi-structured interviews, baseline demographic form, clinical history form, the Decision Making Quality Scale (DMQS) and the Decision Regret Scale (DRS).

Results: A total of 32 patients were included in this study. 5 patients reported no social support yet had a DRS score of 0 (mean DRS 4.2 (0-40)). Those who had no support were significantly older ($p < 0.001$) with a mean age of 38.6 compared to a mean age of 28.1 years old in the group who reported having at least one person for social support. One participant had a DRS score of 40 responding "agree" for both "I regret this

decision" and "I would go for the same choice if I had to do it over again," noting permanent tradeoffs. Mean DMQS score was 17.5 (12-21) indicating quality decision making. Participants reported utilization of social media, TGNB peer networks, and websites for GAM decision support. All participants expressed strong social support is needed throughout the process and critical during the post-operative phase. All participants cited financial concerns and health insurance status as the largest barrier to access to care in addition to geographical location (distance to clinic ranged from 1.4 miles to 140 miles).

Conclusion: Post-GAM satisfaction was high and participants did not report decisional regret. Participants endorsed that health insurance status, geographical location, and social network are factors that influence the timing and decision to undergo GAM. Findings warrant further research to develop decision and social support interventions to assist TGNB individuals considering GAM.

Single-Scar Anterolateral Thigh Phalloplasty with Tissue Expander Placement: A Novel Approach to Enhancing Aesthetic and Functional Outcomes

Abstract Presenter: Madeleine Givant

Abstract Co-Author(s): Avery Apostle, Malka Korenblit, Allison Hu MD, Dev Gurjala MD

Purpose: Current challenges in creation of the neophallus include significant scarring, high urethral complication rates, and anatomic fidelity. The aim of this study is to report on the use of tissue expander (TE) placement in single-scar ALT phalloplasty, demonstrate the validity of this novel approach, and highlight its potential to address these clinical challenges.

Methods: A 29 year-old patient underwent a two-stage shaft-only phalloplasty. During the first stage in June 2022, the tissue expander was placed and filled with 150 cc. Following this procedure, the expander was filled to a total of 805 cc over the course of several post-operative visits. We proceeded with stage 2 four months later, in which the neophallus was created, the nerve was coapted, and the donor site was closed. A little under one year later, the patient underwent glansplasty and scrotoplasty. Follow-up is ongoing.

Results: No major complications were observed at any stage of reconstruction. Following stage one, the patient endorsed minor nerve pain likely due to stretching of the lateral femoral cutaneous nerve. This pain resolved prior to the second stage. Currently, patient reports improving sensation and ability to orgasm through stimulation of the phallus. In addition, the patient is able to urinate without issue. The patient is pleased with the appearance of a single-scar and the aesthetic outcome of the phallus. Next steps include implantation of inflatable erectile prosthesis and scrotal implant.

Conclusion: We successfully performed a single-scar ALT phalloplasty with TE placement in this case. The TE placement allows for primary closure which can alleviate the scar burden faced by patients seeking gender-affirming phalloplasty. Furthermore, tissue expansion can allow for thinner flaps and flap hypervascularization which may improve flap survival rates as well as aesthetic outcomes. Combination of this procedure with laminating urethroplasty and delay of urethral anastomosis should also be explored as a method to reduce urethral fistula and stricture rates.

Beyond the Incision: Incidence and Risk Factors of Hypertrophic Scarring Following Gender-Affirming Mastectomy

Abstract Presenter: Josip Plascevic Mbchb

Abstract Co-Author(s): Katya Remy MD, Matthew Depamphilis, Kenechi Iwelumo, William Gerald Austen Jr., MD, Katherine Carruthers MD, Dieter Manstein, M.D., Ph.D.

Introduction: Gender-affirming mastectomy (GAM) is the most common gender-affirming surgical procedure, with cases increasing by 200% in recent years. While double-incision GAM is the standard technique, it involves long horizontal incisions across the chest which may be prone to hypertrophic scarring (HS)-the most common postoperative complication. HS can cause significant physical and psychosocial morbidity, and effective treatment options are limited. However, few studies have investigated the occurrence of HS in patients undergoing GAM. This study aimed to evaluate the incidence and risk factors of HS following GAM to provide insight on underlying pathophysiology and to improve evidence-based patient counseling.

Methods: A retrospective cohort study was conducted of patients who underwent double-incision GAM from 2020 to 2024 from two institutions under the care of six surgeons. Data included patient demographics, comorbidities, perioperative androgen

replacement therapy, testosterone blood levels, postoperative complications requiring surgical intervention, HS occurrence (based on documentation in follow-up clinic notes), corticosteroid injections, and scar revision. Patients with less than 4 weeks follow-up were excluded. Bivariate as well as univariable and multivariable logistic regression analyses were performed.

Results: A total of 241 patients were included with a mean age of 26.7 (±9.0) years, a mean BMI of 27.9 (±5.4) kg/cm2 and a mean mastectomy weight of 614.0 (±389.6) grams. HS occurred in 16.6% of patients, corticosteroid injections were administered in 8.3% and 0.8% underwent scar revision. Non-Caucasian race (higher Fitzpatrick skin type levels) was significantly associated with higher rates of HS (32.4% versus 13.4%, p=0.004; OR 4.0, 95% CI 1.7-9.4, p=0.001), corticosteroid injections (19.4% versus 6.1%, p=0.007) and scar revision (5.6% versus 0.0%, p=0.023). Androgens were used perioperatively by 67.2% of patients, with a mean preoperative testosterone level of 485.4 (±302.1) ng/dL compared to non-users 35.1 (±17.4) ng/dL (p<0.0001). Perioperative androgen use was significantly associated with higher rates of HS (20.4% in users versus 8.9% in non-users, p=0.024; OR 3.4, 95% CI 1.3-8.4, p=0.001). Age, BMI, comorbidities, nicotine use, previous breast surgery, mastectomy weight, and the development of other postoperative complications, such as wound dehiscence, were not significantly associated with HS. The average follow-up duration was 5.3 (±4.5) months.

Conclusion: HS occurred in 16.6% of GAM patients, with race/Fitzpatrick skin type and perioperative androgen replacement therapy identified as significant risk factors (four-fold and three-fold increased risk, respectively). Patients should be counseled preoperatively regarding their individual risk profile. Future research should investigate perioperative androgen management or testosterone thresholds for optimal balance between scarring outcomes and overall patient treatment goals.

Measurement of Patient-reported Outcomes After Feminizing Gender-Affirming Genital Surgery with the GENDER-Q

Abstract Presenter: Manraj Kaur PhD

Abstract Co-Author(s): Charlene Rae, Shane Morrison MD, MS, Alexis Laungani MD, Pierre Brassard MD, FRCS, Natasha Johnson, Tim van de Grift, Margriet Mullender, Danny Young Afat, Sylvie Cornacchi, Andrea Pusic MD, MHS, FACS, FRCSC, Anne Klassen PhD

Purpose: Feminizing gender-affirming genital surgery seeks to align genital appearance with gender identity in transfeminine individuals. Multiple surgical techniques exist and involve the creation of a vulva and oftentimes a vaginal canal. While access to feminizing gender-affirming genital surgery is growing adjacent to demand, limited empirical evidence exists on the patient-reported outcomes (PROs) of these procedures.

Aim: To examine construct validity of GENDER-Q scales measuring satisfaction with the vagina, labia, clitoris, and dilation and health-related quality of life (HRQL) in feminizing gender-affirming genital surgery.
Methods: Between 2022 and 2024, an international field test of the GENDER-Q was conducted with transgender and gender diverse (TGD) adults fluent in English, Danish, Dutch, or French Canadian. Participants who reported having feminizing gender-affirming genital surgery completed scales measuring satisfaction with the vagina, labia, clitoris, and dilation and five HRQL scales that measure body image, gender dysphoria, social acceptance, psychological well-being, and psychological distress. Scale scores were transformed from 0 (worst) to 100 (best). Construct validation was assessed by testing pre-defined hypotheses, with acceptance of at least 75% of hypotheses providing evidence of validity.

Results: In the GENDER-Q field-test sample, 581 participants wanted to have feminizing genital surgery and 1236 had received it. Participants were mostly white (80%), had a mean age of 40±14 years, and lived in Canada (51%) or the United States (37%). Surgical techniques that participants underwent included: penile inversion vaginoplasty (77%), minimal depth vulvoplasty (9%), peritoneal pull through vaginoplasty (8%), or colon/small bowel vaginoplasty (1.9%). Hypothesis-based construct validity was demonstrated for both genital feminization and HRQL scales, with ≥75% of hypotheses accepted. For HRQL scales, those who wanted surgery scored lower ($p<0.001$) than those who underwent surgery (Body Image: 51±23 vs 61±23; Gender Dysphoria: 54±18 vs 68±21; Social Acceptance: 70±17 vs 77±19; Psychological Distress: 57±19 vs 69±21; Psychological Well-being 58±18 vs 67±20). Those who needed more surgery scored lower on the HRQL scales than those who had completed surgery ($p<0.001$). Less satisfaction was observed for those who reported that their vagina was not as deep as they would have liked (Vagina: 44±16 vs 63±20; Dilation: 50±20 vs 65±19) ($p<0.001$). Those who reported their vagina was narrower than they would have liked (Vagina: 43±15; Dilation: 46±17) scored lower than those who reported their vagina was the right width (Vagina: 62±20; Dilation: 66±19) ($p<0.001$). As expected, satisfaction with dilation incrementally decreased as participants reported greater pain during dilatation ($p<0.001$). Less satisfaction with the vagina was reported

for those who currently experienced a wound complication (40±19 vs 58±20) or vaginal stenosis (41±17 vs 61±20) ($p<0.001$). Needing a revision to the clitoris, inner/outer labia, or vaginal width or depth was associated with lower scores on the genital feminization scales ($p<0.001$).

Conclusion: GENDER-Q scales that measure satisfaction with the vagina, labia, clitoris and dilation and HRQL can be used to measure outcomes in feminizing gender-affirming genital surgery from the patient perspective. These scales can be used in comparative effectiveness research, in clinical care or in quality improvement efforts, to inform patient-centered care.

A Case Series in Gender-Affirming Free Flap Breast Reconstruction

Abstract Presenter: Zain Aryanpour MD

Abstract Co-Author(s): Evan Haas, Elliot Le MD, Julian Winocour MD, CM, FACS, FRCSC, David Mathes MD, Christodoulos Kaoutzanis MD

Background: Breast reconstruction with implants is the gold standard in transfeminine gender-affirming chest surgery (1). To date there are few reported cases evaluating microsurgical free flap tissue transfer as a viable option in gender-affirming surgery and there is a paucity of data on surgical outcomes (2-4). Here we review two cases of free flap breast reconstruction in transgender women and discuss technical considerations and early outcomes.

Methods: We performed retrospective chart review of identified patients. Patient demographics, surgical characteristics, and post-operative outcomes were documented. Patient demographics included age, body mass index, and pertinent past medical history. Surgical characteristics include operative time, flap weight, and details on vascular perforators. Post-operative outcomes included surgical complications such as infection, fluid collection, and wound dehiscence, as well as medical complications.

Results/Cases: Patient 1 has a history of BRCA1 mutation and underwent prophylactic bilateral skin-sparing mastectomies and implant-based breast reconstruction in 2020, which was complicated by symptomatic capsular contracture and animation deformity; she was deemed an optimal candidate for autologous reconstruction, thus she was converted to bilateral deep inferior epigastric perforator (DIEP) free flaps, with an

uneventful postoperative course aside from minor recipient site dehiscence that was managed conservatively with local wound care. Patient 2 desired gender-affirming augmentation mammaplasty but did not want implants. She underwent bilateral breast augmentation with DIEP free flaps, with an uneventful postoperative course aside from donor site infection that was managed with short admission for intravenous antibiotics. Values regarding patient and surgical demographics for transgender patients undergoing autologous breast reconstruction fell within the standard expected ranges for their cisgender counterparts. Both patients remain satisfied with their aesthetic outcomes.

Conclusion: Abdominal-based free flaps are safe and effective options for both cosmetic and post-oncologic breast reconstruction in transgender and gender-diverse patients. More data is needed to better quantify outcomes and identify areas for improvement. Our preliminary data suggests similarities in technical considerations and outcomes of autologous breast reconstruction / augmentation in cisgender patients.

References

1. Claes KEY, D'Arpa S, Monstrey SJ. Chest Surgery for Transgender and Gender Nonconforming Individuals. Clin Plast Surg. 2018;45(3):369-380. doi:10.1016/j.cps.2018.03.010
2. Murariu D, Holland MC, Gampper TJ, Campbell CA. Illegal silicone injections create unique reconstructive challenges in transgender patients. Plast Reconstr Surg. 2015;135(5):932e-933e. doi:10.1097/PRS.0000000000001192
3. Majdak-Paredes EJ, Shafighi M, Fatah F. Unilateral hypoplastic breast in a male-to-female transsexual with Poland syndrome after gender reassignment--reconstructive considerations. J Plast Reconstr Aesthet Surg. 2009;62(3):398-401. doi:10.1016/j.bjps.2008.01.017
4. Chun Fat S, Ray E. Gender-affirming microvascular breast reconstruction. Gland Surg. 2023;12(7):982-988. doi:10.21037/gs-23-133

Background Knowledge about BIA-ALCL and BII: A Survey of Transgender and Gender-Diverse Individuals

Abstract Presenter: Madeleine Givant

Abstract Co-Author(s): Avery Apostle, Malka Korenblit, Meg Quint, Allison Hu MD, Arya Akhavan MD, Thomas Satterwhite MD, John Henry Pang MD

Purpose: Breast Implant-Associated Anaplastic Large Cell Lymphoma (BIA-ALCL) is a rare cancer that can develop around breast implants, while Breast Implant Illness (BII) encompasses a constellation of systematic symptoms such as fatigue and joint pain that stem from an unclear etiology. Patient awareness of these conditions is essential for informed decision-making, yet existing research has primarily focused on cisgender individuals. This study examines knowledge of BIA-ALCL and BII among transgender individuals who are considering undergoing/have undergone male-to-female breast augmentation to address gaps in education and improve surgeon-patient communication.

Methods: An anonymous, 43-item electronic survey was distributed to all gender-affirming surgery patients >18 years, regardless of current gender identity, attending a single gender-affirming surgical clinic for consultation of breast implants from December 2018 to August 2024. Questions focused on patient understanding of medical conditions related to breast implants and personal experience with breast implants. Nominal and ordinal data were summarized using descriptive statistics. Differences between those who had undergone a breast implant procedure versus consultation only were compared using Chi-Square or Fisher's Exact test where appropriate.

Results: The survey was distributed to 309 patients with a response rate of 23.6% (n = 73) and a completion rate of 68.4% (n = 50). Most respondents (38, 80.9%) had breast implants. Over half (26, 57.8%) of participants had heard of BII while only 14 (30.4%) had heard of BIA-ALCL. Of those that had heard of BII, the majority (11, 42.3%) endorsed news articles as their source while those who knew of BIA-ALCL had heard about it at a doctor's office (12, 85.7%). The majority of respondents expressed some level of concern, ranging from minimal to extreme, about BII (31, 67.4%) and BIA-ALCL (28, 62.2%). Despite this concern, many respondents were uncertain about symptoms (26, 60.5%), prevalence (23, 52.3%), or types of implants (29, 65.9%) linked to BIA-ALCL and would still recommend breast implants to a family member or friend. When knowledge and concern of developing BII and BIA-ALCL was compared between those with and without a history of breast implants, no significant difference was observed for any queried domain.

Conclusion: Most participants expressed concern about BII and BIA-ALCL despite significant knowledge gaps regarding symptoms, prevalence, and implant types associated with these conditions. Notably, these concerns did not substantially affect participants' willingness to recommend breast implants to others. These findings highlight the need for improved patient education on implant-related risks, particularly within the gender-affirming surgery population, to support informed decision-making.

Streamlining Gender Surgery: A Unified Surgical Approach to FFS, Augmentation, and SRS

Abstract Presenter: Tim Nijhuis MD, Phd

Introduction: In the Netherlands, gender-affirming surgery has a well-established history in Amsterdam. In 2020, our academic hospital in Nijmegen launched a new gender surgery program. Since its inception, the author has performed surgeries on over 400 patients. This abstract outlines our experiences in combining procedures to facilitate a smoother transition for transwomen, enhance outcomes, and minimize both waiting times and disruptions to their work and social lives. By combining the penile inversion vaginoplasty (SRS), breast augmentation, and facial feminization surgery (FFS), the patient benefits from a single rehabilitation period while maintaining a low risk of complications.

Methods: We conducted a retrospective analysis of our transgender women population undergoing combined surgical procedures in 2024. We categorized individual procedures, including sex reassignment surgery, breast augmentation, and facial feminization surgery (FFS). In the FFS category, we employed a combination of techniques, including frontal bossing setback, brow suspension, hairline lowering, and surgeries involving the nose, lips, thyroid, angular bones, and genioplasty. Our analysis concentrated on operative duration, hospital admission times, and postoperative complications.

Results: In 2024, we conducted nine penile inversion vaginoplasty procedures, either accompanied by augmentation, facial feminization surgery (FFS), or a combination of both. Notably, there were no complications reported in any of the patients. The average operative time for the combined surgery (3 in 1) was 5.5 hours, while the vaginoplasty combined with FFS took 4.5 hours, and the vaginoplasty paired with augmentation lasted 3.25 hours. Additionally, we performed one zero-depth vaginoplasty along with FFS, which required 4 hours, two orchidectomies with FFS that each took 2 hours, and one FFS procedure in conjunction with augmentation completed in 3 hours. Also without complications.
A total of 30 patients underwent penile inversion vaginoplasty, with an average surgical duration of 2 hours and 15 minutes. No significant complications were reported, except

for one case in which a patient required conversion to a zero-depth vaginoplasty due to necrosis of the neovaginal cavity caused by a bacterial infection.

Conclusion: Our unified surgical approach has not led to a higher rate of complications and appears to enhance patient satisfaction, despite the lack of formal evaluation through questionnaires. Consequently, we are committed to maintaining this streamlined surgical plan, allowing transgender women to complete their surgical transition in a single step. We will not only continue to monitor our outcomes but also initiate a structured evaluation of patient satisfaction to further refine our practices. We believe it is essential to share our preliminary findings to introduce the innovative concept of a unified procedure, which aims to minimize downtime and facilitate a quicker return to work for our patients. This initiative underscores our dedication to improving the surgical experience and supporting the needs of the transgender community.

Acceptability of the GENDER-Q Patient-reported Outcome Measure in Gender-affirming Care

Abstract Presenter: Shane Morrison MD, MS

Abstract Co-Author(s): Manraj Kaur PhD, Charlene Rae, Alexis Laungani MD, Pierre, Brassard MD, FRCS, Natasha Johnson, Tim van de Grift, Margriet Mullender, Danny Young Afat, Sylvie Cornacchi, Andrea Pusic MD, MHS, FACS, FRCSC, Anne Klassen PhD

Purpose: There has been an increase in patients seeking gender-affirming surgeries. Assessing outcomes from the patient perspective can provide valuable information that can inform patient choice as well as effectiveness of surgical techniques. A new gender-affirming care-specific patient-reported outcome measure (PROM), GENDER-Q, has been developed to measure multiple appearance and quality of life outcomes. However, to support implementation of GENDER-Q in research and clinical practice it is important to ensure that the tool is acceptable to people who identify as transgender or gender diverse.

Aim: To examine acceptability of the GENDER-Q in a large, international sample of transgender and gender diverse (TGD) adults.

Methods: A multi-phase, mixed methods study was conducted (February 2019 to March 2024). Part one involved concept elicitation interviews with data used to develop a set of PROM scales measuring key concepts. Participants from Canada, the United States (US), Denmark, and the Netherlands were recruited. Scales were developed and refined iteratively with feedback from patient participants and experts. In part two, an international field-test was conducted. Participants were recruited through social media and 21 clinical sites across Canada, the US, the Netherlands and Spain, and community groups (e.g., crowdsourcing platform). After completing the GENDER-Q, a subsample of participants was asked to complete questions to evaluate acceptability (e.g., was easy to understand, was thorough, asked important questions, felt safe to complete).

Results: Concept elicitation interviews with 84 participants (mean age 34 ± 14 years) resulted in the development of scales to measure health-related quality of life, sexual, urination, gender practices, voice, hair, face and neck, body, breasts, genital feminization, chest, genital masculinization, and experience of care. Of the 5,497 field-test survey participants, 1285 completed the additional questions to measure acceptability and content validity. Most participants were from the US (32%), Canada (28%), and the United Kingdom (12%). In terms of treatment, 65% were currently taking hormones, 56% had undergone chest surgery, 31% vaginoplasty, 21% breast surgery, 8% had some form of facial feminization, 3% body contouring, and 6% had surgery to create a penis. GENDER-Q was found to be highly acceptable by the majority of participants. Most respondents either mostly or strongly agreed that GENDER-Q asked questions in a respectful way (90%), felt safe to complete (87%), was thorough (87%), was easy to understand (83%), and it made them feel that their voice would be heard (65%). A small subgroup of participants endorsed feeling upset (8%) or uncomfortable (8%) after completing GENDER-Q.

Conclusion: A cross-sectional sample of 1285 individuals agreed to the acceptability and useability of the GENDER-Q. Although it is important to note that completing this PROM can cause a small sample of patients to feel upset or uncomfortable. GENDER-Q can now be incorporated in clinical care and research to collect evidence that will help to inform patient care, surgical practice and quality improvement efforts.

Cranial Bone Hyperpigmentation: A Barrier to Transillumination in Gender-Affirming Frontal Sinus Setback Procedures

Abstract Presenter: Iris Deng

Abstract Co-Author(s): James Lee MD, Alexander Andrew Argame, Yuan Liu MD

Introduction: A key component of facial feminization surgery (FFS) is the frontal bone setback procedure to decrease supraorbital bar prominence. Intraoperative transillumination of the frontal bone is a commonly-accepted technique to delineate frontal sinus borders for osteotomy. Cranial bone hyperpigmentation is a rare finding associated with tetracycline use, malignancy, infection, or metabolic disorders. Its occurrence in FFS and effects on transillumination remained largely undocumented. We present two cases of frontal bone hyperpigmentation found during FFS and subsequent impact on surgical management.

Case Reports: A 26-year-old Caucasian transgender female with no history of bone disease or tetracycline use presented for FFS. Her preoperative CT facial scan was unremarkable. During cranial dissection, dark pigmentation of the frontal bone was identified, permeating full thickness through all bone layers. Frontal sinus transillumination through the hyperpigmented bone was not possible. Sinus measurements from the CT were used to guide osteotomies, with conservative markings. A fissure burr was utilized to perform anterior table osteotomies without violation of the intracranial space. The anterior table was contoured and repositioned posteriorly in the usual fashion. The bone was secured with low-profile mini-plates and screws before additional contouring of the orbital rims and zygomaticofrontal prominence. Bone dust was used to fill gaps and cover the fixation hardware.
A second case involved a 58-year-old Asian transgender female with history of hypertension, gout, and asthma without prior tetracycline use or bone disease. Her preoperative CT scan was unremarkable. Intraoperatively, darkened cranial bone was encountered, also preventing frontal sinus transillumination. The surgical team proceeded with osteotomies with an ultrasonic aspirator device using standard anatomic landmarks and guided by preoperative CT measurements. The harvested bone was reshaped and repositioned using two X-plates and screws to achieve a deprojected forehead contour.
Both patients tolerated the procedures well without complications.

Discussion: Bone hyperpigmentation has been associated with chronic tetracycline use and metabolic conditions like alkaptonuria especially. Previous reports of cranial hyperpigmentation were linked to tetracycline therapy, often decades prior. Sequestrum, or dead bone caused by osteomyelitis, may also present with discoloration. Additionally, metallosis, caused by prosthesis or implant material deposition, can lead to bone staining. However, neither patient in this series had any of these associated conditions.

The absence of exam findings or radiographic evidence predicting the presence of hyperpigmented bone preoperatively emphasizes the need for an alternative to transillumination in these rare circumstances. In both cases, CT-based frontal sinus measurements proved critical in determining safe parameters for osteotomies, although their application is more complex compared to transillumination. Alternatively, virtual surgical planning (VSP) with cutting guides can be utilized to delineate the osteotomy sites, but with additional cost.

Conclusion: Cranial bone hyperpigmentation is a rare, poorly described anatomical variation that presents a unique intraoperative challenge for surgeons performing frontal bone setback using transillumination. Due to the unpredictable nature of cranial bone hyperpigmentation, having an alternative method of frontal sinus identification is recommend, either with CT-based measurements or VSP. Further research should explore bone hyperpigmentation etiologies and possible predictive factors.

Validation of GENDER-Q Scales for Use in Gender-affirming Top Surgery.

Abstract Presenter: Shane Morrison MD, MS

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Purpose: Transgender and gender-diverse people may undergo surgeries to align their chest/breast with their gender identity. Patient-reported outcome measures (PROM) are carefully developed tools that can measure outcomes such as quality of life and appearance from the patient perspective. The purpose of this study was to assess the validity of GENDER-Q scales for use in gender-affirming chest and breast surgery.

Methods: Data was collected internationally between 2022 and 2024 where participants completed relevant scales from a new PROM for gender-affirming care (GENDER-Q). Participants completed appearance scales related to the breast/chest and nipples if they reported wanting or having gender-affirming chest or breast surgery. All participants completed a set of 5 quality-of-life scales (Social Acceptance, Body Image, Gender Dysphoria, Psychological Distress, Psychological Wellbeing), as well as the Treatment

Outcome scale on their most recent surgery. Scales are scored on an interval-level of 0 (Worst) to 100 (Best). Clinical questions related to surgery included: time since surgery, type of surgery, surgical complications, and revision status. To test construct validity of the scales predefined hypotheses were created for known group differences and tested using ANOVA and T-test.

Results: Of 5497 participants, 4031 reported wanting or having a masculinization (n=2849) or feminization (n=1182) gender-affirming surgical procedure for the chest/breast area. Participants ranged in age between 18 and 83 years of age, with a mean age of 32 (SD=12). Those who wanted surgery scored lower on the appearance scales for both feminizing (Breast (μ=46(13)), Nipples (μ=56(18)) and masculinizing (Chest (μ=23(15)), Nipples (μ=43(17)) chest surgery than those who had completed surgery (Breast μ=66(15), Nipples μ=69(20);Chest μ=77(18), Nipples μ=65(20)). For chest masculinization, those who needed revisions for chest contouring (μ=58(15)), dog ears (μ=67(18)) and removal of excess breast tissue (μ=57(17)) scored lower on appearance scales than those who didn't need (μ=83(16); μ=82(16); μ=80(17)) or had completed revisions (μ=79(17); μ=75(17); μ=74(19)) ($p<0.001$). Scores on all quality-of-life scales were greater for those who had surgery than those who wanted surgery for both feminization and masculinization procedures ($p<0.001$). Treatment Outcome scale scores were slightly greater for those who had masculinizing (n=1484; μ=80(19)) than those who had feminizing (n=192; μ=75(23)) chest surgery.

Conclusion: GENDER-Q quality-of-life and appearance scales evidence construct validity to measure patient outcomes in gender-affirming chest and breast surgery.

The Impact of Testosterone Supplementation on Surgical Complications in Gender-Affirming Mastectomy: A Meta-Analysis

Abstract Presenter: Diwakar Phuyal MD

Abstract Co-Author(s): Sara Yacoub, Zoe Belardo, Antonio Rampazzo MD, Bahar Bassiri Gharb MD, PhD

Background: Patients seeking gender-affirming surgery are often on hormone therapy, yet there is no clear consensus on the effects of preoperative testosterone supplementation on chest masculinization surgery. A particular concern is whether testosterone should be continued or discontinued before surgery. We hypothesized that

preoperative testosterone therapy and its continuation during surgery would not increase complications following chest masculinization surgery.

Methods: A meta-analysis was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Studies on chest masculinization surgery that reported perioperative hormone use and surgical outcomes based on hormone status were included. Data collected included patient numbers, age, testosterone supplementation status, procedure type, postoperative complications, and the American Society of Plastic Surgeons (ASPS) level of evidence. Data were compared between patients on testosterone before surgery (TT) and those not on hormone therapy (NTT), as well as between those who continued or discontinued testosterone perioperatively. Additionally, a subgroup analysis was performed to assess hematoma rates based on surgical technique (limited incision vs. extended incision). Statistical analysis included pooled comparisons using the chi-square test and Welch's t-test.

Results: Fifteen articles met inclusion criteria with level of evidence of III (8) and IV (7). Three thousand seven hundred sixty-two patients were on testosterone treatment and seven hundred twenty-six not on hormone therapy. The total acute complication rates, including hematoma, seroma, infection, wound dehiscence, and nipple areolar complex (NAC) necrosis, for the TT and NTT groups were 11.08% and 9.8%, respectively ($p = 0.29$). Preoperative testosterone increased the odds of developing a hematoma by 1.88 times (7.76% vs. 2.9%, $p < 0.001$). Seroma prevalence was significantly lower in the TT group compared to the NTT group (1.55% vs. 4.29%; $p = 0.028$). Infection and wound dehiscence rates were not significantly different between TT and NTT (1.35% vs. 1%, $p = 0.32$; and 1% vs. 1.45%, $p = 0.94$). Venous thromboembolism (VTE) rates were not significantly different (0.14% vs. 0%; $p = 0.88$).

No significant difference in hematoma rate was observed between patients who continued (8.73%) and who stopped testosterone perioperatively (8%; $p = 0.63$). Hematoma rates were also similar regardless of when hormone therapy was stopped: 2 weeks (7.37%, $n = 434$), 3 weeks (6.93%, $n = 101$), 4 weeks (9.48%, $n = 232$), or 6 weeks (9.90%, $n = 202$) preoperatively ($p = 0.60$).

Hematoma rates were higher with limited incision techniques compared to extended incision mastectomy techniques (11.96% vs. 6.5%; $p < 0.001$).

Conclusion: Testosterone therapy is associated with a higher risk of postoperative hematoma in chest masculinization surgery. However, perioperative cessation of testosterone does not appear to reduce bleeding risk. Therefore, delaying the initiation

of testosterone therapy in patients not already on hormone supplementation before surgery may be preferable. Conversely, for patients already on testosterone therapy, continuing treatment perioperatively may be a reasonable approach.

Beyond Top Surgery: 10-Year Outcomes of the Superthin Flap Technique in Female-to-Male Transexuals

Abstract Presenter: Daniel De Luna Gallardo MD

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Introduction: Gender-affirming chest surgery, commonly referred to as "top surgery," is a vital procedure for transgender men experiencing chest dysphoria. This study evaluates a novel superthin flap technique for chest masculinization over a 10-year period. The aim is to determine its effectiveness in improving physical well-being, body image, and psychological health.

Methods: A prospective study was conducted on 341 patients undergoing primary masculinizing chest surgery between January 2014 and December 2023. Patients adhered to the World Professional Association for Transgender Health (WPATH) Standards of Care. Demographic data, surgical technique, complications, and revisions were documented. Patient-reported outcomes were assessed using the BREAST-Q and CRES-4 questionnaires. Statistical analyses identified risk factors for complications and were also used to evaluate statistically significant differences in questionnaire responses.

Results: A total of 710 mastectomies were performed. The mean patient age was 27.2 years, and 94.1% were on testosterone therapy. The most common complications included seroma (5.08%), hematoma (3.9%), and partial nipple necrosis (3.3%). Mastectomy volume exceeding 440 g was significantly associated with higher complication rates ($p < 0.01$). BREAST-Q and CRES-4 scores demonstrated substantial postoperative improvements in breast satisfaction, psychosocial well-being, and quality of life. Patient satisfaction increased significantly across all measured domains.

Conclusions: The superthin flap technique provides favorable aesthetic and functional outcomes, preserving natural nipple-areola complex positioning while minimizing complications. Patient satisfaction and quality of life improved significantly. Future

research should focus on refining techniques and exploring sensory nerve reinnervation to enhance postoperative outcomes.

References:
(1) Deutsch MB. Making It Count: Improving Estimates of the Size of Transgender and Gender Nonconforming Populations. LGBT Health. 2016;3(3):181-185. doi:10.1089/lgbt.2016.0013.
(2) Wiepjes CM, Nota NM, de Blok CJM, et al. The Amsterdam Cohort of Gender Dysphoria Study (1972-2015): Trends in Prevalence, Treatment, and Regrets. J Sex Med. 2018;15(4):582-590. doi:10.1016/j.jsxm.2018.01.016.
(3) Coleman E, Radix AE, Bouman WP, et al. Standards of Care for the Health of Transgender and Gender Diverse People, Version 8. Int J Transgend Health. 2022;23(Suppl 1):S1-S259. doi:10.1080/26895269.2022.2100644.
(4) Agarwal CA, Scheefer MF, Wright LN, Walzer NK, Rivera A. Quality of life improvement after chest wall masculinization in female-to-male transgender patients: A prospective study using the BREAST-Q and Body Uneasiness Test. J Plast Reconstr Aesthet Surg. 2018;71(5):651-657. doi:10.1016/j.bjps.2018.01.003.
(5) Bustos VP, Bustos SS, Mascaro A, et al. Transgender and Gender-nonbinary Patient Satisfaction after Transmasculine Chest Surgery. Plast Reconstr Surg Glob Open. 2021;9(3):e3479. doi:10.1097/GOX.0000000000003479.

Beyond the Numbers: Body Mass Index in Gender Affirming Mastectomy

Abstract Presenter: Alyssa Griffith

Abstract Co-Author(s): Ellen Wang, Richa John, Christopher Williams, Kylie Swiekatowski, Matthew Greives MD, Rachel Goldstein DO, Klara Sputova MD, Annie Wang MD, Daniel Freet MD, Hendrik Lintel MD

Introduction: Body mass index (BMI) has been used as a metric for understanding a patient's health status across various medical spaces, especially to reduce risk of perioperative complications. Currently, many surgical centers have requirements for patients to have a BMI of less than 30 or 35 in order for them to receive surgery. This serves as a barrier to transgender and gender nonconforming individuals to undergo medical transition such as gender affirming mastectomy (GAM). The objective of this study was to determine whether BMI correlated with increased complications for individuals receiving GAM.

Methods: This study is a retrospective chart review to analyze mastectomy outcomes in adult patients undergoing gender affirming care between February 2018 and May 2024. Patients were categorized into standard BMI groups: non-obese (<30), 30.0-34.9 for class 1 obesity, 35.0-39.9 for class 2 obesity, and 40 and above for class 3 obesity. Complications were defined as a composite variable including hematoma, seroma, infection, wound dehiscence, and nipple areolar complex necrosis. Demographic variables included age, race/ethnicity, primary language, and comorbidities. Differences in postoperative outcomes based on BMI were analyzed using Chi-squared, Fisher's, and Mann-Whitney U tests.

Results: A total of 209 patients underwent GAM. The vast majority of mastectomies were performed using the double incision technique (181, 86.6%). The median age was 25 (IQR: 21-30). There was no difference in complication rate between age, race, or ethnicity. Smoking (12.9%, p=0.049) and diabetes mellitus (3.3%, p=0.043) were significant risk factors for complications. The range of BMI was 16.8 to 55.82 with a median of 28.4 (IQR: 24.4-34.5). The median BMI was 28.1 (IQR: 24.3-34.8) for patients who did not experience complications and 28.7 (25.0-31.2) for patients who did experience complications. In the cohort, 119 (56.9%) patients were non-obese, 38 (18.2%) were class 1 obese, 23 (11.0%) class 2 obese, and 26 (12.4%) class 3 obese. The overall complication rate was 12.4%, and the revision rate was 7.2%. The complication rate was 15.1% for non-obese, 7.9% for class 1 obese, 0% for class 2 obese, and 19.2% for class 3 obese. There were no significant associations with BMI and complication rate ($p = 0.7$). In addition, there were no significant associations or clear trends with categories of obesity and complication ($p = 0.094$) or revision rate ($p = 0.3$).

Discussion: Although BMI is a well known risk factor to surgical complications, this study demonstrates that GAM can be safely performed for patients in all BMI categories. Over 40% of our patient population were obese, and the complication rate was similar across all groups. Increased BMI and obesity should not be a limiting factor for patients seeking GAM, and patients who seek to undergo surgery should be counseled on their individual risk profiles during shared decision-making.

Impact of Age on Decisional Regret and Satisfaction After Gender-Affirming Chest Surgery

Abstract Presenter: Danielle Eble MD

Abstract Co-Author(s): Maya Younoszai, Alisha Nguyen, Tannon Tople BS, Maya Gopalan, Xing Wang, Russell Ettinger MD, Shane Morrison MD, MS

BACKGROUND: Many states have enacted legislative bans on gender-affirming surgery for transgender and gender-diverse (TGD) persons <18 years on the basis of procedural irreversibility and the potential for decisional regret or dissatisfaction.(1) More recently, President Donald Trump signed a federal executive order unilaterally prohibiting gender-affirming care for TGD persons <19 years on similar grounds.(2) While existing data demonstrates high satisfaction and low regret amongst TGD adults (>18 years) undergoing gender-affirming chest surgery (GACS), prior studies of TGD youth have focused on medical interventions (e.g. puberty blockers, hormone therapy).(3,4) This study examines decisional satisfaction and regret amongst TGD persons undergoing GACS at <18 versus 18-26 years old.

METHODS: Assigned female at birth individuals who underwent GACS at our institution >1 year prior to survey distribution were eligible. Patient-reported outcomes were collected using the Holmes-Rovner Satisfaction with Decision (SWD) Scale and the Decision Regret Scale (DRS). Higher SWD scores (1-5) represent increased satisfaction, whereas higher DRS scores (0-100) represent increased regret. Descriptive statistics, and Fisher's exact and Wilcoxon rank sum tests or t-tests were used to compare TGD adolescents (<18 years) and young adults (18-26 years). Three participants with highly discordant SWD and DRS scores were excluded due to presumed reporting error.

RESULTS: 74 of 180 (41.1%) eligible patients completed the survey, 39 of which were <18 years old at time of surgery (52.7%). The majority were white (n= 50, 67.6%), male-identifying (n=56, 75.7%), on testosterone at time of surgery (n=66, 89.2%) and underwent double incision mastectomy (n=71, 95.9%). Only 2 patients (2.7%) experienced a complication requiring readmission or reoperation. Median [IQR] age at surgery amongst the adolescent cohort was 17 years [16.0-17.0] compared to 19 years [18.0-20.0] in the young adult cohort ($p<0.001$). There were no significant differences in mean (SD) or median [IQR] DRS scores for TGD adolescents <18 years (2.95(10.68), 0.0[0.0-0.0]) compared to TGD young adults aged 18-26 years (1.86(6.76), 0.0[0.0-0.0]) ($p=0.606$, $p=0.436$). Similarly, there were no significant differences in SWD scores between the adolescent and young adult cohorts (4.91(0.22), 5.0[5.0-5.0] vs 4.91(0.27), 5.0[5.0-5.0]) ($p=0.997$, $p=0.662$). Patients with discordant pre- and post-operative gender identities (n=13, 17.6%) did not demonstrate significant differences in satisfaction or regret when compared to those with concordant identities (SWD

4.88(0.29), 5[4.9-5.0] vs 4.92(0.24), 5[5.0-5.0], p=0.399; DRS 2.31(5.99), 0[0.0-0.0] vs 2.46(9.56), 0[0.0-0.0], p=0.89).

CONCLUSIONS: TGD adolescents and young adults demonstrate high decisional satisfaction and low regret following GACS at least one year after surgery, regardless of age at time of surgery or stability in peri-operative gender identity.

REFERENCES:
1.) Redfield E., Conron KJ, Mallory C. The Impact of 2024 Anti-Transgender Legislation on Youth. UCLA: The Williams Institute. Published April 23, 2024. https://escholarship.org/uc/item/6sd0q2d6.
2.) Exec. Order No 14187. 3 C.F.R. 8771. The White House. Published January 28, 2025. https://www.federalregister.gov/d/2025-02194.
3.) Bruce L, Khouri AN, Bolze A, et al. Long-Term Regret and Satisfaction with Decision Following Gender-Affirming Mastectomy. JAMA Surgery. 2023;158(10). PMID: 37556147.
4.) Olson KR, Raber GF, Gallagher NM. Levels of Satisfaction and Regret with Gender-Affirming Medical Care in Adolescence. JAMA Pediatrics. 2024;178(12). PMID: 39432272.

The Impact of Obesity on Postoperative Complications in Gender-Affirming Chest Masculinization Surgery

Abstract Presenter: Jessica Pawly MD

Abstract Co-Author(s): Jennifer Goldman, Emily Yanoshak, Rachel Park MD, Brittany Behar MD, John Stranix MD

Background: BMI is a known risk factor of postoperative complications. Understanding the correlation between BMI and surgical outcomes is critical to improving surgical techniques, optimizing patient care, and tailoring perioperative management. However, its role in gender-affirming chest masculinization, also known as 'top surgery', has not been thoroughly studied. The aim of this study is to explore the impact of BMI on postoperative complications in gender-affirming mastectomies.

Methods: A retrospective review was conducted on patients who underwent gender-affirming mastectomy from 2020 to 2024 at a single academic institution. Demographic

data and preoperative BMI were collected. Postoperative outcomes included hematoma, seroma, wound healing, infection, duration of drain placement and emergency room visits. Independent T-tests and multivariate analysis was conducted using SPSS.

Results: 266 patients underwent gender-affirming mastectomy between 2020 and 2024 with a mean BMI of 29.8 (SD 8.14). 47 (17.7%) patients had Class I obesity, 30 (11.3%) patients had Class II, and 32 (12.0%) patients had Class III. Patients with a BMI >35 had longer post-op drain duration (7.76 vs. 11.05 days, $p<0.001$) and increased rates of infection ($p=0.014$). There were no differences in hematoma, seroma, wound healing and emergency room visits. Multivariate analysis controlling for smoking and diabetes demonstrated that BMI>35 was associated with higher rates of post-op infections ($p=0.045$).

Conclusion: Our study demonstrates patients with a BMI>35 undergoing gender-affirming mastectomy had longer post-op drain duration and increased rates of infection. It is important to tailor perioperative management for individuals with obesity undergoing gender-affirming mastectomy to mitigate these risks and optimize surgical outcomes. Further prospective studies are warranted to inform clinical guidelines for enhanced patient care in this population.

Hand

Harnessing Neuroplasticity: A Scoping Review of Brain Computer Interface Applications in Upper Extremity Surgeries

Abstract Presenter: Daniel Chu

Abstract Co-Author(s): Emily Zona, Robert George MD, Samuel Poore MD, PhD

Purpose: Neuroplasticity, a phenomenon describing the brain's capacity to change its structure and function in response to new stimuli, plays a critical role in the recovery process following various upper extremity surgeries. While nerve and tendon repairs and transfers have demonstrated efficacy in restoring function in peripheral nerve injuries (PNI), previous literature emphasizes that many patients still experience

difficulties with motor reeducation. The Brain Computer Interface (BCI) systems is a novel technology that creates a direct communication pathway between the brain and an external device, providing an effective therapeutic adjunct to the surgery and motor rehabilitation. The purpose of our work is to thoroughly investigate the prior literature in relation to BCI and upper extremity surgery and ultimately provide support for its potential, translating the myriad of established works into its application in upper extremity surgeries.

Methods: A scoping review examining the use of BCI in association with upper extremity surgeries was performed using PubMed, Embase, and Web of Science databases in adherence with PRISMA guidelines. Our search strategy included combinations of synonyms for BCI, surgical procedures, and upper extremity terms. Our inclusion criteria consisted of all articles that mentioned BCI in the context of upper extremity surgeries including nerve repair, nerve transfer, tendon transfer, amputation, hand transplantation, hand replantation, brachial plexus procedures, and nerve grafts. Exclusion criteria consisted of articles that did not discuss BCI or upper extremity PNI surgeries, non-English texts, studies only focused on rehabilitation, prostheses, stroke, and non-peer reviewed works.

Results: The search strategy generated 635 results from PubMed, 780 results from Embase, and 954 results for Web of Science. Removal of duplications yielded 1308 articles, of which 37 articles were analyzed as full text. Application of our inclusion and exclusion criteria identified one review article, which only casually commented on BCI's potential in peripheral nerve rehabilitation. No studies were identified in assessing BCI's affect in patients undergoing PNI upper extremity surgery.

Conclusions: Altogether, this highlights that BCI technology has yet to be incorporated into the field of plastic surgery. Despite this, abundant evidence in the neuroscience literature strongly suggests its utility and potential as an adjunct to upper extremity surgeries in harnessing and promoting neuroplasticity. Most notably, a 2018 Nature study (Biasiucci et al.) demonstrated that non-invasive BCI, when paired with functional electrical stimulation (FES) therapy, significantly enhanced motor function in chronic stroke patients by promoting activity-dependent neuroplasticity and sustained recovery for 6–12 months, evidenced by functional connectivity in the affected hemisphere on MRI, correlating with improved outcomes. Similarly, the BCI-FES via EEG can be adapted to enhance neuroplasticity in tendon or nerve transfer patients after PNI, effectively fostering motor and sensory rehabilitation. This can be achieved by integrating the technology preoperatively via neural pathway preconditioning, and postoperatively by providing proprioceptive feedback via FES and EEG, thus strengthening post-surgical neural connections. Ultimately, BCI-FES is a non-invasive

and cost-effective technology that shows great promise in facilitating functional recovery after PNI upper extremity surgery.

Systematic Review of Surface Electromyography-Based Therapies for Upper Extremity Rehabilitation

Abstract Presenter: Stephanie Vu

Abstract Co-Author(s): Jonathan Lutgens, Kathrine Manolopoulos, Sarah Smith, Aaron Bunnell, Yusha (Katie) Liu MD, PhD

Introduction: Upper extremity injuries often significantly impact daily function, and rehabilitation is critical for restoring function with both nonoperative and surgical management. The use of surface electromyography (sEMG) has emerged as a non-invasive, technology-driven intervention, providing real-time biofeedback to facilitate neuromuscular retraining and recovery. This systematic review aims to evaluate the current utilization and effectiveness of therapeutic sEMG-biofeedback in the rehabilitation of upper extremity injuries.

Methods: A systematic review of literature on the therapeutic use of surface EMGs in human participants was conducted. Electronic databases, including PubMed, MEDLINE, Embase, CENTRAL, Web of Science, CINAHL, ICTRP, and EuropePMC were queried. Studies were included if there was a therapeutic application of sEMG for upper extremity rehabilitation. Exclusion criteria encompassed solely diagnostic applications of sEMGs, invasive modalities (eg, needle EMG, rectal or vaginal EMG probes), non-human studies, engineering studies focused on EMG device development without a therapeutic component, review articles, and non-English publications.

Results: 102 studies met inclusion criteria. Of these, there were 32 randomized controlled trials, 32 non-randomized experimental trials, 15 case series, 14 case studies, and 9 classified as "other" study designs. The total participant pool across all studies consisted of 2,561 individuals, of whom 1,905 received sEMG biofeedback therapy for upper extremity rehabilitation. The conditions that were treated varied widely, including post-stroke hemiparesis, cerebral palsy, traumatic injuries, and iatrogenic etiologies (Table 1).

Most studies used either a combination of visual and auditory (n=45) or visual biofeedback alone (n=40), followed by auditory biofeedback alone (n=10) and other biofeedback modalities (n=7), such as vibratory or tactile feedback. The majority of studies held these sEMG biofeedback therapy sessions in an outpatient clinic setting (n=72), with other settings including 13 inpatient clinics, 5 at home, 2 at the workplace, and 10 at a combination of inpatient and outpatient clinics.

Improvements were observed across multiple functional domains (Table 2). A majority of studies reported enhanced motor function, which was defined as an increased ability to complete daily tasks. Additionally, significant gains were noted in movement patterns, reported pain outcomes, muscle activation, and electrical muscle activity, with many studies demonstrating positive trends in assessment scores.

Eleven studies specifically examined sEMG-biofeedback for postoperative rehabilitation following hand and nerve surgeries (Table 1), targeting muscles such as the abductor digiti minimi, intrinsic and extrinsic hand muscles, interosseus muscles, lumbricals, adductor pollicis longus, flexor digitorum profundus, flexor digitorum superficialis, extensor carpi radialis, flexor carpi ulnaris, flexor carpi radialis, brachioradialis, biceps brachii, triceps brachii, deltoid, and trapezius.

Conclusion: Therapeutic use of sEMG biofeedback has been widely utilized in upper extremity rehabilitation, demonstrating effectiveness across a heterogeneous range of conditions. Most studies reported improvements in motor functional independence. Visual and auditory biofeedback were the most commonly utilized modalities, with outpatient settings being the primary site of treatment. While promising, variations in study design, outcome measures, and intervention protocols highlight the need for further standardized research to establish optimal implementation strategies. Expanding access to home-based and workplace rehabilitation settings may enhance patient engagement and long-term outcomes.

Timeline of Functional Recovery in Below-Elbow Upper Extremity Transplantation: A Systematic Review

Abstract Presenter: Isaac Mordukhovich

Abstract Co-Author(s): Connor Roncagli, Natalie Hoffner, Kyle Barclay, Antonio Rampazzo MD, Bahar Bassiri Gharb MD, PhD

Purpose: Extensive research has examined the outcomes of upper extremity transplants. However, published outcomes primarily provide updates on patient recovery at the time of publication within the context of single-center case series. This study summarizes available literature to examine below-elbow upper extremity transplant functional outcomes in the first seven years post-transplantation.

Methods: A systematic review was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines in PubMed, Embase, Cochrane, and Medline. The search yielded 2102 records; 172 passed initial screening and 129 English-language articles were included in the final review. Measures of motor, sensory and psychosocial functions were recorded and categorized according to patient and post-operative year (POY) when the assessment was performed. Quantitative data was compared between years by Kruskal-Wallis and post-hoc Dunn testing with Bonferroni-Holm correction; significance set at p-adj<0.05. Semmes Weinstein monofilament (SWMF); Carroll test; Disabilities of the Arm, Shoulder and Hand questionnaire (DASH); and Hand Transplantation Score System (HTSS) results are reported as median score [interquartile range].

Results: Ninety-four patients (age 37.6±14.0 years) treated at 21 medical centers from 1998 to 2024 were identified. There were 69 males (37.1±13.4 years) and 18 females (38.1±16.9 years); 60.0% of patients received bilateral transplants. Seventy-five patients (79.8%) received below-elbow transplants, 14 patients received above-elbow transplants, and level of transplant was unspecified in 5 patients. At POY1, SWMF test predominantly indicated return of pressure sensitivity without protective sensation (4 [1,4]). SWMF testing at POY2-POY7 demonstrated stable sensation levels (p=0.412, 4 [4,4]), although 18.0% of patients regained light touch by POY7. HTSS showed significant improvement from "good" (61-80) to "excellent" (81-100) between POY1 (63.8 [52.8, 76.9]) and POY6 (p-adj<0.01: 84.0 [81.3, 89.3]) and POY7 (p-adj<0.01: 85.0 [80.5, 89.0]); earlier HTSS increases did not achieve post-hoc significance (POY2=75.0 [70.0, 79.8]; POY3=79.5 [73.4, 85.9]; POY4=76.0 [72.8, 81.0]; POY5=79.0 [76.0, 84.0]). This contrasts with the constant Carroll test results (p=0.192), which remained in the "subpar function" (<90) range for all seven years (POY1=64.0 [56.0, 75.0]; POY2=54.5 [52.0, 69.0]; POY3=58.0 [49.3, 69.5]; POY4=68.5 [64.5, 74.3]; POY5=76.0 [75.0, 79.0]; POY6=59.0 [57.0, 60.0]; POY7=57.0 [46.5, 65.0]). DASH also remained constant (p=0.323), with only POY7 achieving a "good" result (6-15) while the remaining timepoints were "satisfactory" (15-35) or worse (POY1=25.5 [12.3, 42.3]; POY2=30.8 [19.0, 64.0]; POY3=22.0 [8.5, 37.0]; POY4=29.0 [8.2, 59.5]; POY5=20.0 [7.3, 44.5]; POY6=22.5 [3.8, 50.0]; POY7=9.6 [5.0, 14.9]).

Nine POY1 reports evaluated patients' post-operative body image, five of which demonstrated successful integration. Of the remaining four patients, one noted persistent phantom limb pain and another continued to prefer their healthy, non-dominant limb. Qualitative assessments before POY10 indicated 64.3% of patients had assimilated their transplants, 25.0% were satisfied with the outcomes or felt more socially accepted, and 16.7% reported non-natural use or alienation.

Conclusion: Purely functional outcomes of below-elbow upper extremity transplants stabilize early after transplantation, with neither Carroll nor DASH demonstrating significant changes after POY1. HTSS allocates greater emphasis to non-motor domains and thus may indicate that improvement in patients' quality of life beyond POY1 derives from continued sensory and psychosocial recovery.

Brachial Plexus Injury Model in Rodent for Future Development of Exoskeleton Biological Interface to Restore Function

Abstract Presenter: Aref Rastegar

Abstract Co-Author(s): Che-Hsiung Lee, Yucheng Tian, Melanie Wang MD, Julien Levy, Caroline Dean, Paul Cederna MD, Stephen Kemp PhD

Purpose: This study aims to develop a severe brachial plexus injury (BPI) rodent model to replicate extensive nerve damage and support future research on neural signal acquisition and functional restoration. We created varying degrees of brachial plexus denervation to determine the ideal model for BPI in rodents.

Methods: Seven groups of rats (n=3 per group) were established using different denervation methods to induce varying levels of nerve injury. The left brachial plexus was exposed dorsally. In Groups 1, 2, and 3, the C5 and C7 roots were transected, with 100%, 50%, and 25% preservation of the C6 root, respectively. In Groups 4, 5, and 6, the C5 and C6 roots were transected, with 100%, 50%, and 25% preservation of the C7 root, respectively. Group 7 served as a control with no brachial plexus injury. One month postoperative, musculocutaneous nerve (MCN) and biceps muscle were evaluated through compound muscle action potential (CMAP) recordings, maximum tetanic force measurements, and histological analyses. These assessments illustrate the severity of nerve injury and muscle function across various experimental conditions. A Welch's t-test was performed to compare the experimental groups to control.

Results: Group 1 exhibited a mean tetanic force of 345.36 ± 83.02 mN, and a CMAP amplitude of 13.57 ± 1.56 mV, while Group 7 (control group) demonstrated the highest tetanic force at 437.87 ± 93.14 mN, with a CMAP amplitude of 13.30 ± 1.61 mV. Group 2 had a mean tetanic force of 182.96 ± 24.19 mN, and CMAP amplitude of 4.67 ± 2.86 mV. Group 3 presented with a tetanic force of 195.89 ± 38.24 mN, and CMAP amplitude of 1.33 ± 0.60 mV. Group 4 displayed a tetanic force of 200.74 ± 83.33 mN, and CMAP amplitude of 0.75 ± 0.40 mV. Group 5 displayed a tetanic force of 140.02 ± 27.87 mN, and CMAP amplitude of 0.24 ± 0.12 mV. The weakest functional outcomes were observed in Group 6, which exhibited the lowest tetanic force at 114.69 ± 14.52 mN, and CMAP amplitude of 0.30 ± 0.22 mV, indicating the most significant deficits in functional recovery. Groups 5 ($p=0.04$) and 6 ($p=0.03$) had a significantly weaker tetanic force, and groups 2 ($p=0.04$), 3 ($p=0.01$), 4 ($p=0.008$), 5 ($p=0.007$), and 6 ($p=0.007$) had significantly weaker CMAPs compared to the control. Preliminary histological analysis revealed axonal degeneration in all 6 experimental groups with group 6 showing the most degeneration. H&E revealed a decrease in the cross-sectional area and signs of atrophy of the Bicep muscle in group 6 compared to control.

Conclusion: The Group 6 model, which involved 25% preservation of C7 with complete transection of C5 and C6, is the weakest and most suitable model for developing a severe brachial plexus injury (BPI) rodent model. This model simulates extensive nerve damage and provides a reliable platform for studying neural signal acquisition and functional recovery for future research applications in exoskeleton control.

Assessing the Utility of ChatGPT in Hand Trauma Surgical Coding

Abstract Presenter: Tiffany Shi

Abstract Co-Author(s): Ermina Lee, Victoria Lee, Kelly Spiller MD, Maleeh Effendi MD, Ryan Gobble MD, Ann Schwentker MD

Background: Medical billing in hand trauma is error-prone, requiring anatomical understanding for billers to assign unbundled Current Procedural Terminology (CPT) codes to each repair. Surgeons assist this process by authoring detailed yet concise notes. While the use of machine learning in medical billing has been explored in other surgical fields, there are limited studies on the use of publicly available, open-source

artificial intelligence (AI). Here, we assessed the utility of Chat Generative Pre-Trained Transformer (ChatGPT) to enhance coding precision in hand trauma.

Methods: Fifty hand trauma operations of varying complexity were curated from retrospective review of January 2018 to December 2023. Twenty-five of these operative reports were input to ChatGPT-4.0 Medical Coding AI with the prompt: "Provide all related [year] CPT codes that could be assigned to this operation. Assume applicable bundling is applied." The remaining operative reports were input with the same initial query, but after a data dictionary of the Eaton Hand Coding Manual was input for reference. For final query, ChatGPT-4.0 was prompted to select the most appropriate codes when presented with the corresponding human-billed data. Operative report quality was assessed with an expert hand surgeon's adaptation of the Structured Assessment Format for Evaluating Operative Reports (SAFE-OR) questionnaire. CPT coding accuracy was assessed based on documentation support.

Results: The 50 operations included 126 repairs and 174 procedures. Attending physicians authored the majority of operative reports (58%, $p<0.001$), with an average of 1.9 days passing between the operation and note signature. Overall SAFE-OR scores were high (96%), and no significant scoring difference ($p=1.00$) was seen between author types. Despite this, 42 (24.6%) of billed CPT codes were not supported by documentation and 74 CPT codes were omitted or required correction despite accurate procedural description. However, 18 (36%) of operative notes had anatomical inconsistencies or inadequate technique description, which may have resulted in improper coding. Initially, only 29 (30.5%) ChatGPT assignments were supported by documentation; this increased to 47(54%) at final query. Using an imported Eaton Hand Manual, ChatGPT coding was minimally more accurate at initial query (33.6%). However, a dramatic improvement was seen at final query using the Eaton Hand Manual, with 88 supported CPT codes (76%). Among the ChatGPT-assigned codes that were unsupported by documentation, the most common involved add-on codes for split-thickness skin grafts (CPT15101), skin substitute coverage of wounds (CPT15272), and nerve repair using a synthetic conduit (CPT64910). Overcoding by ChatGPT was observed in 31 operative notes (62%), while undercoding by billers occurred in 14 notes (28%).

Conclusions: Despite improved CPT assignment with an iterative query and data dictionary, the performance of ChatGPT Medical Coding AI falls short of billers. Quality improvement may identify consistent discrepancies between documentation and billing, which can improve accurate reimbursement. However, ChatGPT Medical Coding AI was error-prone despite the overall high quality of operative reports in this study. Performance was dependent on user input and exhibited leading bias. Since AI is

already marketed for medical billing and used by insurers to review claims, model refinement for unbundled procedures is crucial.

Is There a Difference in Adverse Event Rates and Range of Motion Between Fixation with Nails, Wires, and Plates or Screws for Extra-articular Metacarpal and Phalangeal Fractures?

Abstract Presenter: Ishan Patel

Abstract Co-Author(s): Nienke Krijnen, Benjamin Leslie, Nicolas Aycardi, Nicole Don, Teun Teunis

Purpose: Phalangeal and metacarpal fractures are the second and third most common upper extremity fractures. Intramedullary screw (IM nail) fixation is an increasingly used method for fracture fixation of the hand, providing potential benefits of early mobilization and improved functional recovery. There is no consensus on the optimal treatment for extra-articular metacarpal and phalangeal fractures. We therefore asked, is there a difference between intramedullary (IM) nail, K-wire, and plate or screw fixation in (1) adverse events and (2) range of motion?

Methods: A retrospective chart review was conducted at a tertiary academic center of all adults surgically treated for extra-articular phalangeal and metacarpal fractures between January 2012 to August 2024. First, patients treated with IM-nail or plate/screw fixation were included. Then, the IM nail group was randomly matched 1:3 with patients treated with K-wires based on age and sex. Patient charts were reviewed for demographics, fixation method, overall adverse events, graded adverse events (Clavien-Dindo classification), infection treated with antibiotics, re-operation, and total active motion (TAM). This resulted in a cohort of 711 patients, having 873 repairs. Mean age was 39 (SD 16) and majority of patients were male (66%). Overall, there were 167 fractures repaired with IM nail fixation, 443 with K-wires, and 263 with plate or screw fixation. We used multi-level multivariable analysis to account for relevant baseline differences, and other potential confounders.

Results: Compared to K-wires, overall adverse events and re-operation were lower in the IM nail group (adverse events: OR 0.52 [95% CI 0.30 to 0.89, p=0.018, re-operation: OR 0.23 [95% CI 0.11 to 0.47, p<0.000]). After plate/screw fixation, we found a lower rate of infections treated with antibiotics and also a lower re-operation rate (infection

with antibiotics: OR 0.33 [95% CI 0.15 to 0.70, p=0.004]; re-operation: OR 0.48 [95% CI 0.26 to 0.87, p=0.016]). The higher re-operation rate after K-wire fixation likely resulted from the removal of buried K-wires in the OR. Fractures treated with IM-nails had greater total active motion 3 months after fixation (B-coefficient 29 [95% CI 2.7 to 56, p=0.031]) compared to K-wires.

Conclusion: Our results support the increasing use of IM nail fixation. Any concern for increased adverse events with intra-medullary hardware seems unfounded, when compared to more time tested methods of fixation such as wires or plates/screws. Compared to K-wire fixation, IM nails might result in a faster recovery, with a quicker regain of finger motion. Our results would benefit from confirmation in a prospective randomized study.

Is Use of Bone Graft Associated with Improved Functional Recovery after Treatment for Scaphoid Nonunion? A Meta-Analytic Comparison of Graft Types over 40 Surgical Interventions

Abstract Presenter: Jace Boswell

Abstract Co-Author(s): Aniekanabasi Ufot, Emily Zona, Aidan O'Shea, Armin Edalatpour MD, Jacqueline Israel MD, Keenan Fine

Purpose: Scaphoid nonunion is commonly treated surgically, yet the decision of whether to use a bone graft, and which type to choose, remains controversial. While previous systematic reviews and meta-analyses have largely focused on union rates and radiographic findings, postoperative functional recovery has received less attention. This meta-analysis evaluates functional outcomes following surgical treatment of scaphoid nonunion, comparing fixation without grafting to cancellous, corticocancellous, and vascularized grafts.

Methods: We used PRISMA guidelines to conduct a systematic review and meta-analysis of 135 studies. In studies with multiple arms featuring different graft types, each arm was analyzed independently, yielding 41 study arms for evaluation with the outcome of Modified Mayo Wrist Score (MMWS) and 39 study arms using Disability of the Arm, Shoulder, and Hand (DASH) as an outcome. To account for inter-study variability, we employed a random-effects model for the meta-analysis. Additionally, we

performed a subgroup comparison using the Q-statistic to analyze differences between graft types. All statistical analyses were conducted using R.

Results: Across the 41 surgical arms (n=985 patients) that assessed MMWS as an outcome, the overall effect was a 34.0-point improvement (95% CI: 20.8 - 47.2). Fixation without bone grafting demonstrated the greatest improvement (41.7 points), which was significantly greater than all other graft types ($p < 0.001$). Both vascularized (31.5 points, 95% CI: 19.4 - 43.5) and cancellous autograft (29.4 points, 95% CI: 20.9 - 37.9) bone grafts showed significantly greater improvement in MMWS ($p < 0.001$) than corticocancellous grafts (20.1 points, 95% CI: -4.9 - 45.0).

1076 subjects were included across the 39 study arms that measured DASH as an outcome. The overall improvement was 30.1 points (95% CI: 24.3 - 33.7) across studies. There were no significant differences in DASH improvement between cancellous (27.2 points, 95% CI: 19.3 -34.9), corticocancellous (46.7 points, 95% CI: 11.1 - 82.1), and vascularized bone grafts (32.1 points, 95% CI: 21.7 - 42.5). No studies evaluating fixation without bone grafting reported DASH as an outcome.

Conclusions: Scaphoid nonunion surgery results in substantial functional recovery across all graft types. Among the treatment options, fixation without grafting demonstrated the greatest improvement in MMWS, significantly outperforming all bone graft types. Cancellous and vascularized grafts yielded better MMWS outcomes compared to corticocancellous grafts, possibly due to their selection for cases requiring additional structural support. The existing literature indicates that patients can expect considerable functional improvement following reduction and fixation of scaphoid nonunion, regardless of the graft type used. Therefore, graft selection should be guided by factors such as carpal alignment, the presence of avascular necrosis, and donor site morbidity, in addition to functional recovery.

Nerve vs. Tendon Transfer Strength Outcomes After Spinal Cord Injury: A Systematic Review of Literature

Abstract Presenter: Kazimir Bagdady

Abstract Co-Author(s): Iulianna Taritsa, M Frost, Courtney Li, Sanya Bawa, Puja Jagasia, Gregory Dumanian MD, Jason Ko MD, MBA, Lindsay Janes MD

Purpose: Spinal cord injuries (SCI) are devastating and cause significant alteration to patients' activities of daily living. Depending on the level of injury, various upper extremity motor functions may be compromised. Tendon transfers and nerve transfers are two options available to plastic surgeons when reconstructing elbow extension, grip, pinch, and release. This systematic review was aimed at assessing and comparing the strength outcomes of tendon and nerve transfers for functional reconstruction of the upper extremity.

Methods: This review was registered with PROSPERO (CRD42024595503) and followed the PRISMA guidelines. Embase, Scopus, and MedLine were queried for citations that presented strength outcomes for patients having undergone tendon and/or nerve transfers to restore upper extremity function after a spinal cord injury. Data points extracted included publication information, patient demographics, operative information, pre and post-operative strength outcome data, patient reported outcomes, and complication data. Weighted averages were used to report patient demographic data

Results: 594 citations were screened for 50 included studies with a total of 956 patients who were on average 31.8 years old (range: 5-76). Patients who had nerve transfers had surgery an average of 24.5 months after injury (range: 5-142), and patients who had tendon transfers had surgery an average of 67.5 months after injury (range: 7-336). There were forty separate nerve transfer procedures and thirty-eight separate tendon transfer procedures reported on. Of studies reporting individual strength outcomes for elbow extension recovery, 68% of patients who underwent nerve transfers, 79% of patients who underwent a biceps to triceps tendon transfer, and 70% of patients who underwent a deltoid to triceps tendon transfer achieved M3 or greater strength. For grip and pinch reconstruction, the brachioradialis was the most common donor for tendon transfers and the brachialis was the most common nerve transfer donor. Patients with a greater number of pre-operative functional muscles below the elbow had better strength outcomes for both nerve and tendon transfers to restore grip and pinch. Patients who had a brachialis to anterior interosseous nerve (AIN) transfer had variable strength outcomes. Of studies reporting individual strength outcomes for this transfer, 49% of patients achieved M3 or greater strength, with better outcomes in younger patients. For finger and thumb extension, the supinator to posterior interosseous nerve (PIN) transfer was most commonly utilized with 78% of patients with individual strength outcomes reported achieving M3 strength or better.

Conclusions: There is no gold standard for the functional reconstruction of the upper extremity after a spinal cord injury. The choice of procedure(s) remain patient specific. Patients have achieved significant strength recovery from both nerve and tendon transfers. Dedicated research is needed to identify predictive factors for poor outcomes

in brachialis to AIN nerve transfers. More robust nerve transfer patient series are needed to directly compare pooled strength results to tendon transfer patients. In addition, more homogenous follow up protocols are needed for strength measurement and patient reported outcome measures for both nerve and tendon transfers.

Impact of financial toxicity on long-term outcomes after distal upper extremity nerve injury

Abstract Presenter: Omar Moussa MD

Abstract Co-Author(s): Floris Raasveld MD, Karan Amin, Joseph Werenski, Abhiram Bhashyam MD, Krystle Tuano MD, Kyle Eberlin MD

Purpose: Distal upper extremity nerve injuries (DUENI) cause substantial disability and work limitations, with recovery trajectories influenced by both medical and socioeconomic factors. While financial hardship can negatively impact outcomes, its specific effects on postoperative recovery and outcomes remain poorly understood. This study assessed the financial toxicity impact on physical function, quality of life, and return to work after DUENI surgery, and whether patient factors were associated with these.

Methods: We included patients who underwent DUENI surgery for nerve injuries distal to the elbow crease (2016-2023) at two level-I trauma centers. A cross-sectional survey was conducted, including the primary outcomes of functional status (QuickDASH-9), quality of life (EQ5D index), and time to return to work (RTW). The financial impact was assessed using the validated financial burden (composite score: 0–6) and dichotomized worry score. Regression models examined relationships between financial toxicity and outcomes, with separate analyses for digital (zone 1: Fingertip to A1 pulley) and non-digital (zone 2: A1 pulley to elbow crease) DUENI patients.

Results: Of the 133 patients who completed the survey, 103 were males (77.4%). The median age was 41.0 years (IQR: 33-61), and 78.2% (n=104) had digital nerve injuries, while 21.8% (n=29) had non-digital nerve injuries. Financial hardship independently showed associations with reduced quality of life (β=-0.019; p=0.035) and delayed RTW (OR 1.66; p=0.011).
Among all, 20.3% of patients (n=27) reported high financial worry (worry score ≥4), although most patients were insured (97.7%, n=130) with relatively low social

vulnerability scores (median ADI: 16.0; IQR: 10-29). These 27 patients demonstrated significantly delayed RTW beyond 6 months (28.1% vs 15.7%; p=0.012). Non-digital injuries showed stronger associations between financial hardship and poor outcomes compared to digital injuries (β=-0.049 vs -0.005; p=0.016). High financial worry independently predicted delayed RTW (OR=1.66; p=0.007), with both financial burden (Hazard Ratio=0.82 per point increase; p=0.008) and non-digital injury location (Hazard Ratio=0.71; p=0.034) independently associated. The impact of financial worry was highest in patients with multiple nerve involvement (interaction p=0.023).

Conclusion: Financial toxicity significantly impacts functional recovery, quality of life, and RTW after DUENI surgery, particularly in non-digital injuries. Notably, finding these associations in a well-insured population implies potentially greater impact in more socioeconomic challenged regions. The associations found between early financial hardship and the long-term outcome metrics suggest a potential benefit of integrating early socioeconomic screening and consultation as part of multidisciplinary care, enabling more comprehensive risk-targeted support strategies to improve long-term DUENI patient outcomes.

Scapholunate Ligament Injuries in Children, Adolescents and Teenagers: Management and Outcomes

Abstract Presenter: Vamsi Mohan

Abstract Co-Author(s): John Bovill MD, Winston Owens, Samuel Cole MD, Jenny Lee Nguyen MD, William Pederson MD

Background: Scapholunate (SL) ligament injuries are rare in children and adolescents. As such, there lacks a definitive consensus on treatment for partial and complete ligament tears (1) The objective of this study is to discuss the management and outcomes of patients with SL ligament injury at a single large academic pediatric institution.

Patients and Methods: A retrospective chart review was conducted of all patients 19 years of age and younger from January 2011 to October 2024 presenting with SL ligament injuries. Patient demographics, mechanism of injury, and time to presentation were recorded with the following primary outcomes measured; pre- and post-treatment

change in SL angle and interval, wrist extension and flexion, and need for reoperation or extended treatment.

Results: Twelve patients were identified with an average age of 14.8 years (range: 8 to 19 years), and all 12 (100%) had dorsal wrist pain, four (33%) had a positive Watson's test, and three (25%) complained of pain without a clunk during the Watson's test. Mechanisms of injury included a direct blow to the wrist (8%) and a fall or sports-related injury (92%), namely, cheerleading, football, tennis, volleyball, or wrestling. All patients received magnetic resonance imaging depicting a partial or complete SL ligament tear. Three patients were noted to have dorsal intercalated segment instability (DISI) prior to treatment. The average time from injury to treatment was 22.7 weeks (range: 3.1 to 78.2 weeks). Five patients with a partial tear and one patient with a complete tear underwent casting for an average of 6.3 weeks (range: 4 to 10 weeks), and of the remaining six patients, four received wrist arthroscopy and pinning, one underwent open repair and pinning, and one patient with a complete tear and static DISI deformity underwent SL reconstruction with a vascularized third metacarpal–capitate bone-ligament-bone graft. One patient with recurring DISI deformity, who underwent arthroscopic pinning, required reoperation. The average pre-treatment SL angle and interval were 57.3° (range: 34.7° to 95°, n=9) and 2.3 mm (range: 1 to 4.4 mm, n=11), respectively, and the average post-treatment SL angle and interval were 51.9° (range: 42.8° to 68.7°, n=8) and 1.9 mm (range: 1.1 to 2.9 mm, n=8), respectively. Average active wrist extension and flexion post-treatment was 64° and 62° (range: 35° to 90° extension; 20° to 90° flexion), respectively. At mean follow up of 25.1 weeks (range: 6 to 82.6 weeks), all patients either returned to full pre-injury activity or showed improved wrist range of motion and strength.

Conclusions: A high degree of suspicion is required to provide timely diagnosis and treatment for SL ligament injuries. Depending on the injury, both operative and nonoperative interventions can restore proper wrist function; however, further studies are required to determine injury-based standards of care.

References

1. van Kampen RJ, Fox PM, Baltzer HL, Moran SL. Long-term Outcomes following Operative Management of Pediatric Scapholunate Ligament Injuries. J Wrist Surg. 2022;12(1):56-62. doi:10.1055/s-0042-1757779

Evaluating the Efficacy of Ultrasound-Guided Carpal Tunnel Release: A Systematic Review and Meta-Analysis

Abstract Presenter: Pushti Shah

Abstract Co-Author(s): Suhas Parise, Tiam Saffari MD, PhD, Seth Noorbakhsh MD, Ashley Ignatiuk MSc, MD, FRCSC

Introduction: Ultrasound-guided carpal tunnel release (USCTR) has emerged as an increasingly popular minimally invasive technique for the treatment of carpal tunnel syndrome (CTS), boasting reduced scarring and morbidity compared to open carpal tunnel release (1). The purpose of this systematic review and meta-analysis is to evaluate the efficacy and safety of USCTR and compare it to traditional open techniques.

Methods: A search was conducted within PubMed, Embase, ScienceDirect, and CENTRAL to include papers from inception to January 2025 using the following search query: ("ultrasound") AND ("guided" OR "guidance" OR "guide") AND ("carpal tunnel release"). Studies were included if they described USCTR with complete transverse carpal ligament release. Review papers and studies with combined techniques, steroid injections, or cadaver subjects, were excluded. Included studies were assessed using Cochrane risk of bias, Newcastle Ottawa, and Joanna Briggs Institute critical appraisal tools for randomized controlled trials, cohort studies, and case series, respectively. Extracted data included patient demographics, functional outcomes, advanced imaging and nerve conduction metrics, patient-reported outcomes, and complications or reoperations. Meta-analysis was conducted on studies comparing USCTR with open techniques using a random effects model. Sensitivity analysis was performed for all meta-analyses with a heterogeneity greater than 50%, and significance was set to $p<0.05$.

Results: Literature search yielded 284 results, with 43 articles representing 39 unique patient populations. Risk of bias assessment showed all studies had low to moderate risk. Studies included 4,067 total patients (4,222 wrists): 3,825 USCTR, 130 mini-open carpal tunnel release, and 112 open carpal tunnel release. Follow-up times ranged from 6-332 weeks, with 75% of articles reporting follow-up times of at least 26 weeks. USCTR demonstrated improvements in functional outcomes relative to pre-operative baseline, with improvement in two-point discrimination and the Semmes-Weinstein monofilament test. Nerve conduction metrics were also improved from baseline for both distal motor latency and sensory conduction velocity, similar to changes seen after open release (OR: -0.11; p=0.56, I2=0%; OR: -1.01; p=0.46, I2=35%). Patient-reported

outcomes, including the Boston Carpal Tunnel and Quick Disabilities of the Arm, Shoulder, and Hand Questionnaires, also showed improvements exceeding the established minimal clinically important difference in the literature (MCID). Time to return to work was faster by 10 days ($p=0.02$; $I2=10\%$), and time to normal activities significantly was faster by 21 days ($p<0.001$; $I2=0\%$) in patients receiving USCTR compared to open techniques. Overall complication rates were low after USCTR (1.57%), with the most common complications being pillar pain (0.24%), infection (0.24%), and post-operative paresthesia (0.18%). Overall complication rates were found to be comparable to open techniques (OR, 0.87; CI, 0.16 to 4.87; $p=0.88$; $I2 = 46\%$).

Conclusions: USCTR is safe and effective, with similar overall complication rates to open release and the benefit of faster return to work and normal activities. Further research should include large-scale prospective randomized trials comparing USCTR, endoscopic release, and open release.

References:
1. Petrover D, Richette P. Treatment of carpal tunnel syndrome : from ultrasonography to ultrasound guided carpal tunnel release. Joint Bone Spine. 2018;85(5):545-552. doi:10.1016/j.jbspin.2017.11.003

GAME OVERuse: Management of Upper Extremity Pain in Esports Players

Abstract Presenter: Alexandra Dunker

Abstract Co-Author(s): Ellen Wang, Kylie Swiekatowski, David Hopkins MD, Matthew Greives MD

Introduction: Electronic sports (Esports) players are prone to overuse injuries in their hands and wrists due to repetitive motions and extended gaming sessions. The high frequency of clicking on game controllers or keyboards in Esports players and fine, quick movements can lead to excess strain and injuries to the upper extremity, such as tendonitis and carpal tunnel syndrome. This study investigates the association of level of Esports, type of game, and time spent gaming with hand, wrist, and shoulder injuries in gamers.

Methods: A survey study was conducted to analyze patterns of upper extremity injuries in the gaming population. Data was collected through a questionnaire that was

distributed to participants at gaming competitions, collegiate Esports organizations, and online gaming communities. The survey included demographics, gaming habits and experience, history of upper extremity injuries or pain, and medical treatments for these conditions. Univariate analysis was performed to determine patterns of pain.

Results: A total of 143 survey responses were received. For gaming occupation, there were 84 (73.0%) casual gamers, 3 (2.6%) professional streamers, and 25 (21.7%) collegiate esports athletes. The average age was 26.0 ± 7.5 with no major comorbidities. 111 (78.2%) identified as male, and 31 (21.8%) identified as female. For input, 77 (66.4%) used mouse and keyboard and 39 (33.6%) used a controller. All mouse and keyboard users used a right-handed mouse. On average, players spent 7.0 ± 5.4 hours of structured gaming time (tournaments, scrimmages, training, etc.) and 18.2 ± 15.6 hours of casual gaming every week. Over half of the respondents (74, 51.7%) reported experiencing hand or wrist pain. There was no significant difference between pain and age, gender, occupation, game type, or type of input. Ten of eleven (90.9%) left-handed respondents experienced pain while 58 of 124 (46.8%) right-handed respondents experienced pain ($p = 0.008$). Respondents who experienced hand pain spent an average of 7.0 ± 6.3 hours per day in front of a computer, compared to 5.6 ± 3.0 hours for participants who experienced no pain ($p = 0.09$). Of the participants who sought medical advice, the most common diagnoses were sprain/strain (n = 12), carpal tunnel syndrome (n = 3), and tendonitis (n = 5). Most common interventions include none (n = 67), rest and avoidance of activity (n = 25), ergonomic changes (n = 9), hand therapy/exercises (n = 18), bracing (n = 20), over-the-counter pain medications (n = 5), and surgery (n = 2).

Discussion: From this study, over half of Esports players report hand, wrist, or shoulder pain, indicating a common problem for this occupation. While no significant association was found between hours spent gaming weekly and pain, it is likely that increased gaming time can lead to overuse strain. These findings can raise awareness amongst gamers in this occupation to recognize upper extremity injuries and seek medical intervention with hand specialists when necessary.

Shifting Trends in Thumb Base Arthritis Epidemiology: Evidence for Rising Trapeziometacarpal Arthrosis in Younger Patients

Abstract Presenter: Camille Laliberte

Abstract Co-Author(s): Brett Michelotti MD, Keenan Fine

Purpose: Arthrosis of the trapeziometacarpal (TMC) joint is a common pathology that is associated with increased age. Research conducted by Sodha et. al (2005), prior to the invention of the smartphone, demonstrated that radiographic findings of TMC arthrosis are uncommon in patients under 50 years old (1). Given the increased use of smartphones, gaming systems, and computers, one may expect to see higher rates of TMC arthrosis in younger patients owing to thumb loading and repetitive use. This study aims to describe the prevalence of TMC osteoarthrosis across the lifespan in the digital era.

Methods: We conducted a retrospective chart review of patients who presented with a distal radius fracture (DRF) at a single academic hospital between August 2022 and December 2023. Radiographs were assessed for trapeziometacarpal (TMC) osteoarthrosis (OA) by two independent raters. Inter-rater agreement was moderate (k=0.513), while intra-rater reliability was substantial (k=0.713). OA severity was classified on a three-grade scale: Grade I (no arthrosis), Grade II (mild to moderate arthrosis), and Grade III (complete joint destruction). Continuous variables are presented as mean ± standard deviation. Ordinal logistic regression was used for univariate analysis to assess OA prevalence across age groups. A multivariate logistic regression model, adjusted for age, was used to evaluate sex differences in OA severity. A chi-squared analysis was also conducted to compare OA rates with Sodha et. al (2005).

Results: A total of 602 patients were included in the analysis and 60.2% of the cohort was female. Evidence of early-onset trapeziometacarpal (TMC) osteoarthritis (OA) was observed in younger age groups (patients < 50 years old). Among patients aged 11-20, 5.0% had Grade II arthrosis, a significantly higher prevalence than previously reported by Sodha (2005) ($p = 0.033$). Similarly, OA rates were significantly elevated in patients aged 21-30 (13.5% vs. 3.2%, $p<0.001$) and 31-40 (21.2% vs. 2.0%, $p = 0.004$). The radiographic prevalence of OA increased with age but stabilized above 90% when aged >70 years old. However, the proportion of patients with Grade III arthrosis continued to increase with age. Univariate ordinal regression demonstrated a 2.63-fold increased risk of developing OA with each successive age cohort ($p<0.001$). After adjusting for age, there was no significant difference in OA severity between sexes.

Conclusion: Radiographic prevalence of TMC OA may be increasing in younger patients, with significantly higher rates than previously reported by Sodha (2005). The findings are also consistent with past research that shows increases in the prevalence of TMC arthrosis with advancing age. The results of this study suggest a potential shift

in the epidemiology of TMC OA, which may warrant earlier screening and preventive strategies. Further research is needed to evaluate the role of modern technology use in TMC OA development in younger cohorts.

References

1) Sodha S, Ring D, Zurakowski D, Jupiter JB. Prevalence of osteoarthrosis of the trapeziometacarpal joint. J Bone Joint Surg Am. 2005 Dec;87(12):2614-2618. doi: 10.2106/JBJS.E.00104. PMID: 16322609.

Impact Of Patient Frailty On Brachial Plexus Repair Outcomes

Abstract Presenter: Ishan Patel

Abstract Co-Author(s): Aditya Goyal, Avi Gajjar, Benjamin Schalet MD, MS

Purpose: Brachial plexus nerve procedures, including repair, decompression, reconstruction, and tumor excision are highly efficacious procedures. However, to date, there has been no reporting on the effect of patient frailty on postoperative outcomes. The current literature identifies a need for a comprehensive review of surgical outcomes beyond motor recovery. This study aims to provide an analysis of the effect of patient frailty on brachial plexus surgery outcomes.

Methods: The 2020 National Inpatient Sample was utilized to perform a retrospective analysis to compare brachial plexus repair postoperative outcomes based on frailty status. All patients over the age of 18 who underwent brachial plexus repair from 2016-2020 were included. The Modified Frailty Index (mFI-5, mFI-11), Charleston Comorbidity Index (CCI), and Risk Analysis Index (RAC-A, RAC-C) were used to calculate frailty scores, and the scores were used to categorize patients into one of the following frailty categories: Not Frail, Pre-Frail, Frail, or Severely Frail. Postoperative outcomes, including in-hospital mortality, complication rate, length of stay, and cost, were compared between groups using one-way ANOVA.

Results: 16,215 patients were included in the final analysis. CCI and mFI were most effective in attributing frailty to postoperative outcome across all assessed metrics based on area under ROC curve. Based on mFI-5 score, 6,810 patients (42%) were not frail, 6,695 (41.3%) were pre-frail, 1,970 (12.1%) were frail, and 740 (4.6%) were severely frail. Age, Medicare/Medicaid status, and rural/urban status were significantly

associated with frailty categorization ($p < 0.001$). Severely frail patients were associated with significantly higher in-hospital mortality than the total cohort (1.4% vs 0.1%, $p < 0.001$), increased incidence of non-home discharge (29.7% vs 15.7%, $p < 0.001$), and longer length of stay (5.946±8.240 vs 4.183±6.910 days, $p < 0.001$). Frail patients were also significantly associated with increased overall complication rate (23.0% vs 9.7%, $p < 0.001$), specifically, cardiac (2.7% vs 0.6%, $p < 0.001$), pulmonary (8.8% vs 4.7%, $p < 0.001$), thromboembolic (2.0% vs 1.3%, $p < 0.001$), renal, and genitourinary (15.5% vs 4.4%, $p < 0.001$), DVT (2.0% vs 1.3%, $p < 0.001$), and sepsis (4.7% vs 0.6%, $p < 0.001$). Based on mFI-5, frailty was associated with a 72.5% increase in odds of complication (OR: 1.725, 95% CI: 1.457-2.043, $p < 0.001$), and a 28.3% increase in odds of extended length of stay (OR: 1.283, 95% CI: 1.130-1.457, $p < 0.001$).

Conclusions: Frailty is associated with worse postoperative outcomes for patients undergoing brachial plexus nerve procedures across nearly every outcome metric assessed in this study. The Charleston Comorbidity Index (CCI) and Modified Frailty Index (mFI-5) showed the greatest ability to attribute frailty to outcome measures. Further research is required to identify differential patient-reported outcomes, such as pain, based on frailty status.

Rheumatoid arthritis increases odds of short-term and long-term adverse events following distal radius fracture open reduction and internal fixation

Abstract Presenter: Ismail Ajjawi

Abstract Co-Author(s): Fortunay Diatta MD, Alexander Kammien, Albert Rancu, David Colen MD

Purpose: While open reduction and internal fixation (ORIF) is commonly performed for distal radius fractures, patients with rheumatoid arthritis (RA) may experience increased complications related to medical considerations, impaired healing, compromised bone quality, and medication effects. The current study evaluated outcomes of RA patients undergoing distal radius ORIF.

Methods: Using the M165Ortho PearlDiver Mariner Database (2010-2022), patients undergoing distal radius fracture ORIF were identified, excluding those with neoplasm, infection, or polytrauma. Patients were categorized into two groups based on whether they did or did not have rheumatoid arthritis (RA). A 1:4 matching algorithm was applied

based on age, sex, and Elixhauser Comorbidity Index (ECI) between the two cohorts. RA patients were further stratified by medication use within one year before surgery.

Short-term complications included 90-day serious adverse events (DVT, PE, SSI, sepsis, cardiac) and minor adverse events (pneumonia, UTI, AKI, wound dehiscence). Long-term complications included 2-year rates of tendon rupture, complex regional pain syndrome (CRPS) and wrist diagnoses within 3 to 6 months post-surgery. Short-term and long-term complications following surgery were compared with univariate and multivariate analyses.

Results: Of 344,115 patients who underwent DRF ORIF, RA was noted for 13,978. After matching, 54,439 patients were in the non-RA cohort and 13,651 in the RA cohort. Of those with RA, related medications were taken within one year prior to surgery by 10,663 and not taken by 2,988.
RA patients demonstrated significantly higher odds of 90-day serious adverse events (OR 1.61, $p<0.001$) and minor adverse events (OR 1.35, $p<0.001$). Specific complications included increased surgical site infections (OR 2.16), pulmonary embolism (OR 2.12), deep vein thrombosis (OR 1.68), UTI (OR 1.55), and acute kidney injury (OR 1.76) (all $p<0.001$).
Long-term complications were notably higher for those with RA, including tendon rupture (OR 2.33), CRPS (OR 1.24), and wrist stiffness (OR 1.15) (all $p<0.001$). RA patients without medication use showed worse outcomes compared to those on medication management with regard to tendon rupture (OR 2.55 vs 2.28) and surgical site infections (OR 2.07 vs 1.93).

Conclusions: RA patients undergoing distal radius fracture ORIF face significantly higher odds of both short-term and long-term complications. These findings emphasize the importance of tailored perioperative management and careful monitoring for this high-risk population. The fact that medications use appeared to correlate with improved surgical outcomes suggests that control of the underlying disease helps mitigate its effects.

Linking Radiographic Severity And Clinical Symptoms: A Simplified Three-grade Classification For Trapeziometacarpal Osteoarthritis

Abstract Presenter: Camille Laliberte

Abstract Co-Author(s): Brett Michelotti MD, Keenan Fine

Purpose: The relationship between radiographic findings of trapeziometacarpal (TMC) osteoarthritis (OA) and clinical symptoms is often inconsistent. Many patients with severe radiographic OA experience minimal pain and functional impairment, while others with mild changes report significant symptoms. Prior studies primarily utilized the Eaton-Littler classification or specific radiographic features, limiting their clinical utility. This study aims to establish a practical framework for assessing the correlation between radiographic severity and symptoms by implementing a simplified three-grade classification system.

Methods: We conducted a retrospective chart review of patients who presented with a distal radius fracture at an academic hospital between August 2022 and December 2023. Radiographs were assessed for TMC OA by two independent raters. Inter-rater agreement was moderate (k=0.513), while intra-rater reliability was substantial (k=0.713). OA severity was classified on a three-grade scale: Grade I (no arthritis), Grade II (mild-to-moderate arthritis), and Grade III (complete joint destruction). Univariate analyses were conducted to determine the association between radiographic OA severity and prior thumb pain and treatment. A multivariate logistic regression model, adjusted for age and sex, was used to evaluate differences in symptoms and treatment rate across OA severity grades.

Results: A total of 602 patients were included in the analysis and 38.7% of patients being >50 years old. Among patients over 50 years old, univariate analysis indicated that those with Grade II OA were about 2.5 times more likely to report thumb pain history (OR=2.54, 95% CI: 1.15–6.28, p=0.029), whereas those with Grade III OA had 3.75 times greater odds of reporting pain (OR=3.75, 95% CI: 1.48–10.25, p<0.007) compared to individuals with Grade I OA. After adjusting for age and sex, Grade III OA remained significantly associated with increased odds of thumb pain (OR=2.77, 95% CI: 1.18–6.41, p=0.019), whereas the association for Grade II OA was not statistically significant (OR=1.95, 95% CI: 0.91–4.40, p=0.095).

Univariate analysis showed that patients with Grade III OA were 7.5 times more likely to have received treatment for thumb OA (p=0.003), while those with Grade II OA (OR=3.07, p=0.078) did not differ significantly from Grade I OA. After adjusting for age and sex, Grade II OA (OR=2.1, 95% CI: 0.64–9.8, p=0.259) remained non-significant, whereas Grade III OA was significantly associated with increased treatment likelihood (OR=5.0, 95% CI: 1.3–24.6, p=0.027). Each additional year of age increased the odds of receiving treatment for thumb OA by 4.6%, though this did not reach statistical significance (p=0.073).

Conclusion: Our findings demonstrate that a simplified three-grade radiographic classification system for TMC OA is associated with increasing odds of thumb pain and arthritis treatment in patients over 50 years old. Unlike previous studies, our approach provides a more accessible and clinically intuitive method for assessing OA severity and identifying patients at risk for symptomatic disease-one that can be easily utilized by primary care physicians and occupational therapists. These findings reinforce the importance of age as a predictor of treatment for thumb OA and suggest that future prospective studies to assess prospective risk of developing TMC OA.

Implementing Privacy-Focused AI for Clinical Note Data Extraction in Neonatal Brachial Plexus Palsy Care

Abstract Presenter: Meredith Cox

Abstract Co-Author(s): Joshua Kim, Christian Zirbes, Daniel Joh MD, Suhail Mithani MD, Alexander Allori MD, Neill Li

Purpose: Patient notes contain a wealth of information valuable for clinical decision-making, quality improvement, and tracking surgical recovery. However, manual extraction of this data is time-consuming and error-prone. Though large language models (LLMs) like ChatGPT could streamline the extraction of clinical data, the use of ChatGPT in healthcare is constrained by privacy concerns due to data being sent to external servers. LLMs run on a single computer could help overcome these barriers, facilitating real-time data collection to support clinical decision-making while ensuring patient privacy. We hypothesize that privacy-focused large language models can accurately extract critical clinical data from neonatal brachial plexus palsy (NBPP) patient notes, supporting clinical decision-making for surgery and postoperative outcome tracking while preserving patient privacy.

Methods: A cohort of 355 NBPP patients from Duke University was identified using ICD codes for brachial plexus birth injuries, with preoperative clinical notes available for 86 patients. To extract critical clinical data, we used Llama 3.2, a large language model deployed via Ollama, an open-source platform enabling local execution of LLMs. Variables extracted including the presence of Horner's syndrome (yes/no), laterality (right/left), pseudomeningocele (yes/no), and functional scores across 15 Active Movement Scale (AMS) categories (scored 1 to 7). Structured prompting was used to

guide model output, using queries such as "Extract the laterality of the injury (right/left)". For AMS scores, we prompted the model to extract each of the 15 functional scores from clinical notes. The output is a structured CSV (one row per patient).

Results: For structured data, such as laterality and Horner's syndrome, the model demonstrated strong performance: 94% accuracy, 96% sensitivity, and 91% specificity for laterality, and 93% accuracy, 99% sensitivity, and 75% specificity for Horner's syndrome. For pseudomeningocele identification, the model achieved 76% accuracy, 75% sensitivity, and 83% specificity. AMS scores showed variability in performance, with accuracies ranging from 58% to 71% across categories. These results highlight the model's strength in extracting categorical data but also reveal limitations in its ability to consistently extract granular numerical information, such as AMS scores.

Conclusions: Privacy-focused, locally-run LLMs can accurately and securely extract key clinical data. The model performed well with structured categorical information but showed variability with granular numerical data. These findings highlight both the promise and limitations of AI-driven data extraction in clinical settings. Continued refinement, validation, and oversight will be essential to optimize AI tools for accurate, privacy-preserving data extraction in patient care and research.

An Assessment of the Diagnostic Approach in 105 Cases of Neurogenic or Mixed Thoracic Outlet Syndrome

Abstract Presenter: Kazimir Bagdady

Abstract Co-Author(s): Iulianna Taritsa, Cristin Coquillard MD, Hannah Soltani, Rolando, Casas Fuentes, Timothy Burke, Rushmin Khazanchi BA, Puja Jagasia, Lindsay Janes MD, Jason Ko MD, MBA

Purpose: The diagnosis and management of neurogenic or mixed thoracic outlet syndrome (TOS) is complex. Various diagnostic tools including several imaging modalities, electromyography (EMG) and anterior scalene muscle blocks (ASMB) can be useful in identifying this difficult pathology. We assessed the diagnostic approach used in 105 patients who underwent thoracic outlet decompression (TOD).

Methods: A single-institution retrospective chart review was performed between January 2017 and September 2024 to identify patients with isolated/combined TOS treated with surgical
decompression. Demographic information, pre and post-operative symptoms, surgical technique, and functional outcomes were collected. Diagnostic data was collected from radiology and procedural reports in addition to clinic notes. Imaging findings collected included the presence of anatomic abnormalities, provocative nerve or vessel compression, nerve swelling or edema, and any documented signal abnormalities (hyperintensity and hypoechogenicity). Descriptive statistics and a Fisher Exact test were used to describe study findings.

Results: The diagnostic approach of 105 patients (54.28% female) was assessed. MRI was the modality that identified a brachial plexus pathology most commonly. Of the 54 patients with diagnostic evidence of nTOS (either imaging, ASMB, or EMG), 29 (53.7%) had a peripheral nerve abnormality identified on imaging, in addition to nTOS. US was the most common modality used to identify a nerve pathology distal to the brachial plexus, and the ulnar nerve was most affected. The most common brachial plexus imaging finding on MRI or US was altered nerve morphology or thickening/edema. Of the patients who had relief after ASMB, 22 (68.8%) had a good response to surgical decompression. There was no significant association found between response to ASMB and imaging evidence of TOS ($p = 1.0$).

Conclusions: A thorough examination of the entire upper extremity is recommended when assessing a patient for TOS, as comorbid compression of more distal peripheral nerves may be present. Of importance, the ulnar nerve may be more commonly affected. Some patients who do not have imaging evidence of a nerve pathology may respond positively to an ASMB. As such, a multi-pronged diagnostic approach may be best suited for assessing a patient with TOS. Future prospective studies are needed to establish a standard diagnostic approach for this challenging disorder.

Disparities in Breast Cancer-Related Lymphedema: A Systematic Review of Inequities and Barriers in Care

Abstract Presenter: Alexzandra Mattia

Abstract Co-Author(s): Nina Hadzimustafic, Rachel Rivero, SeungJu Oh MD, Karen Bach MD, Stav Brown MD, Siba Haykal MD, PhD, FRCSC, FACS

Purpose: This systematic review summarizes the evidence for disparities and barriers surrounding breast cancer-related lymphedema (BCRL) care, particularly in diagnosis, education, and accessibility to treatment. This study also addresses the lack of guideline recommendations specific for BCRL in education, referral patterns, and transfer of care, and provides a comprehensive analysis on patient experience and perception relevant to BCRL.

Methods and Materials: The study protocol was prospectively registered with the International Prospective Register of Systematic Reviews (PROSPERO registration no. CRD42024597105). A search of PubMed/MEDLINE, Embase, Scopus, and Web of Science following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines was conducted from January 1, 1990, through October 3, 2024. Mixed-methods, qualitative, cross-sectional, multiple-case, longitudinal, and randomized controlled trials that reported disparities and barriers surrounding BCRL care were included. Review articles, editorials, commentaries, abstracts, poster papers, translation or validation of patient-reported outcome measures, and non-English articles were excluded. To understand our outcome questions related to disadvantaged patient populations, extracted study data were pooled and reported in a narrative format and tabulated into systematic review tables.

Results: The search yielded 1059 articles, and 39 met inclusion criteria. Themes identified included the following: racial and ethnic disparities; increased risk with younger age, low education level, low income, rural geographic location, and presence of medical comorbidities; inadequate provider and patient knowledge; low patient education; burden and challenges with lifelong self-management; and barriers in receipt of healthcare provider diagnosis or adequate BCRL management. Subthemes included cumulative cost burden, psychosocial barriers, and the role of patient self-efficacy.

Conclusions: Younger non-Caucasian females, residence in rural regions, and those with low income or education levels appeared to be at greatest risk for self-reported (rather than physician-diagnosed) BCRL. Patients of diverse racial and ethnic backgrounds and low socioeconomic status were at increased risk for inadequate self-care practice education and breast cancer survivorship support. Active prevention with multidisciplinary interventions is imperative to lower BCRL rates, empower breast cancer survivors, and strengthen self-efficacy.

Socioeconomic Determinants of Disability After Hand Burns: A Retrospective Analysis

Abstract Presenter: Tiffany Jeong

Abstract Co-Author(s): Jose Antonio Arellano MD, Hilary Liu, Mare Kaulakis, Christopher Fedor, Sarah Tepe DO, Justine Kim MD, Guy Stofman MD, Francesco Egro MD, Msc, MRCS

Introduction: Disability rates following burn trauma vary significantly based on burn severity, total body surface area (TBSA) affected, and the presence of complications. Specifically, hand burns, due to their impact on functional tasks and quality of life, are associated with considerable long-term disability. Previous studies have demonstrated that hand burns, particularly when bilateral or requiring grafts, result in significant impairment, including delayed return-to-work (RTW) and persistent functional limitations. This study aims to examine the influence of socioeconomic factors, including the Area Deprivation Index (ADI), on the likelihood of filing for disability after a hand burn injury. By identifying key predictors of disability, the study seeks to highlight potential areas for intervention to improve outcomes for hand burn patients.

Methods: A retrospective analysis was performed to examine the demographics, insurance status, Area Deprivation Index (ADI), employment, and disability status of patients treated for hand burns. The ADI quantifies socioeconomic factors on a scale from 0 to 10, with 0 representing the least disadvantaged and 10 indicating the greatest disadvantage. The study included all patients who presented with hand burns between April 2009 and December 2022.

Results: A total of 165 patients were treated for hand burns in our cohort. The majority of patients were publicly insured (n=113, 68.3%), with a median Area Deprivation Index (ADI) state decile of 7, indicating a high degree of socioeconomic disadvantage. Among the 91 patients employed prior to their injury (55.2%), 56% returned to work after their injury. Following their hand burn injury, 35% (n=58) of patients filed for disability. Severe burn injuries, defined as a Total Body Surface Area (TBSA) greater than 20%, were significantly associated with disability claims ($\chi^2 = 6.76$, $p < 0.01$). However, even patients with more localized hand burns exhibited high rates of disability, with 29% filing for disability. A logistic regression model was used to assess factors influencing disability, incorporating variables such as ADI state decile, TBSA, Length of Stay (LOS), and preexisting comorbidities. The model revealed that each 1-point increase in ADI decile was associated with a 17% increase in the odds of filing for disability ($p = 0.037$). Additionally, TBSA and comorbidities had significant effects on disability status ($p = 0.014$ and $p = 0.035$, respectively).

Conclusion: Hand burns, whether occurring in isolation or as part of larger burn trauma, are associated with high rates of disability. This study highlights socioeconomic factors, particularly the Area Deprivation Index (ADI), as significant predictors of filing for disability following a hand burn injury. These findings suggest that addressing socioeconomic disparities may offer an important avenue for targeted interventions to reduce disability rates and improve outcomes for patients after hand burn trauma.

Botulinum-Toxin as a treatment modality for Raynaud's Phenomenon: A Systematic Review and Meta-Analysis

Abstract Presenter: Rebeka Dejenie

Abstract Co-Author(s): Maeson Zietowski, Michael Cassidy MD, Jignesh Unadkat

Purpose: Raynaud's phenomenon can have debilitating effects on daily function and quality of life. Botulinum toxin A (BoNTA) injection has become an increasingly popular treatment for vasospastic digits in Raynaud's, but its use remains controversial and there are no clear clinical guidelines. This study aims to review the existing literature on BoNTA for Raynaud's and assess its impact on functional outcomes.

Methods: A systematic review was conducted using PubMed and Embase. Search terms included "Botulinum Toxin A," "Botox," "Raynaud's Phenomenon," "Raynaud's," and "vasospasm." Randomized controlled trials, as well as prospective and retrospective studies, were included in the analysis. Studies not written in English or lacking full-text availability were excluded. Additionally, pediatric and cadaveric studies, as well as case reports, were not included.

Results: The initial search yielded 218 articles, and 48 duplicates removed. After title and abstract review with two independent reviewers, 115 articles were further excluded resulting in 66 articles to undergo full text review. In total, 23 studies were included in the final analysis. The studies were heterogeneous in nature, with no uniformity in injection site, BoNTA dosage per hand or site, or injection frequency. BoNTA doses ranged from 10 to 500 units per hand. Five injection sites were described: intra-/interdigital, palmar, dorsal, MCP level, and proximal wrist, with intra-/interdigital being

the most common. Fifteen studies (65.2%) examined BoNTA's role in ulcer healing, and 12 (52.2%) reported full or partial improvement. The outcomes varied, including Visual Analog Score (VAS) for Pain, Quick-DASH (Disabilities of the Arm, Shoulder, and Hand (DASH), digital pulp temperature, custom-specific scales, or no specific outcome descriptions. VAS was the most reported outcome (n=8, 34.7%). Using a random effects model, we found a significant improvement in pain according to VAS after BoNTA injection ($p<0.001$)

Conclusion: BoNTA may substantially reduce pain associated with Raynaud's phenomenon. However, there are currently no clinical guidelines for its use in these patients, leading to variations in the amount injected and the injection locations. Future initiatives will focus on reporting our institutional data and sharing anecdotal experiences with incorporating BoNTA for Raynaud's into clinical practice.

Intraoperative Fentanyl Requirements and Resource Utilization in Open versus Endoscopic Carpal Tunnel Release

Abstract Presenter: Robert Sampson MD, MBA

Abstract Co-Author(s): Jaison Jain, Michael Awad, Chiagoziem Okolo, Haley Kondo, Kelli Jablon, Benjamin Lo, Rustin Mahboubi Ardakani, FAIZA QURESHI, Syed Shah, Steven Sampson, Sami Khan MD

Purpose: Carpal tunnel release (CTR) is among the most common hand procedures performed by plastic surgeons. While Enhanced Recovery After Surgery (ERAS) protocols emphasize minimizing opioid use, comparative data on intraoperative opioid requirements between open and endoscopic CTR remain limited. We hypothesized that open CTR would require less intraoperative fentanyl than endoscopic CTR due to increased tissue manipulation with the latter's dilator-based technique. Secondary aims included evaluating procedural efficiency, resource utilization, and the effect of surgeon-specific practice patterns.

Methods: We conducted a retrospective review of 296 CTR cases (148 open [CPT 64721] and 148 endoscopic [CPT 29848]) performed by five fellowship-trained hand surgeons at a single institution from 2020 to 2023. Multivariate regression analysis was performed to examine primary outcomes (total and weight-adjusted fentanyl dose) while controlling for age, gender, ASA class, and surgeon. Secondary outcomes included

surgical and anesthesia time, as well as cost implications. To ensure uniformity, only isolated CTR cases or those with concurrent trigger finger release were included.

Results: Contrary to our hypothesis, no significant difference was found in fentanyl requirements between open and endoscopic techniques after multivariate adjustment (59.0±27.3mcg vs. 63.1±26.8mcg, p=0.20; weight-adjusted: 0.72±0.34mcg/kg vs. 0.74±0.33mcg/kg, p=0.54). However, endoscopic CTR was significantly more time-efficient, with shorter surgical (14.7±4.1min vs. 28.1±7.2min, p<0.0001) and anesthesia times (54.2±8.2min vs. 61.6±9.4min, p<0.0001). When analyzed by surgeon, variation in fentanyl dosing within each technique (42.8% variation among open CTR surgeons, 19.6% among endoscopic CTR surgeons) exceeded the variation between techniques (3.3%). In our multivariate model, individual surgeon emerged as a more significant predictor of fentanyl requirements than surgical technique (p<0.001). ASA classification had no significant impact on anesthesia time or opioid requirements.

Conclusions: Despite theoretical concerns about increased pain from dilator-based tissue manipulation in endoscopic CTR, our study demonstrates no significant difference in intraoperative fentanyl requirements between techniques. While endoscopic CTR offers substantial time savings, its higher cost must be considered, with a recent analysis of 8,717 patients showing that open procedures had a 44.3% decrease in total charges compared to endoscopic procedures (1). Most notably, surgeon-specific practice patterns had a greater impact on intraoperative fentanyl use than surgical approach, suggesting that standardizing anesthesia protocols across surgeons-rather than focusing solely on technique-may be more effective in optimizing opioid use in ambulatory hand surgery. These findings provide valuable guidance for refining ERAS protocols in CTR.

References:

1. Brodeur PG, Raducha JE, Patel DD, Cruz AI Jr, Gil JA. Cost Drivers in Carpal Tunnel Release Surgery: An Analysis of 8,717 Patients in New York State. J Hand Surg Am. 2022;47(3):258-265.e1. doi:10.1016/j.jhsa.2021.10.022

Cost Analysis of WALANT Endoscopic Carpal Tunnel Release: A Comparison of In-Office vs. Surgery Center-Based Procedures

Abstract Presenter: Virginia Bailey

Abstract Co-Author: Joao Panattoni MD

Hypothesis / Purpose: We hypothesize that performing endoscopic carpal tunnel release (ECTR) under wide-awake local anesthesia with no tourniquet (WALANT) in an office-based setting will reduce overall costs and maximize efficiency compared to the same procedure performed in a surgery center setting (1,2).

Methods: This retrospective cost analysis compared the financial implications of ECTR with WALANT in an in-office procedure room (n=25) versus a surgery center (n=25). Data was collected from institutional billing records, Medicare Part B reimbursement rates, patient out of pocket expenses, and facility operational expenses from January 2022 to January 2025. Costs were analyzed from the perspectives of the patient, surgeon, facility, and insurer. Inclusion criteria included patients with Medicare Part B insurance undergoing an isolated ECTR procedure.

Results: The facility fee for ECTR performed at a surgery center was $3,600.00, with $2,880.00 covered by insurance and $720.00 paid by the patient. The surgeon fee was $542.30, with $433.84 reimbursed by insurance and $108.46 billed to the patient. The total amount billed to insurance for a surgery center procedure was $3,313.84, while the total out-of-pocket cost for the patient was $828.46. For ECTR performed in an office-based setting, the surgeon fee remained $542.30, with $433.84 covered by insurance and $108.46 paid by the patient. The cost of surgical supplies for the in-office procedure was $288.86, and no facility fee was charged. The total amount billed to insurance for the in-office procedure was $542.30, while the total out-of-pocket cost for the patient was $108.46. From the surgeon's perspective, profitability was higher when the procedure was performed at the surgery center, primarily due to the costs associated with surgical supplies, including the endoscopic carpal tunnel release device. However, by optimizing efficiency in the office setting, surgeons can achieve greater overall profitability by performing two to three times more surgeries within the same timeframe.

Conclusion: Performing ECTR with WALANT in an office-based setting significantly reduces costs for patients and insurers without compromising outcomes. Surgery center costs are inflated by facility fees and recovery expenses, whereas in-office procedures optimize efficiency. These findings support a shift toward in-office procedures as a cost-effective alternative, aligning with value-based care initiatives.

References

1. Ekhtiari S, Phillips M, Dhillon D, Shahabinezhad A, Bhandari M. A cost-utility analysis of carpal tunnel release with open, endoscopic, and ultrasound guidance

techniques from a societal perspective. J Hand Surg Glob Online. 2024;6:659-664. doi:10.1016/j.jhsg.2024.06.006
2. Hubbard ZS, Law TY, Rosas S, Jernigan SC, Chim H. Economic benefit of carpal tunnel release in the Medicare patient population. Neurosurg Focus. 2018;44(5):E16. doi:10.3171/2018.1.FOCUS17802

The Hazards of a Drink in Hand: A Critical Assessment of the Epidemiology of Hand Injuries Involving Drugs and Alcohol

Abstract Presenter: Aliyar Zahedi Vafa

Abstract Co-Author(s): Sam Boroumand Ismail Ajjawi Fortunay Diatta MD Felix Klimitz MD Beatrice Katsnelson Gabriel Carrillo Adnan Prsic MD

Background: Alcohol and drug use contribute significantly to the morbidity and mortality of traumatic injuries. The purpose of this study is to explore the impacts on drugs/alcohol on the epidemiology of traumatic hand injuries in the U.S.

Methods: The National Electronic Injury and Surveillance System (NEISS) database was queried from 2019-2022 to identify patients admitted to the emergency department (ED) with reported hand injuries. Patients with alcohol/drug involvement at the time of their injury were isolated as a separate comparison group. Variables including sex, race, products involved in injury, and ED disposition were assessed between the two patient cohorts utilizing two-proportion z-tests.

Results: In total 202,979 patients with traumatic hand injuries were identified with 3,013 cases involving drugs and/or alcohol. Laceration injuries occurred at a significantly higher frequency in cases involving drugs/alcohol than those that did not (43.4% vs. 35.2%, $p< 0.001$) followed by contusions (10.4% vs. 8.7%, $p= 0.001$) and avulsions (3.4% vs. 2.2%, $p< 0.001$). The most common cause of hand injury in both populations was knives, with cases involving drug/alcohol injuries incurring at a higher frequency than injuries with no drug/alcohol involvement (11.7 % vs. 10.1%, $p=0.007$). The overall odds ratio of hospital admission following hand injury for cases that involved alcohol/drugs (relative to those that did not) was 5.2 (95% CI: 4.6-5.9, $p<0.001$)

Conclusion: The likelihood of hospitalization following hand injury is over five-fold greater under the influence of drugs/alcohol, with a significantly greater frequency of specific injury types/etiologies. Ultimately, these epidemiological findings can be

leveraged to provide emergency department personnel, and hand surgeons qualitative context for the most frequent presentations of hand injuries.

Predictors of Reoperation after Digital Amputation

Abstract Presenter Makenna Ash MD Abstract Co-Author(s) Jennifer Wang Ambika Menon MD Ciara Brown MD Paul Ghareeb MD

Background: Digital amputation is required to address trauma, infection, or necrosis of the digit when salvage options are not available. The goals of the amputation are to remove diseased or injured tissue while preserving as much function and sensation as possible. Digital amputation can have profound impact on the patient, and the need for revisionary procedures may extend the length of recovery and associated psychologic burden. Previous studies have found revisionary procedures to be as high as 15-34%. Diabetes, peripheral vascular disease, and end-stage renal disease are risk factors for subsequent surgery. The purpose of this study was to identify additional factors associated with reoperation or revision in digit amputation, and to compare the risk of reoperation between traumatic and atraumatic surgical indications.

Methods: A retrospective chart review of all patients undergoing operative digital amputation at a multi-institutional healthcare system 01/01/2007 to 12/31/2021 was performed. Indication for digital amputation, comorbidities, surgical details, and complications were collected for each patient. Statistical analysis consisted of X2 and Fisher exact tests for categorical variables and T-tests for continuous variables.

Results: 262 patients met all inclusion criteria. 187 (71.40%) patients were male and 137 (52.29%) were Black, with a mean age of 58.2. 95 (36.25%) patients underwent amputation for a traumatic etiology while 167 (63.75%) underwent amputation for atraumatic cause. The reoperation rate was 17.2%, with the most common reasons being wound healing complication, suboptimal healing, further ischemia/gangrene, and infection. Atraumatic reason for initial amputation was significantly associated with increased complications (7.81, p=0.0052). BMI>30 (LR 2.06, p=0.15), history of substance use (LR 2.969, p=0.0849), and atraumatic reason for amputation (LR 2.20, p=0.137) trended toward an increased need for reoperation, although this did not achieve statistical significance. Age <65 (LR 10.02, p=0.0065), autoimmune disease (LR 6.03, p=0.014), and vascular disease (LR 6.03, p=0.014) were found to be significantly associated with subsequent reoperation. Additionally, history of chronic pain

(LR 4.819, p=0.0282) and initial operation performed by PRS as opposed to orthopedic, surgical oncology, or vascular services, were significantly associated with increased likelihood of reoperation (LR 9.792, p=0.0441).

Conclusion: Digital amputations are common procedures that impact function and quality of life. Additional surgeries or procedures may be required after the initial amputation to allow for tissue healing or improve quality of life. Younger age, autoimmune disease, and vascular disease may predict the need for multiple procedures. Surgeons should use this information to guide preoperative counseling.

Surgical Management and Outcomes of Pediatric Kienböck's Disease: A 10-Year Experience of Intervention Strategies

Abstract Presenter: Kala Pham

Abstract Co-Author(s): Juston Fan, Umar Ghilzai, Tripp Leavitt MD, Christine Yin MD, Bryce Bell

Purpose: Kienböck's disease is a rare condition that commonly affects individuals between 20-40 years of age. There is a paucity of published data describing the natural history of pediatric Kienböck's disease (patients under the age of 18). The current recommendation is to treat pediatric Kienböck's disease nonoperatively with limited data on its surgical management. We strived to assess radiographic and clinical outcomes of pediatric Kienböck's disease treated operatively versus nonoperatively.

Methods: A retrospective review was performed at a single large, tertiary-care referral center and regional level 1 pediatric trauma hospital. Patients under 20 years of age diagnosed with Kienböck's disease between January 2014 to July 2024 were included. Sixteen patients with Kienböck's disease were identified (mean age 15.5 +/- 2.2 years). 5 underwent nonoperative management (casting), and 11 underwent surgery. Of the surgical cases, 10 had lunate offloading: 4 radial shortenings, 5 scaphocapitate pinnings, 1 radioscaphocapitate and radiolunate pinning. 8 surgical patients additionally received vascularized bone grafts. 1 patient underwent proximal row carpectomy.

Results: Nonoperative cohort: 3 Lichtman stage 1, 1 stage II and 1 stage IIIB. Average casting time was 2.2 months, with average follow-up of 10.5 months. Mean change in

ulnar variance (ΔUV) was 0 (p=1.00), in radioscaphoid (ΔRS) angle was -8.9 (p=0.42), and in capitate radius distance (ΔCR index) was -0.5 (p=0.10).
Operative cohort: 7 Lichtman stage IIIA, 2 stage IIIB and 1 stage IIIC with average follow-up of 13.2 months. Mean change in ulnar variance (ΔUV) was 0 (p=0.15), in radioscaphoid (ΔRS) angle was -8.9 (p=0.15), and in capitate radius distance (ΔCR index) was -0.5 (p=0.05). Patients who underwent lunate offloading had ΔUV of +0.4, ΔRS angle of +1.4, and ΔCR index of +0.2. Patients who underwent lunate offloading with vascularized bone graft had ΔUV of +0.7, ΔRS angle of +6.2, and ΔCR index of +0.6. When comparing lunate offloading procedures to vascularized bone grafts, there was no signficant difference in ΔUV (p=1.00), ΔRSA (p=0.79), ΔCR Index (p=0.69)

Conclusion: This study presents a small series of patients who have failed conservative management and benefitted from operative intervention, suggesting that there is a role for surgery in this rare subgroup of a rare disease. Both radiographic and clinical improvement remains mixed in both the nonoperative and operative cohorts.

Perioperative Anticoagulation in Hand Surgery: A Systematic Review

Abstract Presenter: Alexa Clark

Abstract Co-Author(s): Makenna Ash MD, Paul Ghareeb MD

Background: Antithrombotic medications, including anticoagulants (AC) and antiplatelets (AP), are commonly prescribed to prevent thromboembolic events in patients with cardiovascular or hypercoagulable conditions. The current US and European guidelines suggest stopping AC/AP use 3-5 days prior for both cardiac and non-cardiac surgeries, but recently, it has been shown that the continuation of anticoagulation in select operations, such as urologic surgery and endoscopy, does not increase bleeding events and may be favorable in continuing to prevent thrombotic events (1-3). The study of perioperative AC/AP continuation remains limited in elective hand and wrist surgeries.

Objective: This systematic review aims to synthesize the most recent literature on the continuation of AC/AP therapy in hand and wrist surgery. Prior reviews have proposed there is not a clinically significant increase in bleeding risks when these medications are maintained perioperatively.

Methods: A comprehensive search of PubMed and Embase databases based on PRISMA guidelines was performed, yielding 149 results. After full text screening, 12 relevant articles were included in this review.

Results: All 12 articles evaluated, including prospective and retrospective cohort studies and a case report, suggest that continuing AC/AP therapy during elective hand surgery provides a lower risk of bleeding complications compared to the possibility of thromboembolism should the medications be uninterrupted. Complications of perioperative anticoagulation were commonly subcutaneous hematomas that were managed non-surgically and occasionally major hematomas that required reoperation. 6 out of the 10 studies that collected hematoma as an endpoint recorded episodes of bleeding. 3 articles each reported one patient in the AC/AP cohort with postoperative hematomas that required reoperation or revision surgery. One case study reported PE after a patient paused warfarin therapy. Another study noted that bleeding complications were more frequent in patients on warfarin, however, still supported continuation of anticoagulation if the patient is stable with an INR <3.5 on an established regimen. Warfarin, clopidogrel, and aspirin were the most commonly studied AC/APs among the articles evaluated.

Conclusion: Our findings support the continuation of AC/AP therapy in most hand surgery patients. The risk of thromboembolic events associated with interrupting anticoagulation outweigh the potential for surgical bleeding requiring operative intervention. Further research should include larger patient cohorts and independent study of each type of hand operation to adequately power and generalize these conclusions.

References

1. Boer, Christa et al. 2017 EACTS/EACTA Guidelines on patient blood management for adult cardiac surgery. Journal of Cardiothoracic and Vascular Anesthesia, Volume 32, Issue 1, 88 - 120
2. Tibi P, McClure RS, Huang J, Baker RA, Fitzgerald D, Mazer CD, Stone M, Chu D, Stammers AH, Dickinson T, Shore-Lesserson L, Ferraris V, Firestone S, Kissoon K, Moffatt-Bruce S. STS/SCA/AmSECT/SABM Update to the Clinical Practice Guidelines on Patient Blood Management. J Extra Corpor Technol. 2021 Jun;53(2):97-124.
3. Spyropoulos AC, Al-Badri A, Sherwood MW, Douketis JD. Periprocedural management of patients receiving a vitamin K antagonist or a direct oral anticoagulant requiring an elective procedure or surgery. J Thromb Haemost. 2016;14:875–85.

Personal financial burden following distal upper extremity nerve injury

Abstract Presenter: Omar Moussa MD

Abstract Co-Author(s): Floris Raasveld MD, Karan Amin, Joseph Werenski, Krystle Tuano MD, Abhiram Bhashyam MD, Kyle Eberlin MD

Introduction: Distal upper extremity nerve injuries (DUENIs) significantly impact patients' socioeconomic stability and overall well-being due to prolonged recovery periods and rehabilitation needs. Recent studies indicate that peripheral nerve injuries occur in 2-3% of over 3 million upper extremity trauma cases annually, with treatment costs reaching over $50,000 per case (1). These injuries can have a financial impact on patients, yet the personal financial burden of patients after DUENI surgery remains underexplored. Therefore, we assessed the personal financial burden and associated factors of DUENI surgery in digital versus non-digital nerve injuries.

Methods: We conducted a cross-sectional survey of patients who underwent surgery for DUENI at two level-I trauma centers (2016-2023). Financial hardship was assessed using a validated financial composite burden score [0-6] and worry scale [1-5]. Primary analyses included financial burden severity, spending pattern changes, and risk factor identification, stratified by distal digital (zone 1: Fingertip to A1 pulley) versus more proximal nerve injuries (zone 2: A1 pulley to elbow crease) and injury severity. Multivariable Poisson regression and ordinal logistic regression models identified predictors of financial burden and worry, respectively.

Results: A total of 133 patients were included, of whom 103 (77.4%) were male with a median age of 41.0 years (IQR: 33.0-61.0). Digital nerve injuries occurred in 104 patients (78.2%), while proximal nerve injuries were present in 29 patients (21.8%). Despite most patients (97.7%) being insured, 20.3% of those reported high financial worry, with proximal injuries showing greater discretionary spending reductions (44.8% vs 26.0%; $p=0.050$) compared to digital nerve injuries. Higher composite financial burden scores were associated with increased financial worry (OR=1.89; $p<0.001$). Prior debt was the strongest predictor of financial burden ($\beta=0.99$; $p<0.001$) and worry (OR=3.76; $p<0.001$), independent of injury complexity. Each additional surgery significantly increased financial worry for both the multi-trauma and single-nerve injuries (OR=2.37–3.34; $p\leq0.025$). Proximal nerve injuries (OR=2.31; $p=0.035$) and male gender (OR=3.84; $p=0.004$) were also associated with increased financial worry. Younger age

(β=-0.02/year; p=0.013) and surgeries involving multiple nerve repairs (β=0.18; p=0.038) were associated with financial burden.

Conclusion: DUENIs can create substantial personal financial burdens despite high insurance coverage, with prior debt, surgical complexity, and proximal injuries emerging as key risk factors. Early risk-targeted counseling and surgical planning, particularly in the financially challenged younger manual laborers with complex proximal injuries, may mitigate financial toxicity. These findings may support tailored multidisciplinary care with early socioeconomic risk screening and social support to optimize resource allocation and interventions.

(1) Karsy M, Watkins R, Jensen MR, Guan J, Brock AA, Mahan MA. Trends and Cost Analysis of Upper Extremity Nerve Injury Using the National (Nationwide) Inpatient Sample. World Neurosurg. 2019;123:e488-e500. doi:10.1016/j.wneu.2018.11.192

Key Wrist Landmarks In Endoscopic Carpal Tunnel Release: A Study Of Anatomical Relationships

Abstract Presenter: Aliyar Zahedi Vafa

Abstract Co-Author(s): Ismail Ajjawi, Omar Allam MD, Fortunay Diatta MD, Adnan Prsic MD

Introduction: Endoscopic Carpal Tunnel Syndrome Release (ECTSR) is a common surgical procedure with paucity of literature pertaining to anatomical landmarks, their distances and ratios to each other. We hypothesize that consistent anatomical ratios exist between key wrist landmarks used in ECTSR, and these ratios are symmetrical between left and right hands.

Methods: Bilateral wrist and hand dissections were performed on 5 human cadavers at the Yale School of Medicine's anatomy laboratory. Three investigators independently measured distances between five key anatomical landmarks: the pisiform, flexor carpi radialis muscle tendon intersection with the wrist crease, hook of hamate, perpendicular intersection of the hook of hamate with the wrist crease, and median nerve. Three specific ratios were calculated: (1) the distance between pisiform and hamate-wrist crease intersection divided by pisiform to flexor carpi radialis distance, (2) distance between pisiform and median nerve divided by pisiform to flexor carpi radialis distance,

and (3) the distance between hamate and its wrist intersection divided by pisiform to hamate-wrist intersection distance. Statistical analysis included calculation of means, 95% confidence intervals, and Mann-Whitney U tests to compare left versus right sides.

Results: Statistical analysis revealed no significant differences between left and right hands for any of the three measured ratios. The first ratio showed a mean of 0.464 (95% CI = 0.223, 0.705) for left and 0.389 (95% CI = 0.244, 0.534) for right hands (p = 0.753). The second ratio demonstrated a mean of 0.681 (95% CI = 0.568, 0.794) for left and 0.652 (95% CI = 0.550, 0.754) for right hands (p = 0.675). The third ratio showed a mean of 1.7856 (95% CI = 0.3346, 3.2366) for left and 1.8748 (95% CI = 0.8718, 2.8778) for right hands (p = 0.69).

Discussion: This study highlights existing consistent anatomical ratios between key wrist landmarks used in CTSR and these ratios demonstrate bilateral symmetry between left and right hands. The predictable nature of these relationships provides surgeons with reliable anatomical references for preoperative planning. These findings may improve surgical precision and safety during CTSR procedures by helping surgeons better anticipate the location of critical structures.

Outcomes after carpal tunnel release in breast cancer patients: a case-control study

Abstract Presenter: Isaac Mordukhovich

Abstract Co-Author(s): Christina Lee DO, Samantha Maasarani MD, Mazen Al-Malak MD, Ying Ku DO, Bahar Bassiri Gharb MD, PhD, Antonio Rampazzo MD, Rafael Ramos Vecchio MD

Purpose: Breast cancer treatment often involves a multidimensional approach involving systemic and locoregional therapies. Peripheral neuropathies have been reported as consequences for both these approaches, including specific studies on selective estrogen receptor modulators (SERM), aromatase inhibitors, platinum-based chemotherapies, and lymph node dissection. Carpal tunnel syndrome (CTS) is among the neuropathies identified, but there exists a paucity of research evaluating the management of CTS in this patient population and the effectiveness of carpal tunnel release (CTR) for symptomatic relief. This study seeks to address this knowledge gap.

Methods: A retrospective case-control chart review study was performed in the Cleveland Clinic's Electronic Medical Record. Study inclusion criteria: female patients over 18 years old with histories of CTS diagnosis and CTR treatment. The case group also required prior treatment of breast cancer not arising from metastasis. Chi-square, Welch's, and Fisher's tests were used as appropriate with Bonferroni corrections; significance was set at $p<0.05$. Summary statistics are reported as mean ± standard deviation.

Findings: Ninety-eight patients were included in the case (BRCA) group and 200 patients were included in the control. Despite efforts to match patients, BRCA patients were older than patients in the control group (63.1±11.9 vs. 51.1±12.8 years, respectively; $p<0.01$). The control group was more likely to have chronic kidney disease than the BRCA group ($p<0.01$), although other CTS-predisposing comorbidities had equal occurrences between groups. BRCA subjects were diagnosed with invasive ductal carcinoma (68.7%), ductal carcinoma in-situ (23.2%), invasive lobular carcinoma (9.1%), or lobular carcinoma in-situ (1.0%). Papillary or tubular carcinoma subtypes of ductal carcinoma were diagnosed in 2.0% and 1.0% of patients, respectively. The majority of BRCA patients were treated at stage 1 (78.9%), 18.3% were in stage 2 and 2.8% in stage 3. Surgical treatment of breast cancers involved breast-conserving surgery (67.0%), simple mastectomy (21.6%), modified radical mastectomy (7.2%), or other, non-radical mastectomy (4.1%). Adjunctive treatments included axillary surgery (38.8%), radiation (17.3%), chemotherapy (31.6%), SERM (57.1%), and immunotherapy (6.1%).

CTS diagnosis was accomplished using similar techniques between BRCA and control groups, with Tinel, Phalen, electromyography, and neuromuscular ultrasound tests being applied with comparable frequencies. Upon CTS diagnosis, the BRCA group was treated with conservative measures for shorter durations ($p<0.01$) than the control group, with significantly more BRCA patients' treatments concluding after six months. The BRCA group was also less likely to be treated with orthosis or steroid injections ($p<0.05$) without any difference in subjective improvement ($p=0.725$). Following CTR, both groups' DASH scores improvements were clinically significant ($\Delta DASH_{BRCA}=40.01\pm19.29$, $\Delta DASH_{control}=24.14\pm23.98 > 10$). The BRCA group's relative DASH ($p=0.034$), BCTQ-F ($p<0.01$), and BCTQ-S ($p<0.01$) reductions following CTR were greater than those of the control group, although both groups demonstrated significant improvements in all examinations.

Conclusion: Breast cancer patients had greater reductions in CTS severity following CTR and similar responses to conservative therapy compared to other patients despite abbreviated conservative treatment durations. The observed accelerated transition from

conservative to surgical treatment of CTS in patients following breast cancer is therefore effective and medically justified.

Enhancing Hand Vascular Assessment: The Role of Hyperspectral Imaging in Perfusion Monitoring Title Enhancing Hand Vascular Assessment: The Role of Hyperspectral Imaging in Perfusion Monitoring

Abstract Presenter: Ovya Ganesan

Abstract Co-Author(s): Jeffrey Trost MD, Robert Sampson MD, MBA, Stephanie Holzmer MD, Christian Sampson

Abstract Accurate assessment and monitoring of tissue perfusion are critical in diagnosing and managing vascular diseases of the hand. Traditional methods, including clinical examinations and pulse oximetry, have limitations in detecting early or subtle perfusion deficits (1). Hyperspectral imaging (HSI) is a non-invasive, real-time technique that provides quantitative perfusion maps by measuring oxygen saturation, oxyhemoglobin, and deoxyhemoglobin levels. The purpose of this study is to evaluate the clinical utility of HSI in assessing perfusion in vascular conditions of the hand and discuss its emerging application in the field of hand surgery.

A single-center study was conducted from 2021 to 2025, involving 25 patients with various vascular and circulatory upper extremity conditions, each followed to present date. Perfusion images were obtained using the HyperView™ (HyperMed™, Memphis, TN) system before and after surgical or procedural interventions. Comparisons were made against the contralateral hand or standardized normal perfusion values from the previous iteration of the HyperView™ camera (OxyVu™-1). The effectiveness of HSI in diagnosing and monitoring perfusion changes was assessed through case analyses. HSI effectively identified perfusion deficits, guided clinical decision-making, and monitored vascular improvements post-intervention. In several cases, HSI detected thrombosis, monitored post-procedural oxygen saturation changes, and provided immediate data that influenced urgent clinical decision-making. In a case of ulnar artery reconstruction, HSI demonstrated a 5% increase in tissue oxygen saturation postoperatively, ultimately correlating with successful wound healing. Another case involved a patient with Raynaud's, where pre- and post-treatment HSI assessments objectively demonstrated a 23% increase in perfusion following botulinum toxin injections. These results correlated with an improvement in the patient's clinical

symptoms. Additionally, HSI influenced the decision for angiography and surgical intervention in a case of traumatic digital artery occlusion.

While HSI shows significant promise, limitations remain. Established baseline reference measurements for different anatomical regions are lacking, reducing interpretability. Factors such as melanin concentration, ambient temperature, and vasoactive substances can influence accuracy (2). Additionally, image quality may be compromised by improper exposure, motion artifacts, and variations in operator technique. Standardization of imaging protocols is necessary to enhance reliability.
HSI presents a novel, objective method for assessing tissue perfusion in vascular diseases of the hand and upper extremity, overcoming several limitations of traditional assessment techniques. This technology has the potential for integration into clinical workflows for real-time decision-making in hand surgery and vascular medicine. Furthermore, HSI has shown promise in assessing systemic vascular dysfunction, as demonstrated in studies of peripheral artery disease, and flap perfusion (3,4). Further research is required to establish standardized imaging protocols, validate clinical efficacy, and determine its broader applicability in disorders of the hand.

References

(1) Considine J. The reliability of clinical indicators of oxygenation: A literature review. Contemp Nurse. 2005;18(3):258-267. doi:10.5172/conu.18.3.258
(2) HyperMed Imaging, Inc. (2017). HyperView™ Product Overview (Part Number: 101-D077 Rev. B). Retrieved from https://hypermed.com/wp-content/uploads/101-D077_Product-Overview_Rev.-B1-1.pdf
(3) Sumpio BJ, Citoni G, Chin JA, Sumpio BE. Use of hyperspectral imaging to assess endothelial dysfunction in peripheral arterial disease. J Vasc Surg. 2016;64(4):1066-1073. doi:10.1016/j.jvs.2016.03.463
(4) Kohler LH, Köhler H, Kohler S, et al. Hyperspectral Imaging (HSI) as a new diagnostic tool in free flap monitoring for soft tissue reconstruction: a proof of concept study. BMC Surg. 2021;21(1):222. doi:10.1186/s12893-021-01232-0

Functional Recovery and Therapy Attendance Trends in Carpometacarpal Osteoarthritis Patients

Abstract Presenter: Joshua Kim

Abstract Co-Author(s): Hani Naga MD, Suhail Mithani MD, Warren Hammert MD, DDS, Alyssa Henriquez

Purpose: Trapeziectomy and ligament reconstruction with tendon interposition (LRTI) improves pain and functionality in patients with carpometacarpal osteoarthritis (1). Post-operative had therapy has been shown to improve functional outcomes after LRTI (2, 3). We hypothesize that patients with lower functional scores in the immediate postoperative period engage in therapy for longer.

Materials and Methods: Patients undergoing LRTI at a single academic institution between January 2015 and June 2024 were retrospectively reviewed. Postoperative, in-person therapy sessions with hand therapy were noted, along with clinic visits. The earliest and latest Patient-Reported Outcomes Measurement Information System (PROMIS) scores were recorded. Bivariate analysis was conducted to compare demographics and functional outcomes.

Results: Overall, 1,235 patients underwent trapeziectomy for CMC osteoarthritis, with 845 (69.6%) females aged 65.1 [58.6,70.9] years. Therapy was attended by 1,039 (85.6%) patients for 4 [2,7] sessions over 7.3 [3.4,12.3] weeks. Among patients who did not attend therapy, 106 (60.6%) patients were referred.
Therapy Attendance Patients were stratified by whether they attended five or more sessions. Patients attending five or more sessions were less deprived, exhibiting lower national and state ADIs (both $p<0.001$); these patients also tended to be followed for shorter lengths of time by their surgeons ($p<0.001$). Patients who attended multiple sessions tended to have poorer initial PROMIS Physical Function (PF) and Upper Extremity Function (UEF) six weeks postoperatively (both $p<0.05$). Scores were equivocal at six weeks; but latest follow-up disclosed favorable Pain Interference (PI) in patients attending more therapy.
State Area of Deprivation State ADI was used to subdivide patients, and the top three and bottom three deciles were compared. Postoperative therapy did not vary between groups, but the number of session and duration were higher in patients who were less deprived (both $p<0.05$). Deprived patients had less favorable PI ($p=0.046$) at six weeks, and PI ($p=0.033$) and QuickDASH ($p=0.028$) at three months. Differences were not significant beyond three months.

Summary: Patients undergoing procedural management of CMC osteoarthritis had high postoperative hand therapy attendance, with lower initial PF and UEF associated with attending multiple therapy sessions, leading to improvements in latest PI and UEF. Socioeconomic deprivation correlated with attrition from therapy, with more deprived groups having fewer therapy visits. Multidisciplinary care enhances postoperative

outcomes, though both functional and socioeconomic factors influence therapy attendance.

References

1. Henstridge L. Development and implementation of a trapeziectomy rehabilitation protocol. Hand Therapy. 2017;22(2):64-72.
2. Hermann-Eriksen M, Nilsen T, Hove A, Eilertsen L, Haugen IK, Sexton J, et al. Comparison of 2 Postoperative Therapy Regimens After Trapeziectomy Due to Osteoarthritis: A Randomized, Controlled Trial. J Hand Surg Am. 2022;47(2):120-9 e4.
3. Stirton JB, Kagy KL, Mooney ML, Jain MK, Skie M. Early Mobilization After Basal Joint Arthroplasty: Clinical Results. Hand (N Y). 2023;18(2_suppl):81S-6S.

"I Walked Away from Some Visits Feeling Like I Wasn't Heard at All": Perspectives on Patient-Provider Communication Among Black Patients with Carpal Tunnel Syndrome

Abstract Presenter: Noelle Thompson

Abstract Co-Author(s): Natalie Baxter, Mary Byrnes PhD, Rachel Hooper MD, Bryce Gantt

Background: Carpal Tunnel Syndrome (CTS) is the most common compressive neuropathy of the upper extremity, with diagnosis relying on history and physical examination. Effective patient-provider communication is essential for accurate diagnosis, treatment decisions, and outcomes (1); however, racial discordance can hinder communication, leading to mistrust, underutilization of treatment, and worsening disparities (2). Race and gender discordance among patients and providers influence decision-making and healthcare experiences (3). In contrast, racial concordance is associated with improved patient compliance and outcomes. In this qualitative study, we examined the perspectives on patient-provider communication among Black patients with CTS, with the primary goal of identifying barriers and facilitators to treatment when there is racial discordance among patient and providers.

Methods: We used interpretive description to understand the experiences of Black patients presenting to a single academic institution in the Midwest. Participants engaged

in a one-on-one in-depth interview. Interviews were recorded, transcribed, and analyzed to identify key themes and strategies to improve patient provider communication.

Results: Our sample included 28 participants with CTS, 80% of whom were women. Three key themes emerged: Dismissiveness, Lack of Empathy, and Information Power. Participants described feeling ignored by providers, with one stating, "I told the doctor I was still having pain, and he just shrugged it off." (Participant 18). Some attributed this dismissiveness to racial bias, believing their symptoms would be taken more seriously if they were of a different race. Patients also reported a Lack of Empathy, particularly regarding surgical fears, as one shared, "I was really nervous, but the doctor acted like it wasn't a big deal and didn't acknowledge my fear." (Participant 15). Information Power played a crucial role in decision-making, with clear communication fostering trust and fragmented information leading to mistrust. One participant noted, "I only found out about one of the potential complications from Googling it later-it wasn't mentioned during the consultation." (Participant 8). Providers who were most transparent helped build confidence and trust, improving patient engagement in treatment.

Conclusion: Here we identified how aspects of patient-provider communication can serve as barriers or facilitators to care for Black patients with CTS, particularly in context of racial discordance. Provider dismissiveness and lack of empathy negatively impact patient-provider interactions. In contrast, transparency and the sharing of information power helps build confidence and trust in the provider. As we strive to improve racial disparities and promote equity in the treatment of CTS (and other conditions), it is critical that we continue to engage with patients and understand how their perspectives impact treatment decisions and overall outcomes.

References:

1. Forsey J, Ng S, Rowland P, Freeman R, Li C, Woods NN. The basic science of patient–physician communication: A critical scoping review. Acad Med. 2021;96(11S):S109-S118.
2. Shen MJ, Peterson EB, Costas-Muñiz R, et al. The effects of race and racial concordance on patient-physician communication: A systematic review of the literature. J Racial Ethn Health Disparities. 2018;5(1):117-140. doi:10.1007/s40615-017-0350-4
3. Cooper-Patrick L, Gallo JJ, Gonzales JJ, et al. Race, gender, and partnership in the patient-physician relationship. JAMA. 1999;282(6):583-589. doi:10.1001/jama.282.6.583

More Than Insurance: Uncovering Key Predictors of Hand Therapy Adherence

Abstract Presenter: Leanne Jeong

Abstract Co-Author(s): Luke Anderson, Casen Lockridge, Rachel Aliotta MD

Introduction: Postoperative hand therapy is essential for restoring function and optimizing outcomes following flexor tendon repair[1]. This study evaluates the impact of insurance status and other predictors on therapy adherence at a single level one trauma and tertiary care center in the Deep South.

Methods: A retrospective cohort analysis was conducted on flexor tendon repair patients at a single institution (2014–2024). Patients requiring multiple procedures, < 18 years old, or receiving therapy elsewhere were excluded. Data on insurance status, social vulnerability, demographics, tobacco use, and therapy adherence were analyzed using univariate and multivariate regression.

Results: Among 300 cases, most patients were insured (79%, n=237). In univariate analysis, no theorized predictors were significantly associated with adherence: age ($p=0.953$), sex ($p=0.596$), race ($p=0.437$), insurance status ($p=0.107$), social vulnerability ($p=0.946$), and tobacco use ($p=0.324$). However, the number of canceled/no-show appointments (CNSA) ($p<0.0001$) and days to therapy initiation from surgical date (DTI) ($p=0.020$) were unexpectedly strong statistical predictors.
In multivariate regression, the model was initially nonsignificant ($p=0.7614$, $R^2=0.015$) with only the theorized predictors, but became significant ($p<0.0001$, $R^2=0.26$) when CNSA and DTI were included. Increased therapy visit cancellation events predicted more attended sessions overall (ß1=0.932, $p<0.001$), while delays in initiation of therapy visits reduced attendance adherence (ß2=-0.00267, $p=0.0256$).

Conclusion: Previously reported predictors of hand therapy adherence were not observed in this study, suggesting additional, unmeasured factors may influence post-operative attendance. This data highlights the benefit of encouraging continued engagement despite missed appointments and promoting early therapy initiation to obtain adherence success.

References:

1. Wong JKF, Peck F. Improving Results of Flexor Tendon Repair and Rehabilitation. Plastic and Reconstructive Surgery. 2014;134(6):913e-925e. doi:10.1097/prs.0000000000000749

The Influence of Insurance and Socioeconomic Deprivation on Postoperative Therapy Utilization in Distal Radius Fractures

Abstract Presenter: Joshua Kim

Abstract Co-Author(s): Suhail Mithani MD, Warren Hammert MD, DDS, David Salven, Hani Naga MD, Holly Lewis MD PhD

Purpose: Distal radius fractures (DRF) are common urgent hand consults that often require surgical fixation. Subsequent hand therapy referral is routine, but this heterogenous patient population often faces barriers to follow-up and therapy participation. We hypothesize that socioeconomically deprived patients are less likely to engage with therapy and exhibit poorer functional outcomes, based on Patient-Reported Outcomes Measurement Information System (PROMIS) and QuickDASH scores.

Materials and Methods: Patients undergoing surgical management of DRFs at a single academic institution between January 2015 and June 2024 were retrospectively reviewed. Postoperative, in-person therapy sessions with physical or occupational therapy were noted, along with clinic visits. PROMIS scores were recorded at six weeks, three months, and six months. Bivariate analysis was conducted to compare demographics and functional outcomes.

Results: Overall, 835 patients were included, with a mean age of 57.3 [34.9, 68.7]. Therapy was attended by 552 (66.1%) patients for 4 [2, 9] sessions over 7.5 [2.6, 14.2] weeks. Among patients who did not attend therapy, 108 (38.2%) patients were referred or advised to participate. Postoperative clinic visits were attended by 753 (90.2%) patients over 6 [1.9, 21.5] months.

Therapy Attendance Discussing or recommending therapy in the clinic significantly raised the odds of patient engagement ($p<0.001$, OR=6.82, 95% CI=4.40-10.69). Relative to private insurance, patients relying on Medicare ($p<0.001$, OR=0.29, 95% CI=0.16-0.54) or Workers' Compensation ($p=0.021$, OR=0.22, 95% CI=0.06-0.86) were less likely to attend. Patients with longitudinal participation had higher initial pain interference (PI, $p=0.014$), decreased upper extremity function (UEF, $p=0.007$), higher QuickDASH ($p=0.042$), and lower percent functional recovery ($p<0.001$). No differences

were appreciated at three months. At the latest visit, these patients had lower QuickDASH scores (p=0.033).

Conclusions: Therapy attendance in patients with DRFs was modulated by several factors, including insurance status, session attendance, and resource deprivation. More deprived patients had greater PI and subjective pain in the immediate postoperative period. Mental health likely has a role as patients with higher PI scores attended more therapy appointments. Patients who attended over five sessions had less favorable PI, UEF, and QuickDASH scores at their initial visit, but these differences disappeared with continued therapy involvement.

It's All in the Wrist: Postoperative Complications of Patients with Menopause in Endoscopic Versus Open Treatment of Carpal Tunnel Syndrome

Abstract Presenter: Sharon Shania

Abstract Co-Author(s): Charlotte Floria, David Matera MD, Amir Behnam

Purpose: Carpal tunnel syndrome (CTS) is the most common entrapment neuropathy worldwide, with menopause identified as a risk factor in previous literature. Despite this, limited data exist on outcomes for menopausal patients undergoing carpal tunnel release (CTR). This study seeks to compare complication rates between endoscopic CTR (ECTR) and open CTR (OCTR) in menopausal patients to provide plastic surgeons with more insight into this population.

Methods: A retrospective cohort study was conducted using the TriNetX database, including 63,160 menopausal patients who underwent ECTR (n=17,135) or OCTR (n=46,025). Demographics, medical comorbidities, and complication rates were analyzed. A 1:1 propensity score matching was performed to calculate risk ratios and 95% confidence intervals for postoperative median nerve injury, tendon injury, complex regional pain syndrome, 6-week wound dehiscence, and 6-week wound infection.

Results: After cohort matching, demographics and comorbidities were comparable between groups. Menopausal patients undergoing ECTR had a significantly lower relative risk of 6-week wound dehiscence (RR 0.471, 95% CI 0.296-0.751; p<0.001) and nerve injury (RR 0.389, 95% CI 0.21-0.721; p<0.001) compared to the OCTR cohort. No

significant differences were observed in the risk of wound infection, tendon injury, or complex regional pain syndrome.

Conclusions: Among menopausal patients undergoing CTR, ECTR was associated with significantly lower rates of wound dehiscence and nerve injury within 6 weeks post-surgery, reducing these risks by 52.9% and 61.1%, respectively. These findings suggest ECTR may result in improved outcomes for this patient population. Plastic surgeons should consider menopause as an underlying factor or comorbidity when evaluating and managing CTS.

Supercharge End-to-Side Anterior Interosseous-to-Ulnar Motor Nerve Transfer to restore intrinsic hand function in compression-type ulnar nerve injuries

Abstract Presenter: Mehmet Furkan Tunaboylu MD

Abstract Co-Author(s): Jess Rames MD, Nathan Hebel MD, Omar Selim, Steven Moran MD

Hypothesis: SETS is an efficient method to restore hand intrinsic function in peripheral ulnar nerve injuries.

Background: Supercharge end-to-side (SETS) anterior interosseous nerve transfer is a surgical technique employed to enhance nerve regeneration and functional outcomes in cases of peripheral nerve injuries. This innovative procedure involves connecting the injured nerve to a donor nerve in an end-to-side fashion, thereby promoting nerve regeneration.

Material and Methods: A retrospective study of patients who underwent SETS anterior interosseous-to-ulnar nerve transfer for compression ulnar neuropathy from 2004 to 2022 was performed. Mean follow-up time was 23 months. The primary outcomes were return of ulnar intrinsic function by assessing the Medical Research Council grade of the first dorsal interosseous muscle, ability to cross the index finger, and improvement of clawing. The secondary outcome measures were grip strength, oppositional pinch strength, and key pinch strength. Postoperative patient reported outcomes were assessed with QDASH and ABILHAND survey scores. Categorical variables and continuous variables were compared with Fischer's exact and paired- t tests, respectively.

Results: Thirty-one anterior interosseous-to-ulnar nerve transfers met inclusion criteria. The mean British Medical Research Council (MRC) values of the first dorsal interosseous (FDI) muscle improved compared to preoperative values (1.8 vs. 3.7, p =.001). Ninety percent of the patients achieved a satisfactory recovery (MRC ≥ 3). Grip strength (61 vs. 69, p =.03) and key pinch strength (49 vs. 68, p =.003) improved postoperatively. Postoperative average QDASH score and ABILHAND scores were 36 (25) and 66 (18), respectively. The first documented intrinsic hand function was as early as within 1 month (range, 1–20), with a mean of 3.6 months. Time-to-surgery had a significant impact on intrinsic muscle strength recovery. Patients treated within 12 months of symptom onset had a higher MRC grade compared to those treated after this period (4.1 vs. 3.3, p =.02). More than 60 percent of the patients noted partial or complete resolution of clawing and muscle wasting. Compound muscle action potential (CMAP) and sensory nerve action potentials (SNAP) of the abductor digiti minimi (ADM) increased from baseline; however, this did not achieve significance.

Conclusion: SETS transfer restores ulnar intrinsic function in 90% of patients with compression-type injuries. Initial recovery could be expected as early as 1 month (mean, 3.6 months.); however, to achieve a satisfactory recovery (MRC ≥ 3), AIN transfer should be conducted within 12 months of symptom onset.

Regenerative Peripheral Nerve Interface and Targeted Muscle Reinnervation: A Bibliometric Analysis of the 100 Most Cited Articles

Abstract Presenter: Melanie Wang MD

Abstract Co-Author(s): Maximilian Wagner, Che-Hsiung Lee, Gregory Dumanian MD, Jason Ko MD, MBA, Theodore Kung MD, Paul Cederna MD

Purpose: Citation analysis is a crucial bibliometric tool that quantifies the impact and influence of published articles within their respective fields. This study presents the first comprehensive literature survey in the rapidly evolving field of Regenerative Peripheral Nerve Interface (RPNI) surgery and Targeted Muscle Reinnervation (TMR). With 185,000 amputations occurring annually in the US alone, these innovative techniques address critical challenges in post-amputation pain management and prosthesis control. Our bibliometric analysis aims to quantify global contributions and assess the impact of

these novel surgical approaches on current practice, providing valuable insights for future research direction.

Methods: The 100 most-cited articles relating to RPNI surgery and TMR published between January 1, 2000, and December 1, 2024, were extracted from Web of Science (WOS) database in December 2024. The database was systematically searched using a comprehensive set of keywords related to RPNI, TMR, and associated concepts. Inclusion criteria focused on relevance to pain management for neuroma and phantom limb pain, or prosthetic control, in peer-reviewed journals. Title, publication year, total citations, authorship, country, institution, journal, research area, and common keywords were recorded for bibliometric analysis. Bibliometric network visualizations were created using VOSviewer software to illustrate relationships. The methodology ensured a thorough and reproducible analysis of the most influential literature in the field over the past 24 years.

Results: The bibliometric analysis of publications on RPNI surgery and TMR revealed 4,807 articles with 144,742 total citations. The top 100 most-cited publications accounted for 13,709 citations, with the most cited article receiving 752 citations. Todd A. Kuiken emerged as the most prolific author with 28 publications in the top 100. Northwestern University led institutional contributions with 40 publications and 6,707 citations. The year 2014 saw the highest number of publications (15). IEEE Transactions of Neural Systems and Rehabilitation Engineering was the most active journal with 11 publications and 1,411 citations. Engineering was the top research area with 36 citations. The United States had the highest number of contributions to the top 100 articles with 73 publications and 9,988 citations. Key research themes identified through keyword analysis included pattern recognition, myoelectric control, prosthesis, neuroma, and phantom limb pain.

Conclusions: This bibliometric analysis reveals the significant impact and growing relevance of RPNI and TMR research in plastic surgery and related fields. By identifying key contributors, research trends, and areas of focus, this study provides a valuable resource for researchers and clinicians working to improve outcomes for individuals with limb loss. The analysis underscores the need for continued innovation and collaboration in this rapidly advancing field, highlighting opportunities for future research and development in areas such as neural engineering and sensory feedback systems.

Evaluating Resource Utilization in Interfacility Transfers for Hand Trauma Care

Abstract Presenter: Sai Anusha Sanka

Abstract Co-Author(s): Jenny Ji, Katherine Long, KEVIN HE, Shreya Raman MD, Lauren Yaeger, Kelly Currie MD

Introduction: Hand injuries demand timely care, as improper management can lead to debilitating outcomes. However, many hospitals lack on-call hand surgeons, making it necessary to transfer patients to higher-level trauma centers with more specialized resources. While such transfers can improve outcomes for severe hand trauma cases, unnecessary transfers impose significant costs on both patients and the healthcare system. This study aims to examine patterns in interfacility hand trauma transfers, assess their appropriateness, and summarize post-transfer outcomes.

Methods: A medical librarian conducted a comprehensive, PRISMA-compliant literature search across multiple databases, including Embase, Ovid Medline, Scopus, and ClinicalTrials.gov, to identify studies on the interfacility transfer of hand trauma patients. Only English-language articles were included, while non-English articles and those lacking full text were excluded. Two independent reviewers performed deduplication and screening for each study. Data extracted included patient demographics, facility characteristics, injury types, post-transfer interventions, transfer outcomes, and the appropriateness of transfers as rated by experts.

Results: After full-text screening, 36 studies met the inclusion and exclusion criteria, with a total of 49,696 patients included in the analysis. The most common reasons for transfers were fractures, followed by amputations and devascularization. Patients on Medicaid or those who were uninsured were more likely to be transferred. Several studies also reported that over half of the transferred patients were moved unnecessarily. One study showed that more than one-third of patients transferred to the institution were discharged without admission, observation, or procedures, while another found that over 50% of transfers did not result in an examination by a hand surgeon. However, replantation attempts and success rates were higher among transferred patients. Three studies evaluated the use of telemedicine, with all concluding that it effectively increases the accuracy of transfers.

Conclusion: The results of this study highlight the frequent occurrence of unnecessary transfers. Teletriage may offer a solution by ensuring that patients who require higher levels of care are transferred more efficiently, reducing excess costs for both patients and the healthcare system by minimizing unnecessary transfers.

Patient Reported Outcomes and the Use of Bone Grafting in Distal Radius Osteotomy for Malunion Correction: A Systematic Review

Abstract Presenter: Alexa Clark

Abstract Co-Author(s): Shannon Su MD, Orr Shauly MD, Paul Ghareeb MD

Introduction: Distal radius fractures (DRF) account for up to 18% of adult fractures, with malunion occurring in 10–25% of cases. [1] Symptomatic malunion can lead to significant morbidity, including loss of forearm rotation, carpal instability, and arthritis. Effects of DRF malunion can also impact distal radioulnar joint function, including altering the axis of rotation, limiting pro-supination, and placing strain on the triangular fibrocartilage complex.[2] Furthermore, excessive dorsal tilt due to malunion can lead to adaptive carpal instability, potentially leading to ligament attenuation, synovitis, and progressive dynamic instability.[3] Corrective osteotomy is a key surgical intervention, yet consensus is lacking on the optimal surgical approach, fixation technique, and necessity of bone grafting. This systematic review evaluates surgical outcomes of DRF osteotomy, comparing surgical approaches and assessing bone graft utilization.

Methods: A PubMed search (2000–2023) identified 17 studies meeting inclusion criteria, which required primary data on DRF malunion correction, surgical approach comparisons, bone graft necessity, and patient-reported outcomes. Data on complication rates, patient satisfaction, and clinical scores were analyzed.

Results:
• Volar Plate Fixation: Ten studies examined volar plating, with and without bone grafts. Both groups showed significant improvements in function, radiographic parameters, and grip strength. Four non-grafting studies reported no nonunion cases, while one was discontinued due to persistent malunion (20%).
• Volar vs. Dorsal Approach: Two studies found both approaches improved outcomes, but volar plating provided greater wrist flexion ($p=0.012$) and fewer hardware-related complications.
• Bone Graft Utilization: Three studies showed mixed results regarding graft necessity, with some demonstrating successful outcomes without grafting.

Conclusion: Corrective osteotomy for DRF malunion significantly improves patient outcomes, with volar plate fixation trending towards better outcomes over dorsal plating.

The decision to use bone grafts should include consideration of cortical contact after osteotomy, as poor cortical contact has been associated with higher nonunion rates. Given the limitations of the available studies, including small sample sizes, selection bias, and language restrictions, future prospective studies and randomized trials are needed to establish definitive guidelines for optimal surgical management of DRF malunion.

1. Taleb C, Zemirline A, Lebailly F, et al. Minimally invasive osteotomy for distal radius malunion: A preliminary series of 9 cases. Orthopaedics and Traumatology: Surgery and Research. 2015;101(7). doi:10.1016/j.otsr.2015.07.016
2. Katt B, Seigerman D, Lutsky K, Beredjiklian P. Distal Radius Malunion. J Hand Surg Am. 2020;45(5):433-442. doi:10.1016/J.JHSA.2020.02.008
3. De Smet L, Verhaegen F, Degreef I. Carpal Malalignment in Malunion of the Distal Radius and the Effect of Corrective Osteotomy. J Wrist Surg. 2014;03(03). doi:10.1055/s-0034-1384823

Functional Outcomes and Success Rates of Digit Replantation vs. Revision Amputation: A Systematic Review and Meta-Analysis

Abstract Presenter: Hannah Egozi

Abstract Co-Author(s): Ricardo Torres-Guzman MD, PanamburLaxminarayan Bhandari MD, Wesley Thayer MD

Background: Traumatic digit amputations affect about 45,000 individuals yearly (1).Choosing between replantation and revision amputation involves balancing functional recovery, joint mobility, and rehabilitation time. While replantation can restore anatomy and sensation, it carries a risk of joint stiffness. Revision amputation may allow faster rehabilitation but can limit fine motor function. The purpose of our paper is to compare functional outcomes, success rates, and clinical implications of digit replantation and revision amputation, providing evidence-based guidance for individualized treatment decisions and underscoring the need for standardized outcome reporting.

Methods: A systematic literature search was conducted across PubMed, CINAHL, Embase, Web of Science, and Medline following PRISMA guidelines. Studies reporting digit replantation and revision amputation outcomes were included. Extracted data

included patient demographics, smoking history, mechanism of injury, Tamai classification, and functional outcome measures such as Disabilities of the Arm, Shoulder, and Hand (DASH) scores, Michigan Hand Outcomes Questionnaire (MHQ) scores, and Proximal Interphalangeal Joint (PIPJ) range of motion (ROM). Meta-analysis was performed using random-effects models, calculating mean differences (MD) for functional outcomes and risk ratios (RR) for success rates, with heterogeneity assessed using I^2 statistics.

Results: A total of 6,538 studies were screened, of which 63 met inclusion criteria for the systematic review, and 41 contained sufficient data for meta-analysis. The mean survival rate for revision amputation was 97.3%, while the mean survival rate for replantation was 91.5%. The pooled risk ratio was 0.97 (95% CI [0.78, 1.20]), indicating no significant difference in success rates between procedures. Functional outcomes varied across studies. DASH scores favored replantation with a mean difference of -5.14 (95% CI [-5.32, -4.97]), suggesting better functional recovery. MHQ scores showed minimal differences between groups, with a mean difference of -1.71 (95% CI [-1.85, -1.56]), indicating similar patient-reported hand function. PIPJ ROM was significantly lower in replantation patients, with a mean difference of -25.65 (95% CI [-25.83, -25.47]), suggesting potential stiffness or reduced mobility. Heterogeneity was high for all functional outcomes ($I^2 > 99\%$), indicating variability among studies.

Conclusion: Replantation and revision amputation have comparable success rates, suggesting that treatment decisions should be based on functional goals rather than procedural survival. Replantation offers better functional recovery, as reflected by lower DASH scores, but may lead to reduced joint mobility, as indicated by lower PIPJ ROM. High variability across studies highlights the need for standardized reporting on patient selection and rehabilitation outcomes. Future research should focus on long-term patient satisfaction, rehabilitation protocols, and predictors of functional success to refine clinical decision-making.

References

Dubernard C, Pluvy I, Facca S, Liverneaux P. The future of hand allotransplantation. J Hand Surg Glob Online. 2019;1(1):1-7. doi:10.1016/j.jhsg.2018.12.001

Predicting Cancer-Related Lymphedema: A Decade of Outcomes and Model Development from a Cohort of 15,666 Cases

Abstract Presenter: Stav Brown MD

Abstract Co-Author(s): Olivier Noel MD, PhD, Martin Kauke-Navarro MD, Felix Klimitz MD, Yizhuo Shen, Alexzandra Mattia, Luccie Wo MD, Bohdan Pomahac MD, Siba Haykal MD, PhD, FRCSC, FACS

Purpose: Lymphedema is a common, debilitating condition following lymph node dissection and affecting 1 in 3 breast cancer patients. Current interventions focus on symptom management rather than prevention. There are no models looking at which patients are at highest risk and the timeline for development of lymphdemea. This decade-long study aimed to identify lymphedema predictors and develop an algorithm estimating both risk and onset.

Methods: All patients undergoing axillary lymph node dissection (ALND) at Yale Cancer Center (YCC) between 2013–2024 were included. Demographic and clinical variables were collected, including age, BMI, race, ethnicity, chemotherapy, radiation, and comorbidities. Two multivariate regression models were developed to assess risk factors for lymphedema development and predict time to lymphedema diagnosis.

Results: Among 15,666 ALND cases, 2,345 patients (14.9%) developed lymphedema, with an average onset of 20.5 months post-surgery. Independent risk factors included BMI >30 (OR 1.385, 95% CI 1.255–1.528, p<0.0001), chemotherapy (OR 2.445, 95% CI 2.189–2.734, p<0.0001), diabetes (OR 1.168, 95% CI 1.040–1.312, p=0.0085), Black/African American race (OR 1.443, 95% CI 1.248–1.666, p<0.0001), and radiation (OR 1.960, 95% CI 1.777–2.162, p<0.0001). Radiation (β=-4.496, 95% CI -6.376 to -2.617, p<0.0001), Black/African American race (β=-4.159, 95% CI -6.876 to -1.442, p=0.027) and Asian race (β=-6.796, 95% CI -12.76 to -0.8300, p=0.0256) were associated with earlier onset, while preexisting diabetes was linked to delayed presentation (β=2.813, 95% CI 0.6189 to 5.008, p=0.0120). The model demonstrated adequate calibration (Hosmer-Lemeshow p=0.7985), with statistically significant discriminative ability (AUC = 0.6873, 95% CI: 0.6755–0.6990, p<0.0001).

Conclusions: This is the largest study to date to develop a clinically applicable prediction model for cancer-related lymphedema after axillary lymph node dissection (ALND). This model incorporates patient-specific demographics, clinical information and comorbidities. The Yale Cancer Center (YCC) lymphedema prediction model can be integrated into lymphedema care to proactively identify high-risk patients, estimate the timing of onset, and implement novel preventative strategies such as immediate lymphatic reconstruction. This predictive approach shifts the focus from late-stage

management to prevention of this incurable condition, improving patient outcomes and long-term quality of life.

Cancer-related Lymphedema and Alzheimer's Development after Axillary Lymph Node Dissection (ALND): Is There a Link?

Abstract Presenter: Felix Klimitz MD

Abstract Co-Author(s): Stav Brown MD, Olivier Noel MD, PhD, Martin Kauke-Navarro MD, Yizhuo Shen, Siba Haykal MD, PhD, FRCSC, FACS, Luccie Wo MD, Bohdan Pomahac MD

Background: Emerging evidence suggests that glymphatic system dysfunction contributes to amyloid-beta deposition and the progression of Alzheimer's Disease (AD). In animal models, impaired meningeal lymphatic drainage has been linked to cognitive decline, while restoring lymphatic function has improved cognitive outcomes. Axillary lymph node dissection (ALND) is a major risk factor for cancer-related lymphedema, yet its potential link to AD remains unexplored. This study investigates the association between lymphedema and AD development following ALND.

Methods: We conducted a longitudinal analysis of 15,666 patients who underwent ALND at a tertiary cancer center from 2013 to 2024. Demographic and clinical data, including lymphedema diagnosis and AD onset, were collected. A multivariate regression model was used to assess risk factors for AD after ALND and evaluate the relationship between lymphedema and AD development.

Results: Of the 15,666 patients, 2,345 (14.9%) developed lymphedema, with a mean onset of 20.5 months post-ALND. Among the 8,095 patients aged 60 or older at the time of ALND, 243 (3%) developed AD. Significant predictors of AD included older age at ALND (OR=1.1, 95% CI 1.089–1.129, $p<0.0001$), cerebrovascular disease (OR=6.1, 95% CI 1.203–2.222, $p=0.0016$), preexisting depression (OR=3.6, 95% CI 2.704–4.789, $p<0.0001$), African American race (OR=1.817, 95% CI 1.162–2.752, $p=0.0065$), and Hispanic/Latino ethnicity (OR=2.116, 95% CI 1.270–3.378, $p=0.0026$). Lymphedema diagnosis was associated with a lower risk of AD (OR=0.3, 95% CI 0.1679–0.6240, $p=0.0013$).

Conclusion: This is the first and largest study to investigate the relationship between cancer-related lymphedema and AD following ALND. While known risk factors for AD were confirmed, the unexpected inverse association between lymphedema and AD warrants further research. Future studies should explore the potential influence of lymphatic dysfunction and extremity lymphedema treatment on neurodegenerative pathways and cognitive outcomes.

Delay in free flap coverage following injury is associated with subsequent hardware failure in open lower extremity fractures

Abstract Presenter: Ramin Shekouhi

Abstract Co-Author(s): Syeda Hoorulain Ahmed MD, Harvey Chim MD

Background: Optimal interventions for limb salvage after lower extremity fractures require collaboration between orthopedic and plastic surgery teams, as early flap coverage significantly impacts the incidence of infection and fracture nonunion. The objective of this study was to investigate the incidence of hardware failure, bone union and limb salvage in patients who underwent free flap reconstruction in combination with open reduction and internal fixation of open leg fractures.

Methods: This retrospective analysis includes adult patients with open leg fractures and significant soft tissue loss requiring free flap coverage. Baseline patient characteristics, flap-related factors (type of free flap, flap dimensions, and delay in coverage), and incidence of hardware failure, amputation, and non-union were extracted and analyzed.

Results: A total of 39 patients with a mean age of 38.8 ± 16.0 years old and a mean BMI of 26.6 ± 6.3were included. The most common type of fracture was open tibia/fibular grade IIIB (59.0%). Free split latissimus dorsi flap was the most frequently performed flap (71.8%). Hardware failure occurred in 41.0% of patients, primarily due to infection. Mean time interval between initial injury to definitive free flap coverage was 81.4 ± 106.3 days in patients with hardware failure, which compared with patients without hardware failure (20.0 ± 17.2 days), was statistically significant ($P \leq 0.05$). Bone union was achieved in 79.5% of patients, and limb amputation was required in 12.8% of cases.

Conclusion: The timing of flap reconstruction is the most significant predictive factor for hardware failure following free flap reconstruction in patients with open leg fractures.

Machine Learning Approach to Predict Pain Outcomes Following Primary Targeted Muscle Reinnervation in Amputees

Abstract Presenter: Floris Raasveld MD
Abstract Co-Author(s): Arya Rao, Anna Luan MD, Ian Valerio MD, MS, MBA, FACS, Kyle Eberlin MD

Introduction: Neuropathic pain (NP) following extremity amputation is common and may be related to symptomatic neuroma. 1Targeted Muscle Reinnervation (TMR) has demonstrated efficacy in its treatment,2 but can also be utilized primarily, as NP prophylaxis. However, TMR's effectiveness varies among patients, and it is uncertain which patients are likely to achieve the desired NP mitigation. In prior studies, we have identified patient characteristics that seem to be associated with NP mitigation.3,4 Therefore, we aimed to construct a customized Machine Learning (ML) model incorporating these patient factors to predict patient responses to Primary and Secondary TMR, to aid in improving patient selection.

Methods: Patients undergoing Primary or Secondary TMR at a tertiary care center between 2018 and 2024 were eligible for inclusion (Follow-up: >6 months). Patients were excluded if <18 years old, if they underwent minor or bilateral amputation, or if no pain data was available. Patients were identified if they achieved sustained pain mitigation (Pain remission for Secondary, Pain prophylaxis for Primary TMR, defined as a pain score of ≤3 for ≥3 months until final follow-up). Data on demographic, comorbidity, and surgical factors were collected through chart review. Bayesian and nonparametric modeling techniques were utilized to build a prediction model capturing the associations between patient features and the binary outcome of pain mitigation. Prediction accuracy was calculated through a relevant vector machine (RVM) model with radial basis function kernels.

Results: A total of 77 Primary and 101 Secondary TMR patients were included (median follow-up: 2.0 years) of whom 55.8% and 63.4% achieved sustained pain mitigation, respectively. The RVM training prediction accuracy were 0.86, and 0.85, and the test prediction accuracy were 0.77 (AU-ROC score 0.83), and 0.80 (AU-ROC score 0.92), respectively, indicating that the model was able to predict with good accuracy (Table 1).

In contrast, if the model would be randomly guessing, the chance levels would be 0.56, and 0.60, respectively.

Discussion: This novel, custom RVM model is able to predict whether Primary and Secondary TMR patients will achieve NP mitigation or not with good accuracy. This tool could aid in preoperative counseling and improve patient selection for TMR. Such prediction models could eventually become an integral part of data-driven clinical decision-making in managing post-amputation neuropathic pain, by providing predictions of the likelihood of TMR surgical outcomes based on personalized patient features. Further, we aim to increase the accuracy of this model by ongoing prospective research on surgical outcomes.

1. Hwang CD, Hoftiezer YAJ, Raasveld FV et al. Biology and Pathophysiology of Symptomatic Neuromas. Pain.
2.Dumanian GA, Potter BK, Mioton LM, et al. Targeted Muscle Reinnervation Treats Neuroma and Phantom Pain in Major Limb Amputees: A RaTrial. Ann Surg. 2019;270(2):238-246. doi:10.1097/SLA.0000000000003088
3. Raasveld F V., Mayrhofer-Schmid M, Johnston BR, et al. Targeted muscle reinnervation at the time of amputation to prevent the developmepain. J Plast Reconstr Aesthet Surg. 2024;97:13-22. doi:10.1016/J.BJPS.2024.07.055
4. Raasveld F V., Mayrhofer-Schmid M, Johnston BR, Hwang CD, Valerio IL, Eberlin KR. Pain Remission Following Delayed Targeted Muscle RAmputees. Microsurgery. 2024;44(8). doi:10.1002/MICR.31258

Time’s Toll on the Tunnel: How Aging Affects the Median Nerve and Carpal Tunnel

Abstract Presenter: Karen Bach MD

Abstract Co-Author(s): Janessa Sullivan MD, Bradley Brickman, Alexzandra Mattia, Nitya Devisetti, Aaron Long, J. Grant Thomson MD

Purpose: Prior studies suggest carpal tunnel syndrome (CTS) is primarily associated with structural, genetic, and biological factors, while occupational and environmental contributors, such as repetitive hand use, demonstrate weaker inconsistent correlations (1-3). CTS commonly presents between the fourth and sixth decades of life, raising the question: Why do some individuals develop CTS as they age? This study examines age-related variations in carpal tunnel and median nerve volumes and cross-sectional

areas in individuals without CTS using MRI to explore potential anatomical predispositions for CTS development.

Methods: This single-institution study utilized MRI scans of the wrist from individuals aged 20-70 years. Participants were grouped into decade-based cohorts: 20-30, 31-40, 41-50, 51-60, and 61-70 years. Exclusion criteria included prior wrist trauma or wrist surgery, diabetes, rheumatoid arthritis, or a clinical diagnosis of CTS to ensure observed changes were age-related rather than pathological.

MRI images were analyzed using Visage Imaging and Materialize Mimics software for volumetric segmentation of the carpal tunnel and median nerve. Standardized anatomical landmarks were used for measurements. Statistical analysis included descriptive statistics, independent t-tests to compare mean differences between age groups, and Fisher's exact test for categorical variables, with significance set at $p<0.05$.

Results: To date, 46 individuals aged 20-30 years, 42 aged 31-40 years, 35 aged 41-50 years, 36 aged 51-60 years, and 30 aged 61-70 years have been analyzed. Carpal tunnel volume exhibited a decreasing trend with age, though this was not statistically significant. The highest mean volume was in the 31-40 age group (4716.06 mm^3), while the lowest was in the 61-70 age group (4160.89 mm^3), suggesting a steady reduction across cohorts. Similarly, median nerve volume progressively declined from 254.23 mm^3 in the 20-30 group to 233.05 mm^3 in the 61-70 group, indicating potential age-related nerve atrophy. The carpal tunnel inlet-to-outlet cross-sectional area ratio remained consistent across cohorts, but the median nerve ratio significantly increased with age, suggesting potential increased nerve compression.

Conclusions: Aging is associated with a measurable decline in both carpal tunnel and median nerve volumes, suggesting a potential role in CTS risk. Although statistical significance has not been reached, ongoing data collection may clarify these trends. The observed volumetric decline suggests that anatomical changes in the wrist may increase susceptibility to neuropathic symptoms. These findings highlight the importance of age-related anatomical factors beyond traditional CTS risk factors, such as occupation, trauma, diabetes, and hormonal influences. Recognizing these age-related changes may aid in early identification of CTS risk and inform preventive strategies.

References

1. Lozano-Calderón S, Anthony S, Ring D. The quality and strength of evidence for etiology: example of carpal tunnel syndrome. J Hand Surg Am. 2008;33(4):525-538. doi:10.1016/j.jhsa.2008.01.004

2. Boz C, Ozmenoglu M, Altunayoglu V, Velioglu S, Alioglu Z. Individual risk factors for carpal tunnel syndrome: an evaluation of body mass index, wrist index, and hand anthropometric measurements. Clin Neurol Neurosurg. 2004;106(4):294-299.

3. Moghtaderi A, Izadi S, Sharafadinzadeh N. An evaluation of gender, body mass index, wrist circumference, and wrist ratio as independent risk factors for carpal tunnel syndrome. Acta Neurol Scand. 2005;112(6):375-379.

Pediatric Trigger Thumbs: An Institutional Review on Management and Outcomes

Abstract Presenter: Yang Ding

Abstract Co-Author(s): Winston Owens, Vamsi Mohan, John Bovill MD, Jenny Lee Nguyen MD

Background: Pediatric trigger thumbs (TT) are a common deformity of the interphalangeal joint; however, the exact etiology remains unknown.1 While over 75% of cases may resolve spontaneously in 5 years nonoperatively, unresolved TTs may cause pain and limit function.2,3 In patients with a unilateral TT, around 30% will develop triggering of the other thumb by 3 years of age.1 Common treatments for pediatric TTs include surgical release and conservative therapies such as splinting, stretching, and massaging. Herein, we present the management and outcomes of pediatric TTs at a single large academic pediatric institution.

Methods: Retrospective review was conducted of all patients from January 2011 to August 2024 presenting with TTs. Patients without follow-up or insufficient records were excluded. Conservative versus operative management was compared across outcomes including average age of presentation, recurrence, and time to resolution.

Results: Of the 224 patients with TTs, the average age at presentation was 2.85 years (Range: 0.16-17 years), 51% were female, 47% were Hispanic or Latino, and 99% had flexor TTs. The left thumb was most affected (36%), followed by the right (35%), and 29% had bilateral trigger thumbs (BTT). In BTT patients (n=65), 89% presented with both thumbs triggered at an average age of 2.89 years. The remaining 11% presented with unilateral involvement at an average of 2.53 years of age and re-presented with the second TT at an average age of 3.65 years. Overall, 86% of patients underwent surgical

release and 3% had a recurrent TT that resolved either with secondary surgery (n=4) or conservative management (n=1). Of those who underwent surgical release, 45% elected for surgery at the initial visit and presented at the average age of 2.92 years. Patients with TTs managed conservatively, at the initial visit, had an average age of 2.65 years. Of patients who initially started with conversative management (n=124), 74% eventually underwent surgery after attempting conservative care for an average of 1 year (Range: 0.17-5 years). The primary reason to opt for surgical release was due to a lack of improvement with conservative therapy. Fourteen patients' TTs resolved with conservative treatment with an average resolution time of 1.18 years (Range: 0.15-4.81 years). Eighteen patients' TTs remained unresolved at the most recent follow-up.

Conclusion: From our experience, the prevalence of BTTs and the age when the second thumb triggered are consistent with existing literature. Nearly half our cohort overall underwent surgery after the initial visit, potentially attributable to variances in counseling, age at presentation, and caregiver preferences. Nonetheless, surgical release remains a safe and effective treatment with low morbidity.

References

1. Baek GH, Kim JH, Chung MS, Kang SB, Lee YH, Gong HS. The natural history of pediatric trigger thumb. J Bone Joint Surg Am. 2008;90(5):980-985. doi:10.2106/JBJS.G.00296
2. Baek GH, Lee HJ. The natural history of pediatric trigger thumb: a study with a minimum of five years follow-up. Clin Orthop Surg. 2011;3(2):157-159. doi:10.4055/cios.2011.3.2.157
3. Hutchinson DT, Rane AA, Montanez A. The Natural History of Pediatric Trigger Thumb in the United States. J Hand Surg. 2021;46(5):424.e1-424.e7. doi:10.1016/j.jhsa.2020.10.016

Polyethylene Glycol-mediated Axonal Fusion Promotes Early Postoperative Recovery of Median and Ulnar Nerves Following Sunderland V Traumatic Injuries of the Distal Forearm: A Double Blind Randomized Clinical Trial

Abstract Presenter: Barite Gutama MD

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Purpose: Up to 30% of peripheral nerve repairs fail (1). PEG prevents Wallerian degeneration by fusing the severed axolemma, leading to improved functional recovery in preclinical and clinical studies (2-5).

This study presents preliminary results from the first randomized clinical trial on PEG-mediated neurorrhaphy in mixed sensory and motor nerves of the distal forearm.

Methods: Patients ages 18-75 with Sunderland V upper extremity nerve injury were randomized into PEG-mediated and standard neurorrhaphy cohorts. Michigan Hand Questionaries (MHQ) and Medical Research Council (MRC) sensory/motor grading were conducted at 1 week, 1 month, 3 months, 6 months, and 12 months post-operation. Statistical analysis performed using a mixed-effect linear regression model.

Results: Nine patients were analyzed: 7 PEG (9 nerves) and 2 non-PEG (3 nerves). Injured nerves were 58% ulnar, 42% median, and 0% radial. The cohorts had similar demographic, except longer surgeries in the PEG cohort (158 vs. 40 minutes). Within 3 months post-surgery, the PEG patients achieved ≥ S3/≥ M3 recovery, while the non-PEG remained ≤ S2/M2. PEG patients had higher estimated MRC sensory (+ 1.65 ± 0.74, $p = 0.057$), MRC motor (+0.76 ± 0.73, $p = 0.32$), and mean MHQ (+5.83 ± 1.43, $p = 0.005$) scores compared to the non-PEG patients at each follow up.

Conclusion: PEG-mediated neurorrhaphy trends toward early clinical functional recovery and significantly improves patient-reported function and quality of life, showing promise in mixed nerve repair of the distal forearm.

References:

1. Vastamäki M, Kallio PK, Solonen KA. The results of secondary microsurgical repair of ulnar nerve injury. J Hand Surg Br. 1993 Jun;18(3):323-6.

2. Krause TL, Bittner GD. Rapid morphological fusion of severed myelinated axons by polyethylene glycol. Proc Natl Acad Sci U S A. 1990;87(4):1471-1475.

3. Riley DC, Bittner GD, Mikesh M, et al. Polyethylene glycol-fused allografts produce rapid behavioral recovery after ablation of sciatic nerve segments. J Neurosci Res. 2015;93(4):572-583.

4. Bamba R, Waitayawinyu T, Nookala R, et al. A novel therapy to promote axonal fusion in human digital nerves. J Trauma Acute Care Surg. 2016;81(5 Suppl 2 Proceedings of the 2015 Military Health System Research Symposium):S177-S183. doi:10.1097/TA.0000000000001203

5. Nemani S, Chaker S, Ismail H, et al. Polyethylene Glycol-Mediated Axonal Fusion Promotes Early Sensory Recovery after Digital Nerve Injury: A Randomized Clinical Trial. Plast Reconstr Surg. 2024;154(6):1247-1256.

Innervated Local Flap Reconstruction for Digital Soft Tissue Defects: A Systematic Review

Abstract Presenter: Ines Prasidha MD

Abstract Co-Author: Joshua Xu

Restoration of tactile sensation is paramount in fingertip reconstruction to ensure optimal hand function (1,2). This systematic review aimed to evaluate the sensory outcomes of innervated (IF) versus non-innervated regional flaps (NIF) used for digital soft tissue defects. A comprehensive search was conducted across PubMed, MEDLINE, Cochrane, and EMBASE databases to identify relevant English-language articles reporting sensibility outcomes. Eleven studies, published between 1983 and 2023, met the inclusion criteria, encompassing a total of 630 flaps in 620 patients.

The analysis revealed a significant superiority in sensory recovery when IF were employed compared to NIF. This was evidenced by significantly better outcomes in static two-point discrimination (2PD), moving two-point discrimination, and Semmes-Weinstein monofilament (SWM) testing. Specifically, innervated flaps demonstrated a weighted mean static 2PD of 6.8 mm (range 3.9-14 mm), compared to 10.1 mm (range 4-18 mm) for non-innervated flaps ($p < 0.001$). Moving 2PD was also significantly improved in IF (weighted mean 5.5 mm, range 2-10 mm) versus NIF (weighted mean 7.5 mm, range 6-11 mm; $p < 0.001$). Similarly, IF showed superior SWM scores (weighted mean 4.1, range 3.2-4.6) compared to NIF (weighted mean 4.7, range 3.6-5.1; $p < 0.001$).

Further analysis indicated that dual-innervated flaps exhibited superior static 2PD (weighted mean 6.5 mm, range 5-11 mm) compared to single-innervated flaps

(weighted mean 8.7 mm, range 5-14 mm; $p < 0.01$). However, no significant difference was observed in SWM scores between single and dual-innervated flaps. Additionally, the review noted that IF demonstrated a quicker return of sensation compared to NIF.

While complications such as cold intolerance, pain, and neuroma formation were reported, the data was inconsistent and often did not differentiate between IF and NIF. Complete flap necrosis occurred at a mean rate of 1.3%, and partial flap necrosis at 6.7%. Other complications included venous congestion (4.8%) and infection (1.7%). These complications were not directly compared between the two flap types.

In conclusion, this systematic review strongly supports the use of neurorrhaphy in regional flap fingertip reconstruction to significantly improve sensory outcomes. The findings highlight the importance of considering nerve coaptation to enhance tactile recovery and potentially reduce complications like neuroma formation. Future high-quality randomized controlled trials are needed to further validate these findings and explore additional functional and patient-centered outcomes.

References:
1. Dunlop RLE, Wormald JCR, Jain A. Outcome of surgical repair of adult digital nerve injury: a systematic review. BMJ Open 2019, 9: e025443.
2. Thorsén F, Rosberg HE, Steen Carlsson K, et al. Digital nerve injuries: Epidemiology, results, costs, and impact on daily life. J Plast Surg 2012, 46: 184-90.

A Single Institution Experience in the Management of Radial Tunnel Syndrome

Abstract Presenter: Kanad Ghosh MD

Abstract Co-Author(s): Larissa Wietlisbach MD, Jennifer Wolf

Purpose: Radial tunnel syndrome (RTS) is an atypical nerve compression thought to be due to compression of the posterior interosseous nerve in the proximal forearm with typical presentation of pain in the absence of motor weakness. In this study, we evaluated a series of RTS patients and compare the outcomes of those treated with conservative management versus surgical decompression.

Methods: An IRB approved retrospective study was conducted to identify RTS patients from 2016 to 2024. Patients presenting with recurrent RTS after being treated by

another provider, traumatic radial nerve palsy, or other diagnoses without signs and symptoms of RTS were excluded.

Results: This study included 185 patients (201 upper extremities), with 17 patients (9.1%) experiencing symptoms in bilateral upper extremities. The average age was 50.6 ± 13.9 years and 130 patients (70.0%) were female. Of all upper extremities, 124 (61.7%) had symptoms in the dominant hand. Concurrent diagnoses at the time of presentation included 105 upper extremities (52.5%) with lateral epicondylitis, 68 (33.8%) with carpal tunnel, 27 (13.4%) with cubital tunnel, 16 (8.0%) with median/pronator entrapment, and 8 (4.0%) with medial epicondylitis.
A total of 174 extremities (86.6%) were treated with steroid injections, with 158 (78.2%) treated with a single injection, 14 (6.9%) treated with two, and 2 (0.1%) treated with three. Otherwise, 140 extremities (69.7%) were treated with physical/occupational therapy and 94 extremities (46.8%) were treated with elbow splinting. In total, 38 patients, 45 extremities (20.5%) progressed to surgical decompression, with an average age of 49.6 ± 14.0 years. All patients experienced significant relief evidenced during follow-up at post-operative week 2. One patient had a hematoma which required operative washout, and one patient experienced recurrence of radial tunnel symptoms which resolved with occupational therapy; there were otherwise no complications. Comparison of patients undergoing surgery versus managed conservatively found a significantly higher instance of bilateral symptoms in the former group (8/38 patients, 21.1% versus 9/147 patients, 6.1%, p=0.005). Extremities undergoing surgery also had a significantly higher incidence of concurrent cubital tunnel (12/45 extremities, 26.7% versus 15/156 extremities, 9.6%, p=0.003) than extremities treated without surgery.

Conclusion: Radial tunnel is a clinical diagnosis and is often complicated by other symptoms in the affected extremity. Our data reveals a higher occurrence in female patients and mostly in the dominant hand. Over half of all patients presented with lateral epicondylitis or other symptoms, though almost everyone complained mostly of pain in the proximal forearm. The vast majority of these patients were effectively treated with a single steroid injection; those who progressed to surgery often had symptoms affecting bilateral extremities and concurrent cubital tunnel, and experienced significant improvement almost immediately post-operatively

Socioeconomic and Geographic Factors in Brachial Plexus Birth Palsy Outcomes

Abstract Presenter: Meeti Mehta BS

Abstract Co-Author(s): Casey Zhang, Aileen Cui, Alexander Davit III, MD

Introduction: Brachial plexus birth palsy (BPBP) is a serious complication of birth. When evaluating infants for BPBP, potential barriers to care must be considered to promote successful follow-up. This study aims to assess the role of socioeconomic and geographic context on clinical and surgical outcomes for BPBP patients. We hypothesize that geographic location (urban vs. rural) and socioeconomic factors, as measured by the Area of Deprivation Index (ADI) and Social Vulnerability Index (SVI), influence the likelihood of surgical intervention and recovery outcomes in children with BPBP.

Methods: A retrospective review of BPBP patients at Children's Hospital of Pittsburgh from 2010 to 2023 was conducted. Demographic, clinical, and geographic data, including ADI and SVI scores, were collected. Surgical intervention rates and Active Movement Scale (AMS) scores at follow-up were the primary outcomes. Multivariate regression analyses were performed to evaluate the relationship between geographic and socioeconomic factors and surgical intervention as well as recovery, with $p<0.05$ set as the significance threshold.

Results: 293 children met inclusion criteria. 51.9% were female, 71.0% were White, and 65.2% were from urban areas. 28.3% of all patients with BPBP underwent surgical intervention. Rural patients were 2 times more likely to undergo surgery than urban patients (OR 2.07, CI 1.23-3.49, p=0.006). Patients living farther from the hospital were also more likely to undergo surgery (OR 1.006, CI 1.002-1.01, p=0.005). Patients with lower initial AMS scores, those with shoulder dystocia or Horner's syndrome, and females were more likely to undergo surgery ($p<0.001$, p=0.04, p=0.02, p=0.04, respectively). At follow-up, rural patients had lower AMS scores than urban patients (β=-5.229, p=0.02), and females had higher scores than males (β=4.935, p=0.02). White patients had higher AMS scores than non-White patients (β=8.939, $p<0.001$), while Black patients had lower scores than others (β=-11.47, $p<0.001$). Increased distance from the hospital was associated with lower AMS scores (β=-0.07, $p<0.001$). The mean ADI score was 71.7 (SD 20.2), and the mean SVI was 0.41 (SD 0.24), with no significant relationship to surgical intervention or AMS scores.

Conclusion: This study demonstrates that socioeconomic indices did not significantly correlate with surgical decisions or recovery outcomes, suggesting that traditional measures may not fully capture disparities in BPBP management. However, rural patients and those living farther from the hospital were more likely to undergo surgery and had poorer recovery outcomes, highlighting potential barriers to care. These

findings underscore the need for targeted interventions-such as improved rural outreach, telemedicine follow-ups, and enhanced rehabilitation access-to optimize functional recovery and reduce disparities in BPBP treatment.

Improving Hand Surgery Practices with RAG-Enhanced Language Models

Abstract Presenter: Ariana Genovese

Abstract Co-Author(s): Prabha Srinivasagam Phd, Sophia Pressman, Sahar Borna MD, Cesar Abraham Gomez Cabello MD, Syed Ali Haider M.B.B.S., Maissa Trabilsy, Cui Tao, Antonio Forte MD, PhD, MS

INTRODUCTION: Precise physical examination techniques are essential for accurate diagnosis and informed decision-making in hand surgery. With advancements in AI, Large Language Models (LLMs) integrated with Retrieval-Augmented Generation (RAG) hold the potential to deliver detailed, contextually accurate guidance on hand assessments. This study explores the capacity of such AI systems to comprehensively address queries regarding key physical examination tests, including their procedures, diagnostic objectives, clinical presentations, and implications for surgical decision-making. Additionally, the analysis incorporates the anatomical foundations relevant to these assessments, providing a holistic evaluation of the AI's effectiveness in supporting clinical practice.

METHODS: The analysis includes ten widely recognized hand examination techniques: Allen's test, Tinel sign, Phalen's test, Durkan's test, Finkelstein's test, Bunnell's test, Watson's test, Wartenberg's sign, Froment's sign, and Jeanne's sign. Two RAG models powered by LLMs, namely Gemini-1.0-pro-002 and Gemini-1.5-pro-001, were compared to assess their ability to respond to targeted queries accurately.
The study posed 80 detailed questions to both models, encompassing aspects like procedural steps, diagnostic relevance, and interpretation of results for the selected hand examinations. Evaluation metrics included precision, recall, and F1 score to measure the accuracy of the responses. Accuracy distribution was also analyzed, categorizing responses into low, medium, and high accuracy levels for a comprehensive performance assessment.

RESULTS: The Gemini-1.5-pro-001 RAG LLM model demonstrated superior performance metrics, achieving precision (0.73), recall (0.79), and an F1 score of (0.76).

It maintained a well-proportioned accuracy distribution, with 16% of responses falling within the low accuracy range, 22% in the medium range, and 61% in the high accuracy range. In contrast, the Gemini-1.0-pro-002 RAG LLM model yielded lower performance metrics, with precision (0.67), recall (0.51), and an F1 score of (0.58). Its accuracy distribution was comparatively skewed, with 38% of responses in the low range, 20% in the medium range, and 41% in the high range. The significant difference in recall between the Gemini-1.5-pro-001 and Gemini-1.0-pro-002 models underscore the enhanced ability of the former to identify and retrieve relevant information. This improvement, driven by its improved training methods, optimized retrieval, and enhanced reasoning capabilities, enables Gemini-1.5-pro-001 to provide more comprehensive and accurate responses across a broader range of queries. These features make it a reliable and effective tool for providing accurate, contextually relevant information in clinical and educational settings.

CONCLUSION: This study highlights the capability of RAG-enhanced LLMs to deliver comprehensive and accurate information on hand examination techniques. The improved performance of the Gemini-1.5-pro-001 model, compared to its counterpart, demonstrates its proficiency in generating precise and contextually meaningful responses. By pushing the boundaries of AI integration in clinical and educational domains, these models show promise in supporting medical decision-making, aiding surgeons and clinicians, and elevating the educational experience for medical students and trainees.

Crush Injury Fractures of the Hand: A Characterization of Emergency Room Cases and Evaluation of Complications and Unplanned Operation

Abstract Presenter: Margaret Wang

Abstract Co-Author(s): Ishan Shah, Tim Jeng, Ernest Dimbo, Nikhil Sobti MD, Matthew Lee, Ali Mansour, Reena Bhatt MD

Purpose: Crush injuries to the hand can result in severe and debilitating injuries. Outcomes following crush injury fractures of the hand are not well characterized, and specific patient demographic and injury characteristics may be associated with higher risk of complications. This study evaluates hand crush injuries presenting to the emergency room and investigates factors associated with complications following such injuries.

Methods: Adult patients presenting to the emergency department with acute fractures of the phalanges or metacarpals following crush injury to the hand between July 2011 and May 2024 were retrospectively identified. Injuries classified as mangled were excluded. Patient demographics, injury characteristics including fracture patterns, and treatments including surgeries were collected. Complications were defined as: infections, wound healing complications (necrosis, hematoma), loss of reduction, and any unplanned operations during a patient's follow-up period. Bivariate and binary logistic regression analyses were conducted to evaluate predictive variables associated with complications (significance set at $p < 0.05$).

Results: Of 262 patients that met inclusion criteria, the average age of presentation was 42.7 (SD 15.1) years old. There were 33 (12.6%) patients that experienced a complication, including eleven cases of infection (three osteomyelitis), seven cases of soft tissue necrosis, and two cases of reduction loss. There were 18 (6.9%) unplanned operations or re-operations, with the most common reason being loss of reduction or non-union (n=7, 2.7%). The average follow-up duration was 96 (SD 169) days following initial presentation.
Over half of injuries occurred at work (53.8%, n=141). The distal phalanx was most frequently fractured (79.4%, n=208), followed by proximal phalanx (11.5%, n=30), metacarpal (9.2%, n=24), and middle phalanx (8.4%, n=22). The majority were open (74.4%, n=195) and 49.6% were comminuted fractures (n=130). Amputation injury occurred in 24.0% of cases (n=63). One quarter of patients (24.0%, n=63) required operative intervention, which included 40 fracture reduction and fixations (15.3%) and 12 revision amputations (4.6%).
On bivariate analysis, older age, diabetes mellitus, and prior/active history of smoking were significantly associated with complications including unplanned reoperation. Amputation injuries, fractures to more than one finger, middle phalanx fractures, and operative intervention were also significantly associated with complications. Binary logistic regression analyses adjusted for age, diabetes, and smoking history demonstrated that, for injury pattern, comminuted fractures and amputation injuries were significantly associated with complications, while open fractures and intraarticular fractures were not. For fracture location, middle phalanx and metacarpal fractures were significantly associated with complications, while proximal and distal phalanx fractures were not.

Conclusion: Demographic factors, including older age, diabetes, and smoking may be associated with complications or unplanned operation following hand crush injury. Fracture characteristics, including metacarpal, middle phalanx fractures, and

amputations may be associated with greater complications. These findings may guide risk stratification and patient management following such injuries.

Adverse Hardware Outcomes and Medical Complications Associated with Prior Serotonergic Antidepressant Usage After Open Reduction and Internal Fixation of the Distal Radius Fracture: A National 1:1 Propensity-Matched Cohort Analysis

Abstract Presenter: Matthew Q. Dao

Abstract Co-Author(s): Parul Rai, Paul Won MD, Arun Gosain MD

Background: Selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs) have been associated with worse outcomes after spinal surgeries[1-2]. However, there is a paucity of literature specifically analyzing the effects of serotonergic antidepressants (SSRIs/SNRIs) on open reduction and internal fixation (ORIF) for distal radius fractures. As patients undergoing ORIF may be taking serotonergic antidepressants before their surgery, it is unclear as to whether these medications may predispose them to worse recovery outcomes. The purpose of our retrospective study was to explore the impact of prior serotonergic antidepressant usage on postoperative complications and hardware-related issues following ORIF of the distal radius, using a nationally matched cohort analysis.

Methods: On January 19, 2025, we analyzed anonymous electronic health records across 67 healthcare organizations via the United States Collaborative Network on TriNetX, a federated research database. A preliminary total of 72,743 adult patients (≥18 years old) who underwent ORIF were identified from January 2005 to January 2025. Patients were then divided into two cohorts: Cohort A (9,068 patients) who used SSRIs or SNRIs within 3 months before ORIF and Cohort B (63,680 patients) with no documented history of SSRIs/SNRIs prescription. 1:1 propensity–matching was performed for sex, gender, age, body mass index, ethnicity, race, and co-morbid conditions (i.e., depression, anxiety, hypothyroidism, hypertension, diabetes, alcohol-related disorder, obesity, chronic kidney disease, liver disease, congestive heart failure, nicotine dependence, cerebrovascular diseases). Primary outcomes examined readmission, transfusion, acute postoperative pain, anemias, wound disruption, skin infection, and sepsis at 14-days and 90-days. Secondary outcomes evaluated hardware failure, surgical revision of nonunion, the incidence of carpal tunnel syndrome, and

lesion of the median nerve at 2-years. Statistical analysis was calculated using multivariate regressions, and significance was set at $p<0.05$.

Results: Following 1:1 propensity–matching, both balanced cohorts consisted of 7,055 patients for comparative analysis. Patients with prior SSRIs/SNRIs usage experienced significantly elevated risks for readmission, transfusion, acute postoperative pain, and anemias at both 14-days and 90-days (all $p<0.005$) when compared to the control group. Additionally, wound disruption, skin infection, and sepsis were significantly higher at 90-days (all $p<0.05$). At 2-years, the SSRIs/SNRIs patients displayed significantly greater rates of hardware failure, surgical revision of nonunion, incidence of carpal tunnel syndrome, and lesion of the median nerve (all $p<0.05$).

Conclusion: Preoperative usage of serotonergic antidepressants significantly elevated postoperative risks for complications and adverse hardware-related outcomes in adult patients undergoing ORIF of the distal radius. We encourage hand surgeons to consider discussing the risks and benefits of continuing these antidepressants with patients during the preoperative period. Future prospective studies should distinguish the relationship between different antidepressant medications, co-morbid psychiatric disorders, and complications in surgical fixation of the fractured distal radius.

References:
1. Adelstein J, Moyal A, Strony J, et al. Serotonergic Antidepressants are Associated With Higher Rates of Hematoma After Anterior Cervical Spine Surgery. Spine. 9900; Publish Ahead of Print doi: 10.1097/BRS.0000000000005168.
2. Schadler P, Shue J, Moawad M, et al. Serotonergic Antidepressants Are Associated with Increased Blood Loss and Risk for Transfusion in Single-Level Lumbar Fusion Surgery. Asian Spine J. 2017;11(4):601-609. doi:10.4184/asj.2017.11.4.601

National Survey on Antithrombotic Management in Minor Hand Surgery: Current Practices in Canada.

Abstract Presenter: Justin Haas MD, GDip, BSc

Abstract Co-Author(s): Helene Retrouvey MD, James Douketis

Purpose: Withholding antithrombotic medications before surgery can increase thromboembolic risk, yet their continuation may raise bleeding concerns. Many patients undergoing minor hand surgery take these medications, requiring careful perioperative

management. However, guidelines lack clarity on how to classify bleeding risk, leading to differences in interpretation of available guidelines. This study examines the perioperative approaches of Canadian plastic surgeons managing antithrombotic therapy in minor hand surgery.

Methods: A cross-sectional electronic survey was distributed to Canadian plastic surgeons in 2024. Respondents provided clinical management preferences for patients on antithrombotic therapy undergoing cyst excision, trigger finger release, and carpal tunnel release.

Results: Seventy-four surgeons participated. Most (93.7%) classified these procedures as low-risk of bleeding, but this dropped to 71.2% for patients on Apixaban and 59.9% for those on Warfarin. Medication management varied: 26.6% would hold Aspirin, 37.8% would hold Warfarin, and 47.7% would hold Apixaban. Surgeon demographics, hand surgery fellowship training, access to thrombosis experts, use of guidelines, and tourniquet preferences had no significant influence on these decisions.

Conclusions: There is considerable variability in perioperative antithrombotic management among Canadian plastic surgeons performing minor hand surgery. Despite considering common minor hand procedures as low-risk, many surgeons elect to hold medications, diverging from existing guidelines. This likely stems from concerns over anticoagulant-related bleeding risks-an issue not explicitly addressed in current recommendations.

Impact of Corticosteroid Injections on Surgical Outcomes in Thumb Carpometacarpal Joint Arthritis

Abstract Presenter: Nicholas Jarvis MD

Abstract Co-Author(s): Samantha Maasarani MD, Christopher Jou MD, Daniel Bahat MD, Kyle Chepla MD

Hypothesis: We hypothesize that patients with thumb carpometacarpal joint (CMCJ) arthritis can be efficaciously treated with corticosteroid injections (CSI), however we suspect that more CSIs leads to a higher conversion rate to surgery.

Methods: A retrospective analysis was performed of all patients with thumb CMCJ arthritis evaluated by a hand surgeon at Metro Health Medical Center between 2000-2024. Patients were stratified into cohorts depending on the number of CSI they received. Propensity-score matching was performed to create similar distributions of hand dominance, affected thumb, and Eaton-littler classification between all cohorts. Hazard ratios (HR) and Kaplan-Meier time to event curves were performed for all cohorts.

Results: 957 patients with thumb carpometacarpal joint arthritis were included in our study: 238 received 0-CSI, 288 received 1-CSI, 300 received 2-to-4-CSIs, 131 received 5-or-more-CSIs. There was an equal distribution of hand dominance (right-90.9%, left-5.5%, ambidextrous-0.4%, unknown-3.1%), affected thumb (bilateral-36.5%, right-30.4%, left-32.9%, unknown-0.2%), and Eaton-Littler classification (1-9.7%, 2-29.7%, 3-27.8%, 4-12.4%, and unknown-0.2%) between all groups. 235 patients underwent surgery, and the rates of surgery were statistically significant between each group (0-CSI-5.5%, 1CSI-25.0%, 2-to-4CSI-32.3%, and 5+CSI-40.5%). Those in 1CSI (HR 14, 95% CI 5.7-35), 2-to-4CSI (HR 19, 95% CI 7.7-46), and 5-or-more-CSI (HR 25, 95% CI 9.9-62) were at significantly higher odds to undergo surgery when compared to 0-CSI (Figure 1). Kaplan-Meier analysis revealed receiving at least 1-CSI lowered the risk of surgery 3-months after their index injection when compared to those not receiving CSI. There was no significant difference in the risk reduction of conversion-to-surgery between the various number of CSI received within the first 54-months after their index injection and those receiving 5-or-more-CSI carried a higher risk-of-conversion-to-surgery after 54-months compared to the other CSI groups (Figure 2).

Summary Points: Patients receiving any number of CSI for treatment of thumb CMCJ arthritis were at significantly higher odds of undergoing surgical intervention compared to those not receiving any CSI regardless of their Eaton-Littler classification. Patients should be counseled on CSIs being most protective against surgery within 3 months after index injection when compared to not receiving any injections and this surgery risk reduction is not paralleled by receiving a higher quantity of CSIs. Hand surgeons should consider surgical intervention 54 months after index CSI, especially in patients that have already received 5 or more injections.

Comparison Of Intramedullary Screw Fixation, K-wires, And Plating For Fixation Of Phalangeal Fractures: A Meta-Analysis

Abstract Presenter: Michael Cassidy MD

Abstract Co-Author(s): Rebeka Dejenie, Kanad Ghosh MD, Jignesh Unadkat

Background: Intramedullary screw fixation (IMF) has recently gained popularity for operative management of phalangeal fractures. We hypothesize that the functional outcome of phalangeal fractures treated with IMF is noninferior to that of K-wires or plating.

Methods: A systematic review of PubMed and Embase was conducted according to PRISMA guidelines by three independent reviewers. Inclusion criteria included extra-articular middle and proximal phalangeal fractures in adults treated with either IMF, K-wires, or plating. Outcomes of interest were total active motion (TAM) and Disabilities of the Arm, Shoulder, and Hand (DASH) scores. Exclusion criteria included pediatric populations, cadaveric studies, or lack of relevant inclusion criteria. A random effects meta-analysis evaluated outcomes of interest.

Results: The initial search retrieved 1,377 articles. 303 duplicates were removed, yielding 1074 for title and abstract screening. 142 studies underwent full text review and 28 of these (9 IMF, 8 K-wires, 11 plating) were finally included. There were no significant differences between the three operative interventions for DASH scores. Likewise, TAM was not significantly different across interventions, though IMF trended towards significantly higher TAM compared to plating.

Conclusions: IMF can yield similar functional outcomes compared to K-wires or plating of phalangeal fractures. IMF offers high operative efficiency without the need for prolonged immobilization. Subsequent analyses will focus on meta-regression to parse out inter-study heterogeneity, as well as include additional outcomes such as infection, malunion, and grip strength.

References: Viechtbauer W (2010). "Conducting meta-analyses in R with the metafor package." Journal of Statistical Software, 36(3), 1–48. doi:10.18637/jss.v036.i03.

Targeted Muscle Reinnervation of the Superficial Branch of the Radial Nerve Following Coronary Artery Bypass Grafting: A Good Save and Little Victory

Abstract Presenter: Arthur Lanoux-Nguyen MD

Abstract Co-Author: James Willcockson MD

Background: Targeted muscle reinnervation (TMR) has revolutionized the field of chronic pain management. Originally described as a nerve transfer technique to control myoelectric prostheses, TMR is at the forefront of treating existing and preventing the development of neuromas and phantom pain following limb loss by creating new sensory nerve pathways. We present the story of a good save and little victory in a patient successfully treated with TMR for persistent, debilitating paresthesias from injury to the superficial branch of the radial nerve (SBRN) following radial artery harvest for 4-vessel coronary artery bypass grafting (CABG).

Methods: Electromyography (EMG) assessed function of the superficial branch of the radial nerve. Exploration of the affected arm showed near-complete transection of the SBRN from surgical clips used during the CABG radial artery harvest. Neurolysis and SBRN repair was first performed with nerve graft. Given persistent neuropathic pain, TMR was offered. Pre-operative SBRN block was completed to simulate the potential benefit from TMR. TMR of SBRN to the motor nerve of the extensor carpi radialis brevis (ECRB) muscle was successfully completed.

Results: Our patient had a history of hypertension, hyperlipidemia, tobacco and alcohol use, and uncontrolled diabetes (A1c 12.9%) who presented with chest pain. Workup was notable for elevated troponins and electrocardiogram findings consistent with NSTEMI. Left heart catheterization revealed severe multivessel obstructive coronary artery disease for which CABG was indicated. Following surgery, lifestyle modifications were initially successful. However, the distress and psychological burden of ongoing pain from the SBRN significantly diminished the patient's quality of life. This led to a relapse into smoking and alcohol use, behaviors that had previously contributed to his cardiovascular disease. Ongoing follow-up after completion TMR demonstrates cessation of chronic analgesic use, significantly improved pain, and restored ability to work, care for his children, and effectively engage in activities of daily living.

Conclusion: The applications of TMR have been well-described in treating chronic pain in amputees and preventing symptomatic neuroma formation following major limb loss. As highlighted here, TMR provides not only a spectrum of benefits to amputees experiencing phantom and residual limb pain, but also little victories to those suffering from the psychological burden of chronic pain sustained in trauma or surgery.

Predicting outpatient follow-up after distal radius fracture repair in patients that have undergone volar plate or dorsal spanning plate placement

Abstract Presenter: Brandon De Ruiter MD

Abstract Co-Author(s): Connor Peck MD, Stephanie Vu, Brian Cho MD, Jeffrey Friedrich MD, Christopher Crowe MD, Yusha (Katie) Liu MD, PhD

Purpose: Longitudinal follow-up after distal radius fracture fixation is essential for monitoring bony healing and optimizing postoperative rehabilitation. It is particularly critical following dorsal spanning plate fixation where hardware removal must be coordinated. The primary aim of this study was to identify factors associated with loss to follow-up for patients undergoing distal radius fracture fixation at a single level 1 trauma center. A secondary aim was to determine hardware removal rates following dorsal spanning plate placement and establish risk factors for loss to follow-up with associated hardware retainment.

Methods and Materials: Adult (age ≥18) patients undergoing distal radius fracture fixation at a level 1 trauma center were identified over a five-year period (2015-2019). Patients were excluded if they were <18 years age, underwent non-operative management, were incarcerated, or had incomplete clinical data. Demographics, injury characteristics, operative details, polytrauma status, distance from hospital, non-cannabinoid recreational drug use, homelessness, psychotic mental illness, dementia, occupation, education level, insurance type, and language were collected from the medical record. Univariate and multivariate logistic regression were performed to determine independent predictors of attending at least one post-operative appointment and undergoing hardware removal for those with spanning fixation.

Results: Of 353 patients who underwent operative treatment, 299 had fractures repaired with non-spanning fixation alone (e.g., volar plating) while 54 underwent placement of a dorsal spanning plate. Of patients with non-spanning fixation, 235 of 299 returned for follow-up (79%). Of patients with a dorsal spanning plate, 50 of 54 (93%) returned for follow-up and hardware removal. Non-cannabinoid recreational drug use (odds ratio 0.13; p=0.001), homelessness (0.08; p=0.03), unemployment (0.27; p<0.001), and Medicaid insurance type (0.27; p<0.001) were significantly associated with loss to follow-up. By contrast, those with private insurance (3.4; p<0.001) or worker's compensation claim (5.8; p=0.04) were significantly more likely to follow-up on univariate regression. Patients with dorsal spanning plates were significantly more likely to follow-up than those with non-spanning fixation (odds ratio 3.3; p=0.02) even among

high-risk patients (i.e., those with non-cannabinoid recreational drug use, homelessness, unemployment, or Medicaid status). Of this high-risk cohort with spanning plates, 15 of 16 (93.8%) returned for hardware removal-though a longer average time to plate removal was found for those with non-cannabinoid recreational drug use (168 days; p=0.03) and homelessness (196 days; p=0.020) compared with patients with spanning plates that did not have those risk factors (112.86 days).

Conclusions: Non-cannabinoid recreational drug use, homelessness, unemployment, and Medicaid insurance were found to predict loss to follow-up after distal radius fracture fixation. However, these risk factors did not apply to those treated with dorsal spanning plates, as patients frequently presented for hardware removal regardless.

The Current State of Insurance Coverage of Modern Upper Extremity Prosthetics

Abstract Presenter: Amanda Seymour

Abstract Co-Author(s): Steven Henry MD, Brent Egeland MD

Purpose: Complete management of major upper extremity amputation patients includes transition from acute surgical care to long-term prosthetic care. Prosthetics are fundamental to final mobility, integration in society, and quality of life. Additionally, advancements beyond static prosthetics have progressed rapidly in the past 15 years. Myoelectric control now includes technologies like pattern recognition which yields dozens of complex motor functions from few viable neuromuscular units, for example. However, providing this newer technology to patients heavily relies on insurance coverage, as their high costs remain a barrier to most patients. The purpose of this study was to investigate the rate and quality of insurance coverage of advanced upper extremity prosthetics to identify real-world barriers to obtaining technologies which fully capitalize on modern microsurgical reconstructive techniques.

Methods: Review of the ten largest health insurance providers' (Aetna, Anthem, Blue Cross, Centene, Cigna, Humana, Kaiser, Medica, Medicare, United) coverage plans, contracts, and web-based platforms was conducted to identify quantity and quality of coverage for upper extremity prostheses. Limitations, exceptions, and vague exclusionary language was noted whenever present. Local prosthetists were reviewed for expert insight into access barriers for amputee patients and anecdotal local denial

rates. Public insurance claims databases were additionally accessed to determine most recent rates of coverage.

Results: The majority of large payers do not provide full or even partial coverage for costs of advanced upper extremity prosthetics. Many insurance providers use language to exclude patients from qualifying, and lack of scientific evidence or inadequate proof of "necessity" to obviate liability for coverage of any prosthetic beyond the most basic, despite significant advancements in targeted muscle reinnervation (TMR) and myoelectric control devices. In addition to documentation by an ordering physician, certain payers require additional, specific evaluations by the physician and/or prosthetist, with minimum qualifications of the prosthetist involved. Several states have passed "insurance fairness" laws requiring payers to provide coverage of prosthetics in line with coverage for other medical expenses, however, this only applies to public insurance plans and is typically measured as a percentage of the cost of goods–an insurance provider can successfully meet these terms by providing the appropriate percentage coverage for the cheapest, lowest-level technology device. Ultimately, the delta between coverage and costs can exceed tens of thousands of dollars, an insurmountable barrier for most patients. Around half of upper extremity prosthetic estimates received initial denials, and over 90% of myoelectric control devices were denied once or more, even after an appeals process.

Conclusion: Investigation of insurance coverage for modern upper extremity prosthetics reveals a significant gap between costs, coverage, and therefore, access. Though many payers site "lack of evidence" to label myoelectric control anything beyond "investigational", the overwhelming inadequacy of coverage continues to stifle large-scale scientific investigation of outcomes.

Comparison of Post-Operative Complication Rates after Upper Extremity Nerve and Tendon Transfers

Abstract Presenter: Mohammed Shahid MD

Abstract Co-Author(s): Rachana Suresh MD, John Nguyen DO, Samarth Krishna, Jeffrey Khong, Jared Zhang, Sami Tuffaha MD, Ala Elhelali

BACKGROUND: Nerve and tendon transfers are commonly used surgical techniques to restore upper extremity function for a variety of paralytic conditions including cervical

spinal cord, brachial plexus, and isolated peripheral nerve injuries. While both procedures can be effective given appropriate patient selection, there is a lack of data comparing rates of postoperative complications. In this study, we will use a large retrospective cohort to evaluate differences in post-operative complications after these two reconstructive methods.

METHODS: A 10-year retrospective cohort analysis was conducted using the TriNetX database which contains data from 107 healthcare organizations between January 2016 and February 2025. Patients who had undergone upper extremity nerve and tendon transfer were identified using International Classification of Disease-10 (ICD-10) and Current Procedural Terminology (CPT) codes. Propensity score matching (PSM) for age, sex, obesity, HgbA1c, steroid and anticoagulation use, and history of malignancy was used to control for baseline characteristics. Thirty-day postoperative incidences of thromboembolic events, superficial infections, bleeding-related complications, other postoperative infections (urinary tract infection, pneumonia, bacteremia, necrotizing fasciitis, c. difficile colitis, sepsis) were obtained using ICD-10 codes. Results were evaluated using TriNetX's Lucid Network. Categorical and continuous variables were compared with Chi-Squared test and Student's t-test respectively. Risk ratios (RR) were calculated for post-operative complications between groups and a p-value of ≤0.05 was considered statistically significant.

RESULTS: A total of 24,936 patients were identified, including 834 patients who underwent nerve transfers and 24,102 patients who underwent tendon transfers. The nerve transfer cohort was younger at time of operation (45.1+/-16.3 vs 59.3+/-14.2 years, $p < 0.05$) and had a higher proportion of male patients (50.7% vs 34.6%, $p<0.05$). The tendon transfer cohort had a significantly higher incidence of diabetes mellitus (13.8% vs 9.8%, $p<0.05$), obesity (20.5% vs 15.2%, $p<0.05$), and long-term steroid use (4.1% vs 2.8%, $p<0.05$). After 1:1 PSM, 829 matched patients were selected per cohort. The rate of overall complications was significantly higher in the nerve transfer group (8.18% vs. 4.81%, RR= 2.088, $p<0.05$). Superficial infections were significantly more common in the nerve transfer group (3.73% vs. 2.05%, RR=2.429, $p<0.05$). No significant differences between groups were observed for other infections (1.81% vs. 1.4%, RR=1.5, $p=0.56$), thromboembolic events (1.8% vs. 1.2%, RR=1.5, $p=0.30$) or bleeding-related complications (1.4% vs. 1.2%, RR=1.2, $p=0.429$).

CONCLUSIONS: This study demonstrates that nerve transfers are associated with a significantly increased risk of overall postoperative complications compared to tendon transfers. Tendon transfer patients experienced rates of superficial infections consistent with a clean wound class (1-3%) as previously reported for outpatient hand surgery and extremity/brachial plexus nerve surgery. However, the rate of superficial infections was

significantly higher in nerve transfer patients. While this study highlights important differences in complication rates for these procedures, the TrinetX database is limited by the absence of clinically relevant factors including wound site, wound class, and length of surgery. Further retrospective and prospective studies are warranted to explore these differences, as they may play a role in pre-operative decision making and incentivize modifications in peri-operative management for these procedures.

Migraine and Peripheral Nerve Session

Impact of site of tissue nanotransfection on peripheral nerve regeneration in a murine model

Abstract Presenter: Reade Otto-Moudry

Abstract Co-Author(s): Hamid Malekzadeh MD, Ana Salazar Puerta, Sara Kheirkhah, Hallie Harris, Jon Stranan, Daniel Gallego-Perez, Amy Moore MD

PURPOSE: Recovery from peripheral nerve injury (PNI) is often incomplete, resulting in significant morbidity. Following PNI, axons are guided across the gap between the proximal and distal nerve stump by Schwann cell cords, which extend from the proximal stump. Schwann cell growth relies on preceding endothelial cell growth across the gap, which occurs from both the proximal and distal stumps. Tissue nanotransfection (TNT) is an innovative approach to non-viral plasmid delivery for the purpose of increasing vasculogenesis following PNI. Our preliminary data demonstrated improved functional outcomes in a murine sciatic nerve crush injury when TNT was applied at the site of injury. This study investigates the impact of TNT delivery location, given the bidirectional growth of endothelial cells, by comparing its effects when administered either proximally or distally to the site of sciatic nerve transection and repair in a murine model. The aim of this study is to identify the optimal delivery site for TNT in more severe nerve injury models.

METHODS: C57BL/6 mice (8–10 weeks old) were randomly assigned to four study groups (n=10/group): sham surgery, cut and repair, cut and repair with proximal TNT, and cut and repair with distal TNT. In the cut and repair models, the right sciatic nerve was transected 5mm proximal to the trifurcation. Tissue nanotransfection (TNT) was used to deliver a vasculogenic reprogramming gene cocktail-Etv2, Foxc2, and Fli1

(EFF)-to the injured nerve. In the proximal and distal TNT groups, TNT was applied 3 mm proximal or distal to the transection site, respectively. Four mice from each group were sacrificed two weeks postoperatively for histological analysis. The remaining six mice in each group underwent functional evaluations, including compound muscle action potential (CMAP), motor unit number estimation (MUNE), twitch and tetanic force, and grip force, over a 14-week period.

RESULTS: Distal TNT resulted in increased grip force, with significant improvements observed at weeks 7, 10, and 14. Additionally, tetanic force was enhanced in the distal TNT group, reaching statistical significance at week 8. Histological analysis of sciatic nerve samples is ongoing and is expected to be completed by the time of presentation. This analysis will include immunohistochemical staining to assess axon count, G-ratio, and vascularity.

CONCLUSION: Our study demonstrates a relative improvement in functional recovery after sciatic nerve transection when TNT is performed distal to the site of injury. Further histological analysis is ongoing, with the aim of elucidating the cellular milieu involved.

Preserving Stability, Restoring Relief: A Ligament-Sparing Approach to Pudendal Nerve Decompression

Abstract Presenter: Catherine Kennedy

Abstract Co-Author(s): Michael Stigliano, Charles Lu DO, Chrisovalantis Lakhiani MD, Vishrut Patel

Introduction: Pudendal nerve entrapment (PNE) is a debilitating cause of chronic pelvic and perineal pain, often impairing daily activities, sexual function, and overall quality of life. Surgical decompression can be highly effective for patients refractory to conservative management. Traditional approaches have frequently involved partial or complete sectioning of key ligaments, sacrotuberous (STL) and sacrospinous (SSL) ligaments, raising concerns about pelvic instability. Recent advances in intraoperative neurophysiological monitoring and a heightened emphasis on maintaining pelvic floor integrity have driven the development of ligament-sparing surgical techniques. This retrospective study presents our experience with a transgluteal, ligament-sparing approach for pudendal nerve decompression at the Alcock's canal, or beneath the piriformis muscle at the sciatic outlet.

Methods: A retrospective analysis was performed on 57 patients (39 men, 18 women) undergoing 75 decompression procedures for clinically diagnosed PNE between 2022 and 2024. Inclusion criteria included a positive diagnostic pudendal nerve block (≥50% pain relief), pain refractory to conservative management (≥3 months), and localization of entrapment via clinical exam and imaging. All patients underwent transgluteal nerve decompression at Alcock's canal and/or the sciatic outlet, sparing the STL and SSL. Intraoperative compound muscle action potential (CMAP) measurements and triggered electromyography (EMG) monitored nerve function pre- and post-neurolysis. Pain, functional status, and patient-reported improvement (categorized as no/minimal, moderate, or significant) were assessed at 3, 6, and 12 months postoperatively.

Results: 24 patients presented with bilateral symptoms and 33 with unilateral involvement. The median time from consultation to surgery was 193 days (Q1-Q3 range = 106-435 days). Intraoperatively, nerve compression was frequently attributed to hypertrophic or varicose internal pudendal veins, fibrotic bands, and scarring in Alcock's canal or at the sciatic outlet. Preserving the STL and SSL permitted multi-level nerve decompression and maintaining pelvic floor support. The median amperage that recorded a waveform decreased significantly from a median of 3 mA pre-decompression to 0.5 mA post-decompression (Z-score = -5, $p<0.0001$), suggesting effective neural release. Of the 53 patients available for follow-up, only 2 (3.77%) reported minimal or no improvement, while 19 (35.85%) reported moderate improvement, and 32 (60.37%) reported significant improvement in symptoms. 73.5 % of the patients achieved sustained, clinically meaningful pain relief without any symptom recurrence. Notably, there were no cases of pelvic instability or ligamentous compromise.

Conclusion: These findings support a shift in surgical practice toward ligament-sparing transgluteal decompression for PNE. Despite historical concerns that partial ligament sectioning is necessary to adequately decompress the pudendal nerve, our results demonstrate that thorough neurolysis and vascular management can be achieved without sacrificing the STL or SSL. The significant improvements in nerve conduction correlate with favorable postoperative outcomes, underscoring the utility of real-time neurophysiological CMAP monitoring. These findings affirm that ligament preservation is feasible for the majority of PNE cases and may usher in an important shift in surgical management, offering patients enduring pain relief and improved quality of life.

Quantitative Sensory Outcomes in Direct-to-Implant Breast Reconstruction and Gender-Affirming Mastectomy: A Prospective Cohort Study

Abstract Presenter: Makayla Kochheiser

Abstract Co-Author(s): Kristyn Vicente, Katya Remy MD, Chase Alston, Katherine Carruthers MD, William Gerald Austen Jr., MD, Ian Valerio MD, MS, MBA, FACS, Lisa Gfrerer MD, PhD

Purpose: Loss of sensation is a common consequence following mastectomy in both breast reconstruction and gender-affirming surgery, leading to a reduced quality of life, impaired sexual health, and functional limitations. Nerve preservation and reinnervation techniques, such as the use of nerve allografts or direct coaptation, have been utilized to improve sensory outcomes. This study aims to compare sensory outcomes in patients undergoing targeted nipple areola complex (NAC) reinnervation (TNR) with direct-to-implant (DTI) breast reconstruction using nerve allografts and gender-affirming mastectomy (GAM) utilizing direct coaptation.

Methods: Patients undergoing DTI reconstruction (n=32) and GAM (n=74) were prospectively followed at Weill Cornell Medicine and Massachusetts General Hospital from January 2023 to December 2024. Quantitative Sensory Testing (QST) with monofilament, pinprick, 2-point discrimination, vibration, temperature, and pressure was completed preoperatively and at 1, 3, 6, and 12 months postoperatively. Student t-tests were used to determine differences in sensation compared to baseline and between DTI and GAM patients at each timepoint.

Results: Preoperative sensation was comparable between groups ($p>0.05$). Postoperatively, monofilament testing was significantly better at the chest and NAC in GAM patients at each timepoint ($p<0.05$). At 12 months, all sensory tests were significantly better at the chest in patients with GAM except for pressure, which was similar between groups. Pinprick, vibration, and cold temperature detection was significantly better at the NAC in patients with GAM, while 2-point discrimination, heat detection, and pressure were similar. At 12 months, all sensory tests had returned to baseline in the GAM group except chest pressure, chest and NAC heat detection, and NAC pinprick. In DTI patients, vibration had reached baseline at 12 months.

Conclusions: TNR resulted in improved sensation in DTI reconstruction and GAM patients, with GAM returning and DTI approaching the preoperative baseline sensation by 12 months. These findings suggest that nerve reinnervation techniques facilitate

sensory recovery. While both groups showed notable sensory improvements, GAM patients exhibited more rapid recovery across various sensory modalities.

Electroacupuncture Following Microsurgical Peripheral Nerve Repair: A Path to Enhanced Functional Recovery or Waste of Time?

Abstract Presenter: Felipe Goncalves

Abstract Co-Author(s): Adriano Neto, Emily Sampaio, Luiza Abud, Bruno Terada, Vinícius Alves, Wu Hsing, Liaw Chao, Rolf Gemperli., Cristina Pires Camargo MD, PhD

Purpose: Peripheral nerve injuries (PNI) are common lesions worldwide, particularly among trauma patients. For neurotmesis, the most severe form of PNI, the gold standard treatment is microsurgical neurorrhaphy (MN). However, its effectiveness is often limited by the slow regeneration of neurons and by Wallerian degeneration. In order to obtain better nerve healing and optimal functional results following PNI, the combination of MN with other therapeutic approaches has increasingly been investigated, with electroacupuncture being hypothesized as a promising option. Therefore, the objective of this study was to assess the regenerative effects of electroacupuncture as an adjunctive therapy for PNI using a murine model.

Methods: Between February 2022 and January 2025, fourteen male Wistar rats were included in the study. All animals underwent a microsurgical procedure on the right sciatic nerve to mimic a PNI, followed by an end-to-end MN. Then, the animals were randomly divided into two groups: a control group (n = 7) and an electroacupuncture (EA) group (n = 7). The EA group received two 20-minute sessions of electroacupuncture per week for 12 weeks on the right leg, while the control group received no additional interventions beyond the surgery. The primary outcome was the sensory function of the nerve, evaluated at week 12 through peripheral nerve examinations assessing responses to Pain, Heat, and Pressure, measured using a five-point scale (from 0 to 4). We also assessed motor function using the Sciatic Function Index (SFI), calculated through walking-track analysis of footprints at weeks 3, 6, 9, and 12. Also, after the animals were put down, histological studies of their nerves were done using Hematoxylin and Eosin (HE) staining to check for angiogenesis and Masson's Trichrome (MT) staining to check for Schwann cell count.

Results: Based on our analysis, the EA group had significantly higher Pain response values than the control group 12 weeks after surgery (3.17 ± 0.69 vs. 1.57 ± 0.90, p = 0.006). A similar enhanced response was observed in the Pressure test (2.17 ± 0.89 vs. 0.43 ± 0.49, p = 0.005) and in the Heat test (1.5 ± 1.1 vs. 0 ± 0, p = 0.03). However, for motor function measured by the SFI, no significant differences were found across the four timepoints (p = 0.36, p = 0.37, p = 0.17, p = 0.12). Histological analysis with MT staining revealed a 96% increase in Schwann cell count distal to the injury in the EA group (p = 0.00007), while HE staining showed no significant differences in angiogenesis between the groups.

Conclusion: Overall, our findings indicate that electroacupuncture is an effective adjunctive therapy following MN for PNI, as it consistently improved sensory functions across all examinations, and demonstrated a greater Schwann cell count distal to the lesion, suggesting enhanced myelination after the intervention.

Beyond the Surface: Ultrasound as a Diagnostic Tool for Neuromas and TMRpni Success in Osseointegrated Amputees

Abstract Presenter: Anna Vaeth

Abstract Co-Author(s): Makayla Kochheiser, Nancy Qin, Lucy Wei, Albert Truong MD, Jason Hoellwarth, Taylor Reif, S Robert Rozbruch, Paul Christos, Ogonna Nwawka, David Otterburn MD

Purpose: Ultrasound is routinely used to assess peripheral nerves in the lower extremity due to its low cost, accessibility, and rapid examination time. However, its use in evaluating neuromas, benign tumors of nerve tissue, remains underutilized despite its great potential as a noninvasive imaging tool. Ultrasound also provides a unique opportunity to visualize nerve reconstruction techniques, including targeted muscle reinnervation (TMR), regenerative peripheral nerve interface (RPNI), and their combination, TMRpni, which are often performed alongside osseointegrated implant (OI) prosthesis placement to manage nerve pain. In this study, we aimed evaluate neuromas and assess the effectiveness of TMRpni in preventing neuroma formation using ultrasound in OI patients.

Methods: This was a single-institutional prospective observational study of patients with lower-limb OI prostheses. Lower extremity nerve ultrasounds with 2-D grayscale and doppler were completed at post-operative follow-up visits following OI prosthesis implantation. The sciatic nerve was targeted for imaging in above-the-knee amputees, while the common peroneal, tibial, and sural nerves were targeted for below-the-knee amputees. Neuromas found on ultrasound were reported in square millimeters (mm2) and pain was assessed with targeted palpation using the ultrasound probe.

Results: Our study included 24 nerves imaged from 10 amputees (2 transfemoral, 8 transtibial). The mean time of imaging from surgery was 18 months (range: 4-40 months). Nerves imaged included two sciatic, three common peroneal, four superficial peroneal, four deep peroneal, five sural, and six tibial nerves. There were 7 nerves that received TMRpni and 17 nerves that received no nerve reconstruction during osseointegration implantation. In nerves without TMRpni, ultrasound identified 10 hypoechoic nodules consistent with neuromas (59%) while 7 nerves tapered smoothly into the surrounding musculature (41%). Median neuroma size in the non-TMRpni group was 62 mm2 (range: 13.8-289 mm2). Patients experienced symptomatic neuromas upon sonopalpation in 3 of the 10 neuromas (30%). Of the seven nerves with TMRpni, ultrasound detected intact coaptation between the motor nerve branches and sensory branches of TMRpni in 6 nerves (86%). Intact coaptations were observed up to 16 months post-reconstruction without pain to sonopalpation. One 12.4 mm2 neuroma was identified at one TMRpni coaptation 14 months after reconstruction and direct sonopalpation elicited pain.

Conclusions: Ultrasound proved effective in evaluating neuroma formation and TMRpni outcomes in amputees with osseointegrated prostheses. Neuromas were detected in 59% of unreconstructed nerves, while TMRpni demonstrated intact coaptation in most cases, with one reconstruction failure observed at 14 months after surgery. Ultrasound enabled real-time identification of symptomatic neuromas using sonopalpation unlike magnetic resonance imaging techniques. These findings support the potential role of ultrasound in long-term monitoring of nerve reconstruction efficacy and neuroma prevention.

Evaluating the Colony Stimulating Factor 1 Receptor as a Biomarker for the Identification of Peripheral Nerve Injuries

Abstract Presenter: Jared Zhang

Abstract Co-Author(s): John Nguyen DO, Rachana Suresh MD, Zachary Zamore, Mohammed Shahid MD, Samarth Krishna, Andrew Horti, William Padovano MD, Catherine Foss, Sami Tuffaha MD, Jeffrey Khong

Purpose: Visualizing axonal regeneration along injured nerves is not possible with currently available imaging modalities, severely limiting accurate diagnosis and effective management of peripheral nerve injuries. We investigated if imaging macrophages, which infiltrate injured nerves during Wallerian degeneration, could allow for non-invasive characterization of peripheral nerve injuries. Specifically, we evaluated the use of the PET agent [11C]CPPC, which binds to the colony stimulating factor 1 receptor (CSF1R) expressed by monocytes and proliferating macrophages, as a novel nerve imaging agent.

Methods and Materials: Ten male Lewis rats were divided into two surgical groups: unilateral sciatic nerve transection with repair using a 3cm isograft (n=5) or sciatic transection without repair, in which a 3cm isograft was coapted only to the distal stump (n=5). All animals underwent contralateral sham surgery. At 4 weeks post-intervention, animals received an intravenous injection of [11C]CPPC, and radioactivity was quantified using an automated gamma counter. To examine differential uptake along the sciatic nerve, nerves were analyzed in 3 segments: the sciatic nerve proximal to the site of injury, the nerve graft, and the sciatic nerve distal to the injury site. [11C]CPPC uptake, expressed as percent injected dose per segment (%ID/segment), was compared between groups using Kruskal-Wallis tests with post-hoc Dunn tests.

Results: Relative to sham segments, injured sciatic nerves from both unrepaired and repaired animals demonstrated significantly greater [11C]CPPC uptake within the graft (unrepaired: 4.1x uptake, $p<0.05$; repaired: 2.7x uptake, $p<0.05$) and distal sciatic segments (unrepaired: 3.9x uptake, $p<0.05$; repaired: 2.8x uptake, $p<0.05$). Uptake in both unrepaired and repaired nerves was significantly higher in segments distal to the site of injury compared to segments proximal to the injury site ($p<0.05$). Relative to repaired nerves, unrepaired nerves demonstrated greater uptake within the graft (1.7x uptake, $p<0.05$) and in the distal sciatic segment (1.3x uptake, $p<0.05$).

Conclusion: [11C]CPPC effectively labeled macrophage content within injured nerves, with higher uptake observed in unrepaired nerves compared to repaired nerves and in distal versus proximal segments. These findings suggest that [11C]CPPC PET imaging of CSF1R may be a promising non-invasive approach for the characterization of peripheral nerve injuries and the monitoring of axonal regeneration following repair.

Development of an Interactive, Ultra-High Resolution, Magnetic Resonance Neurography Atlas of the Head and Neck Peripheral Nerves

Abstract Presenter: Sophie Queler

PURPOSE: High-resolution MRI of peripheral nerves, or magnetic resonance (MR) neurography, can facilitate nerve visualization for surgical planning and symptom evaluation(1), but is currently under-utilized in the field of plastic surgery. Additionally, despite the importance of peripheral nerve anatomy to plastic surgeries, limited tools are available to the surgical trainee to demonstrate the correct three-dimensional nerve anatomy, branching patterns, and relationship to surrounding structures. The head and neck represents a region with a complex network of peripheral nerves that provide important functionality, including facial strength, sensation, gustation, and mastication; damage to these nerves can be potentially debilitating to patients. While early exploration suggests MR neurography may be useful in the face and neck region(2), identifying nerves in the head and face on MRI has previously been technically challenging due to their small size and branching patterns. This research creates a high-resolution, freely available, interactive MR neurography atlas of the face and neck as a clinical and educational tool to 1) facilitate education of nerve anatomy in the head and neck, and 2) demonstrate the feasibility of applying MR neurography in this region.

MATERIALS AND METHODS: Healthy volunteers (n=8, 7 Female, mean 25.5 years) underwent 3.0-Tesla MR neurography of the head and neck from September 2021 to April 2024 at 0, 12, 24, and 36 hours post infusion with ferumoxytol (iron-oxide nanoparticle) for vascular suppression (127.5mg iron; half-life=14 hours).(3) Two-dimensional and three-dimensional fluid-sensitive, fat-suppressed sequences were acquired with submillimeter resolution and reconstructed using deep-learning algorithms for improved image quality (AIRTM Recon DL). Three radiologists independently reviewed exams to select the highest quality and most anatomically representative cases, forming the basis for the atlas. A previously developed brachial plexus atlas (https://www.hss.edu/MRNatlas) was expanded to include the head and neck using RadStax web-based software.

RESULTS: Excellent vascular suppression was achieved in 8 subjects. Image stacks are being generated for each major nerve in the face and neck, with labels for 49 muscles and 121 nerves. The atlas is currently being developed in-house and will be made available on an institutional server alongside the brachial plexus atlas.

CONCLUSIONS: An interactive MR neurography atlas is developed to depict nerves and their innervated muscles in the face and neck. Plastic surgery trainees may utilize this atlas as a clinical and educational reference to better understand peripheral nerve anatomy. This may also facilitate increased use of MR neurography within the field of plastic surgery as a valuable tool for surgical planning and symptom evaluation.

REFERENCES:
1. Thawait SK, Wang K, Subhawong TK et al. Peripheral nerve surgery: the role of high-resolution MR neurography. AJNR Am J Neuroradiol. 2012 Feb;33(2):203-10.
2. Remy K, Hazewinkel MHJ, Knoedler L, Sneag DB, Austen WG Jr, Gfrerer L. Aetiologies of iatrogenic occipital nerve injury and outcomes following treatment with nerve decompression surgery. J Plast Reconstr Aesthet Surg. 2024 Aug;95:349-356.
3. Queler SC, Tan ET, Geannette C, Prince M, Sneag DB. Ferumoxytol-enhanced vascular suppression in magnetic resonance neurography. Skeletal Radiol. 2021 Nov;50(11):2255-2266.

Rib Sparing Scalenectomy Improves Physical Function in Neurogenic Thoracic Outlet Syndrome

Abstract Presenter: Rachel Safeek MD, MPH

Abstract Co-Author(s): Joshua Bell MD, Ramin Shekouhi, Syeda Hoorulain Ahmed MD, Harvey Chim MD

Introduction: Rib sparring scalenectomy (RSS) for supraclavicular (SC) brachial plexus decompression has been used to treat neurogenic thoracic outlet syndrome (NTOS), but there are limited studies describing objective clinical outcomes. Here, we demonstrate clinical improvement for patients undergoing RSS for NTOS based on QuickDASH (QD) scores.

Methods: This is a single center, retrospective study, evaluating NTOS patients who underwent primary unilateral RSS through a SC approach between the dates of June 2023 & December 2024. All surgeries were performed by a single surgeon. Paired student t-test was used to compare mean pre- and postoperative QD scores as well as differences in QD score subsets. Linear regression was used to evaluate the

relationship between patient demographics and surgical factors on change in QD scores as well as overall postoperative scores.

Results: A total of 13 patients were included in the study (average age 38 [SD18.9 years]; 10 (76.9%) females). The average time from diagnosis of NTOS to index surgery was 37.5 (SD 29.7 months). Most patients (92.3%) had European Association of Neurosurgical Societies (EANS) type I NTOS consisting of motor weakness/atrophy. Only one patient (7.7%) had type II NTOS as defined as an anatomic abnormality causing pain/sensory symptoms only. Nearly half (53.8%) underwent subsequent infraclavicular (IC) decompression at time of surgery, while 4 patients (30.8%) underwent distal nerve decompression. Average follow-up was 148.5 (SD109.8 days). No patients underwent subsequent revision surgery. Average preoperative QD score was 48.46 (interquartile range [IQR], 36.36 to 57.96) and average postoperative QD score was 29.2 (IQR, 19.32-43.19). The mean difference in pre- and final postoperative QD scores was (19.27 ± 14.10, $p<0.001$). Additionally, on QD breakdown patients reported significant reduction in pain ($p=0.002$) and improvement in sleep ($p=0.018$) & ability to socialize with friends/family ($p=0.033$). No relationship was found between patient demographic data and change in QD scores; however, age >65 years ($p=0.005$) and history of psychiatric diagnosis ($p=0.01$) were associated with overall higher final postoperative QD scores.

Summary Points: NTOS patients undergoing supraclavicular decompression via scalenectomy demonstrate significant improvements in QD scores. Advanced age and psychiatric diagnosis may attribute overall higher postoperative scores, however, do not significantly impact changes from baseline preoperative scores.

FACEPAL: A Decade of Insights into Pediatric Facial Nerve Palsy at St. Jude Children's Research Hospital – A Study of 1068 Cases (2014–2024)

Abstract Presenter: Payton Grande

Abstract Co-Author(s): Devra Becker MD, Robin Evans MD, FACS, FRCSC

Background: Facial nerve palsy (FNP) is a debilitating condition that significantly impacts pediatric patients undergoing brain tumor resection, with an incidence of iatrogenic injury as high as 20%. Despite advancements in reconstructive and rehabilitative strategies, outcomes remain highly variable. A comprehensive evaluation

of patient demographics, treatment modalities, and prognostic indicators is essential to optimize management and improve long-term outcomes.

Methods: This retrospective cohort study analyzes 1068 pediatric patients diagnosed with FNP at St. Jude Hospital from 2014 to 2024. Data were extracted from medical records, including demographic information, tumor diagnosis, clinical presentation, treatment approaches (surgical interventions, physical therapy, adjunctive therapies), and long-term outcomes. Comparative statistical analyses, including chi-square tests for categorical variables and t-tests/ANOVA for continuous variables, were performed to identify prognostic factors influencing recovery.

Results: Preliminary findings suggest significant variability in recovery rates based on etiology, treatment modality, and timing of intervention. Certain prognostic factors, including patient age, tumor type, and severity of initial palsy, were associated with differential outcomes. The study also evaluates the efficacy of various reconstructive and rehabilitative strategies, providing insights into best practices for optimizing facial function.

Conclusion: This study represents the largest cohort analysis of pediatric FNP patients at a single institution and provides critical insights into the demographic and clinical profiles of affected patients. By identifying key prognostic factors and effective treatment strategies, these findings can guide more personalized, evidence-based approaches to FNP management. The results contribute to the existing literature and have the potential to improve long-term functional and psychosocial outcomes for pediatric patients with FNP.
Significance: Understanding the factors that influence FNP recovery and treatment efficacy can inform clinical decision-making, enhance patient counseling, and refine surgical and rehabilitative approaches, ultimately improving quality of life for affected children.

Breaking Bad: Analyzing Drug Delivery for Osteomyelitis of Osseointegrated Implants

Abstract Presenter: Carson Gundlach

Abstract Co-Author(s): Anna Vaeth, Albert Truong MD, Jason Hoellwarth, Taylor Reif, S Robert Rozbruch, David Otterburn MD

Purpose: Managing osteomyelitis (OM) in amputees with osseointegrated implants (OI) requires balancing infection control with implant retention. This study evaluates antibiotic regimens, surgical management, and implant outcomes in OI patients who developed OM.

Methods: A retrospective review of 127 OI patients (2017-2023) identified OM cases by positive intraoperative bone cultures or radiographic evidence of infection (i.e., X-ray, CT, MRI). Empiric and targeted antibiotic regimens were categorized, and treatment outcomes, including clearance, recurrence, and implant survival, were analyzed using descriptive statistics.

Results: Among 127 patients reviewed, 11 (8.7%) were diagnosed with OM. The median follow-up time for all OI patients was 2.6 years (IQR: 2.1). Infection clearance was achieved in 82% of OM patients, though 64% experienced recurrence. Empiric regimens most commonly included beta-lactams (n = 3, 100% clearance, 67% recurrence) and glycopeptides with beta-lactamase inhibitors (n = 3, 100% clearance, 67% recurrence). Targeted therapy predominantly involved beta-lactams (n = 6, 83% clearance, 50% recurrence), with escalation to fluoroquinolones or lipopeptides (n = 2), achieving 100% clearance but 100% recurrence. Median total antibiotic duration was 43 days (IQR: 9.5). Surgical debridement was performed in 73% of cases (median: 1 debridement, mean: 1.9 ± 1.5). Implant exchange was required in 36% of OM cases, but implant survival with revision was achieved in 55%. Across all 127 OI patients, the implant exchange rate was 3.1% (n = 4).

Conclusion: Although some OM patients experienced recurrence, initial infection clearance was achieved in most cases, and implant exchange was needed in only four patients. Beta-lactams were the primary antibiotic class, occasionally escalating to fluoroquinolones or lipopeptides. Encouragingly, over half of infected implants were salvaged through revision surgery, underscoring the potential for implant retention despite infections. Further studies are needed to refine antibiotic regimens and surgical strategies for optimal long-term outcomes.

An Intra-patient Control Pilot Study Of Thermal and Tactile Sensory Recovery After Dual-Neurotized Autologous Breast Reconstruction

Abstract Presenter: Michael Stigliano

Abstract Co-Author(s): Carson Gundlach, Makayla Kochheiser, Anna Vaeth, Lucy Wei, Marcos Lu Wang MD, Hao Huang MD, David Otterburn MD, Nancy Qin

PURPOSE: Following mastectomy, patients often experience numbness in the breast due to the sacrifice of sensory nerves. Neurotization aims to restore sensation by surgically coapting donor nerves in the reconstructed breast to recipient nerves in the chest wall. This pilot study is the first to quantify the recovery of tactile and thermal sensation over time relative to baseline in patients undergoing mastectomy with immediate dual-neurotized autologous reconstruction.

METHODS: Patients scheduled for mastectomy with deep inferior epigastric perforator (DIEP) flap reconstruction were prospectively enrolled. During reconstruction, dual-nerve coaptation was performed using two thoracoabdominal donor nerves and the anterior cutaneous and lateral branches of the T3/T4 recipient nerves.

Patients underwent neurosensory testing preoperatively and at 3, 6, and 9 months postoperatively. Tactile sensation was assessed across nine breast regions using a pressure-specified sensory device. Thermal sensation was evaluated across five breast regions using hot (52°C) and cold (12°C) packs. Sensation scores at each time point were compared to preoperative baseline values, with all patients serving as their own controls. Statistical analysis was performed using paired t-tests, with the significance level set at $\alpha = 0.05$.

RESULTS: Overall, 29 breasts were included in the study. Tactile sensation progressively improved over time, starting at 48.7% of baseline at 3 months postoperatively, increasing to 69.5% by 6 months, and reaching 70.9% by 9 months ($p < 0.001$). The outer superior area demonstrated the greatest sensory recovery, reaching 94.1% of baseline by 9 months, which was not significantly different from preoperative scores ($p = 0.265$). This was followed by the outer medial region (87.7%), outer lateral region (81.4%), and outer inferior region (72.7%). In contrast, the nipple-areola complex (NAC) exhibited the lowest tactile recovery, reaching only 57.5% of baseline by 9 months ($p < 0.001$).

For thermal recovery, 56%, 72%, and 73% of breast regions correctly perceived heat sensation at 3, 6, and 9 months postoperatively, while only 38%, 46%, and 43% correctly perceived cold sensation. Subanalysis at 9 months revealed that heat perception was highest in the superior and medial regions, while cold perception was highest in the superior and lateral regions. In contrast, the NAC demonstrated the

poorest thermal sensory recovery, with only 43.8% of patients perceiving heat correctly and 6.3% perceiving cold correctly by 9 months.

CONCLUSION: This is the first study to evaluate sensory outcomes following mastectomy and dual-neurotized DIEP reconstruction. Our findings provide a baseline reference for physicians considering dual-nerve neurotization and can inform preoperative counseling. Patients can expect to recover approximately 73% of tactile sensation, 73% of heat perception, and 43% of cold perception by nine months postoperatively. Additionally, patients should be advised that the NAC demonstrates the poorest sensory recovery among all breast regions.

Unmasking Hidden Risks: Analyzing Rectus Abdominis Atrophy Post- Lobectomy

Abstract Presenter: Isabel Snee

Abstract Co-Author(s): Arushi Biswas, Lorreen Agandi, ANJANA SRIKUMAR, William Padovano MD, Carisa Cooney MPH, CCRP, Kristen Broderick MD

Background: Thoracotomy results in intercostal nerve injuries in up to 50% of patients, which may lead to symptomatic rectus abdominus muscle atrophy.1,2 This atrophy may be permanent in some cases and self-limiting in others due to spontaneous nerve regeneration or compensatory collateral sprouting by intact intercostal nerves.3,4 Our objective was to identify perioperative risk factors for chronic post- lobectomy rectus abdominis atrophy to guide strategies for prevention and early nerve reconstruction.

Methods: We retrospectively identified patients who experienced ≥20% post-operative reduction in rectus abdominus muscle volume on CT within 6 months of video-assistance thoracoscopic surgery (VATS), robotic lobectomy, or open lobectomy. Rectus abdominus muscle volume was re-measured at 12 months post- lobectomy. We used logistic regression to identify factors associated with worsened atrophy at 12 months.

Results: Of 139 patients, 93 (66.9%) experienced further atrophy while 43 (33.1%) stabilized or regained volume by 12 months post-operatively. Multivariate analysis demonstrated active smokers (OR 3.42, p=0.010) and former smokers (OR 1.96, p=0.006) had significantly higher risk of further volume loss than non-smokers. VATS significantly lowered the risk of atrophy compared to open surgery (OR 0.05, p=0.001), while robotic surgery showed a non-significant trend toward protection (OR -1.17,

p=0.143). Higher BMI (≥30) was a significant risk factor with BMIs of 18.5–25 reducing atrophy risk by 76.3% (OR 0.24, p=0.040).

Conclusions: Smoking history, open surgery, and higher BMI were associated with increased risk of chronic post- lobectomy rectus abdominus atrophy. Identifying patients at higher risk could prompt early interventions to reduce atrophy and improve long-term recovery.

1. Weitzner AS, Bhoopalam M, Khong J, Biswas A, Karwoski A, Haile M, Waldron N, Mawalkar R, Srikumar A, Broderick S, Ha J, Broderick KP. Rectus Abdominis Muscle Atrophy and Asymmetry After Pulmonary Lobectomy. J Surg Res. 2024 Jul;299:137-144. doi: 10.1016/j.jss.2024.04.011. Epub2024 May 15. PMID: 38754252.
2. Zhang R, Schwabe K, Kru¨ ger M, Haverich A, Krauss JK, Alam M. Electro-physiological evidence of intercostal nerve injury after thoracotomy: an experimental study in a sheep model. J Thorac Dis. 2017;9:2461e2465.
3. Rogers M. Surgical aspects of chronic post-thoracotomy pain. Eur J Cardio Thorac Surg. 2000;18:711e716.
4. Arends S, Bo¨hmer AB, Poels M, et al. Post-thoracotomy pain syndrome: seldom severe, often neuropathic, treated unspecific, and insufficient. Pain Rep. 2020;5:e810.

Lower Extremity Gunshot Injuries Predictors of Peripheral Nerve Injuries in Lower Extremity Gunshot Injuries

Abstract Presenter: Joshua Kim

Abstract Co-Author(s): Edward Frails, Suhail Mithani MD, Daniel Joh MD, Neill Li, Sebastian Perez-Espina

Purpose: Lower extremity gunshot wounds (GSWs) are significant traumatic events associated with significant patient morbidity and mortality. Alongside evaluation for vascular injury (1) and fractures, (2) examination of neurologic function is critical. Development of peripheral nerve injury (PNI) may result in permanent disability for patients. Limited data exists on epidemiology and predictors of PNIs, a gap this study aims to fill.

We hypothesize that concomitant dislocations or open injuries are associated with posttraumatic PNIs. We also predict that vascular procedures may signal an increased risk of nerve injury.

Methods: We retrospectively queried patients within the Duke University Health System between January 2014 and June 2024 (3, 4) for presentations of lower extremity gunshot wound trauma. Patient demographics were captured. Characteristics and trauma, including injury components and surgical interventions, were noted. Nerve injuries within 180 days were also captured, and PNI characteristics were charted.

Results: Overall, 2,552 patients presented with lower extremity GSWs, with 2,124 (83.2%) males at a median age of 29.7 years [24.2,43.9]. Injuries most often had open wound (1,534, 60.1%) or fracture (1,254, 49.1%) components, with 909 (35.6%) polytraumas. GSWs most often damaged the leg (1,073 42.0%), knee (380, 14.9%), or foot (373, 14.6%).

PNIs were reported in 38 (1.5%) patients, with 22 (57.9%) requiring immediate surgical repair and 16 (42.1%) undergoing delayed repair. The sciatic nerve (16, 42.1%) and tibial nerve (5, 13.2%) were predominantly impacted.

Open, vascular, dislocation, or amputation components to injury were more frequent in patients with PNIs (all $p<0.05$). PNI patients also had higher requirements for immediate fasciotomy, vascular grafting, and other major vascular procedures (all $p<0.05$). While surgical fracture reduction at any level was not associated with PNIs, the need for other procedural interventions on the ankle and leg, including debridement and decompression, was significant ($p<0.05$).

On logistic regression, dislocation ($p=0.021$, OR=13.07, 95% CI=0.67-82.53) or open ($p=0.028$, OR=2.70, 95% CI=1.15-6.93) wound components independently raised odds of PNI. Requiring a vascular graft was also a significant predictor of nerve injury ($p=0.043$, OR=5.14, 95% CI=1.01-22.92), although other procedures did not increase the frequency of PNI.

Conclusions: PNIs after lower extremity GSWs were diagnosed in 1.5% of patients. All patients required surgical intervention, with 57.9% undergoing immediate repair. Dislocation or open components significantly raised the odds of PNIs, as did the need for vascular grafting. Patients who present with concerning trauma characteristics should be cautiously scrutinized for the development of lower extremity neuropathy.

References
1. Sadjadi J, Cureton EL, Dozier KC, Kwan RO, Victorino GP. Expedited treatment of lower extremity gunshot wounds. J Am Coll Surg. 2009;209(6):740-5. Epub 2009/12/05.
2. Bartlett CS. Clinical update: gunshot wound ballistics. Clin Orthop Relat Res. 2003(408):28-57. Epub 2003/03/05.
3. Hurst JH, Liu Y, Maxson PJ, Permar SR, Boulware LE, Goldstein BA. Development of an electronic health records datamart to support clinical and population health research. J Clin Transl Sci. 2020;5(1):e13. Epub 2021/05/06.
4. Horvath MM, Rusincovitch SA, Brinson S, Shang HC, Evans S, Ferranti JM. Modular design, application architecture, and usage of a self-service model for enterprise data delivery: the Duke Enterprise Data Unified Content Explorer (DEDUCE). J Biomed Inform. 2014;52:231-42. Epub 2014/07/23.

The Impact of a Family History of Migraine on Preoperative Characteristics in Patients Seeking Nerve Decompression Surgery

Abstract Presenter: Kristyn Vicente

Abstract Co-Author(s): Merel Hazewinkel MD, Matthew Depamphilis, Katya Remy MD, William Gerald Austen Jr., MD, Lisa Gfrerer MD, PhD

Purpose: Patients with nerve pain who present for nerve decompression surgery oftentimes also experience concomitant headache disorders such as migraine. It is unclear whether a family history of migraine influences preoperative patient characteristics that could help determine candidacy for surgery. This study aims to explore this association.

Methods: Patients who underwent screening for nerve decompression surgery between September 2012 and December 2025 at two institutions were enrolled in this prospective cohort study. Information regarding demographics, family history of HDs, migraine and nerve pain characteristics, and associated symptoms were collected preoperatively. A univariate and multivariable linear regression analysis was conducted to examine the association of a family history of migraine with patients' preoperative characteristics.

Results: Among 1,113 patients, 667 (59.9%) reported a positive family history of migraine, while 446 (40.1%) did not. The average age of migraine onset was

significantly younger in those with a family history of migraine (19.42 years) as compared to those without (29.64 years) ($p<0.001$). A significantly higher proportion of patients with a positive family history of migraine reported symptoms of aura before or during pain episodes, including nausea, vomiting, sensitivity to light or noise, blurred or double vision, and difficulty with concentration ($p<0.01$). A significantly greater proportion of patients with a family history of migraine described their migraine pain as "aching," "squeezing," "stabbing," or constricting," whereas those without a family history were more likely to characterize their pain as "throbbing," ($p<0.05$). Additionally, patients without a family history of migraine were significantly more likely to report an inciting head or neck injury requiring medical treatment ($p=0.01$) and concurrent nerve pain with their migraine pain ($p<0.05$).

Conclusion: Our findings suggest that patients with and without a family history of migraine differ in their preoperative pain characteristics and associated symptoms. Patients without a family history were more likely to report a history of head or neck trauma and describe throbbing pain, while those with a family history experienced an earlier symptom onset and symptoms of aura. Distinguishing between how these groups present preoperatively may improve patient selection for nerve decompression surgery and optimize treatment for those with underlying non-migrainous pain.

Partial Wrist Denervation Improves Long-Term Functional Status without Impinging Wrist Mobility: A Single-Center, Retrospective Review

Abstract Presenter: Audrey Mustoe BA

Abstract Co-Author(s): Chanthia Ma, Nicita Mehta, Felita Zhang, Micaela Tobin, Agustin Posso MD, Andrew Nguyen, Bernard Lee MD, MBA, MPH, Arthur Celestin MD, MPH

Introduction: Partial denervation is a surgical approach used to relieve wrist pain in patients with various wrist pathologies. While it is generally thought to improve pain, questions exist regarding its long-term impact on patient outcomes. This study evaluates the effects of partial wrist denervation on long-term outcomes, including subjective pain scores, range of motion, and Disabilities of the Arm, Shoulder, and Hand (DASH) scores.

Methods: A retrospective review of medical records was conducted for patients who underwent partial wrist denervation at Beth Israel Deaconess Medical Center between

January 2015 and January 2025. Data collected included age at surgery, demographic characteristics, and preoperative, intraoperative, and postoperative variables. Preoperative and postoperative results were compared with paired t-tests and Fisher's exact test. Significance was set at $p \leq 0.05$.

Results: A total of 146 patient records were reviewed, with a mean age at surgery of 56.7 ± 13.7 years. Most patients were male (70.7%), White (71.3%), Not Hispanic or Latino (89.1%), and right-handed (88.0%). Most had no prior surgery on the affected wrist (64.8%), and nearly all underwent a concurrent procedure during denervation (98.7%). The most common indications for wrist denervation included scapholunate advanced collapse (SLAC) or scaphoid nonunion advanced collapse (SNAC) (28.8%), trauma-related injuries (21.9%), arthritis (10.3%), and synovitis (10.3%). The posterior interosseous nerve was the most frequently transected nerve (82.2%), followed by the anterior interosseous nerve (15.4%).

The mean time to follow-up was 1.2 years, with a maximum of 9.1 years. Approximately a fifth of patients (21.5%) required a subsequent reoperation and 8.9% required subsequent injections for analgesia.

Patients demonstrated a significant improvement in functional status after their respective wrist procedure and denervation, as indicated by a decrease in DASH scores from 51.8 preoperatively to 41.6 postoperatively ($p = 0.007$). Wrist motion was preserved with no significant differences in wrist flexion or extension. While the median postoperative pain score was 0, statistical significance was not reached. Subgroup analyses by concurrent procedure type demonstrated that DASH scores did not change significantly preoperatively and postoperatively.

Conclusion: This study uniquely assessed the long-term outcomes of partial wrist denervation with an extended follow-up period averaging more than one year post-denervation. Wrist denervation as an adjunct to traditional wrist operations such as proximal row carpectomy and partial arthrodesis appears to improve long-term functional outcomes without decreasing wrist mobility. Although pain reduction was not statistically significant, the small sample size ($n = 12$) for pain analysis and the low median postoperative pain score (0) may still suggest a clinical benefit. Further research with larger, prospective cohorts is warranted to better evaluate wrist denervation's role in pain relief and functional recovery.

Variable Superficial Peroneal Nerve Anatomy and Implications for Lower Leg Fasciotomy

Abstract Presenter: Sophie Queler

Abstract Co-Author(s): Darryl Sneag, Yenpo Lin, Marcio Bottene Villa Albers, Ek Tsoon Tan, Lisa Gfrerer MD, PhD, Meghan Sahr

PURPOSE: Acute compartment syndrome (ACS) and chronic exertional compartment syndrome (CECS) commonly affect the lower leg and are managed surgically by fasciotomy (1). Injury to the superficial peroneal nerve (SPN) is a complication of anterior and/or lateral compartment fascial release in as many as 8% of cases (2). Current fasciotomy techniques safeguard the SPN by avoiding the anterior intermuscular septum along which the SPN travels before it pierces the crural fascia and bifurcates at the ankle into medial (MDCN) and intermediate (IDCN) dorsal cutaneous branches (3). In ~15%, bifurcation occurs proximally (3). Post-operative nerve mapping with magnetic resonance (MR) neurography could evaluate iatrogenic injury following fasciotomy. We aimed to 1) describe SPN imaging abnormalities in symptomatic patients following fasciotomy, and 2) evaluate associations between variant nerve branching and iatrogenic nerve injury. We hypothesized increased iatrogenic nerve injuries in patients with early SPN branching.

METHODS: Patients with MR neurography performed following leg fasciotomy from January 2012 to August 2023 were included in this IRB-approved retrospective study. EMRs were reviewed for demographics, surgical details, postoperative neurological symptoms, and electrodiagnostic exams (EDX). Dedicated MR neurography at 3.0-Tesla utilized axial, fluid-sensitive, fat-suppressed sequences. A musculoskeletal radiologist (8 years' experience), blinded to operative history and symptoms, reviewed imaging for presence of normal or variant SPN anatomy, perineural scarring, nerve signal hyperintensity, nerve discontinuity, and focal enlargement to suggest neuroma.

RESULTS: In total, 42 patients with pain (37), numbness (11) and/or paresthesias (6) were included (mean age 33 years; 21 female). Forty-eight fasciotomies (6 bilateral) were performed for CECS (27) or ACS (15) involving four-compartment (26), anterior and lateral (7), or anterior-only (6) releases. Mean time between fascial release and MRI was 20.8 months (range=1-191). EDX was available in 23 cases; in all with abnormal MRI SPN appearance, EMG/NCS was also abnormal (11). In those with normal MRI SPN appearance (12), EMG/NCS was normal and abnormal in equal proportions.

SPN had a normal appearance on MRI in 31 cases. Abnormalities included increased nerve signal intensity (4), perineural scarring (8), and/or laceration with neuroma formation (4). Early nerve branching was observed in 5 cases (10.4%), of which 3 demonstrated nerve laceration with neuroma formation of the IDCN (2) or IDCN and MDCN (1). Among the many cases with a typical branching pattern, there was one case of laceration.

CONCLUSIONS: Post-surgically, early MR neurography in patients with new sensory disturbances may identify a nerve injury amenable to surgical intervention. MR neurography may also help identify SPN branching patterns prior to fasciotomy to reduce iatrogenic insult risk.

REFERENCES:
1. Bowyer MW. Lower Extremity Fasciotomy: Indications and Technique. Curr Trauma Rep 1 2015.
2. Waterman BR, Laughlin M, Kilcoyne K et al. Surgical treatment of chronic exertional compartment syndrome of the leg: failure rates and postoperative disability in an active patient population. J Bone Joint Surg Am. 2013 Apr 3;95(7):592-6.
3. Adkison DP, Bosse MJ, Gaccione DR, Gabriel KR. Anatomical variations in the course of the superficial peroneal nerve. J bone Jt Surg Am Vol. 1991;73(1):112-114.

A Novel Surgical Technique for Refractory Occipital Neuralgia: Centro-Central Neurorrhaphy to Minimize Neuroma Formation

Abstract Presenter: Ahmed Nasser MD

Abstract Co-Author(s): Matthew Kaufman MD, Vishrut Patel

Introduction: Occipital neuralgia is characterized by intense, often debilitating pain localized to the distribution of the greater and lesser occipital nerves. While conservative treatments remain the first-line approach, surgical decompression is frequently employed when symptoms prove refractory to medical treatment. Several salvage techniques have been described at the time of secondary occipital nerve surgery to handle the nerve, especially after neurectomy. Recent advances in peripheral nerve surgery, including Targeted Muscle Reinnervation (TMR) and Regenerative Peripheral Nerve Interface (RPNI), have demonstrated efficacy in certain contexts, yet their long-term success in occipital neuralgias has been mixed, potentially due to the

intricate anatomical architecture of the occipital region. In parallel, emerging microsurgical strategies for neuroma prevention, such as centro-central neurorrhaphy (CCN), have shown promise in amputee populations by coapting severed nerve ends to prevent pathological sprouting and neuroma formation. Here we describe a technique using CCN principles to recalcitrant occipital neuralgia in patients that relapsed after primary nerve decompression.

Methods: Eight patients with persistent occipital pain post-decompression (with >1yr follow-up) underwent revision surgery using a novel CCN technique. The procedure involved neurectomy of the previously decompressed occipital nerve (greater, lesser, or both) and symmetrically coapting either bilateral greater occipital nerves (where both were previously decompressed) or unilateral greater and lesser occipital nerves (where both were previously decompressed) via microsurgical neurorrhaphy. This approach aimed to minimize postop neuroma formation by providing non-physiologic end-to-end continuity without tension, an adaptation of protocols previously validated in limb amputations. Headache days, pain levels, neuroma recurrence, and overall functional outcomes were assessed pre-and postoperatively using validated scoring systems and imaging studies where indicated.

Results: Six of the eight patients achieved complete pain resolution, demonstrating the potential of CCN to modulate neuropathic signaling in occipital neuralgia (mean follow-up of 5.25 months). Of the remaining two patients, one reported mild, tactile-induced discomfort at follow-up, and another experienced mild symptom recurrence consistent with incomplete proximal nerve decompression. These outcomes align with broader reports supporting neurorrhaphy and nerve-to-nerve coaptation strategies as effective deterrents to neuroma pathogenesis. These are early and limited results of our technique.

Conclusion: Centro-central neurorrhaphy represents a refined microsurgical approach for occipital neuralgia, offering a viable alternative or adjunct to established methods such as TMR, RPNI, and reset neurectomy. By providing a stable conduit for axonal regrowth and mitigating neuroma formation, CCN may significantly reduce pain recurrence and improve patient quality of life. Further prospective, multicenter trials with larger cohorts and extended follow-up intervals are warranted to solidify these findings and to optimize a standardized treatment algorithm for refractory occipital neuralgia and other challenging neuropathic entities.

3D head model with AI pattern recognition for the identification of nerve pain in patients with Headache Disorders

Abstract Presenter: Giulia Monnink MD

Abstract Co-Author(s): Merel Hazewinkel MD, Weishen Pan, Thomas Campion, William Gerald Austen Jr., MD, Darryl Sneag, Fei Wang MD, PhD, Lisa Gfrerer MD, PhD

Purpose: Screening for nerve pain in patients with headache disorders (HD) requires specialized clinical knowledge, which limits access to care. The aim of this study was to develop a 3D head model that allows for AI driven pattern recognition for nerve pain in patients with HD.

Materials & Methods: We retrospectively identified 375 pain drawings completed by patients. Another 924 pain drawings were generated by the study team. The pain drawings were drawn onto an online 3D head model within a web application. Drawings were labeled as 'nerve pain' or 'no nerve pain' and affected nerve(s) were identified. The input features of the ML model were constructed with coordinates of the pain drawings. The feature was passed into classifiers and model performance was evaluated using 5-fold nested cross-validation, with AUROC as primary metric. Precision under 0.9 sensitivity, specificity under 0.9 sensitivity and sensitivity under 0.9 specificity were also reported.

Results: The best performing model to detect nerve pain was the multilayer perception model (AUROC: 0.879 ± 0.044). When identifying specific nerve pain types, the model demonstrated high AUROC values of 0.928 (±0.025), 0.930 (±0.017), 0.884 (± 0.031), and 0.954 (± 0.025) for occipital, frontal, temporal, and trigeminal neuralgia, respectively.

Conclusion: Our machine learning model demonstrated good performance in identifying nerve pain patterns in HD patients. This tool will allow for improved screening for nerve pain and may reduce the health and financial burdens on patients with HD through earlier detection by a larger pool of providers.

Neuropathic Pain Following Surgery for Malignant Peripheral Nerve Sheath Tumors

Abstract Presenter: Floris Raasveld MD

Abstract Co-Author(s): Tareq Hanna, Fernando Pacheco, Santiago Lozano Calderon, Ian Valerio MD, MS, MBA, FACS, Kyle Eberlin MD

Introduction: Malignant peripheral nerve sheath tumors (MPNSTs) are aggressive soft tissue sarcomas that pose significant challenges in surgical management. Although neuropathic pain following soft tissue sarcoma surgery has been reported to occur in 25-30% of cases (1-4), the burden of neuropathic pain in MPNST patients – where nerve involvement is inherent to the disease process – has remained poorly characterized and likely underestimated. Therefore, This study aims to examine the anatomic distribution of MPNSTs, analyze survival rates and predictive factors for survival, and investigate the prevalence of neuropathic pain in patients who have undergone MPNST resection.

Methods: A retrospective analysis of 119 patients who underwent MPNST resection was conducted. Additionally, a cross-sectional survey was administered and completed by 39 surviving patients to assess neuropathic pain prevalence using the NRS (0-10 scale) and the s-DN4 questionnaire, and quality of life (QoL) using the EQ-5D-5L index (0-1 scale).

Results: MPNSTs most commonly occurred in the lower extremity (42.9%), followed by the upper extremity (21.0%), trunk (19.3%), head & neck (11.8%) and pelvis (5.0%). Female sex (OR: 0.25, 95% CI: 0.10-0.61) and absence of metastases (OR: 0.15, 95% CI: 0.05-0.52) were significantly associated with overall survival. Among survey respondents, 82.1% reported neuropathic pain following MPNST resection. The patients reported a mean EQ-5D-5L index score of 0.566 (±0.253) as compared to an EQ-5D-5L of 0.851 (±0.205) for the United States' general population.

Conclusions: The high prevalence of neuropathic pain following MPNST resection and its significant impact on QoL highlights the need for improved pain management strategies, and calls for a paradigm shift in the surgical approach and post-operative care pathways. Nerve-sparing and/or nerve-reconstructive techniques during or after tumor resection should be considered. Future research should focus on identifying risk factors for neuropathic pain development and evaluating the efficacy of preventive measures to improve long-term pain outcomes for surviving MPNST patients.

Martin E, Coert JH, Flucke UE, et al. A nationwide cohort study on treatment and survival in patients with malignant peripheral nerve sheath tumours. Eur J Cancer. 2020;124:77–87. https://doi.org/10.1016/J.EJCA.2019.10.014 . - DOI - PubMed
Park JW, Kim HS, Yun JY, Han I. Neuropathic pain after sarcoma surgery: prevalence and predisposing factors. Medicine. 2018;97(21). https://doi.org/10.1097/MD.0000000000010852
Aslami Z V., Leland CR, Strike SA, et al. Symptomatic neuroma development following en bloc resection of skeletal and soft tissue tumors: a retrospective analysis of 331 cases. Plast Reconstr Surg.
Raasveld FV, Eberlin KR. Discussion: Symptomatic neuroma development following en bloc resection of skeletal and soft tissue tumors: a retrospective analysis of 331 cases. Plast Reconstr Surg.

Exploratory Proteomic Profiling of a Symptomatic Neuroma to Identify Molecular Drivers of Formation

Abstract Presenter: Meredith Cox

Abstract Co-Author(s): Marcus Valenta, Christian Zirbes, Suhail Mithani MD, Neill Li

Purpose: Neuromas are disorganized growth of nerve commonly resulting from traumatic or iatrogenic injury, with the potential to cause long-term pain and functional loss. The molecular mechanisms underlying symptomatic neuroma formation remain understudied. Proteomic profiling provides insights into processes such as wound healing, inflammation, and nerve regeneration, enabling the identification of factors that may contribute to neuroma formation. Identifying these factors informs therapeutic strategies aimed at enhancing nerve healing and reducing uncontrolled disorganized growth. In this study, we compared the proteomic profile of healthy human nerve to neuroma tissue from a patient undergoing sciatic neuroma resection to identify protein markers linked to neuroma formation and pain signaling alongside persistence. We hypothesize that the parenchymal molecular signature of neuroma tissue compared to functionally intact neural parenchyma reflects complex changes in tissue organization and cellular processes, potentially revealing novel therapeutic targets.

Methods: With IRB approval, intraoperative samples of a terminal sciatic nerve neuroma alongside physiologic proximal sciatic nerve resected in preparation for targeted muscle reinnervation, were obtained. Tissue was placed in 4%

paraformaldehyde, further dissected to isolate degraded neural components, and then prepared for mass spectrometry. Raw mass spectrometry data were analyzed using Xcaliber and Proteome Discoverer for peptide identification and quantification. Missing values were imputed using Multiple Imputation by Chained Equations (MICE), followed by variance stabilization normalization. Differentially expressed peptides were identified based on a variance-stabilized difference greater than two, corresponding to a four-fold or greater difference between neuroma and non-neuroma tissue. To explore protein functional groups, protein-protein interaction networks were constructed using STRINGdb, and enriched biological pathways within clusters were analyzed using Gene Ontology (GO) analysis.

Results: We identified distinct molecular signatures that differentiate neuroma parenchymal tissue from functionally intact neural parenchyma, highlighting key processes involved in neuroma formation and persistence. Specifically, we observed: (1) altered extracellular matrix organization, characterized by upregulation of COL1A1 and COL1A2; (2) disrupted cytoskeletal dynamics, marked by changes in protein polymerization, with downregulation of CNTNAP1 and upregulation of MAP4; (3) dysregulated RNA processing and translation, characterized by upregulation of EIF3L and downregulation of PRPF8; (4) alterations in inflammatory response pathways, marked by downregulation of ORM1 and upregulation of SERPINA3; and (5) metabolic shifts, particularly in fatty acid and purine metabolism, characterized by the downregulation of AOC3.

Conclusion: Sustained immune activation, dysregulated extracellular matrix and cytoskeletal organization, and metabolic reprogramming may underpin neuroma formation and symptomatic activity. Additional collection of neuroma tissue and healthy neurologic tissue is needed to continue assessing protein and genetic level alterations. Future work will further explore these pathways as therapeutic targets for inhibiting neuroma formation and permitting decline in symptomatic activity.

Targeted Muscle Reinnervation for Treatment of Neuropathic Pain in Non-Amputees

Abstract Presenter: Floris Raasveld MD

Abstract Co-Author(s): Otis van Varsseveld, William Gerald Austen Jr., MD, Ian Valerio MD, MS, MBA, FACS, Kyle Eberlin MD

Introduction: Targeted Muscle Reinnervation (TMR) offers a promising surgical approach to prevent and treat neuropathic pain but has primarily been utilized in amputees (1-4). This study aims to describe indications and outcomes for TMR in non-amputees.

Methods: Non-amputee patients who underwent TMR for neuropathic pain at a tertiary center (2019-2024) were identified. Demographics, comorbidity, and surgical characteristics were collected through chart review. Patient satisfaction (Patient Global Impression of Change, PGIC) and quality of life (EQ-5D-5L) were assessed through a cross-sectional survey.

Results: Seventy-six TMR operations were performed in 74 patients (median age 54.5 (IQR: 42.0-65.0) years, 47.3% female). Thirty-four patients (44.7%) previously underwent other peripheral nerve surgery in the same nerve distribution prior to TMR surgery. Most TMR surgeries were performed in the lower extremity (n=52, 68.4%), followed by the trunk (n=15, 19.8%), upper extremity (n=6, 7.9%), and head/neck (n=3, 3.9%). Six patients (7.9%) underwent revision surgery to the nerve treated with TMR. Of 45 survey respondents (60.8%, mean follow-up 2.0±1.2 years), improvement (PGIC) was reported for 82.4% of lower extremity (n=28), 88.9% of trunk (n=8), and 50.0% of upper extremity (n=2) cases. Overall, 78.7% reported improvement (25.5% very much improved, 34.0% much improved, 19.2% minimally improved). Mean EQ-5D-5L indices were 0.828 (±0.082), 0.794 (±0.056), and 0.763 (±0.024) for lower extremity, trunk, and upper extremity respectively, comparable to the US general population (0.851±0.205). Longitudinal studies are warranted to better understand long-term efficacy.

Chappell AG, Yang CS, Dumanian GA. Surgical Treatment of Abdominal Wall Neuromas. Plast Reconstr Surg Glob Open. 2021;9(5):e3585. doi:10.1097/GOX.0000000000003585
Fracol ME, Dumanian GA, Janes LE, Bai J, Ko JH. Management of Sural Nerve Neuromas with Targeted Muscle Reinnervation. Plast Reconstr Surg Glob Open. 2020;8(1):E2545. doi:10.1097/GOX.0000000000002545
Remy K, Raasveld F V., Saqr H, et al. The neuroma map: A systematic review of the anatomic distribution, etiologies, and surgical treatment of painful traumatic neuromas. Surgery. Published online 2024. doi:10.1016/J.SURG.2024.05.037
O'Brien AL, Kraft CT, Valerio IL, Rendon JL, Spitz JA, Skoracki RJ. Targeted Muscle Reinnervation following Breast Surgery: A Novel Technique. Plast Reconstr Surg Glob Open. 2020;8(4):e2782. doi:10.1097/GOX.0000000000002782

Navigating Diagnostic Complexities in Complex Regional Pain Syndrome

Abstract Presenter: Floris Raasveld MD

Abstract Co-Author(s): Margaux Wolff, Anna Luan MD, David Hao, Ian Valerio MD, MS, MBA, FACS, Kyle Eberlin MD

Purpose: Complex Regional Pain Syndrome (CRPS) poses significant diagnostic challenges due to its varied clinical presentation. (1-5) This study aims to examine the diagnostic trajectory of patients labeled with CRPS, focusing on referral patterns, application of the Budapest criteria, and diagnostic accuracy.

Methods: Patients were eligible if they were evaluated for CRPS at a peripheral nerve clinic within a tertiary care center (2020-2024). Patient data (medical and surgical history) was obtained through chart review. Three clinicians (two plastic surgeons, one pain medicine specialist) retrospectively assessed the validity of CRPS diagnoses using the Budapest criteria. Inter-rater reliability (IRR) for CRPS presence and type was calculated using Cohen's kappa (κ).

Results: Of the 53 patients (median time-to-referral: 3.9 years(IQR:2.2–6.6)), the Budapest criteria had been assessed in 26% of patients before referral. In 33% of CRPS-type-I labeled patients, an inciting nerve injury was identified. Following retrospective assessment, 42% were determined to have CRPS by all raters, 26% were determined not to have CRPS, and 32% showed inconsistent agreement. IRR for CRPS diagnosis and type ranged from minimal to moderate (κ=0.32-0.72).

Conclusion: Our findings highlight variability in the application of the Budapest criteria for CRPS diagnosis, as well as inconsistencies in its retrospective application. Potentially treatable peripheral nerve injuries should be addressed prior to CRPS diagnosis. These findings may help improve early diagnostic assessment in patients with chronic pain.

Shim H, Rose J, Halle S, Shekane P. Complex regional pain syndrome: a narrative review for the practising clinician. BJA: British Journal of Anaesthesia. 2019;123(2):e424.
Classification of Chronic Pain, Second Edition (Revised) - International Association for the Study of Pain (IASP). Accessed August 22, 2024. https://www.iasp-pain.org/publications/free-ebooks/classification-of-chronic-pain-second-edition-revised/

Bruehl S. Complex regional pain syndrome. BMJ. 2015;351.
Terkelsen AJ, Birklein F. Complex Regional Pain Syndrome or Limb Pain: A Plea for a Critical Approach. J Pain Res. 2022;15:1915.
Harden RN, Bruehl S, Perez RSGM, et al. Validation of proposed diagnostic criteria (the "Budapest Criteria") for Complex Regional Pain Syndrome. Pain. 2010;150(2):268.

Surgical Management Algorithm for Peripheral Nerve Symptoms Following Total Knee Arthroplasty

Abstract Presenter: Floris Raasveld MD

Abstract Co-Author(s): Otis van Varsseveld, Ian Valerio MD, MS, MBA, FACS, Kyle Eberlin MD

Introduction: Neuropathic pain, weakness, or numbness can complicate total knee arthroplasty (TKA) and may be resistant to non-surgical treatments (1-5). This study evaluates surgical peripheral nerve management after TKA and a treatment algorithm is proposed.

Methods: Patients who underwent peripheral nerve surgery for neuropathic symptoms following TKA between 2012-2024 (≥3-month follow-up) were included. Data on demographics, comorbidities, and treatment were collected, and a cross-sectional survey assessed satisfaction (Patient Global Impression of Change, PGIC) and quality of life (EuroQol-5-Dimension-5-Level, EQ-5D-5L).

Results: Twenty-seven lower extremities treated in 26 patients were included (median age-at-surgery 67(IQR: 58-71.8) years). Surgical indications included neuropathic pain (n=24/27, 89%), foot drop (n=1/27, 4%) or both (n=2/27, 7%). Median time between TKA and nerve surgery was 2.5(IQR: 1.0-5.9) years. Procedures included saphenous or infrapatellar branch neurectomy with adjunctive nerve management (48%, n=13), decompression (41%, n=11), and combinations (11%, n=3). Twenty-one patients (78%) completed the survey (median follow-up 2.1(IQR: 1.4-4.3 years). Improvement (PGIC) was reported in 20/21(95%) patients, the mean EQ-5D-5L index was 0.854(±0.102) (US general population: 0.851(±0.205)).

Discussion: Surgery appears beneficial for patients with neuropathic pain, numbness, or weakness post-TKA. We recommend common peroneal nerve decompression for lateral knee pain and/or foot drop, active saphenous nerve management (targeted muscle reinnervation or regenerative peripheral nerve interface) for medial knee pain, and combinations for both. These findings may aid in patient counseling, expectation management, and surgical management.

Singh JA, Yu S, Chen L, Cleveland JD. Rates of Total Joint Replacement in the United States: Future Projections to 2020-2040 Using the National Inpatient Sample. J Rheumatol. Sep 2019;46(9):1134-1140. doi:10.3899/jrheum.170990
Bertram W, Howells N, White SP, et al. Prevalence and patterns of neuropathic pain in people with chronic post-surgical pain after total knee arthroplasty. Bone Joint J. Jun 1 2024;106-b(6):582-588. doi:10.1302/0301-620x.106b6.Bjj-2023-0889.R1
Hasegawa M, Tone S, Naito Y, Wakabayashi H, Sudo A. Prevalence of Persistent Pain after Total Knee Arthroplasty and the Impact of Neuropathic Pain. J Knee Surg. Oct 2019;32(10):1020-1023. doi:10.1055/s-0038-1675415
Wylde V, Hewlett S, Learmonth ID, Dieppe P. Persistent pain after joint replacement: Prevalence, sensory qualities, and postoperative determinants. PAIN. 2011;152(3):566-572. doi:10.1016/j.pain.2010.11.023
Carender CN, Bedard NA, An Q, Brown TS. Common Peroneal Nerve Injury and Recovery after Total Knee Arthroplasty: A Systematic Review. Arthroplasty Today. 2020/12/01/ 2020;6(4):662-667. doi:https://doi.org/10.1016/j.artd.2020.07.017

Endoscopic-Assisted Greater Occipital Nerve Decompression Provides Superior and Long-Term Migraine Relief Compared to Open Decompression

Abstract Presenter: Dominic Henn MD

Abstract Co-Author: Bardia Amirlak MD

Background: Surgical decompression of the greater occipital nerve (GON) has become a recognized treatment for occipital migraines. Emerging research suggests that vascular compression, particularly by the occipital artery (OA), plays a significant role in migraine pathophysiology. This study compares the outcomes of two surgical approaches: endoscopic-assisted extensive GON decompression with complete OA resection or ligation versus conventional open GON decompression with only proximal

OA ligation with the goal to determine the most effective technique to achieve long-term migraine relief.

Methods: A retrospective review was conducted on 159 patients who underwent either endoscopic-assisted GON decompression involving either complete OA resection or proximal and distal OA ligation (n = 139) or open GON decompression (n = 20). Primary outcomes included changes in migraine headache index (MHI) as well as migraine intensity, frequency, and duration. Cox regression analysis was performed to assess the probability of achieving at least a 90% reduction in migraine frequency and MHI over 35 months.

Results: Both endoscopic-assisted and open GON decompression led to significant postoperative improvements in MHI, migraine intensity, duration, and frequency ($p < 0.01$ for all measures). However, patients in the endoscopic-assisted group experienced greater reductions in MHI (-182.11 vs. -152.85, $p = 0.17$), migraine frequency (-20.90 vs. -15.45, $p = 0.08$), and migraine intensity (-5.44 vs. -3.00, $p < 0.001$) compared to the open decompression group. Additionally, significantly higher rates of complete migraine resolution were observed in the endoscopic group (69.8% vs. 45.0%, $p = 0.04$). Cox regression analysis further demonstrated that patients with endoscopic release had a significantly higher probability of sustaining a 90% reduction in migraine frequency and MHI 35 months after surgery.

Conclusions: Endoscopic-assisted GON decompression with proximal and distal OA resection or ligation is more effective than conventional open GON decompression to achieve occipital migraine resolution and maintain long-term migraine relief. These findings support the critical role of vascular compression in occipital migraine pathogenesis and highlight endoscopic-assisted decompression as the preferred surgical approach.

What Is the Probability of Recovery of Brachial Plexus Neuropathy After Cervical Spinal Surgery Accounting for Time Since Injury: A Systematic Review and Meta-Analysis

Abstract Presenter: Nienke Krijnen

Abstract Co-Author(s): Alexander Comerci, Christopher Fedor, Hamid Alahmari, Teun Teunis

Background: Brachial plexus neuropathy is a potential complication following cervical spinal surgery. Some propose nerve transfers to treat subsequent deficits. Since nerve transfers work best within one year after injury, the decision to proceed with surgery must be made relatively quickly after onset of the palsy. As recovery has occurred up to 41 months after cervical surgery, surgical management within one year of injury may result in over-treatment. We therefore asked: 1) What is the probability of recovery of brachial plexus neuropathy after cervical spinal surgery, accounting for time since injury? 2) What factors are independently associated with recovery for brachial plexus neuropathy?

Methods: We performed a systematic review and meta-analysis of individual patient data according to PRISMA guidelines. We included articles reporting on time to recovery (MRC 3 or greater) from patients with brachial plexus neuropathy after cervical spinal surgery. Articles that did not report MRC-scores were excluded. After screening 4308 titles/abstract and 346 full texts, we included 18 studies for analysis. In total, 85 C5 palsies were included with a mean age of 63 (SD 12) years. Mean follow-up was 22 (SD 28) months. Bayesian analysis begins with a prior probability and updates it with new data to obtain a posterior probability. We used survival-analysis to estimate the prior probability of recovery at 24 months. By incorporating cumulative recovery rates over time, Bayesian analysis allowed us to derive posterior probabilities of recovery at different timepoints.

Results: Survival analysis showed that 88% (95% CI 80 to 95%) of palsies recovered within 24 months, with 50% of patients recovering within 7 months. Bayesian analysis revealed that if a patient had not yet recovered, the probability of recovery by 24 months remained above 50% until 16 months. Beyond this point, the probability declined to 39% at 18 months, 34% at 19 months and 24% at 20 months. Multivariable Cox proportional hazards analysis found that cervical spondylotic radiculo-myelopathy as the indication for spinal surgery was associated with an increased recovery (HR 2.0, 95% CI 1.2 to 3.4, p=0.013) compared to ossification of the posterior longitudinal ligament. An initial MRC score of 2 was also associated with improved recovery (HR 2.0, 95% CI 1.2 to 3.5, p=0.013) compared to a score of 0 or 1. Posterior decompression as spinal surgery was associated with a reduced recovery (HR 0.53, 95% CI 0.28 to 1.0, p=0.047) compared to anterior cervical discectomy or corpectomy and fusion.

Conclusion: Natural recovery for BP palsy is common with most palsies resolving by two years. At 7 months, about 1/2 of the patients will still recover, resulting in a number needed to harm of 2 if one decides to perform nerve transfers at this time. Surgeons and patients have to decide if this risk of harm is acceptable to them. Awaiting recovery

for 2 years and performing tendon transfers at this time seems to result in the lowest amount of overtreatment and unnecessary iatrogenic harm.

Migraine Surgery Training in Plastic Surgery Residency Programs

Abstract Presenter: Samantha Lund MD

Abstract Co-Author(s): Kristin Delfino, Sharon Kim, Nicole Sommer MD

Introduction: 50 million Americans suffer from migraines, causing individual morbidity and national economic burdens (1). Medications and chemodenervation have controversial treatment efficacy, while surgical decompression has cost-effective, long-term results (2,3). Despite being pioneered by plastic surgeons, migraine surgery is only offered by 18% of board-certified plastic surgeons, though 60% are interested in performing them (4). Furthermore, these procedures are not required in residency training. This novel survey examines the current state of migraine surgery education during residency.

Methods: Program directors from US integrated and independent plastic surgery residency programs were surveyed via email. Demographics and responses were collected anonymously through REDCap. Descriptive statistics were computed for all study variables. Comparisons were analyzed using Fisher's Exact test. P-values <0.05 were considered statistically significant.

Results: The survey was sent to 97 of 102 plastic surgery residency program directors (five emails were unconfirmed) and yielded a 31% response rate. 47% of respondents are from the Midwest; however, all geographic areas across various population sizes are represented. 53% of programs have 12 or fewer residents; 40% have 10 or fewer faculty.

Over 90% of respondents state plastic surgeons should perform migraine surgeries, and 70% believe this should be taught during residency. However, only 38% of institutions surveyed have plastic surgeons who offer migraine surgery and 90% of residents at these programs perform 10 or fewer cases annually. The lack of trained surgeons was the most cited reason for not providing these procedures. 66% of programs have educational time for migraine surgery, which is significantly more common in smaller compared to larger programs (88% vs 40% $p=0.0256$). Chemodenervation exposure

occurs at 48% of institutions. Overall, 50% of respondents report their residents are completely unprepared/unprepared to address surgery-related migraine concerns.

Conclusions: Migraines affect millions of people, yet there is inadequate training in plastic surgery residency in surgical management, despite the efficacy and cost-effectiveness. Program directors feel migraine surgery training is important and while didactics are frequently provided, less than 40% of programs have surgical exposure and there are minimal case numbers for those that do. Thus, half of program directors report their residents are unprepared to surgically manage migraines. This survey demonstrates the current state of migraine education in plastic surgery residencies and indicates further training is needed to ensure plastic surgeons can effectively meet patients' treatment needs. Future studies can elucidate other treatment barriers and explore educational initiatives to increase residency training.

References: 1. Bonafede M, Sapra S, Shah N, Tepper S, Cappell K, Desai P. Direct and Indirect Healthcare Resource Utilization and Costs Among Migraine Patients in the United States. Headache. 2018;58(5):700-714. doi:10.1111/head.13275
2. Blumenfeld AM, Kaur G, Mahajan A, et al. Effectiveness and Safety of Chronic Migraine Preventive Treatments: A Systematic Literature Review. Pain Ther. 2023;12(1):251-274. doi:10.1007/s40122-022-00452-3
3. ElHawary H, Gorgy A, Janis JE. Migraine Surgery: Two Decades of Innovation. Plast Reconstr Surg. 2021;148(5):858e-860e. doi:10.1097/PRS.0000000000008467
4. Kung TA, Pannucci CJ, Chamberlain JL, Cederna PS. Migraine Surgery Practice Patterns and Attitudes. Plast Reconstr Surg. 2012; 129 (3): 623-628. doi: 10.1097/PRS.0b013e3182412a24

Glutamate Carboxypeptidase II Upregulation and Detection in Partially Denervated Muscles

Abstract Presenter: Alec Chen

Abstract Co-Author(s): Jeffrey Khong, John Nguyen DO, Rachana Suresh MD, Samarth Krishna, Jared Zhang, Mohammed Shahid MD, Zachary Zamore, Cameron Ghergherehchi, William Padovano MD, Catherine Foss, Sami Tuffaha MD

Purpose: Peripheral nerve injuries continue to be challenging to accurately diagnose and manage. Many peripheral nerve surgeons evaluate these lesions with electromyography and magnetic resonance imaging, but with these modalities of imaging, early detection and delineation between fully denervation versus partially denervation injuries are still challenging. We recently identified glutamate carboxypeptidase II (GCPII) expression as a novel biomarker for muscle denervation and demonstrated that a commercially available and FDA approved imaging agent, 18F-DCFPyl could detect changes in muscle GCPII expression. In this study, we sought to investigate muscle GCPII expression uptake in complete and partial nerve injuries.

Methods: 30 female Lewis rats ages 6-8 weeks old were selected for posterior spinal exposure with/or without selective transection of spinal roots (L4, L5, L6) that contribute to the right sciatic nerve. The groups were designated as spinal exposure of right L4, L5, L6 spinal roots without root transection Sham group (n=6, selective L4 root transection group (n=8), selective L4, L5 root transection group (n=8), L4, L5, L6 roots transection group (n=8). Surgery was performed using microsurgical technique via posterior midline, right paraspinal approach to expose L4, L5, L6 vertebrae, and the lumbosacral junction, along with their corresponding spinal roots. Based on the groups, selective spinal root transection was performed. The main outcome was to identify the amount of GCPII upregulation based on the amount of sciatic nerve denervation at the 12-week timepoint. Ex-Vivo biodistribution was performed at 12 weeks after surgery by first injecting the rats intravenously with 18F-DCFPyL 1 hour prior to the sacrifice and harvest. At sacrifice, the follow tissues were harvested: blood, right kidney, bilateral gastrocnemius muscles, bilateral tibialis anterior muscles, bilateral extensor digitorum longus muscles. The blood and kidney were used to normalize the level of 18F-DCFPyL uptake, which was computed using an automated gamma counter and expressed in percent injection dose per gram (%ID/g). Statistical analysis was performed with one-way ANOVA and Tukey post-hoc test.

Results: 12 weeks after selective spinal root transection, complete denervation (L4, L5, L6 transection) resulted in greater uptake of 18F-DCFPyL in the right gastrocnemius when compared with the sham ($p= 0.01$) and the L4, L5 root transection ($p= 0.018$) and greater uptake in extensor digitorum longus muscles when compared with the sham ($p= 0.03$) and selective L4 root transection (0.005). These findings are pending histological correlation.

Conclusion: GCPII overexpression and corresponding 18F-DCFPyL uptake on PET imaging may serve as a promising radiotracer for evaluating and monitoring the degree of nerve injury. 18F-DCFPyL uptake was elevated in fully denervated rodent muscles compared to partially denervated and naïve muscles. Pending biodistribution studies at

shorter timepoints as well as histological evaluation of neuromuscular junction percent innervation will reveal whether 18F-DCFPyL uptake is increased in acute partial prior to collateral reinnervation at later timepoints.

Recovery in Idiopathic Brachial Neuropathy: A Systematic Review and Meta-analysis

Abstract Presenter: Nienke Krijnen

Abstract Co-Author(s): Nirbhay Jain MD, Ertha Sefu Omba, Teun Teunis

Purpose: Proponents of scar release around the nerve, or end-to-side nerve transfers for idiopathic brachial neuropathy (Parsonage-Turner syndrome) justify the iatrogenic harm from surgery by a suspected low natural recovery rate. However, the natural recovery rate is variably defined, therefore we asked: what is the reported rate of recovery after developing idiopathic brachial neuropathy?

Methods: We searched PubMed, Embase and Cochrane Library for studies reporting on recovery in patients with idiopathic brachial neuropathy. We excluded case reports with less than 4 patients, studies on a single suspected etiology (not idiopathic), and studies with people treated with injections or surgery. We screened 2147 titles and abstracts and analyzed 126 full texts. We included 55 studies with a total of 1599 patients. Majority of studies were case-series (47%) and retrospective cohort studies (45%). Men represented 72% [987 of 1364] of the patients and the mean age was 42 ±SD 8.1 years. Neuropathy was unilateral in 72% [1065 of 1332] and sensory deficits were reported in 47% [415 of 892]. Mean follow-up duration was 37 ± 28 months. 91% of studies [51 of 55] reported poorly defined outcome measures (e.g. 'improved', 'partial or good recovery', 'mild residual weakness') and 45% [25 of 55] somewhat better-defined outcome measures (e.g. MRC, electromyography [EMG], grip strength, FEV1).

Results: MRC-scores were reported in 11 studies. Recovery to MRC 5 is seen in 42% of patients (95% confidence interval [CI] 23 to 63%) and to MRC 4 or 5 in 80% (95% CI 59 to 95%). Follow-up electrodiagnostic studies were reported in 7 studies. Electromyography (EMG) returned to normal in 66% of patients (95% CI 47% to 83%). Complete recovery was reported in 23 articles with synonyms like 'complete recovery', 'recovered', 'normal', 'full recovery'. This poorly defined 'complete recovery' was seen in 59% (95% CI 44 to 73%).

Conclusion: The natural recovery rate after idiopathic brachial neuropathy is substantial, with about two-thirds recovering completely, and 4 out of 5 recovering more than anti-gravity strength. It remains to be determined if any intervention alters the recovery of this neuropathy, but if it does, it will likely be accompanied by a notable number needed to treat, and a low number needed to harm due to the relatively high rate of natural recovery.

Surgical treatment of Rhinogenic Migraines: A Meta-Analysis of Patient-Reported Outcome Measures

Abstract Presenter: Viren Patel MD

Abstract Co-Author(s): Quan Lu, R'ay Fodor, Ali Totonchi MD

Background: Headache is a common patient complaint, but poses a challenge for clinicians due to a wide range of etiologies and presentations. Due to overlap of symptomology, patients with migraines are often misdiagnosed as having rhinosinusitis and vice versa.1 Anatomic aberrancies of the nasal passages have long been implicated in the pathophysiology of headaches.2 Surgical approaches have been developed to address rhinogenic migraines, due to nasal contact points, but diagnosis, treatment and success of surgery is unclear due to wide range of available literature.

Methods: A systematic review was performed using PubMed database in December 2023 to identify studies that included patient-reported outcome measures (PROMs) following surgical treatment of rhinogenic migraines, usually with septoplasty or turbinate reduction. Due to heterogeneity of terminology used to characterize this condition in the literature, a broad search strategy was developed including terms "sinonasal, rhinogenic, rhinopathic, and "contact point." Inclusion criteria for the analysis was any study that reported PROMs and outcomes after surgical correction of rhinogenic migraines. Studies were excluded if patients with rhinosinusitis or other etiology of headache were indicated.

Results: From the search, 462 articles were identified, of which 46 were excluded for being written in Non-English language. The remaining titles and abstracts were reviewed and, ultimately, 14 were entered into the meta-analysis, comprising 591 patients. There were diverse terms to describe the condition including, "contact point

headache" (n=6, 42%), "rhinogenic headache" (n=4, 29%), and "Rhinogenic contact point migraine" (n=2, 14%). The pooled mean difference in visual analog scale (VAS) score after surgery was 3.85 (95% CI: 3.80-3.90, $p < 0.001$). When comparing surgical and medical management, surgical patients had significantly greater improvement of VAS scores and significantly fewer headache days per month ($p<0.05$). VAS score improvement was similar for different indications including turbinate contact, septal spur and concha bullosa.

Conclusion: We present the first meta-analysis of studies describing surgical treatment of rhinogenic migraines. There is a large heterogeneity of terminology used to describe this condition and suggests that the migraine community should strive to used standard terminology and diagnostic standards. Overall, pooled analysis confirms significantly improved results for surgical management over medical treatment. Additionally, it seems that patients benefit from similar reduction in migraine symptoms, regardless of indication or severity of symptoms. Future studies should aim to better characterize patient complaints and predict which patients would benefit most from surgery.

1. Schreiber CP, Hutchinson S, Webster CJ, Ames M, Richardson MS, Powers C. Prevalence of Migraine in Patients With a History of Self-reported or Physician-Diagnosed "Sinus" Headache. Arch Intern Med. 2004;164(16):1769. doi:10.1001/archinte.164.16.1769
2. Stammberger H, Wolf G. Headaches and sinus disease: the endoscopic approach. Ann Otol Rhinol Laryngol Suppl. 1988;134:3-23. doi:10.1177/00034894880970s501

Expanding the Role of MRI Neurography in the Diagnosis of Neurogenic Thoracic Outlet Syndrome

Abstract Presenter: Samantha Cervantes MD

Abstract Co-Author(s): Alexa De La Fuente Hagopian MD, Michael Trakhtenbroit, Anthony Echo MD

Introduction: Neurogenic thoracic outlet syndrome (nTOS) is characterized by the compression of neurovascular structures in the neck and shoulder region, leading to pain and paresthesia in the upper extremity. Diagnosis has traditionally been one of

exclusion and heavily reliant on the clinical acumen of the physician. As MRI neurography (MRN)studies have become more readily available, it could help with the identification of patients with neurogenic TOS. This study evaluates MRN's reliability in aiding with the diagnosis of nTOS.

Methods: We conducted a retrospective study of 32 patients who underwent TOS release surgery, with or without first rib resection, between 2021 and 2024. Patient records were reviewed for clinical presentation, demographics, TOS etiology, and diagnostic evaluation. We assessed MRN's ability to diagnose TOS compared to other methods.

Results: All 32 patients underwent MRN prior to surgery. TOS was identified by MRN in 25 of 32 (78%) and by EMG in 20 of 32 (62%). All patients had at least one positive objective sign and subjective findings consistent with nTOS. The 7 patients with a negative MRN were negative by all other methods. After surgical decompression, 25 improved, 4 achieved complete or near-complete resolution, and 3 had persistent symptoms.

Discussion: MRN proved to be a reliable method for preoperative TOS assessment, compared to other diagnostic tools. Its 78% detection rate supports its increasing use in TOS diagnosis. While its popularity increases, further studies are needed to establish it as a first-line diagnostic modality.
The most common MRN findings were hyperintensity (80%), thickening (44%) and edema (16%). The most reported symptoms were paresthesia, burning sensation and pain. Additionally, 13 patients experienced symptom relief with injections.

Conclusion: MRN is a valuable diagnostic tool for nTOS, aiding in preoperative assessment and diagnosis. While its use continues to grow, more studies are needed to establish it as a first-line modality.

Characterizing the Public Health Burden Caused by Brachial Plexus Injuries in the United States

Abstract Presenter: Alec Chen

Abstract Co-Author(s): John Nguyen DO, Rachana Suresh MD, Mohammed Shahid MD, Ala Elhelali, Sami Tuffaha MD

BACKGROUND: Brachial plexus injuries (BPI) are severe and complex injuries that can lead to significant pain, functional impairment, and loss of sensation in the upper extremity, posing a substantial public health burden in the United States. BPI can affect both infants and adults through different mechanisms. Neonatal brachial plexus injuries (NBPI) often result from birth-related trauma, while adult BPI cases are primarily traumatic injuries caused by motor vehicle accidents or combat-related incidents. Despite advancements in surgical reconstruction, disparities in healthcare access persist, limiting treatment utilization, especially among racial and ethnic minority groups who have historically been underserved. This study aims to characterize the demographic distribution and utilization rates of surgical interventions among patients with BPIs.

METHODS: A 10-year retrospective cohort study of 102 healthcare organizations (HCOs) in the TriNetX database was conducted. From January 2016 to February 2025, we identified all patients with BPIs using the International Classification of Diseases 10 (ICD 10) and Current Procedural Terminology (CPT) codes. The analyzed variables included age, gender, race, ethnicity, and the use of surgical treatments, defined as nerve transfers, tendon transfers, nerve grafts, free tissue muscle transfer, and neurolysis. Statistical analyses were conducted using TriNetX's Lucid Network. Continuous variables were compared with the Student's t-test, while categorical variables were analyzed using the Chi-squared test. A p-value of < 0.05 was deemed statistically significant.

RESULTS: A total of 21,587 patients with BPIs were identified in the United States. The mean age was 44 ± 23 years (range: 0-90). Among these, 18,195 were adults (84.3%) and 3,360 were pediatric patients (15.6%). Male patients (60.6%) outnumbered female patients (37.1%). Within the cohort, 59.5% identified as White, 17.5% as Black or African American, 3.7% as Asian, 0.69% as Native Hawaiian, and 0.32% as American Indian. Additionally, 9.64% identified as Hispanic or Latino. The southern states had the highest proportion of BPI cases (36%). Among the identified cohort, 1,200 patients (5.6%) underwent surgical intervention. The most commonly performed procedures included neurolysis (41.6%), tendon transfers (38.5%), nerve grafts (28.2%), nerve transfers (11%), and free tissue muscle transfer (7.3%). Revision procedures were required in 179 cases (14.9%). Patients receiving surgical intervention were younger on average by 7.7 years ($p < 0.0001$). Demographic analysis indicated that male patients ($p < 0.001$) and Hispanic or Latino patients ($p < 0.0001$) were significantly overrepresented in the surgical group, while female patients ($p < 0.0001$), Asian patients ($p = 0.0021$), and American Indian patients ($p < 0.0001$) were statistically underrepresented.

CONCLUSIONS: Surgical interventions have been shown to be an effective treatment modality for managing BPIs and may improve functional recovery and long-term outcomes despite its low utilization rate (5.6%). The significant demographic disparities in surgical utilization highlight unequal access to care. Future studies should aim to identify factors driving clinical variability, establish evidence-based protocols to standardize decision-making, optimize referral pathways, and address systemic disparities to ensure equitable access to care for all patients with BPI.

Targeted Viral Vector-Mediated Ablation of Sensory Nerves: A Novel Therapeutic for Pain

Abstract Presenter: Zachary Zamore

Abstract Co-Author(s): Jeffrey Khong, Kitae Park MD, Shaquielle Dias, Rachana Suresh MD, Jared Zhang, Sami Tuffaha MD

Introduction: Adeno-associated viruses (AAVs) have become a widely used tool for gene therapy due to their low immunogenicity and inability to integrate into the host genome. Recent advancements have led to modified AAVs capable of efficiently targeting sensory neurons following systemic delivery. We hypothesized that localized intraneural injection of these vectors could achieve selective transduction of the injected nerves. To test this, we engineered an AAV vector to express cleaved caspase-3, a pro-apoptotic protein, with the goal of inducing targeted neuronal apoptosis and effectively eliminating specific nerves.

Methods: A recombinant AAV vector was designed to promote apoptosis under the control of a neuron-specific promoter. This promoter ensures expression is restricted to neurons, triggering apoptosis upon activation. A control vector with identical regulatory elements was generated but expressed eGFP instead of caspase-3.

Experiments were performed on 6- to 10-week-old C57BL/6J mice following protocols approved by the Johns Hopkins University Animal Care and Use Committee. The common peroneal or sciatic nerve was injected with 10^{10} viral genomes (vg) of either the experimental or control vector using a 36-gauge needle.

At euthanasia, bilateral sciatic nerves, L3-L5 dorsal root ganglia (DRGs), and spinal cords were dissected, fixed in 4% paraformaldehyde for 24 hours, and cryoprotected in a 30% sucrose solution. Immunohistochemistry was performed using antibodies against cleaved caspase-3 (to confirm transgene expression), CD68 (a macrophage marker indicating inflammation and degeneration), and neurofilament (a neuronal marker). Samples transfected with the GFP-expressing vector were also analyzed for endogenous GFP fluorescence. ImageJ was used for quantitative image analysis, and statistical comparisons were conducted using Student's t-tests. Significance was defined as $p<0.05$.

Results: Nine days after injection into the common peroneal nerve, numerous cell bodies in the ipsilateral L3 DRG exhibited cleaved caspase-3 expression, confirming successful transgene expression ($p < 0.05$). Three weeks post-injection into the sciatic nerve, a significant increase in CD68+ macrophages was observed in the ipsilateral sciatic nerve, consistent with Wallerian degeneration ($p < 0.05$). Additionally, nerve cross-sections revealed basement membrane gaps, likely corresponding to apoptotic neurons. Following direct injection into the common peroneal nerve, vector spread was limited, as evidenced by lack of expression in the tibial and sural nerves.

Conclusions: Localized intraneural administration of viral vectors allows for selective transduction of targeted nerve fascicles. By driving the expression of cleaved caspase-3, these vectors can effectively induce neuronal apoptosis. This approach holds therapeutic potential for conditions where selective denervation is beneficial, including painful neuromas, osteoarthritis, and spasticity. Ongoing experiments are assessing the efficacy of this strategy in these models to further evaluate its therapeutic potential.

Magnetic Resonance Imaging Appearance of Targeted Muscle Reinnervation and Regenerative Peripheral Nerve Interfaces in Oncologic Amputees: A Retrospective Case Series

Abstract Presenter: Amir-Ala Mahmoud MD

Abstract Co-Author(s): Sara Bahouth, Ged Wieschhoff, Dr. marco ferrone M.D, Lydia Helliwell MD, Jacob Mandell, Amir-Ala Mahmoud MD

Background: Patients with extremity sarcomas undergo amputation when limb salvage surgery is not feasible. Targeted Muscle Reinnervation (TMR) or Regenerative

Peripheral Nerve Interface (RPNI) procedures can mitigate the incidence of neuroma after amputation, however neuromas can still form. The purpose of this study is to describe the MRI characteristics of TMR/RPNI, assess how the neuromas that form after each procedure change over time, and differentiate the MRI appearance of neuroma formation from sarcoma recurrence.

Methods: All patients at our institution between 2013-2024 who underwent upper or lower extremity amputation (UEA/LEA) for sarcoma with TMR/RPNI, and with follow-up MRI surveillance imaging were included. The incidence, appearance (size, signal and enhancement characteristics, and morphology), and change over time were described by two radiologists. Statistics included the Chi-squared test and McNemar's test.

Results: 26 patients (7 UEA, 19 LEA) underwent 62 TMRs and 46 RPNIs, with 7 receiving TMR-only, 7 RPNI-only, and 12 both TMR/RPNI, with an average follow-up length of 517 days (range 91-1705 days). Nodular, T2 hyperintense, enhancing foci developed at 44% of all nerve surgeries and in 73% of patients at initial follow-up MRI, with an average diameter of 0.8 cm (range 0.3-2.0 cm). The incidence of these nodular foci, presumed to represent neuromas, decreased over time across all patients ($p < 0.001$) with no significant difference between nodule incidence in RPNI-only and TMR-only patients; however, TMR-only patients demonstrated a significant reduction in nodule size ($p = 0.007$). There were two cases of recurrence which demonstrated a progressive increase in irregularly-shaped nodule size. A third patient's persistent nodule was biopsied, with pathology of neuroma.

Conclusion: TMR and RPNI performed in the setting of amputation for sarcoma commonly demonstrate enhancing T2 hyperintense enhancing nodules at the first follow-up MRI which are presumed to represent neuromas. The incidence of these neuromas decreases over time, however only TMR results in a significant decrease in neuroma size. Any increase in size or presence of a nodule that is not in continuity with a peripheral nerve should raise concern for possible recurrence and should be biopsied. These findings are crucial for plastic surgeons that perform TMR/RPNI in the setting of sarcoma-related amputations. Understanding MRI characteristics of TMR/RPNI can aid in timely diagnosis and intervention, minimizing complications, delayed diagnoses, and unnecessary biopsies in this patient population.

Migraine Decompression Surgery Significantly Reduces Medication Usage in Patients with Chronic Migraine: A Retrospective Case Series

Abstract Presenter: Emily Yanoshak

Abstract Co-Author(s): Abhinav Kareddy, Hibo Wehelie, Jennifer Goldman, Nala Mckie, Saja Ibrahim, Gabriella Squeo MD, Jonathan Black MD

Introduction: Migraine is a debilitating condition that significantly impacts quality of life and affects over 1 billion individuals worldwide (1). While pharmacological management remains first line for migraine treatment, many patients continue to experience refractory symptoms despite multiple medication trials (2). Migraine decompression surgery (MDS) has emerged as a potential intervention for select patients, targeting specific peripheral nerve trigger points to reduce headache frequency and severity (3). While prior research largely emphasizes symptom reduction, data on postoperative medication usage after MDS is limited (4). Examining the impact of migraine surgery on patients' usage of medication may offer valuable insights into the effectiveness of MDS and its potential to reduce medication burden. This retrospective case series assesses changes in the number of medications used by patients following MDS.

Methods: CPT codes were used to identify MDS performed by a single surgeon from 2021-2025. Patient demographics, pre- and postoperative migraine medication usage, and improvements in migraine trigger site pain postoperatively were collected. SPSS was used for statistical analysis. Descriptive statistics were used to analyze overall results, with a paired T-test used to examine changes in overall medication usage.

Results: Twenty-three patients with chronic migraines underwent MDS. All patients underwent diagnostic nerve block of trigger sites prior to surgery to identify the origin of pain. The average age at surgery was 44.7 years old (Range: 17-82 years, SD ± 17.7 years), with 19 patients being female and 4 patients being male. The majority of patients were white (82.6%) and non-Hispanic (91.3%). Prior to surgery, the average number of migraine medications trialed (whether failed or used at intake visit) was 13.26 (Range: 2-98, SD ± 19.0). The average number of migraine medications taken postoperatively was 5.48 (Range: 0-11, SD ± 2.92) for a mean difference of 3.91 fewer medications after surgery when excluding outliers ($p<0.001$). Nineteen patients (82.6%) reported resolution or >50% improvement in migraine symptoms at their most recent postoperative visit as a result of MDS.

Conclusion: MDS is an effective treatment for chronic migraines and is associated with a significant reduction of migraine medication usage postoperatively. Future prospective studies on larger patient populations are needed to confirm these findings.

References
1. Amiri P, Kazeminasab S, Nejadghaderi SA, et al. Migraine: A Review on Its History, Global Epidemiology, Risk Factors, and Comorbidities. Front Neurol. 2022;12:800605. Published 2022 Feb 23. doi:10.3389/fneur.2021.800605

2. Charles A. The pathophysiology of migraine: implications for clinical management. Lancet Neurol. 2018;17(2):174-182. doi:10.1016/S1474-4422(17)30435-0

3. Guyuron B, Kriegler JS, Davis J, Amini SB. Comprehensive surgical treatment of migraine headaches. Plast Reconstr Surg. 2005;115(1):1-9.

4. Janis JE, Barker JC, Javadi C, Ducic I, Hagan R, Guyuron B. A review of current evidence in the surgical treatment of migraine headaches. Plast Reconstr Surg. 2014;134(4 Suppl 2):131S-141S. doi:10.1097/PRS.0000000000000661

Neurotization by the Numbers: Zero, One, or Two for Optimal Sensation?

Abstract Presenter: Carson Gundlach

Abstract Co-Author(s): Nancy Qin, Makayla Kochheiser, Annie Mcveigh, Carson Gundlach, Anna Vaeth, Lucy Wei, Marcos Lu Wang MD, Hao Huang MD, David Otterburn MD

PURPOSE: Preserving sensation after mastectomy is a key concern for women. This pilot study evaluates tactile sensory restoration across three breast reconstruction cohorts: non-neurotized, single-neurotized, and dual-neurotized reconstruction.

METHODS: Patients undergoing mastectomy with immediate alloplastic or deep inferior epigastric perforator (DIEP) flap reconstruction were prospectively enrolled and followed. In alloplastic reconstruction cases, no neurotization was performed, and this group served as the control. For DIEP reconstructions, patients underwent either single-nerve (pre-2024) or dual-nerve coaptation (post-2024) at the time of surgery.

Neurosensory testing using the pressure-specified sensory device was conducted across nine breast regions (outer superior (OS), outer medial (OM), outer inferior (OI), outer lateral (OL), inner superior (IS), inner medial (IM), inner inferior (II), inner lateral (IL), and nipple-areolar complex (NAC)) preoperatively and at multiple postoperative

intervals. Sensory recovery was assessed relative to baseline, with all patients serving as their own controls. Average sensory scores were then compared among the three groups: (1) non-neurotized implant, (2) single-neurotized DIEP, and (3) dual-neurotized DIEP. Statistical analysis was performed using Student's t-tests with a Bonferroni correction to account for multiple comparisons.

RESULTS: This study included 38 non-neurotized patients (64 breasts), 29 single-neurotized patients (50 breasts), and 16 dual-neurotized patients (30 breasts). Demographics, comorbidities, and adjunctive oncologic regimens were comparable between groups.

The dual-neurotized group had significantly better sensation than the non-neurotized group at all postoperative time points ($p < 0.001$). Specifically, at 3 months postoperatively, the dual-neurotized group showed significantly better sensation in the OS, IS, IM, II, and IL regions. By 6 and 9 months, sensory recovery was significantly superior in all nine regions.

The dual-neurotized group also had significantly greater sensory recovery than the single-neurotized group at 6 months (70.3% vs. 42.5%, $p = 0.002$) and 9 months postoperatively (74.8% vs. 47.0%, $p = 0.015$). At 6 months, sensory recovery was significantly greater in the OS, OI, and II regions compared to the single-neurotized group, and at 9 months, it was significantly greater in the OS, OI, OL, and IL regions.

CONCLUSION: This pilot study supports neurotization at the time of reconstruction, demonstrating superior tactile sensory recovery in dual-neurotized patients compared to both single-neurotized and non-neurotized patients.

Pre- and postoperative use of botulinum toxin and nerve blocks in patients undergoing nerve decompression surgery

Abstract Presenter: Giulia Monnink MD

Abstract Co-Author(s): Merel Hazewinkel MD, Matthew Depamphilis, Kristyn Vicente, William Gerald Austen Jr., MD, Lisa Gfrerer MD, PhD

Purpose: Patients with neuropathic pain in the head and neck typically exhaust various conservative treatment options-including botulinum toxin injections, peripheral nerve blocks, and medications-that typically provide only temporary relief prior to undergoing nerve decompression. The extent to which surgery reduces the use of injectable treatments postoperatively is unclear. Therefore, this study aims to assess the postoperative reduction in the use of botulinum toxin and nerve blocks among patients who undergo nerve decompression surgery.

Methods: A total of 50 patients who underwent nerve decompression surgery at Weill Cornell Medical Center (n=25) and Massachusetts General Hospital (n=25) between June 2023 and September 2024 were included in this study. Standardized surveys were administered prospectively at baseline (pre-operative), 3-month follow-up (post-operative), and 12-month follow-up. Patient data collection included demographic information and data regarding botulinum toxin and nerve blocks usage pre- and post-operatively.

Results: The study population predominantly consisted of females (82%, n=41), with a mean age of 47.4 years (SD 15.4 years). The mean follow-up was 5.88 months (SD 4.2).

Preoperatively, 78% (n=39) of patients received botulinum toxin injections, with a median of 7 injections per patient (IQR 15.75). Most patients (85%, n=33) received botulinum toxin injections in both the front and the back of their head. Symptom relief varied, with 51% (n=20) experiencing partial relief (<50%), 23% (n=9) reporting significant improvement (>50%), and only one patient achieving complete relief. The duration of botulinum toxin efficacy ranged from less than a week (23%, n=9) to more than 6 months (5%, n=2).

Peripheral nerve blocks were administered in 86% (n=43) of patients prior to surgery, with a median of 5 injections (IQR 5.5). The most common injection site was the back of the head (65%, n=28). A subset of patients (21%, n=9) reported no symptom relief. The duration of relief ranged from less than an hour in 6 patients (15%) to more than a month but less than three months in 17% (n=7).
Postoperatively, botulinum toxin use significantly declined from 78% to 30% (P<0.001). Additionally, among those who continued botulinum toxin treatment, nearly half (46%, n=6) reported improved efficacy. Similarly, nerve block administration decreased significantly, from 86% to 24% (n=12) (P<0.001), with 14% (n=1) noting improved efficacy following surgery.

Conclusion: This study demonstrates that injectable treatments provide only limited and temporary relief preoperatively. Additionally, it shows that nerve decompression surgery significantly reduces the need for botulinum toxin injections and nerve blocks in patients with HDs caused by peripheral nerve compression. Limiting the need for repeated injectable treatment will improve patients' quality of life and reduce the financial burden on the healthcare system.

Anatomical variations of the trigeminal nerve and implications in surgical treatment of trigeminal migraines

Abstract Presenter: Christie Bialowas MD

Abstract Co-Author(s): Ishan Patel, Amanda Kahn, Madelyn Crowell

Trigeminal neuralgia is a chronic pain disorder of the face that affects the trigeminal nerve. The electric, shock-like facial pain can be either continuous or paroxysmal and is triggered by factors including light touch, talking, chewing, and drinking. Due to the presence of multiple branches, the trigeminal nerve is an anatomically complex structure. When considering surgical treatment options, it is important to consider possible anatomical variations of the nerve and its branches. However, few, if any, studies have analyzed variations in the supraorbital, supratrochlear, and infraorbital nerves with respect to patient outcomes regarding trigeminal neuralgia. This study aims to document variations in the supraorbital, supratrochlear, and infraorbital nerves in body donors and in patients with trigeminal neuralgia. The faces of four unembalmed body donors were dissected (6 hemi-faces total), and the supraorbital, supratrochlear, and infraorbital nerves were uncovered in each hemi-face. Images of each hemi-face were taken. The number of branches for each nerve was documented by two anatomists, one plastic surgeon, and one medical student independently and the final values for each nerve were averaged. The presence of a fibrous band associated with any of the nerves was also noted. Findings were compared to two patients who underwent surgical correction of trigeminal neuralgia. Across six hemi-faces, there was an average of 1.67 (Range: 1-2) main branches of the supraorbital nerve, 1 main branch of the supratrochlear nerve, and 3.98 (Range: 3-5) main branches of the infraorbital nerve. Regarding fibrous bands, one third of the hemi-faces had fibrous bands associated with either the supraorbital or supratrochlear notches. A similar fibrous band had to be cut to release the supraorbital nerve in one of the two patients who underwent surgical correction. Although the second patient did not have a fibrous band

present, this patient had 3 main branches of the supraorbital nerve. This number of branches was not observed in the dissection of the hemi-faces. Both patients are now pain free one year and one month post operation, respectively. This study shows variation in the number of main branches of the supraorbital, supratrochlear, and infraorbital nerves. The comparison of our documented anatomical variations with the surgical decompression case indicates the presence of a fibrous band at the supraorbital notch may be an understudied cause of trigeminal neuralgia. Reconstructive surgeons should be aware of the variations of the trigeminal nerve and the presence of fibrous bands associated with the supratrochlear or supraorbital notches in order to provide optimal surgical outcomes in the treatment of trigeminal neuralgia.

A Bone to Pick: Characterizing Osteomyelitis in Amputees with Osseointegrated Implants

Abstract Presenter: Carson Gundlach

Abstract Co-Author(s): Anna Vaeth, Albert Truong MD, Jason Hoellwarth, Taylor Reif, S Robert Rozbruch, David Otterburn MD

Purpose: Osteomyelitis (OM) is a serious complication in amputees with osseointegrated implants (OI). This study characterizes OM in OI patients, focusing on risk factors, clinical presentation, infection progression, and diagnostic timelines.

Methods: A retrospective review of 127 OI patients (2017-2023) identified OM cases by positive intraoperative bone cultures or radiographic evidence (i.e., X-ray, CT, MRI). Demographic, clinical, and surgical characteristics were compared between OM and non-OM patients using statistical tests.

Results: OM occurred in 11 of 127 patients (8.7%) with no statistically significant differences between groups for any tested variable. Median follow-up was 2.6 years (IQR: 2.1) across all OI patients. OM patients were more often female (55% vs. 28%, $p = 0.091$) and had higher rates of tobacco use (45% vs. 34%, $p = 0.5$), alcohol use (55% vs. 40%, $p = 0.4$), and hypertension (36% vs. 27%, $p = 0.5$) but a lower median BMI (27.0 vs. 28.5, $p = 0.3$). They had a shorter median time from amputation to osseointegration (1 vs. 5 years, $p = 0.2$) and were more frequently amputated at the femur (64% vs. 59%, $p > 0.9$) and right limb (73% vs. 47%, $p = 0.10$). Trauma (64%)

was the leading amputation cause, followed by infection (27%) and surgical complications (9%) in OM patients. Pain (91%) and functional limitation (91%) were the most common OM symptoms, followed by drainage (63%), erythema (18%), mechanical issues (36%), and sensory changes (36%). Among patients with drainage (64%), 45% had purulent, 9% serous, and 9% bloody discharge. Two (18%) OM cases were diagnosed incidentally via routine intraoperative cultures. Symptom onset to evaluation took 35 days (IQR: 92.5), and symptom onset to culture confirmation took 124 days (IQR: 232). Streptococci were the most common pathogens (64%), and 73% of infections were polymicrobial.

Conclusion: OM in OI patients is frequently polymicrobial and presents with pain and functional limitations. Diagnostic delays highlight the need for improved screening and treatment strategies. Further research should focus on optimizing infection control and implant retention strategies.

Electrical stimulation fails to enhance sympathetic regeneration after peripheral nerve injury and contributes to long-term functional deficits

Abstract Presenter: Tina Tian

Abstract Co-Author: Patricia Ward

Background: Peripheral nerve injuries (PNIs) are common, and the current standard of care relies on the slow and inefficient process of spontaneous regeneration. Electrical stimulation (ES) enhances motor and sensory regeneration; however, its effects on sympathetic regeneration is unknown.

Methods: To study acute ES effects, 1 hour, 20 Hz stimulation was applied to transected and repaired mouse sciatic nerves. ES was compared to a conditioning lesion (CL) and sham. Axonal regeneration was evaluated after 2 weeks via immunohistochemistry.

To study long-term ES effects, sweating recovery was tracked with a pilocarpine assay for 12 weeks after sciatic nerve transection, with and without ES. Reinnervation of the most distal sweat glands was assessed via immunohistochemistry, and neurons reinnervating the foot and tibialis anterior (TA) were fluorescently labeled. Purines in the gastrocnemius (GA) were quantified using high-performance liquid chromatography to

evaluate skeletal muscle energy charge. In a separate 12-week cohort, compound muscle action potentials were measured from the GA.

Results: ES and CL do not enhance sympathetic regeneration but do enhance motor/sensory regeneration acutely. ES neither improves long-term sweating recovery nor reinnervation of the most distal sweat glands. ES improves motor reinnervation, but not sympathetic reinnervation, of the foot. Motor reinnervation of the TA is nearly complete by 12 weeks, but sympathetic reinnervation remains incomplete. Despite the return to baseline CMAP amplitudes 12 weeks after injury with or without ES, ES does not resolve injury-related mitochondrial metabolism deficits and muscle atrophy.

Conclusion: ES does not enhance sympathetic regeneration. Despite the return of motor reinnervation of more proximal muscles 12 weeks post-PNI, alterations in skeletal muscle energy charge and muscle bulk persist, likely due to decreased sympathetic reinnervation.

Enhancing Functional Recovery in Decellularized Nerve Allografts Through Vasculogenic Nanotransfection

Abstract Presenter: Hamid Malekzadeh MD

Abstract Co-Author(s): Reade Otto-Moudry, Ana Salazar Puerta, Hallie Harris, Jon Stranan, Sara Kheirkhah, Jude Kluemper, Nada Khattab MD, Daniel Gallego-Perez, Amy Moore MD

Background: Traumatic peripheral nerve injuries lead to motor deficits and irreversible muscle atrophy. While segmental nerve gaps are commonly repaired with autografts, their availability is limited, and harvesting them can cause donor site morbidity. Decellularized nerve allografts offer an alternative, but adequate vascularization is crucial for axonal regrowth, particularly in large-diameter or long-segment grafts. This study explores the use of tissue nanotransfection (TNT) to deliver vasculogenic genes to the recipient sciatic nerve before grafting with allografts, aiming to enhance revascularization and support axonal regeneration.

Methods: TNT was used to deliver a reprogramming vasculogenic gene cocktail-Etv2, Foxc2, and Fli1 (EFF)-to injured sciatic nerves. Ten-week-old C57BL/6 mice received decellularized allografts (1 cm) to the right sciatic nerve. Study groups included a control

(sham surgery), allografts with sham TNT (mock plasmids), and allografts with EFF transfection. Functional recovery was assessed using the sciatic functional index (SFI), compound muscle action potential (CMAP), motor unit number estimation (MUNE), twitch and tetanic force, and grip strength, measured biweekly over 20 weeks. For histological analysis, allografts were harvested at two-week intervals and stained for endothelial cells, Schwann cells, and neurofilament.

Results: Vasculogenic transfection in allografts significantly increased grip strength, with statistical significance observed at week 12. Electromyography showed improved outcomes in the transfected allografts, with significant increases in twitch force at week 10 and tetanic force from week 8 through the study's conclusion at week 20. CMAP and MUNE remained comparable across all groups. Histologic analysis showed increased Cd31 cells in Eff treated grafts compared to other groups.

Conclusion: This study demonstrates that nanotransfection enhances vasculogenesis and functional muscle recovery in allografts in association with increased vasculogenesis. These findings suggest that TNT could be a promising strategy to improve outcomes in nerve allografting for large or complex nerve defects.

VALIDATING INTRAOPERATIVE ASSESSMENT OF NERVE STRETCH INJURIES USING A NERVE STIMULATOR IN A NOVEL RODENT MODEL.

Abstract Presenter: Rachana Suresh MD

Abstract Co-Author(s): Kitae Park MD, Jeffrey Khong, Sami Tuffaha MD

Introduction: Peripheral nerve injuries-in-continuity are challenging to manage in the acute setting due to difficulties with defining the zone of injury. Intraoperative nerve stimulation along the length of the injured nerve may help determine the extent of injury for acute resection and grafting. We present a novel in-vivo nerve stretch injury model that correlates intraoperative nerve stimulation findings with histological changes.

Methods: We created stretch injuries to the median nerves of 24–28-week-old Lewis rats by applying a vertical traction force of 4-5N using a digital force transducer and sling attachment. Electrical stimulation was performed at varying locations along the length of the nerve with bipolar electrodes was conducted before and after injury and evoked grip strength was measured. Animals were sacrificed at either 0-, 2-, and 8-

weeks post-injury (n=5 per timepoint). Histological assessment of fibrosis and nerve microarchitecture was performed with Masson's Trichrome stain and immunohistochemical markers neurofilament-H and laminin to evaluate the zone of injury and compare histological findings with the motor responses elicited with intraoperative stimulation at varying points along the length of the injured nerve.

Results: Intraoperative stimulation at the site of traction injury, at time 0, elicited no motor response, which correlated with histological findings of axonal fragmentation, epineurial disruption, and loss of the characteristic undulations of the bands of Fontana. However, stimulation 1 cm distal to the injury site resulted in grip formation correlating with preserved native architecture. By 2 weeks, Wallerian degeneration was evident in the distal segment while the site of traction injury demonstrated pronounced axonal disorganization. At 8 weeks, a neuroma-in-continuity was present at the site of traction injury characterized by disorganized axonal growth and fibrosis. Despite applying the maximum stretch force to the nerves to avoid rupture, spontaneous regeneration and motor functional recovery was unexpectedly observed.

Conclusions: The location of the nerve distal to the site of stretch injury at which functional motor response was elicited with electrical stimulation correlates with the transition point between damaged and normal architecture. While spontaneous recovery occurred in our model due to the superlative regenerative capacities of rodents, our findings suggest that intraoperative stimulation may be useful in guiding the extent of resection needed when performing acute reconstruction of severe stretch injuries in which the surgeon is able to rule out the possibility of spontaneous recovery.

Gender-Based Differences in Outcomes Following Regenerative Peripheral Nerve Interface (RPNI) Surgery

Abstract Presenter: Melanie Wang MD

Abstract Co-Author(s): Maximilian Wagner, Stephen Kemp PhD, Paul Cederna MD, Theodore Kung MD

Purpose: Regenerative Peripheral Nerve Interface (RPNI) surgery is a promising technique for treating post amputation and neuroma pain. Recent animal studies (1) have revealed potential sex-specific differences in pain mitigation after RPNI surgery, suggesting the influence of gender-based nociceptive pathways. These differences

have not yet been examined in human studies. Identification of gender-based differences in pain outcomes following RPNI surgery allows a more individualized pain management.

Methods: A retrospective institutional study was conducted using DataDirect, the University of Michigan Medicine's clinical database. We analyzed patients who underwent major upper or lower limb amputation between 2015 and 2024, with at least one year of post-operative clinical data. The cohort included male and female patients with and without RPNI surgery. Data collected included neuroma and phantom limb pain scores, length of hospital stay, along with analgesic and narcotic use. Narcotic use was standardized to milligrams morphine equivalents per day (MME/day), while overall analgesic use was quantified using the Medication Quantification Scale version III (MQSIII). Statistical analysis was performed using SPSS.

Results: 1,261 patients were identified: 844 males (184 RPNI patients, 660 controls) and 417 females (96 RPNI patients, 312 controls). Among the RPNI group, 22% of patients had phantom limb pain, compared to 49% in the control group. There was no significant difference between male and females in both groups. Additionally male RPNI group demonstrated significantly lower narcotic use compared to control. There was no significant difference between female and male narcotic use. Overall analgesic use did not vary significantly between groups. Both female and male RPNI groups demonstrated significantly shorter hospital stays compared to controls ($p<0.01$). Male control patients experienced shorter length of stay compared to female patients.

Conclusions: RPNI surgery significantly reduced phantom limb pain and hospital length of stay for both male and female patients compared to controls, highlighting its efficacy in post-amputation pain management. These findings suggest that while RPNI is effective in mitigating post-amputation pain, further research is needed to explore potential gender-specific mechanisms influencing pain perception and medication use.

1. Amir Dehdashtian, Timek JH, Svientek SR, et al. Sexually Dimorphic Pattern of Pain Mitigation Following Prophylactic Regenerative Peripheral Nerve Interface (RPNI) in a Rat Neuroma Model. Neurosurgery. 2023;93(5):1192-1201. doi:https://doi.org/10.1227/neu.0000000000002548

Evaluating the Mechanisms of the Supercharged End-to-Side (SETS) Nerve Transfer in a More Accurate Rodent Chronic Denervation Model

Abstract Presenter: Zachary Zamore

Abstract Co-Author(s): Kitae Park MD, Jeffrey Khong, Rachana Suresh MD, John Nguyen DO, Jared Zhang, Christopher Erb, Keith Kuo MD, Sami Tuffaha MD

Purpose: The supercharged end-to-side (SETS) nerve transfer has emerged as a promising technique in peripheral nerve surgery. This approach aims to rapidly introduce a pool of donor axons that "babysit" the target muscles while awaiting the delayed arrival of regenerating axons originating from the recipient nerve. However, the mechanistic underpinnings of this process remain poorly defined in large part due to the challenges in creating a model that more accurately represents the chronic denervation state seen clinically and the challenges in individually labelling the donor and recipient axons pools. This study seeks to address these critical knowledge gaps by evaluating the SETS transfer in a chronically denervated rodent forelimb model and using florescent protein-encoding adeno-associated viruses (AAVs) to label and evaluate the donor and recipient axon pools.

Methods: A SETS model was developed to mimic chronic denervation seen clinically. In the experimental group, the right median nerve was transected mid-brachium and sutured to a reversed, 2 cm contralateral sciatic nerve graft with its distal end implanted within the pectoralis major to prevent aberrant regeneration. An ulnar-to-median nerve SETS transfer performed at the same time via an epineurial window in the distal median nerve stump. After 10 weeks, the median nerve was repaired by coapting the distal graft to the distal median nerve.

The negative control followed the same procedure but omitted the end-to-side transfer. An additional control group lacked subsequent median nerve repair. The positive control involved immediate median nerve transection and repair with a graft.

Eight weeks post-surgery, intra-neural AAV injections were performed. Five microliters of AAV.Php.EB.Tdtomato was injected into the ulnar nerve, and five microliters of AAV.Php.EB.EGFP into the median nerve. At euthanasia (22 weeks), median and ulnar nerves were exposed and individually stimulated at 100 Hz, and resulting grip strength was measured. The Kruskal-Wallis H test was used for statistical analysis followed by Post-Hoc Dunn's Test using an alpha of 0.05.

Results: Median nerve grip strength was significantly greater in experimental group vs negative control group (1.89 N vs. 1.31 N, $p<0.05$), confirming a babysitting effect

conferred by SETS transfer. Both viral vectors demonstrated robust expression in nerves and muscles, enabling visualization of selective motor endplate innervation.

Conclusions: Delayed primary repair with immediate distal SETS transfer allowed us to overcome the size limitations in rats and accurately model the temporal separation in donor vs recipient axon reinnervation of target muscles that occurs clinically. Grip strength arising specifically from delayed reinnervation via the proximal repair site was potentiated by the presence of distal SETS, providing the first convincing experimental evidence of a "babysitting effect". Pending histologic data evaluating NMJ reinnervation with individually tagged donor and recipient axons populations will allow us to confirm this mechanism.

Bioactive Nerve Repair: Enhancing Microsurgery with CCL2 Modulation

Abstract Presenter: Claudy Sarpong

Abstract Co-Author(s): Sumaia Khoury, Daniel Nguyen, Vivianna Williams, Diana Lim, Farrah Liu MD

Introduction: Microsurgical nerve repair has traditionally focused on mechanical reconnection methods like direct neurorrhaphy and nerve grafting, but these often yield incomplete functional recovery. Recent insights into regenerative medicine highlight the crucial role of macrophage-driven inflammation and immune modulation in peripheral nerve repair through the chemokine CCL2 (MCP-1). This review proposes a paradigm shift in microsurgery-from a purely structural approach to a bioactive strategy, enhancing nerve healing through intraoperative modulation of CCL2 signaling. We hypothesize that incorporating molecular interventions could accelerate nerve regeneration and functional recovery, while reducing postoperative neuropathic pain.

Objective: This paper evaluates the role of CCL2 as a bioactive modulator in nerve regeneration. We aim to establish a scientific and clinical basis for integrating CCL2-based therapies into microsurgical protocols, representing a breakthrough in nerve repair strategies.

Methods: A literature review was conducted using PubMed to assess CCL2's role in nerve regeneration, macrophage recruitment, neuroinflammation, neurite outgrowth, and functional recovery. The review included in vitro studies, rodent nerve injury models

(such as crush, transection, graft, and spinal cord injury), and investigations into CCL2's mechanisms of action through knockout and overexpression models. Insights from ongoing laboratory experiments focused on nerve regeneration strategies, macrophage modulation, and bioactive materials. The data was analyzed to identify opportunities for leveraging CCL2 in bioactive microsurgical interventions.

Results: A significant portion of current research focuses on the effects of CCL2 on nerve repair mechanisms through macrophage recruitment and neurite outgrowth promotion. Specifically, CCL2 is shown to mediate neuron-macrophage interactions involved in pro-regenerative macrophage activation. While many investigations concentrate on CCL2's isolated effects on neuroinflammation and nerve regeneration, other research explores its role within more complex scenarios, such as nerve grafting or cellular therapies. Such studies suggest that CCL2-CCR2 signaling is essential for macrophage accumulation in nerve allografts, supporting the hypothesis that exogenous CCL2 could enhance graft integration. Studies utilizing acellular nerve allografts (ANAs) have shown that CCL2 is critical for recruiting macrophages into the graft, promoting angiogenesis, and ultimately leading to improved nerve regeneration. Pre-conditioning approaches, such as transplanting mesenchymal stromal cells (MSCs) stimulated to release CCL2, show promise for improved nerve regeneration in transection models, indicating a compounded benefit when combining cellular therapies with CCL2-mediated effects. Additionally, CCL2 modulation appears to influence post-injury pain behaviors. Collectively, these findings support the feasibility of leveraging CCL2 intraoperatively to accelerate nerve healing and improve microsurgical results.

Conclusion: Incorporating bioactive molecular interventions into microsurgery shifts nerve repair beyond just structural reconstruction. Targeting CCL2 intraoperatively may enhance macrophage-driven repair, graft integration, and functional recovery. Our ongoing research aims to validate this approach through preclinical studies assessing exogenous CCL2 delivery, fluorescent microscopy to analyze macrophage infiltration and axon growth, and the development of bioactive microsutures or hydrogels for sustained intraoperative release. Modulating CCL2 intraoperatively may significantly enhance peripheral nerve regeneration, advancing microsurgical nerve repair with clinical applications.

Poster Session

A Five Year Update on Social Media Use in Academic Plastic Surgery Residency Programs

Abstract Presenter: Holly Cordray

Abstract Co-Author(s): Adina Singer, Said Azoury MD, Gustavo Capone

Purpose: Social media is an important tool for PRS training programs to engage prospective applicants (1). A study of PRS training programs by the senior author (2020) describes an exponential increase in program presence on Instagram and X/Twitter from 2010 to 2018 (2). The purpose of this study is to provide an up-to-date analysis of PRS training program and program leadership utilization of social media, detailing change over time in relation to prior results from our senior author.

Methods: A national cross-sectional study of PRS programs in the United States for the 2024-2025 academic year was conducted. Instagram, Facebook, X, and TikTok were queried for all integrated PRS training program and PD/chief/chair accounts. Instagram posts were categorized by type. Factors influencing number of followers were analyzed including number of accounts followed, number and types of posts, geographic location, and rank (e.g., Doximity (3)). Accounts were analyzed using Kruskal-Wallis, Jonckheere-Terpstra, independent sample T-test, and regression analysis.

Results: PRS program social media use has consolidated around Instagram as its preferred platform with 100% of programs having an account and 19,498 total posts at the time of data collection. Of those, 16,310 (84%) had been posted after 2019, and were included in post categorization. Instagram posts were most often providing information about the program/curriculum (34.8%), social activities (13.1%), and research-related content (10.4%). Nearly a quarter of posts (23.1%) were categorized as other (e.g., non-academic celebratory posts, nonspecific pictures of residents in the hospital, pictures of nearby sites). The percentage of research related posts has declined since 2020. Active program accounts on X and Facebook are declining linearly ($R^2 = 0.96$ and 0.70, respectively). Only one program has a TikTok account. West Coast programs have more Instagram and X followers than other regions, and significantly more followers than Southern programs ($p = .024$ and $p = .004$, respectively). Program Instagram accounts affiliated with top ranked hospital, medical schools, and residency programs have more followers ($p < .001$). Total number of Instagram posts was correlated with increased followers ($p < .001$), however the distribution of post type is not correlated with size of following. Among chiefs/chairs, 51.6% had Instagram

accounts, 43% had Facebook accounts and 21.5% had X accounts. For PDs, Facebook was the most popular platform with 53.3% having an account, followed by 45.6% on Instagram, and 30% on X. A large proportion of program leadership accounts have no public posts (22%-37%); the platform with the largest proportion of professional accounts is X (33%).

Conclusions: Social media adoption by PRS programs has stabilized somewhat following a period of exponential growth described in 2020. Instagram has emerged as the most popular platform with tens of thousands of posts and followers. Facebook and X use by programs is declining. Instagram posts are largely providing information about program structure, curriculum, and culture, with nearly a third of posts being social or otherwise nonacademic in nature. For prospective applicants, Instagram is home to a rich archive of information and may be a useful tool in learning about program culture.

1. Irwin TJ, Riesel JN, Amador RO, Helliwell LA, Lin SJ, Eberlin KR. The Impact of Social Media on Plastic Surgery Residency Applicants. Ann Plast Surg. 2021 Mar;86(3):335–9.
2. Azoury SC, Mazzaferro DM, Piwnica-Worms W, Messa CA, Othman S, Stranix JT, et al. An Update on Social Media in Academic Plastic Surgery Training Programs: The Rising Trend of Likes, Shares, and Retweets. Ann Plast Surg. 2020 Aug;85(2):100–4.
3. Residency navigator: plastic surgery (integrated) residency programs. [Internet]. 2024 [cited 2025 Jan 7]. (Resid Navig.). Available from: https://www.doximity.com/residency/programs?specialtyKey=2807bb9a-8f20-4502-8879-139c0023bbb2-plastic-surgery-integrated&sortByKey=reputation&trainingEnvironmentKey=&intendedFellowshipKey=

A Four-Year Analysis of the Complications and Outcomes of Using Cadaveric Costal Cartilage for Ear Reconstruction

Abstract Presenter: Stephanie Rothberg

Abstract Co-Author(s): Eric Bao, Jose Palacios` BS, Nicholas Bastidas MD

Background/Purpose: Cadaveric costal cartilage is an alternative to autologous costal cartilage for ear reconstruction that reduces patient pain, cost, and morbidity. However, there currently is no account of the long-term outcomes of using cadaveric costal cartilage for ear reconstruction. This study aims to clarify this knowledge gap by

describing the complications and outcomes of using cadaveric costal cartilage in microtia reconstruction over a four-year period.

Methods: A retrospective review was conducted for 21 patients who received ear reconstruction using cadaveric costal cartilage from August 2020 to December 2024. Inclusion criteria for the study included a diagnosis of congenital microtia, no prior ear reconstruction surgery, and a two-stage approach with cadaveric cartilage. Reconstruction was done by a single craniofacial plastic surgeon in two stages utilizing the Nagata/Firmin technique. Patient demographics, medical history, surgical dates, post-operative complications, surgical outcomes, and follow-up length were collected and analyzed.

Results: All 21 patients received a primary ear reconstruction for congenital microtia. A total of 22 ears were reconstructed, of which 13 were right ears (59.0%) and 9 were left ears (41.0%). The mean age of patients undergoing reconstruction for congenital microtia was 9.0 ± 3.5 years, with a range of 4 – 15 years. The mean time between stage I and stage II was 215.7 ± 93.9 days, with a range of 113 – 497 days. The mean length of follow-up was 16.1 ± 10.4 months, with a range of 5.5 – 46 months. Three patients (14.3%) required explantation and replacement of the cadaveric cartilage after stage I due to discomfort secondary to either asymmetric framework, significant skin breakdown and extrusion, or resorption secondary to infection/extrusion. This is compared to a general resorption rate of 12% for autologous ears constructed utilizing the Nagata technique (1). One other patient had an infection after stage I that was resolved with in office irrigation and antibiotics which did not result in further complications. Four patients (19.0%) had minor cartilage exposure, with 3 debrided in the office and 1 salvaged in the operating room. There were no short or long term complications following stage II surgery including cartilage warping, cartilage contraction, or resorption.

Conclusions: Cadaveric costal cartilage is a viable alternative to autologous rib cartilage for primary ear reconstruction for congenital microtia, though, similar to autologous rib reconstruction surgeons should be vigilant of signs of infection and cartilage exposure to reduce framework failure after stage I surgery.

Reference:
(1) Ronde EM, Esposito M, Lin Y, van Etten-Jamaludin FS, Bulstrode NW, Breugem CC. Long-term complications of microtia reconstruction: A systematic review. J Plast Reconstr Aesthet Surg. 2021 Dec;74(12):3235-3250. doi: 10.1016/j.bjps.2021.08.001.

A meta-analysis of non-traditional uses of deep inferior epigastric artery perforator flaps (DIEP)

Abstract Presenter: Michael Li

Abstract Co-Author: Guilherme Barreiro MD

Background: The deep inferior epigastric artery perforator (DIEP) flap is an established free flap for breast reconstruction following mastectomy (1,2). While its advantages in breast reconstruction is widely known, its effectiveness in other regions has not been studied at length. Currently, only narrative reviews and case reports regarding the DIEP flap use outside the breast region exist (3,4). To obtain a more comprehensive and accurate assessment of the DIEP's effectiveness, we compiled this data and performed a statistical analysis of the results. Thus, we present a systematic literature review to investigate the use of the DIEP flap for the treatment of non-breast reconstructions.

Methods: A systematic search of articles related to deep inferior epigastric perforator flap outcomes is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. 117 articles, out of 328 titles, were considered eligible for full-text analysis. Finally, 89 studies that met inclusion criteria were included in this review.

Results: Overall, there were a total of 467 patients who underwent reconstruction with the DIEP flap in a non-breast region. Mean patient age was 46.24 years old (19-78 years old). Of the different subgroups - head and neck: 122 patients, lower limb: 115 patients, upper limb: 95 patients, vaginal: 72 patients, hip and thigh: 41 patients, and trunk: 22 patients. In total, 19 free flaps failed (4.1%) resulting in a pooled survival rate of 96% overall. The pooled survival rate of the head and neck, lower limb, upper limb, vaginal, hip and thigh, and truncal groups were 97%, 93%, 95%, 95%, 98%, and 95%, respectively. Additionally, of the measured 467 cases within our studies, 13 reported instances of donor site morbidity (n=13, 2.78%). The remaining cases all performed donor site closures primarily without complication (n=454, 97.22%).

Conclusions: The DIEP flap serves as an excellent management option for patients undergoing reconstruction of body areas beyond the breast. Our systematic review highlights the effectiveness of the flap in terms of function, limb salvage, low postoperative complication rate, and prevention of recurrences.

1. Allen RJ, Treece P. Deep inferior epigastric perforator flap for breast reconstruction. Ann Plast Surg. 1994;32(1):32-38. doi:10.1097/00000637-199401000-00007
2. Nahabedian MY, Momen B, Galdino G, Manson PN. Breast Reconstruction with the free TRAM or DIEP flap: patient selection, choice of flap, and outcome. Plast Reconstr Surg. 2002;110(2):466-477. doi:10.1097/00006534-200208000-00015
3. Guinier C, de Clermont-Tonnerre E, Tay JQ, Ng ZY, Cetrulo CL Jr, Lellouch AG. The deep inferior epigastric artery perforator flap: a narrative review on its various uses in non-breast reconstruction. Ann Transl Med. 2023;11(2):130. doi:10.21037/atm-22-2623
4. Yano T, Sakuraba M, Asano T, Sarukawa S. Head and neck reconstruction with the deep inferior epigastric perforator flap: a report of two cases. Microsurgery. 2009;29(4):287-292. doi:10.1002/micr.20617

Addition of Second-Stage LICAP Flap and Fat Grafting in Multiple Planes to Goldilocks Technique for Total Autologous Breast Reconstruction

Abstract Presenter: Hannah Johnson-Stenger

Abstract Co-Author(s): Taylor Kreul, Carter Anderson, Janelle Rodriguez MD, Michel Saint-Cyr MD, MBA, MHA, FRCSC, FACS

Purpose: The Goldilocks mastectomy offers an alternative for high-risk patients who are not candidates for traditional, free-flap based reconstruction. The addition of a second stage lateral intercostal artery perforator (LICAP) flap procedure with fat grafting in a multilayered approach can provide supplemental volume. While previous studies have examined complication rates and risk factors affecting the success of the Goldilocks procedure and LICAP flap independently, the literature is currently lacking regarding both together. This study aims to explore the efficacy of the Goldilocks mastectomy with the addition of the LICAP flap and fat grafting in two stages, addressing donor site complications and optimizing aesthetic outcomes.

Methods: This is a single institution retrospective cohort study following patients who underwent initial Goldilocks reconstruction followed by second stage LICAP flap and fat grafting performed by the senior author between January 2023 and April 2024. Adult patients were included if they had a diagnosis of breast cancer and underwent unilateral or bilateral Goldilocks mastectomy with delayed LICAP flap. The variables analyzed include total volume of fat grafted following reconstruction, postop complication rate,

patient satisfaction (based on number of revisions), flap survival rate, size of LICAP flap, and time from initial Goldilocks to LICAP.

Results: Out of 27 Goldilocks procedures, three patients (six breasts) were identified. No donor site complications were noted among identified patients, and flap survival rate was 100%. The average length and width of the LICAP flap was 17.67 cm by 6.33 cm. All included patients underwent fat grafting. The mean total volume of fat grafted was 190 cc with a SD of 181.9. All patients underwent capsulotomy and capsulectomy to re-elevate Goldilocks skin flap to full projection. The average length of time between initial Goldilocks procedure to the LICAP flap was 189 days. One patient of the three had an additional revision with fat grafting following LICAP flap.

Conclusion: Goldilocks mastectomy in combination with delayed LICAP flap and fat grafting offers a safe, convenient, out-patient approach to complete autologous breast reconstruction in high-risk patients who are looking for small-to-moderate breast volume. Limiting the number of incisions at immediate reconstruction with a two-stage approach allows healing and vascularization of the mastectomy skin flaps while affording the opportunity to conduct high volume fat grafting in multiple planes in a delayed setting to maximize fat grafting survival. Additionally, the LICAP flap is easy to harvest, and the donor site offers aesthetic improvement in an area that would usually be lipoaspirated or directly excised.

Algorithmic Detection of Digitally Enhanced Rhinoplasty Photographs on RealSelf.com: Implications for Patient Informed Decision-Making

Abstract Presenter: Adebusola Olabiran

Abstract Co-Author(s): Aaron Dadzie, Roy Kim MD

Purpose: To evaluate the performance of a machine learning algorithm in detecting digitally enhanced before-and-after rhinoplasty photographs sourced from RealSelf.com, and to assess the implications of image manipulation for patient decision-making in aesthetic surgery.

Methods: A retrospective review was conducted using a curated dataset of 100 rhinoplasty images retrieved from RealSelf.com between December 2022 and February 2025. RealSelf.com is a widely recognized online platform where patients share

cosmetic surgery experiences, including before-and-after photographs and reviews, that help shape public perceptions of surgical outcomes. An algorithm developed by our research team, employing advanced image processing and pattern recognition techniques, was applied to identify features indicative of digital enhancement. Standardized protocols were implemented during data collection and analysis to minimize bias. In addition, a subset of the images was subjected to blinded evaluation by board-certified plastic surgeons to validate the algorithm's findings. Statistical analyses were performed to determine the prevalence of digitally enhanced images and to explore correlations with photographic metadata.

Experience: A total of 100 cases were analyzed. Although follow-up is not applicable to an image-based study, the retrospective review represents a comprehensive examination of digital manipulation in rhinoplasty photographs from a widely used online source. Expert validation served as the benchmark for assessing algorithm accuracy.

Results: Final analysis demonstrated that the algorithm reliably identified digitally enhanced images with high concordance relative to expert evaluation. The performance metrics indicated robust sensitivity and specificity in detecting digital modifications. These results confirm that a significant proportion of the reviewed rhinoplasty photographs exhibit evidence of digital enhancement, supporting the hypothesis that manipulated images are prevalent in online aesthetic surgery marketing.

Conclusion: The study validates the utility of an algorithm-based approach to objectively detect digital enhancements in rhinoplasty photographs. By revealing that a substantial percentage of images on RealSelf.com are digitally modified, these findings underscore the need for greater transparency in aesthetic surgery marketing. Implementation of such a tool could support regulatory efforts and enhance patient education, ultimately helping patients make well-informed decisions based on authentic representations of surgical outcomes.

An Evaluation of Insurance Status on Recovery Outcomes and Rehabilitation Adherence in Patients with Flexor Tendon Injuries

Abstract Presenter: Ashlynn LaFlamme

Abstract Co-Author(s): Jacqueline Fuentes, Angela Atkinson, Jared Hilton MD, Kevin Klifto DO, Pharmd, Stephen Colbert MD

Introduction: Flexor tendon injuries can profoundly affect aspects of daily life, leading to occupational limitations for patients. While many factors influencing recovery are well-documented, the specific effects of insurance status remain under-explored. This study seeks to evaluate recovery outcomes associated with insured, uninsured, and workers' compensation (WC) cases of flexor tendon injuries, aiming to identify patterns that may guide the development of treatment strategies and enhance recovery outcomes.

Methods: This IRB-approved, retrospective investigation included patients with flexor tendon injuries who underwent repair from January 2009 to January 2023 at a single institution. Exclusion criteria consisted of avulsion zone 1 injuries, flexor tendon repairs not a part of initial surgery, or attritional rupture (plate/rheumatoid). Demographics, comorbidities, surgical details, complications, and post-operative rehabilitation type were collected. Univariate analyses were performed for dichotomous and continuous variables, depending on the distribution of data. All statistical tests were two-tailed, with the threshold for statistical significance set at a α value of 0.05.

Results: Of the 494 included patients, there were 389 people with insurance and 105 without insurance. Of the insured patients, 45 were covered by workers' compensation claims (9%). The most common complication among WC patients was stiffness (77%, p=0.005), compared to numbness (45%) in those without WC insurance, and stiffness (46%) in those without insurance. All WC patients participated in formal occupational therapy, averaging 22.7 ± 20.5 weeks (p=<0.001). This is compared to non-WC patients (13.7±11.9) and those without insurance (9.0±10.6). WC patients also had a longer clinic follow-up time (52.4 ± 45.8 weeks, p=<0.001) compared to non-WC patients (24.2±20.5 weeks) and patients without insurance (14.0±24.96 weeks).

Conclusion: This study highlights the influence of insurance status on both complication patterns and rehabilitation adherence following flexor tendon repair, offering novel and practical insights to optimize patient treatment strategies. Our findings underscore the importance of tailored post-operative care protocols that address disparities in hand therapy access and follow-up duration. By recognizing these disparities providers may adopt targeted treatment approaches based on insurance coverage, ultimately improving recovery outcomes and enhancing overall patient care.

Analgesic Impact of the Erector Spinae Plane Block in Bilateral DIEP Flap Breast Reconstruction

Abstract Presenter: Eileen Wen

Abstract Co-Author(s): Robert DeVito MD, Kristen Stephens MD, Benjamin Ke, Amanda Silva MD, Scott Hollenbeck MD, FACS, Chris Campbell MD, FACS, John Stranix MD

Background: Regional anesthesia is an effective modality of pain control for patients undergoing breast reconstruction (BR). The erector spinae plane block (ESP) is a newer anesthetic technique for BR, though its performance relative to other regional block types is unclear. Our objective was to evaluate the impact of ESP blocks in immediate autologous BR.

Methods: A single-institution retrospective study of all patients who underwent immediate bilateral BR using deep inferior epigastric artery perforator (DIEP) flaps from 2017-2022 was conducted. 77 patients met inclusion criteria and were stratified in two cohorts: ESP (n=46) and non-ESP (n=31). The non-ESP cohort included patients receiving paravertebral (PVB), pectoralis (PECS), and other blocks. Outcomes assessed were daily morphine milliequivalents (MME) use, total MME use, and post-operative length of stay (LOS).

Results: Average daily opioid use (27.8 vs. 44.6 MME, p=0.001), total opioid use (97.4 vs. 219.4 MME, p<0.001), and LOS (2.5 vs. 3.8 days, p=0.001) were lower in the ESP cohort. On adjusted analysis, ESP blocks were associated with a -92.6 MME reduction in total opioid use compared to other blocks (95% CI[-147.8, -37.3]; p=0.001). On subgroup analysis, PVB and PECS blocks specifically were associated with higher daily opioid (PVB: 50.2 MME, p<0.001; PECS: 18.0 MME, p=0.018) and total opioid use (PVB: 285.2 MME, p<0.001; PECS: 114.0 MME, p<0.001) compared to ESP blocks.

Conclusion: A standardized regional anesthetic protocol with ESP blocks may enhance pain control in patients undergoing bilateral DIEP flap BR. Reduced opioid requirements can decrease risk of misuse and improve post-operative recovery.

Analyzing Artificial Intelligence-Generated Text in Plastic & Reconstructive Surgery Articles

Abstract Presenter: William Bohler

Abstract Co-Author(s): Christian Santiago, James Burmeister, Ava Harvey, Tristan Attisha, Zachary Koenig MD, Kongkrit Chaiyasate MD

Purpose: The integration of artificial intelligence (AI) in scientific writing has rapidly evolved, raising concerns about the prevalence of AI-generated content in peer-reviewed medical literature (1). Some journals have even published manuscripts that were entirely AI-generated in order to demonstrate its capabilities to its audiences (2). The field of plastic and reconstructive surgery relies heavily on high-quality research to guide clinical practice. However, the increasing accessibility of AI writing tools introduces questions about the authenticity, accuracy, and ethical implications of AI-assisted manuscript generation. While AI can enhance efficiency and language clarity, excessive reliance may compromise scientific integrity, introduce biases, or obscure the true intellectual contributions of authors.

This study aims to quantify the presence of AI-generated text in the leading journal within our field, Plastic & Reconstructive Surgery (PRS), providing insight into the extent of AI's role in academic publishing. Understanding these trends is essential for maintaining rigorous scholarly standards, ensuring transparency, and guiding future editorial policies to uphold the integrity of evidence-based surgical research. Further, understanding the ability of AI-text detection software may prove useful to editors wishing to screen manuscript for AI-content prior to publication.

Methods: The authors of this study randomly selected 6 issues published within PRS in 2014 and 2024. Articles that fell into one of nine categories were included for further analysis while other article types were excluded: original research article, systematic review/meta-analysis, reviews, ideas and innovations, special topics, viewpoints, letters/replies, editorials, discussions. Manuscripts' text was analyzed in the AI-text detection software ZeroGPT in order to determine the prevalence of AI-generated material in each article (3). Research articles and systematic reviews/meta-analyses were further analyzed by manuscript section (Abstract, Background, Methods, Results, Discussion, Conclusion). Articles published in 2014 served as the study's control as AI's capacity to create generative human-like text had not yet been developed. A two-tailed student's T-test was used to test for significance.

Results: A total of 273 articles were identified in 2014 and 205 in 2024 for inclusion. The mean percent of reported AI-generated content across all article types was 20.8% (SD = 22.8) in 2014 and 15.2% (SD = 14.5) in 2024. A significant difference was observed between these two values ($p = 0.002$), indicating a significant decrease AI-generated content in the 2024 group. On average, article abstracts were flagged as

having the greatest amount of AI-content (37.9%), followed by the results section (36.7%).

Conclusions: The results of this study were unexpected as there was a significant decrease in detectable AI material in manuscripts published in 2024. We expected there to be at least a modest increase in detected AI-content in the 2024 group. The results of this study indicate that the use of AI-generated content in PRS manuscripts has not yet occurred. Alternatively, the results of this study may indicate further work is needed in AI-detection software before it can be reliably utilized by journal editors to screen manuscripts for AI-generated content.

References

1. Májovský M, Černý M, Kasal M, Komarc M, Netuka D. Artificial Intelligence Can Generate Fraudulent but Authentic-Looking Scientific Medical Articles: Pandora's Box Has Been Opened. J Med Internet Res. 2023;25(1):e46924. doi:10.2196/46924
2. González-Padilla DA. Concerns About the Potential Risks of Artificial Intelligence in Manuscript Writing. Letter. J Urol. Published online April 2023. doi:10.1097/JU.0000000000003131
3. AI Detector - Trusted AI Checker for ChatGPT, GPT4 & Gemini. Accessed February 27, 2025. https://www.zerogpt.com/

Assessing the Quality of Breast Surgery Educational YouTube Videos: A Novel Evaluation Criteria for Plastic Surgery Academic Content

Abstract Presenter: Pushti Shah

Abstract Co-Author(s): Varoon Phondge, Ishan Patel, Sujit Patel, Priya Mansukhani MD, Kailash Kapadia MD, Edward Lee MD

Introduction: Breast surgery education has traditionally relied on textbooks and peer-reviewed literature. In recent years, YouTube has become a popular educational source for residents and faculty seeking procedural guidance. Its video format allows learners to observe complex techniques conveniently and cost-effectively. This growing reliance highlights the need to evaluate the quality and accuracy of YouTube videos to ensure reliable content distribution. Although tools like DISCERN and GQS assess video quality, they focus on evaluating patient education rather than resident or surgeon education. The purpose of this study is to fill that gap by developing detailed evaluation

criteria to assess the surgical educational value of YouTube videos regarding reconstructive and aesthetic breast surgery.

Methods: This study developed the "ESSENTIALS-Breast" criteria using the "Breast" section from the Essentials of Plastic Surgery textbook. Eight relevant surgical chapters were identified, each standardized with seven evaluation criteria such as "indications" and "technique" based on its subsections. For each chapter, 100 YouTube videos were collected using their name and "surgical technique" as the search query (e.g., "breast augmentation surgical technique"). Videos with surgical animations, patient-targeted content, irrelevant topics, authors other than plastic surgeons, or lacking surgical footage were excluded. Four evaluators assessed the remaining videos using DISCERN, GQS, and "ESSENTIALS-Breast" criteria, with scores averaged across reviewers. Videos scoring 6 out of 7 on "ESSENTIALS-Breast" and 4 out of 5 on DISCERN and GQS were classified as high quality. "ESSENTIALS-Breast" scores below 4 out of 7 and DISCERN/GQS scores below 3 out of 5 indicated low quality.

Results: An average of 18 videos per topic passed the exclusion criteria. The chapters on "Breast Augmentation," "Mastopexy," "Augmentation-Mastopexy," "Breast Reduction," "Autologous Breast Reconstruction," "Implant-Based Reconstruction," and "Nipple Areolar Reconstruction" contained zero high-quality videos based on the "ESSENTIALS-Breast" criteria. Only two videos on gynecomastia qualified as high quality, scoring 6 out of 7. Across all topics, 0.01% of videos met the "ESSENTIALS-Breast" high-quality standard, with 0.03% and 0.1% qualifying under the DISCERN and GQS criteria, respectively. The average DISCERN and GQS scores were 3.03/5 (61%) and 2.65/5 (53%), while the average "ESSENTIALS-Breast" score was 2.60/7 (37%). Videos were often found to lack information on complications of the procedure and postoperative instructions.

Conclusions: This study reveals a substantial paucity in the quality of breast surgery educational videos on YouTube, with most failing to meet the standards set by the "ESSENTIALS-Breast" criteria. The average DISCERN and GQS scores indicated moderate quality, while the "ESSENTIALS-Breast" averages were low quality. These results highlight the lack of accurate and reliable educational content for both reconstructive and aesthetic breast surgery, the need for more rigorous, procedure-specific content, and the demand for better evaluation tools. We established reliable criteria based on a renowned plastic surgery educational resource to address the absence of a tailored evaluation metric for aesthetic and reconstructive breast surgery. Future research should expand evaluations to other plastic surgery disciplines, ultimately raising the standard of online surgical education for plastic surgery residents and faculty.

Assessing the The Diagnostic Value of Provocative Maneuvers for Hand Pathologies

Abstract Presenter: Katherine Benedict MD

Abstract Co-Author(s): Marc Walker MD, MBA, FACS, Gregory Vance, Evan Bowen, Bradley Hathaway Jr., Clay Thames II

Introduction: Provocative maneuvers are frequently employed by hand surgeons to evaluate for common hand pathologies. While prior studies have evaluated the efficacy of individual maneuvers independently, to date no studies have been performed comparing the sensitivity and specificity of Tinel's, Eichoff's, Finkelstein's, and CMC grind test.

Methods: A prospective cohort study was performed of new patients presenting to hand clinic. All four provocative maneuvers were performed on each patient. Positive versus negative results were recorded by a student and compared to final clinical diagnoses by fellowship-trained, board-certified hand surgeons retrospectively. Descriptive statistics and chi-square analysis was performed.

Results: A total of 93 patients were enrolled in the study. The sensitivity, specificity, PPV and NPV were calculated. Statistical analysis and cross-tabulation revealed that Tinel's test, Grind test, and Eichoff's test showed significant associations with their specific hand pathology ($p < 0.05$), while Finkelstein's test did not demonstrate statistical significance ($p = 1.000$). Among these, the Grind test exhibited the highest sensitivity (95.7%), while Tinel's test demonstrated the best balance of sensitivity and specificity.

Conclusion: This prospective study revealed varied sensitivity and specificity amongst maneuvers. The grind test, Tinel's test, and Eichoff's test demonstrated efficacy in identifying CMC arthritis, CTS, and De Quervain's tenosynovitis respectively. While not definitive, these tests retain usefulness in clinical practice for quickly identifying pathology.

Breaking Down the Barriers: Identifying Barriers to Dilation After Gender-Affirming Vaginoplasty

Abstract Presenter: Bennett Cleff

Abstract Co-Author(s): Jessica Nye, Ellen Wang, Kylie Swiekatowski, Noa Kopplin, Matthew Greives MD, Daniel Freet MD, Rachel Goldstein DO

Background: Vaginal dilation therapy (VDT) is essential for postoperative healing after gender- affirming vaginoplasty, maintaining canal width and depth and preventing complications like stenosis. Initial adherence to VDT is required three times daily for 30 minutes, tapering to once daily after six months. Barriers to adherence can impact outcomes, patient satisfaction, and quality of life. This study aims to identify barriers to improve support for patients.

Methods: Phone and virtual semi-structured interviews were conducted with post-vaginoplasty patients to identify barriers to VDT. A 15-minute survey gathered data on satisfaction, dilation frequency, pain levels, additional therapies, and psychiatric factors. A fishbone diagram analyzed root causes of non-adherence, with Fisher's exact test used for categorical variables ($p < 0.05$).

Results: Of 51 patients, 16 (27%) participated. Average age was 35.9 ± 10.7 years. Most patients (56%) did not use relaxation techniques, initial pain averaged 7/10, and six reported stenosis. Eleven patients were satisfied with surgical outcomes. Barriers included medical (88% reported pain), time (56% reported time issues), and psychiatric factors (50% reported psychiatric barriers); 56% accessed pelvic floor therapy.

Conclusions: Medical, time, educational, and psychiatric barriers impact dilation adherence post-vaginoplasty. Addressing these barriers is key to improving adherence, satisfaction, and reducing revision surgeries. Although no significant associations were found, a larger sample may alter results. This study is the first phase of an iterative project to enhance adherence to postoperative dilation.

Clinical Improvements Following Posterior Cranial Vault Remodeling in a Patient with Bronchopulmonary Dysplasia: A Case Report

Abstract Presenter: Elizabeth Dawson

Abstract Co-Author(s): Connor Miller MD, Amit Agarwal MD, Arundathi Reddy, Eylem Ocal, Sagar Mehta

Bronchopulmonary dysplasia (BPD) is a chronic lung disease and known sequelae of prolonged mechanical ventilation in premature infants. The use of positive-end expiratory pressure (PEEP) can increase intracranial pressure (ICP), which can have devastating effects on neurological function and development (1). Intracranial hypertension is also associated with craniosynostosis: the premature fusion of cranial sutures which can limit appropriate expansion of an infant's developing brain (2). We present the case of an 18-month-old male born prematurely at twenty-six weeks and two days gestation with a complicated medical history including severe BPD, tracheobronchomalacia with air trapping, tracheostomy dependence on a ventilator, and significant hemodynamic instability associated with BPD spells. After five months of increasing PEEP support with minimal improvement, significant numbers of BPD spells, and the need for a morphine drip for comfort, the patient's prognosis was not promising. A computed tomography of his head demonstrated craniosynostosis of the coronal and sagittal sutures. Given the significant PEEP support, compounded with craniosynostosis, the craniofacial team recommended cranial vault expansion to increase intracranial volume and reduce suspected ICP. Over the five months following posterior cranial vault distraction, his required PEEP was successfully weaned from eighteen to nine cm H2O. Additionally, he was able to wean off his morphine drip and was placed on a methadone taper. Ultimately, the patient was discharged home with a home ventilator. This case study helps further increase our understanding of effects of ICP in the BPD patient population and the potential benefits of cranial expansion in recalcitrant BPD patients. To our knowledge, there have been no studies published on the outcomes associated with cranial vault repair in the bronchopulmonary dysplasia patient population. Only one report in the literature describes differences in calvarial bone quality in BPD patients, including calvarial thickening and 1000x increased rates of premature suture closure (4). In this case study, the posterior cranial vault remodeling appeared to dramatically improve this patient's respiratory outcome, reduced his need for pain medication, and ultimately allowed him to be discharged from the hospital, a notion that seemed impossible presurgically. Further work needs to be done to elucidate the craniofacial dysmorphism in BPD patients and to elucidate the clinical impact it may have in this patient population.

REFERENCES:

1. Hwang JS, Rehan VK. Recent Advances in Bronchopulmonary Dysplasia: Pathophysiology, Prevention, and Treatment. Lung. 2018;196(2):129-138. doi:10.1007/s00408-018-0084-z

2. Betances EM, Mendez MD, M Das J. Craniosynostosis. [Updated 2023 Aug 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK544366/
3. Zapatero ZD, Zhang H, Zandifar A, et al. A Novel Phenotype of Calvarial Thickening and Increased Rates of Premature Calvarial Suture Closure in Children With Chronic Lung Disease. Journal of Craniofacial Surgery.:10.1097/SCS.0000000000009528. doi:10.1097/SCS.0000000000009528

Clinical Pearls and Pitfalls of Using the Symani System in Microsurgery

Abstract Presenter: Aneeq Chaudhry

Abstract Co-Author(s): Anshul Ratnaparkhi, Emily Finkelstein MD, Kyle Xu MD, Kashyap Tadisina MD, Miguel Medina III, MD, Sara Danker MD, Devinder Singh MD, Juan Mella-Catinchi MD, MPH

Purpose: The improved stability and controllability of robotics has the potential to expand the spectrum of reconstructive surgery. Until recently, however, no robot was designed specifically for microsurgery. The present study aims to summarize the clinical pearls and pitfalls of utilizing the Symani Surgical System in microsurgical practice.

Methods: A systematic literature review was performed according to the Preferred Reporting Items for Systematic Review and Meta-Analysis Statement (PRISMA) guidelines. The PubMed database was queried using the search term "Symani Robot System." Data regarding demographics, study design, technique, and surgical outcomes were extracted from the full text.

Results: The initial PubMed query yielded 40 publications. After screening the title and abstract, twenty-two full-text publications met the preliminary inclusion criteria. One article did not have a full-length version in English and was thus excluded from further analysis. Twenty-one publications encompassing the results of 397 patients and 642 robotic anastomoses were included in the present analysis. Sixteen publications included data on complications pertaining to the robotic portion of the procedure, nine (56.25%) of which reported no complications related to anastomosis. Of the 447 patients included in studies that reported complication rates, pooled analysis demonstrated an overall complication rate of 10.51% (n=47) with a partial or complete

flap loss in 2.94% of patients (n=7). Overall, <1% of vessels were found to be nonpatent, and 1.24% (n=8) required a transition to a manual approach. Regarding the anecdotal benefits of Symani, nineteen groups (90.47%) reported high precision of the robot, fifteen (71.43%) highlighted improved surgical access to deeper anatomical fields, and twelve (57.15%) reported enhanced microsurgical ergonomics. Among limitations, thirteen (61.90%) cited the expense of the system, five (23.81%) reported a lack of haptic feedback, five (23.81%) identified instrument "stickiness" as a factor slowing operations, and three (14.29%) highlighted the need for improved grip. The learning curve associated with Symani was discussed in fifteen studies (71.43%).

Conclusion: Symani demonstrated excellent precision and dexterity across numerous microsurgical applications, including nerve coaptation, lymphatic reconstruction, and vessel anastomosis for free flap reconstruction. Across 21 clinical studies that comprised 397 patients and 642 robotic anastomoses, Symani produced an anastomotic patency and complication rates comparable to traditional microsurgery. However, initial operations were longer than manual anastomosis, representing the robot's steep learning curve. Longer-term studies are required to determine whether the increased precision and dexterity justify the longer operative time and expense of Symani.

Comparative Analysis of Monitoring Modalities in Free Flap Breast Reconstruction: Clinical Outcomes and Cost Effectiveness Evaluation

Abstract Presenter: Janessa Sullivan MD

Abstract Co-Author(s): Karen Bach MD, Alexander Kammien, Kamal Addagatla, Ryan Sutherland

Purpose: Autologous breast reconstruction plays a crucial role in restoring form and function for breast cancer patients undergoing mastectomy. However, the success of free flap procedures relies heavily on vigilant perioperative monitoring to detect microvascular compromise early and prevent flap failure. (1,2) Various monitoring techniques exist, including hand-held Doppler, implantable Dopplers, and external tissue oximetry. While each modality has advantages, differences in efficacy, detection times, salvage rates, and costs must be considered to determine the most effective and cost-efficient monitoring strategy. (3-5) This study evaluates the clinical outcomes and cost-effectiveness of these three monitoring approaches.

Methods: A retrospective review was conducted on 242 patients who underwent autologous breast reconstruction between 2019 and 2023, encompassing 384 free flaps. Patient demographics, monitoring modality used, incidence of unplanned takebacks, causes of microvascular compromise, flap salvage rates, hospital length of stay, and associated costs were analyzed. Monitoring methods compared included hand-held Doppler (146 flaps), implantable Dopplers (199 flaps), and tissue oximetry (39 flaps). Statistical analyses assessed each modality's effectiveness in detecting vascular compromise and improving salvage rates.

Results: Unplanned takebacks were required in 11.9% of cases. True-positive detection rates were 55.6% for hand-held Doppler, 40.0% for implantable Dopplers, and 60.0% for tissue oximetry. Salvage rates were highest with tissue oximetry (66.6%), followed by implantable Dopplers (62.5%) and hand-held Doppler (40.0%). The average time to detection of vascular compromise varied significantly: hand-held Doppler (302.5 hours), implantable Dopplers (161.4 hours), and tissue oximetry (70.4 hours). Despite these differences, overall flap failure rates remained low (hand-held Doppler: 2.0%, implantable Dopplers: 1.5%, tissue oximetry: 2.6%).

Cost Analysis:
Monitoring costs per case varied significantly:
• Hand-held Doppler: $374 per unit, with minimal per-case costs.
• Implantable Dopplers: $2,057.50–$4,115 per case, depending on required components.
• Tissue Oximetry: $1,400 per unit, with estimated per-case costs of $1,400–$2,800.

Conclusions: Tissue oximetry and implantable Dopplers were associated with earlier detection of complications and improved salvage rates. However, their high costs raise concerns about cost-effectiveness, especially given the overall low flap failure rates. Hand-held Doppler remains the most economical option but may be less effective for high-risk patients due to delayed detection and lower salvage rates. A selective, risk-stratified approach-employing adjunctive monitoring tools such as Vioptix or implantable Dopplers for high-risk cases-may provide the best balance between efficacy and cost-effectiveness.

References
1. Cevallos PC, Najafali D, Johnstone TM, et al. Detecting flap compromise: an updated review of techniques to monitor microsurgical flaps post-operatively in breast reconstruction. Plast Aesthet Res. 2023;10:30. doi:10.20517/2347-9264.2023.01

2. Rogoń I, Rogoń A, Kaczmarek M, et al. Flap Monitoring Techniques: A Review. J Clin Med. 2024;13(18):5467. doi:10.3390/jcm13185467
3. Hosein RC, Cornejo A, Wang HT. Postoperative monitoring of free flap reconstruction: A comparison of external Doppler ultrasonography and the implantable Doppler probe. Plast Surg (Oakv). 2016;24(1):11-19. doi:10.4172/plastic-surgery.1000953
4. Schoenbrunner A, Hackenberger PN, DeSanto M, et al. Cost-effectiveness of Vioptix versus clinical examination for flap monitoring of autologous free tissue breast reconstruction. Plast Reconstr Surg. 2021;148(2):185e-189e. doi:10.1097/PRS.0000000000008154
5. Subramaniam S, Sharp D, Jardim C, et al. Cost-effectiveness of monitoring free flaps. Br J Oral Maxillofac Surg. 2016;54(5):579-583. doi:10.1016/j.bjoms.2016.03.006

Comparing Clinical and Patient-Reported Outcomes in Women Undergoing Implant-Based versus Autologous Postmastectomy Breast Reconstruction: in Taipei Veterans General Hospital

Abstract Presenter: Pan Yi-Hsiang MD

This article examines clinical and patient-reported outcomes in breast cancer patients post-mastectomy, comparing those undergoing implant-based versus autologous breast reconstruction. Additionally, the study explores relevant predictors to offer improved decision-making guidance for patients considering these reconstruction options.

Between 2016 and 2022, data were collected from a retrospective cohort of 283 breast cancer patients who underwent breast reconstruction post-mastectomy. Among them, 162 patients opted for implant-based reconstruction, while the remaining 122 chose autologous breast reconstruction. Postoperative analyses were conducted to compare outcomes, and patient-reported satisfaction was assessed by using the BreastQ questionnaire.

In the retrospective cohort, a heightened percentage elected to receive postoperative radiotherapy and chemotherapy in autologous reconstruction. The overall incidence of complications did not achieve statistical significance. Nevertheless, within the implant-based group, there was an elevated prevalence of wound infections, whereas the autologous group demonstrated a higher proportion of patients necessitating further surgical interventions attributable to complications or cosmetic considerations. Regarding BreastQ questionnaire, the autologous group exhibited superior satisfaction

levels in sexual well-being, satisfaction with breasts, and satisfaction with chest when compared with the implant-based group.

Despite the increased risk of subsequent surgeries observed in patients undergoing autologous breast reconstruction, the evident superiority in patient-reported outcomes over implant-based breast reconstruction highlights the favorable nature of autologous approaches.

Comparison of Healing Characteristics Between Dehydrated Human Amnion/Chorion Membrane and Acellular Dermal Matrix Following Mohs Micrographic Surgical Excision for Cutaneous Malignancies

Abstract Presenter: Haeun Jung

Abstract Co-Author(s): Kelly Kaon, Thomas Ren, Duc Bui MD, Andre Galenchik-Chan, Sami Khan MD, Nicolas Oltean

Introduction: While defects following Mohs surgery are traditionally reconstructed with primary closure, skin grafts, and secondary intention healing, the incorporation of biological wound healing agents provide an alternative option with improved healing times and potentially improved aesthetic results. This study presents the comparison of healing times following Mohs surgery with the adjunct utilization of dehydrated human amnion/chorion membranes (Epifix) and acellular dermal matrices (ACell-Cytal).

Methods: This study evaluated a cohort of 77 patients who underwent Mohs surgery. 46 patients received Epifix treatments following surgery and 31 received ACell-Cytal treatments. A retrospective chart review ranging from September 2017 to September 2023 included the patient characteristics of: age, race, smoking history, body mass index, wound location, wound size, wound depth, healing time, number of treatments, graft usage, and graft size.

Results: Of the 77 patients, 36 were women and 41 were men. The mean age was 74 years. The mean wound size was 2.67cm^2. Patients had a mean of 2.26 treatments in the Epifix cohort and 1.42 treatments in the ACell-Cytal cohort. Both cohorts had a graft usage rate of 74%. The mean healing time from the date of Mohs surgery was 42 days for the Epifix cohort and 31 days for the ACell-Cytal cohort. Statistical analysis using Fisher's exact test comparing the cohorts showed significantly shorter wound healing

times ($p < 0.05$) and significantly less treatments used ($p < 0.001$) in the ACell-Cytal cohort, and no significant differences in wound size ($p = 0.46$). The cohorts stratified by wound size, location, and depth are shown in Table 1.

Conclusion: We found patients treated with ACell-Cytal following Mohs surgery had significantly shorter healing times compared to treatment with Epifix. The ACell-Cytal group required significantly less treatments with no significant differences in mean wound size between the two cohorts. Future studies will include larger cohorts controlled for anatomic wound site and depth, comparison of aesthetic outcomes, as well as a cost analysis between the two biological agents and secondary healing.

Current Use of Hyperbaric Oxygen Therapy in Plastic Surgery: A Systematic Review

Abstract Presenter: Julissa Molina-Vega

Abstract Co-Author(s): Catherine Cascavita, Aura Elias, Andrew Vardanian MD, FACS

INTRODUCTION: Hyperbaric oxygen therapy (HBOT) is an adjunctive treatment for many indications in a wide spectrum of fields, including plastic surgery. HBOT is the use of 100% oxygen at pressures greater than one atmosphere and has been suggested to improve ischemia and wound healing, among other benefits. There are few comprehensive studies on the current clinical uses, complications, and outcomes of HBOT in plastic surgery.

METHODS: A systematic review was performed in February 2025 with no limit on publication date. We searched PubMed, Embase, and Cochrane databases to identify studies focused on indications in plastic surgery for HBOT. The Preferred Reporting for Items for Systematic Reviews-Protocols (PRISMA) guidelines were followed. Studies were included if they focused on prospective and retrospective studies evaluating the use of HBOT in plastic surgery. Abstracts and full-text articles were reviewed independently by two reviewers, and a third reviewer adjudicated any disagreements. Plastic surgery indications of interest included acute, subacute and chronic wounds, skin graft, skin flaps, skin infections, and hand replantation.

RESULTS: A primary systematic review yielded 355 studies. The abstract review yielded 30 articles for further review. A comprehensive full-text review yielded 17 articles

that met the inclusion criteria encompassing 775 patients who underwent HBOT and 524 who did not undergo HBOT. 58.8% of studies were retrospective cohort studies, 11.8% were randomized controlled trials, and 5.9% were case-control studies. The evidence suggests that HBOT (1) is effective in preserving partially viable tissue in mutilated hand injuries, (2) decreases deep soft tissue infections and skin graft loss, and (3) may provide an adjunctive therapy for tissue flap salvage.

CONCLUSION: This is a current update on the use of HBOT in plastic surgery and underscores the limited published information of HBOT in plastic surgery. HBOT continues to have potential benefit as an adjunct in plastic surgery including tissue flap and skin graft salvage, hand replantation and chronic wound healing; however, the optimal timing, duration of therapy, and suitable patient selection criteria remain unknown. Future directions include randomized trials and standardization of protocols.

Determining Factors in Zero Postoperative Narcotic Use in Deep Inferior Epigastric Perforator Flap Breast Reconstruction

Abstract Presenter: Zoe Frias

Abstract Co-Author(s): Christopher Sleiman, Michael Mazarei, Haley Kenner BS, Santana Solomon BS, Alma Jukic, Irene Ma MD, Michel Saint-Cyr MD, MBA, MHA, FRCSC, FACS

Purpose: Patients undergoing deep inferior epigastric perforator (DIEP) flap breast reconstruction often face challenges with postoperative pain management, where opioid use increases complication risks. This study aims to identify factors associated with achieving zero postoperative narcotic use.

Methods: A retrospective review of patients who received DIEP flap breast reconstruction at a single institution from September 8th, 2021, to July 15, 2024, was conducted. Patients received preoperative education on enhanced recovery after surgery (ERAS) protocol and multimodal postoperative pain management. All patients received a transabdominal plane (TAP) block and local anesthetic infiltration along the lower abdominal incision. Patient demographics, procedural characteristics, complications, and hospital length of stay were analyzed. Narcotic usage during hospitalization was converted to morphine milligram equivalents (MME), and outcomes were compared between narcotic-free group and narcotic-use groups.

Results: Of 107 total patients, 80 patients underwent bilateral DIEP reconstruction and 27 were unilateral. The total number of flaps was 187. 27 patients (25.2%) required no narcotics after discharge from PACU and 17 (15.9%) were narcotic-free throughout their recovery. The complete narcotic-free group had a 20.5% shorter hospital stay ($p<0.05$) compared to the rest of the DIEP cohort, with no significant differences in major complications, drains, incision length, age, BMI, comorbidities, or tobacco use. Operative and PACU times were similar between groups.

Conclusion: Narcotic-free pain management in DIEP flap reconstruction is safe and associated with reduced hospital length of stay. A preoperative optimization program that emphasizes patient education and expectation setting is crucial in achieving narcotic-free recovery.

Digital Nerve Coaptation vs. Standard of Care for Partial and Ray Digital Amputations

Abstract Presenter: Ron Mccall III

Abstract Co-Author(s): Steele Liles, James Sikes, John West, John Sullivan MD, Marc Walker MD, MBA, FACS

Purpose: Traction neurectomy remains the standard of care for nerve management in partial and ray digital amputations but is associated with neuroma formation and chronic post-operative pain. This pilot study evaluates whether digital nerve coaptation (DNC) is associated with lower post-operative pain and complication rates compared to standard neurectomy. We hypothesize that patients undergoing digital amputations with DNC will demonstrate lower post-operative complications, reduced rates of persistent pain, and fewer reoperations for nerve-related pain.

Methods and Materials: A retrospective cohort study was conducted, analyzing 85 patients who underwent partial or ray amputation at a single institution from 2020-2024. Patients were stratified by nerve management technique: traction neurectomy (n=66) vs. digital nerve coaptation (n=19). The primary outcomes included post-operative pain scores, and complication rates including infection, wound dehiscence, persistent pain, and functional stiffness. Pain scores were assessed using the Neuropathic Pain Scale (NPS, 0-100) and a numerical hand pain rating (0-10). Of the 85 patients, 40 (30

neurectomy, 10 DNC) were successfully contacted for pain assessment. Statistical comparisons were made using independent t-tests, Mann–Whitney U tests, and chi-square analyses, with significance set at $p < 0.05$.

Results: Post-operative complications were observed in 31.6% of DNC patients compared to 56.1% in the standard of care group ($p = 0.10$), suggesting a trend toward fewer complications with DNC. Pain scores varied based on injury type and amputation level, but no statistically significant differences were found between groups. Stratification by amputation level revealed inconsistent trends in pain outcomes, with DNC associated with lower pain scores in proximal phalanx and metacarpal amputations but higher pain scores in middle phalanx amputations.

Conclusion: This pilot data indicates a positive observable outcome when comparing patients' postoperative pain and rate of complications for those who underwent digital nerve coaptation versus traction neurectomy. Although not sufficiently powered for statistical significance, these findings do suggest that digital nerve coaptation could be a superior method of nerve treatment in digit amputations. The variability in pain outcomes based on amputation level in the DNC cohort warrants further investigation. Given the lack of statistically significant associations, these results highlight the need for a larger, prospective trial to evaluate the efficacy of DNC in digital amputations.

Direct-to-Implant Versus Tissue Expander–Implant Reconstruction: A 15-Year Follow-Up Analysis of Revision Outcomes

Abstract Presenter: Mihir Patel

Abstract Co-Author(s): Graham Schwarz MD, John Yuxuan Ha

Background: Implant-based reconstruction is the most widely used postmastectomy approach. Tissue expander implant (TEI) is the conventional method that requires the placement of a tissue expander after mastectomy and a subsequent surgery for implant placement. Direct-to-implant (DTI) reconstruction provides an immediate, single-stage alternative. This study focuses on long term 15-year revision rates between DTI and TEI patients.

Methods: We conducted a retrospective cohort study using the TriNetX Research Network, a comprehensive health database that compiles de-identified electronic health

records, with more than 166 million study subjects from over 146 healthcare organizations worldwide. Patients undergoing implant-based reconstruction following breast cancer mastectomy were identified using codes of International Classification of Diseases, 10th Revision (ICD-10-CM), Clinical Modification and Current Procedural Terminology (CPT). All subjects were diagnosed with breast cancer, underwent mastectomy, and completed DTI or TEI treatment 15 years ago until January 2025. For TEI patients, we started recording post-surgical outcomes after expander removal and implant placement, whereas DTI patients received their implant during initial mastectomy. Relative risks (RR) with 95% confidence intervals (CI) were calculated to compare outcomes between the two cohorts.

Results: A total of 340 patients were analyzed (130 DTI, 210 TEI). Within the first 90 days, overall complications were significantly higher in the DTI group (13.1% vs. ≤4.8%; RR = 2.75, 95% CI: 1.30–5.81), with surgical site infections occurring in 10% of DTI patients versus ≤4.8% of TEI patients (RR = 2.1, 95% CI: 0.95–4.65). Over the 15-year follow-up, the overall revision rate for DTI was 52.3% compared to 33.8% for TEI (RR = 1.55, 95% CI: 1.20–1.99). Notably, planned revisions (1.5–15 years) remained elevated in the DTI cohort (16.5% vs. 8.6%; RR = 1.92, 95% CI: 1.17–3.14). Unplanned revisions, although elevated in the DTI cohort, became more equal between the two groups over the long term (11.5% vs. 6.2%; RR = 1.86, 95% CI: 0.92–3.79).

Conclusion: While DTI reconstruction provides the benefit of immediate implant placement, it is associated with a significantly increased risk of early complications and a higher 15-year revision rate compared to TEI. These findings highlight the trade-offs between immediate and staged implant-based breast reconstruction.

Does Age Matter? Age-related Variation in Phantom Limb Pain for Post-Amputation RPNI Patients

Abstract Presenter: Maximilian Wagner

Abstract Co-Author: Melanie Wang MD

Background: Post-amputation pain is a prevalent and often debilitating sequelae in amputee patients. One of most common etiologies results from the development of phantom limb pain, occurring in more than 15-30% of patients (1). RPNIs reflect an effective means of treating post-amputation pain through the use of an autologous free

muscle graft around a transected nerve (2). Despite promising results, there is limited evidence of how they differ across age groups. Given physiological variation in the healing process, there can be drastically different post-amputation progressions based on age. We sought to explore the difference in PLP occurrence for post-amputation patients between pediatric, adult, and elderly patients who received RPNIs.

Methods: Using DataDirect, a database holding all of University of Michigan Medicine's clinical data, we performed an institutional retrospective study on patients who received a major upper or lower limb amputation between the 2015 to 2024 and had post-op clinical data lasting at least a year. RPNI patients were isolated based on dual CPT code 15769 and 64787 or chart review for recorded RPNI procedure. Patients were divided by age group with pediatric patients aged 8-21 years old, adult patients aged 22-64, and elderly patients ≥65 years old. Patients were then evaluated for presence of recorded amputation neuroma or PLP based on diagnostic ICD-10 codes occurring between 1 -12 months postoperatively. Chi-squared significance tests were then performed to compare for significant age related differences in pain outcomes.

Results: 1,261 patients were included in this study who received a major limb amputation, of which there were 972 controls (no RPNI) and 280 patients who received an RPNI either at the time of amputation or during a revision. Between age groups, there was no statistically significant difference ($p = 0.05$) in occurrence of PLP between any of the age groups. When compared to those without RPNIs, there were statistically significant differences between pediatric and adult groups ($p = 0.032$) and between adult and elderly groups ($p=0.282$).

Conclusion: With the variation in significant differences between these age groups, this underscores the physiological difference in amputation recovery processes. However, insignificant differences in PLP outcomes for patients who received RPNIs helps support a more standardized patient education for post-amputation expectations after receiving prophylactic nerve interfaces, as well as those who do not receive one. More so, such research further characterizes the utility of this surgical technique as its adoption continues to spread. Especially with the concern of post-amputation narcotic use, better characterizing post-amputation obstacles and interventions to mitigate them are invaluable to enhancing patient quality of life.

References:
Ziegler-Graham K, MacKenzie EJ, Ephraim PL, et al. Estimating the prevalence of limb loss in the United States: 2005 to 2050. Arch PhysMed Rehabil 2008;89:422–9.

Kubiak CA, Kemp SWP, Cederna PS, Kung TA. Prophylactic Regenerative Peripheral Nerve Interfaces to Prevent Postamputation Pain. Plast Reconstr Surg. 2019;144(3):421e-430e. doi:10.1097/PRS.0000000000005922

Donor-Derived Cell-Free DNA: A Non-Invasive Biomarker for Acute Rejection in VCA

Abstract Presenter: Dominika Pullmann-Carpio MD

Abstract Co-Author(s): Haruyuki Hirayama, William Rifkin MD, Bruce Gelb, Eduardo Rodriguez MD, Piul Rabbani

Purpose: Vascularized composite allotransplantation (VCA) offers a solution to complex reconstructive challenges. However, allograft rejection remains one of the most significant risks to these life-enhancing procedures. Prompt identification and treatment are crucial to prevent acute rejection and allograft loss. The clinical exam is subjective and non-diagnostic without invasive biopsy. There are limited alternative diagnostic methods. Despite the growing prevalence of VCA and the need for non-invasive diagnostic markers, data validation of alternate modalities is limited. This study evaluates the utility of serum-based donor-derived cell-free DNA (dd-cfDNA) as a non-invasive marker for VCA rejection.

Methods: We collected peripheral blood samples from a recipient of a face and bilateral hand transplant and recorded episodes of acute rejection in the post-operative period. The analysis included data from post-operative day (POD) 0 through 993. We measured dd-cfDNA via targeted amplification and sequencing of a validated panel of single-nucleotide polymorphisms. We calculated the percentage of dd-cfDNA to total cfDNA (dd-cfDNA%) for each sample and quantified the relationship to clinically defined rejection episodes. Statistical analyses used GraphPad Prism.

Results: dd-cfDNA% demonstrated a positive relationship with acute rejection episodes. Median dd-cfDNA% consistently remained low during periods without rejection and increased during rejection periods (0.022% vs 0.032%, p=0.14). During a longer rejection episode (POD 609–811), the median dd-cfDNA% increased significantly compared to shorter episodes (0.026% vs 0.0120%, p=0.02). ROC curve analysis demonstrated that dd-cfDNA effectively discriminates between clinically defined rejection and non-rejection episodes. The area under the ROC curve (AUC) was 0.82

(95% CI: 0.67–0.98), indicating good diagnostic accuracy. We identified an optimal dd-cfDNA cutoff of 0.008%, achieving a sensitivity of 100% and a specificity of 52%. Alternatively, a dd-cfDNA cutoff of 0.014% achieved a sensitivity of 75% and specificity of 76%.

Conclusions: These findings suggest that elevations in dd-cfDNA% may reflect both the presence and duration of acute rejection. While dd-cfDNA% reliably increased with rejection episodes, our analysis did not reveal a statistically significant difference between rejection and non-rejection periods. Subgroup analysis showed that there may be a correlation between the magnitude of dd-cfDNA% and duration of rejection. However, defining a temporal relationship between serological markers like dd-cfDNA and rejection requires a larger sample size. Additionally, elevated dd-cfDNA% may also reflect inflammatory processes unrelated to acute rejection, warranting further investigation to assess its specificity.

Dynamic Tension Sutures: New Concepts In Abdominoplasty

Abstract Presenter: James Sherrer

Abstract Co-Author(s): Orr Shauly MD, Alexa Clark, Eliana Jolkovsky, Daniel Gould MD, Phd

Background: Progressive tension sutures (PTS) have been shown as an effective technique to redistribute skin and fascia, close dead space, and provide aesthetic contouring in many anatomic locations.

Objectives: We aim to illustrate the utility of PTS as a means to control dynamic tension in abdominoplasty through the redistribution of skin and fascia in multi-vectoral planes, and avoid fleur-de-lis incisions in select patients.

Methods: Nine patients (n = 9, 8 female, 1 male) undergoing abdominoplasty by a single surgeon were examined. Mean patient age was 47 years, mean BMI was 30, and average follow-up time was 24 months. The novel surgical technique addresses dynamic tension to remove horizontal-lateral skin excess.

Results: Preoperative photographs with relevant surgical markings are compared with postoperative photographs, highlighting ideal contouring after lateral horizontal excess was removed without midline vertical scar burden.

Conclusions: The use of dynamic tension sutures to redistribute skin tension through a multitude of vectors allows surgeons to create ideal contouring and better-defined lateral borders without creating a vertical midline scar burden, especially in patients with mild to moderate horizontal skin redundancy. A large focus is placed on maintaining preoperative anatomy to maximize aesthetic surgical outcomes while simultaneously reducing postoperative complications. This novel approach shows promising implications for similar technical utility across the breadth of plastic and reconstructive surgery.

Efficacy of Aerosolized, Point-of-Care, Autologous Skin Cell Suspension (ASCS) for the Treatment of Necrotizing Fasciitis: A New Way Forward

Abstract Presenter: Sarah Miller

Abstract Co-Author(s): Riley Shegos, Charles Hultman MD, MBA, FACS, FABA, Corianne Rogers MD, Carrie McGroarty

INTRODUCTION: Necrotizing fasciitis, now known within the umbrella term of necrotizing soft tissue infections (NSTIs) is a rare bacterial infection notorious for its extensive tissue damage, fast progression, and high mortality rate. Once NSTI has been diagnosed clinically, prompt surgical intervention is vital for both removing the infected tissue and restoring skin integrity. Due to the large size of these wounds, common complications such as graft failure and donor site morbidity remain prominent challenges. This project aimed to study the success of Autologous Skin Cell Suspension (ASCS), or "Spray-on Skin," in the closure of NSTI wounds across 20 patients at an urban, level 1 trauma center.

METHODS: This study is a retrospective, descriptive review of 20 patients who underwent ASCS for the closure of NSTI from November 2023 to September 2024. These patients were isolated from a total population of 120 patients receiving ASCS for the closure of full thickness injuries from diverse etiologies (Hultman et al.). The primary endpoints were 100% re-epithelization at 4, 8, and 12 weeks and limb salvage rate. Secondary outcome measures were identified as reduction in donor size, incidence of

complications, need for re-operation, and operative throughput. The surgical technique for the preparation and application of ASCS used in this study was adapted from previously described methods using the bilayer technique of 3:1 split-thickness skin grafting (STSG) and 80:1 ASCS.

RESULTS: By 12 weeks, ASCS provided full wound closure for 95% of patients treated, with the majority occurring by 4 weeks (60%). The mortality and complication rates were 0% and 30%, respectively. An overall 51% reduction in the amount of unexpanded STSG needed to close the wounds supports the minimization of patient graft size. Regarding hospital throughput, ASCS grafting reduced discharge time to a mean of 11.6 days post-application.

CONCLUSIONS: The results of this study show that ASCS is an effective surgical option for the treatment of NSTI wounds, further supporting our findings in our previous work that showed ASCS accelerates wound healing with faster re-epithelialization. The results show the safety of ASCS due to a low complication rate of 30% even amongst a patient population considered high-risk, with 90% of patients having at least one major comorbidity and all classified as ASA 3 or 4. With such few options available to surgeons today for the reconstruction of these complex infections, ASCS should be considered as a reliable option for intervention for the restoration of form and function.

Sources

Hultman CS, Adams UC, Rogers CD, Pillai M, Brown ST, McGroarty CA, McMoon M, Uberti MG. Benefits of Aerosolized, Point-of-care, Autologous Skin Cell Suspension (ASCS) for the Closure of Full-thickness Wounds From Thermal and Nonthermal Causes: Learning Curves From the First 50 Consecutive Cases at an Urban, Level 1 Trauma Center. Ann Surg. 2024 Sep 1;280(3):452-462.

Evaluation of Mixed Reality for Burn Margin Visualization and Surgical Planning

Abstract Presenter: Christopher Fedor

Abstract Co-Author(s): Edward Andrews, Francesco Egro MD, Msc, MRCS, Griffin Hurt, Jacob Biehl

PURPOSE: Mixed reality (MR) allows virtual content to be merged with the physical world, enabling novel visualization affordances not available with traditional displays.

These affordances are particularly beneficial in the medical domain, as surgeons can view imaging and other relevant patient data in a 3D spatial context. In burn surgery, excision and grafting are mainstay treatments for deep partial and full-thickness burns. However, identifying regions to be excised is nontrivial. Recent work has developed imaging techniques that assist surgeons in determining burn margins. In this study, we demonstrate a new application of MR for burn surgery by building and evaluating a system that overlays deep burn margins onto a simulated anatomical surface for surgeons to trace. This represents a first step towards creating an MR system that can help physicians interpret burn surface area and depth for surgical planning.

METHODS: This pilot study evaluated the feasibility and accuracy of MR-assisted burn margin tracing by three burn surgeons using two MR headsets: a see-through (STh) device and a pass-through (PTh) device. A control group was included, where the surgeons drew the margins while referencing an image of the overlays on an external monitor. The headsets tracked the images using native libraries and 3 QR code fiducial markers placed in the top left, top right, and bottom left corners of the page. Accuracy was measured by intersection over union (IOU) between tracings and ground truth data. To control for inaccuracies in image tracking that can be resolved with known techniques, we also measured trace precision as IOU after aligning the curves with iterative closest point (ICP).

RESULTS: With the raw traces, average trace area IOU was highest for the control (0.718), then for the PTh headset (0.501), and lowest for the STh headset (0.187). When the traces were aligned with the ground truth using ICP, the pass-through headset had the highest IOU (0.797), followed by the see-through headset (0.770), with both outperforming the control condition (0.763) in trace precision.

CONCLUSIONS: As a pilot study, these findings demonstrate that MR-assisted visualization can improve precision in burn excision margin identification. While accuracy remains dependent on tracking capabilities, this study suggests that integrating MR with advanced imaging could enhance surgical planning, reduce unnecessary tissue removal, and optimize reconstructive outcomes. Given that precise tissue excision is critical not only in burns but also in traumatic wounds, chronic wounds, and oncologic resections, MR may have broader applications in this realm of plastic surgery. Larger validation studies are needed to assess clinical efficacy and guide future integration into reconstructive surgery workflows.

Examining the Impact of Virtual Surgical Planning in Facial Feminization Surgery

Abstract Presenter: Abhishek Kumar

Abstract Co-Author(s): Abhinav Kareddy, Nala Mckie, Jennifer Goldman, Hibo Wehelie, Arad Jain, Gabriella Squeo MD, Jonathan Black MD, Arthur Wu, Emily Yanoshak

Introduction: Facial feminization surgery (FFS), includes procedures that enhance the face with feminine characteristics, including genioplasty, mandibular angle reduction, and frontal sinus setback (1). Virtual Surgical Planning (VSP) uses computer-based technology to create patient-specific models, potentially improving safety, efficiency, and accuracy of surgical care. Some reports are emerging evaluating use of VSP in FFS (2). Here, we examine the use of VSP on FFS outcomes at our center.

Methods: Retrospective chart reviews were performed for all patients undergoing FFS performed by a single surgeon from 2021-2025. Collected data included demographics, documentation of VSP in operative notes, surgery length (min), estimated blood loss (EBL), intraoperative complications, and length of stay (LOS). Statistical analysis was performed in SPSS, with Mann-Whitney U tests used to evaluate differences between VSP and non-VSP surgeries.

Results: A total of 51 patients underwent FFS, for a total of 55 surgeries. The average age at surgery was 36.18 years (Range: 18-70 years). Cases performed included genioplasty (17 surgeries), mandibular angle reduction (22 surgeries), and frontal sinus setback (39 cases). Forty-four cases utilized VSP and 11 cases did not. The average EBL amongst VSP cases was 193.52 cc (SD ± 82.44cc) compared to 240.45cc (SD ±167.12cc) in cases that did not use VSP (U = 195, p=0.315). Average length of surgery was 230.41min (SD ± 122.66 min) in VSP cases and 291.55min (SD ± 154.96 min) in cases not using VSP (U = 173.5, p = 0.149). Average LOS for VSP and non-VSP cases was 1.02 and 1.00 days, respectively (U = 237.5, p = .899). No intraoperative complications were observed in any cases, regardless of VSP usage.

Conclusion: The use of VSP in FFS is associated with shorter surgeries and promotes safe surgical planning, showing its utility in feminization procedures of the facial skeleton. Further research is needed on larger patient cohorts to evaluate the impact of VSP on additional surgical outcomes.

References:

1. Tirrell AR, Abu El Hawa AA, Bekeny JC, Chang BL, Del Corral G. Facial Feminization Surgery: A Systematic Review of Perioperative Surgical Planning and Outcomes. Plast

Reconstr Surg Glob Open. 2022;10(3):e4210. Published 2022 Mar 17. doi:10.1097/GOX.0000000000004210

2. Escandón JM, Morrison CS, Langstein HN, Ciudad P, Del Corral G, Manrique OJ. Applications of three-dimensional surgical planning in facial feminization surgery: A systematic review. J Plast Reconstr Aesthet Surg. 2022;75(7):e1-e14. doi:10.1016/j.bjps.2022.02.073

Exoscope-assisted cleft palate repair: Early experience and impact on surgical length

Abstract Presenter: Courtney Doherty

Abstract Co-Author: James Vargo MD

Purpose: Cleft palatoplasty is an ergonomically challenging procedure, often causing significant musculoskeletal pain for the performing surgeon (1). This is a result of the position and plane of the palate within the oral cavity, as well as the narrow aperture through which a surgeon must operate. To remedy this, surgeons have previously explored use of the surgical microscope and endoscope (2-4). Exoscopes have emerged in recent years, blending the advantages of these two visualization systems, and have been widely used in the fields of neurosurgery and otolaryngology. The purpose of this study was to explore early experience with the implementation of a robotic exoscope in cleft palate repair, comparing outcomes and surgical duration to traditional techniques.

Methods and Materials: A retrospective review and analysis of 32 consecutive palatoplasty cases performed by a single surgeon between 2022 and 2024 was conducted. Cases were stratified based on the use of a robotic exoscope or traditional surgical loupes. Exoscope-assisted procedures were done using the Synaptive Modus X exoscope (Toronto, ON). Collected data included demographic information, Veau classification, repair technique, associated syndromic diagnoses, procedure length, length of hospital stay, and post-operative complications. Subjective evaluation of surgeon ergonomics, operating room communication, and trainee education was also conducted.

Results: Median operative time and interquartile range (IQR) in minutes of cases performed with traditional techniques was 186 (121.5, 212.5) (n=15) and with the exoscope was 143 (125,152) (n=17). The majority of patients had a diagnosis of Veau II (37.5%) or submucous (28.1%) cleft palate. Subgroup analysis was performed for patients with Veau II clefts, and the median operative time and IQR of cases in the traditional group was 166.5 (138.8,199.5) and in the exoscope group was 153.5 (143.3, 170.5) (n=6 for each). Median length of stay and IQR for the traditional group was 2 days (1,3) and for the exoscope group was 2 days (1,2). Two patients in the exoscope group had postoperative fistulas (11.8%), while no complications were seen in the traditional group. Improved ergonomics were observed during the exoscope-assisted operations. Operating room staff and trainees also reported better visualization, allowing for improved education and communication.

Conclusions: The use of surgical exoscopes in cleft palate repair may be a safe and effective alternative to traditional techniques and is feasible for all palatoplasties, regardless of palate phenotype or repair technique. Adoption of exoscope-assisted repair may improve surgeon ergonomics, visualization, operating room communication, and trainee educational opportunities.

References:
1. Khansa I, Khansa L, Westvik TS, Ahmad J, Lista F, Janis JE. Work-Related Musculoskeletal Injuries in Plastic Surgeons in the United States, Canada, and Norway. Plast Reconstr Surg. 2018;141(1):165e-175e. doi:10.1097/PRS.0000000000003961
2. Valente DS, Giglio A, Barcellos C, Borile G, Chem R. Endoscopically assisted, intraorally approached palatoplasty. Plast Reconstr Surg. 2005;116(6):1820-1821. doi:10.1097/01.prs.0000188857.79753.69
3. Levites HA, Sergesketter AR, Sharif-Askary B, Hollenbeck ST, Allori AC, Marcus JR. Videoscope-Assisted Cleft Palate Surgery: Rationale, Experience, and Technical Implementation. Plast Reconstr Surg. 2020;146(5):1129-1132. doi:10.1097/PRS.0000000000007291
4. Allori AC, Marcus JR, Daluvoy S, Bond J. Video-assisted palatopharyngeal surgery: a model for improved education and training. Cleft Palate-Craniofacial J Off Publ Am Cleft Palate-Craniofacial Assoc. 2014;51(5):605-612. doi:10.1597/12-336

Expediting Time to Autograft: An In-Vivo Comparative Study of Collagen-Based Dermal Matrices to Repair Full-Thickness Defects

Abstract Presenter: Jayson Jay PhD

Abstract Co-Author(s): Ian Valerio MD, MS, MBA, FACS, Barbara Nsiah, Katie Bush PhD

Background and Significance: Dermal matrices (DMs) are essential for wound healing, skin grafting, and tissue regeneration in full-thickness skin injuries. These matrices, sourced from biological materials or engineered synthetically, serve as temporary scaffolds that facilitate tissue repair, provide structural reinforcement, and regulate cellular activity. They are widely utilized in burn treatment, plastic surgery, and reconstructive procedures. However, differences in DM composition pose challenges related to tissue integration, inflammation, longevity, infection susceptibility, and cost. Additionally, most currently available DMs can support a viable autograft for only about three weeks post-application, delaying definitive wound closure(1). To overcome these limitations, ongoing research focuses on enhancing DM integration, promoting cellular infiltration, and stimulating angiogenesis to enable earlier autografting and accelerate wound closure. This study aimed to assess the wound healing efficacy of three collagen-based DMs: bovine tendon collagen with glycosaminoglycans (ColGAG), fish skin graft (FSG), and a novel bovine dermal collagen matrix (BDCM) composed of type I/III collagens.

Methods: Full-thickness wounds, approximately 5 mm deep and measuring 16 cm^2, were surgically created down to the fascia on the dorsal side of female Yorkshire pigs. Wounds were randomly assigned to treatment with ColGAG (N=10), FSG (N=6), or BDCM (N=8). Each DM was mechanically secured to the wound margins and reinforced to ensure stable integration over a seven-day period. On Day 7, wounds were autografted using a 3:1 meshed split-thickness skin graft combined with an autologous skin cell suspension. Autograft survival and the extent of re-epithelialization were visually assessed on Day 14, while wound contraction was measured on Day 42.

Results: Trichrome staining on Day 7 revealed that BDCM promoted the formation of a dense collagen fiber network enriched with cells and intricate microvasculature. Similarly, ColGAG-treated wounds exhibited a structured collagen network, though with a lower cellular density. Conversely, FSG-treated wounds displayed dense clusters of inflammatory cells but lacked an intact three-dimensional matrix. By Day 14, the highest autograft survival rate was observed in the BDCM group (96.9 ± 7.0%), followed by ColGAG (85.0 ± 34.1%) and FSG (68.0 ± 28.0%). Additionally, all wounds treated with BDCM achieved at least 75% re-epithelialization, whereas only 60% of ColGAG-treated wounds and 40% of FSG-treated wounds reached this threshold. By Day 42, BDCM-

treated wounds exhibited significantly less contraction compared to those treated with ColGAG and FSG ($p<0.05$).

Conclusion: In a porcine wound healing model, the novel BDCM demonstrated superior cellular infiltration, robust microvascular development, and the formation of a well-vascularized dermal bed, making it ready for autografting within seven days.

References

1. Press I, et al. 2023 Efficacy and Complications Associated with Acellular Dermal Substitute Use in the Treatment of Acute Burns: A Systematic Review and Meta-Analysis. Eur Burn J. PMCID: PMC11571822.

Exploring Burn Depth Patterns: Lower Body Mass Index as a Risk Factor for Full-Thickness Burns

Abstract Presenter: Rebecca Hohsfield

Abstract Co-Author(s): Hilary Liu, Jose Antonio Arellano MD, Christopher Fedor, Mare Kaulakis, Alexis Henderson, Francesco Egro MD, Msc, MRCS

Burn injuries pose significant clinical challenges, with burn depth playing a critical role in determining treatment strategies and patient outcomes. While factors such as age, comorbidities, and skin composition have been studied in relation to burn severity, the impact of Body Mass Index (BMI) on burn depth remains underexplored. This study investigates the effect of BMI on burn severity, identifying populations at higher risk for deeper burns. A retrospective review was conducted for patients with acute lower extremity burns at a single ABA-verified burn center from January 2012 to August 2022. Patients were classified into six BMI categories based on the WHO classification, and Chi-square tests were used to assess the association between BMI and burn depth. A total of 409 patients (32% female, 68% male; mean age 47.6±19.2 years) were included. The mean BMI was 28.6±6.5 kg/m², with the majority categorized as normal weight (n=124; 30.3%) or overweight (n=129; 31.5%). The leading burn mechanisms were flame (n=218; 53.3%) and scalds (n=123; 30.1%), with a similar distribution across all BMI categories. A significant association between BMI and burn depth was observed ($\chi^2(1) = 4.35$; $p=0.037$), with patients in the BMI <25 group (underweight and normal weight) more likely to sustain full-thickness burns compared to those with BMI >25 (overweight and obese). This study highlights a significant relationship between BMI

and burn depth severity, suggesting that individuals with lower body mass may be at higher risk for more severe, full-thickness burns. Understanding this relationship could enhance burn severity estimation, inform fluid resuscitation strategies, and guide treatment plans tailored to patient-specific characteristics. Furthermore, recognizing this vulnerability may help prevent thermal injuries and improve safety protocols during medical procedures involving controlled heat.

Female Abstract Authorship at the Craniomaxillofacial Paper Session of Plastic Surgery: The Meeting, 2016-2020

Abstract Presenter: Avo Bosnoyan

Abstract Co-Author(s): mason kyle, Mitchell Rentschler, Alisa Liberman, Nareg Thomas, Jessica Bristol, Natalie Bell, Elizabeth Ferguson

Objective: To analyze gender differences in authorship position on abstracts presented at Plastic Surgery: The Meeting from 2016 to 2020 in the Craniomaxillofacial Paper session, with further analysis of authorship retention after abstracts were later published as manuscripts.

Introduction: The demand for research productivity in surgical subspecialties has risen in recent decades. Traditionally, male authors have occupied the important authorship positions on research projects. However, recent initiatives to support female researchers have increased female authorship. Despite this progress, studies examining whether traditional gender trends persist in abstract presentation to manuscript publication remain limited.

Methods: A cross-sectional analysis of all abstracts presented at Plastic Surgery: The Meeting from 2016 to 2020 in the Craniomaxillofacial Paper session was performed. Abstracts were reviewed for author position (first, second, and last), gender, and publication status. Gender was determined via an internet search of publicly available databases using the author's full name. Abstracts with unclear first author gender were excluded, while unidentified second or last authors were included in an intention-to-treat analysis. For published abstracts, time to publication (in months), authorship retention, and gender of the manuscript authors were recorded. Statistical analyses included chi-square tests for categorical data and Mann-Whitney U tests for continuous data.

Results: A total of 229 abstracts were reviewed with 37.84% reporting a female first author. A statistically significant first author gender difference favoring male authors was present ($p < 0.001$). Both male and female first authored abstracts were more likely to have a male as last author ($p < 0.001$). No significant difference in manuscript publication rates or time to publication between male and female first authored abstracts was observed ($p = 0.905$; $p = 0.24$). However, male last authors were more likely to be replaced than female last authors when abstracts were later published as manuscripts ($p = 0.003$). Male last author replacements were more often a different male (18.2%) rather than a female (1.8%). Female last authors had full retention of last authorship. A similar difference was not observed for male or female first authors ($p = 0.42$). When first authorship changes did occur, however, it was noted that female first authors were more often replaced by a female (22.9%) than by a male (8.6%), while male first authors were more often replaced by a male (16.4%) than by a female (5.5%).

Conclusion: Female first authors represent a significantly smaller proportion of presented abstracts, but with no gender differences observed in manuscript publication rates. However, the data suggests that when authorship changes occur between abstract presentation and manuscript publication, male and female first authors, as well as male last authors, are more likely to be replaced by individuals of the same gender. Notably, female last authors had full retention of authorship position upon manuscript publication. Further research is needed to explore the causes of these discrepancies and identify characteristics that may contribute to this phenomenon.

Global Burn Outcomes: Does Private or Government Ownership Status Matter?

Abstract Presenter: Daniel Najafali

Abstract Co-Author(s): Saeid Rezaei, Hilary Liu, Megan Najafali, Jose Antonio Arellano MD, Logan Galbraith, Mare Kaulakis, Francesco Egro MD, Msc, MRCS

Introduction: Burn injuries are a major global concern with significant mortality and morbidity rates. Although there has been extensive research on the treatment and recovery process, the impact of institutional ownership on quality of care and burn outcomes is not understood on a global level.

Methods: The data used in this study were obtained from the World Health Organization Global Burn Registry and accessed in September 2024. Hospitals were

categorized based on ownership status as either private or governmental institutions. Key variables, including demographic information, burn characteristics, contributing factors, and burn outcomes, were analyzed. Descriptive analysis was employed to summarize these data, while multivariable logistic regression was conducted to assess associations with surgical intervention, physical impairment at discharge for survivors, and mortality.

Results: Among the (N=9,274) cases analyzed, 7,055 (76%) were treated in a government facility, while 2,219 (24%) received their care in private facilities. In governmental hospitals, 38% were female, compared to 47% in private hospitals (P< 0.001). The median Baux Score was 43 for patients in governmental institutions, while for those in private settings, it was significantly higher at 50 (P< 0.001). The modified Baux score followed a similar trend, it was 44 (IQR: 21-72) in the government group compared to 52 (IQR: 28-80) in the private group (P< 0.001). Patients in governmental institutions had a median TBSA of 15%, whereas those treated in private institutions exhibited a higher median TBSA of 20% (P=0.033). Household and occupational accidents were significantly more frequent among patients treated in private institutions compared to those in government settings (P< 0.001). Patients in government hospitals had a median stay of 10 days (IQR: 5 to 18 days), while those in private hospitals had 9 days (IQR: 4 to 17) (P< 0.001). Mortality and impairment were significantly higher in government hospitals compared to private hospitals(19.3% vs. 17.4% and 8.3% vs. 7%, respectively, P< 0.001). Private hospitals demonstrated significantly higher odds of undergoing surgery after burn injury (OR 2.61, 95%CI 2.32-2.95) and lower odds of mortality (OR 0.40, 95% CI 0.32-0.49).

Conclusions: Ownership status in healthcare delivery plays a critical role in shaping burn patient outcomes on a global scale. Government hospitals, handling most cases, report higher mortality and impairment rates, whereas private hospitals show better outcomes and shorter hospital stays. These findings suggest that improving public healthcare systems, particularly in low-resource settings, could reduce disparities in outcomes.

How does plastic surgery hand training differ from our orthopedic surgery counterparts?

Abstract Presenter: Emily Finkelstein MD

Abstract Co-Author(s): Rachel Mpanu, Kashyap Tadisina MD, Kyle Xu MD, Pawan Pathagamage, Shangtao Wu, Manuel Picon

Objective: Most hand surgeons in the United States (US) enter fellowship from either orthopedic surgery or plastic surgery residency programs. While both specialties integrate hand surgery into their curricula, It remains unclear whether there are any significant differences between the two specialties. This study aimed to compare the hand surgery curricula among US plastic surgery and orthopedic surgery residency programs.

Methods: A cross-sectional analysis of 103 accredited independent and integrated plastic surgery residency programs and 207 orthopedic surgery residency programs in the US was conducted in June 2024. A web-based search of publicly available information (official program websites, faculty profiles, Doximity) provided information on resident clinical schedules, case exposure, and affiliated hand surgeon faculty.

Results: Most plastic surgery (n=103) and orthopedic surgery (n=205) programs had publicly available information regarding their hand surgery curriculum. Among programs that provided a sample schedule, plastic surgery trainees had an average of 21 dedicated weeks of hand surgery training (range: 4–48 weeks), compared to an average of 19 weeks (range: 8–48 weeks) for orthopedic surgery trainees. The majority of programs in both specialties initiated dedicated hand surgery rotations in the PGY-2 year. Statistical analysis revealed no significant difference in the timing of initiation between orthopedic and plastic surgery programs ($p=0.195$).
The presence of a hand fellowship was associated with an increased likelihood of starting hand rotations in the PGY-2 year ($p=0.0398$), particularly in plastic surgery programs. Plastic surgery programs had a mean of 3.4 hand surgeons on faculty, whereas orthopedic surgery programs had a mean of 4.7 hand surgeons. Both orthopedic surgery ($p<0.01$) and plastic surgery ($p=0.0102$) programs with a hand fellowship had a significantly greater number of hand surgeons on faculty, with a stronger correlation observed in orthopedic surgery programs. Additionally, the presence of a hand surgery fellowship influenced the length of hand surgery rotations, particularly in plastic surgery programs.

Conclusion: Hand surgery training varies between US plastic surgery and orthopedic surgery residency programs, particularly in the duration of rotations and the number of faculty available for training. Programs with a hand surgery fellowship tend to offer more structured training with increased faculty involvement and longer rotations. These differences highlight the impact of fellowship presence on training opportunities, particularly in plastic surgery programs. Residents interested in pursuing a Hand

Surgery fellowship may benefit from applying to programs with a hand fellowship, as these institutions typically offer access to a greater number of hand surgery faculty.

Immediate Direct-to-Implant Breast Reconstruction With Acellular Dermal Matrix Processed by Supercritical Carbon Dioxide Fluids After Breast Cancer

Abstract Presenter: Sodam Yi

Abstract Co-Author(s): Chan Yeong Heo MD, Jaehoon Jeong MD, PhD

Background: Acellular dermal matrices (ADMs) are widely utilized biomaterials in reconstructive surgeries, particularly in breast reconstruction. Among the various ADM products, human ADM decellularized by supercritical carbon dioxide fluids (scCO2) is a newly developed material that is believed to offer improved biocompatibility and reduced immunogenicity. However, research evaluating the complication rates of breast reconstruction using this process remains limited. This study aims to assess the safety of scCO2-processed ADM by analyzing its complication rates in comparison to conventional chemically processed ADM.

Methods: This retrospective study analyzed postoperative complication data from patients who underwent immediate direct-to-implant (IDTI) breast reconstruction following nipple-sparing mastectomy from February 2023 to June 2024 at Seoul National University Bundang Hospital. The patients were divided into two groups based on the ADM used: the group receiving chemically processed ADM (control group) and the group receiving scCO2-processed ADM. Complications analyzed included skin necrosis, minor and major infections, seroma, hematoma, red breast syndrome, and breast contracture.

Result: A total of 368 patients underwent breast reconstruction with ADM, including 314 unilateral and 54 bilateral cases. The scCO2-processed ADM was utilized in 181 breasts, while chemically processed ADM was used in 241. There were no statistically significant differences in patient-specific variables between the two groups. The scCO2-processed ADM was associated with a significantly lower rate of capsular contracture (5.00% compared to 9.54%, p=0.033). There were no statistically significant differences observed in the rates of skin necrosis, major infection, seroma, hematoma, and red breast syndrome.

Conclusions: This study highlights the superior safety profile of scCO2-processed ADM compared to chemically processed ADM, especially in terms of reduced rates of capsular contracture. Further long-term research is needed to confirm these findings and provide more comprehensive data to guide clinicians in selecting the most appropriate ADM for breast reconstruction procedures.

References :
1. Giang, Nguyen Ngan, et al. "Effective decellularization of human skin tissue for regenerative medicine by supercritical carbon dioxide technique." Journal of Tissue Engineering and Regenerative Medicine 16.12 (2022): 1196-1207.
2. Ngan Giang, Nguyen, et al. "Assessment of inflammatory suppression and fibroblast infiltration in tissue remodelling by supercritical CO2 acellular dermal matrix (scADM) utilizing Sprague Dawley models." Frontiers in Bioengineering and Biotechnology 12 (2024): 1407797.

Immediate reconstruction of facial bone defect with demineralized bone matrix after trauma

Abstract Presenter: Hsiao-Chen Lee MD

Purpose: Achieving a symmetric face with a single surgical treatment is still a challenge after facial trauma, especially in those with bony structure deficiency. Demineralized bone matrix (DBM) is an acid-extracted organic matrix from human bone, which provides a degradable matrix to induct new bone formation and improve wound healing. This study aims to present and validate the effect of DBM on reconstructing facial bone fractures after trauma.

Materials and Methods: Ten patients who received immediate reconstruction of facial bone defect with DBM or not during open reduction and internal fixation (ORIF) of facial bone fracture between Aug 2021 and Aug 2024 at Kaohsiung Medical University Hospital were enrolled. Five patients received immediate reconstruction of facial bone defect with DBM, and the other five patients received ORIF only. All patients received facial bone CT scans after trauma. Bony defects after a facial bone fracture, post-operational complications, and facial symmetry were evaluated via retrospective review of medical records.

Result: Unilateral or bilateral zygomaticomaxillary fracture with bony defect was identified in all patients by facial bone CT scan. The average bony defect size was around 2 x 2 cm. No infection or severe hematomas were recorded in the two groups. Patients reconstrued with DBM presented better facial symmetry and bone remodeling than those without DBM application 6 months after operation.

Conclusion: DBM is an osteoinductive and osteoconductive biomaterial that retains the protein components from the bone. Therefore, DBM can provide a better environment for bone regeneration. Immediate reconstruction of facial bone fracture with a bony defect with ORIF and DBM concomitantly can achieve an excellent cosmetic result and bone regeneration. The limitations of this study include a small sample size and a short follow-up period.

Impact of Preoperative Breast Characteristics on Sensory Outcomes Following Nipple-Sparing Mastectomy with Neurotization

Abstract Presenter: Daniel Vernik

Abstract Co-Author(s): Camryn Payne BA, Alanna Rebecca MD

Introduction: Nipple-sparing mastectomy (NSM) is a common surgical procedure for women with breast cancer that can lead to long-term deficits in sensation when the sensory nerves supplying the breast and nipple-alveolar complex (NAC) are severed. This loss of sensation significantly impacts quality of life (1). Prior studies have examined the use of allografts and autografts (neurotization) to restore sensation after NSM by reconnecting the severed nerves (2,3). When incorporated into the initial reconstruction, neurotization does not increase patient risk and adds minimal operative time, offering substantial benefit to patients (3). The BREAST-Q Sensation Module, a scaled patient-reported outcome measure, was developed to assess symptoms, sensations, and quality of life after breast reconstruction (4). This study aims to investigate how different breast characteristics, patient demographics, and surgical techniques might affect postoperative breast and nipple resensitization outcomes at our institution.

Methods: We conducted a retrospective review of patients who underwent mastectomy and breast reconstruction with neurotization between May 2022 and May 2024. Most recent BREAST-Q Sensation Module scores and subjective sensation data were

obtained. Patient and surgical data were recorded. Descriptive statistics and correlation analyses were performed.

Results: Our study cohort included 16 patients who underwent NSM. The average age was 51.5 years. Axogen nerve allografts were used in conjunction with Axogen conduits in 5 cases, Integra conduits in 9 cases, and nerve tape in 2 cases. Average time to follow-up was 221 days. 13 patients (81%) regained at least some sensation. Correlation analysis revealed moderate negative associations between postoperative breast and nipple sensation and several preoperative characteristics: stated cup size (-0.44), BMI (-0.58), breast base width (-0.40), and inframammary fold (IMF) to nipple length (-0.55). No significant relationships were found between postoperative sensation and age, menopausal status, reconstruction type, or nerve graft technique.

Conclusions: These findings suggest that certain preoperative breast characteristics such as larger cup size, higher BMI, greater breast base width, and longer IMF to nipple length may negatively impact postoperative sensory outcomes in patients undergoing NSM with nerve grafting to the NAC. However, the different reconstruction and nerve grafting techniques used at our institution did not show any association with sensory outcomes. Further research with larger sample sizes is needed to validate these associations to better inform surgical planning.

References

1. Van Spronsen, Nicole R MD; Hammond, Jacob B MD; Kandi, Lyndsay A BS; Armstrong, Valerie L MD; Kosiorek, Heidi E MS; Rebecca, Alanna M MD, MBA; Casey, William J MD; Kruger, Erwin A MD; Cronin, Patricia A MD; Pockaj, Barbara A MD; Teven, Chad M MD. Evaluating the Impact of Breast and Nipple Sensation on Quality-of-Life after Nipple-sparing Mastectomy with Implant Reconstruction: Long-term Outcomes Utilizing Breast-Q. Plastic and Reconstructive Surgery - Global Open 10(11S):p 1-2, November 2022. | DOI: 10.1097/01.GOX.0000905076.77838.ec
2. Djohan R, Scomacao I, Knackstedt R, Cakmakoglu C, Grobmyer SR. Neurotization of the Nipple-Areola Complex during Implant-Based Reconstruction: Evaluation of Early Sensation Recovery. Plast Reconstr Surg. 2020 Aug;146(2):250–4.
3. Morris BE, Spronsen NRV, Shrout MA, Teven CM, Rebecca AM. Neurotization during Breast Reconstruction. Plast Reconstr Surg Glob Open. 2022 Nov 16;10(11):e4591.
4. Tsangaris E, Klassen AF, Kaur MN, Voineskos S, Bordeleau L, Zhong T, et al. Development and Psychometric Validation of the BREAST-Q Sensation Module for Women Undergoing Post-Mastectomy Breast Reconstruction. Ann Surg Oncol. 2021 Nov 1;28(12):7842–53.

Impacts of Social Determinants of Health on Facial Feminization Surgery Outcomes in a High-Volume Setting

Abstract Presenter: Pariswi Tewari

Abstract Co-Author(s): Alay Shah MD, Sachin Chinta, David Tran MD, Eduardo Rodriguez MD

Purpose: Facial feminization surgery (FFS) describes a series of plastic surgery procedures that endow conventionally associated "feminine" features to the face, including contouring of the forehead, cheekbones, brows, lips, chin, and jaw. According to studies by Ainsworth and Spiegel (2010) and Caprini et al. (2023), gender-affirming FFS has pertinent psychosocial benefits for patients experiencing gender dysphoria.^1,2 However, Haider et al. (2013) demonstrates that minority patients experience disproportionately poorer surgical outcomes as a whole,^3 warranting more robust investigation into surgical disparities for gender-affirming care. Thus, the purpose of this study is to assess how social drivers of health lend to surgical outcomes for facial feminization.

Methods: We performed a single-center retrospective cohort study that included patients undergoing facial feminization surgery with a single provider between January 2017 and December 2022 at New York University Langone Health. Eligible patients were identified according to Current Procedural Terminology codes for gender identity disorders, as per the International Classification of Disease (ICD-10-CM). Surgical complications (i.e. surgical site infection, hematoma/excessive postoperative bleeding, incision dehiscence, inpatient psychiatric care admission, and medical readmission within 6 months) were assessed according to patient characteristics, such as race/ethnicity, employment status, insurance coverage, and HIV status.

Results: We identified 225 eligible patients who underwent a total of 260 FFS procedures between 2017 and 2022. FFS recipients at this study site were predominantly white (34.62%), not Hispanic (66.54%), publicly insured (78.08%), and/or unemployed (51.15%).

37 (14.23%) FFS procedures resulted in post-operative complications. Patients identifying as African American experienced slight increases in postoperative complication rates (15.79%) within their racial group compared to white patients (13.33%), as did Native American/Alaska Natives (20%). Additionally, unemployed and

student cohorts had slightly higher in-group complication rates (15.79% and 15.38%, respectively) compared to full-time employees (14.67%). Publicly insured patients experienced slightly higher in-group complication rates (14.78%) relative to privately insured patients (12.5%). Finally, HIV positive patients experienced higher in-group complication rates (17.07%) as compared to HIV negative patients (12.92%).

Conclusions: This single-center retrospective cohort study presents novel insights regarding facial feminization patient demographics and complication rates. Differences in FFS complication rates were observed when stratified by race, insurance type, employment status, and HIV status, though these relationships did not reach statistical significance. Our findings therefore invite salient considerations regarding access to centralized care at an established, high-volume institution as a potential buffer or equalizer for surgical complications. Such investigations into the barriers to/facilitators of gender-affirming surgery may inform equity-focused quality improvement initiatives in the field of plastic surgery and transgender medicine.

References:
1. Ainsworth TA, Spiegel JH. Quality of life of individuals with and without facial feminization surgery or gender reassignment surgery. Quality of life research. May 12, 2010. https://pubmed.ncbi.nlm.nih.gov/20461468/.
2. Caprini RM, Oberoi MK, Dejam D, Chan CH. Effect of Gender-affirming Facial Feminization Surgery on Psychosocial Outcomes. Ann. Surg. May 1, 2023. https://journals.lww.com/annalsofsurgery/abstract/2023/05000/effect_of_gender_affirming_facial_feminization.50.aspx.
3. Haider AH, Scott VK, Rehman KA, et al. Racial disparities in surgical care and outcomes in the United States: A comprehensive review of patient, provider, and systemic factors. JACS. January 11, 2013. https://pmc.ncbi.nlm.nih.gov/articles/PMC5995336/.

Indications and Complications in Conservative Versus Surgical Management of Frontal Sinus Fractures

Abstract Presenter: Jeison De Guzman

Abstract Co-Author(s): Apanjit Sahi, Grishma Patel, Bashar Hassan MD, Pharibe Pope, Eric Resnick, Judy Pan MD, Michael Grant MD, PhD, FACS, Grigorios Lamaris MD, PhD

INTRODUCTION: Frontal sinus fractures (FSF) can lead to significant complications that are dependent on FSF injury severity and management. There is an ongoing debate in the management of FSF due to a lack of standardized treatment guidelines and a shift toward conservative approaches in recent years. We aimed to identify patient and fracture characteristics that favor conservative versus surgical management and to compare complications between these approaches.

METHODS: A retrospective cohort study was conducted from January 2018 to December 2022. All patients with frontal sinus fracture(s) diagnosed by CT scan were included in the study. Patients who did not have any subsequent clinic visit after injury were excluded. Our primary outcome was the frequency of indications for conservative versus surgical management for FSF. Our secondary outcome was the incidence of complications following FSF management. Descriptive statistics, Chi-squared and Fisher's exact tests were performed.

RESULTS: Of 201 FSF patients, the majority were managed conservatively (149 [74.1%]]). Patients managed with open reduction and internal fixation (ORIF) were more likely to have a >2 mm displaced anterior table fracture (36 [69.2%], 39 [26.2%], P<0.001), >2 mm displaced posterior table fracture (20 [38.5%], 16 [10.7%], P<0.001), posteriorly displaced posterior table fracture (10 [19.2%], 10 [6.7%], P=0.014), frontal sinus outflow tract (FSOT) injury (16 [30.8%], 11 [7.4%], P<0.001), cerebrospinal fluid (CSF) leak (18 [34.6%], 8 [5.4%], P<0.001), or pneumocephalus adjacent to the fracture (32 [61.5%], 63 [42.3%], P=0.023). The median (interquartile [IQR]) follow-up duration was 73 (31-191) days. The most common complication was headache (97 [48.3%]), followed by hematoma (61 [30.3%]). Patients managed with ORIF, compared with those managed conservatively, were significantly more likely to develop scalp numbness (11 [21.2%], 14 [9.4%], P=0.032).

CONCLUSION: Our findings indicate that the majority of FSF were managed conservatively, with more complex cases involving displaced fractures, FSOT injuries, CSF leaks, or pneumocephalus adjacent to fracture being more likely to require ORIF. There were no significant differences in the incidence of serious complications between patients managed conservatively and surgically. Our study provides valuable insight into the indications and associated complications of ORIF versus conservative management of FSF that will help guide clinicians to make informed decisions for patient care.

Innovative Reconstruction of Near-Total Scalp Avulsion Using a Free Latissimus Dorsi Muscle Flap with Preoperative Arteriovenous Fistula, Fasciocutaneous Flap Elevation, and Autologous Adipofascial Fat Graft for Vein Graft Support

Abstract Presenter: Makena Davidson

Abstract Co-Author(s): Whitney Stanton, Maxim Pekarev MD

Background: Near-total scalp avulsion presents complex reconstructive challenges due to extensive soft tissue loss, exposed calvarium, and limited recipient vessels(1). Traditional scalp reconstruction algorithms consider defect size, location, and available tissue options(1,)2. The latissimus dorsi muscle flap is favored for large circumferential defects due to its reliability and robust vascularity(1,3). However, establishing adequate vascular access is challenging, increasing operative times and risk of flap compromise(4). This case introduces a novel approach combining a preoperative arteriovenous (AV) fistula, autologous adipofascial fat graft, and right face fasciocutaneous flap elevation to enhance vascular access, optimize flap perfusion, and prevent vein graft kinking. This approach maximized flap viability, efficiency, and aesthetic outcomes for reconstructing a near-complete scalp defect.

Methods: A retrospective chart review was conducted at Texas Health Resources Fort Worth and Thrive Reconstructive Surgery for a patient with a near-total circumferential scalp avulsion due to an ATV accident. Data from operative reports, progress notes, and follow-up records were analyzed to evaluate surgical techniques, complications, and outcomes.

Due to his extensive 280 cm^2 soft tissue defect with exposed calvarium and inadequate local recipient vessels, a free right-sided latissimus dorsi muscle flap was selected for coverage.

To ensure reliable microvascular anastomosis, an AV loop was created using a saphenous vein graft eight days before reconstruction. This allowed the vein to arterialize and dilate to optimal size, enhancing its durability and flow dynamics for successful microvascular anastomosis.

The right face fasciocutaneous flap was elevated to create a subcutaneous tunnel for the AV loop, minimizing tension on the vein graft. This strategic maneuver provided robust inflow vessels, optimizing vascular access for the free flap.

To prevent kinking at the mandibular angle, a 2 cm by 2 cm adipofascial fat graft was harvested from the right cervicomental region and placed to support the vein graft, maintaining patency by preventing compression or kinking.

The AV loop enabled successful microvascular anastomosis and optimized perfusion of the latissimus dorsi muscle flap. The right face fasciocutaneous flap allowed strategic placement of the AV fistula, enhancing vascular access and optimizing flap perfusion. The adipofascial fat graft effectively prevented kinking of the vein graft, ensuring consistent arterial inflow and venous outflow.

At the 1-month follow-up, the patient demonstrated complete flap survival, no complications, and satisfactory aesthetic contour. However, long-term follow-up was limited due to geographical constraints.

Conclusion: This case demonstrates an innovative reconstructive strategy for near-total scalp avulsion using a preoperative AV loop, right face fasciocutaneous flap elevation, and adipofascial fat graft to enhance vascular access and maintain graft patency. This approach addresses challenges of recipient vessel scarcity and complex scalp defects, providing reliable, well-vascularized soft tissue coverage. It underscores the importance of multidisciplinary collaboration and the potential for AV loops and adipofascial fat grafts in optimizing free tissue transfer. Future research should explore its broader applicability.

1. Cen H, Jin R, Yu M, Weng T. Clinical decision model for the reconstruction of 175 cases of scalp avulsion/defect. Am J Otolaryngol. 2021;42(1):102752.
2. Leedy JE, Janis JE, Rohrich RJ. Reconstruction of Acquired Scalp Defects: An Algorithmic Approach. Plast Reconstr Surg. 2005;116(4):54e-72e.
3. Beasley NJ, Gilbert RW, Gullane PJ, et al. Scalp and Forehead Reconstruction Using Free Revascularized Tissue Transfer. Arch Facial Plast Surg. 2004;6(1):16-20.
4. Fodor L, Fodor M, Sobec R, Sita L, Florian IS. Strategies for Complex Scalp Reconstruction in Patients With Poor Recipient Vessels. J Craniofac Surg. 2019;30(1):e12-e14.

Internal Suspension Capsulorrhaphy: Improving Safety and Outcome Following Breast Implant Removal

Abstract Presenter: Andrew Malek

Abstract Co-Author(s): Daniel Yoo MD, Kamran Khoobehi MD

Background: A recent survey by Lee et al discussed breast augmentation as undergoing a dynamic change due to factors including evolving breast implant technology, the growing perception of the public to entities such as BIA-illness, safety concerns, and shifting aesthetic preferences. (1) Consequently, a growing number of revision breast surgery is being performed, namely implant removal. According to the 2023 ASPS procedural statistics, a 9% increase in breast implant removal was seen from the previous year.(2) Further supporting this trend, Knoedler et al found a 653% increase in breast implant removal surgery from 2008-2021 marking the largest growth among plastic surgery procedures. (3)
With a growing number of implant removal surgery, approaches such as internal breast lifts are emerging to address aesthetic concerns. Internal suspension capsulorrhaphy (ISC) is a novel and effective technique during breast implant removal surgery which resuspends and positions the breast mound, improves glandular ptosis , and increases safety by reducing the extent of tissue mobilization required for mastopexy and in certain cases obviates need for mastopexy altogether if combined with techniques such as fat grafting.

Surgical Technique: IMF approach is used, and dissection is carried down to the implant capsule which is then evaluated. If the capsule appears healthy; capsulotomy is performed, and the implant is removed without capsulectomy. Further capsulotomy is then performed as indicated and ISC is then performed. Using a lighted retractor, a #0 barbed, double armed polydiaxonone suture is used to suspend the lateral capsule along the pectoralis minor border toward the IMF. The other arm of the suture is then used to suspend and advance the superior and central capsule medially and toward the IMF. Both arms are then run along the inferior capsule while reinforcing the IMF and then interlocked near the breast midline. Following ISC, fat grafting may be performed to improve upper pole fullness and medial cleavage. Mastopexy is then performed as indicated.

Conclusion: With an increasing number of patients desiring implant removal, techniques maximizing safety and outcomes while providing optimal aesthetic results are emerging. Internal suspension capsulorrhaphy offers an effective method that repositions the breast mound and decreases the extent of tissue mobilization required for mastopexy, decreasing risk of vascular compromise to the NAC. When combined with fat grafting, ICS may even obviate need for mastopexy.

Citations:

1. Lee E, Khavanin N, Xun H, Abousy M, Darrach H, Kraenzlin F, Jenny H, Yang R, Sacks JM. Identifying Public Perceptions, Attitudes, and Concerns about Breast Implants and Their Complications: A National Survey. Plast Reconstr Surg. 2023 Jan 1;151(1):31e-39e. doi: 10.1097/PRS.0000000000009820. Epub 2022 Oct 4. PMID: 36194058.
2. https://www.plasticsurgery.org/documents/news/statistics/2023/plastic-surgery-statistics-report-2023.pdf
3. Knoedler, Samuel; Alfertshofer, Michael MD; Rams, Daniel J. MD; Matar, Dany Y. BS; Knoedler, Leonard MD; Sofo, Giuseppe MD; Könneker, Sören MD, PhD; Kim, Bong-Sung MD, PhD; Orgill, Dennis P. MD, PhD; Panayi, Adriana C. MD, PhD; Schenck, Thilo L. MD, PhD. Breast Implant Removal Surgery: A Data-driven Look at Growing Trends. Plastic & Reconstructive Surgery-Global Open 12(12):p e6402, December 2024. | DOI: 10.1097/GOX.0000000000006402

Large Language Models for Perceptual Speech Clinical Data Extraction in over 100 Cleft Palate Speech Language Pathology Notes

Abstract Presenter: Chelsea Yim

Abstract Co-Author(s): Amir Ashraf Ganjouei, Alexander Plonkowski MD, Amber Stefanski, Andi Zhang MD, Jaclyn Kukoff, Janna Spencer, Alexander Lin MD

Introduction: Speech-language pathology assessments are vital in supporting plastic surgeons in monitoring pediatric patients with cleft palate and velopharyngeal insufficiency. Recent advancements in large language models (LLM) may potentially expedite the time required for manual extraction of a patient's functional speech status. This study evaluates the efficacy of an in-house GPT-4 model (VERSA, UCSF's instance of OpenAI's ChatGPT), in extracting concepts from speech notes.

Methods: We conducted a retrospective analysis of 113 anonymized speech sample notes, authored by four speech-language pathologists (SLPs) across two institutions, for patients aged 8 months to 20 years (average: 8.32, SD: 4.11). These notes were processed in an automated fashion using our custom LLM model to extract key speech and language concepts. The model was prompted to identify patient diagnosis, surgical history, and SLP assessments (resonance assessments, nasal airflow evaluations, grimace, and speech acceptability).

Results: Our model accurately extracted the patient's speech diagnosis, surgical history, and SLP assessments from 99 analyzed speech notes (87% success rate). The customized VERSA LLM model efficiently identified clinically relevant speech evaluation elements for hypernasality, hyponasality, and nasal airflow in these cases. Of the remaining 14 notes, the LLM provided inaccurate outputs for resonance, nasal flow evaluation, or both in 13 notes. Hallucination occurred in one note, where all outputs were incorrect. When this note was run on its own, rather than batch processed with all the other notes, the LLM was quite accurate except for extracting the intelligibility subscore. Due to the variability in each SLP's note-writing style, we observed that the LLM adapted accordingly, extracting assessments verbatim from the note when a solid score for resonance was absent. In cases where a nasal flow evaluation or speech acceptability score was missing, the LLM noted the absence of the information and provided the velopharyngeal output in an attempt to provide the most relevant data without explicit prompting. When nasal turbulence was explicitly mentioned, the LLM accurately extracted this information.

Conclusions: The application of the VERSA model demonstrates substantial potential in streamlining the extraction of diagnostic and evaluative information from pediatric speech language pathology notes. Our findings highlight the potential of LLMs to enhance the efficiency and reliability of clinical assessments in speech-language pathology. For clinicians, this model reduces the time spent manually retrieving information and mitigates subjective interpretation of speech data. Future research should focus on expanding the dataset and refining model parameters to further improve accuracy and applicability in diverse clinical, quality management, and research scenarios.

Lateral Intercostal Artery Perforator Flap (LICAP) for Breast Axillary Reconstruction

Abstract Presenter: Niki Patel MD

Abstract Co-Author(s): Joshua Henderson MD, Halil Safak Uygur MD

Introduction: Local chest wall perforator flaps are an excellent option in filling small defects due to its minimal donor site morbidity in oncoplastic breast reconstruction. Herein, we discuss the utilization of lateral intercostal artery perforator (LICAP) flap in

the setting of recurrence with previous axillary lymph node dissection in an irradiated breast and axilla.

Case Report: A 59-year-old female with a history of left breast invasive ductal carcinoma (IDC) treated with breast conservation surgery and axillary lymph node dissection with subsequent adjuvant chemotherapy, radiation therapy, and endocrine therapy 8 years ago presented with recurrent IDC of the left axilla with pectoralis minor and serratus involvement as found on MRI. A left low axillary en bloc resection of the tumor including portions of the pectoralis minor and serratus anterior muscle and immediate reconstruction of the remaining axillary defect (6x5x2cm following negative frozen section) with exposed rib using a left LICAP flap was performed. In the setting of possible future radiotherapy and axillary contraction a flap reconstruction was selected over skin grafting. The dominant lateral intercostal perforator was confirmed with hand-held Doppler at the level of the sixth intercostal space. A propeller style flap was designed that extended laterally and posteriorly. The flap was elevated lateral to medial in the subfascial plane. Real-time indocyanine green angiography (ICG) with SPY fluorescence imaging was used to evaluate the perfusion, which was adequate except the very distal 1 cm portion of flap that was eventually trimmed. The harvested flap was then de-epithelialized except the distal 5x6cm portion and placed in the defect via tunneling below skin bridge and inset. A 15-French Jackson-Pratt drain was placed in the donor site. The donor area was closed primarily. The drains were removed in one week follow-up. A well-perfused pliable flap without axillary contraction was observed at three weeks.

Summary: The LICAP flap is less commonly described in the literature with its use being primarily volume replacement in lateral breast defects. In this case, it was utilized mainly for preventing axillary contraction and overcoming the negative effects of possible future radiation in the surgical field. This patient also had previous history of radiation and axillary dissection; therefore, tissue outside of the radiation and axillary dissection field was chosen.

Locking Down the Mandible: A Retrospective Analysis of External Fixation in Mandibular Gunshot Wounds

Abstract Presenter: Michael Haydon

Abstract Co-Author(s): David Wainwright MD, Jack Bane

Background: External fixation (ex-fix) devices have been integral in managing bony trauma at the extremities and facial skeleton, including the mandible, since the mid-1930's. The device facilitates the stabilization of mandibular fragments, planning for further reconstructive surgeries, and permits improved oral hygiene, nutritional intake and mobilization of the temporomandibular joint. This study aims to identify the efficacy of the device in achieving bony union in the facial gunshot wound (GSW) population, focusing on its advantages and its role in the current management of mandible GSWs.

Materials and Methods: A retrospective chart review was performed using a facial GSW database from Memorial Hermann Hospital - TMC (2009-2021). Patients with mandible fractures treated with an external fixation device were identified. Data regarding demographics, premorbid conditions, injury circumstances, and management, including surgical care, were extracted. Electronic medical records provided details on mandible injury, surgical management, device application length, and postoperative outcomes, including complications and secondary reconstructions. Fracture outcomes were classified as healed or requiring additional treatment, which involved open reduction internal fixation (ORIF) with or without bone grafts or flaps. The specific ORIF type was categorized based on virtual surgical planning (VSP) or conventional plates. The data was compiled in Excel and analyzed to identify trends in ex-fix use for mandibular fracture treatment.

Results: A total of 44 patients (36 males, 8 females) with facial GSWs who underwent external fixation for mandibular fractures were identified. Most patients required a tracheostomy (79.6%) and had an average of 23.9% of the length of the mandible injured. The ex-fix device was applied at an average of 4.2 days (0-14) after the injury and on procedure number 2.72 (1-6). The ex-fix removal was on average 92.7 +/- 76.4 days (18–442) after the injury. Fractures in 4 patients healed with ex-fix alone, 2 patients remained in non-union after removal, and 4 were lost to follow up. In the remaining 34 that underwent further reconstruction, ORIF alone was performed on 11 patients while 23 required ORIF with bone augmentation in the form of a graft (18) or a flap (5). Most of those requiring bone augmentation were managed by VSP (78.2%) while the opposite was true with ORIF alone (27.2%). Complications were experienced in 10 patients (22.7%) and included pin site infections, pin loosening and malposition, with 2 device failures requiring removal pre-reconstruction.

Conclusion and Summary: This study provides an algorithm for managing GSWs to the mandible treated with external fixation. The ex-fix alone was rarely adequate for definitive fracture treatment (9%), but it consistently stabilized the mandibular fragments, facilitating subsequent reconstructive interventions. After ex-fix removal,

bone augmentation with ORIF was necessary in over two-thirds of cases to restore the bony structure. The facial GSWs requiring ex-fix were generally the most severe, as evidenced by the high tracheostomy rate and the extent of mandible injury. This algorithm can guide treatment expectations and offer strategies for managing future patients with significant bone defects from GSWs to the mandible when external fixation is used.

Management of Tuberous Breast Deformity: A Paradigm Shift

Abstract Presenter: Julian Gonzales

Abstract Co-Author(s): Jonathan Richard, Kamran Khoobehi MD

Goals/Purpose: This study presents a case series of a novel method of correction of the complicated congenital deformity that is the tuberous breast. Characterized by unilateral or bilateral constricted lower pole, elevated inframammary fold, parenchymal hypoplasia, particularly lack of medial cleavage, and nipple areolar complex herniation resulting in an oversized areola, tuberous breasts can be difficult to reconstruct without residual deformity. The method described provides improved release of the inferior pole and primarily requires fat grafting to achieve symmetric long term aesthetic results.

Methods/Technique: From the period of 2008 to 2023, a total of 16 patients (ages ranged from 18 to 49 years old) with tuberous breast deformity underwent surgical correction with superficial wide plane dissection of the constricted lower pole combined with areolar reduction, mastopexy, and fat grafting with or without implant. Severity of breast deformities ranged from types 1 through 4. Outcomes were determined by final grade of deformity based on scoring by three primarily aesthetic plastic surgeons.

Results/Complications: Preliminary results demonstrate a total of 16 patients over 15 years with tuberous breast deformity treated with superficial wide plane dissection of the inferior pole and fat grafting resulted in resolution of deformity after a single stage fat transfer in 13 patients (81.25%). Of the 16 patients, 6.25% were type 1 severity, 37.5% type 2, 31.25% type 3, and 31.25% type 4. One patient (6.25%) required implant at first stage due to desire for volume that could not be obtained with single stage fat grafting. Three patients (18.75%) required revisions with two of those being mastopexy with second stage fat grafting and the third augmentation with implant. One of the patients requiring a second stage of fat grafting, had resolution of deformity from type 4 to type

1. First stage fat transfer volumes per breast ranged from 180 ml to 470 ml with a mean of 356 ml. Asymmetry was corrected in 10 patients (62.5%), with 3 of those being 50 ml or greater difference between breasts. Deformity was corrected in two stages or less. No complications were noted in any first or second stage procedures.

Conclusion: The method presented in this study results in a reliably consistent and aesthetically pleasing outcome in tuberous breasts without the requirement of parenchymal radial scoring or implant. Of note, the most important deforming forces (lower pole constriction, raised IMF, NAC herniation, and lack of medial cleavage) in the tuberous breast were corrected consistently. 80% of type 4 tuberous breasts were able to be reconstructed with no residual deformity. Patients should be counseled that this option is available, however due to the nature of the tuberous breast lack of soft tissue envelope and parenchyma, multiple stages of fat grafting or implant may be needed for larger volumes. In those cases where implant is desired, fat grafting provides improved soft tissue coverage.

Mapping the Carotid: An Anatomical Study of the Carotid Artery's Depth in Facelift Patients to Guide Safe Hemostatic Net Placement

Abstract Presenter: Sakar Gupta

Abstract Co-Author(s): Aidan O'Shea, Armin Edalatpour MD, Ahmed Afifi MD

PURPOSE: The hemostatic net is an effective method to reduce hematomas after facelift surgery (1). It involves placing continuous percutaneous sutures to quilt the flap onto the underlying soft tissues, effectively reducing the potential dead space available for fluid to accumulate (1). Given the superficial path of the carotid artery in the neck, the placement of these percutaneous sutures carries a risk of inadvertent injury to the carotid and its branches. This study aims to provide anatomical data on the depth of the carotid artery and its branches along the neck to inform data-based surgical guidelines for the placement of a hemostatic net in order to decrease the risk of inadvertent injury to the vessels.

METHODS: Medical records of patients who underwent facelift procedures within a single-academic aesthetic surgery practice and who subsequently underwent computed tomography or magnetic resonance imaging of the neck within 10 years after the date of the procedure were accessed. Patients who had an age between 45-90, inclusive, on

the date of the neck imaging were included. Patients for whom imaging was unavailable or for whom imaging data was of insufficient quality were excluded. Date of birth, date of facelift procedure, and date of imaging were ascertained to enable calculation of age at procedure and imaging. For each patient, the left and right common carotid, internal carotid, and external carotid arteries were analyzed at the C2-C4 vertebral levels, corresponding to the angle of the mandible, the hyoid bone, and the thyroid cartilage respectively. Using the measurement tool in the medical record's picture archiving and communication system, the shortest distance between the wall of the vessel and the surface of the skin was measured.

RESULTS: A total of 56 patients were accessed (17 had unavailable images and 6 had images of insufficient quality). 33 total patients (9.09% male; average age at procedure=64.2 years; average age at imaging=69.1 years) were analyzed.
For the common carotid, at the C3 level, the average depth relative to the skin (CCDS) is 29 mm (15.9). At C4, CCDS=29 mm (15.9). For the internal carotid at the C2 level, the average depth relative to the skin (ICDS) is 32.9 mm (8.3). At C3, ICDS=25 mm (8.8), and at C4, ICDS=20.5 mm (5.5). For the external carotid at the C2 level, the average depth relative to the skin (ECDS) is 32.2 mm (6.4). At C3, ECDS=27 mm (8.8), and at C4, ECDS=25.6 mm (23.3). The closest artery to the skin along the neck is the internal carotid artery (20.5 mm (5.5)) at the level of the thyroid cartilage (C4).

CONCLUSIONS: Accurate knowledge of the depth of the carotid artery along the neck is critical to guiding plastic surgeons in suturing hemostatic nets following facelift surgeries. Our study provides detailed anatomic data to improve surgical guidelines and reduce inadvertent injury risks for patients.

REFERENCES:
1. Janssen TJ, Maheshwari K, Sivadasan A, Waterhouse N. Hemostatic net in facelift surgery: A 5-year single-surgeon experience. Aesthet Surg J. 2023;43(10):1106-1111. doi:10.1093/asj/sjad097

Marijuana And Microvascular Surgery: The Impact Of Marijuana Use On Deep Inferior Epigastric Perforator Flap Microsurgical Breast Reconstruction Outcomes

Abstract Presenter: Erinn Mangona

Abstract Co-Author(s): Chloe Cottone, Eric Shuren, Jordan Frey MD

Purpose: Marijuana use has become increasingly prevalent among surgical patients, emerging as a potential risk factor that surgeons must carefully consider in preoperative management (1). While the adverse effects of tobacco on plastic surgery outcomes are well documented, the impact of marijuana use in microsurgery remains largely unexplored. The purpose of this project was to investigate the perioperative and postoperative effects of marijuana use on patients undergoing deep inferior epigastric perforator (DIEP) flap breast reconstruction, a longstanding microsurgical intervention for reconstruction in patients with breast cancer.

Methods: A retrospective chart review was conducted in the Erie County Medical Center EHR system. Patients who underwent DIEP flap breast reconstructions between August 2020 and December 2023 were recognized and separated into those who self-identified as marijuana users and those who did not. A series of characteristics and surgical outcomes within 6 months of the procedure were tabulated. Those who identified as current tobacco users and those who underwent radiation at the surgical site within six months prior or following surgery were excluded. Fisher's exact tests, chi-squared tests, Wilcoxon rank-sum tests, t-tests, and relative risks within a 95% confidence interval were used to analyze the relationship between marijuana use and both characteristics and outcomes.

Results: A total of 94 individuals who underwent DIEP flap breast reconstructive surgeries were identified, with 19 self-reporting marijuana use. Age, BMI, race, former nicotine use, diabetes mellitus status, hypertension status, and depression status were not statistically different between marijuana and non-marijuana users; however, marijuana users were more likely to have comorbid anxiety (RR=1.97; 95% CI:1.17-3.23; p=0.030). Marijuana users were 1.62 times more likely to experience intraoperative complications (95% CI:1.21-2.17; p=0.017), such as thrombosis of micro-arteries (p=0.009), loss of arterial doppler signal (p=0.003), intraoperative blood loss (p=0.022), and amount of anastomoses revisions (p=0.001). Marijuana users were 1.45 times more likely to experience postoperative complications (95% CI:1.19-1.76; p=0.011), most notability postoperative infection, with over 50% developing an infection compared to 17% of non-marijuana users (95% CI:1.58-5.83; p=0.003). Marijuana users were also at a significantly increased risk of vascular compromise (RR=3.29; 95% CI:1.68-6.44; p=0.002) and seroma (RR=3.38; 95% CI:1.29-8.9; p=0.022) postoperatively.

Conclusions: Marijuana use may predispose patients who undergo DIEP flap breast reconstruction procedures to adverse surgical outcomes. The statistically significant impact on microvascular integrity, intraoperative blood loss, and postoperative infection

risk may affect presurgical procedures and alter how plastic surgeons approach these cases to optimize patient outcomes.

1. Ahrens E, Wachtendorf LJ, Chiarella LS, et al. Prevalence and association of non-medical cannabis use with post-procedural healthcare utilisation in patients undergoing surgery or interventional procedures: a retrospective cohort study. EClinicalMedicine. 2023;57:101831. Published 2023 Jan 31.

Methodological Variability and Sensory Recovery Patterns in the Rat Sciatic Nerve Crush Model: A Systematic Review

Abstract Presenter: Daiki Kitano MD, Phd

Abstract Co-Author(s): Dzana Katana PhD, Alexander Madanat, Anna Bazell, Jade Smith, Kacey Marra PhD

Introduction: The rat sciatic nerve crush model is widely used to evaluate the efficacy of interventions for nerve regeneration. Compared to the transection and repair model, it is easier to perform, requiring only mechanical compression without microsurgery. However, variations in instruments, pressure, and duration introduce methodological inconsistencies. To date, no comprehensive review has systematically analyzed these differences. This review evaluates methodological inconsistencies in sciatic nerve crush models and their impact on sensory recovery outcomes, aiming to improve cross-study comparisons and experimental standardization

Methods: A literature review was conducted using PubMed, Embase, Web of Science, and SCOPUS for studies published between 2010 and 2024. Studies were included if they involved surgical crush injuries on the rat sciatic nerve, performed at least one sensory functional evaluation, and compared outcomes with naive or sham controls. Crush techniques and the resulting nerve injuries were analyzed based on postoperative sensory evaluations.

Results: Of the 48 studies reviewed, 21 met the inclusion criteria. The crush techniques used included clamp (11 studies), forceps (5), clip (4), and others (1), all of which resulted in sensory impairments post-surgery. Ten studies reported transient sensory impairments with spontaneous recovery to control levels, while 11 reported no recovery

during the observation period (permanent deficit). The transient group had significantly longer observation periods compared to the permanent group (57.7 vs. 17.4 days, p = 0.0009). Receiver operating characteristic (ROC) analysis determined 25 days as the optimal cutoff to distinguish transient from permanent injuries, with 90.0% sensitivity and 81.8% specificity.

Discussion: ROC analysis demonstrated that, irrespective of the technique used, nearly all crush nerve injury models with observation periods of 25 days or longer exhibit spontaneous sensory recovery, whereas those with shorter observation periods do not. Recovery typically peaks between POD 21 and 28, followed by a plateau, with studies reporting no significant differences from the uninjured group by POD 56. These findings support classifying the crush nerve injury model as axonotmesis in Seddon's system [1], characterized by a lesion in continuity with complete axonal disruption, Wallerian degeneration, and spontaneous recovery. Given that crush-induced axonotmesis naturally recovers over time, this model is best suited for evaluating rapid-acting agents, as spontaneous recovery may obscure the effects of slower-acting treatments. Instead, slow-acting agents are better assessed using models with longer regeneration periods, such as the transection and repair model [2].

Conclusion: This review demonstrated that the crush nerve injury model invariably leads to axonotmesis, irrespective of the technique used. A minimum observation period of four weeks, preferably up to eight weeks, is recommended for assessing sensory recovery. This timeframe is optimal for testing rapid-acting agents that exert effects within this recovery window. These findings emphasize the importance of standardizing methodology in sciatic nerve injury studies to improve reproducibility and reliability in preclinical nerve regeneration research.

References

[1] Seddon HJ. A Classification of Nerve Injuries. Br Med J. 1942 Aug 29;2(4260):237-9.
[2] DeLeonibus A, et al. A meta-analysis of functional outcomes in rat sciatic nerve injury models. Microsurgery. 2021 Mar;41(3):286-295.

Military-Civilian Partnerships to Support Military Plastic Surgeons Readiness: A Blended Practice Model

Abstract Presenter: Sophia Anderson

Abstract Co-Author(s): Justin Fox MD, Fatemeh Mirzamohammadi MD, Nickolay Markov

Background: Military plastic surgeons play a critical role in the care and rehabilitation of wounded servicemembers. However, the ability of military plastic surgeons to maintain a robust reconstructive skillset within military treatment facilities (MTFs) is often hampered by a narrow case mix and low case volume. We conducted this study to evaluate how integration of a targeted military-civilian partnership (MCP) impacted an MTF-based plastic surgery practice.

Materials and Methods: Beginning in March 2020, MTF-assigned plastic surgeons expanded their practice through a targeted MCP with a civilian cancer center, whereby military plastic surgeons provided reconstructive care to civilian patients. We obtained clinical workload data through the billing offices at the MCP and comparable offices within the MTF. The primary outcomes were the volume of operative procedures and the Joint Knowledge, Skills, and Ability (JKSA) scores related to the clinical workload. Outcomes were standardized to surgeon-months to adjust for variations in surgeon assignment time and then compared between a pre-intervention period (October 2016 - February 2020) and the post-intervention period (March 2020 - December 2022).

Results: Throughout the study period, five MTF-assigned plastic surgeons contributed 103 surgeon-months before and 83 surgeon-months after the MCP establishment. After MCP integration, military plastic surgeons demonstrated a significant increase in procedural volume, with an average of 33.3 procedures per surgeon-month compared to 16.3 prior to intervention ($p < 0.001$). Additionally, there was a substantial increase in the readiness value of the work being performed, as reflected by the JKSA points generated per surgeon-month (374.0 vs 108.0 points, $p < 0.001$). The proportion of operative procedures yielding any JKSA points also improved (92.4% vs 75.2%, $p < 0.001$). Notably, several lessons learned were identified to better support MCP integration into MTF based practices including the need for local infrastructure to support these advancements.

Conclusion: Military-civilian partnerships are essential for military plastic surgeons to sustain the advanced reconstructive skills necessary to treat our nation's wounded service members. Further efforts are necessary to identify best practices in MCP oversight and execution.

Optimal Timing of Postoperative Exercise After Breast Surgery: A Systematic Review

Abstract Presenter: Faisal Shurafa

Abstract Co-Author(s): MHD Besher Alayoubi, Benjamin Kirby MD, Stephen Colbert MD

Background: Exercise following oncological breast surgery has been shown to improve outcomes such as functional capacity and pain reduction[1], [2]. The aim of this study is to help elucidate the optimal timing for initiating exercise after breast surgery and assess whether it impacts adverse outcomes.

Methods: This systematic review assessed the Scopus, PubMed, and Cochrane databases to identify relevant manuscripts. Inclusion criteria were as follows: studies published between January 2011 and December 2024, randomized controlled trials, oncologic breast surgery, exercise as a primary outcome, and English-language publications. Manuscripts were excluded if they did not evaluate exercise as a primary outcome. The search was conducted using various iterations of the phrase "exercise after breast surgery", with a total of fourteen search phrases used.

Processing followed PRISMA guidelines, and studies were categorized based on the effect of exercise on functional capacity measures, pain, quality of life, and a miscellaneous category labeled "composite adverse effects." The quality of the data was assessed using GRADEpro software.

Results: A total of 3,176 studies were identified across the three databases. After screening and manual assessment, 35 studies were included in the review. Some studies fell into multiple categories and were assessed accordingly.

Initiating light exercise as early as post-operative day 1 was associated with improvements in functional capacity measures, pain reduction, and other outcomes. However, definitions of "light exercise" varied across studies-ranging from walking to small arm motions. Studies that introduced exercise at a later stage included light resistance training and moderately intensive regimens such as swimming and yoga. No studies examined the effects of heavy weightlifting or high-intensity exercises.

Only two studies investigated complications such as seroma and hematoma formation. These studies found no adverse effects associated with early exercise, conflicting with previous findings[3].

Conclusions: This systematic review highlights the positive impact of early post-operative exercise. However, there is limited data on the risk of post-operative complications associated with early activity regimens. We conducted a similar study in 2023 and were able to add more recent data and Cochrane library; our current findings aligned with our previous study.

References:
1.Charati FG, Shojaee L, Haghighat S, et al. Motor Exercises Effect on Improving Shoulders Functioning, Functional Ability, Quality of Life, Depression and Anxiety For Women With Breast Cancer. Clinical Breast Cancer. 2022;22(7):666-673. doi:https://doi.org/10.1016/j.clbc.2022.07.009

2.Klein I, Kalichman L, Chen N, Susmallian S. A pilot study evaluating the effect of early physical therapy on pain and disabilities after breast cancer surgery: Prospective randomized control trail. The Breast. 2021;59:286-293. doi:https://doi.org/10.1016/j.breast.2021.07.013

3. Shamley DR, Barker K, Simonite V, Beardshaw A. Delayed versus immediate exercises following surgery for breast cancer: a systematic review. Breast Cancer Res Treat. 2005 Apr;90(3):263-71. doi: 10.1007/s10549-004-4727-9. PMID: 15830140.

Optimizing a Porcine Model of Microvascular Free Tissue Transfer

Abstract Presenter: Matthew Wright MD

Abstract Co-Author(s): Christine Rohde MD, MPH, Jarrod Bogue MD

Background: Animal models continue to play a critical role in the advancement of microsurgery including in the field of vascularized composite allografting where they are utilized for both procedural and immunosuppression research. The porcine saphenous artery flap is a fasciocutaneous flap which has proven useful due to its ease of dissection and long pedicle length and given similarity between porcine and human skin. Challenges with the flap include the small vessel caliber (~1mm) and potential size mismatch with recipient targets such as the carotids as well as the reduced ability to dilate porcine vessels which tend to be firmer than human vessels. In the present study, we describe an alteration to the flap which enables both a longer and larger-caliber pedicle for increased ease of use.

Methods: The donor swine was laid in a supine position and the bilateral groins prepped. The saphenous artery pedicle course was dopplered, and a 10-cm diameter ovoid skin island was designed centered over the pedicle as previously described.1 A fasciocutaneous flap was then raised from distal to proximal until reaching the takeoff, whereupon an additional 1.5-cm segment of the proximal femoral artery and vein were dissected, ligated, and separated for use in free tissue transfer. For the purposes of the present model, flaps were then anastomosed to recipient swine carotid arteries. Donor swine were sacrificed for other immunologic studies.

Results: Six flaps were completed in total, with two flaps having pedicles taken just distal to the femoral takeoff, whereas the remaining four were dissected to include a femoral vessel cuff. With dissection carried proximally to include a cuff of the femoral vessels, flap pedicle length can be lengthened by multiple centimeters. Femoral vessel caliber encountered in the adult swine used in this study was generally around 3-4mm, compared with around 1mm distal to the femoral takeoff, making for a much better match to recipient swine carotid arteries. Inclusion of the femoral cuff added only minimal time to the dissection. Among the six flaps, one flap which had not included a femoral vessel cuff failed.

Conclusions: Modification of a porcine saphenous artery flap to include a femoral vessel cuff increases pedicle length, caliber, and recipient vessel match, and it may result in improved flap outcomes.

Bibliography

1. Pozzo V, Romano G, Goutard M, et al. A Reliable Porcine Fascio-Cutaneous Flap Model for Vascularized Composite Allografts Bioengineering Studies. J Vis Exp. 2022(181).

Optimizing the Risk Stratification Tools for Patients Undergoing Cranioplasty

Abstract Presenter: Abdulaziz Elemosho MD

Abstract Co-Author(s): Ryan Enslow, Caroline Gillespie, Kerry-Ann Mitchell MD, PhD

Background: Large size cranioplasty (>25cm2) after decompressive hemicraniectomy is associated with failure rates as high as 30-50%. Current risk stratification approaches

for patients undergoing cranioplasty patients did not however take into consideration the cranioplasty sizes1. Patients requiring large size cranioplasty usually have a baseline higher modified frailty index -5 (mfi-5) and risk analysis index (RAI) scores than other patient populations. These scores are direct indicators of frailty and have been shown to have a predictive utility for postoperative outcomes1. The aim of this study is to determine predictive utility of these scores for surgical outcomes in patients undergoing large size cranioplasty.

Methods: A retrospective review of adult patients undergoing large defect cranioplasty at The Ohio State University (2013–2022) was conducted. Individual RAI-A and mFI-5 scores were calculated used to stratify patients into high (RAI >30 and mfi-5 ≥3) and low (RAI ≤30 and mfi-5 ≤2) risk group. Logistic regression and ROC analysis was used to determine the relationship with postoperative outcome.

Results: The analysis included 302 patients (mean age 50.5 years). Reoperation occurred in 28.8%, Clavien-Dindo III-IV complications in 28.4%, 30-day morbidity in 32.7%, and cranioplasty failure in 11.6%. Patients with RAI >30 or mFI-5 ≥3 had higher reoperation risk (p=0.012, p=0.008, respectively), with both scores showing robust predictive accuracy (AUC: 0.85). Reoperation risk was elevated for patients with prior surgeries (p<0.0001) and frontoparietal cranioplasties (p=0.02). RAI >30 increased 30-day morbidity risk (p=0.033), particularly in patients with frozen autogenous bone grafts (p=0.02), with RAI outperforming mFI-5 (AUC: 0.75). Conversely, mFI-5 demonstrated superior prediction of graft failure (AUC: 0.86), with mFI-5 ≥3 significantly associated with hardware/graft failure (p=0.00012).

Conclusions: We have shown that RAI and mfi-5 scores can help stratify patients risks of postoperative complications. Further, these scores have different discriminatory ability on the specific type of complication. The scores may be helpful for preoperative identification and optimization of patients that are likely to have a complicated postoperative course.

References

1. Moya, A. N., Owodunni, O. P., Harrison, J. L., Shahriari, S. R., Shetty, A. K., Borah, G. L., Schmidt, M. H., & Bowers, C. A. (2023). Preoperative Frailty Risk in Cranioplasty Patients: Risk Analysis Index Predicts Adverse Outcomes. Plastic and reconstructive surgery. Global open, 11(6), e5059. https://doi.org/10.1097/GOX.0000000000005059

Outcomes and Complications of Minimally Invasive Lipoabdominoplasty (MILA) and SCOLA: A Case Series Review of 147 Patients

Abstract Presenter: Abdulaziz Alkhazi MD

Abstract Co-Author(s): Sarah Al-Youha MD Phd, Hmoud Saleh Alrashidi, Reem AlSaeedi

Purpose: Minimally invasive lipoabdominoplasty (MILA) combined with subcutaneous onlay laparoscopic-assisted plication (SCOLA) has been developed as an alternative to traditional abdominoplasty. This study evaluates patient outcomes, complication rates, and satisfaction following MILA and SCOLA.

Methods: A retrospective review was conducted on 147 patients who underwent MILA with SCOLA between September 2023 and February 2024. Patient data including demographics, operative details, intraoperative variables, and postoperative outcomes were analyzed. Follow-up evaluations were performed at 6 weeks, 3 months, and 6 months. A subgroup of patients who underwent additional liposuction and J-Plasma treatment was assessed for comparative analysis.

Results: The cohort consisted primarily of multiparous females with rectus diastasis. The mean operative time was 150 minutes. Postoperative complication rates were low, with seroma formation occurring in very few cases, predominantly in patients receiving adjunct liposuction and J-Plasma. No deep vein thrombosis, necrosis, or major wound dehiscence cases were observed. Most patients reported high satisfaction with aesthetic and functional outcomes. Patients with realistic expectations and appropriate surgical indications demonstrated the highest satisfaction rates.

Conclusions: MILA with SCOLA is a safe and effective approach for abdominal contouring, yielding high patient satisfaction with a low complication rate. While adjunctive procedures like liposuction and J-Plasma may enhance aesthetic outcomes, they are associated with increased surgical time and a higher incidence of seroma. Further studies with longer follow-ups are needed to optimize patient selection and refine the technique.

Outcomes and complications of monobloc versus LeFort III procedures for treating craniosynostosis: A literature review.

Abstract Presenter: Bassem Chamma

Abstract Co-Author(s): Kirollos Tadrousse, Sara Trumza, Mark Houdi, Sahil Kapur, Richard Simman MD, Suhas Nagappala

Introduction/Purpose: Craniosynostosis is a congenital disorder resulting in the early fusion of several bones in the skull, causing a deformity of the head and facial structures. While craniosynostosis is often idiopathic, it can also be a consequence of various types of genetic syndromes, commonly Crouzon syndrome, Apert syndrome, and Pfeiffer syndrome. Several of these patients present with complications of restricted brain growth and impediment of other organs, resulting in exorbitism, airway obstruction, and increased intracranial pressure. The two most commonly performed surgeries to treat craniosynostosis include the monobloc and LeFort III advancements. While the LeFort procedure exclusively brings the midface forward, the monobloc simultaneously advances the forehead and upper orbit. Due to the differing techniques between these two surgeries, there is a need to assess the variation in outcomes between them. This literature review compares functional and anatomical outcomes and complications between the monobloc and LeFort III procedures for treating craniosynostosis.

Methods: A PubMed search was conducted to identify retrospective reviews and case reports assessing the outcomes following monobloc and LeFort operations. Exclusion criteria included review articles and articles not discussing syndromic craniosynostosis. Data on anatomical changes, ophthalmic, airway, and neurological sequelae, and miscellaneous infectious or aesthetic complications were extracted from each study. The average facial advancement accomplished with each procedure was also calculated based on the number of patients each article assessed.

Results: A total of 34 articles published between 1998 and 2022 were included for analysis. 33 articles were found through the PubMed search, and an additional one was included via identification from the Discussion section of an original article. 130 patients who underwent the monobloc were reported on, while 39 patients who underwent the LeFort procedure were identified. The length of maxillary or midface advancement via distraction was similar between the monobloc (15.72 mm) and LeFort III (15.28 mm) ($p=0.58$). The postoperative improvement of sleep apnea was slightly higher in the monobloc procedure (83.3%) compared to LeFort (75%). The monobloc surgery also demonstrated higher incidences of correcting exorbitism (11/130 patients), with 2 patients experiencing a relapse of proptosis. CSF leakage (13/130 patients), seizures

(8/30 patients), and meningitis (8/130) were also prevalent in monobloc patients, but no studies reported such complications in LeFort patients.

Conclusion/Discussion: In conclusion, both the monobloc and LeFort III operations demonstrate similar efficacy in correcting anatomic and airway defects of craniosynostosis. However, the monobloc is particularly effective in improving overall facial aesthetics due to simultaneous forehead advancement. Moreover, this analysis identifies a considerable risk of neurological complications in the monobloc technique over the LeFort III operation, likely due to the involvement of bones closer to the brain. Limitations of this study include the relatively higher number of patients undergoing monobloc compared to LeFort, as well as variation in the reporting of certain outcomes, such as midface advancement, between articles. Further research should refine protocols for identifying patient populations best suited to undergo each technique.

Outcomes of a New Technique for Late Reinnervation of the Areola-Nipple Complex in Breast Reconstruction with Implants: A Case-Control Study

Abstract Presenter: Erika Barlandas MD

Abstract Co-Author(s): JAIME ARON GARCIA ESPINOZA, Jose Telich Tarriba MD, Mauricio Gutierrez Alvarez

Background: Breast reconstruction plays a crucial role in alleviating the psychological burden and enhancing the quality of life following breast cancer surgery (1). Despite these benefits, the loss of sensitivity after mastectomy is a well-documented issue, with many studies reporting suboptimal sensory outcomes as reported by patients. The return of sensation to the breast and nipple-areolar complex skin post-mastectomy is observed in only 0 to 47% of cases (2-4). These low rates of sensory recovery, coupled with patient dissatisfaction (5), have driven the development of various surgical techniques aimed at improving sensation after mastectomy (6). A novel technique for reinnervating the areola-nipple complex has been developed, which can be performed in a delayed surgical setting after mastectomy, without the need for additional incisions to harvest nerve autografts (12). The aim is to determine if the reinnervation technique improves skin and areola-nipple complex sensitivity postoperatively, compared to the group without neurotization

Methods: A prospective case series of patients who underwent delayed neurotization during the placement of the definitive breast implant was compared to a control group (without neurotization). The technique involved harvesting the 4th intercostal nerve and connecting it with a graft from the 5th intercostal nerve to the dermis of the areola. Sensory evaluation was performed by dividing the breast into five zones and assessing sensation using two-point discrimination tests at 3, 6, and 12 months postoperatively.

Results: Sensory outcomes showed significant improvement in treated breasts compared to the control group. At 12 months, breast skin sensitivity in the treatment group was 23.1±2.5 mm, versus 29±3.9 mm in the control group. Similarly, areola-nipple complex sensitivity improved in the treatment group to 18.1±2.5 mm, compared to 25.5±3.6 mm in the control group. However, the sample size remains small, and these results suggest a trend favoring neurotized breasts.

Conclusion: Delayed neurotization of the areola-nipple complex can restore tactile sensation in patients undergoing breast reconstruction with implants. Further studies with larger sample sizes are needed to achieve statistical significance and validate these findings.

1 Chang, T. N.-J., Lu, J. C.-Y., Sung, C. W.-H., Illias, A. M., Cheong, D. C.-F., Kao, S.-W., Kuo, W.-L., Pindur, L., Chen, L. W.-Y., Lin, J. A.-J., Chuang, D. C.-C., & Huang, J.-J. (2024). Elongation of intercostal nerve cutaneous branches for breast and nipple neurotization during breast reconstruction after mastectomy for breast cancer: Case–control study. British Journal of Surgery, 111(2), znae005.
2 Dossett, L. A., Lowe, J., Sun, W., et al. (2016). Prospective evaluation of skin and nipple-areola sensation and patient satisfaction after nipple-sparing mastectomy. Journal of Surgical Oncology, 114(1), 11–16.
3 Khan, A., Zhang, J., Sollazzo, V., et al. (2016). Sensory change of the reconstructed breast envelope after skin-sparing mastectomy. European Journal of Surgical Oncology, 42(7), 973–979.

Patient-Specific 3D Printed Custom Implants Versus Traditional Reconstruction Methods in Craniomaxillofacial Surgery – A Systematic Review

Abstract Presenter: Iyah Totounji

Abstract Co-Author: Nina Khamnei

Background: Three-dimensional (3D) printing has revolutionized craniomaxillofacial surgery through the development of patient-specific implants (PSIs), offering superior anatomical fit and improved clinical outcomes compared to traditional reconstruction methods. This review systematically evaluates the effectiveness of PSIs in terms of complication rates, patient satisfaction, mechanical properties, and implementation challenges.

Methods: A systematic search was conducted in PubMed, Scopus, Web of Science, and Cochrane Library (2010–present) for studies comparing PSIs to traditional craniomaxillofacial reconstruction. Inclusion criteria encompassed RCTs, cohort studies, and case series evaluating clinical outcomes, patient satisfaction, and implant durability. Study quality was assessed using the Cochrane Risk of Bias Tool and Newcastle-Ottawa Scale. A qualitative synthesis of findings was performed.

Results: A total of 45 studies met the inclusion criteria, encompassing over 1,200 patients. PSIs demonstrated significantly lower complication rates (5% vs 15%), reduced implant failure, and improved osseointegration compared to traditional implants (1). Patient satisfaction was consistently higher with PSIs (90% vs 70%), with improvements in both functional and aesthetic outcomes (2). 3D-printed titanium implants exhibited superior mechanical strength and fatigue resistance, while porous designs promoted vascularization and osseointegration (3). Operative time was reduced by an average of 30 minutes per procedure, and the need for revision surgeries decreased by 25% (4). However, challenges remain, including high initial costs, imaging precision requirements, and variability in printing quality (5). Cost analysis indicates that while PSIs require greater initial investment, they reduce long-term expenses by minimizing complications and revision procedures (5).

Conclusion: PSIs outperform traditional methods in craniomaxillofacial surgery in terms of clinical outcomes, patient satisfaction, and biomechanical properties. Addressing cost barriers, standardization challenges, and improvements in manufacturing protocols will be critical for broader clinical adoption. Future research should focus on reducing costs, improving regulatory frameworks, and exploring novel biocompatible materials to enhance the accessibility and efficacy of 3D-printed implants.

References

1. Onică D, Gălățan A, Muntianu LA, et al. Long-term clinical outcomes of 3D-printed subperiosteal titanium implants: a 6-year follow-up. J Pers Med. 2024;14(5). doi:10.3390/jpm14050541

2. Ebel F, Kübler A, Mühling J, et al. Clinical and patient-reported outcome after patient-specific 3D printer-assisted cranioplasty. Neurosurg Rev. 2023;46(1):98-110. doi:10.1007/s10143-023-02000-9
3. Jindal P, Singamneni S, Truong D, et al. 3D printed composite materials for craniofacial implants: current concepts, challenges, and future directions. Int J Adv Manuf Technol. 2020;110(1):31-45. doi:10.1007/s00170-020-06397-1
4. Park J, Kim Y, Heo S, et al. 3D-printed titanium implant with pre-mounted dental implants for mandible reconstruction: a case report. Maxillofac Plast Reconstr Surg. 2020;42(1):12. doi:10.1186/s40902-020-00272-5
5. Lor K, Ferneini EM, Salomon D, et al. Cost analysis for in-house versus industry-printed skull models for acute midfacial fractures. Plast Reconstr Surg Glob Open. 2020;8(3). doi:10.1097/GOX.0000000000002831

Pediatric Free Fillet of Leg Flap for External Hemipelvectomy Coverage: A Case Report and Systematic Review

Abstract Presenter: Joshua Khorsandi

Abstract Co-Author(s): Evan Childers MD, Matthew Kelecy MD

Background: Despite recent advancements in antineoplastic agents for soft tissue sarcomas, wide local resection remains the gold standard for definitive treatment (1). However, given the proclivity of sarcomas to be locally aggressive and rapidly destructive, coverage can present a challenge for reconstructive surgeons given the paucity of local tissue available after resection (2, 3). After systematic review, we present the youngest published use of a free fillet of leg flap for definitive coverage after hemipelvectomy. This technique eliminates the need for additional donor sites while providing well-vascularized coverage, reducing morbidity, and facilitating early rehabilitation.

Case Report: An 11-year-old male with recurrent inflammatory myofibroblastic tumor of the left thigh underwent external hemipelvectomy after failing systemic chemotherapy. Given the anticipated large defect, a free fillet of leg flap was planned. The entire soft tissue from the popliteal crease to 5 cm proximal to the ankle was harvested intraoperatively. The popliteal artery and vein were preserved for microvascular anastomosis and connected to the external iliac artery and common iliac vein. A 25×19 cm biologic mesh was used to reinforce the defect, with fenestrations for the spermatic

cord and flap pedicle. Postoperatively, venous congestion developed on Day 2 but was successfully managed with leech therapy and bowel decompression. The flap remained viable with no loss or infection. At three months, the patient demonstrated full wound healing, and by five months, he achieved prosthetic ambulation with early independent mobility. A systematic literature review identified 63 prior cases of fillet flaps for hemipelvectomy coverage, but none in pediatric patients of this age.

Discussion: The free fillet of leg flap provided durable, well-vascularized coverage without additional donor-site morbidity. Key technical considerations included minimizing ischemia time, optimizing anastomosis, and proactively managing venous congestion. This case underscores the feasibility of this approach in pediatric reconstruction and highlights critical perioperative management strategies to ensure flap survival and functional recovery. This case expands the application of free fillet of leg flaps to younger patients and reinforces its viability for complex oncologic defects. Future research should refine surgical execution, enhance perioperative protocols, and explore long-term quality of life outcomes in pediatric patients undergoing radical resections.

References:
1. Bibbo, C., Newman, A. S., Lackman, R. D., Levin, L. S., & Kovach, S. J. (2015). A simplified approach to reconstruction of hemipelvectomy defects with lower extremity free fillet flaps to minimize ischemia time. Journal of plastic, reconstructive & aesthetic surgery : JPRAS, 68(12), 1750–1754. https://doi.org/10.1016/j.bjps.2015.07.006
2. Boehmler, J. H., Francis, S. H., Grawe, R. K., & Mayerson, J. L. (2010). Reconstruction of an external hemipelvectomy defect with a two-stage fillet of leg-free flap. Journal of reconstructive microsurgery, 26(4), 271–276. https://doi.org/10.1055/s-0030-1248236
3. Sawyer, J., Van Boerum, M. S., Groundland, J., Lorimer, S., & Agarwal, J. (2020). Free tibia and fibula-fillet-of-leg flap for pelvic ring reconstruction: A case report. Microsurgery, 40(4), 492–496. https://doi.org/10.1002/micr.30559

Peripheral Nerve Surgery for Breast Surgery-Related Nerve Injuries: A Systematic Review and Meta-Analysis

Abstract Presenter: Alec Chen

Abstract Co-Author(s): John Nguyen DO, Isabel Snee, Mark Poisler, Jared Zhang, Rachana Suresh MD, Mohammed Shahid MD, Zachary Zamore, Ala Elhelali, Sami Tuffaha MD, A. Lee Dellon MD, Jeffrey Khong

Background: With rising rates of breast cancer, elective and reconstructive breast surgeries have become essential treatment options. However, these procedures carry the risk of inadvertent injuries, most commonly nerve transection or entrapment. Damage to chest wall nerves, including the intercostal, pectoral, long thoracic, thoracodorsal, and intercostobrachial nerves, may cause chronic neuropathic pain, potentially necessitating further treatment. This study aims to characterize post-operative peripheral nerve injuries associated with breast surgery and the outcomes of peripheral nerve surgery for chronic post-operative pain.

Methods: From 2003 to 2024, a systematic review was conducted using PubMed, Embase, Web of Science, and Scopus, followed by two rounds of independent author screening. The search strategy included terms related to nerve injury symptoms and breast procedures, combined with the Boolean operators AND and OR. The inclusion criteria consisted of patients experiencing peripheral nerve injuries after mastectomy, breast reconstruction, breast reduction, breast augmentation, or mastopexy. For each study, data were extracted on the number of patients, age, history of chemotherapy or radiotherapy, type of breast procedure, pain symptoms, treatment utilization rate, and treatment outcomes. Statistical analysis was performed using pooled statistics from all included studies.

Results: Out of 514 unique studies, 41 (n = 9282 patients) met the inclusion criteria. The average age of patients was 47.1 ± 14.8, ranging from 18 to 92. The most common procedure was breast augmentation with implants (n = 4940, 49.9%), followed by mastectomy (n = 2297, 23.2%), breast augmentation without implants (n = 1447, 14.6%), breast reconstruction (n = 776, 7.8%), breast reduction (n = 427, 4.3%), and mastopexy (n = 4, 0.04%). After these procedures, 2,339 patients (25.2%) experienced nerve-related symptoms. Among these patients, 105 (4.5%) underwent surgical intervention for pain, leading to complete resolution of pain (n = 9, 8.6%), reduction of pain (n = 54, 51.4%), or no change in pain (n = 7, 6.7%).

Conclusion: Peripheral nerve injury is a known post-operative risk following breast surgery; however, the results of this study show a low rate of peripheral nerve surgery being utilized for pain treatment (7.5%). This indicates that many patients who could benefit from surgery are left without options when non-surgical or conservative management approaches fail to resolve chronic post-operative pain. To tackle this

public health issue, standardized protocols and assessment tools are needed to determine whether patients are suitable candidates for surgical pain treatment.

PlasticsGPT: A Validation Study of Automated Systematic Review Screening with a Large Language Model (LLM) in Plastic & Reconstructive Surgery

Abstract Presenter: Nikhil Gangoli

Abstract Co-Author(s): Akash Kapoor, Myles Lavalley, Jarrod Bogue MD

Objectives: Research productivity in plastic and reconstructive surgery has grown exponentially in recent years (1). As such, systematic reviews are increasingly important in synthesizing evidence to guide clinical practice (2). However, reviews are time and resource-intensive, requiring a mean of five collaborators and 67.3 weeks (3). The use of Large Language Models (LLMs) to conduct high-volume text screening is a promising solution (4), though its applicability in plastic surgery remains uncharted. Here, we present an analysis of a custom LLM framework's performance in screening articles for plastic surgery systematic reviews.

Methods: We designed PlasticsGPT, a multi-step LLM framework for systematic literature screening (using GPT-4o). Performance was assessed by comparison to inclusion/exclusion decisions made by two human reviewers for a published study about plastic surgical involvement in orthopedic oncology which screened 778 articles (5). PlasticsGPT was first asked to review titles/abstracts and identify articles that required full-text screening. Then, full-text PDFs were provided. Final inclusion/exclusion decisions were compared to the human decisions from the original screen. A post hoc analysis was conducted for articles that were excluded during the abstract screen, where the model was given full texts directly and asked to make a decision.

Results: PlasticsGPT achieved 90.4% accuracy (95% CI: 88.3% - 92.5%) on the classification of 778 articles compared to human reviewers. Specificity was 91.4% (95% CI: 89.4% - 93.4%) and sensitivity was 65.4% (95% CI: 42.5% - 83.2%), with nine false negatives. The AUROC was 0.784 (95% CI: 0.679 – 0.889). When given full texts directly, accuracy improved to 91.3% (95% CI: 89.3% - 93.3%) and sensitivity improved to 92.3% (95% CI: 74.5% - 99.1%). The updated AUROC was 0.918 (95% CI: 0.845 - 0.991).

Screening of 778 abstracts took 50.3 minutes (3.9s/abstract) and decisions from 175 full texts took 12.3 minutes (4.2s/article). All results were output into a spreadsheet, including study name, model decision at abstract stage, model decision after full-text review, and final decision with model reasoning.

During post hoc analysis, we found that four of nine false negatives were unable to be processed as they were scanned documents from physical journals. The remaining five were excluded during abstract screening. When readable full texts were provided, seven of nine false negatives were appropriately included. The remaining two false negatives were attributed to decisions made by human reviewers that deviated from the explicit criteria available to the model.

Conclusions: PlasticsGPT dramatically streamlined systematic review screening. This framework could allow teams to rapidly screen full texts, for confirmation of sufficient evidence or even support and validation of human review. However, we also identified several limitations of using LLMs with current screening protocols, including an inability to process non-standard file types and decreased performance when reviewing abstracts, rather than full texts directly. Adjusting for these limitations, PlasticsGPT was highly accurate in screening, even on articles involving complex interdisciplinary populations. Notably, full-text review was incredibly resource efficient, taking just 0.3s/article longer than abstract screening. Future iterations of PlasticsGPT will assess validity in extracting field-specific data such as flap type and post-operative complications.

References:

1. Spake CSL, Zeyl VG, Crozier JW, Rao V, Kalliainen LK. An analysis of publication trajectory in plastic surgery across the decades. Journal of Plastic Reconstructive & Aesthetic Surgery. 2021;75(1):439-488. doi:https://doi.org/10.1016/j.bjps.2021.09.039

2. Natukunda A, Muchene LK. Unsupervised title and abstract screening for systematic review: a retrospective case-study using topic modelling methodology. Systematic Reviews. 2023;12(1). doi:https://doi.org/10.1186/s13643-022-02163-4

3. Borah R, Brown AW, Capers PL, Kaiser KA. Analysis of the time and workers needed to conduct systematic reviews of medical interventions using data from the PROSPERO registry. BMJ Open. 2017;7(2):e012545. doi:https://doi.org/10.1136/bmjopen-2016-012545

4. Delgado-Chaves FM, Jennings MJ, Atalaia A, et al. Transforming literature screening: The emerging role of large language models in systematic reviews. Proceedings of the National Academy of Sciences. 2025;122(2). doi:https://doi.org/10.1073/pnas.2411962122

5. LaValley MN, Dugue D, Diaddigo SE, Kuonqui KG, Tyler WK, Bogue JT. A Systematic Review of the Orthoplastic Approach in Adult Lower Extremity Soft Tissue Sarcoma Flap Reconstruction. JAAOS Global Research and Reviews. 2024;8(3). doi:https://doi.org/10.5435/jaaosglobal-d-23-00290

Post-Facial Filler Infections: A Systematic Review of Incidence, Microbial Causes, Risk Factors, and Long-Term Complications

Abstract Presenter: Manav Patel

Abstract Co-Author(s): Evan Pistone, Victoria Cuello, Jeffrey Smith MD

Introduction: The use of facial fillers has surged in aesthetic medicine, with over 3.4 million soft tissue filler procedures performed in 2020 alone (2020 Plastic Surgery Statistics Report). While soft tissue fillers are generally considered safe and minimally invasive, it is important to acknowledge the potential for complications such as infections. Recognizing how to prevent, recognize and manage infections due to fillers is essential for improving long term patient outcomes and satisfaction. This systematic review aims to assess the incidence rates, causative microorganisms, risk factors and long-term complications of infections following facial filler injections. The purpose of this study is to provide a consolidated overview of the existing data to guide clinical guidelines to reduce complications and enhance patient safety for soft filler injections.

Materials and Methods: A systematic review was conducted following PRISMA guidelines across Ovid Medline, Scopus, and CINAHL in February 2025. Articles published between January 2005 and February 2025 were screened for inclusion. Eligible studies reported infections following cosmetic facial filler injections, biofilm formation, or sterility concerns of partially used fillers. Exclusion criteria included non-infectious complications, non-human studies, and systematic reviews. Primary measures included infection rates, time to infection, filler type, length of infection, long-term complications, biofilm presence, and microbial strains identified. Secondary

measures included comorbidities and treatment strategies. Three independent reviewers screened 7,884 articles based on the inclusion and exclusion criteria.

Results: A total of 12 articles met inclusion criteria, documenting 18 cases of post-filler infections (mean age: 46 years, 100% female). The average time from the injections to diagnosis of the infection was 1202 days. Hyaluronic acid was the most commonly implicated filler (43%), followed by polyacrylamide (14%), autologous fat (14%), and calcium hydroxyapatite (10%). There was no significant difference between filler type and infection outcomes (p-value=0.51). Bacterial infections were predominant, with Mycobacterium and Staphylococcus species each identified in three cases. Of the 11 bacterial infections, most had favorable prognosis, though three were classified as intermediate. The fungal infections were associated with a significantly higher instance of poor or intermediate prognosis compared to bacterial infections (p-value=.019). Infections were often challenging to treat, with multiple recurrences requiring prolonged antibiotic therapy, incision and drainage, and, in some cases, surgical intervention.

Conclusion: Infections following facial filler injections, though rare, can be severe and difficult to manage, particularly those caused by atypical or fungal pathogens. Clinicians should maintain a high index of suspicion for delayed infections and implement early, targeted interventions to optimize patient outcomes. This review underscores the need for standardized prevention and management protocols to enhance safety in aesthetic medicine.

References:

1. 2020 Plastic Surgery Statistics Report. Plast Surg. Published online 2020.

Prediction of unknown breast implant volume using novel MRI software: A pilot study

Abstract Presenter: Scott Odorico MD

Background: Silicone implants are the most common method for oncologic breast reconstruction following mastectomy. Frequently, patients present to providers following reconstruction without knowledge of their implant volume, placed at an outside institution, and desire exchange. In these scenarios, there are currently no vehicles to estimate implant size in situ. In the present study, we utilize a novel MRI software to study its ability to predict breast implant volume.

Methods: This was a single center, retrospective cohort review pilot study of all patients with breast implants of known volume, who have undergone breast MRI in the last 2 years. We excluded all patients with unknown breast implant volumes. 3D analytical software TeraRecon was used to reconstruct MRI images to estimate implant volumes by manually drawing regions of interest around areas of signal consistent with the implant on each slice of imaging sequence. We performed OLS regression modeling to identify the correlation between the known volumes and MRI based volumes.

Results: 114 implants were analyzed during the specified time period in 63 patients. Our linear regression modeling identified a correlation coefficient of 0.93 (95% CI 0.89-0.96) when comparing known volume to software estimated volume. There were 20 cases of capsular contracture reported in this data set; the correlation coefficient was 0.91 (0.81-1.01) in this subgroup. There were 13 cases of implant rupture; the correlation coefficient was 0.95 (0.79-1.10) in this subgroup.

Conclusions: 3D reconstructed MRI volume estimates of breast implants represent a potentially reliable and feasible method for predicting sizes in patients with unknown volumes. Additionally, this trend seems to be independent of presence of capsular contracture or implant rupture. Larger, prospective studies clarifying these technologies limitations are needed to verify this software's possible utility.

Publication characteristics of successful integrated plastic surgery applicants from 2018 through 2023

Abstract Presenter: Madison Golla

Abstract Co-Author: Elizabeth Ferguson

Authors: M. Golla, E. Jensen, M. Dumke, A. Shino, J. Ballard, K. Phan, K. Gardner, A. Schraml, C. Cooper, D. Kennedy, J. Ashurst DO, EdD, MS, for the MIRAGE Research Group

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Background: Integrated plastic surgery residency continues to be a top competitive specialty for aspiring MD/DO seniors.1 There was a total of 207 residency spots with

332 applicants applying for integrated plastic surgery in the 2023 match, giving a match rate of 62%.2 One must achieve high accomplishments that distinguishes them from other applicants when applying into the integrated plastic surgery route. These factors include top USMLE scores, AOA membership, and quantity research experiences across all applicants.3 For first year integrated plastic surgery residents in 2022-2023, the average number of abstracts, presentations, and publications was 28.7.4 Given the elevated number of research experiences, the goal is to analyze successfully integrated plastic surgery residents based exclusively on their publication characteristics to perceive how it relates to the match rate.

Objective: To determine the publication characteristics and trends of successful integrated plastic surgery applicants from 2018 through 2023

Methods: A retrospective cohort of integrated plastic surgery applicants who matriculated between 2018 and 2023 were included in analysis. All demographic data was collected from each program's website and when a resident's data could not be found they were removed from analysis. Publication data including the manuscript's topic (plastic surgery or non-plastic surgery), type of manuscript (article or review), and author position (first, second, or other) from six months prior to matriculation into residency was obtained from SCOPUS. Data are reported as a median with interquartile range and was analyzed using either a Wilcoxon Rank test or an uncorrected Kruskal-Wallis test. All correlations were calculated using the Spearman's correlation.

Results: A total of 942 residents (504 female and 438 male) and 1,920 articles (1650 research and 270 review) were included in the final analysis. There was a statistical difference between the number of publications ($p<0.001$), plastic surgery publications ($p<0.001$), research manuscripts ($p<0.001$), and review articles ($p<0.001$) that a successful applicant had at the time of matriculation between the years studied. Similar trends were seen for male and female successful applicants. A statistically significant weak positive correlation was noted between year and the number of publications ($rs = 0.25$; $p<0.001$), plastic surgery publications ($rs=0.21$; $p<0.001$), research articles ($rs=0.23$; $p<0.001$), review articles ($rs=0.20$; $p<0.001$), first author publications, ($rs=0.19$; $p<0.001$), second author publications ($rs=0.15$, $p<0.001$) and last author publications ($rs=0.20$; $p<0.001$). Applicants who trained at a medical school ranked in the top 20 for NIH grant funding had higher number of publications than those who trained at a school that was outside of the top 20 in regard to NIH funding (2[3] vs 1[3]); $p<0.001$).

Conclusion: Over the year's studied, there has been a trend for an increase in the number of publications seen in successful applicants who matriculated into an integrated plastic surgery residency. This trend is not limited to just the total number of

publications but also includes the type of publication, topic of publication, and authorship position of the applicant.

References:
1. Keane, C. A., Akhter, M. F., Sarac, B. A., & Janis, J. E. (2022). Characteristics of successful integrated plastic surgery applicants from US allopathic medical schools without a home integrated program. Journal of Surgical Education, 79(2), 551–557. https://doi.org/10.1016/j.jsurg.2021.11.002
2. Results and Data: 2023 Main Residency Match. NRMP. (n.d.). https://www.nrmp.org/match-data/2023/06/results-and-data-2023-main-residency-match/
3. Schultz, K. P., Shih, L., Davis, M. J., Reece, E. M., Buchanan, E. P., Maricevich, R. S., & Winocour, S. (2020). Integrated Plastic Surgery Applicant Review: Important Factors and Selection Criteria. Plastic and reconstructive surgery. Global open, 8(7), e2892. https://doi.org/10.1097/GOX.0000000000002892
4. Table B1. experiences of first-year residents by specialty. AAMC. (n.d.-a). https://www.aamc.org/data-reports/students-residents/data/report-residents/2023/table-b1-experiences-first-year-residents-specialty

Recombinant Human Bone Morphogenetic Protein-2 (rhBMP-2) as an alternative to autologous bone graft in pediatric craniofacial reconstruction: A systematic review.

Abstract Presenter: Jesse Chou MD

Abstract Co-Author(s): Laiba Murad, Daniel Lee

Background: Pediatric craniofacial reconstruction often utilizes autologous bone grafts. rhBMP-2 use as an off-label alternative may decrease OR time and donor-site morbidity. This review assesses whether rhBMP-2 can serve as an appropriate alternative.

Methods: Literature search was conducted via Pubmed/Medline, Ovid, and Web of Science for publications between 01/2008 and 05/2023. Included were RCTs, prospective or retrospective case series, and case reports on pediatric craniofacial reconstruction with rhBMP-2 grafting.

Results: 211 articles were screened. 6 RCTs, 2 longitudinal prospective studies, 10 retrospective comparative studies, and 3 case reports were included. 18 studies in all utilized rhBMP-2 for alveolar cleft repair. Iliac crest bone grafts (ICBG) served as controls. rhBMP-2 grafting and ICBG were compared based on osteogenic efficacy, complications, operative time, hospitalization time, and cost. 12 studies compared osteogenesis: 4 favored rhBMP-2, 1 favored ICBG, and 7 showed no difference. 11 studies evaluated complication rates: 5 favored rhBMP-2, 2 favored ICBG, and 4 showed no difference. rhBMP-2 was frequently associated with facial edema, and ICBG was frequently associated with donor-site morbidity. 5 studies compared OR time, all favoring rhBMP-2. 8 studies compared hospitalization time: 7 favored rhBMP-2 and 1 showed no difference. 4 studies compared cost burden: 2 favored rhBMP-2, 1 favored ICBG, and 1 reported no difference.

Discussion: rhBMP-2 is an appropriate alternative to ICBG in pediatric alveolar cleft repair in terms of osteogenesis, complications, resource and cost burden. However, its use in other craniofacial reconstruction, such as calvarial or mandibular repair, warrants further study.

Reevaluating BMI as a Barrier to Gender-Affirming Mastectomy: A Retrospective Analysis of Transmasculine Patients

Abstract Presenter: Elad Fraiman

Abstract Co-Author(s): R'ay Fodor, Kyle Barclay, Vikas Kotha MD, Raymond Isakov MD

Purpose: Transmasculine patients with high BMI seeking gender-affirming mastectomy (GAM) are often excluded from surgery due to fear of elevated risk for complications. The current literature is often underpowered, lacks sufficient patients with a BMI >45, and does not compare outcomes by breast resection mass. We aim to address the paucity of data by comparing GAM outcomes across BMI and resection mass ranges.

Methods: A retrospective review of GAM cases between 2014 and 2025 was conducted. Patients were categorized according to BMI (<19.9, 20–24.9, 25–29.9, 30–34.9, 35–39.9, 40-44.9, 45-49.9, and >50) and total bilateral breast resection mass (<999 g, 1000-19999 g, 2,000-2999 g, 3000-3999 g, 4000-4999 g, and >5000 g). Chi-square and logistic fit were used to analyze the impact of BMI, resected breast mass, and comorbid conditions on complication rates.

Results: The sample included 521 patients undergoing GAM. The mean age of participants was 26.5 ± 7.5 and mean follow up time was 117.5 ± 218.2 days. Seventeen patients (3.2%) had a BMI of <19.9, 112 (21.5%) between 20-24.9, 138 (26.5%) between 25-29.9, 121 (23.2%) between 30-34.9, 65 (12.5%) between 35-39.9, 45 (8.6%) between 40-44.9, 14 (2.7%) between 45-49.9, and 9 (1.7%) > 50. The average BMI was 30.8 ± 7.4. Two-hundred twelve (40.6%) patients had a total resection mass of <1000 g, 164 (31.5%) between 1000-1999 g, 106 (20.3%) between 2000-2999 g, 28 (5.4%) between 3000-3999 g, 10 (1.9%) between 4000-4999 g, and 1 (0.19%) >5000g. The mean resection mass was 1439.0 ± 998.9. Twenty patients (3.8%) had diabetes and four (0.76%) had a diagnosed hypercoagulable condition. Forty-two (8.06%) of patients had a seroma, 36 (6.91%) had a hematoma, 24 (4.61%) had hypertrophic scarring, 15 (2.88%) had delayed wound healing, 15 (2.88%) had an infection, 14 (2.69%) had a dog ear, 9 (1.73%) had nipple necrosis, and 4 (0.77%) had dehiscence. There were no significant associations between BMI and breast resection mass for any complications (all comparisons $p > 0.05$). Patients with diabetes had significantly increased rates of infection ($p < 0.0001$), dehiscence ($p = 0.03$), and dog ear ($p = 0.0005$); patients with documented hypercoagulable states had a significantly increased rate of developing nipple graft necrosis ($p = 0.00003$).

Conclusion: This large retrospective study of chest masculinization stratifies outcomes by BMI, breast resection mass, and comorbidities. It demonstrates that neither BMI nor breast resection mass are significant factors driving complication rates. These data challenge the conventional belief that GAM in patients with a high BMI is unsafe.

Salvaging Function in a Completely Degloved and Mangled Transmetacarpal Hand Amputation via Multi-staged Reconstruction and Partial Hand Myoprosthesis: a case report

Abstract Presenter: Connor Gantt

Abstract Co-Author(s): Brandon Zakeri, Sunishka Wimalawansa

Introduction: Management of the mangled degloved hand is unique to each case, and difficult to standardize with no consensus on optimal treatment strategies. Key considerations include the surgeon's microsurgical expertise and patient factors including age, health, and life goals. Salvage efforts should prioritize stability,

revascularization, and infection prevention (1,2). Judiciously amputating unsalvageable digits can improve outcomes (3). Following the initial salvage efforts, a multistage reconstructive approach can significantly improve a patient's future as opposed to primary amputation.

Case Presentation: A 28-year-old left-hand dominant male presented with a crush-avulsion injury to the left hand after it was caught in a bubble wrap machine resulting in a severely mangled and degloved hand. Initial evaluation demonstrated multiple devitalized partial amputations on the volar and dorsal sides of the hand with distally based avulsed skin flaps showing obvious ischemia. Multiple open, comminuted fractures with apparent bone loss in all 5 digits were grossly apparent and confirmed via plain radiographs. The fingertips were ischemic and exposed bone fragments were devoid of soft tissue. Muscle and soft tissue proximal to the transverse palmar crease remained well perfused and the palmar arch had strong doppler signals. Stage 1 was centered upon exploration, debridement, and stabilization. Continued debridement and amputation revision was executed in Stages 2 and 3. A sensate anterolateral thigh free flap was transferred to the hand, accompanied by targeted muscle reinnervation in Stage 4, followed by donor site revision and skin grafting in Stage 5. Stages 6-10 included flap debulking, recontouring, and first webspace deepening. These stages were supplemented by a metacarpal ray amputation, contracture releases, tenolysis, and Guyon's Canal release. A myoelectric partial hand prosthesis was customized to his hand. Hand therapy began 2 days post-trauma and continued for 2 years and 10 months. He gained significant improvements in passive/active ROM, strength, functional capabilities. At 4.5 years post injury, he is creating artwork, playing guitar, and has returned to work as a wiring technician without difficulties positively impacting his mental health and quality of life. He is extremely satisfied with the overall cosmetic appearance and function, and is glad to have partially preserved his hand, wrist, and thumb.

Conclusion: The present case report describes the presentation of a severely mangled and degloved hand injury and details the strategies utilized in multistage reconstructive salvage. This case report exemplifies the importance of proper planning and intraoperative preparation in the early stages of reconstruction. Furthermore, it details the favorable outcomes that can be achieved follow such a devastating injury.

References:

1. Lo S, Lin YT, Lin CH, Wei FC. A new classification to aid the selection of revascularization techniques in major degloving injuries of the upper limb. Injury. 2013;44(3):331-335. doi:10.1016/j.injury.2013.01.025
2. Anderson SR, Vincent JA, Wimalawansa SM. Multi-staged management of a mangled, exploded hand crush injury with long-term outcome: the critical link between

surgery and therapy. BMJ Case Rep. 2022;15(5):e248429. Published 2022 May 20. doi:10.1136/bcr-2021-248429
3. Tosti R, Eberlin KR. "Damage Control" Hand Surgery: Evaluation and Emergency Management of the Mangled Hand. Hand Clin. 2018;34(1):17-26. doi:10.1016/j.hcl.2017.09.002

Should Premature Anterior Fontanelle Closure be used as a Criteria for a Craniosynostosis Diagnosis in Patients Younger than One Year Old?

Abstract Presenter: Stephanie Greenfield

Abstract Co-Author(s): Chaimae Oualid, Eric Stelnicki, George Kamel, Diana Ghisa

Background and purpose: Craniosynostosis is a condition in which the cranial sutures of an infant's skull fuse prematurely, potentially leading to cranial and facial deformities, developmental delays, increased intracranial pressure, and neurological complications. The anterior fontanelle, a soft spot on the anterior aspect of an infant's skull where the frontal and parietal bones come together, typically closes between 13 and 24 months of age. This allows the skull to expand as the brain grows greatly in the first year of a child's life. Pediatricians often refer patients for further evaluation when early anterior fontanelle closure is observed before one year of age to rule out craniosynostosis. However, the validity of this association remains unclear. Given the potential consequences of both misdiagnosis and unnecessary referrals, this study aims to determine whether premature anterior fontanelle closure is a reliable indicator of craniosynostosis in infants under one year of age.

Method/description: We conducted a single-center retrospective study, analyzing high-resolution three-dimensional reconstruction computed tomography (CT) of patients diagnosed with non-syndromic craniosynostosis between January 2019 and March 2024. Preoperative CT scans were reviewed to assess the status of the anterior fontanelle, identifying whether it was open or closed. Data was extracted for patients who underwent CT prior to one year old and prior to surgery. Exclusion criteria included patients with syndromic craniosynostosis, due to its potential as a confounding variable for early fontanelle closure, and CT scans conducted after one year of age, as this is the typical age for anterior fontanelle closure.

Results: We examined CT scans of 80 patients with non-syndromic craniosynostosis, including 36 females and 44 males. Among these, 79 patients had an open anterior fontanelle on their preoperative CT scan before one year of age.

Conclusions: Our findings indicate that premature anterior fontanelle closure is not a reliable diagnostic marker for craniosynostosis. If early closure had been used as a primary referral criterion, only one out of 80 patients in this study would have been identified for further evaluation, while the majority of affected infants would have been missed. These results suggest that premature closure of the anterior fontanelle may not be an indicator of craniosynostosis. Moreover, reliance on an open anterior fontanelle as a sign of normal skull development may lead to missed diagnoses, delaying necessary treatment and increasing the risk of complications.
Further studies are needed to establish more accurate early screening criteria for craniosynostosis.

Main purpose: Each learner will understand how these findings can inform referral to specialists for suspected craniosynostosis. Each learner will recognize the factors that indicate concern for craniosynostosis and understand that premature closure of the anterior fontanelle may not be a significant indicator for suspicion or diagnosis of craniosynostosis.

Simultaneous microsurgery during bilateral autologous breast reconstruction reduces ischemia time without increasing complications

Abstract Presenter: Jacquelyn Roth

Abstract Co-Author(s): Maxwell Godek, Jamie Frost, Peter Shamamian Jr, BS, Bernice Yu MD, Ethan Fung, Jordan Jacobs M.D., Hani Sbitany MD, Peter Henderson MD, MBA, FACS, Rebecca Suydam MD

Background: In bilateral deep inferior epigastric perforator (DIEP) flap reconstruction procedures, the microsurgical anastomoses are usually performed consecutively, where one side is completed before the other side is started. However, when a co-surgeon model and loupe magnification are used, it is possible to perform both sides simultaneously. While simultaneous microsurgery is expected to reduce total ischemia time for both flaps, this has not yet been studied. In addition, its impact on postoperative complications has not been studied either. Therefore, the objective of this study is to

compare simultaneous and consecutive microsurgery in bilateral DIEP flap reconstruction, focusing on their effects on ischemia time and postoperative outcomes.

Methods: A retrospective chart review was conducted on patients who had undergone bilateral DIEP flap breast reconstruction between 2017 and 2023. Patients with documented bilateral ischemia start times and stop times were included in the analysis. Patient's missing bilateral data or precise ischemia times were excluded. Ischemia time was used to categorize the timing of microsurgical anastomosis, with an overlap of 10 or more minutes between sides classified as "simultaneous microsurgery", and an overlap of less than 10 minutes (or no overlap) classified as "consecutive microsurgery". Data was collected on patient demographics, total ischemia time (defined as the time when one or both sides of the abdomen were undergoing microsurgical anastomoses), total operating time, postoperative complications, 90-day postoperative events, hospital length of stay (LOS), and millimeter morphine equivalents (MME) required for pain management. Regression analyses assessed the impact of simultaneous microsurgery versus consecutive microsurgery on key outcomes. Statistical significance was set at $p < 0.05$.

Results: Seventy-four patients met inclusion criteria for this study. Thirty-one (42%) had undergone simultaneous microsurgery, and 43 (58%) had undergone consecutive microsurgery. There were no significant differences between the two groups in age, body mass index, race, ethnicity, or baseline comorbidities. Univariate regression analysis revealed a statistically significant reduction in total ischemia time associated with simultaneous microsurgery (111 minutes vs. 147 minutes; $p<0.001$), and no differences in operating time ($P=0.508$), hospital LOS ($P=0.098$), or total MME ($P=0.236$). These findings were unchanged on multivariate regression, adjusting for age, BMI, comorbidities, and total flap weight, showing simultaneous microsurgery significantly reduced ischemia time ($P<0.001$) without affecting other outcomes ($P>0.05$).

Discussion: This study demonstrates that simultaneous microsurgery significantly reduces ischemia time compared to consecutive

microsurgery. Additionally, the lack of differences in postoperative complications, 90-day unplanned reoperations, and
readmissions suggests that expanding the operative field for simultaneous microsurgery does not negatively impact
outcomes. These findings align with prior studies showing that co-surgeon models enhance surgical efficiency without
compromising patient safety. Furthermore, while outcomes were comparable, prolonged ischemia has been associated with
increased flap-related complications and ischemic injury in existing literature. As such, future prospective studies with larger
cohorts should seek to validate these ischemia time reductions and assess their impact on long-term patient-reported
outcomes, including satisfaction, flap aesthetics, and functional recovery.

Conclusion: Simultaneous microsurgery in bilateral DIEP flap reconstruction significantly reduces total ischemia time without increasing
postoperative complications, LOS, or pain management needs.

Superficial Inferior Epigastric Fascia Flap in Mice to Study Peripheral Nerve Regeneration

Abstract Presenter: Tina Tian

Abstract Co-Author(s): Paul Ghareeb MD, Kevin Patel, David Kim, Patricia Ward

Introduction: Angiogenesis is important for axon regeneration after peripheral nerve injury (PNI). The pedicled superficial inferior epigastric fascia (SIEF) flap has been shown to promote vascularization and regeneration in rat sciatic nerve grafts. Mouse models offer a broader range of genetic manipulations that are not possible in rat models; therefore, we sought to translate this technique to a mouse sciatic nerve transection and repair model.

Methods: 3 wild type mice received bilateral sciatic nerve transections with immediate repairs. SIEF flaps were dissected bilaterally: One nerve was wrapped by its ipsilateral flap while the other served as a control. On postoperative day 23-24, the medial head of the gastrocnemius (GA) was injected with fluorescent retrograde tracer bilaterally. Four days later, maximum compound muscle action potentials were measured from the

lateral GA alongside the force exerted by and the mass of the triceps surae. Retrogradely-traced neurons in the spinal cord, L4 dorsal root ganglia, and lumbar sympathetic ganglia were counted. Sciatic nerves were evaluated for vascularization and macrophage infiltration.

Results: Wrapping the sciatic nerve transection site with the SIEF flap did not improve functional outcomes of nerve regeneration and did not increase vascularization nor macrophage infiltration.

Conclusion: Due to the size of the mouse, wrapping the sciatic nerve with the SIEF may have contributed to tension on the repair site. Therefore, the mouse sciatic nerve injury model may not be appropriate for SIEF PNI studies. More work should be done to understand the role of vascularized flaps in PNI-related angiogenesis.

Surgical Treatment of Breast Implant Associated Complications in United States Ambulatory Surgery Centers, 2019-2022

Abstract Presenter: Sean Garin

Abstract Co-Author(s): Ashley Tyburski, Nickolay Markov, Justin Fox MD

Background: Complications associated with breast implantation have gained the public's attention, leading to some patients requesting implant removal (1). We conducted this study to describe the nature of breast implant complications treated in U.S. ambulatory surgery centers and identify factors associated with implant removal without replacement.

Methods: Using the 2019–2022 Nationwide Ambulatory Surgery Sample (2), we identified discharges for women aged ≥18 years with a diagnosis related to breast implant complications. Next, we excluded discharges for tissue expander placement or removal and where concurrent mastectomy was performed. Then, patients were grouped as reconstructive or cosmetic based on a history of breast cancer. The primary outcomes were the type of surgery performed. Multivariable logistic regression was used to identify factors associated with implant removal without replacement.

Results: The final sample included 74,756 discharges with over 18,000 ambulatory surgery center discharges per year for breast implant complications. The most common

breast implant complications were contracture alone (45.1%) followed by multiple diagnoses (32.1%), rupture (13.7%), and displacement (9.1%). The most common procedures to address the complications were directed at the implant (66.4%), breast capsule (52.6%), and/or breast tissue (18.4%). Overall, 7,505 (10.0%) discharges were for implant removal without replacement. Factors associated with not having an implant replaced included increasing age in years (Odds Ratio=1.01 [95% Confidence Interval=1.01-1.01]), and a history of diabetes (OR=1.23 [1.12-1.36]), obesity (OR=1.37 [1.25-1.50]), or smoking (OR=1.19 [95% Confidence Interval=1.13-1.26]). Additionally, compared to a complication of implant displacement alone, those with implant rupture (OR=2.53 [2.25-2.85]) and multiple complications (OR=2.22 [1.98-2.48]) were more likely to not have an implant replaced.

Conclusions: These findings provide context and support physician-patient discussion regarding the management of breast implant complications. Further research should explore the removal of breast implants in patients without concurrent diagnoses of complications.

References

1. Lieffering AS, Hommes JE, Ramerman L, et al. Prevalence of Local Postoperative Complications and Breast Implant Illness in Women With Breast Implants. JAMA Netw Open. 2022;5(10):e2236519. doi:10.1001/jamanetworkopen.2022.36519
2. HCUP Nationwide Ambulatory Surgery Sample (NASS). Healthcare Cost and Utilization Project (HCUP). Agency for Healthcare Research and Quality. 2019, 2020, 2021, and 2022. Accessed January 27, 2024. https://hcup-us.ahrq.gov/nassoverview.jsp

The Effect of Surgeon and Anesthesiologist-Performed Pectoral Nerve Blocks on Postoperative Pain Management in Gender-Affirming Chest Masculinization Surgery

Abstract Presenter: Andrew Minchow

Abstract Co-Author(s): Anna White, Jainaha Srikumar, Makayla Schissel, Rafael Arsky Lombardi, Perry Johnson, Sean Figy MD

Background: Major breast and chest surgeries are associated with significant postoperative pain. Although opioids significantly reduce pain after breast and chest procedures, physician-prescribed narcotics have markedly contributed to the opioid

epidemic in the United States. Preoperative and intraoperative nerve blocks have been found to significantly decrease pain scores in oncologic, cosmetic, and reconstructive breast surgeries. However, the efficacy of regional anesthesia on postoperative pain in the setting of chest masculinization surgery is not well defined. This retrospective study examined patient-reported pain scores and opioid requirements following gender-affirming chest masculinization in individuals who received a preoperative pectoral nerve block, intraoperative block, or no block.

Methods: All 292 adult patients who underwent gender-affirming chest masculinization performed by two plastic and reconstructive surgeons between January 2017 and June 2023 were screened for inclusion. Of the 275 patients included in the data analysis, 21 received an anesthesiologist-performed preoperative pectoral II (PECS II) nerve block, 39 received a surgeon-performed intraoperative pectoral I (PECS I) nerve block, and 215 did not receive a nerve block. Intravenous (IV) milligram morphine equivalents (MME) of all opioid medications given in the postanesthesia care unit (PACU) and the number of opioid prescriptions in 90 postoperative days were recorded. Patient-reported numeric rating scale (NRS) pain scores were recorded upon arrival to the PACU and each 15-minute interval thereafter.

Results: The mean PACU IV MME required by the preoperative PECS II (1.9) and intraoperative PECS I (2.0) block groups was significantly less than the no-block group (4.8; $p<0.01$). The mean maximum NRS pain score at 15 and 30 minutes following arrival to the PACU was significantly lower in the preoperative PECS II (3.0) and intraoperative PECS I (3.5) groups than the no-block group (4.6; $p=0.02$). The mean maximum NRS pain score at 45 and 60 minutes was not significantly different between the anesthetic modality groups ($p=0.45$). Analysis of pain scores at additional time points was not possible due to the number of patients who were discharged from the PACU. The number of opioid prescriptions required following discharge did not significantly differ between the anesthetic modality groups ($p=0.19$).

Conclusion: The implementation of preoperative PECS II and intraoperative PECS I blocks in the setting of gender-affirming chest masculinization resulted in significantly lower NRS pain scores early after PACU arrival (15 and 30 minutes) and significantly lower opioid analgesic requirements while in the PACU than standard IV analgesia.

The Evolving Landscape of Patient Education: A Comparative Analysis of Large Language Models and TikTok in Delivering Information on Breast Reconstruction

Abstract Presenter: Daniel Soroudi

Abstract Co-Author(s): Daniel Rouhani, Michelle Benedict MD, Matthew Mclaughlin, Merisa Piper MD

Background: Breast reconstruction after mastectomy is a complex decision requiring accurate patient education. As digital health resources like TikTok and large language models (LLMs) grow in popularity, concerns persist about their reliability.

Methods: A retrospective, cross-sectional analysis evaluated TikTok videos and LLM responses on oncologic breast reconstruction. TikTok videos were identified using search terms from plasticsurgery.org and Google Trends. Engagement metrics were recorded, and content quality was assessed using DISCERN, a validated tool for reliability and quality. ChatGPT-4o and Google Gemini responses to three standardized questions were also evaluated using DISCERN.

Results: Among 570 TikTok videos identified, 66 met inclusion criteria, with 12 (18.2%) created by healthcare professionals (HCPs) and 54 (81.8%) created by patients. Patient-generated videos had significantly higher engagement but lower DISCERN scores (1.49 ± 0.34) than HCP videos (1.87 ± 0.36, $p = 0.004$). Across all TikTok videos, the mean DISCERN score was 1.57 ± 0.35, indicating low content quality. ChatGPT-4o (3.00 ± 0.58) and Google Gemini (2.67 ± 0.58) significantly outperformed TikTok ($p = 0.002$, $p = 0.005$). HCP-created TikTok videos had higher DISCERN scores than patient videos on TikTok but remained inferior to LLMs ($p = 0.005$, $p = 0.019$).

Conclusion: LLMs provided more accurate breast reconstruction information than TikTok, where patient-generated content had greater engagement but lower quality than HCP-created videos.

The Five-Item Modified Frailty Index (mFI-5) Predicts Adverse Short-term Outcomes in Patients Undergoing Mastectomy: A Propensity Score-matched Analysis of 252,054 Cases

Abstract Presenter: Felix Klimitz MD

Abstract Co-Author(s): Fortunay Diatta MD, Stav Brown MD, Samuel Knoedler, Bohdan Pomahac MD, Martin Kauke-Navarro MD

Background: Frailty has emerged as a crucial predictor of postoperative outcomes, particularly in surgical patients. However, its role in mastectomy patients remains underexplored. The 5-item Modified Frailty Index (mFI-5) has been increasingly used to assess frailty in surgical populations. This study evaluates whether the mFI-5 predicts 30-day postoperative complications in mastectomy patients, aiming to enhance preoperative risk stratification and inform clinical decision-making.

Methods: A retrospective cohort study was conducted using data from the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) between 2008 and 2022. Female patients undergoing mastectomy were categorized into high-risk (mFI-5 ≥2) and low-risk (mFI-5 <2) groups. Propensity score matching (PSM) was applied to create comparable cohorts. Multivariate logistic regression was used to evaluate associations between frailty and postoperative outcomes, including overall complications, surgical site infections, unplanned readmissions, and reoperations.

Results: Among 252,054 mastectomy patients, 1.2% were classified as high-risk frail. These patients were older (70±9.9 vs. 60±14 years, $p<0.001$) and had a higher BMI (35±9.1 vs. 29±7.1 kg/m², $p<0.001$). After PSM, high-risk frail patients demonstrated significantly increased odds of: Any complication (OR: 2.05, 95% CI: 1.70–2.47, $p<0.001$), Surgical complications (OR: 1.70, 95% CI: 1.38–2.10, $p<0.001$), and Medical complications (OR: 3.81, 95% CI: 2.64–5.50, $p<0.001$). Key complications included wound infections, bleeding requiring transfusion, and sepsis. Additionally, high-risk patients had significantly higher odds of unplanned readmissions (OR: 3.29, $p<0.001$) and reoperations (OR: 1.59, $p=0.006$).

Conclusion: The mFI-5 is a robust predictor of postoperative complications in mastectomy patients, reinforcing its role in preoperative risk stratification. Integrating frailty assessment into routine clinical practice can guide surgical decision-making, optimize resource allocation, and improve patient outcomes. Future studies should explore long-term complications and interventions to mitigate frailty-associated risks.

The Prognostic Impact of Medial Arterial Calcification in Primary Atraumatic Below-Knee Amputation: A Large Retrospective Cohort Study

Abstract Presenter: Ryan Lin MD

Abstract Co-Author(s): Rachel Rohrich, Sami Ferdousian, Amy Zhou, Sami Alahmadi, Cameron Akbari, Karen Evans MD, Christopher Attinger MD

Background: Medial arterial Calcification (MAC) is a known marker of advanced vascular pathology and is frequently observed in patients with diabetes, end-stage renal disease (ESRD), and peripheral arterial disease (PAD). Previous studies have linked MAC to poor limb salvage rates and increased risk major adverse limb events. However, the effect of MAC among a large group of patients who undergo primary below-knee amputation (BKA) for non-healing chronic wounds is not well characterized. It remains unclear whether the presence of MAC in this population correlates with higher rates of complications, re-amputation, or mortality following BKA. Thus, the present study investigates the impact of MAC on outcomes in patients undergoing BKA.

Methods: A retrospective cohort study was conducted on patients who underwent primary BKA at a tertiary care wound center between September 2017 and January 2022. Pedal radiographs were reviewed by two separate reviewers and assigned scores according to the validated Ferrassi et al. MAC grading scale. Patients were subsequently stratified for analysis (absent MAC [0] and any MAC [1-5]).

Results: A total of 259 BKA patients were analyzed: 152 (58.7%) without MAC and 107 (41.3%) with MAC. Patients with MAC had significantly higher rates of diabetes, ESRD, and PAD ($p<0.001$). All patients were ambulatory at baseline, although patients with MAC had lower rates of ambulatory without assistance (13.1% vs. 26.3%) and higher rates of ambulatory with assistance (86.9% vs. 73.7%) compared to patients without MAC ($p=0.01$). Postoperative ambulation rates were similar between MAC and without MAC groups (59.6% vs. 64.5%, $p=0.432$). Dehiscence rates were higher in patients with MAC compared to without MAC (18.7% vs. 8.6%, $p=0.016$). Rates of seroma, hematoma, delayed healing, infection were similar between groups ($p>0.08$). Rates of conversion from BKA to above knee amputation were similar between patients with MAC and without MAC (0.9% vs. 0.7%, $p=0.657$). 2-year mortality was significantly higher in patients with MAC compared to without (19.6% vs. 10.5%, $p = 0.039$). Overall mortality rates between patients with MAC and without MAC trended toward significant difference (25.2% vs. 16.5%, $p<0.08$). Multivariate regression identified Charlson Comorbidity Index as an independent predictor of mortality ($p<0.001$) but not MAC ($p<0.2$).

Conclusion: In patients treated with primary BKA, the presence of MAC was associated with greater rates of dehiscence but similar rates of other complications. Although overall mortality rates were not significantly different, 2-year mortality rates were significantly higher in patients with MAC. Patients with MAC may benefit from preoperative optimization by a multidisciplinary team to prevent and mitigate adverse postoperative complications.

The Publishing Paywall: How Plastic Surgery Researchers Struggle to Afford Recognition

Abstract Presenter: Alexander Chang

Abstract Co-Author(s): Alex Stratton-Moore, Natalia Mejia MD, Sameer Patel MD

Introduction: Publishing in high-impact journals offers significant advantages, including greater name recognition and an increased likelihood of citation in future studies (1). For medical students aspiring to enter an integrated plastic surgery residency, these factors can play a crucial role in strengthening their applications (2). However, the cost of publishing-particularly in high-impact journals-varies widely and can be prohibitively expensive, creating financial barriers for students seeking to contribute to and gain recognition in the field (3). This study aims to assess whether a journal's impact factor influences the cost of article processing charges (APCs). By examining this relationship, we seek to quantify the financial burden associated with high-impact publishing and explore its implications for accessibility in academic research.

Methods: A comprehensive search for plastic surgery journals was conducted using PubMed (NLM), Embase (Elsevier), Cochrane Central (Wiley), Web of Science Core Collection (Clarivate), ScienceDirect (Elsevier), and CINAHL (EBSCOhost). Journal titles were deduplicated, and the Journal Citation Reports (JCR) database was used to obtain impact factors and other publication metrics. Fundamental descriptive statistics, including mean, median, and standard deviation, were calculated. Pearson's correlation analysis and linear regression were performed to assess relationships between citation metrics.

Results: The search identified 25 journal publishers, with an average article processing charge (APC) of $2,428, an average impact factor of 1.35, 33 years of activity, and 33%

open-access articles. A significant positive correlation was found between APC and impact factor ($r = 0.459$, $p = 0.021$), indicating that higher-impact journals tend to have higher publication costs. Linear regression showed that impact factor explained 22.1% of APC variation ($R^2 = 0.221$). No significant correlation was found between years active and APC.

Conclusion: This study highlights a statistically significant trend: publishing in high-impact journals comes at a premium, further intensifying the financial barriers medical students face in disseminating their research. The correlation between impact factor and APCs underscores how prestigious journals demand substantially higher fees than their lower-impact counterparts, limiting accessibility for aspiring researchers. These financial challenges are especially pronounced for students at institutions without a home plastic surgery residency, where research opportunities and funding often rely on personal resources (4). With an average of 34.7 publications among students who successfully matched into an integrated plastic surgery residency, the expectations for research productivity are undeniably high (5). Addressing this disparity is crucial-not only for medical students but also for faculty at smaller institutions or those without an integrated residency program, who may ultimately bear the financial burden.

1. Saha S, Saint S, Christakis DA. Impact factor: a valid measure of journal quality? Journal of the Medical Library Association. 2003;91(1):42-46.
2. Maggio LA, Sewell JL, Artino AR. The Literature Review: A Foundation for High-Quality Medical Education Research. J Grad Med Educ. 2016;8(3):297-303. doi:10.4300/JGME-D-16-00175.1
3. Yesantharao PS, Long C, Sacks JM, Lee GK, Nazerali RS. The Price of Publishing: An Investigation of the Open Access Landscape in Plastic Surgery. Plastic & Reconstructive Surgery. 2022;149(5):1249-1260. doi:10.1097/PRS.0000000000009016
4. Schultz KP, Shih L, Davis MJ, et al. Integrated Plastic Surgery Applicant Review: Important Factors and Selection Criteria. Plast Reconstr Surg Glob Open. 2020;8(7):e2892. doi:10.1097/GOX.0000000000002892
5. National Resident Matching Program. Charting Outcomes: Characteristics of US MD Seniors Who Matched to Their Preferred Specialty: 2024 Main Residency Match. https://www.nrmp.org/match-data/2024/08/charting-outcomes-characteristics-of-u-s-md-seniors-who-matched-to-their-preferred-specialty-2024-main-residency-match/. Published August 20, 2024. Accessed February 27, 2025.

The Studded Neck: Complication of Improper CaHa Filler Placement

Abstract Presenter: Maxim Narduzzi

Abstract Co-Author: Jason Cohn

Introduction: Calcium hydroxyapatite (CaHA) fillers, such as Radiesse©, are increasingly used off-label for skin rejuvenation. Its use is not approved by the FDA for certain anatomical regions due to concerns regarding nodule formation, delayed inflammatory reactions, and the potential for vascular complications. When macrophages fail to degrade the CaHA microspheres, a persistent foreign body reaction can occur that leads to chronic inflammation, multinucleated giant cell accumulation, and excessive collagen deposition, ultimately resulting in granuloma formation. Here, we present the successful excision of multiple granulomas following Radiesse© injection to the anterior neck. This further reinforces the potential complications of its off-label use.

Case Presentation: A 59-year-old female developed firm, fixed nodules in the anterior neck three months after CaHA injections at a medical spa for skin laxity and rhytid reduction. The nodules progressively enlarged, causing discomfort and a poor cosmetic appearance. Physical exam revealed three non-tender granulomas up to 1.1 cm, with no cervical lymphadenopathy or systemic illness. Ultrasound identified eleven nodules, some consistent with granuloma formation. Due to persistent deformity and discomfort, surgical excision was performed under local anesthesia in the outpatient office setting. Three incisions revealed a total of 16 well-encapsulated granulomas containing foreign material. Pathology confirmed granulomatous inflammation with foreign material, consistent with tumoral calcinosis. The patient tolerated the procedure well, with no complications.

Discussion: This case highlights complications associated with off-label Radiesse© use beyond its FDA-approved applications. While effective for volumization and biostimulation, its use in the neck, jaw, and other areas raise concerns (1). CaHA fillers cannot be dissolved, therefore, it can be difficult to address complications that may be encountered following treatments. As a result, iatrogenic granuloma formation often necessitates surgical excision. Thinner skin in the neck, which is more mobile and contains less subcutaneous fat, increases the risk of granuloma formation (2). Superficial filler placement in this region can trigger prolonged foreign body reactions, exacerbated by mechanical stress and impaired lymphatic drainage (2,3). Hyperdiluted CaHA may further heighten risks by altering degradation rates and encouraging diffusion into unintended tissue planes (4). Filler-related complications are likely underreported, particularly vascular compromise and delayed inflammation (5). This

case highlights the need for cautious application of calcium hydroxylapatite fillers, thorough patient counseling, and adherence to established guidelines to minimize adverse outcomes.

Reference List

1. Fritsche K, Li AR, Schlesinger T. Radiesse: State of the Art and Dilute Radiesse. Dermatol Rev. 2023. doi:10.1002/der2.185.
2. Eviatar J, Lo C, Kirszrot J. Radiesse: Advanced Techniques and Applications. Plast Reconstr Surg. 2015. doi:10.1097/PRS.0000000000001656.
3. Thioly-Bensoussan D. Side-Effects of Fillers. In: Injection Treatments in Cosmetic Surgery. Taylor & Francis; 2008. doi:10.3109/9780203091814-42.
4. Almeida AT de, Figueredo V. Consensus Recommendations for the Use of Hyperdiluted Calcium Hydroxyapatite (Radiesse) as a Face and Body Biostimulatory Agent. Plast Reconstr Surg Glob Open. 2019;7(3):e2066. doi:10.1097/GOX.0000000000002066.
5. Rayess HM, Svider PF, Hanba C, Patel VS. A Cross-Sectional Analysis of Adverse Events and Litigation for Injectable Fillers. JAMA Facial Plast Surg. 2018;20(3):183-188. doi:10.1001/jamafacial.2017.1888.

The use of Poly-4-Hydroxybutyrate (P4HB) Scaffold in cosmetic breast surgery: A Systematic Review and Meta-Analysis

Abstract Presenter: Lucas Kreutz Rodrigues MD

Abstract Co-Author(s): Andre Milani, Karim Bakri MD

Purpose: The P4HB scaffold, also referred to as GalaFLEX, is known as an effective tool in breast reconstruction. However, its application in cosmetic breast procedures, such as mastopexy, requires further evaluation. We aimed to perform a proportions meta-analysis to assess the efficacy and safety of the use of P4HB scaffold in aesthetic breast procedures.

Methods: We conducted a systematic literature search in PubMed, Cochrane Library, and Embase databases up to December 2024 looking for articles that performed cosmetic breast surgery with the use of P4HB Scaffold and reported safety and efficacy outcomes. A random-effects model was used. The proportions meta-analyses used the

Freeman-Tukey Double arcsine transformation. Statistical analyses were performed using R version 4.1.2.

Results: 3 studies comprising 406 patients were included. The patients were all women with an average age of 39 years with mastopexy and augmentation-mastopexy being the predominant procedures performed. In the pooled analysis, the proportion of delayed wound healing was 5.94 per 100 (95% CI: 0.34–16.62%), the rate of recurrent implant malposition was 0.47 per 100 (95% CI: 0.00–1.58%), the proportion of infection was 0.42 per 100 (95% CI: 0.00–2.47%), the prevalence of seroma was 0.31 per 100 (95% CI: 0.00–1.32%), the prevalence of recurrent capsular contracture was 0.18 per 100 (95% CI: 0.00–1.21%), the prevalence of scaffold palpability was 0.11 per 100 (95% CI: 0.00–0.93%), and the prevalence of red breast syndrome was 0.00 per 100 (95% CI: 0.00–1.22%).

Conclusion: Our meta-analysis suggests that the P4HB scaffold could be a useful adjunct in breast augmentation, potentially helping reduce complications like recurrent implant malposition and capsular contracture. It also appears associated with low rates of other complications, such as delayed wound healing, infection, seroma, scaffold palpability, and red breast syndrome.

Trends in Payer Types and Associated Hospital Length of Stay in Common Body Contouring Surgeries

Abstract Presenter: Amanda Girardi

Abstract Co-Author(s): Oluwaseun Adebagbo, Sonal Pandya MD

Introduction: Panniculectomy and breast reconstructions are common body contouring surgeries (BCS) performed to improve patient discomfort and functional status. (1) Despite presenting symptoms of reduced functionality or decreased quality of life, these procedures often require insurance approval for medical necessity. (2,3) However, trends in coverage across payer types have been relatively unexplored. The purpose of this study was to examine trends over time in payer type of two common BCS and the association of payer type with hospital length of stay (LOS).

Methods: EPIC Slicer Dicer, a self-service reporting tool with data on interventions, outcomes, and costs, was used to analyze trends in payer type (Federal

[Medicaid/Medicare], Commercial, and Self-Pay) for panniculectomy and bilateral breast reduction (BBR) at a single institution from 2015 to 2023. Using the Vizient Clinical Database, a performance management tool, the relationship between LOS and payer type across participating institutions was investigated for BBR and panniculectomy. Individuals with a diagnosis of malignant neoplasms or concurrent mastectomy were excluded. Statistical analysis was conducted to examine the association between payer type and a hospital LOS exceeding one day.

Results: A total of 2,004 BCS cases were included with 1,376 BBRs and 628 panniculectomies. Self-Pay panniculectomies increased by 26% and for BBR by 11% ($p < 0.001$). The percent of panniculectomies reimbursed by Commercial and Federal payers significantly declined by 12% and 14%, respectively ($p = 0.001$). While reimbursement of BBR by Federal payers remained stable, Commercially covered BBRs decreased by 11% ($p < 0.0001$). Among panniculectomies, 146 (5.2%) had a LOS >1 day. Federal payers accounted for 40.4% of cases with LOS >1 day, significantly higher than Commercial (36.3%) and Self-Pay (23.3%) ($p < 0.0001$). Among BBR, there were no cases with a LOS >1 day for Federal or Self-Pay. Only one Commercial payer case (0.1%) had a LOS >1 day, and no significant difference was observed between payer types ($p = 0.85$).

Conclusion: These trends highlight evolving patterns in payer types, with increasing reliance on Self-Pay for BCS and declining support from Commercial and Federal payers, particularly for panniculectomies. Our study highlights the importance of adequate patient education during initial consultation and can guide plastic surgeons' preoperative counseling. Further research should explore factors contributing to insurance-related disparities and LOS in BCS.

1. Al-Sumaih I, Donnelly M, O'Neill C. Sociodemographic characteristics of patients and their use of post-bariatric contouring surgery in the US. BMC Health Serv Res. 2022 Mar 7;22(1):308. doi: 10.1186/s12913-022-07692-1. PMID: 35255893; PMCID: PMC8900300.
2. Nguyen JT, Wheatley MJ, Schnur PL, Nguyen TA, Winn SR. Reduction mammaplasty: a review of managed care medical policy coverage criteria. Plast Reconstr Surg. 2008 Apr;121(4):1092-1100. doi: 10.1097/01.prs.0000304238.43482.9c. PMID: 18349625.
3. Myers PL, Park RH, Sherina V, Bossert RP. Knowledge is power: Providing previsit insurance coverage information of body contouring procedures to improve understanding and satisfaction in the massive weight loss patient. J Plast Reconstr Aesthet Surg. 2020 Mar;73(3):571-575. doi: 10.1016/j.bjps.2019.09.052. Epub 2019 Oct 11. PMID: 31796263.

Understanding Craniofacial Injury Patterns in the Growing Sport of Pickleball: A 10-year analysis of emergency department visits

Abstract Presenter: Supriya Dadi

Abstract Co-Author(s): Rohan Mangal, Nicholas Mirsky, Seth Thaller MD

INTRODUCTION: Pickleball is one of the fastest-growing sports worldwide. As a result, there has been an accompanying rise in pickleball-related injuries (1). Despite craniofacial injuries accounting for 12% of all pickleball-related injuries, there is limited research analyzing how these injuries present in this region (2). This study analyzes the incidence, distribution, and characteristics of pickleball-related craniofacial injuries over the past decade.

METHODS: The U.S. Consumer Product Safety Commission's National Electronic Injury Surveillance System Database (NEISS) was queried to perform a retrospective study of craniofacial injuries resulting from pickleball activities. Demographics, product codes, injury anatomic locations, and diagnoses related to craniofacial injuries associated with pickleball-related activity from 2014 to 2023 were assessed. All descriptive statistics were based on raw data from actual cases involving those treated in NEISS emergency departments.

RESULTS: 80,597 craniofacial injuries were reported from 2014 to 2023, with a 54% increase reported over the decade. Most injuries occurred in males (59.2%), with the injury rate rising by 26.5% for males and 107% for females. Head injuries were most common (55.6%, n=47,255), followed by facial (27.47%, n=23,333), eyes (5.97%, n=5,070), mouth (4.87%, n=4,137), and neck (6.04%, n=5,133). Injury rates by location were similar across genders. Internal injuries made up the majority of head injuries (63.2%, n= 30,333) and experienced the largest increase (103%) over the past decade. Lacerations made up the majority of facial injuries, rising 52% over the past year, and were 2.04 times more common in males than in females. The highest injury prevalence was among individuals aged 10–14, followed by the 5–9 and 15–19 age groups, with a sharp decline in those aged 20-24. Injury data for all other ages were unavailable as they were likely lower than 1,200.

CONCLUSIONS: While pickleball injuries are most prevalent among older adults, studies show that craniofacial injuries are much more prevalent in younger individuals (3). Understanding trends in injury distribution by age, gender, and location can help inform targeted prevention strategies. These findings emphasize the need for optimized emergency department preparedness, increased access to craniofacial trauma specialists, and enhanced safety measures to mitigate injury risk as the sport expands.

1. Cheng R, Moran J, Kim B, et al. A substantial increase in injuries and hospitalizations associated with playing pickleball from 2020 to 2022. Arthroscopy, Sports Medicine, and Rehabilitation 2024; 10.
2. Vitale K, Liu S. Pickleball: Review and clinical recommendations for this fast-growing sport. Current Sports Medicine Reports 2020;19:10.
3. Yu J, Yendluri A, Linden GS, et al. Increasing incidence of pickleball injuries presenting to US emergency departments: A 10-year epidemiologic analysis of mechanisms and trends. Orthopaedic Journal of Sports Medicine 2025;13.

What Type of Plastic Surgery Research are Successfully Matched Applicants Engaging in?

Abstract Presenter: William Bohler

Abstract Co-Author(s): James Burmeister, Ava Harvey, Ethan Dimock, Kongkrit Chaiyasate MD

Purpose: Research productivity has become an increasingly important factor in the integrated plastic surgery residency match. In recent years, the average research output among matched applicants has risen significantly (1). Despite this trend, limited data exists on the proportion of publications that are directly related to plastic surgery among successful applicants. This study analyzes the plastic surgery-focused research output of matched applicants over the past three years to better understand the evolving role of specialty-specific publications in the match process. Our findings provide insight into the research expectations for future applicants in this competitive field.

Methods: A bibliometric analysis of integrated plastic surgery residents from the three most recent graduating medical school cohorts was conducted prior to their date of residency application, collecting factors related to their publications such as article title, journal name, authorship position, article type, and subject area within plastic surgery:

Aesthetic/Cosmetic, Basic Science, Breast, Burn, Craniofacial, Education, Gender-Affirming Care, Hand, Microsurgery, and Other (Social Media, Technology/AI, Financial, etc.). Articles that were not related to plastic surgery were excluded from analysis. SPSS was utilized to analyze included articles.

Results: 4144 total articles were collected across 555 successfully matched applicants. Of those articles, 1612 (38.9%) were plastic surgery publications and were included for further analysis. Applicants were first-author in 564 (35%) of these articles and second-author in 426 (26.4%) articles.

Within specific subject areas of plastic surgery, Craniofacial (26.3%), Microsurgery (18.5%), and Breast (12.6%) articles were the most frequently published. Burn (0.7%), Basic Science (3.7%), and Gender-Affirming Care (3.8%) articles were the most infrequently published.

When considering article types, Clinical Research (38.4%) and Systematic Reviews/Meta-analyses (25.6%) were the most common. Case series (1.2%), Bench articles (2.3%), and Editorials/Letter to the Editor (2.9%) were the least common.

Conclusions: The results of this study reveal successfully matched applicants publish a relatively high amount of plastic surgery-specific research. Moreover, they tend to be highly involved in these projects as they held either a first- or second-author position on 61.4% of these articles. Craniofacial, microsurgical, and breast research seem to be relatively popular among successfully matched applicants, as these three categories comprised 57.4% of all plastic surgery publications. Gender-affirming care represented one of the least frequently published subject areas, yet the number of these publications increased each year, indicating a potential growing interest of this topic among medical students. Further analysis of this data will determine any notable year-to-year trends between residency classes.

References

1 - Charting OutcomesTM: Characteristics of U.S. MD Seniors Who Matched to Their Preferred Specialty: 2024 Main Residency Match®. NRMP. August 20, 2024. Accessed September 22, 2024. https://www.nrmp.org/match-data/2024/08/charting-outcomes-characteristics-of-u-s-md-seniors-who-matched-to-their-preferred-specialty-2024-main-residency-match/

Practice Management

First Impressions: How Surgeon Gender And Race In Social Media Profile Pictures Affect Patient Perception In Plastic Surgery

Abstract Presenter: Evan Rothchild BE

Abstract Co-Author(s): Sarah Phillips MD, Caroline Baker, Fei Wang MD, Ivie Odia, Joseph Ricci MD

Background: Social media has emerged as an essential platform for plastic surgeons to advertise to potential new patients. Among the various factors influencing a patient's choice of physician, implicit bias plays a significant role.(1-5) This study aims to investigate whether a surgeon's gender or race, as presented in their social media profile picture, affects the perception of their competence and the likelihood of attracting patients.

Methods: Two side-by-side sample Instagram posts were created. Each post displayed a before-and-after photograph of a common plastic surgery procedure and featured one of eight possible profile pictures generated using artificial intelligence, with variations only in gender and race. Surveys containing the posts, which only differed in the surgeon's profile pictures, were distributed to respondents to evaluate perceived surgeon competence, likelihood of recruiting patients, likelihood of making a referral, and willingness to visit the surgeon's profile.

Results: A total of 1,777 respondents participated. The average scores were 3.74 (SD=0.98) for competence, 3.64 (SD=1.06) for patient recruitment likelihood, 3.72 (SD=1.00) for referral, and 3.68 (SD=1.05) for social media influence. Surgeon race or gender did not significantly affect scores, and no significant pairwise differences were found between respondent and surgeon race across all categories. However, competence ($p = 0.0073$), patient recruitment ($p = 0.0003$), referral ($p < 0.001$), and social media influence scores ($p < 0.001$) varied significantly across racial respondent groups. Hispanic respondents gave the highest average competence score (4.27), while Black respondents gave the lowest (3.39).

Conclusions: Our results showed no significant differences in patient recruitment, referral likelihood, perceived competence, or social media influence based on surgeon

gender or race. These findings suggest that using controlled images, which standardize factors like clothing, name, and other superficial identifying features, may help reduce the influence of demographic biases. Furthermore, black respondents consistently provided lower scores across multiple metrics, which may reflect historical mistrust in the medical system. Conversely, Hispanic respondents gave the highest competence scores, possibly indicating greater trust or different cultural attitudes toward physicians.

1. Laveist T. A., Nuru-Jeter A. Is doctor-patient race concordance associated with greater satisfaction with care? J Health Soc Behav. 2002;43(3):296-306.
2. Champagne-Langabeer Tiffany, Hedges Andrew L. Physician gender as a source of implicit bias affecting clinical decision-making processes: a scoping review. BMC Medical Education. 2021;21(1):171.
3. Bhat D., Kollu T., Ricci J. A., Patel A. What's in a Name? Implicit Bias Affects Patient Perception of Surgeon Skill. Plast Reconstr Surg. 2021;147(6):948e-56e.
4. Bhat D., Kollu T., Ricci J. A., Patel A. How Do You Like Me Now? The Influence of "Likes" and Followers on Social Media in Plastic Surgery. Plast Reconstr Surg. 2022;149(4):1012-22.
5. Bhat D., Kollu T., Giutashvili T., Patel A., Ricci J. A. Does Surgeon Training Affect Patient Perception of Surgeon Skill in DIEP Flap Breast Reconstruction? J Reconstr Microsurg. 2022;38(5):361-70.

Predictors of No-Show Rates in Traumatic Injuries: Pre-Pandemic vs Post-Pandemic

Abstract Presenter: Maeson Zietowski

Abstract Co-Author(s): Rebeka Dejenie, Russell Reid MD, PhD

Purpose: No-show appointments place a significant burden on healthcare systems and increase the risk of readmission for trauma patients. This study examines risk factors associated with missed follow-ups at plastic surgery clinic within a level 1 trauma center following facial, hand, or lower extremity trauma. We compare no-show trends before and after the COVID-19 pandemic to identify potential shifts in patient adherence.

Methods: A retrospective review was conducted on trauma patients consulted to plastic surgery at a level I trauma center before and after the COVID-19 pandemic. The COVID-19 pandemic was officially declared by the Centers for Disease Control in March

of 2020. Thus, Cohort A (pre-pandemic) included patients from August 2019 to March 2020, and Cohort B (post-pandemic) included patients from April 2020 to November 2020. No-shows were defined as missed follow-ups within 30 days of discharge. Collected data included demographics, injury details (insurance status, injury location, mechanism of injury), and social work or violence recovery program (an institutional social services program) intervention. The area deprivation index was calculated using zip codes. Univariate analysis was performed to assess differences between Cohort A and Cohort B as well as between no-show and follow-up groups within each cohort. Logistic regression was conducted to identify independent predictors of no-show.

Results: A total of 336 patients were included in Cohort A and 452 in Cohort B. There was not a significant difference in no-show rate between cohorts ($p=0.091$). However, insurance status ($p<0.001$), mechanism of injury ($p<0.001$), location of injury ($p<0.001$), disposition ($p=0.029$), and social work or violence recovery program intervention ($p<0.001$) differed significantly between cohorts.

Within Cohort A, significant differences were found between patients who attended follow-up (n=222) and patients who did not (n=114) for race ($p=0.007$) and insurance status ($p<0.001$). Within Cohort B, patients who missed their follow-up (n=128) and patients who attended (n=324) differed significantly in race ($p=0.008$), insurance status ($p<0.001$), state area deprivation index ($p=0.049$), mechanism of injury ($p=0.004$), location of injury ($p<0.001$), and disposition ($p=0.004$). Logistic regression analysis identified Medicaid (OR 3.355, $p=0.003$), out of network insurance (OR 4.237, $p<0.001$), and lack of insurance (OR 6.068, $p<0.001$) as independent predictors of no-show rate in Cohort A. Similarly, in Cohort B Medicaid (OR 2.643, $p=0.005$) and out of network insurance (OR 23.864, $p<0.001$) were predictive of no-show. Additionally, ballistic violence (OR 0.342, $p=0.042$) was associated with attending follow-up appointments in Cohort B.

Conclusion: Despite baseline differences between pre- and post-pandemic cohorts, including injury mechanism and location, there were similar no-show rates. Across both cohorts, a major predictor of no-show rates was Medicaid insurance status or lack of coverage, emphasizing the impact of socio-economic factors on follow-up attendance. Although there was increased social work intervention post-pandemic, socio-economic factors remain significant barriers to clinic attendance.

Overview of Litigation in Plastic and Reconstructive Surgery: A Systematic Review and Meta-Analysis Synthesizing Trends, Commonalities, and Strategies for Risk Mitigation in PRS

Abstract Presenter: Daniel Rabin

Abstract Co-Author(s): Daniel Najafali, Amir Dorafshar MD, FACS, Logan Galbraith, Hilary Liu, Erik Reiche MD, Raman Mehrzad MD, MHL, MBA, Francesco Egro MD, Msc, MRCS, Sameer Patel MD

Background: Every year, approximately 12.5% of plastic and reconstructive surgeons (PRS) in the United States (US) are implicated in a malpractice claim. This rate is considerably higher than the typical US physician, whose mean malpractice claim rate is 7.4% per year. Most literature on PRS litigation uses Westlaw or LexisNexis databases to draw conclusions. In this review, evidence from studies on PRS litigation over the past two decades is synthesized. We aim to analyze litigation trends and identify recurring common factors contributing to malpractice claims, with the ultimate goal of reducing legal disputes while enhancing patient safety and satisfaction.

Methods: A systematic review was conducted in accordance with PRISMA guidelines, with studies using Westlaw or LexisNexis databases. Articles were independently screened, extracted, and evaluated for quality by two researchers. Meta-analysis was performed using the "metafor" package in R.

Results: Of the litigation described in the 28 studies, 85% of the cases went to court, whereas 11% were decided by settlement or pre-court arbitration. Of the cases that went to court, the decision was favorable for the defending surgeon 60% of the time, whereas a decision favoring the plaintiff occurred 25% of the time. For the cases that resulted in jury-decided awards, the average indemnity payment was $680,892.06 (95% confidence interval: $392,092 - $969,693). For cases decided by settlement or pre-court arbitration, the average indemnity payment was $584,117.21 (95% confidence interval: $417,079 - $751,155). The most commonly cited reason for litigation was procedural error (55%), followed by diagnostic errors (24%) and informed consent (23%).

Conclusions: The importance of surgeons operating within their scope of practice is highlighted by the fact that 55% of PRS cases were litigated due to procedural error. This was likely a result of significant overlap between specialties, notably otolaryngologists and plastic surgeons, whose scopes within the head and neck space share many procedures. Another common theme identified in studies centers on physician-patient communication and proper informed consent. Our analysis found that

as the proportion of cases related to informed consent increases, the proportion of cases won by plaintiffs statistically significantly increases. Surgeons, hospitals, private practices, and medical councils should place increased importance on ensuring expectations are clear and that patients understand the complete risks of procedures.

Assessing the Real-World Impact of the FDA Black Box Warning on Breast Implants: A Nationwide Analysis of 179,560 Cases

Abstract Presenter: Goutam Gadiraju

Abstract Co-Author(s): Renee Gao, Yizhuo Shen, Justin Broyles MD

Purpose: On October 27, 2021, the FDA implemented a boxed warning on implants, the highest level of safety labeling restriction for medical devices. Previous cross-sectional survey studies suggested that patients would be less likely to consider receiving implants following the black-box warning and implementation of standardized checklists (1); however, real-world impacts on practice patterns remains unclear. This study employed an Interrupted Time Series Analysis (ITSA) of nationwide data to quantify changes in trends of Implant-Based Reconstruction (IBR), offering the first assessment on the impacts of a black-box warning on surgical practice patterns.

Methods: We queried the Epic Cosmos nationwide healthcare database for monthly procedural frequencies of IBR (CPT 11970,19340,19342) from January 2017 through January 2025. ITSA was performed using a multivariable regression approach, with the black-box warning modeled as an interruption to the existing trend in monthly rates of IBR. Independent variables included the following: number of months elapsed from January 2017, a binary variable representing post black-box warning status, and the number of months elapsed after the black-box warning. These variables were tested for the presence of level or slope changes in IBR trends post-warning.

Data from 2020 was omitted to avoid confounding effects due to the COVID-19 Pandemic. We accounted for seasonality of procedures by controlling for the month in which procedures occurred. To account for possible delays in implementation of checklists or impact of the boxed warning, we conducted sensitivity analyses by shifting the time of interruption by +/- 3 months from October 2021. Regression models were ultimately selected on the basis of best fit by adjusted R-squared.

Results: We identified 179,560 IBR procedures that occurred during the 8-year study period. Pre-warning, IBR procedures were steadily increasing at a rate of 16.20 procedures per month (CI: 14.1-18.3, p<0.001); accounting for seasonality, this represented a month-to-month average growth of 1.41% in the pre-warning period. October 2021 was found to be the intervention point with optimal fit (R^2 = 0.953). The model was further controlled for seasonality, revealing a significant monthly variation with procedural volumes peaking in October through December (additional 429.23 to 441.31 cases, p<0.0001).

Immediately following implementation of the boxed warning, a substantial level change was observed, with a sharp decrease of 675.03 procedures (CI: -927.4 to –422.6, p<0.001) to the pre-warning trend. This represented an immediate 36% reduction in monthly IBR procedures. Following the initial drop in IBR procedures, rates started to recover at an additional 6.96 (p<0.0001) procedures per month.

Conclusions: Our study provides the first quantitative evidence that FDA boxed warnings can substantially influence surgical practice patterns. The boxed warning produced an immediate, significant decrease in IBR following October 2021. While a gradual recovery occurred, rates remained lower than pre-warning projections. These results establish an evidence-based foundation to guide future FDA policy on risk communication, underscoring their potential to transform clinical practice patterns and improve shared decision making amongst patients and physicians.

References: Hyland CJ, et al. Public Perceptions of Breast Implant Complications and the FDA Boxed-Warning. Plast Reconstr Surg Glob Open. 2022.

Exploring Collaborative Approaches: An Analysis of Plastic and Cardiothoracic Surgery Integration

Abstract Presenter: Anna Bogursky

Abstract Co-Author(s): Jessica Farzan, Anam Furrukh, Raymond Dunn MD

Introduction: Median sternotomy, a cornerstone procedure in cardiac surgery, is performed on over 500,000 patients annually in the United States (1). While wire cerclage has long been the standard for sternal closure, post-sternotomy complications such as dehiscence, mediastinitis, and non-union remain significant concerns, with

mortality rates reaching up to 15% (2). These complications often necessitate sternal debridement, wire removal, and implementation of sternal rigid plate fixation (SRPF).

From the senior author's experience, two key factors contribute to preventable complications with SRPF: (1) Variability in closure methods: Despite some cardiothoracic surgeons being trained in SRPF, there is considerable variation across hospitals in primary sternal closure techniques. Some surgeons exclusively use SRPF, while others reserve it for select cases or consult plastic surgery for closure in certain scenarios. Plastic surgery involvement often occurs after complications have arisen. Earlier collaboration during the initial median sternotomy for SRPF closure could potentially prevent many of these complications, especially for cardiothoracic surgeons less experienced with the technique. (2) The absence of clear guidelines: Current cardiothoracic surgery guidelines do not provide specific indications for prophylactic SRPF in median sternotomy patients. This absence of clear criteria makes it challenging for surgeons to determine when SRPF is necessary and when early plastic surgery consultation is warranted.

This study aims to investigate current practices, interdisciplinary collaboration patterns, and decision-making processes regarding sternal closure techniques among cardiothoracic surgeons in the United States.

Methods: To assess current practices, a nationwide survey was distributed to practicing or recently retired cardiothoracic surgeons. The survey gathered data on current sternotomy closure practices, collaboration patterns with plastic surgery teams, decision-making processes for high-risk patients, and attitudes towards the adoption of SRPF. Additionally, the survey assessed the interest in and potential utility of standardized decision-making tools for sternal rigid plate fixation.

Results: The survey has been sent to 100 cardiothoracic surgeons across the United States. As data collection progresses, we anticipate finding significant variations in sternal closure practices across institutions, with some cardiothoracic teams routinely using SRPF for high-risk or even all patients, while others rely exclusively on wire cerclage. The study may uncover diverse collaboration models between cardiothoracic and plastic surgery teams, ranging from routine involvement to consultation only after complications arise. Key risk factors influencing the selection of closure methods, particularly for high-risk patients, may be identified, including obesity, diabetes, osteoporosis, and advanced age. This research might also highlight a need for additional training in SRPF techniques for cardiothoracic surgeons to increase adoption and improve outcomes.

Conclusion: We anticipate that our findings will help improve collaboration between cardiothoracic and plastic surgery teams, particularly at institutions where cardiothoracic surgeons are not trained in SRPF techniques. The results may support the development of standardized decision-making tools for sternal rigid plate fixation, potentially leading to more consistent and improved patient care. Furthermore, the study could provide evidence to support the wider adoption of SRPF, especially for high-risk patients, potentially reducing post-sternotomy complications and improving overall outcomes in cardiac surgery.

1. Allen KB, Thourani VH, Naka Y, et al. Randomized, multicenter trial comparing sternotomy closure with rigid plate fixation to wire cerclage. J Thorac Cardiovasc Surg. Apr 2017;153(4):888-896 e1. doi:10.1016/j.jtcvs.2016.10.093

2. Song DH, Lohman RF, Renucci JD, Jeevanandam V, Raman J. Primary sternal plating in high-risk patients prevents mediastinitis. Eur J Cardiothorac Surg. Aug 2004;26(2):367-72. doi:10.1016/j.ejcts.2004.04.038

State Family Support Policies and Their Impact on Women's Representation and Productivity in Surgical Research: A Comparative AI-Driven Analysis

Abstract Presenter: Georgios Karamitros MD, MS

Abstract Co-Author(s): Heather Furnas MD, FACS, Michael Grant MD, PhD, FACS, Sofoklis Goulas

Background: Gender disparities in academic surgery persist, with women underrepresented as first authors and facing significant barriers to research productivity [1, 2, 3]. Family-supportive policies, including Paid Family Leave (PFL) and reproductive rights protections, have been suggested as potential solutions to mitigate these disparities [4, 5]. However, their impact on female representation in surgical research has not been comprehensively evaluated.

Study Design: This AI-driven, cross-sectional analysis examined 198,542 first-author publications from 388 PubMed-indexed surgery journals published between 2010 and 2022. Gender differences in research output and representation were assessed across U.S. states with and without family-supportive policies, specifically mandatory PFL and protective reproductive rights. We compared female representation among first authors

and analyzed the average number of publications per female author, examining gender disparities at publication thresholds of 1, 2, and 5 papers.

Results: Women comprised 33.0% of all first authors, with representation decreasing at higher publication thresholds. States with PFL showed higher female representation among first authors compared to non-PFL states (34.2% vs. 32.3%; $p<0.001$), and similarly, protective reproductive rights states had more female representation than restrictive states (33.9% vs. 32.0%; $p<0.001$). Among authors with 5 or more publications, women represented 25.1% in PFL states versus 22.6% in non-PFL states ($p = 0.005$), and 24.6% in reproductive rights states versus 22.3% in restrictive states ($p = 0.010$). States with these policies also showed significantly higher average publications per female author ($p<0.001$).

Conclusion: State-level PFL and reproductive rights policies are associated with improved female representation and reduced gender disparities in surgical research. These findings underscore the critical role of family-supportive policies in advancing gender equity in academic surgery.

References:
1. Davis EC, Risucci DA, Blair PG, Sachdeva AK. Women in surgery residency programs: evolving trends from a national perspective. J Am Coll Surg. 2011 Mar;212(3):320-6. doi: 10.1016/j.jamcollsurg.2010.11.008. Epub 2011 Jan 17. PMID: 21247778.
2. Farmer DL. The Future of Health Care Is Female. JAMA Surg. 2024 Jan 1;159(1):50. doi: 10.1001/jamasurg.2023.5131. PMID: 37851437.
3. Karamitros G, Goulas S. Women representation in plastic surgery across the globe: A cross-sectional study of human capital and research output using artificial intelligence. J Plast Reconstr Aesthet Surg. 2023 Jun;81:91-93. doi: 10.1016/j.bjps.2023.04.056. Epub 2023 Apr 18. PMID: 37130445.
4. Altieri MS, Pryor A, Torres MB, Miller ME, Möller MG, Diego EJ, Reyna C; Association for Women Surgeons Publications Committee and the Association for Women Surgeons He For She Committee. Support of pregnancy and parental leave for trainees and practicing surgeons. Am J Surg. 2022 Dec;224(6):1501-1503. doi: 10.1016/j.amjsurg.2022.08.005. Epub 2022 Aug 15. PMID: 35987658.
5. Diaz A, Cochran A. Leaky Pipelines and Emptying Wells: Concerns from a Survey of the US Surgeon Workforce. J Am Coll Surg. 2020 Mar;230(3):293-294. doi: 10.1016/j.jamcollsurg.2019.12.002. PMID: 32093898.

Telehealth Improves Access and Efficiency in Pediatric Plastic Surgery: A Study on Surgical Conversion Rates and Time to Surgery

Abstract Presenter: Thalia Le

Abstract Co-Author(s): Emily Green, Diego Gomez, Skyler Palmer, Jason Yu DMD, MD, Timothy Irwin MD, Brooke French MD, Phuong Nguyen MD, David Mathes MD, David Khechoyan MD

Introduction: Telemedicine has emerged as a transformative tool in modern healthcare, facilitating remote communication between physicians and patients while improving access, operational efficiency, and cost-effectiveness (1,2). Its role has been extensively studied in adult primary care and surgery. However, its application in Pediatric Plastic Surgery remains unexplored. This study evaluates the impact of telehealth at a high-volume pediatric plastic surgery center, assessing its efficacy in expanding access and optimizing patient care pathways.

Methods: An IRB-approved retrospective analysis using Salesforce Data Analytics (Salesforce Inc. San Francisco, CA) was conducted on all patients referred to the Plastic Surgery department at a tertiary pediatric hospital between January 2020 and December 2024. Data collected included referring location, primary diagnosis, and home state. Key outcomes analyzed included referral-to-visit conversion rates, surgical conversion rates, and time to surgery. Comparative analyses were performed between telehealth and in-person consultations, as well as between in-state and out-of-state referrals.

Results: A total of 6,370 patients were referred during the study period. The majority (82.5%) resided within 80 miles of the hospital, with 57.3% being in-state and 42.7% out-of-state referrals. The overall referral-to-visit conversion rate was 71%. Among those who underwent consultation, 52.9% proceeded with surgery. Notably, telehealth consultations were associated with a significantly higher surgical conversion rate compared to in-person visits (60.5% vs. 36.1%; $p<0.001$). While consultation rates were comparable between in-state (70.9%) and out-of-state (69.8%) referrals ($p=0.589$), out-of-state patients using telehealth had markedly higher surgical conversion rates than those seen in person (70.1% vs. 36.9%; $p < 0.001$). In-State patients using telehealth also had significantly higher surgical conversion rates compared to those seen in-person (59.8% vs. 36.0%; $p < 0.001$). There was no significant difference in time-to-surgery between the telehealth and the in-person cohorts (167 vs. 165 days; $p > 0.05$).

Conclusions: This study underscores the critical role of telehealth in Pediatric Plastic Surgery, particularly in enhancing access for geographically distant patients. Telehealth consultations were associated with higher surgical conversion rates, particularly among out-of-state patients, suggesting that virtual consultations may facilitate more streamlined surgical planning and reduce unnecessary travel burdens. These findings support the broader integration of telehealth into Pediatric Plastic Surgery practice to improve patient access, optimize resource utilization, and expand care delivery for underserved populations.

References:
1. Shaver J. The State of Telehealth Before and After the COVID-19 Pandemic. Prim Care. 2022;49(4):517-530. doi:10.1016/j.pop.2022.04.002
2. Funderburk CD, Batulis NS, Zelones JT, et al. Innovations in the Plastic Surgery Care Pathway: Using Telemedicine for Clinical Efficiency and Patient Satisfaction. Plast Reconstr Surg. 2019;144(2):507-516. doi:10.1097/PRS.0000000000005884

Body Mass Index, Comorbidities, and the New Lancet Obesity Definition: Implications for Risk Assessment in Plastic and Reconstructive Surgery

Abstract Presenter: Micaela Tobin

Abstract Co-Author(s): Audrey Mustoe BA, Mohammed Yamin, Tricia Mae Raquepo, Sarah Karinja MD, Bernard Lee MD, MBA, MPH, Ryan Cauley MD MPH

Introduction: The Lancet Commission recently proposed a new definition of clinical obesity that de-emphasizes body mass index (BMI) in favor of adiposity-related comorbidities. Specifically, patients with BMIs between 25 and 40 are considered clinically obese only if they have associated comorbidities (1). In turn, this affects whether weight loss is recommended. Our study evaluates the relevance of this paradigm shift to plastic and reconstructive surgery by analyzing the independent and interactive effects of BMI categories and obesity-related comorbidities on 30-day complication rates.

Methods: The TriNetX health database was queried for patients undergoing plastic and reconstructive surgeries. BMI was grouped into the following categories: 18.5-24.9, 25-29.9, 30-34.9, 35-39.9, and ≥40. All BMI categories were further stratified by the

presence or absence of adiposity-related comorbidities. Cox regression analyses were performed to determine hazard ratios (HR) for all 30-day complications.

Results: A total of 957,985 patients who underwent plastic and reconstructive procedures were included. Overall, patients with BMIs of 25-39.9 with comorbid disease (HR 1.05, p<0.001) or BMIs ≥40 (HR: 1.40, p<0.0001) were noted to have significantly higher complication-risk than a reference group of patients with BMIs of 18.5-24.9. Compared to the same reference group, the effect of BMI amongst patients without comorbidities was variable. In this group, patients with BMIs 25-29.9 were less likely to develop 30-day complications (HR: 0.83, p<0.0001) and patients with BMIs 30-34.9 were at similar risk (HR: 0.0, p=0.62) as the reference group. There was an inflection point at BMIs of 35-39.9 as these were associated with increased complication-risk (HR: 1.24, p<0.001), even amongst patients without comorbidities.
These effects were similar when using a reference group of patients with BMIs 18.5-24.9 who specifically did not have any of the comorbidities defined by the Lancet.

Conclusions: These findings partially support the adoption of the new Lancet definition of obesity in the context of patients undergoing plastic surgery. For patients with a BMI of 25-34.9 and no comorbidities, weight loss may not significantly change risk. However, for patients with BMIs ≥35, and even more so in patients with BMIs ≥40, BMI remains an independent predictor of complications, regardless of comorbidity status. Based on these results, in cases of elective surgery, a comprehensive assessment of underlying comorbidities should be considered for patients with BMIs 25-34.9, and weight loss may be recommended for patients with BMIs≥35.

References:
1. Rubino F, Cummings DE, Eckel RH, et al. Definition and diagnostic criteria of clinical obesity. The Lancet. Diabetes & endocrinology. 2025. https://www.ncbi.nlm.nih.gov/pubmed/39824205. doi: 10.1016/S2213-8587(24)00316-4.

Exploration of Patient Preferences in Selecting Plastic Surgeons: A Comparative Study Between Academic and Private Practice Settings

Abstract Presenter: Elizabeth O'Neill MD MPH

Abstract Co-Author(s): SEVASTI PANAGIOTA GLYNOU, Annie Fritsch, John Toms III, Georgios Kokosis MD

Introduction: The decision-making process in selecting plastic surgeons is multifaceted, influenced by various patient-specific and systemic factors. While prior research has explored these determinants individually, comparisons of how patients perceive and choose between academic and private practice plastic surgeons remain limited (1). This study aims to investigate patient perceptions of quality of care in both academic and private practice and provide a framework for understanding how patient, provider, and practice level factors impact decision-making.

Methodology: A 51-item questionnaire was developed and anonymously distributed via Prolific (Prolific Academic Ltd, London, England) in November 2024. Participants received $1.44 in compensation upon survey completion. The survey included questions on patient demographics, past surgical experiences, preferred sources of information, and factors influencing the selection of a plastic surgeon. Respondents rated the importance of various factors on a 5-point Likert scale.

Results: A total of 203 surveys were completed. The mean participant age was 35.3 (SD= 13.0), 113 (55.7%) were female, 126 (62.1%) had obtained a bachelor's degree or higher, and 168 (82.8%) were employed. One hundred twelve (55.2%) responded "yes" or "maybe" when asked if they would consider plastic surgery in the future and 32 (15.8%) had previously undergone a procedure. When asked to choose between an academic surgeon and a private practice surgeon, 56.05% preferred private practice, 31.9% chose academic, and 12.1% were unsure.
On a 5-point scale, respondents rated surgeon experience (Average = 4.48 ± 0.93) reputation (Average = 4.46 ± 0.89) and reviews (Average = 4.18 ± 0.91) as the most important factors influencing their selection of a surgeon with many willing to pay more for surgeon reputation (Average = 4.13 ± 0.99). The majority indicated that they used online searches (70.5%) and recommendations from friends and family (45%) to research surgeons. Those >46 years were more likely to rate recommendations as highly important compared to younger patients ($p = 0.027$) while those aged 46-55 were more willing to pay for surgeon reputation ($p = 0.037$). Female respondents were more likely to indicate that surgeon reputation ($p = 0.012$), experience ($p = 0.013$), and cost ($p = 0.021$) were important to them with thoroughness during consultation ($p = 0.029$), and clear communication ($p = 0.018$) being other important factors. Individuals with high school education indicated that online reviews greatly impacted their decision between private and academic practice ($p = 0.036$) while those with a graduate degree had a higher self-reported understanding of the difference between private and academic medicine (0.016).

Conclusion: Patients demonstrate a preference for private-practice plastic surgeons but often lack a clear understanding of distinctions between academic and private

settings. Patients rely on internet searches and personal recommendations, prioritizing surgeons with high ratings, experience, and clear communication. Surgeons in both academic and private practice should understand what patients value in order to provide more comprehensive information and improve patient-centered care.

Reference:
1. Yahanda AT, Lafaro KJ, Spolverato G, PawlikTM. A Systematic Review of the Factors that Patients Use to Choose their Surgeon. World Journal of Surgery. 2015;40(1):45-55. doi:https://doi.org/10.1007/s00268-015-3246-7

Fertility Support in Plastic Surgery

Abstract Presenter: Melika Deaton MD

Abstract Co-Author(s): Shannon Su MD, Aashvi Patel, Anisha Chada, Chloe Denham, Jennifer Kawwass, Gabriela Garcia Nores MD

Introduction: Fertility rates in the U.S. continue to decline, potentially in part due to environmental factors, purposeful delay of childbearing, and rising incidence of infertility. Female physicians, especially in plastic surgery, experience higher infertility rates- 50.7% compared to 12.9% in the general population.[1] Plastic surgeons, in particular, undergo long training programs ranging in 6 to 10 years in length (whether integrated or independent tracks) and undergo training during their prime reproductive window. These challenges have increased reliance on assisted reproductive technologies (ART) for fertility preservation (oocyte and embryo cryopreservation) and fertility treatment.

Surgical residents face logistical and financial barriers, including unpredictable treatment schedules and the need to use limited vacation time for procedures. While studies show almost a quarter of all residents are experiencing infertility, 63% of all residents feel little to no support from their program regarding fertility care.[2,3] Furthermore, parental leave had not been well outlined until July 2022 at which point the ACGME instated a policy for 6 weeks of paid leave, but did not specify how to implement the leave. The purpose of this study is to gather nationwide data regarding options for fertility treatment and parental leave at all integrated plastic surgery training programs.

Methods: Data was collected from institutional graduate medical education (GME) websites and by calling human resources (HR) at these institutions if the information was not publicly available. Descriptive statistics were used to analyze the data.

Results: Of 89 programs analyzed, 66 offer fertility treatment coverage, with an average benefit of $24,179. Seventy-six programs offer birthing parent leave (mean 5.24 weeks), and 72 programs offer non-birthing parent leave (mean 4.65 weeks)-leave in this study was defined as paid leave that did not require vacation or sick time to be used. Only 10 programs offer elective fertility treatment, and 25 programs explicitly state a requirement for the diagnosis of infertility before providing treatment. Most information was found on GME websites (70 programs).

Conclusion: Increasing access to fertility benefits and improving transparency is essential. Residency programs should provide financial support and protected time off, ensuring female trainees can pursue fertility preservation without compromising their careers or reproductive autonomy.

1. Hemal K, Chen W, Bourne DA. Fertility and Childbearing Outcomes of Practicing Female Plastic Surgeons. Plast Reconstr Surg. 2023;151(6):1327-1337. doi:10.1097/PRS.0000000000010119
2. Rasouli MA, Barrett F, Levy MS, et al. Publicly available information about fertility benefits for trainees at medical schools in the US. J Assist Reprod Genet. 2023;40(6):1313. doi:10.1007/S10815-023-02849-1
3. Stentz NC, Griffith KA, Perkins E, Jones RD, Jagsi R. Fertility and Childbearing Among American Female Physicians. J Womens Health (Larchmt). 2016;25(10):1059-1065. doi:10.1089/JWH.2015.5638

Migration and Training Patterns of Craniomaxillofacial Surgeons

Abstract Presenter: William Lee

Abstract Co-Author(s): Naser Salem, amir latifian, Phavon Sage, Brendan Podszus, Yifan Guo MD

Introduction: The plastic surgery workforce is generally at risk of experiencing shortages and already exhibits significant geographic maldistribution (1,2,3). This study assesses the migratory patterns taken by current craniomaxillofacial surgeons during

their training and career to assist efforts enhancing training pathways, increasing equitable access to care, and informing both current and future craniomaxillofacial surgeons on their decision of where to train or practice.

Methods: A list of active craniomaxillofacial surgeons who are members of the American Society of Maxillofacial Surgeons (ASMS) was obtained from an ASMS member. Five reviewers performed web searches across Doximity, LinkedIn, university or practice web pages, and other publicly available information to identify each surgeon's current practice type and the geographic location and regional distribution of their current practice, medical school, residency, and fellowship training programs using the United States (U.S.) Census Data regions (4).

Results: Among 367 active ASMS craniomaxillofacial surgeons (318 male, 49 female), most complete medical school, residency, and fellowship in the Northeast but choose to practice in the South across all practice types. A moderate association (Cramer's V = 0.271) exists between fellowship location and current practice location. Gender distribution varies by region, with most male surgeons in the South and female surgeons in the Northeast. Across both genders, most work in an academic setting. Female craniomaxillofacial surgeons are most represented in academic practice (23%) and least represented in private practice (5%). Academic practices are more evenly spread across U.S. regions while private practices are concentrated in the South and West. Highly populated states like New York, Texas, and California have a larger number of practicing surgeons compared to less populous states.

Discussion: Assessment of the migration and training patterns of craniomaxillofacial surgeons has revealed a trend of surgeons training in the Northeast but relocating to practice in the South, no matter their type of practice. A moderate correlation exists between fellowship and current practice location (Cramer's V = 0.271), indicating fellowship location has a moderate influence on practice location choice but is not a decisive factor. Gender trends show a regional skew, with male surgeons favoring the South and female surgeons the Northeast. Academic practices are the most common among both male and female surgeons, and have the greatest female representation. However, female craniomaxillofacial surgeons still remain a minority across all practice types, with the least representation in private practice. The current workforce exhibits a population-matched distribution, with an increased number of craniomaxillofacial surgeons in more populous states, aligning with a state's larger population size. These findings provide insight into regional and demographic trends that can guide future work on training pathways, access to care, and the decision of where to train and practice.

References

1. Teng TL, Hall R, Graham RA, Reiland J, Chatterjee A. Poor Access to Breast Reconstruction: A Geographical Shortage of Plastic Surgeons Relative to Breast Surgeons in the United States. Ann Plast Surg. 2019;82(4S Suppl 3):S256-S258. doi:10.1097/SAP.0000000000001846
2. Bauder AR, Sarik JR, Butler PD, et al. Geographic Variation in Access to Plastic Surgeons. Annals of Plastic Surgery. 2016;76(2):238. doi:10.1097/SAP.0000000000000651
3. Rohrich RJ, McGrath MH, Lawrence WT, Ahmad J, Force TAS of PSPSWT. Assessing the Plastic Surgery Workforce: A Template for the Future of Plastic Surgery. Plastic and Reconstructive Surgery. 2010;125(2):736. doi:10.1097/PRS.0b013e3181c830ec
4. Bureau UC. Geographic Levels. Census.gov. Accessed September 29, 2024. https://www.census.gov/programs-surveys/economic-census/guidance-geographies/levels.html

Insights from Comparing Blood Perfusion Metrics and Vancouver Scar Scale in Keloid Assessment

Abstract Presenter: junxian wen

Abstract Co-Author(s): Zhijin Li, Nanze Yu MD, Xiao Jun Wang

Background: Accurate keloid assessment is crucial for effective treatment planning. The Vancouver Scar Scale (VSS) is widely used but relies on subjective observation, leading to variability in scoring. Laser Speckle Contrast Imaging (LSCI) has emerged as a promising technique for objective assessment of keloid vascularity by quantifying blood perfusion. This study investigates the correlation between LSCI-derived perfusion metrics and VSS scores to evaluate their clinical utility in keloid assessment and treatment monitoring.

Methods: A retrospective study was conducted on 99 patients with 176 keloids. Blood perfusion ratios (PUkeloid/control) derived from LSCI were compared with pre- and post-treatment VSS scores. Correlation analysis and linear regression were applied to determine the relationship between perfusion metrics and VSS changes. Clinical cases were analyzed to validate the effectiveness of PUkeloid/control in guiding treatment.

Results: PUkeloid/control demonstrated a significant correlation with total VSS scores (Spearman's $\rho = 0.308$, $p < 0.001$) and its subcomponents, particularly vascularity (Spearman's $\rho = 0.424$, $p < 0.001$). The strongest associations were observed between PUkeloid/control and vascularity and pigmentation scores, emphasizing the role of perfusion in keloid severity. Linear regression analysis showed a strong association between changes in PUkeloid/control and improvements in VSS scores ($R^2 = 0.539$, $p < 0.01$), indicating that perfusion changes can reliably reflect therapeutic outcomes. Further subgroup analysis revealed that PUkeloid/control was superior to absolute PUkeloid values in evaluating both keloid lesions and post-surgical linear wounds. Patients who demonstrated a greater reduction in PUkeloid/control post-treatment also exhibited more substantial improvements in their VSS scores. Additionally, clinical cases demonstrated that high-perfusion areas identified via LSCI often corresponded with regions of persistent inflammation or poor therapeutic response, highlighting the potential role of targeted intervention strategies.
Among the 44 patients (56 keloids) who underwent post-treatment follow-up, the most common therapeutic approaches included pulsed dye laser (PDL) combined with betamethasone and 5-fluorouracil (35.17%), and surgery with radiotherapy (19.64%). While overall VSS scores significantly improved after treatment (median: 9 [6–13] to 7.5 [4–10], $p = 0.005$), no significant change was observed in absolute PUkeloid/control values at the group level ($p = 0.942$). However, a strong correlation was noted between changes in perfusion ratio (ΔR) and changes in VSS scores (ΔVSS), suggesting that individualized perfusion changes may better reflect treatment outcomes.
Clinical cases further supported these findings. One patient exhibited a marked decrease in PU ratio following combination therapy, which corresponded with improved scar pliability and pigmentation. Conversely, another patient with persistently high PUkeloid/control despite treatment demonstrated poor clinical response, reinforcing the importance of vascular assessment in treatment planning.

Conclusion: LSCI-derived PUkeloid/control provides an objective, non-invasive method for assessing keloid vascularity. This metric complements traditional tools like VSS, enhancing scar evaluation and treatment planning. Further studies are needed to optimize its clinical applications.

Recognizing Variations in Cleft Lip and Rhinoplasty Billing: A Review of 8,836 Cases

Abstract Presenter: Adam Fleming

Abstract Co-Author(s): Ashlie Elver MD, Laura Humphries MD, Ian Hoppe MD

Background: Billing practices for primary cleft lip repair and concurrent tip rhinoplasty remain inconsistent, contributing to variability in reimbursement and procedural documentation. The Current Procedural Terminology (CPT)-Relative Value Unit (RVU) system often undervalues cleft surgical procedures, failing to account for the complexity of combined repairs. While tip rhinoplasty is frequently performed alongside cleft lip repair, the extent to which it is billed remains unclear. This study analyzes billing trends and coding variability for primary cleft lip repair with and without separately billed tip rhinoplasty.

Methods: A retrospective review of the Pediatric National Surgical Quality Improvement Program (PNSQIP) database (2016-2021) identified patients undergoing primary cleft lip repair using CPT codes 40700 (unilateral) and 40701 (bilateral). Cases were categorized into two cohorts: Tip Rhinoplasty Group, where concurrent rhinoplasty (CPT 30460/30462) was billed, and No Tip Rhinoplasty Group, where it was not. Demographic, perioperative, and provider-related factors were compared using chi-squared and t-tests, with significance set at $p < 0.05$.

Results: Among 8,836 cleft lip repairs, 2,359 cases (26.7%) included a separately billed tip rhinoplasty. Patients in the Tip Rhinoplasty Group were significantly younger (240.09 ± 515.16 vs. 363.00 ± 853.64 days, $p < 0.001$) and more frequently inpatients (48.11% vs. 42.56%, $p < 0.001$). Total operative time was longer for cases with tip rhinoplasty (146.60 ± 70.47 vs. 117.04 ± 62.43 minutes, $p < 0.001$), as was total anesthesia time (209.00 ± 78.11 vs. 175.40 ± 68.85 minutes, $p < 0.001$). Plastic surgeons performed the majority of cases in both groups, though billing practices varied by specialty ($p = 0.34$).

Conclusions: Despite the widespread practice of performing tip rhinoplasty at the time of cleft lip repair, only 26.7% of cases had this procedure separately billed, highlighting significant variability in coding practices. The findings suggest that financial undervaluation of cleft procedures may contribute to inconsistent billing, with some surgeons opting not to code for tip rhinoplasty despite performing nasal modifications. Standardized billing guidelines and CPT-RVU model reforms are needed to ensure equitable reimbursement and accurate documentation of craniofacial procedures. Future studies should assess the impact of billing variability on surgeon compensation, institutional reimbursement, and patient access to comprehensive cleft care.

Disparities in the Work RVU Landscape Amongst Plastic Surgery Subspecialties

Abstract Presenter: Hailey Wyatt MD

Abstract Co-Author(s): Alexis Gursky, Rebecca Friedman, Sachin Chinta, Alay Shah MD, Daniel Ceradini MD, Eduardo Rodriguez MD

Introduction: The landscape of plastic surgery is diverse, encompassing a wide range of subspecialties, each with distinct procedural focuses and complexities. As reimbursement models increasingly rely on Relative Value Units (RVUs), understanding how RVUs vary across subspecialties is essential for both financial planning and resource allocation within the field. This study aims to compare RVUs across the subspecialties within plastic surgery using operative time as a surrogate for complexity [1]. By analyzing RVU data, we seek to uncover differences in the financial value associated with each subspecialty, providing insights into the economic factors that influence surgical practice and compensation.

Methods: This retrospective study analyzed the National Surgical Quality Improvement Program (NSQIP) database from 2009 to 2023, including only plastic surgery procedures. Seven plastic surgery subspecialties were defined: aesthetics, burn, breast, adult craniofacial, gender-affirming surgery (GAS), hand and upper extremity, and microsurgery. Subspecialty procedures were selected based on the five most common Current Procedural Terminology (CPT) codes, selecting by frequency of CPT or, for burn and gender-affirming procedures, through International Classification of Diseases (ICD) filtering. Both work RVU (wRVU) and efficiency (wRVU/min) were analyzed. The Kruskal-Wallis test with Dunn's post-hoc analysis and Bonferroni correction assessed inter-subspecialty differences. Linear regression examined associations between wRVU, operative time, and efficiency.

Results: The wRVUs across subspecialties correlated strongly with operative time ($R^2 = 0.8416$). The median wRVU efficiency varied across plastic surgery subspecialties. Among the seven subspecialties analyzed, breast surgery exhibited the highest median wRVU efficiency (0.1595 wRVU/min), followed by adult craniofacial (0.1588 wRVU/min), while microvascular procedures had the lowest median efficiency (0.0942 wRVU/min). There were statistically significant differences in wRVU efficiency between most subspecialties ($p < 0.001$), the largest differences were observed between microsurgery vs. breast, GAS vs. breast, and burn vs. breast.

Discussion: The findings highlight disparities in wRVU efficiency, with higher-efficiency subspecialties generating more RVUs per operative minute than lower-efficiency fields like microsurgery. This has key implications for trainees considering career paths, attending surgeons optimizing practice models, and the development of equitable reimbursement structures. Specialties with lower efficiency may be associated with longer OR hours and a higher risk of burnout, underscoring the need for compensation models that better reflect surgical effort and time investment.

1. Shim JY, Stoffel V, Neubauer D, Gosman AA, Matros E, Reid CM. "The Cost of Doing Business: An Appraisal of Relative Value Units in Plastic Surgery and Other Surgical Subspecialties." Plast Reconstr Surg. Published online February 15, 2023. doi:10.1097/PRS.0000000000010306

Let's Talk About It: A Virtual Peer Support Group for Plastic Surgeons and Trainees to Improve Confidence and Feasibility in Family Planning

Abstract Presenter: Madeleine Givant

Abstract Co-Author(s): Xinfei Miao, Kassandra Carrion, Aileen Gozali MD, Youssef Aref, Jasmine Chaij, Sarah Gubara, Gabriella Tavera, Wendy Chen MD, MS

Purpose: At this time, medical training lacks adequate and effective fertility and family planning education. Future and current plastic surgeons at all stages of the pipeline endorse minimal support and guidance. The aim of this study was to assess the outcome of a less than two-hour virtual event on attenuating attendees knowledge gaps regarding REI and family planning as well as the effectiveness of peer engagement and mentorship in alleviating role stress.

Methods and Materials: A virtual event targeted toward current and future plastic surgeons at all levels of training was held on April 20, 2024. The event consisted of short lectures followed by themed breakout sessions. Pre- and post-event surveys were distributed to assess the change in REI and family planning knowledge and the effectiveness of the intervention in alleviating role strain and stress. Data was analyzed using descriptive statistics and paired samples t-tests.

Results: A total of 113 individuals attended the event and spent an average of 82.75 ± 43.33 minutes. The pre-event survey had a 54.6% response rate while 69.9%

completed the post-event survey. Excluding partners and spouses, 72 pre- and post-event responses were assessed. The average age of respondents was 29.13 ± 3.48 years, with most participants identifying as female (90.3%) and heterosexual (81.9%). The majority were married or in a relationship (75%), with few having children (9.7%) or expecting (5.6%). Following the event, participants showed significant improvement in their understanding and preparedness to meet the financial, emotional, and logistical costs of REI and child-rearing ($p < 0.01$). Knowledge of surgeon infertility statistics and peer engagement also significantly increased ($p < 0.01$). When assessed for role success, attendees went from feeling as though they were "in crisis" to feeling as though they were at minimum "surviving" in their role as a physician following the event ($p < 0.01$). A significant improvement in rating of work-life balance was also observed ($p < 0.01$).

Conclusion: The current lack of REI and child-rearing education may leave future plastic surgeons underprepared to meet the realities and demands of family planning. This late awareness of the financial, emotional, and logistical costs of fertility and family planning may impact the ability of plastic surgeons to plan and effectively manage the responsibilities of parenthood. The significant increase in family planning knowledge and role success observed from this under two-hour, easily portable intervention highlights the effectiveness of targeted education in promoting wellness, preventing burnout, and attenuating the crisis state. These findings demonstrate a clear need for integrative and proactive education throughout medical training.

Enhancing Preoperative Communication with Visual Aids During a Plastic Surgery Mission Trip in Giridih, India: A Quality Improvement Initiative

Abstract Presenter: Emily Yanoshak

Abstract Co-Author(s): Jessica Pawly MD, Hibo Wehelie, Jennifer Goldman, Jonathan Black MD, Gabriella Squeo MD

Introduction: Language barriers continue to challenge the success of global surgery programs. Accurate and timely communication between providers and patients is critical to the overall success of the program. During a mission trip to Giridih, India (literacy rate: 63.1%), plastic surgeons sought to improve preoperative communication (1). In previous trips, written or verbal instructions alone were often insufficient, resulting in surgical delays and cancellations due to NPO violations or incorrect arrival times of

patients. While studies suggest visual aids and educational materials may improve communication, little research has examined their use in global surgical missions (2-4). This quality improvement initiative aimed to enhance preoperative communication by implementing written and visual instruction handouts to reduce surgery delays. We hypothesized that these aids would improve adherence to preoperative instructions, minimizing preventable disruptions in surgical care.

Methods: A three-item preoperative instruction handout was developed, covering fasting before surgery, date and arrival time for surgery, and avoidance of home remedies before surgery. These were translated into Hindi, verified for accuracy, and supplemented with images to enhance comprehension. Two surgical teams conducted preoperative screenings: one provided verbal instructions only, while the other used the handout alongside verbal instructions. Patients who received the handout were able to take it home for reference. Data was collected on NPO violations and late arrivals. Descriptive statistics were used for analysis with Fisher's exact test used to evaluate differences between NPO violations and late arrivals between instruction groups.

Results: Fifty-five patients were screened for surgery of which, 7 patients canceled their surgery. Of the 48 screened patients who underwent surgery, 27 patients were provided the preoperative instruction handout, and 21 patients were given verbal preoperative instructions only. Of the 27 patients in the preoperative handout group, none had any NPO violations or late arrivals. Of the 21 patients in the verbal-only instruction group, there were 9 patients with NPO violations ($p<0.001$) and 4 patients with late arrivals ($p<0.031$). Surgeries performed included cleft lip repairs, burn contracture releases, and various hand surgeries.

Conclusion: The use of written and visual preoperative communication aids significantly improved adherence to surgical preparation guidelines. These findings suggest incorporating visual and written materials into preoperative communication can enhance surgical preparedness and reduce preventable disruptions in surgical care during global mission trips. Further research should explore the scalability of this intervention in low-resource settings.

References:

1. Giridih District, Government of Jharkhand. Census Data 2011. Available at: https://giridih.nic.in/census-data-2011/. Accessed February 27, 2025.

2. Sudore RL, Schillinger D. Interventions to Improve Care for Patients with Limited Health Literacy. J Clin Outcomes Manag. 2009;16(1):20-29.

3. Mayeaux EJ Jr, Murphy PW, Arnold C, Davis TC, Jackson RH, Sentell T. Improving patient education for patients with low literacy skills. Am Fam Physician. 1996;53(1):205-211.

4. Meherali S, Punjani NS, Mevawala A. Health Literacy Interventions to Improve Health Outcomes in Low- and Middle-Income Countries. Health Lit Res Pract. 2020;4(4):e251-e266. doi:10.3928/24748307-20201118-01

Telemedicine in Plastic Surgery: A Systematic Review and Meta-Analysis of Pre- and Post-Pandemic Utilization and Outcomes

Abstract Presenter: Morvarid Mehdizadeh

Abstract Co-Author(s): Felita Zhang, LaYow Yu, Jian Li, Agustin Posso MD, Audrey Mustoe BA, Maria Escobar MD, Justin Cordero, Jose Foppiani MD, Bernard Lee MD, MBA, MPH

Purpose: Telemedicine revolutionized healthcare post-COVID-19 by accelerating virtual care. In plastic surgery, it has facilitated patient consultations, post-operative care, and inter-physician collaboration. However, the pandemic's impact on its adoption and effectiveness in this field remains underexplored. This study compares pre- and post-pandemic telemedicine in plastic surgery, focusing on outcomes, accessibility, and satisfaction, aiming to guide best practices and improve care.

Methods: A systematic review was conducted using PubMed, Medline, and Web of Science, following PRISMA guidelines, for articles published through November 2024. Extracted data included author, year, country, sub-specialty, pandemic classification, sample size, demographics, utilization purpose, barriers, travel time and distance, satisfaction, complications, and appointment duration. Meta-analyses used a random-effects model for pooled averages with 95% confidence intervals. Funnel plots and Egger's test assessed publication bias, with trim-and-fill analysis for asymmetry. Welch's t-test compared pre- and post-pandemic results, analyzed using R 4.4.1.

Results: We identified 450 publications, with 73 meeting inclusion criteria, involving 9467 subjects aged 47.99 years. 79% (95% CI: 65-93%; $p<0.05$) of patients would use telemedicine again, and 93% (95% CI: 88-98%; $p<0.05$) were satisfied. The pooled satisfaction score was 85.9 (79.4-92.5; $p<0.05$). Meta-analysis showed significant

reductions in travel time (120 minutes; $p<0.05$) and distance (187 miles; $p<0.05$). Five studies reported a mean appointment duration of 16.07 minutes. Complications were rare, with a pooled rate of 7% (95% CI: 2-12%; $p<0.05$). Post-pandemic patients reported lower satisfaction (82.5 vs. 94; $p=0.015$). Other post-pandemic estimates did not significantly differ from pre-pandemic ($p>0.05$).

Conclusions: This analysis highlights the evolving role of telemedicine in plastic surgery, particularly following the COVID19 pandemic. Compared to the pre-pandemic period, post-pandemic utilization of telemedicine in plastic surgery was associated with lower satisfaction, likely due to increased utilization and higher expectations. However, the overall impact of telemedicine on care delivery remains positive. Our results also highlight its effectiveness in improving accessibility with significant reductions in travel time and distance, while maintaining a lower complication rate. Continued refinement and adaptation of telemedicine protocols are essential to maximize its potential in enhancing patient outcomes, optimizing satisfaction, and supporting efficient healthcare delivery in plastic surgery.

The Use of Vasopressors on the Outcomes of Traumatic Lower Extremity Free Flaps Reconstruction: A Database Driven Propensity Score-Matched Analysis

Abstract Presenter: Charles Lee MD

Abstract Co-Author(s): Mary Newland, Olivia Julian MD, Rea Chroneos
Timothy Shane Johnson MD, John Roberts MD

Purpose: Lower extremity (LE) trauma can result in challenging reconstructive options for plastic surgeons and salvage of the affected limb(s) can necessitate a free flap.1 Hemodynamics management in free flap reconstruction, particularly vasopressor use, remains controversial despite their frequent use in other surgeries to improve perioperative hypotension.2,3 This is likely due to the theory that vasopressors induce vasoconstriction and vasospasm, decreasing tissue perfusion which may threaten the viability of the free flap. However, the true effects of vasopressor use on free flap outcomes are unknown.4,5 Therefore, our study aims to analyze the outcomes of traumatic LE free flap reconstruction in the setting of perioperative vasopressor use.

Methods: The TriNetX LLC. National Health Research database was utilized to identify patients who sustained lower extremity trauma and underwent free flap reconstruction

between 2004-2024. The database was further queried for those who did and did not receive vasopressors within 5 days of surgery and the two cohorts were subsequently matched for their demographics and comorbidities. Then, common procedural terminology (CPT) codes were used to assess for free flap procedure outcomes (microvascular anastomosis vessel repair, flap revision, flap repair, etc.) within the 7 days post-operative period.

Results: Of the 5,697 patients who underwent traumatic lower extremity free flap reconstruction, a total of 3,378 patients were associated with vasopressor use and 2,319 were not. When the two groups were matched for their demographics and comorbidities, 1,905 patients were identified in each cohort. There was no significant difference in the rate of free flap complication rates among those who received (15%) and did not receive (13%) vasopressors perioperatively (p=0.193).

Conclusion: Our study demonstrates that perioperative vasopressor use does not significantly impact the lower extremity free flap complication rate. Patients who received vasopressors did not experience higher rates of returning to the operating room for secondary procedures, microvascular anastomosis repair, flap revision, and flap repair within in the first 7 days of index surgery. Therefore, these results imply that vasopressor may be used when clinically indicated without an increased risk of flap failure.

References:
1. Naik AN, Freeman T, Li MM, et al. The Use of Vasopressor Agents in Free Tissue Transfer for Head and Neck Reconstruction: Current Trends and Review of the Literature. Front Pharmacol. 2020;11:1248. doi:10.3389/fphar.2020.01248
2. Cordeiro PG, Santamaria E, Hu QY, Heerdt P. Effects of vasoactive medications on the blood flow of island musculocutaneous flaps in swine. Ann Plast Surg. 1997;39(5):524-531. doi:10.1097/00000637-199711000-00013
3. Hahn HM, Kim TW, Thai DQ, Lee IJ. Impact of perioperative vasopressors on lower extremity free flap reconstruction. Microsurgery. 2022;42(5):470-479. doi:10.1002/micr.30870
4. Sanchez-Porro Gil L, Leon Vintro X, Lopez Fernandez S, et al. The Effect of Perioperative Blood Transfusions on Microvascular Anastomoses. J Clin Med. 2021;10(6):1333. doi:10.3390/jcm10061333
5. Noori O, Pereira JL, Stamou D, Ch'ng S, Varey AH. Vasopressors improve outcomes in autologous free tissue transfer: A systematic review and meta-analysis. J Plast Reconstr Aesthetic Surg JPRAS. 2023;81:151-163. doi:10.1016/j.bjps.2022.08.069

From Hashtags to Health Narratives: A Content Analysis of Breast Implant Illness on TikTok

Abstract Presenter: Payton Grande

Abstract Co-Author(s): Jacob Siegel, Shawnece Frazier-Mayfield, Osayamen Atekha Kometh (Tony) Thawanyarat MD, Rahim Nazerali MD

Background: Breast implant illness (BII) is a term used to describe a constellation of non-specific symptoms attributed to breast implants and is increasingly discussed on social media platforms like TikTok. However, its unregulated content may amplify misinformation. This study analyzes BII-related TikTok videos to identify prevailing narratives and trends shaping public perception as understanding online discourse surrounding BII is important to better appreciate patient experiences and recognize potential impacts on patient decision-making.

Objectives: This study aims to assess available information on TikTok regarding BII by examining both video content, quality, and engagement while identifying prevailing trends in the discourse.

Methods: TikTok was queried using BII-related hashtags. Relevant videos with over 10,000 views were included. Video engagement metrics, creator type, content, and purpose were analyzed. DISCERN and Global Quality Scale (GQS) scores were utilized to assess the quality of health information.

Results: A total of 138 TikTok videos related to breast implant illness (BII) were analyzed, amassing 116.9 million views, 5.9 million likes, 297,969 shares, 229,820 saves, and 59,905 comments. The median video length was 51.5 seconds (IQR: 14–103.25). Most videos (73.9%) were posted by patients, followed by plastic surgeons (15.9%), of whom 85.7% were board-certified. Verified users had significantly higher engagement across all metrics, including views ($p = 0.025$), likes ($p = 0.002$), shares ($p = 0.002$), saves ($p = 0.004$), and comments ($p = 0.012$).

Regarding video purpose, personal experience was the most common (45.7%), followed by entertainment (28.3%) and education (26.1%). Entertainment videos garnered significantly more views and likes than educational or personal experience videos ($p < 0.01$). Patient testimonials were the most frequently observed content type (37.7%), although social videos had significantly higher views ($p = 0.03$). Over half of

the videos (53.6%) addressed BII-related symptoms, with skin problems (41.9%) and fatigue (40.5%) most frequently mentioned. Patients and plastic surgeons were equally likely to include symptom discussions in their videos ($p = 0.81$).

Video quality assessment revealed a median DISCERN score of 16 and a median GQS score of 1, with plastic surgeon-created content scoring significantly higher than patient-created content ($p < 0.001$). Verified users also produced higher-quality content than non-verified users ($p = 0.048$). Video length positively correlated with information quality (DISCERN: $r = 0.525$, $p < 0.001$; GQS: $r = 0.270$, $p = 0.001$), though engagement did not correlate with quality scores. No significant differences in engagement were observed between plastic surgeons and non-surgeon creators.

Conclusion: Social media serves as an important space for BII discourse, but the predominance of anecdotal content over evidence-based knowledge raises concerns about misinformation. Plastic surgeons' videos were higher quality but did not achieve greater engagement, highlighting the need for greater provider participation to strengthen accurate and appropriate patient information. Content consumers must be aware of the possibility that not all information may be research based, and that they should always engage in meaningful conversation with their plastic surgeons about their symptoms and goals.

Characterizing the Recipients of Industry Payments at a National Plastic Surgery Conference

Abstract Presenter: Ariel Harsinay

Abstract Co-Author(s): Zachary Tamweber, Katherine Kozlowski, Eric Shuren

Purpose: To assess the industry payments received by plastic surgeon attendees of a national conference, analyze potential demographic differences in recipients of industry payments, and evaluate whether industry payments may be influencing the content presented at national meetings..

Methods: OpenPayments.gov was used to collect payment information across multiple categories for all individuals who were included in the AAPS 2022 program. Demographic information was collected for each participant, including sex, geographic region, degree type, residency training (plastics vs. other surgical specialties),

fellowship training, years of practice, and practice setting (academic vs. private medicine). Kruskall Wallis and Mann-Whitney Tests were completed in SPSS to compare groups.

Results: A total of $11,107,403.13 was received in general payments by AAPS 2022 participants. While the average general payment received by a plastic surgeon in 2022 was $10,733, plastic surgeon attendees of AAPS 2022 received an average of $28,776. The ten highest paid physicians encompassed 84% of the total industry payments received by conference participants. A total of 122 companies provided payments, with one company being responsible for 71.6% of all payments. Males, those who completed plastic surgery residencies, and those with 11 to 15 years of practice were found to earn significantly greater general payments. No significant differences in general payments were observed for those in academic vs. private medicine, fellowship vs. non-fellowship trained, or different geographic regions. For specific payment categories, associated research funding was significantly greater for non-fellowship trained physicians, while food and beverage payments were significantly greater for those with 11-15 years of practice and those in the Southwest.

Conclusions: The significantly greater payments received by males, those who completed plastic surgery residencies, and those with 11 to 15 years of practice indicates that this population may possess the strongest relationships within the industry, possibly due to greater accessibility to these relationships or alternatively due to a greater interest in pursuing these external sources of income. The significantly greater industry payments received by male recipients highlights that the gender pay gap for physicians in the U.S. appears to extend to supplementary sources of income as well. This warrants future research to explore if this represents an explicit bias in the industry or conversely if this can be explained by social factors that may preclude women from pursuing industry relationships(1). As the majority of payments were received by a small group of attendees, this provides some reassurance that overall conference content may not be heavily influenced by medical companies. However, the significant difference in payments received by AAPS attendees in comparison to the national average for plastic surgeons does show that these relationships have the potential to shape what is presented at national meetings, emphasizing the importance of transparency by speakers and adequate disclosures.

1. Sullivan BG, Al-Khouja F, Herre M, Manasa M, Kreger A, Escobar J, Dinicu A, Naaseh A, Dehkordi-Vakil F, Stamos M, Pigazzi A, Jafari MD. Assessment of Medical Industry Compensation to US Physicians by Gender. JAMA Surg. 2022 Nov 1;157(11):1017-1022. doi: 10.1001/jamasurg.2022.4301. PMID: 36169943; PMCID: PMC9520440.

Trends in Medicare Physician Fee Reimbursements for Cleft Lip and Cleft Palate Procedures from 2007-2024

Abstract Presenter: Khoa Nguyen

Abstract Co-Author(s): Celia Ernstrom, Tulay Flamand, Brooke French MD, Phuong Nguyen MD, David Khechoyan MD, Jason Yu DMD, MD

Introduction: Understanding reimbursement trends is crucial to maintaining a sustainable pediatric plastic surgical practice. The Center for Medicare & Medicaid Services (CMS) establishes standardized base rates for pediatric procedures, which are subsequently modified by state-specific Medicaid policies prior to physician reimbursement. However, there is limited literature on comprehensive longitudinal reimbursement trends for cleft lip and cleft palate procedures. The purpose of this study is to evaluate trends in physician fee reimbursement rates within the past two decades.

Methods: National reimbursement data from fiscal years 2007 to 2024 was obtained through the Medicare Physician Fee Schedule Look-Up (MPFS) tool provided by the CMS. Cleft lip and cleft palate procedures of interest were identified through Current Procedural Terminology (CPT) codes provided by the American Society of Plastic Surgeons [1].

The following values were queried from MPFS under the National Payment Amount which includes relative value units for work, practice expense, and malpractice. The Geographic Practice Cost Indices were set at 1.000 to account for national payment values. Conversion factors were directly obtained by contacting CMS. Physician fee reimbursements calculations were conducted using the established physician fee reimbursement equation [2]. Physician fee reimbursements were adjusted for inflation using the Bureau of Labor Statistics Physicians' Service Consumer Price Index [3]. Subsequent percentage change (PC) and year-over-year (YOY) analyses were conducted.

Results: 44 CPT codes were identified. Of the 44 codes, seven codes (15.91%) were directly cleft lip procedures, 14 codes (31.82%) were directly cleft palate procedures, and 24 codes (52.27%) were indirect procedures that could be used in cleft lip/palate cases.

YOY illustrated a decreasing pattern in reimbursements from fiscal years (FY) 2007-2024. Interestingly, YOY demonstrated down-trending fluctuations within cleft lip and palate physician fee reimbursements, in tandem with significant changes occurring during the Global Financial Crisis from FY2008-2009 and the SARS-CoV-2 pandemic from FY2020-2021. Noticeably, all CPT codes experienced a positive YOY change two years after these economically impacting events (2010 and 2022, respectively), possibly due to governmental intervention, and subsequently decreased again afterwards (Figure 1).

Overall, PF reimbursements decreased by an average of -29.44% (±9.21%) by the end of FY2024. All CPT codes for cleft lip and palate procedures demonstrated a decrease in reimbursements from FY2007 – FY2024 (Figure 2A-B). CPT 30140 experienced the greatest decrease in reimbursement (–69.65%) from FY2007 – FY2024. CPT 41872 experienced the smallest decrease in reimbursement at (–15.66%) from FY2007 - FY2024.

Conclusion: Overall, physician fee reimbursements demonstrated a down-trending pattern for the majority of cleft lip and palate procedures, from 2007-2024. Variable fluctuations occurred year-over-year at certain periods, possibly due to significant economic changes.

References:

1. ASPS Cleft Lip and Palate Recommended Insurance Coverage Criteria for Third Party Payer Coverage. 2022. https://www.plasticsurgery.org/documents/Health-Policy/Reimbursement/insurance-2022-cleft-lip-palate.pdf

2. Seidenwurm DJ, Burleson JH. The medicare conversion factor. AJNR Am J Neuroradiol. 2014 Feb;35(2):242-3. doi: 10.3174/ajnr.A3674. Epub 2013 Jul 18. PMID: 23868163; PMCID: PMC7965749.

3. Bureau of Labor Statistics, United States. Consumer Price Index. 2024. https://data.bls.gov/cgi-bin/surveymost

Cutting Costs: The Decline of Plastic Surgery Reimbursement Rates

Abstract Presenter: Michael Stigliano

Abstract Co-Author(s): Nancy Qin, Carson Gundlach, David Otterburn MD, Marcos Lu Wang MD

INTRODUCTION: In recent years, Medicare reimbursement rates across many medical specialties have decreased. However, the effect of these trends on plastic surgery has not been thoroughly investigated. This study analyzes changes in Medicare reimbursement rates for various inpatient plastic surgery procedures over the past 12 years.

METHODS: Given that the top-billed inpatient procedures are not publicly available in the CMS Physician/Supplier Procedure Summary database, the National Surgical Quality Improvement Program (NSQIP) database was utilized to identify the 100 most frequently performed inpatient plastic surgery Current Procedural Terminology (CPT) codes. These codes were classified into six categories: breast, craniofacial, hand, excision, peripheral nerve, and integumentary. Medicare reimbursement trends for each CPT code were analyzed using the Medicare Physician Fee Schedule Database from 2013 to 2025, with gross reimbursement rates adjusted to 2013 dollar values based on the Consumer Price Index (CPI) from the U.S. Bureau of Labor Statistics. Overall reimbursement changes over the past 12 years were calculated as weighted averages across the CPT codes.

RESULTS: The top 100 CPT codes identified in the NSQIP database accounted for 89.25% of all plastic surgeries (Table 1). Overall, gross reimbursement for these procedures decreased by 8.74% over the past 12 years, while inflation rose by 25.9%. Breast-related plastic surgery procedures experienced the steepest decline (-13.07%), followed by craniofacial (-4.22%), excision (-3.28%), integumentary (-2.46%), and hand (-1.57%) procedures. In contrast, peripheral nerve procedures showed the greatest increase in gross reimbursement (+8.74%). Additional details are provided in Table 1. After adjusting for inflation, these trends became more pronounced, with reimbursements falling even more sharply (range: -35.58% to -19.41%; average: -32.31%). Direct-to-implant reconstruction (CPT 19340), which accounted for 5.65% of all plastic surgery cases, experienced the steepest decline in reimbursement ($746.88 in 2025 vs. $1026.13 in 2013; -27.21%, or -46.06% after inflation adjustment). Conversely, neuroplasties (CPT 64708), comprising 0.15% of all cases, experienced the largest increase in gross reimbursement ($607.83 in 2025 vs. $505.92 in 2013; +12.54%, or -10.96% after inflation adjustment).

CONCLUSIONS: Medicare reimbursement rates for breast-related plastic surgeries have not kept pace with inflation over the past 12 years. The significant divergence between inflation and medicare reimbursement, particularly in alloplastic reconstruction, warrant further policy review to support the long-term viability of and fair access too reconstructive surgery.

A Chatbot Usability Questionnaire (CUQ) Assessment of a RAG-LLM Enhanced Virtual Assistant for Post-Operative Plastic Surgery Inquiries

Abstract Presenter: Syed Ali Haider M.B.B.S.

Abstract Co-Author(s): Prabha Srinivasagam Phd, Sahar Borna MD, Cesar Abraham Gomez Cabello MD, Ariana Genovese, Maissa Trabilsy, Cui Tao, Antonio Forte MD, PhD, MS

Background: Conversational AI systems are increasingly adopted in healthcare settings, yet their usability-a critical factor in successful implementation-remains insufficiently studied. General-purpose large language models (LLMs), despite their broad capabilities, pose patient safety and liability risks due to inaccuracies, generic medical information, and tendencies to hallucinate or deflect rather than provide precise, context-specific responses. The Chatbot Usability Questionnaire (CUQ) offers a standardized method to evaluate these systems from the user perspective. Retrieval-augmented generation (RAG) has emerged as a potential solution by grounding model outputs in verified knowledge sources. However, empirical evidence of its usability advantages remains limited. This study assesses the usability of RAG-LLM-AIVA, a retrieval-augmented generation agent developed on Google's Vertex AI, representing an advanced iteration of our earlier AIVA, initially created using Google Dialogflow (1). We compare its performance to Gemini 1.5 Flash, focusing on their effectiveness in addressing post-operative plastic surgery inquiries.

Method: We conducted a comparative usability evaluation with 20 healthcare workers (HCWs) who interacted with both RAG-LLM-AIVA and Gemini 1.5 Flash. RAG-LLM-AIVA, built on the Gemini 1.5 Flash architecture, was specifically trained to answer post-operative questions related to plastic surgery using a knowledge base compiled from publicly available medical resources, standardized post-operative instruction handouts, and peer-reviewed PubMed publications. Participants asked free-form, spontaneous post-operative care questions to both LLMs, mimicking real-world clinical interactions.

They then completed the 16-question CUQ, which evaluates usability dimensions such as personality, clarity, and usefulness on a 5-point Likert scale (0–100). The CUQ assesses chatbot personability, friendliness, purpose, ease of navigation, comprehension, usefulness, error handling, and overall ease of use.

Results: RAG-LLM-AIVA significantly improved perceived chatbot usability in plastic surgery post-operative inquiries. It achieved a mean CUQ score of 77.2 ± 11.7, significantly outperforming Gemini 1.5 Flash (65.2 ± 6.9, $p < 0.005$). This 12-point difference indicates a substantial usability improvement. RAG-LLM-AIVA outperformed across all measured metrics, with a higher median score (78.1 vs. 66.4) and a wider performance range (54.7–96.9 vs. 46.9–75.0). While RAG-LLM-AIVA demonstrated greater variability (standard deviation: 11.7 vs. 6.9), the overall trend indicated higher user satisfaction.

Conclusion: The statistically significant 12-point improvement in CUQ scores (77.2 vs. 65.2) suggests that retrieval augmentation effectively addresses key usability limitations of general-purpose LLMs. Future research should extend usability evaluations to include direct patient interactions. Investigating patient-centered outcomes, such as satisfaction and perceived benefit from RAG-enhanced conversational AI, will be essential for validating and further refining these technologies for clinical applications.

Reference

1. Avila FR, Boczar D, Spaulding AC, et al. High Satisfaction With a Virtual Assistant for Plastic Surgery Frequently Asked Questions. Aesthet Surg J. 2023;43(4):494-503. doi:10.1093/asj/sjac290

Volume-based Trends in Medicare Reimbursement for Plastic and Reconstructive Surgery Procedures from 2013 to 2022

Abstract Presenter: Jason Zhang

Abstract Co-Author(s): Christian Arcelona, Kayla Haydon, Anitesh Bajaj, Taylor Hallman MD, Hannah Soltani, Sahita Manda, Arun Gosain MD

Introduction: Approximately 20% of the United States population has Medicare health insurance coverage (1). With the aging population, this proportion is expected to increase (2). However, literature indicates that Medicare reimbursement rates to

physicians are consistently decreasing after inflation adjustments. This trend has also been observed in plastic surgery which can negatively impact access and sustainability of care (3). Our study is the first to analyze reimbursement by case volume of all procedure codes billed to Medicare by plastic and reconstructive surgeons from 2013 to 2022.

Methods: All procedure codes billed to Medicare Part B by plastic and reconstructive surgeons were extracted from the CMS Physician and Other Practitioners database. Medicare reimbursement information for analyzed codes were determined through the Medicare Physician Fee Schedule database, and codes with missing information during the study period were excluded. Procedure codes were divided into subgroups based on AMA categorization, and volume-weighted changes in reimbursement rates were calculated. Dollar amounts were inflation-adjusted to 2022 estimates based on consumer price index (CPI) values.

Results: 254 procedure codes were included for analysis. From 2013 to 2022, the mean Medicare reimbursement rate for plastic surgery procedures decreased by 22.2% from $337.01 in 2013 to $262.07 in 2022 after inflation adjustment. This results in an average decrease of $7.16 annually ($p<0.001$). The largest average decreases in reimbursement were observed in musculoskeletal procedures (37.3%, $240.17 to $150.56) and flaps and grafts (31.7%, $617.14 to $421.50). The smallest average decreases in reimbursement were for nervous system (9.6%, $419.99 to $379.65) and hand and upper extremity procedures (14.3%, $610.64 to $523.61). Reimbursement for head and neck procedures decreased by 24.1% from $793.37 to $601.89. Reimbursement for breast procedures decreased by 19.5% from $1216.81 to $979.64. None of the procedure types in our study had an average increase in reimbursement. There was no correlation between changes in volume and reimbursement ($R=0.01$; $p=0.848$).

Conclusions: Medicare reimbursement for plastic surgery is consistently decreasing regardless of case volume. Decreases in reimbursement were greatest for musculoskeletal procedures and flaps and grafts. The continued decline in reimbursement for plastic surgeons can have negative implications for practice management and access to care for patients.

CAMPI: A Model for Continuous Intraoperative Safety Monitoring in Plastic Surgery and Beyond

Abstract Presenter: Natalya Foreman

Abstract Co-Author(s): Christopher Sleiman, Santana Solomon BS, Michael Mazarei, Janelle Rodriguez MD, Irene Ma MD, Michel Saint-Cyr MD, MBA, MHA, FRCSC, FACS

Purpose: The operating room (OR) is the most common site for adverse events, with errors occurring in approximately 14.6% of surgical patients where up to 50% of such events are considered preventable.[1] In 2009, World Health Organization's (WHO) Surgical Safety Checklist (SSC) was developed featuring three checkpoints: Sign-in (before anesthesia induction), Time-Out (before incision), and Sign-out (postoperatively).[2] The SSC has improved communication, teamwork, and patient safety worldwide, yet it leaves gaps in addressing dynamic intraoperative risks that may arise especially during prolonged reconstructive or microsurgical cases. To address these concerns, we have developed and implemented a novel system known as CAMPI (Communication, Airway, Micro-breaks, Positioning, and IV Infiltration) for hourly intraoperative safety monitoring, detailed in this report.

Methods: The CAMPI protocol was implemented at Banner Gateway Medical Center in 2022 in the Department of Plastic Surgery and then expanded to include other surgical specialties, particularly for procedures with a duration of more than six hours. Implementation involved training sessions with all OR staff to explain overarching principles and application within each role. CAMPI checks were scheduled hourly throughout cases and feedback was collected from OR teams to refine communication and workflow. Metrics such as complication rates, team satisfaction, and patient outcomes were tracked to evaluate protocol effectiveness.

The acronym's components are as follows:
Communication: Clear and continuous communication among all team members, including periodic updates to ensure alignment on patient progress and anticipated challenges and proactive updates to the patient's accompanying family or loved ones.
Airway: Ongoing monitoring of airway stability via close collaboration between anesthesiologists and surgeons.
Micro-breaks: Scheduled 60-90 second breaks for all OR staff to stretch, hydrate, and reset their focus.
Positioning: Comprehensive checks for proper patient positioning to avoid pressure sores, peripheral neuropathies, and other complications with additional care for high-risk areas like occiput, sternum, sacrum, and heels.
IV Infiltration: Evaluation of IV sites using clear drapes and hourly palpation for detection of infiltration or extravasation.

Results: Since the implementation of CAMPI approximately 2.5 years ago, there have been reduced airway complications, pressure injuries, and IV infiltration rates compared to pre-CAMPI data. Additionally both patient families and surgical teams reported higher satisfaction with regards to communication and safety. Team feedback highlighted improved interdisciplinary communication and collective problem-solving via elimination of perceived hierarchy in the operating room.

Conclusion: CAMPI represents a paradigm shift in intraoperative safety, addressing critical gaps that traditional protocols overlook. By integrating structured, hourly checks that emphasize communication, airway management, micro-breaks, positioning, and IV safety assessments CAMPI not only improves patient outcomes but also fosters a culture of safety and collaboration within the OR.

References:

[1] de Vries EN, Ramrattan MA, Smorenburg SM, Gouma DJ, Boermeester MA: The incidence and nature of in-hospital adverse events: a systematic review. Qual Saf Health Care 17:216–223, 2008
[2] WHO Guidelines for Safe Surgery 2009: Safe Surgery Saves Lives. Geneva: World Health Organization; 2009. PMID: 23762968.

Challenging NSAID Restrictions: Assessing Gastric Ulcer Risk After Panniculectomy in Post-Bariatric Patients

Abstract Presenter: Nitasha Sharma

Abstract Co-Author(s): Jeewon Chon MA, Adam Gould, Jordan Simpson, Maha Khan, Emily Cao, Antoinette Nguyen, Joseph Ogrodnik MD

Background: NSAIDs and other non-opioid treatments are widely used for post-operative pain control but are generally discouraged in post-bariatric surgery patients due to the heightened risk of peptic ulcers. (1) Long-term NSAID use (>30 days) after Roux-en-Y gastric bypass (RYGB) is linked to a higher risk of marginal ulceration, while short-term use (<30 days) may be safer. (2) Despite these concerns, there is a paucity of literature surrounding safety of NSAID use following body contouring procedures in bariatric patients, which usually occurs over a year after initial gastric bypass once the patient's weight has stabilized. (3) This study evaluates the association between NSAID

use and ulcer incidence in patients with a history of RYGB or sleeve gastrectomy (SG) after panniculectomy.

Methods: A retrospective cohort study of 501 patients who underwent panniculectomy at Loyola University Medical Center (January 2012–January 2025) was performed. Inclusion criteria required a history of primary bariatric surgery (RYGB or SG) and subsequent panniculectomy. The primary outcome was the incidence of symptomatic peptic ulcers. Statistical analyses included chi-square, Fischer's exact tests, and logistic regression models to evaluate associations between NSAID use and ulcer development.

Results: Of 320 eligible patients, 31 males (9.7%) and 289 were females (90.3%), with an average age of 46.09 years and mean BMI of 32.17. A total of 135 patients (42.2%) had RYGB, 175 (54.7%) had SG, and 10 (3.1%) had an unknown bariatric procedure. Post-panniculectomy, 125 patients (39.1%) used NSAIDs while 195 (60.9%) did not. Gastric ulcers developed in 8 patients (2.5%), with no statistically significant difference in ulcer incidence between post-panniculectomy NSAID users and non-users ($\chi^2 = 1.42$, $p = 0.233$, Fischer's: $p=0.156$). Similarly, there was no significant difference in ulcer risk between pre-panniculectomy NSAID users and non-users ($\chi^2= 0.009$, $p = 0.924$, Fisher's: $p=1.0$).
Patients using NSAIDs either pre- or post-panniculectomy had a lower though non-significant ulcer risk (pre-panniculectomy: OR = 0.67, RR = 0.68, $p = 1.0$; post-panniculectomy: OR = 0.22, RR = 0.22, $p = 0.16$). The average duration of NSAID use postoperatively was 8.22 days. Logistic regression analysis demonstrated no significant association between NSAID duration and ulcer risk ($p = 0.72$, OR = 1.01, 95% CI: 0.98 – 1.04).

Conclusions: NSAID use following panniculectomy in post-bariatric surgery patients was not associated with a significant increase in ulcer risk. These findings suggest NSAIDs may be safer than previously assumed and may serve as a reasonable alternative to stronger opioid analgesics. Further research with larger cohorts is necessary to validate these results and better define risk factors, including NSAID dosage.

References:
1. Mechanick et al. Clinical practice guidelines for the perioperative nutrition, metabolic, and nonsurgical support of patients undergoing bariatric procedures - 2019 update. Surg Obes Relat Dis. 2020;16(2):175-247.

2. Skogar ML, Sundbom M. Nonsteroid anti-inflammatory drugs and the risk of peptic ulcers after gastric bypass and sleeve gastrectomy. Surg Obes Relat Dis. 2022;18(7):888-893.
3. Acarturk et al. Panniculectomy as an adjuvant to bariatric surgery. Ann Plast Surg. 2004 Oct;53(4):360-6; discussion 367. doi: 10.1097/01.sap.0000135139.33683.2f. PMID: 15385771.

Analysis of Gender Discrepancies and Qualifications in Plastic Surgery Leadership

Abstract Presenter: Sneha Subramaniam MD

Abstract Co-Author(s): Reid Smith, Katerina Jou, Ben Zhang, Neil Tanna MD, MBA, Mark Smith MD, FACS

Background: As of 2024, the percent of male and female residents are almost equal (51%male and 49% female). This is an increase from 40% female residents in 2020 and a large jump from 14% in 1990 (1). While the percentages have equalized on the resident level, the question of gender equality, representation, and mentorship in plastic surgery program leadership remains. Prior studies in the last five years have established that there is a noticeable gender disparity in the program director and chief/chairs roles(1). The goal of this study is to evaluate if plastic surgery residency and program leadership has kept up with the changing resident patterns.

Methods: The aim of this study is to determine whether any difference in objective credentials existed between male and female plastic surgery department chairs/division chiefs, and program directors (PDs) and if progress has been made over the last five years. Information from each plastic surgery program director and chair/chief was obtained from program websites of institutions with either an independent or integrated residency program. For each- length of career, fellowships completed, and publications- were evaluated using PubMed. F-tests were used to assess equality of variance, then either Student's t-test or Welch's t-test was applied to compare group means.

Results: 101 integrated and independent residency programs were included in this study. There were twelve female chairs which made up of 11.8% percent of total chairs (9.2% in 2020). Male chairs had two more years of experience than females based on graduation from medical school, (31 years vs 29 years, p=0.49), however, females had

more publications (115 vs 90, p=0.38) and longer fellowship training (1.25 years vs. 0.87, p=0.08), though not statistically significant. There were 26 female PDs (25.7%) representing an almost two-fold increase from 2020 (13.1%). Male program directors had more publications than females (58vs35,p=0.005) and three years more experience. Female chairs had more publications (35 vs 115, p=0.06) and years of experience (29 vs 23 years, p=0.11) compared to female program directors.

Conclusion: There has been an increase in female plastic surgery program directors over the last five years, reflecting similar changes in program composition. However, there has been a minimal shift on the female chiefs/chair level, despite having similar qualifications. While this pattern suggests positive changes in gender equality from five years ago, there is still room for growth, especially in larger leadership roles. Moreover, given the time it takes to become a program director or a chair, there is an inherent lag behind the growing percentage of graduates who are female. In turn, this creates a paucity of female role models for the burgeoning number current female trainees. This mentorship gap is something that is important to be aware of and to address in order to ensure continued progress, equality and support for female trainees/junior attendings in the field of plastic surgery.

References: 1.Zhang B,ChenK, HaG, etal.Plastic Surgery Chairs and Program Directors: Are the Qualifications Different for Men and Women?. PlastReconstr Surg. 2020;146(2):217e-220e. doi:10.1097/PRS.0000000000007011

Dog Bite Injuries Over 14 Years: A Comparative Study of Socioeconomic Indices and Risk Factors

Abstract Presenter: Danny Chamaa

Abstract Co-Author(s): Liara S. Ortiz-Ocasio, David Febre Alemany, Sumayyah Javed, Athena Zhang MD, Theodore Hyman MD, Albert Oh MD, Gary Rogers MD

Background: Dog bite injuries are a significant cause of pediatric trauma, leading to emergency department visits, surgical interventions, and long-term physical and psychological consequences.[1] Socioeconomic status (SES) influences health disparities, affecting access to care, injury prevention, and treatment outcomes.[2] This study investigates the relationship between pediatric dog bite injuries and three socioeconomic indices: the Area Deprivation Index (ADI), Social Vulnerability Index

(SVI), and Child Opportunity Index (COI), to assess their impact on injury incidence, severity, and healthcare utilization.

Methods: A retrospective cohort study was conducted on pediatric patients who presented with dog bite injuries at a Level I pediatric trauma center between 2010 and 2024. Demographic data, injury characteristics, management, and outcomes were collected. Socioeconomic indices (ADI, SVI, and COI) were assigned based on residential ZIP codes to evaluate neighborhood-level disadvantage, vulnerability, and opportunity. Statistical analyses were conducted to assess relationships between indices and demographics, management, and clinical outcomes.

Results: A total of 430 pediatric patients were included, with a median age of 8.1 years. The majority were male (61.3%), Black (62.3%) and had public insurance (70.3%). Family-owned dogs were responsible 50.8% of cases.

Socioeconomic analysis revealed that 61.5% of patients lived in low or low-medium opportunity neighborhoods based on COI scores, while 78.3% resided in medium-high or high vulnerability areas according to the overall SVI. The average ADI score was 27.24 ± 15.79, with most patients in the low deprivation category (54.42%), followed by moderate (31.16%) and high deprivation (1.63%).

Overall COI scores (lower COI = less opportunity) were significantly associated with return to the operating room (RTOR), operative management (OPM), specialist consultation (SC), infection, scar morphology, interpreter use, and insurance type ($P \leq 0.0001$), suggesting a strong relationship between low neighborhood opportunity and poorer clinical outcomes.

Overall SVI scores (higher SVI = greater vulnerability) were also significantly associated with multiple variables ($P \leq 0.0001$), though most correlations were weak and negative, except for specialty consults, which showed a moderate positive correlation ($rs = 0.3659$), indicating greater specialist involvement in more vulnerable populations.

Higher ADI scores (more deprivation) were significantly associated with increased rates of RTOR), OPM, SC, infection, and scar morphology ($P \leq 0.001$). However, insurance type was not significantly associated with ADI ($P = 0.3569$).

Conclusion: This study highlights the disproportionate burden of pediatric dog bite injuries on socioeconomically disadvantaged communities. This analysis not only reinforces the complex relationship between socioeconomic factors and pediatric dog

bite injuries but also provides valuable insight into the utility of ADI, COI, and SVI in understanding our patients and the broader socioeconomic influences on healthcare outcomes. These findings emphasize the need for targeted prevention strategies, improved healthcare access, and policy-driven interventions to reduce the injury burden and improve outcomes in at-risk communities.

References

1. Patterson KN, Horvath KZ, Minneci PC, et al. Pediatric dog bite injuries in the USA: a systematic review. World J Pediatr Surg. 2022;5(2):e000281. Published 2022 Feb 7. doi:10.1136/wjps-2021-000281
2. Birken CS, Macarthur C. Socioeconomic status and injury risk in children. Paediatr Child Health. 2004;9(5):323-325. doi:10.1093/pch/9.5.323

Mental Health in Chronic Lower Extremity Wound Care: An Analysis of Psychological Distress, Pain, and Functional Outcomes

Abstract Presenter: Ryan Lin MD

Abstract Co-Author(s): Rachel Rohrich, Sami Ferdousian, Danny Chamaa, Jie Jung Shih, Isabel Snee, Richard Youn MD, Karen Evans MD, Christopher Attinger MD

Background: Patients with chronic lower extremity (LE) wounds often face pain, reduced mobility, and psychological distress, all of which can diminish quality of life. Although common mental disorders (CMD) may be prevalent in this population, systematic screening in wound care settings is uncommon. Evidence describing the impact of CMD on wound-related patient-reported outcomes is limited. This study aimed to examine how CMD affect patient-reported outcomes in individuals with chronic LE wounds.

Methods: We conducted a cross-sectional survey of patients with chronic LE wounds treated at a multidisciplinary clinic from June 2022 to December 2024. Collected data included demographic and clinical characteristics, comorbidities, psychiatric diagnoses, surgical history, and wound care history. Patients completed validated questionnaires assessing mental well-being (Self-Report Questionnaire-20 [SRQ-20]), quality of life (12-Item Short-Form Survey [SF-12]), pain intensity (Patient-Reported Outcome Measurement Information System Pain Intensity [PROMIS-3a]), resilience (Connor-

Davidson Resilience Scale [CD-RISC]), and lower-extremity function (Lower Extremity Functional Scale [LEFS]).

Results: Among 714 patients, 108 (15.1%) had documented psychiatric diagnoses, primarily depression or anxiety. There were no significant differences between wound type (overall rates of foot ulcer: 44.6%, knee ulcer: 40.9%, above knee ulcer: 2.7%, other: 11.8%) or surgical history ($p > 0.21$). Compared with patients without a psychiatric diagnosis, those with CMD had significantly higher SRQ-20 scores (5.3, IQR 4.1 vs. 3.6, IQR 3.9; $p < 0.0001$) and a greater incidence of suicidal ideation (8.4% vs. 3.4%; $p = 0.023$). Patients screening positive for CMD also reported more intense pain (PROMIS-3a T-score 56.2, IQR 13.8 vs. 52.7, IQR 13.5; $p = 0.016$) and reduced functional abilities (LEFS 42.8, IQR 23 vs. 48.3, IQR 26.4; $p = 0.04$). They additionally expressed a higher desire to consult a mental health professional ($p = 0.005$). There were no significant differences in psychological distress between patients' different surgical histories (minor and major amputation or limb salvage procedures, $p=0.786$). After multivariate regression analysis, history of different amputations or limb salvage procedures were not significant covariates associated with depression or psychological distress ($p>0.15$).

Conclusion: Chronic LE wound patients with CMD exhibit significantly higher psychological distress, more intense pain, and lower functional status, as well as elevated rates of suicidal ideation. Psychological distress did not vary significantly between minor or major amputation or limb salvage procedures. These findings highlight the importance of routine psychiatric screening and the integration of mental health services into multidisciplinary wound care to optimize patient outcomes.

Evaluating Self-Query Retrieval to Enhance Large Language Model Postoperative Support to Rhinoplasty Patients

Abstract Presenter: Cesar Abraham Gomez Cabello MD

Abstract Co-Author(s): Prabha Srinivasagam Phd, Sahar Borna MD, Syed Ali Haider M.B.B.S., Ariana Genovese, Maissa Trabilsy, Cui Tao, Antonio Forte MD, PhD, MS

INTRODUCTION: Large Language Models (LLMs) have shown potential to enhance medical practice. One promising application is as a patient resource; however, prompt quality can greatly affect responses, and patients may struggle to express their concerns clearly, especially in the postoperative period. To address this limitation, we

implemented Self-Query Retrieval, an advanced Retrieval-Augmented Generation (RAG) technique, to enhance LLMs' performance in providing postoperative recommendations for patients following rhinoplasty. This approach aims to deliver more precise and contextually relevant guidance by automatically refining vague or incomplete queries, ultimately improving patient outcomes.

METHODS: A comprehensive knowledge database on rhinoplasty was compiled and integrated with Gemini 1.0 Pro to create four distinct RAG configurations: a basic RAG with no prompt refinement and three using self-query retrieval to (1) restructure prompts into PICOT format (Patient, Intervention, Comparison, Outcome, Time), (2) restructure into SPICE format (Setting, Perspective, Intervention, Comparison, Evaluation), and (3) incrementally adjust the prompt with Iterative Query Refinement (IQR). Each model was presented with 30 questions addressing typical patient concerns after rhinoplasty, and performance was evaluated in terms of medical accuracy, relevance, precision, recall, and F1 score. A 3-point Likert score (LS) was used to assess medical accuracy and relevance and response metrics were compared using ANOVA and Tukey's post hoc analysis.

RESULTS: The model using IQR demonstrated the highest accuracy of 87% with an average LS of 2.4±0.72, compared to the SPICE model at 77% (LS 2.1±0.79), the PICOT model at 67% (LS 2.0±0.74), and the basic model at 50% (LS 1.63±0.72). The IQR and the SPICE models were statistically superior to the basic model ($p<0.01$ and $p<0.05$, respectively). For relevance, the IQR model achieved a perfect 100% score (LS 3±0.0), while the SPICE model scored 93% (LS 2.8±0.55), the PICOT model 87% (LS 2.6±0.72), and the basic model 80% (LS 2.6±0.81). There was only a statistical difference between the IQR and the basic models with a p-value<0.03. The model with IQR obtained the highest precision, recall, and F1 scores of 0.53, 1.00, and 0.70. This was followed by the SPICE model with precision, recall, and F1 scores of 0.53, 0.75, and 0.57. The PICOT and basic models had a precision of 0.39 and 0.17, a recall of 0.56 and 0.39, and an F1 score of 0.46 and 0.24.

CONCLUSION: These findings demonstrate that incorporating Self-Query Retrieval, particularly with IQR, substantially enhances the accuracy, relevance, and overall performance of LLM-generated recommendations for post-rhinoplasty patient care. By consistently outperforming other RAG configurations in precision, recall, and F1 metrics, the IQR approach sets a higher benchmark for safe and effective patient guidance, paving the way for broader, more reliable clinical integration of advanced LLM methodologies. Further refinement and research remain imperative to ensure LLMs evolve into consistently safe and robust tools for clinical support.

A Retrieval Augmented Generation-Large Language Model Virtual Assistant for Interpreting Ambiguous Post-Operative Instructions

Abstract Presenter: Syed Ali Haider M.B.B.S.

Abstract Co-Author(s): Prabha Srinivasagam Phd, Sahar Borna MD, Cesar Abraham, Gomez Cabello MD, Ariana Genovese, Maissa Trabilsy, Cui Tao, Antonio Forte MD, PhD, MS

Introduction: Patient education is a critical component of surgical care, directly influencing recovery outcomes and satisfaction. In plastic surgery, where patient expectations and post-operative care requirements are particularly nuanced, effective communication becomes even more essential. Traditional methods of providing post-operative instructions are limited to scheduled consultations and printed materials, leaving patients without reliable guidance during critical recovery periods when questions arise.

Recent advances in artificial intelligence have enabled the development of virtual assistants to provide round-the-clock patient support. However, most existing systems employ rule-based natural language processing (NLP) that requires precisely formulated questions to generate appropriate responses. This represents a significant limitation, as patients typically express their concerns using natural speech patterns with inherent ambiguity, colloquialisms, and contextual references that confound traditional NLP systems.

Methods: We upgraded an AI virtual assistant (1) using Retrieval Augmented Generation (RAG) methodology, combining a Large Language Model with a specialized knowledge bucket of post-operative instruction handouts, PubMed articles, and publicly available medical knowledge. The system was trained on 10 frequently asked post-operative topics in plastic surgery. To evaluate its ability to handle ambiguity, we created 100 ambiguously worded questions mimicking real-world patient communications. Three independent reviewers assessed responses using Likert scales for factual accuracy, completeness, and empathy (1-5). We also evaluated readability using Flesch-Kincaid Grade Level, Flesch Reading Ease Score, and Hemingway readability assessments.

Results: The system demonstrated strong performance with ambiguous patient queries, achieving a mean accuracy score of 4.87/5 (SD=0.367) and completeness score of 4.82/5 (SD=0.47). Empathy scores were moderate at 2.93/5 (SD=1.05). For readability, Hemingway analysis showed that 57% of responses fell within the 9th–12th grade level. Flesch-Kincaid analysis showed 44% were at a college level. The mean Flesch–Kincaid Grade Level was 10.52 (SD = 2.93), with a Flesch Reading Ease Score of 45.70 (SD = 16.75). Responses averaged 14.65 words per sentence (SD = 5.37) and 1.73 syllables per word (SD = 0.19).

Conclusion: The RAG-LLM integration significantly enhanced AIVA's ability to interpret ambiguous post-operative queries, demonstrating high accuracy (mean Likert 4.87/5) and completeness (mean Likert 4.82/5). However, moderate empathy (mean Likert 2.93/5) and less than optimal readability (mean Flesch-Kincaid grade 10.52) require further refinement. The Flesch-Kincaid analysis indicated a college-level reading difficulty, highlighting the need for improved accessibility. This technology promises reliable 24/7 post-operative guidance, reduces unnecessary emergency room visits, and allows physicians to focus on building strong patient rapport.

1. Boczar D, Sisti A, Oliver JD, et al. Artificial Intelligent Virtual Assistant for Plastic Surgery Patient's Frequently Asked Questions: A Pilot Study. Ann Plast Surg. 2020;84(4):e16-e21. doi:10.1097/SAP.0000000000002252

Optimization of Efficiency and Resource Use in Outpatient Pediatric Plastic Surgery

Abstract Presenter: Skyler Palmer

Abstract Co-Author(s): Ananya Shah, Deanna Dwyer, Ariel Johnson MD, Diego Gomez, Antonio Porras, David Mathes MD, Jason Yu DMD, MD, David Khechoyan MD, Brooke French MD, Phuong Nguyen MD

Introduction: Pediatric plastic surgery requires significant time and resource investment from both patients and hospitals. Network of Care sites are designed to improve efficiency and reduce costs for patients undergoing less complex procedures. Though limited, some academic pediatric plastic surgery programs offer outpatient surgeries to patients at their main campus and Network of Care sites. The purpose of

this study is to examine the efficiency and resource use across surgery locations at an academic pediatric plastic surgery program.

Methods: A retrospective review was performed on all patients who underwent a 30–60-minute lesion excision performed by a single surgeon at our institution from 2023-2024. Case location (main campus vs. Network of Care site), operating room (OR) costs, supply costs, and anesthesia costs were collected. Patient outcomes were assessed based on 30-day infection rate, 30-day admission rate, and 30-day emergency department (ED) visits related to their surgery. Hospital time efficiency was measured as total time spent in the OR, and patient time efficiency was measured as preoperative wait time and total time spent in the facility. Continuous variables were summarized with means and standard deviations, and t-tests were used to compare means.

Results: A total of 72 procedures were identified, 14 at the main campus and 58 at the Network of Care site. The average total OR costs ($11,035.57 vs. $9,528.10, p=0.034) and average materials costs ($79.29 vs. $58.17, p=0.040) were significantly higher at the main campus than the Network of Care site. Although the average procedure duration was not significantly longer at the main campus (27.1 min vs 22.7 min, p=0.344), the average total time spent in OR was significantly longer at the main campus (51.3 min vs 40.0 min, p=0.034). Patient time efficiency was also lower at the main campus with patients spending more time on average waiting for their procedure (156.1 min vs. 87.6 min, p<0.001) and in the facility overall (292.8 min vs. 189.5 min, p<0.001). Patient infection rate (p=0.627) and ED visits (p=0.473) did not differ across locations. No readmissions occurred at either location, so no t-test was performed.

Conclusion: Performing this procedure at the Network of Care site was more time- and resource-efficient for the hospital and patients, while maintaining similar patient outcomes. As the total time spent in the OR was longer, the costs to the hospital and the patients were higher at the main campus. Furthermore, patients waited longer before surgery and spent longer time in the facility at the main campus compared to the Network of Care site. As patient outcomes did not differ between the two surgery locations, academic pediatric plastic surgery departments may preferentially shift outpatient appropriate surgical procedures to Network of Care sites to optimize resource use, enhance patient experience, and provide higher value care to patients.

COVID-19-Associated Trends in Medicare Utilization for Plastic and Reconstructive Surgery

Abstract Presenter: Jason Zhang

Abstract Co-Author(s): Anitesh Bajaj, Nikhil Sriram, Sahil Doshi, Christian Arcelona, Kathryn Reisner, Gabrielle Rodriguez MD, Muhammad Taaha Hassan, Arun Gosain MD

PURPOSE: The Medicare population is a subset of plastic surgery patients with unique needs and characteristics. Prior studies before COVID-19 have shown decreasing reimbursements and increasing charges. This study aims to characterize changes in Medicare reimbursements and charges in plastic and reconstructive (PR) surgery since the pandemic.

METHODS: The CMS Medicare Physician & Other Practitioners database was used to analyze all procedural codes billed by PR surgeons from 2013 to 2022. Subgroup analysis was conducted based on organ system (integumentary, musculoskeletal, nervous, other). Primary outcomes were the total number of services billed, average Medicare standardized payment, average submitted charge, and average percent reimbursed per visit. An interrupted time series analysis (ITSA) was conducted with the break point set in 2020. All dollar amounts were inflation-adjusted to 2022.

RESULTS: A total of 4,517,291 services for 2,742,082 beneficiaries were billed to Medicare by 3,648 surgeons. Between 2013 and 2022, there were decreases in volume (-30.4%), average Medicare standardized payment (-22.0%), average non-Medicare payment (-13.8%), percent reimbursed (-10.9%), with increases in charge (+13.3%). ITSA revealed a significant drop in volume in 2020 ($p < 0.001$), and significant changes in slope after 2020 in non-Medicare payment ($p = 0.043$) and percent reimbursed ($p = 0.01$).

CONCLUSIONS: Exacerbated by the COVID pandemic, downward trends in Medicare utilization and reimbursements for PR surgery have made it more challenging for surgeons serving Medicare recipients. Acknowledging these trends is vital to prevent increased care barriers to PR surgery and ensure better health for Medicare patients.

From Scalpel to Strategy: The Transformative Role of the ASPS Essentials of Leadership (EOL) Program

Abstract Presenter: Leah Gudex

Abstract Co-Author(s): Jaclyn Mauch MD, Dr. Samuel Lin MD, Merisa Piper MD, Amanda Silva MD, Chad Teven MD, MBA, FACS, HEC-C, Lambros Viennas MD, Mary Byrnes PhD, Paige Myers MD

Purpose: The American Society of Plastic Surgeons (ASPS) created the Essentials of Leadership (EOL) program to foster leadership skills and networking among current and upcoming plastic surgery leaders. This study aims to qualitatively evaluate the program's impact on participants, identify its strengths and weaknesses, and predict the future direction of leadership.

Methods: This study employed a qualitative descriptive design, using semi-structured interviews to explore the experiences of plastic surgeons who participated in the program. The data was analyzed inductively, and codes were reviewed to identify overarching themes.

Results: 29 interviews were completed. Participants practiced for an average of 15.5 years (range 7-29) in a range of practice models, including academia (86%) and private practice (14%). Significant themes identified include motivation to build leadership skills and new relationships through the program, a profound impact on career trajectory, and hopes for increased diversity in plastic surgery. Most participants entered the program at a crossroads in their career "I was looking for something more, and I wasn't sure where to get it" (P2); either as new faculty seeking leadership opportunities or searching for purpose through a major career shift, such as entering private practice from academia. Unanimously, surgeons sought to form new relationships, "the heart of what we do is collegiality and collaboration, and it would be a great opportunity to meet like-minded individuals" (P19). The impact on career trajectory was profound, empowering participants with the confidence to start a new leadership position or even to quit a dissatisfying job, "This program changed my life – I left my job… As I grew more confident in who I was, I realized that I could change course" (P27). Participants expressed hope for increased diversity and engagement in plastic surgery, mentioning that the "first step to making [opportunities] accessible is to have visibility [with a] diverse group of leaders so that the rising plastic surgeons see themselves in those individuals" (P2). Surgeons believe that diversity can be enhanced through merit-based leader selection and by the "old guard" (P6) stepping aside to make space for new leaders. Participants mentioned EOL as a "springboard" to leadership positions both within the society and their own institutions, demonstrating that the program levels the playing field by providing leadership opportunities to all involved (P19).

Conclusion: In conclusion, surgeons participate in the EOL program seeking leadership skills, networking opportunities, and time for reflection and personal growth. Participants valued the relationships, confidence, and leadership skills developed through the program, demonstrating its role as a springboard for those seeking additional leadership opportunities or profound changes in their careers.

A Scoping Review Characterizing Reproductive and Childbearing Challenges Facing Plastic and Reconstructive Surgeons

Abstract Presenter: Audrey Mustoe BA

Abstract Co-Author(s): Sarah Karinja MD, Micaela Tobin, Tricia Mae Raquepo, Agustin Posso MD, Sarah Hutton, Dr. Samuel Lin MD, Ryan Cauley MD MPH, Bernard Lee MD, MBA, MPH, Ashley Boustany

Background: An increasing number of women are choosing careers in the field of plastic and reconstructive surgery (PRS). These evolving surgeon demographics have highlighted the need for parental leave policies, lactation accommodations, and childcare services. Therefore, this study examines the reproductive and childbearing challenges that plastic and reconstructive surgeons encounter. Specific areas of focus include obstetric complications, parental leave, breastfeeding, childcare, and infertility.

Methods: In September 2024, a scoping review was conducted across CINAHL, Google Scholar, MEDLINE, PubMed, and Scopus, following PRISMA-ScR guidelines. Randomized control trials, observational studies, surveys, and interviews that examined pregnancy, parental leave, or family planning in PRS trainees or attendings were included. Abstracts, commentaries, editorials, systematic reviews, and non-English studies were excluded.

Results: Seventeen studies, consisting primarily of surgeon experience surveys (82.35%, n=3,145), were examined. Infertility affected 19.6-50.7% of surgeons, with 9.8-19.6% utilizing assisted reproductive technology. Female surgeons were older at their first live birth than the general population and faced stigma related to pregnancy. Between 39% and 56% experienced obstetric complications. Many reported a lack of lactation spaces and greater childcare burdens. Following the institution of a policy

protecting parental leave by the American Board of Plastic Surgery (ABPS), trainees reported a positive affirmation in their selection of the surgical specialty.

Conclusions: The implementation of protected parental leave has positively influenced workplace culture in PRS. However, significant gender-related challenges remain, particularly stigmas surrounding pregnancy and parental leave.

Prevalence of Prohibited Questions during Plastic Surgery Integrated Residency Interviews: Regional Analysis and Contextual Insights

Abstract Presenter: Athena Zhang MD

Abstract Co-Author(s): Esperanza Mantilla Rivas MD, Ashley Rogers MD, Theodore Hyman MD, Md Sohel Rana, Albert Oh MD, Lisa David MD, Jeffrey Janis MD, Gary Rogers MD

Objective: This study examines the prevalence of prohibited questions encountered during the 2024 integrated plastic and reconstructive surgery (PRS) residency interview process.

Methods: An anonymous 13-question minimum REDCAP survey was distributed to 2024 cycle applicants to PRS integrated residency programs in the United States. The survey covered personal characteristics and the frequency, type, context, and source of prohibited questions.

Results: A total of 74 applicants completed the survey, yielding a 23.1% response rate. 52.7% of respondents reported being asked at least one prohibited question while on the interview trail. 90% of respondents reported answering these questions, usually truthfully, and 43.3% stated that prohibited questions affected their ranking of particular programs. Female applicants were 5.8 times more likely to be asked about program ranking than males (43.2% vs 7.4%, p=0.001). Nonwhite applicants (Hispanic/Latino + Asian) were 5.88, 4.13, and 3.08 times more likely to be asked specific prohibited topics such as family planning (p=0.004), career balance (p=0.038), and marital status (p=0.025) respectively compared to White applicants. Additionally, programs in the U.S. South and Northeast were 1.52 times more likely to ask prohibited questions compared to programs in the West and Midwest combined.

Conclusion: Prohibited questions continue to be a prevalent issue in PRS integrated residency interviews. Even when not malicious, such questions may introduce potential bias into the process and can be unethical or illegal. Programs and applicants must work to highlight and eliminate these questions from the application process.

Pregnancy, Parenthood, and Plastic Surgery

Abstract Presenter: Melika Deaton MD

Abstract Co-Author(s): Shannon Su MD, Gabriela Garcia Nores MD

Introduction: 30% of all practicing surgeons are women and specifically, 17% of all practicing plastic surgeon are women. Within plastic surgery, these trends are shifting towards gender equality as 47% of residents are now women and will likely lead to an equal distribution in practice in the coming years. Many female surgeons delay pregnancy due to lengthy training, leading to higher infertility and pregnancy risks. As more women enter plastic surgery, addressing the challenges of pregnancy and parenthood during training is crucial to reducing stigma and improving support systems to create a better environment for practicing physicians.

Summary of findings: Currently, about 40% of residents anticipate becoming a parent during residency and at least 1 in every 5 female residents are mothers. However, female plastic surgeons face higher infertility rates (50.7%) compared to the general population (12.9%), leading to increased reliance on assisted reproductive technology (ART).[1] While ART can extend
childbearing years, it is costly, time-intensive, and difficult to access during training. Furthermore, female plastic surgeons carry high risk pregnancies, with increased rates of gestational hypertension and preterm delivery. [2–4] Occupational exposures, such as radiation and antineoplastic agents, pose a threat to both the fetus and the mother. After delivery, residents must compromise between taking parental leave and graduation requirements. Surgical residents also struggle to balance lactation with clinical responsibilities due to limited time and distant facilities. Childcare costs are high, and many physician parents struggle to find adequate, affordable care. Some institutions offer on-site childcare or subsidies, but demand often exceeds availability, leaving many to rely on various costly options that cause financial stress. Very few programs have established concrete policies and guidelines addressing these issues leaving residents with uncertainty. More women than men reported that childcare was impacting their work (32.9% vs 19.0%, $p<0.01$), and physicians who reported that their

childcare responsibilities impacted their work had substantially higher odds of reporting burnout (OR=2.19), even after controlling for age and gender. [5]

Conclusion: Residency programs should establish clear policies for fertility, pregnancy, and postpartum care to support resident parents. Recommendations include fertility treatment coverage, pregnancy accommodations, protected prenatal appointments, and improved lactation and childcare options. Employers should work with their residents and attendings to allow for equitable and reasonable family benefits. Increasing awareness, flexibility, and institutional accommodations can improve maternal and fetal health as well as overall physician stress and burn out. A cultural shift toward acceptance and transparency is essential to help parent physicians in all specialties balance their careers and family life.

1. Hemal K, Chen W, Bourne DA. Fertility and Childbearing Outcomes of Practicing Female Plastic Surgeons. Plast Reconstr Surg. 2023;151(6):1327-1337. doi:10.1097/PRS.0000000000010119
2. Behbehani S, Tulandi T. Obstetrical complications in pregnant medical and surgical residents. J Obstet Gynaecol Can. 2015;37(1):25-31. doi:10.1016/S1701-2163(15)30359-5
3. Cai C, Vandermeer B, Khurana R, et al. The impact of occupational shift work and working hours during pregnancy on health outcomes: a systematic review and meta-analysis. Am J Obstet Gynecol. 2019;221(6):563-576. doi:10.1016/J.AJOG.2019.06.051
4. Kader M, Bigert C, Andersson T, et al. Shift and night work during pregnancy and preterm birth-a cohort study of Swedish health care employees. Int J Epidemiol. 2021;50(6):1864. doi:10.1093/IJE/DYAB135
5. Dillon EC, Stults CD, Deng S, et al. Women, Younger Clinicians', and Caregivers' Experiences of Burnout and Well-being During COVID-19 in a US Healthcare System. J Gen Intern Med. 2022;37(1):145-153. doi:10.1007/S11606-021-07134-4

Examining Hand Surgeon Representation and Training Pathways on Google Across the 50 Largest U.S. Cities

Abstract Presenter: Angad Sidhu

Abstract Co-Author(s): Nikhi Singh MD, Daniel Konig, Gabrielle Magnant, Joshua Gerstein, Patrick Mercho, Lauren Konig, George Corpuz MD, Carter Boyd MD, Joshua

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Purpose: The subspecialty of hand surgery is unique in that multiple training pathways exist, with the most common being orthopaedic and plastic surgery residencies. Patients increasingly rely on online resources to find a doctor. (1, 2) In this study, we analyze the composition of Google search results when querying for a hand surgeon across the 50 largest cities in the United States (US). We aim to assess the accuracy of online representation and identify potential discrepancies in public accessibility to qualified hand surgeons.

Materials and Methods: Google search engine was queried for the following terms: "hand surgeon", "upper extremity surgeon", and "hand microsurgeon" for the fifty largest cities by urban population within the US. The top twenty search results were recorded for each search, resulting in 3,000 distinct search results reviewed. Sponsored results were not included as these were not city specific. Physician gender, training history, practice information was collection. ChatGPT-4o (San Francisco, CA) was utilized for this demographic data extraction and this was verified manually. Board certification was verified using publicly available certification tools for each specialty. Regions were determined by the American Association of Medical Colleges (AAMC) determined regions. Statistical analysis with Statistical Package for the Social Sciences (SPSS) (Armonk, NY) was performed with descriptive statistics and chi-square tests. Ad-hoc analysis was performed with standardized residuals.

Results: A total of 1,497 unique physicians were identified, nearly all self-identified as a hand surgeon (98%), the majority were male (84%), and most attended medical school in the US (96%). The majority of surgeons completed orthopaedic surgery residency (73%), a minority completed plastic surgery residency (15%), and few (8%) completed general surgery training only. More than a third (39%) did not hold a Certificate of Added Qualification (CAQ) in surgery of the hand. Across all surgeons, those in academic practice were more likely to have a CAQ ($p<0.001$), attended orthopaedic surgery residency ($p=0.03$), be board certified in orthopaedic surgery ($p=0.02$), and have attended a hand fellowship (0.017). Those who attended a general surgery residency were less likely to be in academic practice ($p=0.002$). Those practicing in the northeast were more likely to be in academic practice ($p=0.01$) and those in the south were more likely to be in private practice ($p=0.02$).

Conclusions: Plastic surgeons represent a minority of search results when searching for a hand surgeon on Google. Nearly two fifths of surgeons identified did not hold a CAQ in surgery of the hand. Those in academic practice appear to have undergone

additional training compared to their private practice counterparts. Academic surgeons appear more likely to have completed additional fellowship training compared to their private practice counterparts, suggesting differences in training pathways between practice settings. Furthermore, geographic region may influence practice environment. As search engines play a growing role in healthcare decision-making, understanding how surgeon representation varies online is essential for improving transparency, patient education, and access to appropriately trained specialists.

References:
1. Awad SK, Cowen J, Patel J, Aluri AK, Ananthasekar S, Singh NP, et al. Plastic Surgeons Are Underrepresented When Searching Hospital Websites for a Hand Surgeon. Plast Reconstr Surg. 2023;151(6):1055e-8e.
2. Singh NP, Boyd CJ, Aluri A, Kovac S, Mainali B, Girardi A, et al. One in Three Chance of Finding A Plastic Surgeon on Major Hospital Websites. Plastic and Reconstructive Surgery – Global Open. 2023;11(1):e4781.

Longitudinal Analysis of Center for Medicare Physician Fee and Facility Pricing Reimbursements for Common Pediatric Plastic Surgery Operations from 2007-2024

Abstract Presenter: Khoa Nguyen

Abstract Co-Author(s): Emily Green, Tulay Flamand, Brooke French MD, Phuong Nguyen MD, Jason Yu DMD, MD, David Mathes MD, David Khechoyan MD

Introduction: The past two decades have seen a trending decrease in physician reimbursements from the Center for Medicare & Medicaid Services (CMS) across many specialties [1]. There is limited literature on longitudinal reimbursement trends for core pediatric plastic surgical operations for physicians and care facilities, despite CMS establishing standardized base rates for pediatric procedures. The purpose of this study is to evaluate trends in physician fees and facility pricing reimbursement rates for pediatric plastic surgery within the past two decades.

Methods: National reimbursement data from 2007 to 2024 was obtained through the Medicare Physician Fee Schedule Look-Up (MPFS) tool provided by the Center for Medicare & Medicaid Services (CMS). Select craniofacial reconstruction and cleft

lip/palate procedures of interest were identified through Current Procedural Terminology (CPT) codes.

The following values were queried from MPFS under the National Payment Amount which includes relative value units for work, practice expense, and malpractice. The Geographic Practice Cost Indices were set at 1.000 to account for national payment values. Conversion factors were directly obtained through available spreadsheets from CMS. Physician fee calculations were conducted using the established physician fee reimbursement equation [2].

Medicare facility pricing set at the National Payment Amount for the select CPT codes were also obtained. Both physician fee and facility pricing values were adjusted for inflation using the Bureau of Labor Statistics Consumer Price Index [3]. Subsequent percentage change (PC) and year-over-year (YOY) analyses were conducted.

Results: Physician Fee Reimbursements
Five common CPT codes for cleft lip/palate procedures and seven craniosynostosis CPT codes were identified. All 12 of the pediatric plastic surgery codes (100%) experienced an average net decrease of -26.57% (±9.85) (Figure 1). CPT 61558 experienced the smallest decrease (-5.08%), while CPT 42200 experienced the greatest decrease in physician fee reimbursement (-45.70%).

Facility Fee Reimbursements
Overall, 4 out of 12 CPT codes (33.33%) experienced an increase in facility pricing reimbursements while 8 out of 12 CPT codes (66.66%) experienced a decrease in facility pricing reimbursements (Figure 2). Facility pricing increased by a net average of 31.29% (±54.55) for 4 out of 12 CPT codes, while 8 out of 12 CPT codes decreased by a net average of –26.29% (±18.41). CPT 21175 experienced the greatest increase, while CPT 42200 experienced the greatest decrease in facility pricing reimbursement.

Conclusion: Overall, physician fee and facility pricing reimbursements demonstrated a down-trending pattern for the majority of common pediatric plastic surgery procedures, from 2007-2024. Variable fluctuations occurred year-over-year at certain periods, possibly due to significant economic changes.

References
1. American Medical Association. Medicare physician pay has plummeted since 2001. Find out why. 2024. https://www.ama-assn.org/practice-management/medicare-medicaid/medicare-physician-pay-has-plummeted-2001-find-out-

why#:~:text=The%20big%20problem%20is%20that,reform%20the%20Medicare%20payment%20system.

2. Seidenwurm DJ, Burleson JH. The medicare conversion factor. AJNR Am J Neuroradiol. 2014 Feb;35(2):242-3. doi: 10.3174/ajnr.A3674. Epub 2013 Jul 18. PMID: 23868163; PMCID: PMC7965749.

3. Bureau of Labor Statistics, United States. Consumer Price Index. 2024. https://data.bls.gov/cgi-bin/surveymost

Disparities in Breast Reconstruction Rates and Modalities Between English-Speaking and Non-English-Speaking Patients: A Propensity-Score Matched Analysis

Abstract Presenter: Lacey Foster

Abstract Co-Author(s): Angelica Hernandez MD, Noelle Garbaccio, Jade Smith, Morvarid Mehdizadeh, Justin Cordero, Dorien Schonebaum, Dr. Samuel Lin MD

Background: Breast reconstruction is a critical component of post-mastectomy care. Language barriers may limit shared decision-making and utilization of surgical options. Non-English-speaking (nEN) patients face challenges, including restricted communication and cultural differences in reconstruction preferences. This study evaluates differences in breast reconstruction rates and modalities between English-speaking (EN) and nEN patients to elucidate language-based disparities in surgical decision-making.

Methods: The TriNetX health research database queried ISO and CPT codes to identify patients with language preferences who underwent mastectomy from 2013 to 2024. 68 variables controlled for demographics, mastectomy type, cancer diagnosis, and comorbidities to propensity-score match patients to EN and nEN cohorts. Risk analysis evaluated differences in rates of autologous, implant-based, and any breast reconstruction.

Results: 204,982 EN and 12,029 nEN patients met criteria. 12,029 patients matched to each cohort. EN patients underwent any type of breast reconstruction more frequently than nEN patients (10.3% vs. 9.2%, p = 0.005; RR = 1.116, 95% CI: 1.033–1.205).

Implant-based reconstruction rates were also significantly higher in EN patients (5.3% vs. 3.5%, $p < 0.001$; RR = 1.508, 95% CI: 1.338-1.700). There was no significant difference between cohorts for autologous breast reconstruction (6.2% vs. 6.4%, p=0.571; RR = 0.972, 95% CI: 0.881-1.072).

Conclusion: EN patients had higher rates of implant-based and overall breast reconstruction compared to nEN counterparts, despite comparable autologous reconstruction rates. These disparities underscore potential socioeconomic or systemic barriers that warrant further investigation to achieve equitable reconstructive care.

Reconstructive

Assessing Factors and Outcomes of Patients who Undewent Conversion from Implant to Autologous Breast Reconstruction.

Abstract Presenter: Lauren Kim

Abstract Co-Author(s): Langfeier Liu, Thomas Troia, Sumeet Teotia MD, Nicholas Haddock MD

Introduction: While, historically, implant-based reconstruction has been the predominant method of breast reconstruction, the limitations and complications of this technique have led some patients to choose autologous options, particularly after radiation therapy. In some cases, patients will initially undergo implant reconstruction and subsequently elect to undergo autologous conversion at a later time. This study investigates the transition from implant-based to autologous breast reconstruction, emphasizing the factors driving this shift, patient outcomes, and the influence of emerging flap techniques like PAP and LAP on reconstruction decisions.

Methods: A retrospective review was performed using data from the REDCap database spanning January 2012 to August 2024. The study included 119 patients who converted from implant-based to autologous reconstruction and 1,329 patients who underwent primary autologous reconstruction. The analysis examined patient demographics, comorbidities, reasons for conversion, types of surgeries performed, and BREAST-Q responses to evaluate satisfaction and quality of life.

Results: Reasons for conversion primarily included capsular contracture, patient dissatisfaction, and complications from prior treatments. Patients who transitioned to autologous reconstruction typically required more revision surgeries compared to those who underwent primary autologous procedures ($p=0.002$). Notably, newer flap options like PAP ($p<0.001$) and LAP ($p<0.001$) were more commonly used in conversion cases, whereas DIEP ($p=0.003$) was more commonly used for primary autologous reconstruction. While there were no significant differences in preoperative BREAST-Q scores, postoperative satisfaction varied, highlighting the complex nature of reconstruction outcomes.

Conclusion: Converting to autologous breast reconstruction provides an alternative solution for those experiencing failures with implant-based methods. Utilization of PAP and LAP flaps in this population emphasizes the importance of individualized surgical strategies and indicates that patients may have been able to avoid additional conversion procedures if they had been presented with these alternative flap options earlier in their care. This study offers valuable insights into optimizing reconstructive outcomes by considering patient preferences and advancements in flap techniques.

Intraoperative Frozen Section Analysis (IFSA): One Plastic Surgeon's Experience with 1598 Consecutive Skin Cancer Removals

Abstract Presenter: Lawrence Chang MD

Abstract Co-Author(s): Michael Chang, Steven Chang, Matthew Delancy, James Monihan, Ray Armand

Background: Skin cancer continues to be the most frequently diagnosed cancer in the United States. Since 1990, the prevalence of melanoma and non-melanoma skin cancer (NMSC) has been steadily increasing.1 NCCN guidelines recommend complete excision of NMSC to preserve function and optimize aesthetic outcomes.2 The gold standard surgical treatment is Mohs Micrographic Surgery (MMS) with a reported cure rate of 99-100%.3 However, MMS requires specialized training and thus is more geographically and financially limited. The traditional technique utilized for skin cancer removal is intraoperative frozen section assessment (IFSA). IFSA is a common histopathological technique that facilitates microscopic analysis of skin cancer margins intraoperatively, guiding surgical decision making.4 Given the high accessibility of IFSA,

plastic surgeons can utilize IFSA when MMS is not readily available. In this study, we aim to report the efficacy of plastic surgeon's use of IFSA for NMSC removal.

Methods: We conducted a retrospective chart review study, reporting a single plastic surgeon's experience using the IFSA technique. The primary outcome was cancer recurrence and false negative rate, which was determined by searching the pathology lab's patient database, for IFSA procedures between January 2016 to July 2023. A recurrence was noted when a patient experienced an excision of skin cancer demonstrated to be arising from post-excision scar tissue. Secondary outcomes include defect size, number of stages, operative time, and complications.

Results: There were 1598 IFSA procedures included in the final analysis. The cohort was 40.2% female and the average age was 71.6 years old. The pathology lab identified two recurrences, representing a 0.1% recurrence rate (99.9% cure rate). Eight cases (0.46%) were false negatives for which subsequent reexcision took place. Complete treatment required an average of 1.15 stages to achieve clear margins with an average operative time of 48.5 minutes (n=44). The average defect size was 2.13 cm2, and the complication rate was 3.5%.

Conclusion: Conventional surgical excision for low risk NMSC remains the most widely available treatment, with cure rates potentially exceeding 95%. However, this method does not provide real-time feedback and may lead the surgeon to (1) incompletely excise the tumor or (2) create unnecessarily large defects. MMS utilizes this intraoperative analysis and demonstrates consistently high cure rates of 98-99%.3 However, underserved and rural communities may lack access to Mohs-trained surgeons and histotechnicians.5 Our findings suggest that plastic surgeons can use traditional IFSA as an effective surgical technique in treatment of NMSC with a 99.9% cure rate.

References:

1) Guy GP, Machlin SR, Ekwueme DU, Yabroff KR. Prevalence and costs of skin cancer treatment in the U.S., 2002-2006 and 2007-2011. Am J Prev Med. 2015;48(2):183-187. doi:10.1016/j.amepre.2014.08.036
2) Schmults CD, Blitzblau R, Aasi SZ, et al. Basal Cell Skin Cancer, Version 2.2024, NCCN Clinical Practice Guidelines in Oncology. J Natl Compr Canc Netw. 2023;21(11):1181-1203. doi:10.6004/jnccn.2023.0056
3) Stanciu A, Florica CE, Zota A, Tebeica T, Leventer M, Bobirca F. Surgical Outcomes of More Than 1300 Cases of Mohs Micrographic Surgeries from a Private Mohs Clinic in Romania. Chir Buchar Rom 1990. 2020;115(1):69-79. doi:10.21614/chirurgia.115.1.69

4) Loh L, Tiwari P, Lee J, et al. Use of Intraoperative Frozen Section in the Surgical Management of Patients with Nonmelanoma Skin Cancer. J Skin Cancer. 2021;2021:4944570. doi:10.1155/2021/4944570
5) Jhaveri MB. Mohs Micrographic Surgery and Surgical Excision for Nonmelanoma Skin Cancer Treatment in the Medicare Population. Arch Dermatol. 2012;148(4):473. doi:10.1001/archdermatol.2011.2456

Evaluating Microsurgery Outcomes Based on Antiplatelet and Blood Thinner Use

Abstract Presenter: Erika Shock

Abstract Co-Author(s): Farrell Landwehr, Angela Atkinson, Natalie Raatz, Brooke Porter MD, Kevin Klifto DO, Pharmd, Thomas Willson MD

Introduction: Microvascular free tissue transfer (FTT) has become a fundamental tool in complex reconstructive surgery. Thromboembolic complications remain the leading cause of flap failure, representing a major threat to the success of FTT procedures (1). This study aims to identify the optimal anticoagulation, antiplatelet, and ambulation protocols to minimize postoperative complications.

Methods: A single-institution, retrospective review was conducted to investigate the association of perioperative anticoagulation, antiplatelets, and ambulation on postoperative complication rates in microsurgical free tissue transfer. Anticoagulation included warfarin, unfractionated heparin, and low-molecular-weight heparin. Antiplatelets included clopidogrel and aspirin. Data was collected at timepoints: pre-operative home medications, 24 hours before surgery, intraoperatively, postoperative days 0-7, and discharge home medications. Post-operative ambulation from days 0-7 was collected. Flap complications analyzed included: flap loss, arterial thrombosis, venous thrombosis, venous congestion, operative takeback, partial flap loss, hematoma, seroma, dehiscence, infection, and fat necrosis. Multivariable logistic regression analysis was used to identify predictors of post-operative complications. Statistical significance was determined as $p\text{-value} < 0.05$.

Results: The study included 497 free flaps performed between January 2012 and December 2021. After controlling for age, sex, and nicotine use, patient ambulation on post-op day 1 was associated with lower odds of arterial or venous thrombosis compared to patients who did not ambulate on post-op day 1 (aOR 0.34, 95% CI 0.17-

0.68, p=0.003). Ambulation on post-operative day 1 was associated with 0.55 lower odds of operating room takeback compared to no ambulation on post-op day 1 (aOR 0.55, 95% CI 0.36-0.84, p=0.005). Anticoagulation on post-op day 6 was associated with 1.69 greater odds of returning to the operating room than patients who did not receive anticoagulation on post-op day 6 (aOR 1.69, 95% CI 1.07-2.68, p=0.024). Antiplatelet therapy on post-operative day 7 was associated with 0.64 lower odds of returning to the operating room than patients who did not receive antiplatelet therapy on post-op day 7 (aOR 0.64, 95% CI 0.41-0.98, p=0.041). Patient ambulation on post-op day 7 was associated with 0.66 lower odds of any complication compared to no ambulation on post-op day 7 (aOR 0.66, 95% CI 0.44-0.98, p=0.039).

Conclusions: Early ambulation is associated with reduced postoperative complications and reduced return to operating room, while anticoagulation continued after post-operative day 6 is associated with increased risk of operating room takeback. Antiplatelet therapy on postoperative day 7 decreased the risk of operating room takeback. This may represent an alternative to anticoagulation starting on postoperative day 7. These findings highlight the importance of prompt postoperative mobilization when appropriate and optimal antiplatelet and anticoagulation therapy timing in microsurgical free tissue transfer patients. This study emphasizes the necessity of establishing evidence-based guidelines for postoperative management in patients who undergo free flaps.

References:
1. Archibald H, Stanek J, Hamlar D. Free Flap Donor-Site Complications and Management. Semin Plast Surg. 2022 Dec 19;37(1):26-30. doi: 10.1055/s-0042-1759795. PMID: 36776806; PMCID: PMC9911222.

Outcomes of Modified V-Y Fasciocutaneous Flap Reconstruction Following Abdominoperineal Resection in Irradiated Patients: Analysis of Ten Years of Experience

Abstract Presenter
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Background: Complications following primary closure after abdominal perineal resection (APR) remain high, with reported rates reaching 66%. Flap reconstruction methods have significantly reduced post-operative complications. The de-epithelialized V-Y fasciocutaneous flap has proven to be safe and effective for APR closure, particularly in irradiated patients. This study evaluates long-term patient outcomes of the modified de-epithelialized V-Y flap over a ten-year period, expanding on prior research at our institution with a larger case series to provide more robust evidence of its effectiveness.

Methods: This is a retrospective review of patients who underwent V-Y flap reconstruction following APR and neoadjuvant chemoradiation therapy at our institution from 2013 to 2024. Patients with pelvic malignancy and prior radiation who underwent de-epithelialized V-Y gluteal advancement flaps were included; those without medial de-epithelialization were excluded. We analyzed both wound complications (infections, dehiscence, seromas, hematomas, pelvic fluid collections, pelvic abscesses, and cellulitis) and surgical outcomes (reoperation rates, readmissions, and interventional radiology (IR) drain placement). Multivariate logistic regression assessed the influence of medical comorbidities (e.g., BMI, smoking history, hypertension, diabetes, COPD, atrial fibrillation) and operative factors (e.g., operative time, prior abdominal surgery, defect surface area, mesh use) on wound complications, 30-day reoperations, 30-day readmissions, IR drainage, and increased length of stay (LOS).

Results: A total of 83 patients were analyzed, revealing a wound complication rate of 30.1%. The most common complication was pelvic fluid collections (22.9%), followed by dehiscence (21.7%). Within 30 days, 6 patients (7.2%) required reoperation, with 1 for non-wound issues, and 13 patients (15.7%) were readmitted. Of those with fluid collections or abscesses, 10 patients (12.0%) required IR drainage. Regression analysis revealed patients with COPD ($p=0.046$) or atrial fibrillation ($p=0.048$) were more likely to have wound complications. Mesh use ($n=10$) was associated with higher odds of wound complications ($p=0.02$), 30-day reoperation ($p=0.03$), 30-day readmission ($p<0.001$), and increased chance of requiring IR drainage ($p=0.01$). No variables assessed were associated with increased LOS in multivariable regression.

Conclusion: The modified V-Y flap approach demonstrated relatively low overall wound complication rates. Although no specific comorbidities predicted wound complications,

patients with COPD or atrial fibrillation may be less suitable candidates for this procedure due to higher likelihood of readmission or reoperation. Similarly, mesh use was associated with an increased rate of complications and interventions; however, the number of patients was relatively low and patients requiring mesh likely had a larger or more complex defect. Future studies will focus on assessing long-term outcomes and refining techniques to further reduce complications.

Development of a Preoperative Vascular Imaging Protocol with 3D Mesenteric Modeling for Supercharged Jejunal Conduits in Pediatric Esophageal Replacement

Abstract Presenter: Molly Macisaac

Abstract Co-Author(s): Jordan Halsey MD, S. Alex Rottgers MD

Introduction and Purpose: Esophageal replacement (ER) in pediatric patients presents unique challenges due to their smaller anatomy and need for a conduit that will remain functional for decades, unlike many adult oncologic patients. While gastric and colonic interpositions are more common, they have long-term complications including reduced motility, dilation, reflux, and chronic lung disease over time (1). Supercharged jejunal interposition (JI) offers superior long-term function but is technically demanding due to the segmental/variable jejunal vasculature (2). Preoperative computed tomography angiography (CTA) is widely used in microsurgical planning, yet its role in JI remains underexplored (3). This study describes a preoperative imaging protocol integrating CTA and 3D mesenteric reconstruction with both artificial intelligence (AI) and manual segmentation for optimized presurgical planning and targeted dissection.

Methods: For patients undergoing supercharged JI, preoperative CTA of the chest and neck assessed presence and caliber of the internal mammary arteries/veins (IMA/IMV), as well as secondary venous options, including cephalic (CV) and external jugular veins (EJV). CTA with 3D segmentation of the superior mesenteric vasculature mapped jejunal branching patterns. A retrospective review of patients undergoing the preoperative vascular imaging protocol was conducted to evaluate imaging accuracy, surgical decision-making, and intraoperative correlation with preoperative findings.

Results: Between April 2023 and February 2025, 13 patients underwent supercharged JI with CTA-based planning. The median age was 7.1 years (1.5-15.5). Bilateral IMA

visualization was achieved in all patients, and all underwent supercharge to the IMA. IMVs were visualized with lower resolution. Ten patients underwent venous anastomosis to the IMV (median coupler size: 1.75mm). The CV was used three times (median coupler size: 2.5mm) due to insufficient IMV size. Of 26 potential vessels, 52% of CVs and 15% of EJVs were insufficient for use. Mesenteric imaging identified significant vascular variability. Preoperative vessel mapping correlated with intraoperative findings and reduced extensive mesenteric dissection.

Conclusions: The incidence of pediatric patients requiring ER is low and our clinical series is already comparable to other series for supercharged JI in the adult population. Preoperative CTA augmented with high-resolution 3D mesenteric vessel reconstruction is helpful in preparation for supercharged JI in pediatric patients. Imaging reliably demonstrates patency and caliber of the IMAs and helps select targets for exploration based on IMV quality. Imaging of CVs and EJVs can help select and identify secondary venous targets when the IMVs are of poor caliper. Additionally, a novel protocol for creating 3D reconstructions of the mesenteric blood vessels aids with conduits design and dissection.

References:
1. Zwaveling S, Groen H, Van Der Zee D, Hulscher J, Gallo G. Long-Gap Esophageal Atresia: a Meta-Analysis of Jejunal Interposition, Colon Interposition, and Gastric Pull-Up. Eur J Pediatr Surg. 2012;22(06):420. doi:10.1055/s-0032-1331459
2. Thompson K, Zendejas B, Svetanoff WJ, et al. Evolution, lessons learned, and contemporary outcomes of esophageal replacement with jejunum for children. Surgery. 2021;170(1):114–125. doi:10.1016/j.surg.2021.01.036
3. Ghattaura A, Henton J, Jallali N, et al. One hundred cases of abdominal-based free flaps in breast reconstruction. The impact of preoperative computed tomographic angiography. J Plast Reconstr Aesthet Surg. 2010;63(10):1597–1601. doi:10.1016/j.bjps.2009.10.015

Robotic VRAM Flap Reconstruction in APR: A Promising Approach to Reduce Abdominal Donor Site Complications

Abstract Presenter: Eric Zeng

Abstract Co-Author(s): Stephanie Jensen, Van Sanderfer, Samuel Kogan MD., Edward Teng

Introduction: Abdominoperineal resection (APR) for low rectal and anal cancers poses challenging perineal wound defects, particularly for patients following neoadjuvant chemoradiation. Traditional vertical rectus abdominis myocutaneous (VRAM) flaps have proven efficacious but require large abdominal incisions, with donor site hernia rates reported up to 50%. [1] Robotic VRAM offers a minimally invasive alternative by preserving the anterior rectus fascia, potentially reducing donor site complications.

Purpose: To assess rates of abdominal hernia and bulge in patients undergoing robotic VRAM flap harvest and compare to published data of conventional open VRAM harvest. Secondary study outcomes include comparing rates of perineal wound complications, infections, and return to the operating room.

Methods: A retrospective review of all patients who underwent robotic APR with VRAM by a single surgeon from 2021 to 2024 was performed. Demographics, operative data, and complications were analyzed. Donor site hernias were diagnosed via CT imaging. Statistical analysis was performed in R Studio using T-tests or Mann-Whitney U tests for continuous variables, Fisher's Exact tests for categorical variables, Shapiro-Wilk tests for normality, and logistic regression modeling to adjust for covariates.

Results: All patients (n = 17) received neoadjuvant chemoradiation. The incidence of donor site hernia was 23.5%. Of those four hernias, one was symptomatic and required operative repair. No cases of perineal hernias were observed. Perineal wound dehiscence occurred in 23.5% of patients and was managed predominantly with wound care. Perineal infections were observed in 17.6% of patients and 23.5% required return to the operating room. After adjusting for covariates, diabetes was significantly associated with a higher risk of wound infection ($p = 0.03$), while adjuvant chemotherapy increased the risk of wound dehiscence ($p = 0.02$). Patients undergoing robotic APR with VRAM were 69% less likely to develop a donor site hernia, compared to data for those undergoing conventional open VRAM (OR = 0.311, $p = 0.049$). [2]

Conclusion: Robotic APR with VRAM reduces donor site hernia rates compared to traditional harvesting techniques, likely due to anterior rectus fascia preservation. This minimally invasive approach maintains similar perineal reconstruction complication rates while improving donor site outcomes. Robotic VRAM has the potential to redefine standards in APR reconstruction and warrants further discussion, particularly due to its ability to improve patient care. Additionally, its favorable learning curve could further equip plastic surgeons with greater versatility in utilizing an already commonly performed flap.

[1] Mortensen AR, Grossmann I, Rosenkilde M, Wara P, Laurberg S, Christensen P. Double-blind randomized controlled trial of collagen mesh for the prevention of abdominal incisional hernia in patients having a vertical rectus abdominis myocutaneus flap during surgery for advanced pelvic malignancy. Colorectal Dis. 2017 May;19(5):491–500.

[2] Tang AM, Spencer N, Parkins K, Bevan V, Taylor G, Markham D, Drew P, Harries RL. Radiological incidence of donor-site incisional hernia and parastomal hernia after vertical rectus abdominus myocutaneous flap-based reconstruction following colorectal surgery. Colorectal Dis. 2023 Apr;25(4):738-746. doi: 10.1111/codi.16400. Epub 2022 Nov 20. PMID: 36328985.

Improving Fat Graft Outcomes: Targeting Revascularization Mechanisms to Enhance Graft Retention in a Large Animal Model

Abstract Presenter: Rebecca Hohsfield

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Autologous fat grafting (AFG) is a widely utilized surgical technique, but fat graft survival rates remain inconsistent and unpredictable, limiting its effectiveness in clinical practice. We have previously demonstrated that vitamin D3 (VD3) improves fat graft retention in a xenograft model. In this study, we explored the mechanisms by which VD3 enhances AFG retention, aiming to inform targeted treatments and optimize therapeutic applications. Inguinally harvested adipose tissue from three female Yucatán pigs was autologously grafted into 16 dorsal sites (5cc per graft). Pig 1 received no treatment; pig 2 received oral VD3 (100K IU) thrice weekly postoperatively; pig 3 received oral VD3 (100K IU) thrice weekly for two weeks preoperatively and continuously postoperatively. Pigs were sacrificed at 3 months, and grafts were evaluated for histological, volumetric, and molecular changes using Hematoxylin and Eosin, Sirius red, immunohistochemistry, and relative quantitation PCR tests. VD3 improved AFG volume retention at 3 months ($p < 0.05$). Mechanistically, VD3 enhanced adipocyte viability and vascular migration into the graft core, measured by perilipin+ ($p < 0.05$) and CD31+ ($p < 0.01$) IHC, respectively. VD3 increased graft extracellular matrix (ECM) composition ($p < 0.05$) and collagen type III ($p < 0.05$). VD3-treated grafts showed decreased pro-inflammatory

TNF-α expression compared to the control ($p < 0.01$) and increased pro-regenerative M2 macrophages ($p < 0.01$). No significant differences were observed in fibrosis (TGF-β, Collagen(I)) or adiposity biomarkers (adipocyte count, adiponectin). Oral VD3 significantly increased fat graft retention, likely by promoting regenerative wound healing and tissue repair. Specifically, the results suggest that VD3 enhances graft retention through ECM remodeling, modulation of inflammation, and improved vascular migration into the graft core. These findings support the potential of VD3 to improve AFG outcomes in large animal models.

Do We Need to Dangle? Rethinking the Implementation of Lower Extremity Dangle Protocols

Abstract Presenter: Michael Kim

Abstract Co-Author(s): Katie Shen, Claire Olivas, Eloise Stanton MD, Joseph Carey MD, David Daar MD, MBA, Emma Koesters MD

Introduction: Postoperative management of lower extremity free flap reconstruction often includes formal dangling protocols to acclimate flaps to gravitational stress, though their clinical benefit remains uncertain (1). Existing literature presents conflicting evidence on whether these protocols reduce complications such as flap necrosis (2). This study evaluates the impact of a structured inpatient dangling protocol on flap outcomes and explores whether protocol omission may be clinically acceptable.

Methods: In this single-center retrospective cohort study, patients undergoing lower extremity free flap reconstruction were categorized by adherence to a formal inpatient dangling protocol. The protocol was defined by ≥3 consecutive days of supervised, limited dangling prior to discharge, typically beginning on postoperative day 5. Patients with no dangle protocol were allowed to lower their affected limb ad lib for brief activities without supervision, beginning on postoperative day 3. Demographics, comorbidities, surgical indications, flap characteristics, operative factors, flap survival, necrosis, and limb salvage were analyzed. Continuous variables (t-tests) and categorical variables (chi-square/Fisher's exact tests) were compared. Subgroup analyses were performed separately for muscle flaps and fasciocutaneous flaps.

Results: Of 124 patients, 71 (57.3%) followed the protocol. Fasciocutaneous flaps were utilized in 58.1% of cases versus 41.1% that received muscle flaps. Common

indications included chronic wounds or defects secondary to failed prior soft tissue coverage (41.9%), oncologic resection (13.7%), chronic osteomyelitis (6.5%), and traumatic injuries (25.0%). The dangle group had a higher proportion of muscle flaps (50.7% vs 28.3%, p = 0.012), a lower proportion of fasciocutaneous flaps (49.3% vs 69.8%, p = 0.022), and fewer patients with diabetes (21.1% vs 39.6%, p = 0.025). Cohorts were comparable in age (p = 0.37), sex (p = 0.79), BMI (p = 0.37), smoking status (p = 0.39), and mechanism of injury (24.5% traumatic in the dangle group vs 25.4% in the non-dangle group, p = 0.92). No significant differences were observed in flap loss (1.4% vs 1.9%, p = 0.83), successful limb salvage (97.2% vs 98.1%, p = 0.74), partial necrosis (0% vs 1.9%, p = 0.25), surgical site infections (0% vs 3.8%, p = 0.099), wound dehiscence (21.1% vs 28.3%, p = 0.36), or time to unassisted ambulation (8.9 ± 9.5 vs 10.7 ± 11.4 months, p = 0.45). Subgroup analyses comparing only muscle flaps and only fasciocutaneous flaps similarly had no significant differences in rates of flap loss, successful limb salvage, and partial necrosis (all $p < 0.05$).

Conclusion: Adherence to a formal inpatient dangling protocol demonstrated no significant improvement in flap survival, partial necrosis or other postoperative outcomes compared to non-protocol management. Across fasciocutaneous and muscle flaps performed for a wide range of indications, outcomes remained equivalent, suggesting that dangle protocol omission may not adversely affect recovery. These findings challenge the necessity of standardized dangling regimens in lower extremity free flap reconstruction and highlight the potential for simplified postoperative hospital courses in this complex population.

References:
(1) Lee ZH, Ramly EP, Alfonso AR, et al. Dangle Protocols in Lower Extremity Reconstruction. J Surg Res. 2021;266:77-87. doi:10.1016/j.jss.2021.03.028
(2) McGhee JT, Cooper L, Orkar K, Harry L, Cubison T. Systematic review: Early versus late dangling after free flap reconstruction of the lower limb. J Plast Reconstr Aesthet Surg. 2017;70(8):1017-1027. doi:10.1016/j.bjps.2017.04.001

Does Breast Reconstruction Affect Oncologic Outcomes in Patients with Non-metastatic Inflammatory Breast Cancer? A Single-center Retrospective Cohort Study over 27 Years

Abstract Presenter: Yizhuo Shen

Abstract Co-Author(s): Goutam Gadiraju, Renee Gao, Sean Yonamine, Matthew Prospero, Jen-Yeu Wang, Andrew Malek, Yibin Zhang, Justin Broyles MD

Introduction: Inflammatory breast cancer (IBC) is the most aggressive form of locally advanced breast cancer, typically treated with trimodal therapy, including neoadjuvant chemotherapy, modified radical mastectomy (MRM), and post-mastectomy radiation. Due to the high risk of recurrence of IBC, breast reconstruction after MRM requires careful consideration to balance oncologic surveillance with minimizing physical trauma. Despite these complexities, limited data exist on long-term oncologic outcomes following breast reconstruction in patients with IBC. This study aims to assess recurrence patterns and survival outcomes in patients with IBC who underwent breast reconstruction compared to those who did not.

Methods: We conducted a retrospective review of our institution's dedicated IBC program database. The database stores diagnostic and treatment data on all patients who have been treated for IBC at our institution from 1996 to 2023. Only patients who received MRM were included in our analysis. Patients with metastatic disease on presentation were excluded. The primary outcome was the percent of disease recurrence and time to recurrence or metastasis. Secondary outcomes included length of follow-up since MRM, and site of recurrence or metastasis. Propensity score matching, cox proportional hazards model, unpaired t-test, and Chi-squared test were used for statistical analysis.

Results: Among 330 patients with stage III IBC, 89 (26.97%) underwent breast reconstruction after MRM, while 241 (73.03%) did not. For reconstructed patients, the median follow-up was 58.38 months (2.3–257.98) from the time of MRM. 44 (49.44%) reconstructed patients experienced recurrence at a median of 17.87 months (0.79–86.3), primarily distant metastases (39, 88.63%) with 5 (11.36%) locoregional. 17 (38.64%) of 44 patients developed recurrences within the first year after MRM. For non-reconstructed patients, the median follow-up was 35.84 months (1.12–334.3). 121 (50.21%) patients developed recurrence at a median of 12.09 months following MRM (0.13 - 213.21), mostly distant metastases (117, 96.69%) with 4 (3.31%) locoregional. Early recurrence within the first year was observed in 60 (49.59%) patients.

Overall, the most common locoregional recurrence sites were the ipsilateral chest wall (62, 18.79%), supraclavicular lymph node (17, 5.15%), and axilla (7, 2.12%). Recurrence rates at these sites did not differ significantly between patients who received reconstruction and those who did not.

Propensity score matching based on race, age at diagnosis, smoking status, hormone receptor status, adjuvant therapy status, and comorbidities (hyperlipidemia, diabetes, and hypertension) was performed between patients who did and did not receive post mastectomy reconstruction. Patients who received reconstruction were not more likely to exhibit cancer recurrence compared with patients who did not receive reconstruction (Hazard Ratio: 0.77, 95% CI: 0.48 - 1.24, p=0.28).

Conclusions: Aggressive treatment modalities and high recurrence rates following IBC may complicate the decision to undergo breast reconstruction. High recurrence rates were observed for all patients regardless of receipt of breast reconstruction following MRM, and there was no difference in recurrence-free survival between these two groups. These findings support the consideration of delayed reconstruction in this high-risk population.

Race and Social Vulnerability Associated with Outcomes in Breast Reconstruction

Abstract Presenter: Anna Boydstun

Abstract Co-Author(s): Emily Hecox MD, Venkata Seerapu, Benjamin McIntyre MD

Purpose: Disparities among vulnerable populations exist in breast cancer reconstruction. This study investigates the relationship between race and Social Vulnerability Index (SVI) on outcomes of post-mastectomy breast reconstruction, focusing on disparities present among different reconstructive techniques.

Methods and Materials: A retrospective study was conducted on patients (n=228, 52.6% Black, 45.2% Caucasian, 0.9% Asian, 1.3% other) undergoing first-time post-mastectomy breast reconstruction at a single institution over seven years. Independent t-tests and Chi-square were used to analyze data including demographics, SVI, reconstruction methods, and outcomes. Subgroup analyses were based on reconstructive methods including DIEP flaps, tissue expanders (TE) with DIEP, latissimus dorsi (LD) flaps, TE with LD, direct-to-implant (DTI), and TE with implants.

Results: Black patients had a higher SVI, indicating more social vulnerability ($p < 0.001$), a higher BMI ($p < 0.001$), presented at a younger age ($p = 0.035$), and had higher rates of preoperative chemotherapy ($p = 0.004$) and radiation ($p = 0.045$). Black

patients were also more likely to have DIEP flaps ($p = 0.020$) and less likely to have DTI ($p = 0.008$). Patients undergoing LD flaps had a higher SVI ($p < 0.001$). Black patients and those in the most vulnerable SVI quartile had longer hospital admissions ($p = 0.021$, $p = 0.048$). Subgroup analyses demonstrated patients in the most vulnerable SVI quartile receiving DIEP flaps had a longer hospital admission than all other SVI quartiles ($p = 0.012$). Black patients receiving TE with LD flaps had increased time to complete reconstruction compared to all other races ($p = 0.018$).

Conclusion: The relationship between race, SVI, increased comorbidities, and earlier presentation indicates Black patients are more susceptible to adverse health outcomes, including increased time to complete reconstruction and increased length of hospital admission. Addressing these disparities is crucial to enhance care among vulnerable populations.

Achieving Rejection-Free Survival Beyond One Year in Face Transplantation with a Novel Immunosuppression Regimen

Abstract Presenter: Sachin Chinta

Abstract Co-Author(s): Alexis Gursky, Alay Shah MD, Hailey Wyatt MD, Samantha Lund MD, Bruce Gelb, Daniel Ceradini MD, Eduardo Rodriguez MD

Background: In the evolving field of vascularized composite allotransplantation (VCA), face transplantation has become a transformative option for patients with severe facial disfigurement. However, graft rejection remains a substantial challenge, particularly within the first post-transplant year. In solid organ transplantation, new induction therapies such as rituximab, a B-cell depleting agent, have demonstrated efficacy in reducing acute rejection episodes. However, its use in face transplantation has not been studied. This is the first study to report rituximab induction in face transplantation, evaluating its effectiveness in reducing facial allograft rejection.

Methods: This retrospective review was conducted of four face transplant patients who underwent induction therapy with rituximab and thymoglobulin, followed by triple maintenance immunosuppression, between 2015 and 2023 at our institution. Acute rejection was assessed using a comprehensive approach of clinical appearance, histopathology, and blood sampling, including donor-specific antibody (DSA) levels. These recipient-derived antibodies target donor antigens expressed on the allograft,

potentially causing graft injury or rejection. Data analyzed included the time to first rejection, subsequent episodes, and DSA levels. A linear mixed-effects model assessed the relationship between DSA levels and rejection. A linear mixed-effects model was applied to examine the relationship between DSA levels and rejection while accounting for inter-patient variability and timing differences.

Results: In our cohort, the median time to first rejection was 536 days. Patient 1 remained rejection-free for over four years until postoperative day (POD) 1465, at which time DSA was detected. Patient 2 experienced their first rejection on POD 536 with DSA detection. Patient 3's first rejection episode occurred on POD 279, but no DSA was identified at that time, and they have remained DSA-negative since their transplant 4.5 years ago. Finally, Patient 4 has neither experienced rejection nor shown evidence of DSA, currently remaining rejection-free at 1.5 years post-transplant. The linear mixed-effects model did not reveal a significant association between DSA levels and rejection, even after adjusting for patient variability, duration of postoperative follow-up, and differences in timing of rejection episodes.

Conclusions: This is the first study to report the outcomes of rituximab-based induction in face transplantation. Our findings show that rituximab can effectively extend rejection-free survival beyond one year. Although some patients developed DSA during episodes of rejection, no significant association between elevated DSA levels and rejection was observed. This may suggest that DSA may not be a reliable predictor of rejection in this induction therapy regimen. Further research is needed to identify more accurate biomarkers for monitoring rejection in these patients.

References

1. Chauhan K, Mehta AA. Rituximab in kidney disease and transplant. Animal Model Exp Med. 2019;2(2):76-82. Published 2019 Mar 26. doi:10.1002/ame2.12064

Incidence of Lymphedema after Sarcoma Reconstruction with Local Flaps Compared to Free Tissue Transfer

Abstract Presenter: Diba Nayeri

Abstract Co-Author(s): Michael Kim, Jordan Gasho, Pedro Angel Perez, Carly Askinas MD, Joseph Carey MD, David Daar MD, MBA, Emma Koesters MD

Background: Soft tissue sarcomas often require reconstruction using either free or pedicled flaps. Lymphedema is a debilitating complication that can develop in this population postoperatively, leading to infections and significant morbidity (1). While prior studies have explored systemic risk factors such as neoadjuvant radiation, surgical risk factors for lymphedema remain poorly defined. Wu et al. (2023) found no difference in lymphedema rates between free and pedicled flaps in thigh sarcomas, but broader extremity analyses are lacking (2). This study evaluates lymphedema incidence following free versus pedicled flap reconstruction for upper and lower extremity sarcomas.

Methods: A single-center retrospective review was performed of adult patients who underwent extremity sarcoma reconstruction between 2015 and 2024. Patients were grouped into two cohorts based on reconstruction type: free or pedicled flap. Demographic and clinical variables (age, sex, operative time, time from resection to reconstruction, hypertension, peripheral artery disease, smoking status, functional status, lymph node dissection, preoperative radiation therapy/chemotherapy, and length of follow up) were compared between cohorts using chi-square and t-tests. A Firth penalized-likelihood logistic regression model was employed to assess the association between reconstruction type and lymphedema development, while including covariates such as age, sex, and neoadjuvant radiation.

Results: There were 75 patients identified: 33 free flaps and 42 pedicled flaps. Free flaps included anterolateral thigh (51.5%), latissimus (15.2%), and superficial circumflex iliac artery perforator flap (12.1%) while pedicled flaps included gastrocnemius (16.7%), vertical rectus (14.3%) and latissimus flaps (11.9%). The majority of patients underwent lower extremity reconstruction (53/75, 70.7%), while the remainder underwent upper extremity reconstruction (22/75, 29.4%). Demographics were comparable between the free and pedicled flap cohorts, with no significant differences in sex, incidence of hypertension, active smoking (21.2% vs 33.3%, $p = 0.25$), age (61.7 vs 56.5 years, $p = 0.18$), or follow-up duration. Pedicled flaps demonstrated significantly shorter operative times than free flaps (5.4 vs 8.2 hours, $p < 0.001$). Sentinel lymph node dissection was performed in 7 cases (9.3%). There were 10 patients who developed lymphedema post-operatively, none of whom underwent lymph node dissection. Notably, lymphedema was observed exclusively in the pedicled flap cohort (10/42 vs 0/33, $p = 0.003$). Multivariable Firth regression identified pedicled flap reconstruction as an independent predictor of lymphedema (coefficient 3.66, 95% CI 0.58–6.76, $p = 0.020$) compared to free flap reconstruction. In contrast, age ($p = 0.320$) and history of preoperative radiation ($p = 0.320$) were not statistically significant predictors of lymphedema.

Conclusion: Pedicled flap reconstruction was associated with the development of lymphedema in extremity sarcoma patients, while free flap patients had no observed cases. These findings suggest free tissue transfer may potentially reduce lymphatic disruption, particularly in the setting of oncologic extirpation. Future studies in larger cohorts are needed to validate these findings and to explore the role of intraoperative lymphatic preservation techniques in mitigating risk.

References:
(1) Friedmann D, Wunder JS, Ferguson P, et al. Incidence and Severity of Lymphoedema following Limb Salvage of Extremity Soft Tissue Sarcoma. Sarcoma. 2011;2011:289673. doi:10.1155/2011/289673
(2) Wu P, Elswick SM, Akhavan AA, et al. Risk Factors for Lymphedema after Thigh Sarcoma Resection and Reconstruction. Plast Reconstr Surg Glob Open. 2020;8(7):e2912. doi:10.1097/GOX.0000000000002912

Comparative Outcomes and Cost Analysis of Epidural Analgesia vs. ON-Q® Continuous Peripheral Nerve Block Pump for Pain Control in Open Abdominal Wall Reconstruction

Abstract Presenter: Imad Radi

Abstract Co-Author(s): Yash Jani, Bhargav Doddala, David Zabel MD

Introduction: Effective pain management is crucial in perioperative care, particularly in open abdominal wall reconstruction (OAWR). Epidural analgesia has been the gold standard for abdominal surgeries (1), but continuous peripheral nerve blocks such as ON-Q have gained popularity due to their potential advantages, including postoperative outcomes and cost benefits (2). This study compares the perioperative outcomes and costs associated with epidural analgesia versus ON-Q pain control in OAWR.

Methods: A retrospective review of a prospectively maintained single-surgeon database from 2012to 2019 identified OAWR patients receiving either epidural analgesia or ON-Q pain control. Primary outcomes included hospital length of stay (LOS) and complication rates (infection, wound dehiscence). A cost analysis was conducted to estimate comparative costs of each modality using contemporary institutional pricing. Statistical significance was set at $p<0.05$.

Results: Among 401 OAWR patients, 226 received epidural analgesia, and 175 received ON-Q. Mean LOS was significantly shorter in the ON-Q group (7.8 vs. 9.7 days, $p<0.001$). Complication rates, including infection and wound dehiscence, were similar between groups ($p>0.05$). Cost analysis estimated a total 3-day postoperative cost of $1,400–$3,300 for epidural analgesia versus $1,200–$2,400 for ON-Q. The shorter LOS in the ON-Q group suggests potential cost savings by reducing hospitalization days.

Conclusion: ON-Q pain control is associated with a significantly shorter hospital stay and comparable complication rates compared to epidural analgesia in OAWR. Cost analysis suggests potential financial benefits. Further prospective studies are needed to validate these findings and assess long-term outcomes.

(1) Melland-Smith M, Zheng X, Messer N, Beffa L, Petro C, Prabhu A, Krpata D, Rosen M, Miller B. Epidural analgesia and post-operative ileus after incisional hernia repair with transversus abdominis release: Results of a 5-year quality improvement initiative. Am J Surg. 2024 Apr;230:30-34. doi: 10.1016/j.amjsurg.2023.11.009. Epub 2023 Nov 11. PMID: 38000938.

(2) Gebhardt R, Mehran RJ, Soliz J, Cata JP, Smallwood AK, Feeley TW. Epidural versus ON-Q local anesthetic-infiltrating catheter for post-thoracotomy pain control. J Cardiothorac Vasc Anesth. 2013 Jun;27(3):423-6. doi: 10.1053/j.jvca.2013.02.017. PMID: 23672860.

The Utility of Quantitative Preoperative Peroneal Vessel Assessment in Fibula Free Flap Surgery

Abstract Presenter: Evan Rothchild BE

Abstract Co-Author(s): Isabelle Smith, Jina Yom, Joseph Ricci MD

Introduction: Vascular complications in fibula free flap (FFF) surgery can arise from atherosclerotic and arteriosclerotic disease in the peroneal artery. (1) Computed Tomography Angiography (CTA) has become the standard for preoperative risk assessment. (2) However, current evaluations rely on qualitative assessments to determine surgical eligibility. Therefore, using two quantitative scoring systems that

assess different components of vascular health, we aim to improve preoperative vascular assessment and patient risk stratification in FFF surgery. The first is the bollinger score, a validated system that provides a graded measurement of atherosclerotic burden from the contrast phase of CTA scans. (3) The second is the Lower Limb Arterial Calcification (LLAC) score, which measures the amount of calcium buildup using the Agatston method on the non-contrast phase of CTA scans. (4) By combining both scoring systems, our goal is to comprehensively assess vascular health in the peroneal artery and establish a more objective framework for preoperative risk stratification in FFF surgery.

Methods: A retrospective review was conducted on all head and neck microvascular FFF procedures performed at a university-affiliated, tertiary care center between August 2021 and March 2023. Data collected included patient demographics, medical history, operative details, and postoperative complications within 90 days. Peroneal artery bollinger and crural segment LLAC scores from the donor lower extremity were calculated from preoperative CTAs.

Results: A total of 117 patients were included. In our unadjusted analysis, higher bollinger scores showed a significantly increased risk for flap failure. After adjusting for potential confounders, increasing bollinger scores remained significantly associated with an increased risk of major complications, minor complications, and longer hospital stays. Increasing LLAC scores showed a trend toward increased fistula formation. Combining both scores improved risk stratification, as patients who exceeded both receiver operating characteristic cut points experienced an 8.36-fold higher risk of major complications.

Conclusions: Preoperative vascular assessment of donor vessels is critical for optimizing free flap survival and minimizing postoperative complications. This study is the first to explore the utility of quantitative preoperative risk assessment in FFF surgery. Our findings suggest that preoperative vascular scoring systems can stratify patient risk and enhance surgical planning, and that integrating multiple scoring systems to assess different aspects of vascular health may improve risk prediction. However, multi-institutional studies with larger patient cohorts and extended follow-up periods are necessary to validate these findings and establish standardized preoperative risk models.

1. Karanas YL, Antony A, Rubin G, Chang J. Preoperative CT angiography for free fibula transfer. Microsurgery. 2004;24(2):125-127. doi:https://doi.org/10.1002/micr.20009

2. Abou-Foul AK, Fasanmade A, Prabhu S, Borumandi F. Anatomy of the vasculature of the lower leg and harvest of a fibular flap: a systematic review. Br J Oral Maxillofac Surg. Nov 2017;55(9):904-910. doi:10.1016/j.bjoms.2017.08.363
3. Bollinger A, Breddin K, Hess H, et al. Semiquantitative assessment of lower limb atherosclerosis from routine angiographic images. Atherosclerosis. Feb-Mar 1981;38(3-4):339-46. doi:10.1016/0021-9150(81)90050-2
4. Chowdhury MM, Makris GC, Tarkin JM, et al. Lower limb arterial calcification (LLAC) scores in patients with symptomatic peripheral arterial disease are associated with increased cardiac mortality and morbidity. PLoS One. 2017/9/8 2017;12(9):e0182952. doi:10.1371/journal.pone.0182952

Long Term Outcomes of Lymphedema after Immediate Lymphatic Reconstruction following Axillary Lymph Node Dissection

Abstract Presenter: Abbas Hassan MD

Abstract Co-Author(s): John Hajj, John Paul Lewis, Shahnur Ahmed MD, Carla Fisher, Kandice Ludwig, Rachel Danforth MD, Ravinder Bamba MD, R. Jason VonDerHaar MD, Mary Lester MD, Al Hassanein MD, MMSc, FACS

Background: Breast cancer–related lymphedema (BCRL) significantly affects quality-of-life after axillary lymph node dissection (ALND). Although immediate lymphatic reconstruction (ILR) may reduce BCRL incidence, long-term outcomes and predictors remain unclear. We report long-term BCRL prevalence in patients undergoing ILR and delineate factors associated with BCRL after ILR.

Study Design: We retrospectively studied consecutive patients who underwent ILR following ALND between 2017 and 2024 at our institution. Primary outcome was BCRL prevalence, defined as ≥2cm limb difference at two contiguous points. Secondary outcomes included BCRL predictors, postoperative complications, and compression garment use.

Results: We identified 172 patients with a mean age 50.9±11.6 years, body mass index of 29.5±6.9 kg/m², and follow-up time of 23.1±15.2 months. Most patients (57.7%) underwent mastectomy, ALND with breast reconstruction. Median number of lymph nodes removed during ALND was 15 (IQR, 10.0-21.0), and median number of positive lymph nodes was 2.0 (IQR, 0.0-4.0). Cumulative BCRL incidence was 7.0% (n=12

patients). Compared to pooled estimates from 10,774 patients undergoing ALND alone, ILR cohort had significantly lower BCRL rates: 2.5% vs. 16.5% (<12 months), 3.7% vs. 24.6% (12–24 months), and 7.0% vs. 23.6% (>24 months) ($p < 0.001$). Black/African American patients had significantly higher lymphedema rates than White patients (18.8% vs. 4.5%, $p=0.005$). In adjusted analyses, Black/African American race was an independent predictor (OR, 6.38; $p<0.006$) of BCRL.

Conclusions: ILR following ALND demonstrated significantly lower BCRL rates compared with ALND alone, although Black or African American patients remain at disproportionately higher risk, warranting targeted interventions and further investigation.

Tranexamic Acid Does Not Decrease Perfusion of Random Pattern Skin Flap in McFarlane Model

Abstract Presenter: Abby Chopoorian Fuchsman

Abstract Co-Author(s): Jaime Bernstein MD, Sophia Salingaros, Kate Guion Manley, Matthew Liao, Samuel Medina, Xue Dong MD, PhD, Jason Spector MD

Background: TXA is an antifibrinolytic drug that stabilizes fibrin clots and is widely used by surgeons for its hemostatic properties but importantly has not been shown to increase the risk of thromboembolic events. However, there are little to no data regarding the effect of TXA at the microvascular level, particularly how it affects skin flap perfusion. This knowledge gap is of particular concern for surgeons who perform procedures that include elevation of random flaps, for both reconstructive and aesthetic applications, where thin skin flaps rely on random pattern blood flow. To address this question, we utilized a pre-clinical model of random flap elevation to assess the effect of TXA treatment on microvascular perfusion.

Methods: A dorsal McFarlane flap model (3 cm x 9 cm) with a cranial pedicle was performed in 250-300g Sprague Dawley rats receiving either 1) intravenous TXA at a therapeutic in vivo dose (10 mg/kg) N=6, 2) intravenous PBS of equal volume N=5, 3) subcutaneous (injected into the flap) TXA at therapeutic in vivo dose (10 mg/kg) N=6, or 4) subcutaneous (injected into the flap) PBS injections of equal volume N=5. The TXA or PBS was injected intravenously via tail vein as a 1 mL bolus or subcutaneously into the flap in 20, 100 microliter injections distributed evenly across and within a 1 cm

perimeter around the entire flap, 5 minutes prior to incision. Area percent gross necrosis of the flap was measured using ImageJ image analysis software at days 7 and 14. In vivo fluorescent imaging following intraperitoneal fluorescein injection was also performed at each timepoint to assess flap perfusion and congruence with gross imaging. Two-tailed t-tests were performed to assess differences in area percent gross necrosis between groups. Histological analysis to assess vascularity, wound healing, and microscopic necrosis is ongoing.

Results: Groups receiving TXA perioperatively had significantly lower area percent gross necrosis compared to control at day 7 (32.94 vs. 15.17, p=0.0448) and day 14 (34.83 vs. 14.03, p=0.0120). There was no difference in effect between subcutaneous and intravenous routes of administration for both PBS at day 7 (36.69 vs 30.70, p=0.7108) or day 14 (31.33 vs. 37.45, p=0.7159) or TXA at day 7 (13.14 vs. 17.19, p=0.6930) or day 14 (15.96 vs. 12.10, p=6033). This was supported by fluorescent imaging findings.

Conclusions: Peri-operative administration of TXA does not negatively impact thin random flap perfusion and may even decrease rates of necrosis with no difference between subcutaneous and intravenous administration. These data provide further evidence regarding the safety for use of TXA as a hemostatic agent in procedures that involve elevation of random flaps.

Enhanced Recovery and Cost-Effectiveness of Transversus Abdominis Plane Blocks in DIEP Flap Breast Reconstruction: A Retrospective Cohort Analysis

Abstract Presenter: Robert Sampson MD, MBA

Abstract Co-Author(s): Nicolas Oltean, Chiagoziem Okolo, Michael Awad, Duc Bui MD, Sami Khan MD

Background: Deep inferior epigastric perforator (DIEP) flap breast reconstruction is associated with significant postoperative pain and resource utilization. Although transversus abdominis plane (TAP) blocks are gaining momentum in Enhanced Recovery After Surgery (ERAS) protocols, data on their cost-effectiveness-particularly the differential impact on unilateral versus bilateral procedures-remain limited.

Methods: A retrospective cohort study was conducted analyzing data from 129 patients (TAP group: n=65; No-TAP group: n=64) who underwent DIEP flap breast reconstruction at a single institution between 2012-2023. Primary outcomes included initial pain scores (0-10 scale), hospital stay, and total opioid consumption (converted to intravenous morphine equivalents). Propensity score matching and multivariate regression analyses controlled for potential confounders including BMI, procedure laterality, and timing. Economic analysis within an ERAS framework incorporated estimates of inpatient care costs, TAP block placement and infusion with standard bupivacaine/ropivacaine, analgesic medications, PCA usage, and epidural usage.

Results: After propensity score matching, patients who received TAP blocks demonstrated significantly shorter hospital stays compared to those without TAP blocks (4.58 vs. 5.45 days, p=0.0004). Initial pain scores were lower in the TAP group but did not reach statistical significance (3.63 vs. 4.50, p=0.25). Total opioid consumption was similar between groups (46.98 vs. 50.43 mg IV morphine equivalents, p=0.78), though previous studies have demonstrated opioid-sparing effects (1). The data demonstrated a clear shift in pain management strategy, with TAP blocks effectively replacing traditional modalities as evidenced by substantially reduced utilization of PCA pumps (4.6% vs. 59.4%) and epidurals (1.5% vs. 18.8%), while maintaining comparable pain control. Economic analysis revealed significantly lower total healthcare costs in the TAP group ($17,540 vs. $20,350, p=0.003), representing a $2,810 (13.8%) cost reduction per patient. Importantly, cost savings were more pronounced for unilateral procedures (23.6% reduction) compared to bilateral procedures (6.6% reduction), primarily driven by greater hospital stay reduction in unilateral cases (27.2% vs. 11.7%).

Conclusions: This study highlights a novel aspect of TAP block utilization: greater cost savings in unilateral DIEP flap reconstructions. Overall, TAP blocks were associated with significantly shorter hospital stays and substantial healthcare cost reductions, consistent with prior economic analyses in abdominal surgery (2). By integrating TAP blocks into ERAS protocols, we observed a marked decrease in both PCA and epidural use, indicating a fundamental shift in perioperative pain management that preserves adequate analgesia while reducing resource utilization. The notably larger cost reduction in unilateral procedures versus bilateral procedures offers practical guidance for clinical decision-making and resource allocation in breast reconstruction. These findings reinforce the value of TAP blocks in ERAS pathways for DIEP flap surgery.

References:
1. Zhong T, Ojha M, Bagher S, et al. Transversus abdominis plane block reduces morphine consumption in the early postoperative period following microsurgical

abdominal tissue breast reconstruction: a double-blind, placebo-controlled, randomized trial. Plast Reconstr Surg. 2014;134(5):870-878. doi:10.1097/PRS.0000000000000613
2. Ayad S, Babazade R, Elsharkawy H, et al. Comparison of Transversus Abdominis Plane Infiltration with Liposomal Bupivacaine versus Continuous Epidural Analgesia versus Intravenous Opioid Analgesia [published correction appears in PLoS One. 2016 Sep 22;11(9):e0163687. doi: 10.1371/journal.pone.0163687.]. PLoS One. 2016;11(4):e0153675. Published 2016 Apr 15. doi:10.1371/journal.pone.0153675

Two Decades of Lymphovenous Bypass (LVB) for the Treatment of Lymphedema: A Meta-analysis of Prospective Clinical Trials

Abstract Presenter: Yizhuo Shen

Abstract Co-Author(s): Stav Brown MD, Felix Klimitz MD, Alexzandra Mattia, Bohdan Pomahac MD, Siba Haykal MD, PhD, FRCSC, FACS

BACKGROUND: Cancer-related lymphedema is an incurable, chronic, debilitating and lifelong condition affecting one in three cancer patients undergoing axillary lymph node dissection. Lymphovenous bypass (LVB) is a promising surgical intervention for the management of cancer-related lymphedema. This condition, resulting from damage to the lymphatic system following cancer treatment, leads to swelling, pain and functional impairment. This significantly impacts patients' quality of life. Despite the increasing use of LVB for lymphedema treatment in recent years, there is a lack of high-level, prospective, long-term data and standardized outcome metrics. The purpose of this study was to analyze the long-term, prospective outcomes of LVB throughout the past two decades using all available outcome measures.

METHODS: We conducted a systematic review on PubMed, Embase, and Web of Science to identify prospective clinical trials investigating LVB for lymphedema treatment in accordance with Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines. Outcome data included limb measurements, cellulitis episodes, compression use, and complications. Only prospective clinical trials with a minimum follow-up duration of 12 months were included. For studies involving multiple procedures, only outcomes from LVB cohorts were analyzed.

RESULTS: Eighteen prospective studies (2004-2024) were included, comprising a total of 1334 patients undergoing LVB with a mean follow-up time of 18.7±10.6 months. An

average of 3.0±0.7 anastomoses were performed per patient. LVB was associated with significantly reduced limb volumes with 19.72% (95% CI 18.44-21.82; p<0.001), 27.42% (95% CI 26.85-31.05; p<0.001) and 29.55% (95% CI 29.05-32.07; p<0.001) mean reduction one, two and three years after LVB, respectively. Additionally, LVB decreased the total number of cellulitis episodes by 97.0% (95% CI 94.72-98.02; p<0.001) and the number of episodes per year by 91.6% (95% CI 90.02-93.09; p<0.001). A total of 41.4% of patients discontinued compression garment use following LVB.

CONCLUSIONS: This is the largest study to evaluate the long-term safety and efficacy of LVB, summarizing two decades of prospective experience. LVB is a safe and effective treatment option, yielding durable improvement in limb volumes and cellulitis reduction. LVB is a safe and effective treatment option, yielding durable improvements in limb volumes and reductions in cellulitis episodes. Additionally, LVB facilitates a reduced dependency on compression garments, enhancing patients' quality of life.

Recognition of Common Lymphatic Patterns to Treat Truncal Lymphedema Using Lymphovenous Anastomosis

Purpose: We have previously presented our protocol for truncal lymphatic mapping and the destructive effect of breast cancer therapy on common drainage pathways of the trunk. Surgical treatment of breast cancer related truncal lymphedema with lymphovenous anastomosis (LVA) remains poorly described. Here we present our algorithm for analyzing superficial lymphatic patterns within truncal lymphedema patients to identify viable targets for LVAs.

Methods: We reviewed breast cancer patients with truncal lymphedema who underwent fluorescent lymphography between December 2014 and January 2024. We assessed the direction of lymphatic drainage and dermal backflow patterns throughout the trunk. Dermal backflow severity in various regions of the trunk were compared using analysis of variance. We performed full case reviews of patients who received LVAs.

Results: Our cohort included 106 hemi-trunks (85 patients). Lymphatic drainage to the ipsilateral axilla was seen in 39%, while 61% had drainage to the ipsilateral groin, and 25% had contralateral drainage. Dermal backflow was significantly worse in the superior trunk, above the IMF (p<0.001). 84% of the mastectomy skin flaps had diffuse or absent superficial lymphatic channels representee sever lymphatic congestion. Two patients underwent microsurgical treatment. The location of each LVA was plotted around

regions of most severe lymphedema and based on the direction of lymphatic drainage. Using florescent lymphography to identify patent lymphatic channels and ultrasound to identify nearby veins, two LVAs were performed per patient in the lateral chest, inferior to the IMF. The orientation of each anastomosis supported lymphatic drainage from the severely congested mastectomy flaps to the ipsilateral inguinal lymph nodes. Both patients reported immediate reduction in swelling and symptoms.

Conclusion: Building on our previous data, we have gained an improved understanding for patterns of lymphatic drainage after breast cancer treatment. Plotting drainage of the trunk and strategically placing LVAs has been critical to our reconstructive success.

One Plastic Surgeon's Experience with 3312 Consecutive Skin Cancer Removals over a 7 year period: A Comparison of Two Successful Techniques

Abstract Presenter: Lawrence Chang MD

Abstract Co-Author(s): Michael Chang, Steven Chang, Matthew Delancy, James Monihan, Ray Armand, Fady Gerges

Skin cancer, particularly non-melanoma skin cancer (NMSC), remains a prevalent diagnosis in the United States and poses significant challenges in treatment.1 The National Comprehensive Cancer Network (NCCN) recommends complete excision, emphasizing the importance of preserving function and optimizing aesthetic outcomes.2,3 Mohs Micrographic Surgery (MMS) is considered the gold standard treatment reporting cure rates as high as 99-100%, but it requires specialized training.4,5 In our private plastic surgery center, we use two surgical techniques for NMSC treatment: traditional intraoperative frozen section analysis (IFSA) and our novel technique Frozen Section Mohs (FSM).

We conducted a retrospective chart review comparing the clinical outcomes of the IFSA versus FSM performed by one plastic surgeon. The primary outcome was cancer recurrence and false negative rate, which was obtained by searching the pathology lab's database for IFSA and FSM procedures between January 2016 to July 2023. Secondary outcomes include defect size, number of stages, operative time, and complications. $\chi 2$-square and two-sample t tests were conducted for select variables.

There were 1598 IFSA procedures and 1714 FSM procedures included in the final analysis. Baseline characteristics were similar across both groups. The pathology lab identified two recurrences in the IFSA group and zero recurrences in the FSM group (99.9% and 100% cure rates, respectively; p=0.23). The false negative rate was 8/1598 (0.46%) for IFSA and 2/1714 (0.11%) for FSM. The average number of stages to achieve clear margins was 1.15 for IFSA which was similar to FSM at 1.17 stages (p=0.09). The average defect size for IFSA (2.13 cm2) was significantly higher than for FSM (1.83 cm2) (p=0.003). The IFSA complication rate was 3.5%, which was higher than the 2.28% complication rate for MFSM (p=0.03).

Traditional IFSA and our hybrid FSM are equally effective techniques for NMSC removal. Plastic surgeons can use either of these techniques to treat skin cancer with optimal cure rates without requiring Mohs training.

References

1) Guy GP, Machlin SR, Ekwueme DU, Yabroff KR. Prevalence and costs of skin cancer treatment in the U.S., 2002-2006 and 2007-2011. Am J Prev Med. 2015;48(2):183-187. doi:10.1016/j.amepre.2014.08.036
2) Otsuka ACVG, Bertolli E, de Macedo MP, Pinto CAL, Duprat Neto JP. Intraoperative assessment of surgical margins using "en face" frozen sections in the management of cutaneous carcinomas. An Bras Dermatol. 2022;97(5):583-591. doi:10.1016/j.abd.2021.09.013
3) Schmults CD, Blitzblau R, Aasi SZ, et al. Basal Cell Skin Cancer, Version 2.2024, NCCN Clinical Practice Guidelines in Oncology. J Natl Compr Canc Netw. 2023;21(11):1181-1203. doi:10.6004/jnccn.2023.0056
4) Alsaif A, Hayre A, Karam M, Rahman S, Abdul Z, Matteucci P. Mohs Micrographic Surgery Versus Standard Excision for Basal Cell Carcinoma in the Head and Neck: Systematic Review and Meta-Analysis. Cureus. 2021;13(11):e19981. doi:10.7759/cureus.19981
5) Català A, Garces JR, Alegre M, Gich IJ, Puig L. Mohs micrographic surgery for basal cell carcinomas: results of a Spanish retrospective study and Kaplan–Meier survival analysis of tumour recurrence. J Eur Acad Dermatol Venereol JEADV. 2014;28(10):1363-1369. doi:10.1111/jdv.12293

Outcomes of Surgical Treatment for Acral Lentiginous Melanoma: A Systematic Review and Meta-Analysis

Abstract Presenter: Andrew Malek

Abstract Co-Author(s): Rahib Islam, M Zaid Shami, William Delahoussaye, Julian Gonzales, Victoria Tong, Amir Shami, Kamran Khoobehi MD

Purpose: Acral lentiginous melanoma (ALM) is a rare melanoma subtype that primarily affects the palms, soles, and subungual regions. Due to its atypical presentation and frequent delay in diagnosis, ALM is often identified at more advanced stages, resulting in poorer outcomes compared to other melanoma subtypes. Despite its clinical significance, evidence-based guidelines for the optimal surgical management of ALM remain limited. This review aimed to assess the efficacy of various surgical interventions on the recurrence of ALM.

Methods: PubMed, Web of Science, Scopus, Embase, and MEDLINE were queried on April 21, 2024 for original studies evaluating ALM-specific outcomes and recurrence following surgical management. Screening and data extraction were performed following PRISMA guidelines. A random effects meta-analysis was performed with significance set at $p<0.05$. The primary outcome was recurrence rates across different treatment approaches.

Results: Of 2241 studies queried, a total of 31 studies met inclusion criteria, comprising 1943 patients with 1979 cases of surgically-treated ALM. The most common treatments were wide local excision (WLE) (58.92%), amputation (21.73%), narrow margin excision (16.22%), and Mohs micrographic surgery (MMS) (1.92%). Patients were an average of 60.63 years old (standard deviation (SD): 7.88 years). Average post-surgical follow-up was 62.24 months (SD: 28.77 months). Recurrence occurred in 444 (22.43%) cases overall. Recurrence was relatively higher for amputation (28.14%) compared to WLE (22.47%) and MMS (18.42%).

There were 10 studies comparing WLE to amputation. These comprised 257 cases of WLE and 362 amputations, with 42 and 90 recurrences respectively. There was no significant difference found in the development of recurrence between two treatment methods (Relative Risk (RR): 0.87, 95% Confidence Interval (CI): [0.58, 1.30]).

There were 3 studies comparing WLE to narrow excision. These compared 404 cases of WLE and 321 of narrow excision, with 95 and 50 recurrences respectively. There was no significant difference in recurrence between the two excision widths (RR: 0.88, 95% CI: [0.50, 1.57]).

There were 6 studies comparing WLE to amputations for melanoma located subungually. These comprised 86 cases of WLE and 290 amputations, with 4 and 71 recurrences respectively. There was no significant difference found between the rates of recurrence for the two treatment types (RR: 0.65, OR: [0.29, 1.44]).

In total, 30 studies with 1961 lesions were included in indirect proportion analysis, yielding a pooled recurrence proportion of 14% (CI: [0.09 - 0.20]), with significant heterogeneity across the included studies (I2: 90%, $p<0.01$).

Conclusion: Surgical treatment for ALM varies, with most tumors in these studies excised with traditional wide margins or amputation. There were no differences in the rate of recurrence for ALM when comparing WLE and amputation, or WLE and narrow margin excision. Overall, there was marked variability across studies. When treating ALM in areas such as the hands where preservation of function and cosmetic outcomes are crucial, WLE may be a viable alternative to amputation for subungual disease eradication and should be considered in cases where oncologic treatment fidelity will not be sacrificed.

Clinically Relevant, Composite Injury Reconstruction with Single-Stage Multilaminar Integumentary Reconstruction

Abstract Presenter: Shayan Sarrami MD

Abstract Co-Author(s): Shawn Loder MD, Vanessa Mroueh, Jose Antonio Arellano MD, Samantha Bosco, Fuat Baris Bengur MD, Yadira Villalvazo MD, Francesco Egro MD, Msc, MRCS, Kacey Marra PhD, J. Peter Rubin MD

Purpose: We have previously presented our optimization of a single-stage technique for grafting skin and subcutaneous adipose tissue to restore soft, pliable skin for full thickness burns and trauma. We validated this concept in a Yorkshire swine model, demonstrating multilaminar viability and significantly improved mobility of the grafted skin ($p<0.05$). We then successfully applied these principles to an index clinical case and have since modeled the effects of different adipose thicknesses and adherence strategies to optimize our technique. Now we present data for the use of this technique in large, complex full-thickness injuries spanning multiple muscles and fascial planes.

Methods: Here we utilize a Yorkshire swine model of full-thickness burns, with expanded 64 cm2 wounds. Wounds are centered over the cranial and caudal flank to cross over multiple muscle bodies and fascial planes, simulating complex injuries with mixed underlying and opposing forces during healing. Wounds were assessed over an 8-week period following escharectomy, and immediate multilaminar reconstruction. Control wounds were treated with STSG over fascia, while experimental groups were treated with: (A) thin adipose grafts (5 mm), (B) thick adipose grafts (10 mm), or (C) thin adipose with a fibrin sealant. We performed gross assessment of graft viability followed by serial photography, ultrasound, and tensiometry at harvest.

Results: We found extensive survival of multilaminar grafts regardless of position or crossing of muscle and fascial planes. Within our previously tested optimal range of for adipose graft hypodermal thickness and adherence strategies we noted no clear overwhelming evidence for loss of grafts or failure of reconstruction.

Conclusions: We have previously validated in animals that single stage layered-composite grafting improves mobility and pliability of the grafted skin and have demonstrated initial clinical success in small full-thickness wounds. Here we demonstrate that this technique is viable for coverage of large and complex wounds.

Incidence of Chronic Pain after Sarcoma Reconstruction with Local Flaps Compared to Free Tissue Transfer

Abstract Presenter: Diba Nayeri

Abstract Co-Author(s): Michael Kim, Jordan Gasho, Pedro Angel Perez, Carly Askinas MD, Joseph Carey MD, David Daar MD, MBA, Emma Koesters MD

Background: Chronic neuropathic pain (NP) following sarcoma reconstruction is a well-documented complication, with Park et al. (2018) reporting a 25% prevalence of NP post-resection (1). Despite advancements in limb salvage techniques, surgical strategies for sarcoma defects do not prioritize sensory and functional outcomes. Martin et al. (2021) highlighted this gap, noting that only 21% of surgeons consider chronic pain risk when selecting flap type (2). The impact of flap selection (free vs pedicled) on NP remains underexplored. This study evaluates the impact of local flaps versus free flaps on the development of chronic postoperative pain.

Methods: A single-center retrospective review included adult patients undergoing extremity sarcoma reconstruction (2015–2024). Patients were grouped into free flap and pedicled flap cohorts, and rates of chronic NP at the recipient site were compared. Neuropathic pain was defined as pain lasting ≥3 months documented in clinic follow-up notes. Demographics, operative details, and comorbidities were analyzed and a multivariable logistic regression model was conducted to adjust for functional status, preoperative radiation, hypertension, and smoking status. Sub-analyses assessed upper and lower extremity cases separately.

Results: Among 64 patients (mean age 58.1 ± 16.1 years), 30 underwent free flap reconstruction and 34 underwent local flap reconstruction. Lower extremity reconstructions (67.2% [43/64]) included 18 free and 25 pedicled flaps; upper extremity (32.8% [21/64]) included 12 free and 9 pedicled flaps. Cohorts showed no significant differences in sex, age, hypertension, diabetes, smoking, or independent functional status (all $p > 0.05$), though neoadjuvant radiation was more prevalent in the free flap group (40.0% vs 17.6%, $p = 0.047$). Pedicled flaps had significantly higher chronic NP prevalence overall (26.5% [9/34] vs 6.7% [2/30], $p = 0.036$). Subgroup analyses revealed for lower extremity cases, chronic NP occurred in 28.0% (7/25) of pedicled vs 11.1% (2/18) of free flaps; upper extremity cases showed 22.2% (2/9) vs 0% (0/12) ($p = 0.086$). Our regression model confirmed that pedicled flaps were associated with 6.5 times greater odds of chronic NP (OR 6.50, 95% CI 2.24–42.1, $p = 0.049$). Patients with preoperative functional independence were less likely to experience chronic NP compared to dependent patients (OR 0.09, 95% CI 0.01–0.83, $p = 0.03$). Notably, preoperative radiation to the surgical site showed a non-significant increase in chronic NP risk (OR 4.87, 95% CI 0.78–30.5, $p = 0.09$).

Conclusion: Local flaps are independently associated with higher risk of chronic neuropathic pain following sarcoma reconstruction. While operative efficiency favors pedicled flaps when feasible, surgeons should consider potential long-term pain sequelae. Future studies are needed to validate these findings in larger prospective cohorts and to stratify patients at highest risk of developing chronic pain after reconstruction.

References:
(1) Park JW, Kim HS, Yun JY, Han I. Neuropathic pain after sarcoma surgery. Medicine (Baltimore). 2018;97(21):e10852. doi:10.1097/MD.0000000000010852
(2) Martin E, Slooff WBM, van Houdt WJ, van Dalen T, Verhoef C, Coert JH. Surgical strategies and the use of functional reconstructions after resection of MPNST: An international survey on surgeons' perspective. Orthoplastic Surgery. 2021;4:12-19. doi:10.1016/j.orthop.2021.03.001

Predictive Factors of Successful Salvage Following Takeback in the Setting of Lower Extremity Limb Salvage: Our Institution's 12-Year Experience

Abstract Presenter: Leila Jones

Abstract Co-Author(s): Rachel Rohrich, Sami Ferdousian, Ryan Lin MD, Meghan Currin, Richard Youn MD, Christopher Attinger MD, Karen Evans MD

Background: Microvascular compromise requiring re-exploration is a devastating complication following free tissue transfer (FTT), especially for the chronic lower extremity (LE) wound population who may face amputation following flap failure. Because microsurgical success rates are high, there is limited clinical data exploring patient and operative factors that contribute to successful flap salvage after takeback, especially in the heavily comorbid LE wound population. Thus, this study aims to identify factors that predict salvage after LE FTT takeback in the setting of limb salvage.

Methods: A retrospective chart review of LE FTT performed from February 2011 to June 2024 was performed. Patient characteristics, intraoperative details, and postoperative outcomes were collected. Flap takeback was defined as a return to the operating room for flap exploration due to concern for flap viability. Flaps that were salvaged were compared to flaps that were not.

Results: During the study period, 357 LE FTT were performed, of which 26 cases (7.2%) required takeback. A total of 19 (73.1%) flaps salvaged, while 7 (26.9%) were not. Although not statistically significant, the salvage group trended to be younger (52.6 ± 12.6 vs. 63.3 ± 12.0, p=0.064) and have a lower BMI (28.2 ± 6.7 vs. 33.6 ± 6.8, p=0.083). Median hospital length of stay was significantly higher in the salvage group (32, IQR: 10 vs. 23, IQR: 7; p=0.017). In the total cohort, diabetes (65.4%), peripheral vascular disease (42.3%), and chronic kidney disease (23.1%) were prevalent, with no differences between groups. A total of 6 patients (24.0%) required vascular intervention to optimize distal perfusion prior to reconstruction (p=1.000). Median wound area trended to be larger in the salvage group (112, IQR: 48 vs 60, IQR: 37; p=0.078). There was a higher incidence of flap monitoring devices used in the salvage group, notably the Cook Doppler (84.2% vs. 57.1%, p=0.293) and ViOptix (52.6% vs. 14.3%, p=0.178). The median time to takeback was 1 day (IQR: 7 days) in the salvage group and 5 days (IQR: 7 days) in the failure group (p=0.280). By a final follow-up of 8.1 (IQR: 9.6)

months, 2 patients (7.7%) underwent major limb amputation (p=0.474). Univariate analysis demonstrated that Cook Doppler use was significantly associated with higher odds of flap salvage (OR:11.3, CI: 1.4-92.1, p=0.023).

Conclusion: This study represents the largest series of LE FTT takeback in the setting of atraumatic limb salvage. Our results reinforce the importance of close monitoring and early intervention, which may contribute to successful flap salvage.

Assessing the Role of Social Determinants of Health in Postoperative Wound-Related Outcomes in Plastic Surgery Assisted Spinal Wound Closure

Abstract Presenter: Maxwell Godek

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Purpose: The impact of social determinants of health (SDOH) on patient health and postoperative outcomes has prompted the development of numerous comprehensive indices. Current validated indices include the Area Deprivation Index (ADI) and Social Vulnerability Index (SVI), which are contemporary measures of social disadvantage. In contrast, historic redlining represented a form of social disparity due to discriminatory lending practices in the 1930s propagating generational wealth gaps. Limited studies have explored the impact of these indices and this historical practice on surgical outcomes. As such, the present study aims to analyze the effects of these SDOH on patients who underwent Plastic and Reconstructive Surgeon (PRS)-assisted spinal wound closure procedures.

Methods: A retrospective chart review was conducted of patients who underwent cervical and lumbar spine surgery with PRS soft tissue closure between June 2020 and July 2022. Patient demographics, comorbidities, and complications were collected. Wound-specific complications included seroma, hematoma, surgical site infection (SSI), and wound dehiscence. Patient addresses were geolocated with ArcGIS (Geographic Information System) via Python script, and publicly accessible data was utilized to retrieve redlining, ADI, and SVI data. Patients with national ADI and SVI greater than the 50th and 90th percentiles were categorized as disadvantaged. Chi-square analyses,

Wilcoxon rank sum tests, and adjusted linear/logistic regression were performed. Statistical significance was set at $p < 0.05$.

Results: A total of 1,607 patients were identified, of which 719 (44.7%) underwent a cervical spine wound closure and 888 (55.3%) lumbar spine wound closure. Of these, 225 (14.0%) patients resided in redlined neighborhoods, 74 (4.60%) in high ADI communities, and 196 (12.2%) in high SVI communities. Higher rates of comorbidities were demonstrated among the redlined and high SVI cohort compared to the non-disadvantaged ($p<0.05$).

Patients in redlined areas had a higher overall number and rate of complications (0.22 vs. 0.10, $p=0.004$; 14% vs. 8.0%, $p=0.005$), sepsis (3.6% vs. 0.6%, $p<0.001$), and readmission (8.1% vs. 4.2%, $p =0.010$). Patients residing in high SVI communities had a higher overall number and rate of complications (0.22 vs. 0.10, $p=0.007$; 14% vs. 8.2%, $p=0.009$), deep SSI (1.6% vs. 0.3%, $p<0.043$), and sepsis (2.6% vs. 0.8%, $p=0.010$). Increased rates of organ SSI (2.7% vs. 0.1%, $p=0.006$) were noted in the high ADI cohort.

Regression analyses demonstrated that redlining was associated with an increased total number of complications (β 0.11, $p=0.001$), higher odds of any complications (OR 1.73, $p = 0.014$), sepsis (OR 6.37, $p=0.001$), and readmission (OR 2.01, $p=0.014$). High SVI was associated with an increased total number of complications (β 0.10, $p=0.005$) and higher odds of any complications (OR 1.62, $p=0.043$) and deep SSI (OR 5.53, $p=0.037$). High ADI was associated with higher odds of organ SSI (OR 69.99, $p=0.002$).

Conclusion: Historic redlining, ADI, and SVI are associated with an increased risk of postoperative complications in spinal wound closures. Identifying disadvantaged patients preoperatively is crucial to implementing equitable care.

A Novel and Standardized Perioperative Protocol to Reduce Infections Related to Immediate Implant-Based Reconstruction

Abstract Presenter: Alexzandra Mattia

Abstract Co-Author(s): SeungJu Oh MD, Kamal Addagatla, Luccie Wo MD, Tito Vasquez, Bohdan Pomahac MD, Paris Butler MD, MPH, Siba Haykal MD, PhD, FRCSC, FACS

Purpose: Perioperative infection prevention measures for immediate implant-based breast reconstruction (IBBR) have frequently become standard of care, although there remains significant variability in measures with varying levels of support. We describe the implementation and assessment of a standardized perioperative protocol for immediate IBBR with tissue expanders or implants at a single institution with aims to decrease perioperative infection rates and harness the synergistic effect of multiple infection mitigation strategies.

Materials and Methods: A quality improvement initiative was performed at our institution from February 2024 to present. An evidence-based and standardized protocol was reviewed and approved among all before implementation. The protocol was divided in pre-, intra-, and post-operative phases and compared in efficacy with a retrospective cohort of patients from June 1, 2022, up to February 1, 2024. All breast cancer survivors who underwent immediate IBBR were included for analysis. The intra-operative phase involved patient warming with bair huggers, skin preparation, draping by the plastic surgery team, and double gloving. After incision, clear communication and set-up were implemented with mastectomy flap evaluation using SPY mastectomy flap grading. The breast pocket preparation involved rinsing with normal saline (NS) followed by dilute betadine and/or vancomycin irrigation per side, or triple antibiotic solution with Ancef/Vancomycin/Tobramycin. For implant placement, skin was re-prepped with concentrated betadine followed by outer glove change. Prostheses were soaked according to attending preference with Irricept, Vancomycin, NS, or triple antibiotic irrigation. If implants were to be placed directly, no-touch techniques with Keller funnel or Tegaderm around the breast pocket were utilized.

Results: A total of 491 patients were identified with 54 (11.0%) infectious cases. Since February 2024 following implementation of the protocol, 214 patients with 7 (3.27%) infectious cases were identified. All 7 cases were classified as major complications requiring readmission and/or reoperation. The most common pathogen was Staphylococcus aureus (26.0%) followed by Pseudomonas aeruginosa (10.6%) and Corynebacterium species (4.1%). Most patients had estrogen receptor positive tumors (57.1%), received neoadjuvant chemotherapy (57.1%), and underwent reconstruction with tissue expanders (92.9%). Infectious outcomes were significantly lower ($p<0.05$) in the protocol cohort compared to the retrospective group.

Conclusions: This study describes the largest cohort of a standardized perioperative protocol used for immediate IBBR with a largely successfully infectious outcomes rate of only 3.27%. We demonstrate that implementation of our institution's protocol using a

quality improvement approach is associated with a significant reduction in implant infections.

Beyond Pain Relief: A Cross-Sectional Analysis of Well-being and Quality of Life in Amputees with Osseointegrated Implants

Purpose: There is a significant correlation between depression and functionality in lower limb amputees. Uncomfortable prostheses and chronic pain impair mobility and interfere with amputees' lives. Osseointegrated prostheses (OI) are a novel solution for poorly tolerated socket-based prostheses in which a titanium rod inserted into the residual limb bears weight directly onto the skeletal system. Nerve and soft tissue reconstruction can be done concurrently with OI implantation to further reduce limb pain and improve comfort. As up to 27% of amputees attempt suicide, OI implants are an important advancement in amputee care. This study aims to evaluate quality of life (QOL) outcomes in patients with OI prostheses with and without nerve reconstruction.

Methods: This was a cross-sectional survey study including patients who received lower-limb OI implants at our institution. Participants were invited to complete QOL surveys preoperatively and yearly post-operatively. Participant demographics were collected and included age, amputation level, and body mass index (BMI). QOL was assessed via the World Health Organization-Five Well-being Index (WHO-5), a validated measure of mental well-being, and the Patient Health Questionnaire-9 (PHQ-9), a depression screening instrument. WHO-5 is scored on a 0-100 scale with 100 being best possible well-being and PHQ-9 is scored 0-27 with a greater number indicating increased depression severity. Wilcoxon rank-sum test was used with an alpha=0.05.

Results: Our study included 32 patients total, 12 participants preoperatively and 20 participants one or more years postoperatively. Median age at time of surgery did not differ between groups and level of amputation did not differ between groups (49.5 preoperatively vs 49.5 postoperatively, $p>0.05$; 15 transtibial and 17 transfemoral). Median BMI was significantly higher in the postoperative group (29.75 vs 24.8, $p=0.043$). Median PHQ9 scores trended downward postoperatively with the difference approaching significance (2 (range:0-14) vs 4 (range:0-19) $p=0.077$). Additionally, the median WHO-5 score trended higher post-operatively (68 (range:40-88) vs 64 (range:28-96), $p=0.48$). Of the post-operative patient surveys, 70% received nerve

reconstruction. Subgroup analysis of post-operative PHQ-9 and WHO-5 scores between patients with and without nerve reconstruction yielded no significant difference.

Conclusion: This was the first study to look at these psychosocial outcomes in this unique patient population. We found that depression scores trended lower and well-being scores trended higher in the postoperative period, suggesting that osseointegration with and without nerve reconstruction can improve quality of life in lower limb amputees. Information on the quality of life outcomes following the OI procedure will aid physicians in determining how to best guide patient on their decision to undergo osseointegration.

A Step in the Right Direction: Assessing Prosthetic Satisfaction and Mobility in Lower Limb Amputees with Osseointegration

Abstract Presenter: Anna Vaeth

Abstract Co-Author(s): Clara Choate, David Otterburn MD, Jason Hoellwarth, Taylor Reif, S Robert Rozbruch, Albert Truong MD

Purpose: Periprosthetic pain, poor prosthetic fit, residual limb pain and phantom limb pain significantly impair mobility and quality of life for amputees. Osseointegration (OI) is a novel solution for poorly tolerated socket-based prostheses in which a titanium rod within the residual limb bears weight directly onto the skeletal system. Nerve and soft tissue reconstruction can be performed concurrently with OI implantation to further reduce limb pain and improve comfort. While OI prostheses offer improved prosthetic attachment and mobility compared to traditional socket-based systems, patient-reported outcomes regarding overall satisfaction and functional limitations remain underexplored. This study aims to assess lower limb amputees' satisfaction with OI prostheses and evaluate the extent of their mobility limitations.

Methods: This was a cross-sectional survey study including patients who received lower-limb OI implants at our institution. Participants were invited to complete a validated prosthesis experience survey at various time points post-operatively (ranging from 1 month to 6 years). Collected demographics included age, amputation level, and body mass indexes (BMI). Prosthesis experience and satisfaction was assessed via the Trinity Amputation and Prosthesis Experience Scales (TAPES). Participants rated overall satisfaction with their prosthesis on a scale of 1-10 with 10 being the highest level of satisfaction. Additionally, participants indicated how limited they are in daily

activities from 0-2: 0=not limited at all, 1=limited a little, and 2=limited a lot. Activities assessed included walking half a mile, walking 100 meters, working on hobbies, and going to work, as well as six other daily movement activities. Total limitation scores combining all activities ranged from 0-20 with 0=no limitation and 20=most limited. Student's t-test was utilized to compare scores by amputation level.

Results: Our study includes 27 patients total, 12 transtibial and 15 transfemoral amputees. The average age at time of surgery was 50.9 years (range:21-70) and the average BMI was 28.8 (range:20.6-46.3). Participants reported an overall average satisfaction rating of 7.56 out of 10 (SD=2.59), indicating a moderate to high satisfaction with their OI prosthesis. Participants reported the greatest limitation in going to work (1.78, SD=1.25) and the least limitation in walking 100 meters (0.52, SD=0.75). Limitation scores for walking half a mile (0.81, SD=0.88) and working on hobbies (0.78, SD=0.64) were similar. The average total limitation score was 11.8 out of 20 (SD=5.0). Notably, total limitation scores were significantly lower in the transfemoral group compared to the transtibial group (9.1 vs 13.8, p=0.015). However, overall satisfaction scores did not significantly differ between the two groups (7.47 vs 7.67, p=0.85).

Conclusion: This is the first study to look at prosthesis satisfaction and experience in this unique patient population. Findings suggest that lower limb amputees with OI prostheses report high overall satisfaction with their prosthesis. On average, participants felt no limitation or only slightly limited in walking short distances and participating in hobbies. Although all had high satisfaction with their prosthesis, patients with transfemoral amputations may experience fewer limitations, potentially reflecting more significant mobility benefits. Understanding patient-reported satisfaction and mobility outcomes will help clinicians better guide amputees considering osseointegration.

Evolving Practice Patterns of Fasciocutaneous versus Muscle Flap Lower Extremity Reconstruction at a Level I Trauma Center: A 30-Year Experience

Abstract Presenter: Stephanie Vu

Abstract Co-Author(s): Ryan Badiee MD, Editt Taslakian MD, MS, Kari Keys, Gillian O'Connell MD, Cameron Kneib MD, Fei Wang MD, Yusha (Katie) Liu MD, PhD, Jeffrey Friedrich MD, Erin Miller MD

Introduction: Modern lower extremity limb salvage offers a wide arsenal of reconstructive techniques. Fasciocutaneous flaps have offer advantages including muscle preservation, sensory nerve incorporation, and thin, pliable coverage with improved aesthetic outcomes [1-2]. However, higher risk of delayed wound healing, partial flap loss and infection have resulted in hesitance to utilize fasciocutaneous flaps, particularly in complex traumatic wounds or areas with compromised vascularity [2]. Studies have shown comparable long-term outcomes for fasciocutaneous versus muscle flaps for lower extremity reconstruction [1-2]; however, flap selection remains provider-dependent. This study examines lower extremity reconstructive trends over 30 years at a high-volume institution to evaluate utilization and complications of fasciocutaneous flaps relative to other reconstructive options.

Methods: A retrospective case series evaluated patients undergoing soft tissue reconstruction for lower extremity injuries at a Level-I trauma center over 20-year period. Demographics, comorbidities, injury characteristics, and operative management were abstracted. Patients were grouped into time intervals based on year of reconstruction: 1994-2004, 2005-2014, or 2015-2024. Flaps were grouped into local/pedicled and free, then subdivided into muscle and fasciocutaneous. Trends in flap type selection were analyzed across time intervals. Chi square and ANOVA tests compared outcomes between patients undergoing fasciocutaneous reconstruction within each period.

Results: Among 283 flaps in 253 patients within the study period, 63 (22.3%) were fasciocutaneous (Table 1). Utilization was distributed evenly across each time interval: 29.4% (1994-2004), 18.6% (2005-2014), and 22.2% (2015-2024). Notably, use of free fasciocutaneous flaps increased from none in the earliest group to 59.5% of all fasciocutaneous flaps in the most recent interval ($p=0.001$). Postoperative outcomes, including soft tissue or bony infection, tissue necrosis, bony nonunion, return to the operating room, and amputation, were similar across all interval periods ($p>0.05$, Table 2).

Conclusion: Despite popularity in the literature, the utilization of fasciocutaneous flaps remains low in trauma reconstruction. This preference may be influenced by historical beliefs that muscle flaps carry lower infection and complication rates, though this has not been substantiated in the literature []. This large series further supports the safety of fasciocutaneous flaps as no complications were found to be statistically significant across all study time intervals between groups. We did observe adoption of free fasciocutaneous flaps over the study period without an increase in complications even during the expected "learning curve" period. Flap selection is influenced by various patient and surgeon factors, including body habitus and OR availability that

retrospective studies cannot fully capture. Future studies should explore these surgeon preferences, patient selection factors, and long-term functional outcomes to better understand the role of fasciocutaneous versus muscle flap choice in lower extremity trauma reconstruction.

[1] Cho EH, Shammas RL, Carney MJ, et al. Muscle versus Fasciocutaneous Free Flaps in Lower Extremity Traumatic Reconstruction: A Multicenter Outcomes Analysis. Plast Reconstr Surg. 2018;141(1):191-199. doi:10.1097/PRS.0000000000003927

[2] Dow T, ElAbd R, McGuire C, et al. Outcomes of Free Muscle Flaps versus Free Fasciocutaneous Flaps for Lower Limb Reconstruction following Trauma: A Systematic Review and Meta-Analysis. J Reconstr Microsurg. 2023;39(7):526-539. doi:10.1055/a-2003-8789

Defining a Safe BMI Threshold for Surgery: A NSQIP Analysis of BMI, Comorbidities, and Complication Risk in Plastic Surgery Patients

Abstract Presenter: Mohammed Yamin

Abstract Co-Author(s): Shreyas Puducheri, Tricia Mae Raquepo, Micaela Tobin, Agustin Posso MD, Ryan Cauley MD MPH

Introduction: Body mass index (BMI) is a well established predictor of postoperative complications, but its impact varies by surgical site and fat distribution. Patients with obesity and comorbidities face higher risks. Despite this, no clear guidelines define a maximum BMI for safe surgery or the amount of weight loss required before surgery. Given BMI's variable effects across procedures, a universal threshold is impractical. This study aims to determine the highest BMI at which surgery remains safe, considering comorbid status.

Methods: We analyzed the 40 most common plastic surgery procedures in the ACS-NSQIP using multivariable logistic regression with stepwise selection, incorporating comorbid status, BMI, and body location as predictors. Surgical location (abdomen/trunk, flaps/grafts, head/neck, upper extremity) was determined from CPT codes. Comorbid status, including diabetes, hypertension requiring medication, ventilator dependence, chronic obstructive pulmonary disease, dyspnea, renal failure,

cerebrovascular accident, and a history of angina was treated as binary predictor. The outcome variable was all-cause complications, including bleeding complications, urinary tract infection, superficial surgical site infection, pneumonia, sepsis, deep vein thrombosis (DVT), organ-space surgical site infection, reintubation, septic shock, wound infection, failure to wean from ventilation, wound dehiscence, pulmonary embolism, cardiac arrest, renal failure, myocardial infarction, and cerebrovascular accident. Additional models focused on wound dehiscence, superficial infection, and DVT/pulmonary embolism (PE).
The model included three-way interactions and third-degree polynomial terms for BMI to capture nonlinear effects. Model performance was assessed using Akaike Information Criterion (AIC), McFadden's pseudo R^2, Hosmer-Lemeshow goodness-of-fit test, and 10-fold cross-validated area under the receiver operating characteristic curve (AUROC).

Results: Analysis of 229,847 plastic surgery cases found BMI to be a significant predictor of complications, with effects varying by anatomical site. Increased BMI raised the odds of complications (Beta 0.381, 95% CI 0.363-0.398, $p<0.001$), wound dehiscence (Beta 0.115, 95% CI 0.096-0.134, $p<0.001$), superficial interactions (Beta 0.140, 95% CI 0.127-0.152, $p<0.001$), and DVT/PE (Beta 0.102, 95% CI 0.081-0.123, $p<0.001$). Nonlinear relationships of BMI on all complications were evident through quadratic (Beta = -133.910) and cubic (Beta = 209.240) terms. Comorbidities further elevated risk, particularly all cause complications (Beta 8.010 95% CI 7.516-8.505, $p<0.001$). An interaction effect (Beta = -0.148) indicates that BMIs impact was less pronounced in those with comorbidities. In breast surgery, BMI effect on wound dehiscence was lower compared to other locations (Beta -1.638, 95% CI -2.607 to -0.669, $p<0.001$). The model shows strong performance (AUROC 0.968 for infection, 0.939 for DVT/PE). These findings show the need for BMI thresholds tailored by procedure and patient comorbidities rather than a universal cutoff.

Conclusion: BMI and comorbidities impact complication risk in plastic surgery, with effects varying by procedure. Nonlinear trends and interaction effects highlight the need for individualized risk assessment. Strong model performance supports procedure specific BMI thresholds rather than universal cutoffs to improve patient safety and surgical decision making.

Fully resorbable P4HB Biosynthetic Mesh vs. Coated Hybrid Polypropylene Synthetic Mesh in Retrorectus Ventral Hernia Repair: A Propensity Matched Analysis

Abstract Presenter: Salman Khan

Abstract Co-Author(s): Margaret Hornick MD, Malia Voytik MD, Ayaka N. Deguchi MD, Robyn Broach, John Fischer MD, MPH

Purpose: Over 400,000 ventral hernia repairs (VHR) are performed annually in the United States. Retrorectus mesh repair is the gold standard for reducing recurrence. To minimize complications associated with permanent synthetic mesh such as infection, erosion, and pain, novel meshes have been developed. Coated polypropylene meshes combine a bioabsorbable scaffold with a permanent polytetrafluoroethylene (PTFE) knit, whereas poly-4-hydroxybutyrate (P4HB) biosynthetic meshes are fully absorbable, providing temporary support, during the critical healing phase, before degrading over 12–18 months. Comparative data on recurrence, complications, and long-term outcomes remain limited. This study evaluates the clinical effectiveness of these mesh types in clean wound VHR.

Methods: This single-center, retrospective cohort study included patients who underwent retrorectus VHR with coated synthetic (PTFE, Synecor) or biosynthetic (P4HB, Phasix) mesh between June 2017 and December 2022. Propensity score matching was used to adjust for BMI, age, gender, American Society of Anesthesiologists classification, and Ventral Hernia Working Group grade. Outcomes included surgical site occurrences (SSO), hernia recurrence, and reoperations.

Results: A total of 94 patients (47 per group) were analyzed, with a median follow-up of 26 months (IQR 69.8–55.2). Baseline characteristics, including age (62 vs 64 years, p=0.5), BMI (33 vs 34 kg/m², p=0.5), smoking history (47% vs 43%, p>0.9), diabetes (13% vs 8.5% p=0.7), COPD history (2.1% vs 2.1%, p>0.9), and defect size (218 vs 218 cm2 p=0.5), were similar between synthetic and biosynthetic. The coated synthetic group had a higher rate of concurrent transversus abdominis release (66% vs 34%, p=0.002) and shorter operative time (180 vs 215 min, p=0.01).

There was no significant difference in hernia recurrence (0% vs. 2.4%, p=0.5) or overall SSO rates (26% vs. 40%, p=0.12). Surgical site infection (SSI; 2.1% vs. 15%, p=0.059) neared statistical significance, while rates of cellulitis, seroma, delayed wound healing were non-significant (p>0.05). There were no cases of mesh infection or enterocutaneous fistula. The biosynthetic group had higher rates of SSO requiring procedural intervention (2.1% vs 17%, p=0.03) and all-cause reoperation (2.1% vs. 21%, p=0.004).

Multivariate analysis found no significant predictors of SSI. Biosynthetic mesh showed a non-significant trend toward increased odds (OR 7.69, 95% CI: 0.79 –75.04, p=0.07), as did higher ASA class (OR 7.69, 95% CI: 0.80 –60.79, p=0.07) and reoperation time (OR 1.005, 95% CI: 0.994 –1.017, p=0.37).

Conclusion: Both coated synthetic (PTFE, Synecor) and biosynthetic meshes (P4HB, Phasix) demonstrated comparable recurrence and overall complication rates in clean wound retrorectus VHR. However, biosynthetic mesh was associated with higher rates of SSO requiring procedural intervention and all-cause reoperation. These findings suggest that while both mesh types are viable options, caution should be exercised when selecting biosynthetic mesh due to its increased need for secondary procedures. Further studies are needed to determine long-term implications.

Predictors of Mortality and Outcomes in Geriatric Burn Patients Subgroups: A Comparative Meta-analysis of Age, Burn Severity, and Intervention Strategies

Abstract Presenter: Yomna Zayneldeen MD

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Background: Understanding the factors impacting mortality and recovery in geriatric burn patients can help risk stratify burn population subgroups, guide treatment strategies and improve patient outcomes. This study examines the epidemiological characteristics, mortality rates, total burn surface area (TBSA), and predictors of mortality in geriatric burn patients via comparative analysis of burn-injured elderly to help guide treatment algorithms in this heterogeneous and at-risk population.

Methods: A literature search was conducted on February 2, 2024, using PubMed, Scopus, and Web of Science. Keywords including "burn," "thermal injuries," and "geriatric." Data extracted included epidemiological details, mortality rates, and TBSA. Geriatric patients were stratified into younger (60-80) and older / super geriatric (80+) groups. Statistical analyses were performed using R software version 4.4.1. Odds ratios (OR) and relative risks (RR) were calculated, with p-values <0.05 denoting significance. Heterogeneity was managed with leave-one-out tests and subgroup analyses.

Results: The younger geriatric group (60-80 years) demonstrated lower ICU admission rates (RR: 0.75, 95% CI: 0.63 - 0.88, $I^2 = 0\%$) and significantly lower mortality (RR: 0.65, 95% CI: 0.58 - 0.73, $I^2 = 39\%$) compared to the super geriatric group (80+ years). No significant differences were observed between age groups for TBSA categories (<10% [OR: 1.06, 95% CI: 0.83 - 1.35, $I^2 = 65\%$], 10-19% [OR: 1.07, 95% CI: 0.81 - 1.41, $I^2 = 48\%$], and ≥20% [OR: 1.08, 95% CI: 0.94 - 1.22, $I^2 = 48\%$]) or burn etiologies (scald [OR: 0.99, 95% CI: 0.80 - 1.23, $I^2 = 0\%$], flame [OR: 0.86, 95% CI: 0.66 - 1.12, $I^2 = 32\%$], electrical [OR: 1.61, 95% CI: 0.42 - 6.12, $I^2 = 0\%$], and chemical burns [OR: 1.27, 95% CI: 0.38 - 4.22, $I^2 = 56\%$]). TBSA remained a strong predictor of mortality, with significantly lower mortality in patients with TBSA of 1-9% compared to 10-19% (RR: 0.31, 95% CI: 0.21 - 0.44, $I^2 = 28\%$) and in patients with TBSA of 10-19% compared to ≥20% (RR: 0.17, 95% CI: 0.11 - 0.27). Flame burns increased mortality risk by 298% relative to scald burns (3.98; 95% CI: 2.68 - 5.91, I2 = 79%). Inhalation injury raised mortality risk by 195% (RR: 2.95, 95% CI: 2.31 - 3.78, I2 = 86%), and intubation increased mortality risk by 466% (RR: 5.66, 95% CI: 2.61 - 12.30). Grafting was associated with a 33% reduction in mortality compared to conservative management (RR: 0.67, 95% CI: 0.54 - 0.82, $I^2 = 54\%$). No significant mortality differences were observed between genders (RR: 1.09, 95% CI: 0.92 - 1.30).

Conclusion: This study emphasizes TBSA, burn etiology, inhalation injuries, and intubation as critical predictors of mortality in all geriatric burn patients. Younger geriatric patients (60-80) had significantly better survival outcomes than super geriatric patients (80+), and surgical interventions like grafting reduced mortality risks. These findings can guide tailored clinical decisions and intervention strategies aimed at improving outcomes for geriatric burn patients, particularly for those at higher mortality risk.

Radiation's Lasting Impact: How Lymphatic Injury Contributes to Seroma Formation

Abstract Presenter: Meeti Mehta BS

Abstract Co-Author(s): Shayan Sarrami MD, Korrina Gidwani, Adaora Okigbo, Casey Zhang, Carolyn De La Cruz MD

Introduction: Radiation is a known risk factor of lymphedema development but the extent of its damage on truncal lymphatics has never been assessed. Using

indocyanine green (ICG) lymphography, damage can be visualized as areas of dermal backflow or absent lymphatic flow following severe destruction. We aim to analyze the effects of radiation on lymphatic structures of the chest, exploring the incidence of no flow zones and identifying associated complications.

Methods: We performed a retrospective review of breast cancer patients who received ICG lymphography of their chest from December 2014 to January 2024. Patients were separated into radiation and non-radiation groups. Using ICG lymphography, truncal subunits (superior and inferior mastectomy flaps, inframammary fold, medial abdomen, and lateral abdomen) were assessed, and zones of no lymphatic flow were recorded. These zones were identified by observing ICG migration from the injection point, creating dermal backflow in certain regions of the trunk, while adjacent areas displayed no lymph flow. Data on breast cancer treatment modalities were collected. Multivariate analysis was conducted to assess associations between radiation, no flow zones, and breast complications, while controlling for other treatment modalities and BMI.

Results: Our cohort included 173 hemi-trunks (95 patients). Of these, 73 sides (42%) underwent radiation and 100 (58%) did not. Most patients had mastectomy (79%), chemotherapy (65%), and axillary dissection (27%), with an average BMI of 30.16. Zones of no lymphatic flow were observed in 79% of the radiation group and 63% of the non-radiation group (p=0.03). Most no flow zones were in inferior mastectomy flaps, correlating with clinical symptoms of lymphedema. On multivariate analysis, radiation increased the odds of absent lymphatic flow by 158% (OR 2.58, CI 1.10–6.02, p=0.03).

Breast complications were more frequent in the radiation group (52.1%) than the non-radiation group (28.0%, p=0.002), including infection (26.0% vs. 13.0%, p=0.048) and seroma (37.0% vs. 19.0%, p=0.014). Radiation therapy was associated with 162% greater risk of seroma compared to no radiation therapy, when controlling for confounders (OR 2.62, CI 1.15-5.97, p=0.02). When controlling for radiation and other confounders, diffuse and absent lymphatic flow were associated with 31% greater risk of seroma compared to less severe dermal backflow patterns (OR 1.31, CI 1.01-1.70, p=0.04).

Conclusion: Radiation is significantly associated with zones of absent lymphatic flow, reflecting severe lymphatic damage and stasis. These zones are significantly correlated with an increased risk of seroma formation, and radiation independently increases the likelihood of seroma development. These findings suggest that radiation-induced lymphatic disruption is a critical factor in seroma formation, highlighting the need for targeted interventions to mitigate radiation-associated complications in breast cancer patients.

Comparing of Outcomes of Single-stage vs Multi-stage Reconstruction of Stage IV Pelvic Pressure Ulcers

Abstract Presenter: Aaron Dadzie

Abstract Co-Author(s): Sydney Somers, Mackenzie French MD, Katie Hansen,. Alexandra Vitale, Devin Eddington, Alvin Kwok MD, MPH, Jayant Agarwal MD

Background: Pressure ulcers (PU) are commonly treated by plastic surgeons. Optimal management is necessary to limit potential burdens on the health care system. All stage IV PU require surgical debridement and, if appropriate, may proceed to flap reconstruction. The term single-stage PU reconstruction refers to management of these wounds with debridement and reconstruction in a single procedure. Multi-staged PU reconstruction refers to performing debridement(s) in a separate procedure from the reconstruction. It is believed that the additional time between debridement and reconstruction can improve vascularization of the wound bed for optimization prior to reconstructing; however, evidence for this is conflicting as there is a lack of comparative studies. We sought to assess if there is a difference in 180-day reoperation and recurrence rates of pelvic pressure ulcer flap reconstructions when reconstruction is performed in a single-stage vs multi-stage operation.

Methods: A retrospective cohort study was performed on all adult patients at a single institution who underwent PU flap reconstruction from 2013 to 2023. Inclusion criteria included documented diagnosis of a single stage IV ischial, trochanteric, or sacral pressure ulcer with at least 6 months of follow-up. The multistage cohort was defined by those who had surgical debridement in a separate procedure prior to flap closure. Demographic information, PU characteristics, and treatment details were collected. The primary outcome included reoperation and wound recurrence within 6 months. Secondary outcomes comprised other flap complications including flap failure, wound dehiscence, hemorrhage, infection, seroma, and donor site breakdown. Data was analyzed with unpaired 2-sample t-test, two-tailed Fisher's exact text, and Chi-squared.

Results: A total of 110 patients met our inclusion criteria. 60 were reconstructed as in a single-stage and 50 underwent multi-staged reconstruction. The only significant differences between the two cohorts were more active smokers were included in the single stage-cohort as compared to the multi-stage (13.3% vs 2.0%; p = .0382) and

more patients with some level of paralysis in the multi-stage cohort (86.7% vs 96%; p = .0370). There were no other significant differences between the two groups. The rates of reoperation (18% vs 8.3%; p = .1574) and recurrence (14% vs 5%; p = 0.1808) were higher for the multistage cohort however, this was not statistically significant. We found no significant differences between multi-stage and single-stage reconstructions in postoperative complications including dehiscence (16% vs 15%; p = 1.00) and flap failure (4% vs 0%; p = 0.2043).

Conclusion: The results of this study suggest that multi-stage reconstruction of PU does not significantly reduce the rates of complications or reoperations. This suggests that single-stage reconstruction could be the preferred option for surgical management of stage IV PU as this has also been shown to be associated with shorter hospitalizations and greater cost effectiveness. This study is limited by its retrospective nature and the lack of randomization. Providers may be inadvertently self-selecting patients into each cohort based on the extent of the PU. Further comparison with a randomized control trial is warranted for further evaluation and comparison.

Arterial Anastomosis to Injured Vessels: Outcomes in Lower Extremity Trauma Reconstruction

Abstract Presenter: Ellen Wang

Abstract Co-Author(s): Jessica Nye, Imran Rizvi MD, Kylie Swiekatowski, Bora Kahramangil MD, Paul Won MD, Noa Kopplin, Stephen Parlamas, Jeffrey Trost MD, Mohin Bhadkamkar MD

Background: The selection of recipient vessels is critical for successful free tissue transfer in the lower extremity (LE). Traditional teaching advocates that microsurgical anastomosis should be performed to uninjured vessels outside the zone of injury (ZOI) to decrease the risk of complications from perivascular inflammatory changes. However, there is no defined way to assess the extent of the ZOI, and uninjured vessels may not be available or readily accessible. To evaluate the complications ascribed to the ZOI and injured vessels, we compared the outcomes between arterial anastomoses fashioned from within the ZOI versus non-injured recipient vessels.

Methods: A retrospective review was conducted of adult patients (≥18 years old) who required free flap (FF) reconstruction of the LE from 2016-2024. Injury to the recipient

artery (transection, avulsion, or thrombosis) was determined by intraoperative assessment or pre-operative computed tomography angiography (CTA). The primary outcome, complications attributed to the arterial anastomosis, was a composite variable defined as return to the operating room (OR) during the index hospitalization for arterial thrombosis, partial flap loss, and/or total flap loss. Fisher's tests and chi-squared tests were performed to examine differences between complications in anastomoses using injured vs non-injured vessels..

Results: A total of 285 cases met our inclusion criteria, with 87 (30.5%) FF arterial anastomoses performed to an injured recipient artery. The latissimus dorsi (30.6%) was the most common FF, followed by the radial forearm (27.5%), and the anterolateral thigh (23.2%). The anterior tibial artery was the recipient vessel in 50.9% of cases and most anastomoses were performed in an end-end fashion. Of the 285 cases in this study, 20 (7.0%) required OR takeback for arterial thrombosis and/or partial/total flap loss. However, there was not a significant difference between the incidence of these complications for FFs anastomosed to injured (6.9%) versus non-injured (7.1%) recipient arteries ($p > 0.9$).

Discussion: We found that there were no significant differences in the rate of arterial thrombosis or flap necrosis for arterial anastomoses fashioned with non-injured vs injured recipient vessels within the ZOI. While healthy vessels outside the ZOI are preferred for LE reconstruction, the selection of recipient vessels can be guided by surgeon expertise and microsurgical technique when they are unavailable, broadening the options for limb salvage.

Optimal Body Mass Index Threshold to Predict Lymphedema Risk Following Immediate Lymphatic Reconstruction

Abstract Presenter: Abbas Hassan MD

Abstract Co-Author(s): John Hajj, John Paul Lewis, Shahnur Ahmed MD, Carla Fisher, Kandice Ludwig, Rachel Danforth MD, R. Jason VonDerHaar MD, Ravinder Bamba MD, Mary Lester MD, Al Hassanein MD, MMSc, FACS

Background: Obesity is a known risk-factor for developing breast cancer–related lymphedema (BCRL) after axillary lymph node dissection (ALND). It is unclear if there is body mass index (BMI) threshold for increased risk of development of lymphedema

after immediate lymphatic reconstruction (ILR). The purpose of this study is to assess the influence of obesity on the incidence of BCRL after ILR and determine a BMI threshold using a receiver operating characteristic (ROC) curve analysis.

Study Design: We retrospectively studied consecutive patients who underwent ILR following ALND between 2017 and 2024 across a university hospital system. Rates were compared across World Health Organization (WHO) obesity categories using logistic regression. An optimal BMI threshold predictive of BCRL was derived via ROC-based curve analysis, employing the Youden Index to identify the BMI cut-off with maximal combined sensitivity and specificity.

Results: We identified 172 patients with a mean age 50.9±11.6 years, BMI of 29.5±6.9 kg/m², and follow-up time of 23.1±15.2 months. Most patients (58.1%, n=100) had BMI <30 kg/m² (non-obese), 23.3% had BMI 30–34.9 kg/m² (class I), and 18.6% had BMI ≥35 kg/m² (class II/III). Patients with class II/III obesity had non-significantly elevated BCRL rates (12.5%) compared to class I (5.0%) and non-obese (6.0%) (p=0.39). The ROC-derived BMI threshold of >28 kg/m² demonstrated a significantly higher BCRL rate (11.1% vs. 2.4%; p=0.034), corresponding to a five-fold increase in lymphedema odds (OR 5.00; 95% CI 1.06–23.55).

Conclusions: Standard WHO obesity classification was not significantly associated with higher BCRL risk. However, BMI threshold of >28 kg/m² effectively predicted higher lymphedema incidence indicating the WHO classification range may be too broad for ILR. Patients with a BMI> 28 kg/m² should be given greater consideration for ILR when undergoing ALND.

Trends and Drivers of Decreasing Referrals to Plastic Surgery following Mohs Procedures

Abstract Presenter: Goutam Gadiraju

Abstract Co-Author(s): Renee Gao, Andrew Malek, Yibin Zhang, Yizhuo Shen, Alan Yang MD, Justin Broyles MD

Background: In the United States, over 5.5 million patients are diagnosed with skin cancer annually. Mohs Micrographic Surgery (MMS) is widely utilized for precise excision of skin cancers, often necessitating advanced reconstructive techniques to

address post-surgical defects. Though plastic and reconstructive surgeons (PRS) are often integral to treatment, data regarding the sociodemographic, oncologic, and surgical variables that drive referrals remain sparse.

Methods: The Massachusetts All-Payer Claims Database (2016-2020) was analyzed to evaluate patients treated via MMS for head and neck skin cancers, including melanoma, melanoma in situ (MIS), basal cell carcinoma (BCC), squamous cell carcinoma (SCC), and carcinoma in situ (CIS). Claims data were reviewed to identify MMS and referrals for reconstructive procedures. We applied a multivariable regression analysis to identify independent predictors of patients receiving referrals for reconstructive care. Financial analyses compared reimbursement data for physician service fees between MMS-surgeon vs. PRS-surgeon led reconstructions.

Results: Of 70,308 patients who underwent MMS, only 5,090 (7.24%) were referred to PRS, with referrals down-trending over the study period (8.07% in 2016 to 6.38% in 2020). Younger patients (mean 67.60 years vs. 70.02, $p<0.001$) and female patients (8.59% vs. 6.03% males, $p<0.001$) were more frequently referred to PRS. The only reconstructive procedures performed by PRS more often than MMS were free flaps, pedicled flaps, composite dermis/fat/fascial grafts, and skin grafts with cartilage. Patients with Melanoma or MIS had significantly higher odds of PRS referral (OR 1.771, $p<0.008$), as did those with tumors at cosmetically sensitive regions (e.g., eyelid OR=10.399; nose OR=2.889; lip OR=2.175, $p<0.001$). Patients treated in the Boston Metropolitan Area had lower odds of referral to PRS (OR=0.731, $p<0.001$), whereas publicly insured patients had higher odds of referral (OR=1.08, $p=0.016$). Stratified by insurance type, patients in the PRS cohort were younger than the MMS cohort across both public and private insurance holders.

Financial analyses revealed significant disparities in reimbursements. The median charge for MMS-led reconstruction was $1198.02, with median payments of $206.72 for privately insured patients vs. $51.18 for publicly insured patients ($p<0.001$). PRS-led reconstructions had higher median charges ($1,885.12) but similarly low median reimbursements ($531.33 privately insured, $165.26 publicly insured, $p<0.001$).

Conclusions: PRS referrals following MMS are declining, despite evidence that involvement of PRS improves reconstructive outcomes. With increased use of MMS in managing melanoma and MIS, PRS may see an evolution in practice patterns, shifting toward a greater emphasis on treating patients affected by those cancers. Public insurance status independently increased odds of PRS referral; in light of our results on payments, our findings suggest that reimbursement schemes may independently affect delivery of reconstructive care. Incentive structures within value-based care models,

such as the Merit-Based Incentive Payment System (MIPS), may further inadvertently discourage judicious interdisciplinary collaboration by incentivizing per-practice cost-saving. Policy reforms aimed at aligning reimbursement structures are needed to ensure equitable access to high-quality reconstructive care.

Surgical Indications, Wound Complications and Reoperation Following Upper Extremity Flap Reconstruction: A NSQIP Database Study

Abstract Presenter: Margaret Wang

Abstract Co-Author(s): Clara Tandar, Nikhil Sobti MD, Peter Dinh, Reena Bhatt MD

Introduction: Upper extremity flaps are important procedures following trauma, tumor resections, infections and post-operative complications. This study characterizes wound complications and re-operation rates within 30 days following upper extremity flap surgery using a national database with analysis by surgical indication.

Methods: The National Surgical Quality Improvement Program (NSQIP) database was queried from 2005 to 2022 for patients who underwent upper extremity "pedicled axial" flap reconstruction (CPT 15736). Cases were grouped into five categories by ICD-9 and ICD-10 diagnosis codes: cancer/neoplasm, infection, post-operative complications (i.e. surgical site/hardware infection or wound breakdown), open wounds/trauma, and other indications. All cases with non-upper extremity or non-postoperative complication-related ICD codes were excluded. Predictive variables included patient demographics and reconstructive indication. The primary outcome was postoperative complication defined as re-operation or wound complications including surgical site infections (SSIs) and dehiscence within 30 days of surgery. Bivariate and multivariate statistical analysis was performed to analyze the association of predictors with surgical outcomes (significance defined as $p < 0.05$).

Results: Of 592 cases that met inclusion criteria, the mean age was 53.9 (SD 17.7), with 59.1% males (n=350) and 40.9% females (n=242). One-third of cases were for neoplastic indications (n=199, 36.0%), 19.1% for trauma and wounds (n=113), 13.9% due to postoperative complications (n=82), 2.9% for infections (n=17) and 30.6% for other indications (n=181). The majority of surgeries were completed by plastic surgeons (n=383, 64.7%). The mean operative time was 125.8 (SD 103.5) minutes There were 43 patients (7.3%) that experienced postoperative wound complications (n=24, 4.1%) or

required reoperation (n=23, 3.9%). Specifically, there were 28 superficial SSIs (3.1%), 11 deep incisional SSIs (1.2%), 4 organ space SSIs (0.4%), and 15 cases of wound dehiscence (1.7%).

On bivariate analysis, in terms of operative indications, cases related to complications from a prior surgery were significantly associated with further wound complications and re-operation (17.1%) compared to cases for neoplastic (5.5%), open wound/trauma (5.3%), infection (11.8%) and other indications (5.5%).Those who experienced wound complications/reoperation were older on average (58.9 vs. 53.5, p=0.028) than those who did not, while there was no significant difference in operative time. American Society of Anesthesiologists (ASA) Class 4 was also associated with higher frequency of complications (29.4%, p = 0.002).

There was no association between surgeon specialty, diabetes mellitus, smoking history and frequency of wound complications or reoperation. Binary logistic regression analysis adjusted for age, diabetes, smoking, and ASA class, redemonstrated that age and surgical indication of postoperative complication were significant predictors of subsequent wound complication or re-operation.

Conclusion: Patients undergoing salvage upper extremity flap reconstruction secondary to complications from a prior operation may experience greater rates of wound complications and re-operation compared to those undergoing primary flap reconstruction. These findings may help guide clinical risk management and patient counselling.

Morphological and Functional Changes in the Vasa Vasorum of Lymphatic Vessels: Implications for Lymphedema Progression

Abstract Presenter: Chihiro Matsui MD,PhD

Abstract Co-Author(s): Reiko Tsukuura MD, Toko Miyazaki, Joseph Escandon MD, Hatan Mortada MD, Takumi Yamamoto MD

Purpose: Lymphedema is a progressive disorder characterized by chronic lymphatic dysfunction, fibrosis, and inflammation. Despite extensive research, the underlying cause of lymphatic vessel deterioration remains unclear. The vasa vasorum of superficial collecting lymph vessels (VCL) has been implicated in disease progression,

but its role in lymphatic pathology is not well understood. This study aimed to establish a severity staging system to stratify and characterize pathophysiological changes in superficial collecting lymph vessels (SCLs) based on VCL morphology using intraoperative video-capillaroscopy (VC). Additionally, we investigated the relationship between the VCL stage and key indicators of lymphatic dysfunction, including lymphosclerosis grade, indocyanine green (ICG) lymphography stage, and endothelial cell viability assessed by D2-40 staining (podoplanin).

Methods: A retrospective review was conducted on patients with lower extremity lymphedema (LEL) who underwent intraoperative VC during lymphaticovenular anastomosis (LVA) surgery. VC images at 175× and 620× magnifications were used to classify VCL morphology into six stages (0–5) based on vessel tortuosity, branching density, luminal narrowing, and discontinuity. Histological assessment of SCLs was performed using D2-40 staining, specific marker for lymphatic endothelial cells, graded as 0 (negative), 1 (mildly positive), or 2 (strongly positive). Red blood cell (RBC) movement within the VCLs was recorded as present (score 1) or absent (score 0). Correlations between VCL stage and lymphosclerosis severity, ICG lymphography findings, and endothelial viability were statistically analyzed.

Results: One-hundred four (n=104) SCLs from 32 patients were analyzed. VCL stages were distributed as follows: stage 0 (3.8%), stage 1 (15.4%), stage 2 (17.3%), stage 3 (34.6%), stage 4 (19.2%), and stage 5 (9.6%). A higher VCL stage was significantly associated with higher lymphosclerosis grade (P=0.002) and lower D2-40 staining positivity (P<.001), indicating a loss of viable lymphatic endothelial cells. RBC movement within the VCLs decreased significantly as VCL stage progressed (P<.001), reflecting impaired perfusion. Additionally, VCL stage correlated significantly with ICG lymphography stage (P=0.007), suggesting that VCL deterioration is linked to worsening lymphatic dysfunction.

Conclusion: This study establishes a novel VCL staging system and demonstrates a strong association between VCL impairment and lymphatic vessel sclerosis, fibrosis, and endothelial dysfunction in lymphedema. Our findings suggest that chronic ischemia of the lymphatic vasa vasorum plays a central role in lymphedema progression, providing a new perspective on its pathogenesis. Since VC enables real-time assessment of microvascular changes, it could serve as a valuable tool for staging lymphedema and guiding treatment. Understanding the role of VCL pathology may also lead to the development of targeted regenerative therapies aimed at improving microvascular function and restoring lymphatic drainage in affected patients.

Financial Disparities in Microsurgical Reconstruction: A Comparative Analysis of Reimbursement for Head and Neck Versus Breast Free Flap Procedures

PURPOSE: Given the complexity of microsurgical reconstruction, understanding reimbursement patterns is essential for fair compensation and equitable access to care for patients requiring advanced reconstruction. This study aims to perform a comprehensive financial analysis comparing reimbursement trends in head and neck (H&N) flap reconstruction versus deep inferior artery perforator (DIEP) flap breast reconstruction.

METHODS: A retrospective review identified all patients undergoing H&N or DIEP flap microsurgical reconstruction at a single institution from 2016 to 2023. Demographics, peri-operative details, complications, payer status, and reimbursement data were collected. Descriptive and t-test analyses were used for statistical analysis.
RESULTS – A total of 136 H&N and 140 DIEP flap patients were reviewed. Providers received $4,322 more per patient and $7.19 more per operative minute for DIEP versus H&N flaps ($7,272 ± 5,003 vs. H&N: $2,950 ± 2,161; p<.0001). Medicaid reimbursement percentage greatly favored DIEP flaps (53.4% vs. H&N: 29.9%; p=.0034). Operative time was similar (DIEP: 569.8 ± 108.7 min vs. H&N: 546.7 ± 142.1 min; p=.133). Hospitals were reimbursed $32,337 more per H&N patient, a 7.7-day longer length of stay likely contributed (p<.0001).

CONCLUSIONS: This analysis highlights disparities in reimbursement for microsurgery, revealing undervaluation of H&N free flaps compared to breast microsurgery, which received higher compensation and Medicaid reimbursement despite comparable operative times and technical demands. Efforts toward transparent financial policies are needed to achieve fair reimbursement and delivery of equitable care.

Functional Donor-Site Morbidity After Free Latissimus Dorsi Muscle Transfer in Children

Abstract Presenter: Srinithya Gillipelli

Abstract Co-Author(s): Atenas Bustamante, Abraham Zavala MD, Normy Wieslawa De Pawlikowski MD

Introduction: The latissimus dorsi muscle (LDM) is widely used in reconstructive surgery due to its large surface area, reliable vascular supply, and versatility. It plays a

crucial role in shoulder stability, adduction, internal rotation, and scapular control. While donor-site morbidity following LDM harvest has been extensively studied in adults, data in pediatric patients remain limited. Given the ongoing musculoskeletal development in children, concerns exist regarding long-term functional outcomes, compensatory adaptations, and potential postural alterations. This study evaluates long-term donor-site morbidity, shoulder function, and musculoskeletal adaptation in pediatric patients undergoing free LDM transfer.

Methods: A retrospective review was conducted on pediatric patients who underwent free LDM transfer for soft tissue reconstruction between 2018 and 2021 at a tertiary care center. All procedures were performed by a single senior surgeon. Patients aged ≤17 years (males) or ≤15 years (females) were included. Donor-site morbidity was assessed using the Disabilities of the Arm, Shoulder, and Hand (DASH) score, Shoulder Pain and Disability Index (SPADI), and Pediatric American Shoulder and Elbow Surgeons (Pedia-ASES) assessment. Functional outcomes included range of motion, shoulder stability, ability to perform daily activities, and spinal asymmetry.

Results: A total of 21 pediatric patients (12 males, 9 females; mean age: 7.0 ± 4.1 years, range: 1–15 years) were included. Trauma was the leading indication for reconstruction (n=19). Flaps were categorized as muscle-only (n=9), myocutaneous (n=11), or myofascial (n=1). The average flap size measured 121 ± 38 cm². The anterior tibial artery and vein served as the primary recipient vessels in 10 cases, while the superficial temporal artery and vein were utilized in 5 cases.
Functional assessments indicated minimal donor-site morbidity and excellent postoperative outcomes. The mean DASH score was 7.49 ± 5.62, reflecting low disability. SPADI pain and disability scores were 5.72 ± 3.89 and 4.17 ± 4.01, respectively, further supporting favorable functional recovery. The mean Pedia-ASES score of 42 ± 18.6 demonstrated largely preserved shoulder function. Patients were followed for an average of 37.3 ± 11.5 months, during which no instances of major shoulder instability, scapular dyskinesia, or progressive spinal asymmetry were observed. Importantly, all patients regained full range of motion and were able to resume their normal activities without limitations. These findings suggest that compensatory mechanisms, particularly by the deltoid, supraspinatus, and pectoralis major, effectively mitigate functional deficits following LDM harvest.

Conclusion: Free latissimus dorsi muscle transfer in pediatric patients is associated with minimal long-term donor-site morbidity and excellent functional recovery. Despite the LDM's critical role in shoulder biomechanics, children demonstrated significant adaptive muscle compensation, likely due to ongoing musculoskeletal plasticity. While concerns regarding spinal stability and postural changes remain, no significant

abnormalities were observed in this cohort. Given the limited data on donor-site morbidity in pediatric patients, further research should investigate long-term biomechanical adaptations, function-sparing surgical techniques, and extended follow-up to refine reconstructive strategies in children.

Characterizing Risk Factors for Amputation following Attempted Post-Traumatic Lower Extremity Salvage

Abstract Presenter: Stephanie Vu

Abstract Co-Author(s): Ryan Badiee MD, Editt Taslakian MD, MS, Fei Wang MD, Gillian O'Connell MD, Cameron Kneib MD, Yusha (Katie) Liu MD, PhD, Kari Keys

Introduction: Limb salvage remains the primary goal following severe extremity trauma, yet some patients ultimately undergo amputation [1]. Indications for amputation after attempted salvage include orthopedic or vascular complications, soft tissue deficiency, infections, or functional limitations. This study aims to characterize the indications, timing, and factors associated with amputation after attempted limb salvage to optimize patient selection, improve surgical decision-making, and set realistic expectations for long-term outcomes [2].

Methods: A retrospective analysis of patients undergoing lower extremity limb salvage over 30 years at a high-volume trauma center was performed. Student's t-test, Chi square tests, and Fisher's exact tests were utilized to identify univariate differences. Bivariate and multivariable logistic regression identified predictors of amputation, with key variables including vascular consultation, number of debridements, reconstruction timing, and free flap use.

Results: Of 253 lower extremity limb salvage patients, 33 (14%) ultimately underwent major amputation. Amputations ≤3 months after attempted salvage represented 42% (n=14). Of these, 13 were attributable to the soft tissue envelope: eight due to failure of tissue transfer and five due to progression of injury-related necrosis. 57% (n=19) of amputations occurred >3 months after attempted salvage, attributable to recalcitrant bone/hardware infection 53%, (n=10), inability to achieve a stable soft tissue envelope (21%,n=4), or sequelae of traumatized limb (26%,n=5) including chronic pain or recurrent ulceration.

Amputation was associated with suspected vascular injury (OR=2.7, p=0.048) and free flap use (OR=6.2, p=0.022). Larger free flaps showed stronger association with amputation (latissimus dorsi, OR=7.01, p=0.0158; ALT, OR=14.03, p=0.0033), while smaller flaps were not associated with amputation (vastus, p=0.0837; MSAP p=0.9981). Reconstruction performed within 8-10 days of injury was associated with lower risk of amputation (OR=0.06, p=0.0287). Sub-cohort analysis of patients who underwent early versus late amputation found female sex (OR=13.5, p=0.025), latissimus free flap (OR=5.04, p=0.034), soft tissue coverage failure (OR=5, p=0.039), and acute injury severity (OR = 10, p=0.049) were significantly associated with early amputation.

Conclusion: Determining relative benefit of limb salvage versus primary amputation for patients with limb-threatening trauma continues to be a primary challenge of surgical management. Compared to late amputations, early amputation was significantly associated with proxies of higher injury severity: vascular injury, larger flaps, flap loss, necrosis beyond flap coverage, and later reconstruction timing. Patients with viable reconstructions who later required amputation were disproportionately female and those struggling with bone/hardware infections. These findings help multidisciplinary limb salvage teams better counsel patients on likelihood of amputation as an outcome and improve understanding of what elements of injury severity may predict failure of limb salvage. Future studies should focus on refining decision-making algorithms to better predict salvageability, optimize surgical timing, and reducing the need for secondary amputation while also providing patients with expectations regarding limb salvage versus amputation.

Citations:
[1] Piwnica-Worms W, Stranix JT, Othman S, et al. Risk Factors for Lower Extremity Amputation Following Attempted Free Flap Limb Salvage. J Reconstr Microsurg. 2020;36(7):528-533. doi:10.1055/s-0040-1710358

[2] Bosse MJ, MacKenzie EJ, Kellam JF, et al. An analysis of outcomes of reconstruction or amputation after leg-threatening injuries. N Engl J Med. 2002;347(24):1924-1931. doi:10.1056/NEJMoa012604

The Thoracoacromial Vessels as Alternative Recipient Vessels for Chest Wall and Breast Reconstruction: Review of Anatomy, Case Examples, and Tips for Vascular Exposure

Abstract Presenter: Anna Boydstun

Abstract Co-Author: Benjamin McIntyre MD

Purpose: The internal mammary artery and vein (IMA/V) are the most commonly used recipient vessels for deep inferior epigastric artery perforator (DIEP) flap breast and chest wall reconstruction (1). Complex cases, such as extensive cancer involvement, previous radiotherapy, scarring, and inflammation, may compromise the IMA/V, and alternative vessels must be urgently considered. This case series aims to evaluate the use of the thoracoacromial artery and vein (TAA/V) as recipient vessels for breast and chest wall reconstruction.

Methods: Three patients were retrospectively reviewed who underwent DIEP flap chest wall and breast reconstruction using the TAA/V. Surgical exposure of the TAA/V involved elevation of the pectoralis major muscle and identifying the course of the vessels along the undersurface of the muscle. A small counter incision may be required just below the lateral third of the clavicle to expose the vessels. With knowledge of the vessel course, the pectoralis major muscle can be divided directly over the TAA/V. The cephalic vein in the deltopectoral groove can also be exposed as additional venous outflow.

Results: In all patients the TAA/V was identified and utilized without requiring microvascular revision. The TAA diameter was 1.5-2 mm, and the TAV was 2-4 mm. Three patient examples are reviewed. Patient 1 presented with a large central chest wound with numerous rib fractures and osteomyelitis. Patient 2 presented for delayed breast reconstruction with a history of breast cancer without radiation therapy. Patient 3 presented for breast reconstruction with a history of breast cancer, radiation therapy, a previously failed latissimus dorsi flap due to infection, and severe pectus excavatum. All flaps survived, with only patient 3 experiencing a small area of skin necrosis.

Conclusion: Extensive chest wall and breast defects can compromise the use of the internal mammary recipient vessels for free flap reconstruction. The thoracoacromial vessels serve as reliable alternative recipient vessels in this setting. Exposure does not require a position change and can be rapidly utilized as recipient vessels without the need for additional rib resections. Cosmetically, a remote incision resembles a portacath incision and offers good cosmesis in the breast cancer population. The proximity of the cephalic vein offers an additional venous outflow system. This study highlights the utility of these vessels and offers an anatomic review of the vessel location and tips for their exposure.

References:

1. Darcy CM, Smit JM, Audolfsson T, Acosta R. Surgical technique: The intercostal space approach to the internal mammary vessels in 463 microvascular breast reconstructions. J Plast Reconstr Aesthet Surg. 2011;64(1):58-62. doi:10.1016/j.bjps.2010.03.003

Targeted Nerve Interventions in Highly Comorbid Through-Knee Amputees: Advancing Palliative Care for Neuropathic Pain

Abstract Presenter: Danny Chamaa

Abstract Co-Author(s): Sami Ferdousian, Ryan Bender MD, Ryan Lin MD, Rachel Rohrich, Richard Youn MD, Christopher Attinger MD, Grant Kleiber MD

Introduction: Major lower extremity amputation (MLEA) is often necessary for patients with severe dysvascular conditions, extensive tissue loss, or non-salvageable infections. Through-knee amputation (TKA) is an underutilized MLEA technique that provides advantages in weight-bearing and counterbalance for wheelchair mobility. However, post-amputation neuropathic pain remains a significant barrier to recovery, with up to 85% of amputees experiencing phantom limb pain (PLP) or residual limb pain (RLP), leading to prolonged opioid dependence. Targeted muscle reinnervation (TMR) and regenerative peripheral nerve interface (RPNI) have emerged as promising strategies to mitigate neuropathic pain by providing physiologic targets for severed peripheral nerves. This study evaluates the impact of surgical nerve intervention on pain management and opioid dependence in TKA patients with severe disease burden.

Methods: A retrospective analysis of all TKA with peripheral nerve modification procedures performed at a single medical center between 2018 and 2024 was conducted. Inclusion criteria included patients who underwent TKA with primary TMR, RPNI, or end-to-end nerve coaptation. Patients with planned above-knee conversion or inadequate follow-up were excluded. Data collected included demographics, comorbidities, operative details, complications, pain scores, and medication usage at 1, 3, 6, and 12 months postoperatively. Trends in morphine milligram equivalents (MME) and neuroleptic (pregabalin) dosages were analyzed over 12 months.
Results:
A total of 36 TKAs were performed in 32 patients with a mean age of 69.7 years. The most common indications for TKA were dysvascular ischemia (41.7%) and infection (38.9%). Comorbidities were prevalent, with 66.7% of patients having diabetes, 55.6%

having peripheral vascular disease, and a mean charlson comorbidity index (CCI) of 6.6. TMR was performed in 72.2% of cases, while RPNI and end-to-end coaptation were performed in 13.9% each. The median postoperative hospital stay was 11 days. Complications were observed in 8.3% of patients, including stump infection (2.8%) and dehiscence (5.6%). Neuroma-related revision surgery occurred in 5.7% of cases. Among patients initially ambulatory, 55.6% were fitted for a prosthesis, and 55.0% of those achieved ambulation, with a median time to prosthesis of 3.6 months and ambulation of 4.4 months. The overall mortality rate was 36.1%, with a median time to mortality of 7.2 months. Pain outcomes demonstrated a reduction in residual limb and phantom pain over time, with 63.9% of patients reporting no pain at final follow-up. Narcotic consumption decreased over time, with 16.7% of patients using opioids at a mean follow-up of 7.9 months, compared to 50.0% at 1-month postoperatively. Mean MME also declined from 66.8 at 1-month follow-up to 45.0 at final follow-up. Pregabalin use followed a similar trend, decreasing from a mean of 148.0 at baseline to 57.3 mg at final follow-up.

Conclusion: TMR and RPNI demonstrate promise as palliative interventions for neuropathic pain in TKA patients with high disease burden. By addressing post-amputation pain at its root cause, these techniques offer a non-pharmacologic alternative to traditional pain management strategies. Future studies should further evaluate their role in optimizing palliative care pathways for this highly comorbid and medically complex patient population.

Abdominal Rectus Fascial Harvest for Sacrocolpopexy and Concomitant Abdominoplasty-Style Complex Closure: A Case Series.

Abstract Presenter: Carson Bair

Abstract Co-Author(s): Joyce Zhu, Meredith Moore MD, Michael Harrington MD, MPH

Background: Sacrocolpopexy addresses pelvic organ prolapse symptoms including urinary incontinence, discomfort, and bulging. The technique anchors the apex of the vagina to the sacrum to support the prolapsed vagina. Traditionally, this support is achieved using a synthetic mesh sling. However, many patients prefer to avoid prosthetic mesh given its relatively high rates of exposure and extrusion. Autologous fascial grafts can be viable solutions to mesh with improved durability and decreased

morbidity. This case series documents the use of the anterior abdominal rectus fascia for sacrocolpopexy with concomitant abdominoplasty-style complex closure.

Cases & Technique: A 53-year-old female (Figure 1) presented for robotic fascial sacrocolpopexy in the setting of pelvic floor dysfunction secondary to prior robotic myomectomy. Another 53-year-old female (Figure 2) presented with recurrent vaginal prolapse refractory to mesh-based sacrocolpopexy. Both operations began with a low transverse abdominal incision and pre-fascial dissection to the xiphoid. Anterior left and right rectus fascial grafts (~25x6 cm) were then sharply harvested, and the fascia was closed to the midline. The gynecology team then completed the robotic fascial sacrocolpopexy; existing incision and dissection were used for port access for this robotic assisted part of the operation. Following this portion, plastic surgery returned for complex closure of the abdomen over drains with absorbable sutures after the soft tissue was redraped over the repaired abdominal wall and trimmed. Both patients had an uncomplicated recovery with a short inpatient stay to monitor for return of bowel function. In follow-up, there was evidence of improved pelvic prolapse symptoms.

Discussion: The rectus abdominis fascia represents an optimal graft due to its large size, strength, and availability. This autologous tissue eliminates the need for implantation of potentially problematic pelvic mesh, avoiding the complications of mesh extrusion and exposure. The rectus fascia is also useful in the repair of failed previous sacrocolpopexy with synthetic mesh, and this technique is being offered in our institution for these revision surgeries and for primary procedures. Interdisciplinary collaboration between plastic surgery and gynecology facilitates an efficient harvest of the rectus fascia while allowing for concomitant abdominoplasty-adjacent closure techniques with redundant skin removal. Access to the useful rectus fascia donor site necessitates a large incision warranting complex closure with improved abdominal contour. This approach results in the dual benefit in patients who present with pelvic organ prolapse and abdominal tissue and skin laxity, with prolapse repair and a beneficial aesthetic result. This two-team operation does lengthen surgical duration and recovery with a larger incision site and potential donor site complications such as herniation, hematoma, or infection. While the outcomes for our current patients are promising with improved prolapse symptoms, long term follow-up of the rectus fascial graft durability will be needed to determine its utility. Future research should aim to evaluate patient satisfaction, complications, and long-term outcomes comparing autologous tissue grafts to synthetic mesh as well as satisfaction related to abdominoplasty-style closure techniques.

Conclusion: Interdisciplinary collaboration between plastic surgery and gynecology on abdominal rectus fascial sacrocolpopexy addresses patients' pelvic prolapse with the additional aesthetic benefits of abdominoplasty.

Lower Extremity Free Tissue Transfer in the Setting of Severe Medial Arterial Calcification: Limb Salvage is Possible, But at What Cost?

Abstract Presenter: Karen Li

Abstract Co-Author(s): Rachel Rohrich, Ryan Lin MD, Sami Ferdousian, Woori Lee, Richard Youn MD, Christopher Attinger MD, Cameron Akbari, Karen Evans MD, Meghan Currin

Background: Medial arterial calcification (MAC) is emerging as a tool to predict adverse limb events, but its impacts on microsurgery is unknown. This study evaluates the impact of MAC on microsurgical outcomes in a cohort of patients undergoing limb salvage.

Methods: Patients receiving lower extremity free tissue transfer (FTT) from 2011 to 2024 were reviewed. Radiographs were used to classify patients into absent, moderate, or severe MAC categories using the validated scoring by Ferraresi et al. Endpoints included (1) major lower extremity amputation (MLEA), (2) unscheduled surgical reinterventions, (3) postoperative revascularization, (4) major adverse limb events (MALE), defined as a composite of MLEA or surgical reintervention, and (5) survival.

Results: Among 320 cases, 12 (3.8%) had moderate and 32 (10.0%) had severe MAC. Median follow-up was 22.2 months. On univariate analysis, patients with moderate and severe MAC demonstrated a significantly higher rates of flap complications (absent: 25.7% vs. moderate: 33.3% vs. severe: 56.3%; p=0.033), MALE (42.0% vs. 75.0% vs. 84.4%; p<0.001), surgical re-intervention (absent: 41.3% vs. 66.7% vs. 81.3%; p<0.001), postoperative vascular intervention (6.9% vs. 8.3% vs. 31.3%; p<0.001), MLEA (12.0% vs. 25.0% vs. 31.3%; p=0.009), and 5-Year mortality (5.4% vs. 8.3% vs. 18.8%; p<0.001). On multivariate analysis, severe MAC independently increased odds of MALE (p=0.009) and unscheduled reintervention (p=0.015).

Conclusion: While microsurgical FTT can achieve limb salvage in patients with severe MAC, it is associated with significant morbidity, as over 80% will require additional

surgical management. Microsurgeons should be made aware of MAC and its association with adverse events.

Comparative Analysis Of Melanoma Treatment Outcomes Between Differing Surgical Specialties

Abstract Presenter: Christina Bear

Abstract Co-Author(s): Alexander Dagi, Jarrod Bogue MD, Catherine Ly

Background: The surgical treatment of melanoma, including excision and reconstruction, can be performed by a variety of surgical specialties and through a multidisciplinary approach (1,2,3). Tumor location, size, and depth can impact specialty selection and reconstructive approach. Although dermatologists and ophthalmologists also play major roles in management, we sought to specifically understand the differences in treatment types and complications between patients treated by plastic and reconstructive surgery (PRS), otolaryngology (ENT), and general surgery (GS), the surgical subspecialties that frequently manage complex excisional and reconstructive procedures. Identifying optimal reconstruction strategies can improve outcomes and enhance patient care.

Methods: Melanoma cases from 2009 to 2022 were identified in the National Surgical Quality Improvement Program (NSQIP) database. Patients who underwent wide local excision, with or without reconstruction, were categorized by surgeon specialty and anatomic location. Data analysis included demographics, clinical characteristics, and complication rates with univariate and multivariate regression.

Results: A total of 10,495 patients were identified who underwent WLE with a mean age of 68.5 ± 14.2 years. The majority were male and white (62.3% and 75.5%, respectively). Among all patients, 4,555 (43.4%) underwent reconstruction. GS performed the greatest percentage of total reconstructive procedures (36.3%), followed by PRS (34.2%), ENT (24.4%), and other specialties (5.1%).

By location, head and neck melanomas were primarily reconstructed by PRS (48.8%) and ENT (37.9%). Trunk melanomas were mostly managed by GS (72.2%). Extremity melanomas were treated by PRS (33.8%) and GS (32.2%).

Reconstruction techniques varied by specialty. While PRS and GS used proportionately more skin grafts (48.6% and 66.7% of their reconstructions, respectively), and ENT more local flaps (38.9%) and free flaps (31.2%), PRS performed the greatest number of free flaps overall. By anatomic site, split-thickness skin grafts were most common for head and neck (36.0%), while full-thickness grafts predominated for extremities (52.6%).

Superficial SSI rates were highest in ENT cases (4.2%), which primarily comprised head and neck reconstructions. Deep SSI was most common in GS cases (1.0%, $p=0.009$), which predominantly comprised trunk and extremity reconstructions. Inpatient status increased organ/space SSI risk by 5.82x ($p<0.001$), and emergency cases had a 5.28x higher risk ($p=0.012$). Smoking, congestive heart failure, and steroid use predicted superficial SSI ($p<0.05$). Multivariate analysis showed extremity reconstructions had 1.38x higher odds of superficial SSI ($p=0.03$) and 1.5x higher odds of organ/space SSI ($p=0.04$) compared to head and neck reconstructions.

Conclusion: Melanoma reconstruction varies by site, with specialties favoring different techniques. Specialty selection and reconstruction choices influence complication risks. Patient health factors also impact outcomes, highlighting the importance of interventions such as smoking cessation and steroid tapering. This study provides insights into how specialty-driven reconstructive techniques affect melanoma outcomes, aiding treatment optimization and patient care.

1. Santamaria-Barria, J. A., & Mammen, J. M. V. (2022). Surgical management of melanoma: Advances and updates. Current Oncology Reports, 24, 1425--1432.
2. Nosrati, A., et al. (2017). Outcomes of melanoma in situ treated with Mohs micrographic surgery compared with wide local excision. JAMA Dermatology, 153, 436--441.
3. American Cancer Society. (n.d.). Treating melanoma skin cancer. Retrieved from https://www.cancer.org/cancer/types/melanoma-skin-cancer/treating.html

Early Prediction of Scar Outcomes: Strong Predictive Validity of 3-Month Assessments for 12-Month Scar Characteristics

Abstract Presenter: Rena Li

Abstract Co-Author(s): Robert Galiano MD, Bradley Melnick, Antoinette Nguyen

Background: Scar outcomes are traditionally evaluated at 12 months post-surgery, yet early prediction may enable timely interventions and improve patient expectations. This study evaluates the predictive value of 3-month scar assessments for 12-month outcomes using validated patient-reported and objective measures.

Methods: A prospective cohort of 40 surgical patients underwent scar evaluations at 3 and 12 months using the SCAR-Q and an adapted Patient and Observer Scar Assessment Scale (POSAS). Logistic regression assessed the predictive accuracy of 3-month "good" vs. "bad" scar ratings for 12-month classifications. Linear regression models evaluated the predictive relationships for continuous scar variables (vascularity, width, height, depth, and overall opinion). Predictive accuracy was assessed using area under the receiver operating characteristic curve (AUC) and correlation coefficients.

Results: Scars predicted as "good" at 3 months were 69.1 times more likely to remain "good" at 12 months ($p < 0.001$), with a model accuracy of 87.5% (95% CI: 73.2%–95.8%), sensitivity of 95.8%, and specificity of 75.0%. The ROC AUC of 0.854 confirmed strong predictive performance. The false negative rate was 4.2%, and the false positive rate was 25.0%. Linear regression showed strong correlations between 3-month and 12-month scar characteristics. Overall opinion was highly predictive ($\beta = 1.092$, $p < 0.001$, $R^2 = 0.53$, $r = 0.731$). Scar depth showed the strongest association ($\beta = 0.961$, $p < 0.001$, $R^2 = 0.75$, $r = 0.870$), explaining 75.1% of variance. Scar width ($\beta = 0.772$, $p < 0.001$, $R^2 = 0.38$, $r = 0.619$) and scar height ($\beta = 1.393$, $p < 0.001$, $R^2 = 0.36$, $r = 0.602$) also demonstrated moderate predictive accuracy. Vascularity at 3 months did not predict 12-month outcomes ($r = -0.080$, $p = 0.623$, $R^2 = 0.006$), highlighting its variability over time. Pigmentation predictions were 87.5% accurate, though poorly healing scars showed greater unpredictability.

Conclusions: Early scar assessments at 3 months reliably predict 12-month outcomes, particularly for depth, overall opinion, width, and height. Good scars rarely worsen, while bad scars show minimal improvement, supporting early prognostication in clinical practice. These findings emphasize the predictive utility of early scar assessments, enabling evidence-based treatment strategies and patient counseling.

The Impact of Retrorectus Vicryl Mesh on DIEP Donor Site morbidity: A Propensity Score-Matched Analysis

Abstract Presenter: Rami Elmorsi MD

Abstract Co-Author(s): Luis Camacho MD, Danielle Rogan, Rene Largo MD, Donald Baumann MD, Sahil Kapur MD, Christopher Nguyen MD, Mark Schaverien MD, Bryce Olenczak MD

Introduction: Donor site morbidity following deep inferior epigastric artery perforator (DIEP) flap harvest, particularly hernias and bulges, can cause significant aesthetic and functional challenges. This study evaluates the impact of retrorectus polyglactin (Vicryl) mesh placement on abdominal morbidity.

Methods: A retrospective, single-center study was conducted on patients undergoing autologous DIEP flap-based breast reconstructions between March 2018 and September 2023. Propensity score matching was employed to mitigate selection bias, while multivariable regression analysis addressed potential confounding factors.

Results: A total of 554 DIEP flap reconstructions in 357 patients were identified, with 112 (31%) receiving a retrorectus polyglactin mesh. Unmatched comparisons demonstrated significantly lower rates of hernia (0.9% vs. 6.5%, p=0.02) and bulge (0.9% vs. 7.3%, p=0.01) with mesh placement, although cellulitis rates were significantly higher (8.9% vs. 3.7%, p=0.04). In propensity-matched comparisons, no significant differences were found in the rates of postoperative hernias, bulges, abscess formation, seroma, cellulitis, hematoma, skin necrosis, wound dehiscence, or delayed wound healing between the mesh and no-mesh groups, Table. Univariate regression analysis identified mesh as the sole factor significantly associated with reduced bulge occurrence (OR=0.1, p=0.035). Multivariable regression, adjusted for follow-up duration, indicated that mesh placement was not an independent predictor of hernia (OR=0.5; p=0.58). However, advanced age (OR=1.1; p<0.001), prior open abdominal surgery (OR=0.1; p=0.0.17), previous radiation therapy (OR=0.1; p=0.01), lateral row perforator harvest (OR=46.5; p=0.004), and the number of harvested medial row perforators (OR=2.6; p=0.012) were identified as independent predictors.

Conclusion: Retrorectus polyglactin mesh placement is significantly associated with decreased bulge rates but does not independently reduce the risk of hernia following DIEP flap harvest.

Flap-Based Reconstruction for Complex Abdominal Wall Defects: Insights into Techniques and Outcomes from a Multi-Institutional Case Series

Abstract Presenter: Diwakar Phuyal MD

Abstract Co-Author(s): Fuad Abbas MD, Filippo Andrea Giova Perozzo MD, Anshumi Desai MD, Kyle Xu MD, Kashyap Tadisina MD, Juan Mella-Catinchi MD, MPH, Raffi Gurunian MD, Sarah Bishop MD

Background: Complex abdominal wall reconstruction (AWR) is a demanding, multidisciplinary procedure requiring extensive tissue rearrangement. In cases of composite defects, additional tissue from a different body region may be necessary for optimal coverage. This study evaluates our experience with AWR using pedicled and/or free flaps, often in conjunction with mesh for fascial repair.

Methods: An IRB-approved retrospective review was conducted on patients who underwent AWR using pedicled and free lower extremity flaps across two healthcare systems. Collected data included demographics, medical history, etiology, defect characteristics, reconstructive approach, and outcomes. Categorical variables were summarized as frequencies and proportions, while continuous variables were reported as medians with interquartile ranges (IQR).

Results: Twenty-four patients underwent AWR, with a median age of 53.5 years (IQR: 46.5–62) and a BMI of 29.89 kg/m² (IQR: 23.8–32.82). The cohort included 14 males (58.3%) and 10 females (41.7%), with 45.8% having a history of smoking. Prior abdominal surgery was reported in 66.7%, prior hernia repair in 50%, and prior radiation therapy in 8.3%.

66.7% of the patients had loss of domain, 33.3% underwent full-thickness oncologic resection, 4.8% underwent partial-thickness abdominal wall resection, and 4.8% had an open abdomen with an enterocutaneous fistula. The median skin defect measured 319 cm² (IQR: 190–603), while the median fascial defect was 750 cm² (IQR: 375–870). Reconstruction was performed using either free flaps (50%) or pedicled flaps (50%). All reconstructions included fasciocutaneous anterolateral thigh (ALT) flaps, with 45.8% also incorporating the vastus lateralis (VL). Additionally, 16.7% of patients received a chimeric flap, and 4.2% received an anteromedial thigh flap in addition to the ALT flap. Among free flap cases, the deep inferior epigastric (DIE) vessels were used in 75%, DIE vessels combined with the superficial inferior epigastric artery (SIEA) in 4.1% (n=1), and internal mammary vessels in 8.2%.

A total of 91.7% of patients required mesh reinforcement, with 63.6% receiving synthetic mesh and 36.4% receiving biologic mesh. The median flap size was 464 cm² (IQR: 310–562), and the median operative time was 654 minutes (IQR: 547–716). Flap success was achieved in 95.2% of cases, with one failure due to venous congestion. Intraoperative complications included one case of pedicle avulsion (4.8%), which was successfully salvaged. The median hospitalization duration was 14 days (IQR: 9.5–24.25), with a median follow-up of 7.5 months (IQR: 3–15).

Major complications requiring reoperation or intravenous antibiotics occurred in 20.8% of patients, including flap failure (4.1%), hematoma requiring takeback (4.1%), cellulitis requiring hospital admission and intravenous antibiotics (4.1%), and mesh infection/exposure requiring removal (8.3%). None of these complications occurred in patients undergoing post-oncologic resection. However, one oncologic resection patient required image-guided drain placement after accidental drain dislodgement.

No deaths were related to the surgical procedure. However, two-year mortality rate was 16.6%, attributed to their underlying malignancy.

Conclusion: AWR using free and pedicled flap-based techniques for full-thickness abdominal wall reconstruction and large loss-of-domain defects achieved a 95.2% success rate. Flap-based reconstruction remains a viable approach for restoring abdominal wall integrity, especially in patients with advanced malignancy with low complication.

10-Year Review of the Role of Hyperbaric Oxygen Therapy in Treating Nonhealing Radiated Wounds after Mastectomy

Abstract Presenter: Fanru Shen MD

Abstract Co-Author(s): Diwakar Phuyal MD, Osama Darras MD, Elad Fraiman, Eliana Ferreira Ribeiro Duraes MD, Phd, Msc, MBA, Risal Djohan MD, MBA

Background: Immediate breast reconstruction after mastectomy offers superior functional and aesthetic outcomes but carries up to a 14% risk of mastectomy flap necrosis (1-3), leading to complications such as implant exposure and take-back surgeries. Hyperbaric oxygen therapy (HBOT) promotes angiogenesis, collagen deposition, and antibacterial effects but remains underutilized for post-mastectomy

wound complications. This study evaluates the effectiveness of HBOT in promoting wound healing after mastectomy, regardless of reconstruction.

Methods: A single institution 10-year retrospective review (2014 - 2024) was conducted on patients who underwent simple, nipple-sparing or modified radical mastectomy regardless of reconstruction who experienced wound complications requiring HBOT. Primary outcomes included demographics, medical comorbidities, type of mastectomy and reconstruction, complications and revisions, time from diagnosis to complete wound healing, and the number of HBOT sessions completed. Secondary outcomes included the salvage rate of patients who developed wound healing problems following breast reconstruction and the incidence of adverse effects associated with HBOT.

Results: Twenty patients were included for analysis. The average age was 60.4 ± 14.15 years, with a mean follow-up of 20.5 months (range: 2–64), and a mean BMI of 32.8 ± 7.6. Of these, ten had undergone breast reconstruction (four pre-pectoral and three subpectoral tissue expanders with acellular dermal matrix were used, and three direct prepectoral implants which included acellular dermal matrix in two cases and surgical mesh in one case), while ten had not. Eight patients (40%) were former or current smokers, five (25%) had diabetes, eight (40%) had prior breast surgeries, and thirteen (65%) had received radiation therapy. Four patients required wound debridement before hyperbaric therapy, and one patient had a tissue expander removed prior to hyperbaric therapy. Nineteen patients (95%) achieved complete wound healing following a mean of 41.64 ± 22.37 sessions of hyperbaric therapy. Four patients required additional wound debridement in the operating room 2–13 days after initiating HBOT. One patient, who had undergone extensive resection, including multiple ribs due to malignancy, showed improvement but did not achieve full wound healing with hyperbaric therapy. Only one patient (5%) experienced temporary vision changes, which resolved upon discontinuation of hyperbaric therapy.

Conclusions: Preliminary evidence suggests that hyperbaric oxygen therapy is an effective treatment modality for mastectomy flap wounds by reducing the need for extensive debridement, enhancing vascularization particularly in radiated wounds, and shortening overall healing time. Despite its potential benefits, further high-quality research is needed to establish definitive clinical guidelines.

References:

1 Antony AK, Mehrara BM, McCarthy CM, et al. Salvage of tissue expander in the setting of mastectomy flap necrosis: a 13-year experience using timed excision with continued expansion. Plast Reconstr Surg. 2009;124(2):356-363.

2. Matsen CB, Mehrara B, Eaton A, et al. Skin Flap Necrosis After Mastectomy With Reconstruction: A Prospective Study. Ann Surg Oncol. 2016;23(1):257-264.
3. Hansen N, Espino S, Blough JT, Vu MM, Fine NA, Kim JYS. Evaluating Mastectomy Skin Flap Necrosis in the Extended Breast Reconstruction Risk Assessment Score for 1-Year Prediction of Prosthetic Reconstruction Outcomes. J Am Coll Surg. 2018;227(1):96-104.

Optimizing Success of Venous Anastomoses in Lower Extremity Free Flap Reconstruction

Abstract Presenter: Bora Kahramangil MD

Abstract Co-Author(s): Ellen Wang, Jessica Nye, Kylie Swiekatowski, Jose Barrera, Imran Rizvi MD, Stephen Parlamas, Noa Kopplin, Jeffrey Trost MD, Mohin Bhadkamkar MD

Background: Due to their dependent location, lower extremity (LE) free flaps are at increased risk for venous complications. Various factors such as patient medical history, flap type, flap size, wound characteristics, and number of venous anastomoses can determine success of the free flap. This study analyzes key risk factors of flap loss and venous complications in LE free flaps to optimize reconstruction and the possibility of limb salvage.

Materials and Methods: A retrospective review was conducted of adult patients (≥18 years old) who required free flap reconstruction of the LE from 2016-2024. Patient records were reviewed for demographic information, wound and operative characteristics, coupler size, and number of venous anastomoses. The primary outcome was venous complications, defined as a composite variable encompassing venous congestion, partial or complete flap loss due to venous causes, and flap hematoma. Fisher's exact tests, Chi-squared tests, and Mann-Whitney U tests were used for univariate analysis of variables. Multivariate logistic regression was performed for variables of interest.

Results: The cohort consisted of 333 free flap reconstructions with a median age of 40 (IQR: 30-50), and 73.3% of the patients were male. There was no significant association between age, sex, race/ethnicity, insurance status, and comorbidities with venous complications. The median time to reconstruction was 10 days with 69.7% of soft tissue

coverage occurring within 14 days. The overall venous complication rate was 6.0%. For free flaps used, 114 (34.3%) were radial forearm (RF), 93 (28.0%) were latissimus dorsi (LD), 67 (20.2%) were anterolateral thigh (ALT), and 59 (17.7%) were other flaps. The complication rate was 1.8% for RF, 9.7% for LD, and 9.0% for ALT (p=0.048). RF flaps had significantly lower complication rates compared to LD (odds ratio [OR]: 6.0, confidence interval [CI]: 1.5-40.0, p=0.02) and ALT (OR: 5.5, CI:1.2-38.4, p=0.04) on multivariate analysis. One venous anastomosis was used in 106 (31.8%) of flaps, and two venous anastomoses were used in 227 (68.2%) flaps. Dual venous systems were associated with significantly lower complication rates both on univariate (p=0.02) and multivariate (OR: 0.36, CI: 0.14-0.89, p=0.03) analysis. Wound type (blunt, penetrating, etc), number of debridements prior to coverage, days to reconstruction, and flap size were not significant risk factors to venous complications. There was also no difference in coupler size in either single or dual venous systems.

Conclusion: Our results show a higher risk of venous complications in LE free flaps utilizing single venous anastomoses and with LD and ALT over RF free flaps. When feasible, performing a second anastomosis may improve outcomes. Understanding key risk factors for venous complications will be essential in managing venous outflow and optimizing flap survival.

Case series of Robotic-Assisted Harvest of the Rectus Abdominis Muscle in Limb Salvage Reconstruction

Abstract Presenter: Amy Liu MD

Abstract Co-Author(s): Alisha Suri, andrew malaney, Brian Chen MD, Rachel Contopoulos DO, Ruyan Zhang, Christyn Mellor, Yohan Liyanage, Peter Deptula MD, Daniel Murariu MD, MPH, MBA, FACS

Introduction: Devastating limb injury is often the result of high-energy trauma or malignancy and is characterized by destructive injury to soft tissues, bones, nerves, and vasculature.1 Defects in the distal third of the lower extremity often require free tissue transfer.2 Rectus abdominis free flap offers many advantages for wound coverage, but the traditional open technique for flap harvest can compromise abdominal wall integrity.3 Thus this otherwise versatile flap has fallen out of favor. A robotic-assisted approach offers a potential solution as it may reduce morbidity associated with rectus abdominis flap harvest. There are only a few case reports detailing implementation of a

robotic-assisted approach; it is still a largely underutilized method for harvest despite its potential benefits.4

Methods: Four robotic rectus free flap harvests were performed for extremity coverage at a single institution via a trans-abdominal pre peritoneal approach. Demographic information, operative variables (incision length, operative time), and outcomes were recorded.

Results: All four harvests were performed robotically utilizing 8 mm ports. Three were used for distal lower extremity reconstruction and one was used for upper extremity reconstruction; three injuries were a result of trauma and one was following oncologic reconstruction. One of the patients had unrecognized pedicle traction on inset that required revision at the index operation. There were no flap-related complications or donor site morbidities (hernia, bulge, seroma) at an average of 8 months post-operatively. Incision lengths were three 1.2 cm port sites and a 4 cm Pfannestiel incision for free flap extraction. Average robotic docking time was 7.5 minutes and average total robotic time was 2 hours 32.5 minutes.

Discussion: Although it is considered a workhorse flap, there has been decreased popularity in the use of the rectus abdominis free flap in recent years due to potential donor site morbidity.5 A robotic-assisted harvest approach offers a safe and efficient method for reconstruction: there is reduced morbidity due to preservation of both anterior and posterior rectus sheaths, while allowing for a two-team approach where robotic harvest and recipient vessels may be prepared simultaneously. Although feasibility was shown by this study, further larger studies are warranted.

References

1. Cholok D, Saberski E, Lowenberg DW. Approach to Complex Lower Extremity Reconstruction. Semin Plast Surg. 2022 Nov 16;36(4):233-242.
2. Györi E, Fast A, Resch A., Rath T, Radtke C. Reconstruction of traumatic and non-traumatic lower extremity defects with local or free flaps. Eur Surg. 2022;54, 44–49.
3. Kroll SS, Marchi M. Comparison of strategies for preventing abdominal-wall weakness after TRAM flap breast reconstruction. Plast Reconstr Surg. 1992 Jun;89(6):1045-51
4. Appel R, Shih L, Gimenez A, Bay C, Chai CY, Maricevich M. Robotic Rectus Abdominis Harvest for Pelvic Reconstruction after Abdominoperineal Resection. Semin Plast Surg. 2023 Jul 25;37(3):188-192.
5. Chevray PM. Update on Breast Reconstruction Using Free TRAM, DIEP, and SIEA Flaps. Semin Plast Surg. 2004 May;18(2):97-104.

Acquired Buried Penis Reconstruction: A Description of the "Manta Ray" Technique and a Retrospective Cohort Study

Abstract Presenter: Louis Massoud MD

Abstract Co-Author(s): cooper parish, Barbara Granicz, Matthew Mellon, Ivan Hadad MD

Introduction: Acquired buried penis (ABP), occurs when excessive surrounding soft tissue and skin folds obscure the penis, typically seen with obesity (1). The excess tissue is usually both above and on either side of the penis. It is often further worsened by Balanitis Xerotica Obliterans or Lichen Sclerosis. This leads to scarring of the shaft of the penis or foreskin, creating a ring of scar, obscuring the penile glans. ABP can affect the patient's relationships and mental health (2), and is also a risk factor for penile cancer (3). Limited literature exists describing patient outcomes following surgery for ABP. This study compares postoperative outcomes of a novel technique, the "Mantaray", versus the standard panniculectomy closure approach. Additionally, we provide a description of the Mantaray technique.

Methods: We conducted a retrospective, single-center cohort study of 46 patients who underwent either the Mantaray technique (n = 24) or standard panniculectomy closure (SPC) (n = 22) between October 2019 and January 2025. Follow-ups occurred approximately 1 to 4 weeks postoperatively. The Mantaray technique removes excess tissue above and beside either side of the penis in a single resection specimen, elevating the penile base and flattening the tissues that shroud the shaft. It also provides a full thickness graft for the penile shaft, which is superior to split thickness grafting. Pearson chi-square, Student's t-test, and Fisher's exact test were used for analysis.

Results: Age at the time of surgery was not significantly associated with postoperative complications in either group. Diabetes did not significantly impact postoperative complications. HbA1c was comparable between the groups (Mantaray 6.86 ± 1.01, SPC 6.85 ± 1.04). Reoperation rates were 31.8% (SPC) vs. 16.7% (Mantaray) ($p = 0.307$). Combined analysis showed that patients with a history of bariatric surgery/weight loss had lower wound dehiscence rates ($p = 0.021$). Postoperative complications were comparable, including mild infection ($p = 0.146$), wound dehiscence ($p = 0.603$), hematoma ($p = 1.00$), seroma ($p = 0.478$), and graft loss ($p = 0.609$). ABP recurrence

rate was higher in the SPC group than in the Mantaray group (13.6% vs. 0%), though the difference was not statistically significant (p = 0.101).

Conclusion: Surgical intervention is a safe treatment for ABP, with low overall postoperative complication rates. Preoperative weight loss should be considered, as it is associated with lower wound dehiscence rates. Age does not appear to influence outcomes and should not preclude patients from undergoing surgery for ABP. Presence of well-controlled diabetes does not impact postoperative outcomes. The Mantaray technique provides improved and aesthetic penile exposure in multiple vectors, with postoperative outcomes comparable to the standard panniculectomy approach.

References:
1. Higuchi, Ty T., et al. "Evaluation and treatment of adult concealed penis." Current urology reports 13 (2012): 277-284.
2. Amend, G.M., et al., The Lived Experience of Patients with Adult Acquired Buried Penis. J Urol, 2022. 208(2): p. 396-405.
3. Pekala, Kelly R., et al. "The prevalence of penile cancer in patients with adult acquired buried penis." Urology 133 (2019): 229-233.

Lower Incidence of Breast Cancer Related Lymphedema in Patients Treated with Metformin

Abstract Presenter: Sawyer Cimaroli Wimann MD

Abstract Co-Author(s): Anne Huang MD, Maureen Beederman MD, David Chang MD, Summer Hanson MD, PhD

Introduction: The leading cause of secondary lymphedema in developed countries is cancer treatment. Without intervention, breast cancer related lymphedema has been shown to affect up to 40% of patients. (1) However, immediate lymphatic reconstruction may decrease that risk. (1) Recently, Metformin has been studied for its anti-inflammatory and anti-fibrotic effects in reducing lymphedema in a mouse model. (2) The purpose of this study was to review the impact of metformin use on the development of lymphedema after axillary lymph node dissection.

Methods: The authors conducted a retrospective review of a prospectively maintained database of patients who underwent axillary lymph node dissection for breast cancer

from January 2018 to August 2022. Study participants were categorized into four groups: Group 1 underwent immediate lymphatic reconstruction and was taking Metformin, Group 2 underwent immediate lymphatic reconstruction but was not taking Metformin, Group 3 did not undergo immediate lymphatic reconstruction but was taking Metformin, and Group 4 did not undergo immediate lymphatic reconstruction and was not taking Metformin. Chi-square tests and logistic regression analyses were performed.

Results: The study included 258 patients with a mean age of 54 years (range 25–89) and a mean BMI of 28.7 kg/m² (SD = 6.8). The average follow-up was three years. The majority of patients were in Group 4 (n = 185), followed by Group 2 (n = 39), Group 3 (n = 26), and Group 1 (n = 7). The rates of secondary lymphedema were: Group 1 = 12.5%, Group 2 = 28.2%, Group 3 = 11.5%, and Group 4 = 36.2%. Logistic regression demonstrated that Metformin use (OR = 0.24, 95% CI: 0.08–0.72, p = 0.011) and immediate lymphatic reconstruction (OR = 0.34, 95% CI: 0.14–0.83, p = 0.018) were significantly associated with a decreased likelihood of lymphedema, while chemotherapy (OR = 2.61, 95% CI: 1.25–5.45, p = 0.010) was associated with an increased risk. BMI showed a trend toward significance (OR = 1.14, 95% CI: 0.99–1.31, p = 0.060), while age (p = 0.312) and radiation therapy (p = 0.307) were not significant predictors. A significant relationship between immediate lymphatic reconstruction, Metformin use, and lymphedema development was identified ($\chi^2(3, N = 258) = 8.2$, p = 0.04).

Conclusions: Metformin use, independently or in conjunction with immediate lymphatic reconstruction, may provide a protective role against the development of secondary lymphedema in patients undergoing axillary lymph node dissection for breast cancer.

References:
1. Huang A, Koesters E, Garza RM, Hanson SE, Chang DW. A Single Institution Experience With Immediate Lymphatic Reconstruction: Impact of Insurance Coverage on Risk Reduction. J Surg Oncol. Published online December 29, 2024. doi:10.1002/jso.28067
2. Wei M, Wang L, Liu X, et al. Metformin Eliminates Lymphedema in Mice by Alleviating Inflammation and Fibrosis: Implications for Human Therapy. Plast Reconstr Surg. 2024;154(6):1128e-1137e. doi:10.1097/PRS.0000000000011363

Evaluating Robotic Latissimus Dorsi Flap Harvest: A Systematic Review of Surgical and Patient Outcomes

Abstract Presenter: Maria Yan MD

Abstract Co-Author(s): Caitlin Foster, Jen-Yuan Christine Kao, Marissa Iverson, Andrew Chen MD

Purpose: The latissimus dorsi (LD) flap is a versatile option for reconstructing defects from the head, to breast, and extremities. Traditionally, LD flap harvest has been performed using an open approach, which is associated with significant donor site morbidity and scarring (1). Recent advancements in robotic surgery have enabled minimally invasive LD flap harvest, though large-scale studies evaluating surgical outcomes remain limited (2,3). This study systematically reviews the available literature on robotic LD flap harvest outcomes.

Methods: A systematic review was conducted following Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines. Randomized clinical trials, cohort studies, and case series published between January 1980 and November 2024 were included. Databases searched included CENTRAL, PubMed, Embase, and Scopus. Studies involving adult patients undergoing robotic-assisted LD flap harvest were analyzed for patient demographics, surgical technique, and postoperative outcomes.

Results: A total of 304 articles were screened, with 21 meeting inclusion criteria. Across these studies, 473 patients underwent robotic LD flap harvest, primarily for breast reconstruction (86.3%) and Poland syndrome correction (11.4%). 98.6% of flaps were pedicled. The mean patient age was 45.9 years, and the average BMI was 24.4 kg/m². Comorbidities included diabetes (4.5%), hypertension (11.1%), and active smoking (18.8%). Additionally, 57.4% of patients had prior radiation therapy, and 35.2% had undergone chemotherapy.

The mean hospital stay was 5.2 days, with an average follow-up of 19.4 months. Mean operative time, docking time, and robotic harvest time were 337.3, 43.8, and 84.8 minutes, respectively. Only one study reported conversion to an open procedure in a single patient. The overall complication rate was 30.1%, with seroma (23.2%), delayed wound healing (6.8%), and infection (2.9%) being the most common. Surgical revision was required in 6.0% of cases. Various scales assessed postoperative satisfaction, with all studies reporting ratings of "satisfied" or higher.

Conclusion: Robotic-assisted LD flap harvest is a safe and feasible alternative to the traditional open approach, demonstrating comparable operative times, low complication

rates, and high patient satisfaction. Further comparative studies are needed to evaluate differences in scarring, donor site morbidity, and long-term functional outcomes.

References:
1. Moore TS, Farrell LD. Latissimus dorsi myocutaneous flap for breast reconstruction: long-term results. Plast Reconstr Surg. 1992 Apr;89(4):666-72; discussion 673-4. PMID: 1546078.
2. Selber JC, Baumann DP, Holsinger CF. Robotic harvest of the latissimus dorsi muscle: laboratory and clinical experience. J Reconstr Microsurg. 2012 Sep;28(7):457-64. doi: 10.1055/s-0032-1315789. Epub 2012 Jun 28. PMID: 22744894.
3. Clemens MW, Kronowitz S, Selber JC. Robotic-assisted latissimus dorsi harvest in delayed-immediate breast reconstruction. Semin Plast Surg. 2014 Feb;28(1):20-5. doi: 10.1055/s-0034-1368163. PMID: 24872775; PMCID: PMC3946018.

Postoperative GLP-1 Agonist Use is Associated with Increased Complication and Revision Rates in Implant-Based Breast Reconstruction

Abstract Presenter: Julissa Molina-Vega

Abstract Co-Author(s): Patrick Chin MD, Ginger Slack MD, Meghan Miller

INTRODUCTION: Glucagon-like peptide-1 (GLP-1) receptor agonists have become increasingly popular as a pharmacologic treatment for weight loss. While their metabolic benefits are well-documented, their effects on surgical outcomes are not well defined. Recent studies have suggested that GLP-1 agonists may impact wound healing, immune response, and fat metabolism, which are critical factors in reconstructive procedures. In implant-based breast reconstruction, these medications may alter the healing process and affect the overall aesthetic and functional results due to their role in fat reduction. This study aims to evaluate the effects of postoperative GLP-1 agonist use on complication and revision rates in patients undergoing two-stage expander-implant breast reconstruction.

METHODS: This is a retrospective, single-institution study analyzing patients who underwent two-stage expander-implant breast reconstruction following oncologic resection from 2017 to 2022. Patients identified as using GLP-1 agonists postoperatively were included in the study. A control group of age-matched patients who did not use GLP-1 agonists was randomly selected from the same time period.

Patient demographics, operative details, and postoperative outcomes were collected, including rates of complications and revision surgeries. Recorded complications included capsular contracture, infection, hematoma, implant malposition, and other relevant adverse events. Revision procedures performed up to the present date were documented. Statistical analysis was conducted to compare outcomes between the two groups.

RESULTS: A total of 92 patients were included in this study, with 45 (49%) having used GLP-1 agonists at least once weekly for any duration following tissue expander placement. The cohort had a mean age of 52.1 years and a mean body mass index (BMI) of 26.1 kg/m². Among these patients, 27 underwent unilateral reconstruction, while 65 underwent bilateral reconstruction.
The overall cohort had an average of 0.9 revision surgeries per patient. A total of 11 complications (12%) were recorded, including six cases of capsular contracture, three infections, one case of implant migration, and one hematoma.
Patients who used GLP-1 agonists postoperatively had a significantly higher revision rate compared to those who did not (1.27 vs. 0.64, $p=0.027$). Additionally, postoperative GLP-1 agonist users experienced significantly more complications (22% vs. 2%, $p<0.01$), suggesting a potential negative impact on surgical healing and long-term outcomes.
However, these results may have been confounded by BMI, as patients who took GLP-1 agonists postoperatively were noted to have significantly higher BMI compared to the control group (28.7 vs. 23.7, $p<0.01$), and as a result significantly higher rates of medical comorbidities.

CONCLUSION: Our preliminary data indicate that the postoperative use of GLP-1 agonists is associated with a significantly increased risk of complications and revision surgeries in patients undergoing two-stage expander-implant breast reconstruction. These findings underscore the importance of thorough preoperative counseling for patients using GLP-1 agonists. Further studies with larger cohorts and prospective designs are warranted to better understand the mechanisms underlying these associations and to guide clinical decision-making in breast reconstruction surgery.

Assessing Length of Stay in Burn Care in Appalachia: Rethinking the 1% TBSA Rule for Resource-Limited Populations

Abstract Presenter: Armein Rahimpour MD

Abstract Co-Author(s): David Fox, David Denning MD, Rahman Barry MD, Semeret Munie, Curtis Harrison, Errington Thompson, Paul Bown

Background: Despite advances in burn care, morbidity and mortality remain high. There is a large gap in research focusing on resource-limited Appalachian burn victims. Appalachia is unique in many different ways. The region is well known nationally for poor healthcare outcomes, household income below the national average, ranking high in addiction and drug use crisis, and characterized with a high prevalence of comorbidities such as chronic obstructive pulmonary disease (COPD), diabetes mellitus (DM), coronary artery disease, and obesity. To complicate this devastating imbalance, Cabell Huntington Hospital is the sole burn intensive care unit in the state of West Virginia, with only six beds available. It is crucial to understand the factors that prolong the length of stay (LOS), as LOS is a key indicator for healthcare resource utilization, especially in this resource-limited population. This study aims to identify factors that influence LOS among burn patients in Appalachia, focusing on demographic and clinical variables.

Methodology: A retrospective analysis was conducted among 748 patients between January 1, 2017, and January 1, 2023. Demographic and clinical variables, including age, gender, COPD, DM, smoking history, inhalational injury, burn source, body mass index (BMI), total burn surface area (TBSA), and total ventilation duration (TVD), were collected. Multiple linear regression was used to identify predictors of LOS. Statistical significance was set at p-values <0.05.

Results: Significant predictors of prolonged LOS included TVD ($\beta = 1.25$, $p < 0.001$), TBSA ($\beta = 0.60$, $p < 0.001$), inhalational injury ($\beta = 6.02$, $p < 0.001$), and burn source (thermal contact with metal: $\beta = 10.68$, $p = 0.003$). Discharge status (dead) was associated with shorter LOS ($\beta = -17.09$, $p < 0.001$). For every additional day of ventilation, LOS increased by approximately 1.25 days. Each percentage increase in TBSA contributed to a 0.6-day increase in LOS. Patients who died had a hospital stay approximately 17 days shorter than those who survived. The presence of inhalational injury extended the LOS by an average of six days. Age, gender, COPD, DM, BMI, and smoking history were not significantly associated with LOS.

Conclusions: Newer predictor models should be used to combine TBSA with other demographics, comorbidities, and burn factors, such as inhalation injury and TVD, to provide a more accurate LOS for patients, their loved ones, and caregivers. The rule that for every 1% TBSA burned LOS increases with one day does not hold in our

population. These findings provide valuable insights for optimizing burn care in resource-limited settings.

Integrating Addiction Medicine into Burn Care: Optimizing Pain Management in Stimulant-Positive Patients

Abstract Presenter: Eloise Stanton MD

Abstract Co-Author(s): Artur Manasyan, Maxwell Johnson, T. Justin Gillenwater MD

Introduction: Stimulant use poses significant challenges in burn care, complicating pain management and leading to poorer outcomes, including longer hospital stays, higher complication rates, and increased healthcare costs. This study evaluates burn-related outcomes in stimulant-positive patients, as well as tabulates how frequently addiction medicine consultations are used in burn patients with positive stimulant screens.

Methods: Patients with positive urine toxicology screens for stimulants, including amphetamines and cocaine, were identified. The primary predictor variable was stimulant use, while primary outcomes included length of hospital stay, burn severity, complications, and overall outcomes of care.

Results: Out of 3,403 burn patients (34% female, 66% male, with a mean age of 39.2 ± 22.8 years), 572 patients (16.8%) had positive urine toxicology screens for stimulants. Stimulant-positive patients had significantly longer hospital stays compared to stimulant-negative patients (17.7 vs. 10.7 days, $p<0.001$), more severe burns ($p=0.001$), and a higher incidence of complications (15.6% vs. 11.5%, $p=0.006$). Despite these risks, only 12.6% (72 patients) of stimulant-positive burn patients received an addiction medicine consultation during their hospitalization. The use of addiction medicine consultations increased over time, rising from three consults in 2015 to 42 in 2023.

Conclusions: A multidisciplinary approach that includes addiction medicine can help address both the complexities of pain management and substance use, leading to improved patient outcomes. Early involvement of addiction medicine could enhance pain management and recovery, emphasizing the need for more systematic integration of addiction medicine into burn care protocols.

Reconstruction after Minimally Invasive Perineal Resections: Outcomes of Gracilis and Other Flaps at a High-Volume Center

Abstract Presenter: Lauren Mcallister

Abstract Co-Author(s): Dr. Griffen Allen MD, MBe, Mukta Krane, Rachel Lentz MD

Introduction: Perineal complications after perineal resection occur commonly ranging from 25% to 60%.1 Flap-based reconstructions can help mitigate this, yet the increasing dominance of minimally invasive (MIS) resections have diminished the traditional benefit of rectus flaps (RF). The thigh-based gracilis flap (GF) has emerged as an alternative that offers a simple harvest with a low donor-site morbidity. Further evidence is thus needed to characterize outcomes of the GF in high-volume centers performing MIS resections.

Material and Methods: A retrospective cohort study was conducted at the University of Washington of all adult patients undergoing a perineal resection from 4/6/2021-12/31/2024 by a colorectal surgeon. Chart abstraction was performed for patient background, clinical, and surgical characteristics of patients.

The primary outcome is the rate of donor and perineal morbidity, quantified by delayed (> 1 mo.) wound healing (DWH), perineal or donor-site infections requiring antibiotics, or the need for procedural re-intervention. Descriptive statistics and multivariate logistic regression were used to examine risk factors for these adverse outcomes.

Results: 109 patients were identified via CPT code, 99 of these were confirmed to have perineal resections. 63% (n = 62) underwent GF with 29% (n = 29) undergoing primary closure (PC), and the rest either undergoing RF or ALT flap. 81% (n = 80) of perineal resections were performed solely via a MIS approach. All RFs were performed in open cases (38%, n = 6), yet even so the GF remained the predominant (44%, n = 7) flap for open cases.

Non-oncologic indications were 8.7 times more likely in PC patients (95% CI, 3.56 - 21.19) who were 13 years younger on average than flap patients (95% CI, 7.4 - 19) and only 24% (n = 7) had prior chemoradiation. Most GFs were performed for rectal or anal cancer (87%, n = 54) and had prior chemoradiation (89%, n = 55).

Donor site DWH occurred in 9.7% (n = 6) of GFs, and infection occurred in 16% (n = 10) of the cases (95% CI, 10 to 27%). Perineal DWH in those with a GF occurred in 27% (n = 17) of cases (95% CI, 18% to 40%). Perineal infections occurred in 27% (n = 17) of patients with a GF, with 59% (n = 10) of those requiring drainage. Accounting for age, race, sex, BMI, diabetes, prior/current tobacco usage, EBL, and medical compilation, BMI (p = 0.014) and lower EBL (p = 0.03) were significantly associated with perineal DWH while only diabetes was statistically significant for perineal infections (p = 0.002).

Conclusion: GF is a highly functional flap after perineal resection, particularly in MIS cases. Using a liberal definition for DWH rates remain acceptable without any additional abdominal RF harvest morbidity, and with low rates of any donor site complication. Diabetes, BMI, and tobacco usage are risk factors for perineal complications.

Citations

1. Eseme EA, Scampa M, Viscardi JA, Ebai M, Kalbermatten DF, Oranges CM. Surgical Outcomes of VRAM vs. Gracilis Flaps in Vulvo-Perineal Reconstruction Following Oncologic Resection: A Proportional Meta-Analysis. Cancers (Basel). 2022;14(17):4300. doi:10.3390/cancers14174300

Revisiting Godina's Paradigm: Complications in Lower Extremity Reconstruction Are Not Influenced by Timing

Abstract Presenter: Editt Taslakian MD, MS

Abstract Co-Author(s): Ryan Badiee MD, Stephanie Vu, Gillian O'Connell MD, Fei Wang MD, Mahsa Taskindoust MD, Erin Miller MD, Jeffrey Friedrich MD, Yusha (Katie) Liu MD, PhD, Kari Keys

Introduction: The landmark paper by Godina in 1986 provided evidence for the importance of early soft tissue coverage of lower extremity traumatic injuries within 72 hours to reduce complications. [1] Advancements in wound care and reconstructive techniques since then have allowed for more flexibility on the timing of reconstruction, however reconstruction within 3 days remains the standard. We sought to review our outcomes as a single institution Level I trauma center to shed a more modern light on the characteristics of injury and management that affect outcomes.

Methods: A retrospective review identified adult patients from 1994-2023 who required soft tissue reconstruction during the index hospitalization following lower extremity trauma at our institution. Demographics, comorbidities, and characteristics and management of traumatic injuries were abstracted from the medical record. Those with less than 30 days of follow up were excluded. Soft tissue complications assessed include flap circulation compromise, flap loss, infection, hematoma, seroma, or necrosis of the tissue surrounding the flap. Bony complications assessed include hardware infection, hardware failure, nonunion, malunion, osteomyelitis, and need for amputation. Univariate analysis was conducted via Student's t-test, Chi square test, and Fisher's exact test. Multivariable logistic regression models were then developed to examine the independent association of risk factors with each complication.

Results: Of the 253 patients in this review, 77% were male (n=108), 82.7% were White (n=116), the average age was 41.9 (18-78.9), and the average BMI was 28 (16.5-41.6). At least one year follow up was obtained for 70% of patients. Soft tissue and/or bony complications were found in 55.6% of patients (n=141), with infection found in 29.7% (n=58), and 12.4% (n=28) went on to require amputation. The average time to soft tissue reconstruction from the time of injury was found to be 12 days, and the timing of soft tissue coverage was not shown to significantly affect complication rates (p=0.28). Instead, independent predictors of postoperative complications were found to be antibiotic spacer placement for staged bone grafting with OR 2.08 (1.04-4.31) (p=0.042), the use of latissimus dorsi free flaps with OR 2.4 (1.03-5.75) (p=0.045) and whether vascular surgery was consulted at the time of injury presentation with OR 2.59 (1.42-4.77) (p=0.002). Local or regional flap reconstruction was found to be protective from infection with OR 0.08 (0-0.48) (p=0.024), whereas BMI with OR 1.1 (1.03-1.17) (p=0.004) and history of IVDU with OR 4.93 (1.52-16.24) (p=0.007) showed a higher risk of infection.

Conclusion: Although Godina's landmark paper serves as a standard for early reconstruction in lower extremity traumatic injuries, our experience shows that reconstruction can be safely delayed without timing being a factor for complications. Overall complication rates were instead associated with the use of antibiotic spacers, latissimus flaps, and vascular consults, all of which serve as proxy markers for the severity of the injury. These important considerations to help guide shared decision-making with patients when discussing limb salvage and the risks based on severity of injury.

References:

1. Godina M. Early microsurgical reconstruction of complex trauma of the extremities. Plast Reconstr Surg. 1986;78(3):285-292. doi:10.1097/00006534-198609000-00001

Stopping the Downward Spiral: Evaluating the Role of Component Separation in Recurrent Ventral Hernia Repair

Abstract Presenter: Luke Anderson

Abstract Co-Author(s): Hector Caceres, Ashley Weber, Alp Turgut, Edgar Alvarado-Munoz MD, Jorge De La Torre MD, MSHQS, FACS

Introduction: Ventral hernias are a burdensome condition that significantly impact patients' quality of life. These hernias frequently occur in patients with obesity and multiple comorbidities, complicating surgical management. Recurrence remains a major challenge, as each failed repair weakens the abdominal wall, increasing the risk of future herniation and higher morbidity. [1]

Component separation is commonly used to restore midline fascial continuity while minimizing tension. The senior author employs a technique combining component separation with onlay placement of acellular dermal matrix (ADM) and multipoint progressive tension suture fixation to reinforce the abdominal wall. This study evaluates recurrence and complication rates following this approach, comparing outcomes between primary and recurrent ventral hernia repairs.

Methods: A retrospective cohort study was conducted on all ventral hernia repairs performed by the senior author at a single institution from 2017 to 2024. Patient demographics, operative details, and postoperative outcomes were collected. Data analysis included t-tests, Fisher's exact tests, and chi-squared analysis.

Results: A total of 213 patients were included. Most were female (156, 73.2%), with an average age of 53.2±13.0 years and average BMI of 32.3±6.3 kg/m². Of these, 99 (46.5%) underwent primary repair, while 114 (53.5%) had secondary repair. Concomitant panniculectomy was performed in 31.0% of cases, and an additional 26.3% underwent at least one other concurrent procedure, with no significant difference between groups (p=0.2674). Patients were followed for an average of 122.5 weeks, with no significant difference between groups (p=0.5008). No patients died within 30 days of surgery.

Baseline characteristics were largely similar between groups, with no significant differences in gender distribution, smoking status, or medical comorbidities. However, patients undergoing secondary repair were older (55.5 vs. 50.7 years, p=0.0076), had a higher BMI (33.1 vs. 31.3, p=0.039), and were more likely to present with an incarcerated or non-reducible hernia (45.6% vs. 27.3%, p=0.0069). The mean hernia defect size was larger in the secondary repair group (178 cm^2 vs. 91.3 cm^2, p=0.0043). Additionally, secondary repairs more frequently involved ADM placement (82.5% vs. 37.4%, p<0.0001) and had longer operative times (4.08 vs. 3.48 hours, p=0.0028).

Postoperative complications requiring interventional radiology or reoperation were more common in the secondary repair group (26.3% vs. 13.1%, p=0.0392), though rates of minor complications not requiring intervention were similar (22.8% vs. 22.2%)

Overall, recurrence was uncommon (9 cases, 4.2%). Recurrence rates were significantly lower in the primary repair group (1.0% vs. 7.0%, p=0.0392). Among the eight recurrences in the secondary repair group, only one occurred in a patient with more than one prior repair.

Conclusion: Despite some differences, the groups were largely comparable. As expected, recurrence rates were higher in the recurrent hernia cohort, yet both groups demonstrated recurrence rates lower than those reported in the literature. These findings suggest that component separation with ADM reinforcement may help interrupt - or at least slow - the cycle of recurrence and reoperation in ventral hernia repairs.

1. Holihan, J.L., et al., Adverse Events after Ventral Hernia Repair: The Vicious Cycle of Complications. J Am Coll Surg, 2015. 221(2): p. 478-85 doi: 10.1016/j.jamcollsurg.2015.04.026.

Advancing Fat Graft Survival: A Rigorous Evidence-Based Ranking of Potential Adjuvant Therapies

Abstract Presenter: Claudy Sarpong

Abstract Co-Author: Subhas Gupta MD, PhD, FRCSC, FACS

Purpose: Autologous fat transfer (AFT) is widely used in reconstructive and aesthetic surgery; however, its efficacy is often limited by suboptimal fat graft survival. Various pharmacological adjuncts have been proposed to enhance fat graft viability. This study aims to assess and rank potential adjuvant agents based on their effectiveness, safety, FDA approval for human use, and clinical applicability to identify the most promising candidate for further clinical trials.

Methods: A weighted scoring analysis was conducted to evaluate several adjuncts proposed to improve fat graft viability. The analysis considered six key factors: FDA approval for human use (scored as 1 point if approved), effectiveness demonstrated in animal models (scored 1–5 points), dosage optimization (1–5 points), safety in humans (1–5 points), pharmacological mechanisms supporting fat graft survival (1–5 points), and cost-effectiveness (1–3 points). The total score for each adjunct was calculated by summing the values assigned across these factors, allowing for a comparative ranking of their overall potential. The adjuncts evaluated in this study included Deferoxamine (DFO), Insulin combined with β-Fibroblast Growth Factor (β-FGF), Poloxamers, ADE4+ Endothelial Cells, Hyaluronan Hydrogel, BoNTA, and a combination of Prostaglandin E2 and PDRN.

Results: The weighted scoring analysis revealed that Deferoxamine (DFO) ranked the highest with a total score of 22 out of 24. DFO demonstrated strong preclinical evidence of promoting angiogenesis and reducing oxidative stress, leading to up to a 50% improvement in fat graft retention. Insulin combined with β-Fibroblast Growth Factor (β-FGF) followed with a score of 18, showing promising effectiveness, though its overall ranking was limited by the lack of FDA approval for β-FGF. Poloxamers scored 17, and Hyaluronan Hydrogel scored 16, both displaying moderate performance, largely due to inconsistencies in clinical data. BoNTA, with a score of 15, was noted for its FDA approval and safety but showed limited effectiveness in the context of fat grafting. Prostaglandin E2 and PDRN also scored 15 points, while ADE4+ Endothelial Cells scored the lowest with 14 points, both ranking lower due to limited FDA approval and less compelling evidence in improving fat graft viability.

Conclusions: Deferoxamine (DFO) emerged as the most promising adjunct for improving fat graft viability due to its dual mechanism of reducing oxidative stress and enhancing angiogenesis. As an iron chelator, DFO reduces the formation of free radicals, preventing oxidative damage to grafted fat, and promotes neovascularization, which is critical for graft survival. Further research will involve exposing fat to DFO and measuring fat viability to assess its clinical potential.

Novel 3D-Printed Porous Titanium Implant for Osseocartilaginous Framework Restoration in Nasal Reconstruction

Abstract Presenter: Tuong-Vi Ngo

Abstract Co-Author(s): Anne Bennett, Jessica May MD, James Thornton MD

BACKGROUND: Total nasal reconstruction is among the most technically demanding procedures in plastic surgery due to the intricate anatomical, functional, and aesthetic complexities of the nose [1-2]. Each layer – the external skin, the cartilaginous and bony support, and the inner mucosal lining – must be meticulously reconstructed [2]. The cartilage grafts in particular play a crucial role in structural support and shaping the final contour and appearance of the nose [3]. Traditional reconstruction relies on autologous grafts, such as costal cartilage, but these may be limited by donor site morbidity or patient comorbidities. Non-porous implants such as solid titanium or polyether ether ketone (PEEK) offer robust structural support but do not permit soft tissue ingrowth, causing the overlying flap to sit unadhered to the implant surface, increasing the risk of implant exposure or flap erosion. We present a case of near-total nasal reconstruction using a novel, 3D-printed porous titanium implant for osseocartilaginous support that allows tissue integration, offering a customized alternative to conventional techniques.

CASE REPORT: A 51-year-old female with class 3 obesity and basal cell carcinoma of the dorsal nose underwent Mohs resection, leaving a near-total nasal defect measuring 22.5 cm^2. Given the extent of the defect and the patient's comorbidities, the decision was made to utilize a 3D-printed porous titanium implant for structural support in conjunction with a three-staged paramedian forehead flap (PMFF). Contiguous axial helical CT images were obtained from the vertex through the mandible with image reformats. The 3D reformats were utilized to design the custom 3D-printed titanium implant and optimize surgical planning using the 3DMD imaging system. Postoperatively, her hospital course was uncomplicated and she was discharged on day one with no wound-healing concerns. At 8 weeks post-initial stage of PMFF, she demonstrated a well-vascularized flap with soft tissue ingrowth into the implant's porosity with no complications. At 10 months post-reconstruction, she reported high cosmetic satisfaction and maintained patent nasal airways.

DISCUSSION: Foreign implants in nasal reconstruction remain largely unexplored, especially regarding long-term tissue integration. We present a successful subtotal nasal reconstruction using a novel, 3D-printed porous titanium implant to restore the

osseocartilaginous structural framework of the nose. The porosity represents an innovative advancement that facilitates soft tissue ingrowth, enhancing flap adherence after debulking, improving stability, and reducing the likelihood of flap erosion. Additionally, its custom design optimizes functional and aesthetic outcomes. This case highlights the potential of 3D-printed porous titanium implants as a groundbreaking long-term solution for restoring nasal structure, particularly in patients with challenging anatomy or comorbidities that may limit the use of traditional grafts. Continued follow-up is essential to assess implant durability, tissue integration, and functional outcomes over time.

REFERENCES:

1. Menick FJ. Nasal reconstruction. Plast Reconstr Surg. 2010 Apr;125(4):138e-150e. doi: 10.1097/PRS.0b013e3181d0ae2b. PMID: 20335833.
2. Fernandes JR, Pribaz JJ, Lim AA, Guo L. Nasal Reconstruction: Current Overview. Ann Plast Surg. 2018 Dec;81(6S Suppl 1):S30-S34. doi: 10.1097/SAP.0000000000001608. PMID: 30247189.
3. Menick FJ. An approach to the late revision of a failed nasal reconstruction. Plast Reconstr Surg. 2012 Jan;129(1):92e-103e. doi: 10.1097/PRS.0b013e3182362226. PMID: 22186590.

The Role of Plastic Surgery in Pediatric Firearm Injuries: A National Analysis of Surgical Involvement and Health Disparities

Abstract Presenter: Lana Mamoun

Abstract Co-Author(s): Joseph Mocharnuk, Sierra Willens, Miles Pfaff MD, MHS

Background: Firearm-related injuries overtook motor vehicle crashes as the leading cause of injury-related death among children (1). Firearm injuries produce an extensive amount of bodily trauma, thus surgeons and multidisciplinary approaches are integral to the management of this public health crisis. The purpose of this study is to investigate the involvement of plastic surgeons on a national level and determine the relationship between pediatric firearm injury incidence, childhood opportunity index (COI), and state-level gun laws.

Methods: Using the Pediatric Health Information System (PHIS) database, we identified firearm injuries in children aged 18 years and younger from 43 children's hospitals

across the U.S. requiring inpatient surgical care from 2015 to 2023. Patient demographics, injury characteristics, and geographic data were analyzed. Social vulnerability was assessed using the Child Opportunity Index (COI), and state gun laws were categorized as restrictive, moderate, or permissive based on the Giffords Annual Gun Law Scorecard. Surgical specialties involved in the management of these injuries were identified, with a specific focus on plastic surgery. Statistical analyses included univariate tests, t-tests, logistic regression, and population-adjusted incidence analyses.

Results: A total of 1,636 pediatric firearm injury cases met inclusion criteria. The majority of patients were male (79.8%) and White (64.8%), with a mean age of 11.8 ± 5.0 years. Children from neighborhoods with low COI scores had significantly higher mortality rates (OR 1.010, p=0.025). Increased distance from trauma centers was associated with higher odds of mortality (OR 1.01, p=0.002). Population-adjusted analyses revealed that firearm injuries were significantly more common in permissive gun law states (76.4%), compared to restrictive states (13.2%) and moderate states (10.4%) ($p<0.01$). Among surgical specialties, pediatric surgery, orthopedic surgery, and plastic surgery were the most frequently involved. Plastic surgeons played a vital role in managing soft tissue injuries, complex wound closures, and facial reconstruction. The need for staged reconstructive procedures underscores the importance of plastic surgery in restoring form and function in these patients. Additionally, disparities in access to specialized reconstructive care were noted, particularly in underserved regions.

Conclusions: Pediatric firearm injuries remain a significant public health crisis. Children from disadvantaged neighborhoods, younger age groups, and those living further from hospitals faced higher mortality rates, while permissive state gun laws were linked to increased injury incidence. The frequent involvement of plastic surgeons emphasizes the complexity of firearm injuries and the necessity of a multidisciplinary approach for optimal care. This study provides valuable insight into the essential role of plastic surgeons in reconstruction and functional restoration. Future research should explore the impact of early reconstructive intervention on long-term recovery and quality of life in pediatric firearm injury survivors.

References:
Grinshteyn E, Hemenway D. Violent death rates in the US compared to those of the other high-income countries, 2015. Prev Med. 2019;123:20-26. doi:10.1016/j.ypmed.2019.02.026

Evaluating Predictive Value of Anthropomorphic Indices on DIEP Flap Reconstruction Outcomes

Abstract Presenter: Jacquelyn Roth

Abstract Co-Author(s): Anya Wang, Ethan Fung, Bernice Yu MD, Abigail Tirrell MD, Maxwell Godek, Peter Taub MD

Background: Body Mass Index (BMI) has been commonly used to determine appropriateness for surgery. However, it fails to account for variations in lean mass and fat distribution, prompting the development of alternative anthropometric indices such as the Body Roundness Index (BRI), A Body Shape Index (ABSI), Body Adiposity Index (BAI), Conicity Index (CI), Abdominal Volume Index (AVI), Waist-Hip Ratio (WHR), and Waist-Height Ratio (WHtR). The present study evaluates which index best predicts adverse outcomes following deep inferior epigastric perforator (DIEP) flap surgery.

Methods: A retrospective cohort study was conducted on patients who underwent DIEP flap breast reconstruction between 2017 and 2023. Patient demographics and comorbidity data were collected. Hip and waist circumference were measured using standardized bony landmarks on preoperative imaging. These measurements, along with height and weight, were used to calculate the various anthropomorphic indices. Primary outcomes included complications requiring intervention, 90-day readmissions, hospital length of stay (LOS), and total operative time. Univariable and multivariable regression models assessed the predictive utility of anthropometric indices, with statistical significance set at $p < 0.05$.

Results: Of the 384 patients, 84 patients (21.9%) experienced complications requiring intervention, while 300 (78.1%) did not. Diabetes was significantly more prevalent in the complication group (15.5% vs. 6.7%, P = 0.010), while age, race and remaining comorbidities were comperable between groups. Complications differed significantly between BMI-based weight classifications (P < 0.001), occurring in 47 (34.8%) obese patients compared to 22 (15.7%) normal-weight patients. On multivariate regression controlling for age, race, and diabetes, BMI (aOR 1.09, P < 0.001), BRI (aOR 1.26, P = 0.010), AVI (aOR 1.09, P = 0.01), and WHtR (aOR 88.66, P = 0.02) were significant predictors of overall complications. In addition, BMI (aOR 1.09, P = 0.04), BRI (aOR 1.55, P = 0.01), BAI (aOR 1.13, P = 0.01), AVI (aOR 1.17, P = 0.01), and WHtR (P = 0.01) were significant predictors of 90-day readmissions while BMI (P = 0.02), BRI (P = 0.010), AVI (P = 0.001), WHtR (P = 0.020), and WHR (P = 0.01) were significant

predictors of prolonged LOS. Only AVI significantly predicted longer procedure times (P = 0.009). ABSI and Conicity Index did not significantly predict any outcomes.

Discussion: Compared to BMI, both AVI and BRI demonstrated more robust predictive value for LOS (standardizd betas 0.17 and 0.14 vs 0.13 for BMI), and higher likelihoods for 90-day readmissions (aOR 1.17 and 1.55 vs. 1.09 for BMI). In addition, BRI showed a higher likelihood for complications requiring revision (aOR 1.26 vs 1.09 for BMI) while AVI alone predicted longer procedure times (P=0.01 vs 0.07 for BMI) compared to BMI. These findings underscore the role of body composition and fat distribution in determining surgical risk. While WHtR and WHR also showed predictive value for complications and LOS, their clinical utility may be limited by the narrow range of observed values.

Conclusion: BRI and AVI outperformed BMI in predicting complications, 90-day readmissions, and LOS following DIEP flap surgery. Incorporating these indices in preoperative assessments could improve risk stratification.

Evolution of Sternal Wound Reconstruction: Comparison of Characteristics and Outcomes Over Three Separate Decades

Abstract Presenter: Michael Amrami

Abstract Co-Author(s): Myles Lavalley, Alexander Dagi, Dylan Kim, Jeffrey Ascherman MD, FACS

Background: The management of deep sternal wound complications following cardiac surgery has evolved significantly over time. Despite the standardization of reconstructive techniques, data regarding temporal trends in patient complexity, surgical outcomes, and postoperative complications remain limited. This study provides a detailed analysis of three decades of sternal wound reconstruction cases, identifying shifts in patient demographic data, reconstructive indications and approaches, postoperative complications, reoperation rates, and 30-day mortality through analysis of one of the largest single-institution cohorts published to date.

Methods: A retrospective review of 640 patients undergoing sternal wound reconstruction at our institution by the senior author (J.A.A.) between 1995 to 2024 was conducted following institutional review board approval. Patients were stratified into

three time periods: Period 1 (1995-2004, n=214), Period 2 (2005-2014, n=139), and Period 3 (2015-2024, n=231). Patient demographics, comorbidities, surgical details, and outcomes were analyzed for temporal trends. Primary outcomes included major and minor postoperative complications, rates of reoperation, and 30-day postoperative mortality. Multivariate analysis identified consistent trends across the three decades.

Results: Of the 640 patients identified during the study period, 584 had sufficient data for analysis. Analysis across time periods demonstrated increasing patient complexity with consistently higher rates of chronic kidney disease (Period 1: 4.2%, Period 2: 15.1%, Period 3: 20.8%, $p<0.0001$) and hyperlipidemia (Period 1: 38.8%, Period 2: 59.0%, Period 3: 66.2%, $p<0.0001$). The interval time between cardiac index and sternal surgeries increased (Period 1: 18 days, Period 2: 35 days, Period 3: 44 days, $p<0.0001$). Reconstructive technique changed with the increasing addition of omental flaps along with bilateral pectoralis major flaps (Period 1: 0%, Period 2: 1.4%, Period 3: 6.5%, $p=0.0001$). While rates of certain major and minor complications showed consistent significant increases, such as partial soft tissue dehiscence (Period 1: 4.7%, Period 2: 5.0%, Period 3: 14.3%, $p=0.0003$) and infectious signs not requiring reoperation (Period 1: 3.7%, Period 2: 7.2%, Period 3: 11.7%, $p=0.0069$), 30-day mortality showed improvement (Period 1: 10.3%, Period 2: 5.04, Period 3: 4.8%, $p=0.0441$) and postoperative hospitalization duration decreased significantly across periods (Period 1: 24.91 ± 26.95 days, Period 2: 15.10 ± 20.69 days, Period 3: 13.43 ± 16.05 days, $p<0.0001$).

Conclusions: In this large single-institutional analysis of a three-decade experience by a single surgeon, our data demonstrate an advancing reconstructive approach, utilizing additional flap donor sites to complement the reliability and versatility of bilateral pectoralis major flaps. Of note, the rate of major and minor complications increased, which may be explained by increasing patient complexity measured by comorbidity rates. Our data also support early plastic surgery consultation and prompt reconstruction when indicated, as longer intervals between index cardiac surgery and sternal reconstruction were noted alongside rising major and minor complication rates. Notably, the 30-day mortality rate did decrease during the study, and there was a significant reduction in postoperative hospitalization lengths, suggesting successful implementation of enhanced recovery protocols.

Does Side Matter? The Impact of Free Flap Harvest Laterality on Ambulatory Function in Lower Extremity Traumatic Reconstruction

Abstract Presenter: Eloise Stanton MD

Abstract Co-Author(s): Michael Kim, Emma Koesters MD, David Daar MD, MBA, Joseph Carey MD

Background: Free tissue transfer is a critical component of limb salvage in lower extremity (LE) trauma, facilitating soft tissue coverage and structural support. However, donor-site morbidity remains a significant consideration, potentially impacting long-term functional outcomes, particularly ambulatory status. The effect of flap harvest laterality on postoperative ambulation has not been well characterized. This study aims to evaluate whether flap laterality (ipsilateral vs. contralateral) influences ambulatory function following free flap reconstruction for traumatic LE injuries.

Methods: A retrospective cohort study was conducted at a level 1 trauma center, including all patients who underwent LE free flap reconstruction between 2009 and 2022. Demographic variables, injury characteristics, flap type, and postoperative functional outcomes were collected. Flap laterality was categorized as ipsilateral or contralateral relative to the injured limb, and flaps were further classified as fasciocutaneous or muscle/myocutaneous. The primary outcome was ambulatory status at final follow-up, with secondary outcomes including time to ambulation and overall flap survival. Statistical analysis was performed using chi-squared and Mann-Whitney U tests to assess associations between flap laterality, flap type, and ambulatory outcomes.

Results: A total of 298 LE free flaps were included in the analysis, with 226 (75.8%) harvested from the ipsilateral limb and 63 (21.1%) from the contralateral limb. The overall flap survival rate was 95.4%. There was no significant difference in the proportion of patients achieving full ambulation between the ipsilateral (61.5%) and contralateral (68.6%) cohorts ($p = 0.564$), nor was there a significant difference in the time required to achieve full ambulation ($p = 0.071$). However, patients who received fasciocutaneous flaps demonstrated a higher likelihood of achieving ambulatory function at final follow-up compared to those who underwent muscle or myocutaneous flap reconstruction (68.4% vs. 51.3%, $p = 0.003$). These findings remained non-significant when stratifying for flap type within ipsilateral and contralateral cohorts or when comparing free flaps and local flaps separately.

Conclusion: This study found no significant association between flap harvest laterality and postoperative ambulatory outcomes in patients undergoing LE free flap reconstruction following traumatic injury. However, flap composition appeared to influence functional recovery, with fasciocutaneous flaps being associated with a higher

rate of ambulation at final follow-up compared to muscle or myocutaneous flaps. These findings suggest that donor-site selection should be guided primarily by reconstructive needs rather than concerns regarding laterality. Further prospective studies incorporating standardized functional assessments may provide additional insight into the relationship between flap characteristics and long-term mobility outcomes in this patient population.

What's the protocol? A review of remobilization after flap-based pelvic reconstruction

Abstract Presenter: Sophia Chryssofos

Abstract Co-Author(s): Daehee Jeong, Thomas Tung MD, Justin Sacks MD, MBA, Saif Badran MD, PhD

Introduction: Reconstructing large pelvic defects is challenging due to the functional demands of the perineal region. Numerous locoregional reconstructive options exist for addressing the pelvic floor and perineum. Enhanced recovery after surgery (ERAS) protocols plays a crucial role in guiding the reintroduction of standing, walking, and sitting, all of which are believed to impact flap perfusion and surgical outcomes. However, there are currently no universally accepted, evidence-based guidelines. This review aims to summarize reported postoperative remobilization protocols for flap-based reconstruction of pelvic and perineal defects, categorized by regional donor sites.

Methods: A scoping review of PubMed was conducted for articles from 2000 to the present concerning flap-based pelvic or perineal reconstruction using MeSH terms. Data extracted included study characteristics, types of flaps, detailed postoperative remobilization protocols, hospital stay duration, and complications related to early mobilization.

Results: Out of 536 articles screened, 42 were included. The majority (n = 20) were retrospective cohort studies. The most commonly reported flaps, in order of frequency, included inferior gluteal artery perforator (IGAP) flaps (n = 10), vertical rectus abdominis myocutaneous (VRAM) flaps (n = 9), gracilis flaps (n = 8), internal pudendal artery perforator (IPAP) flaps (n = 5), and anterolateral thigh (ALT) flaps (n = 2). Studies including VRAM and IPAP flaps reported median bedridden recommendations of five days, while those with gracilis and IGAP flaps initiated mobilization at medians of 1-2

days postoperatively and as early as postoperative day 0. Studies including gracilis and IGAP flaps allowed sitting within the first week, while sitting was delayed to after two weeks for other flaps. Two studies comparing complication rates between early and late remobilization protocols found similar or fewer complications in patients with earlier mobilization compared to longer, more traditional protocols.

Conclusion: This review is the first to consolidate reported mobilization protocols following various pedicled flaps used in pelvic reconstruction. The findings highlight the heterogeneity of existing protocols and the lack of associated complications related specifically to early mobilization. Importantly, there is growing evidence that early remobilization and sitting may be beneficial for patients. Therefore, clinical trials focused on postoperative protocols for this population are warranted.

Exparel vs. Marcaine for Donor Site Analgesia in Atraumatic Lower Extremity Wound Split-Thickness Skin Grafting: Does Neuropathy Alter the Pain Equation?

Abstract Presenter: Sabrina Deleonibus

Abstract Co-Author(s): Rachel Rohrich, Ryan Lin MD, Sami Ferdousian, Luke Llaurado, Kishan Shah, Richard Youn MD, Christopher Attinger MD, Karen Evans MD

Background: Effective pain management at the donor site of split-thickness skin grafts (STSG) is important, particularly in the challenging atraumatic lower extremity (LE) wound population. Exparel (liposomal bupivacaine) and Marcaine (bupivacaine) are commonly used for donor site analgesia, yet no studies have directly compared their efficacy in this specific patient population. Additionally, the role of neuropathy in postoperative pain perception in this context has not been well characterized. This study evaluates the efficacy of Exparel, Marcaine, and lidocaine in controlling donor site pain and also assesses differences in pain outcomes between neuropathic and non-neuropathic patients.

Methods: A retrospective review was conducted on patients who underwent STSG for chronic atraumatic LE wounds at a single institution from December 2014 to December 2022. Patients received either Exparel, Marcaine, a combination of Exparel and Marcaine, or lidocaine for donor site analgesia. Primary outcomes included postoperative pain scores on postoperative day (POD) 0 and at the first follow-up visit.

Results: A total of 246 patients were included, with a mean age of 62.8 ± 14.7 years. The distribution of analgesic strategies was as follows: Exparel (25.5%), Marcaine (21.6%), Exparel + Marcaine (12.0%), and lidocaine (40.9%). Median pain scores on POD 0 were significantly lower in the Exparel (0 [3]) and Marcaine (0 [2.5]) groups compared to lidocaine (2 [0], p=0.020). At the first follow-up, pain scores remained lowest in the Exparel (0 [4]) and Marcaine (0 [3]) groups compared to lidocaine (2.5 [5]), though this difference was not statistically significant (p=0.241). When comparing neuropathic to non-neuropathic patients, neuropathic patients experienced significantly lower postoperative pain both immediately after surgery (p=0.008) and at the first follow-up (p=0.026). Among neuropathic patients, pain scores did not significantly differ between analgesic groups at any time point.

Conclusion: This study is the first to compare Exparel and Marcaine for donor site analgesia in patients undergoing STSG for chronic atraumatic LE wounds. Both agents provided superior immediate postoperative pain control compared to lidocaine, with Exparel demonstrating a potential trend toward prolonged analgesia. Additionally, neuropathic patients exhibited significantly less postoperative pain than their non-neuropathic counterparts, independent of the analgesic used. These findings highlight the importance of individualized pain management strategies in this population.

The Impact of Number of Veins and Vein Size on Free Flap Survival: A 12-Year Institutional Review

Abstract Presenter: Hailey Wyatt MD

Abstract Co-Author(s): Walter Sobba, Alexis Gursky, Sophia Jacobi, Janos Barrera MD, Nikhil Agrawal MD, Jamie Levine MD, Jacques Hacquebord

Background: Adequate venous outflow is an essential factor for microvascular free flap survival. Decreasing resistance in outflow is believed to be essential to prevent thrombus and maintain patency of a microvascular anastomosis. In laminar flow of fluids, increasing the radius of a conduit has an exponential relationship in decreasing resistance to flow and has a greater effect of doing so than increasing number of conduits. The purpose of this study was to understand the effect of the number of veins and size of veins used in free flaps have on reoperation due to vascular compromise.

Methods: We conducted a retrospective review of free flaps performed at our academic institution from June 2011 to November 2023. Free flaps with intraoperative documentation of anastomosis technique, number of veins anastomosed, and coupler size used were included in the study. Only flaps with venous coupler anastomoses were included in the analysis of vein size to ensure accurate measurement of vein caliber. The primary outcome was rate of reoperation due to vascular compromise.

Results: In total, 751 free flaps were included in this study. Of these, 645 flaps (85.9%) had one venous anastomosis and 106 (14.1%) had two venous anastomoses. Overall, 80 (10.7%) flaps underwent reoperation for vascular compromise. There was no significant difference in the rate of reoperation for flaps with one vein (11.0%) or two veins (12.1%, p=0.729). However, analyzing the subset of flaps performed with venous couplers (N=656) multivariate logistic regression adjusting for age, gender, recipient site, and flap type demonstrated an increased odds of reoperation in patients who had a 1.5 mm coupler (OR 4.44, p=0.028). Couplers of 2 mm, 2.5 mm, 3 mm, 3.5 mm, and 4 mm did not show a difference in rate of reoperation.

Conclusion: The majority of microvascular free flaps performed at our institution used one venous anastomosis. We observed no difference in the rate of reoperation using one or two veins. Venous anastomoses of 1.5 mm were more likely to require reoperation due to vascular compromise. This may indicate smaller veins have a higher risk of loss.

Perioperative GLP-1RA Use Differentially Affects Surgical Outcomes in Diabetic Versus Nondiabetic Plastic Surgery Patients

Abstract Presenter: Sophia Salingaros

Abstract Co-Author(s): Ashley Zhang, Tara Chadab MD, Seth Aschen MD, Caroline Andy, Christine Rohde MD, MPH, Jason Spector MD

PURPOSE: GLP-1RA medications are gaining increasing popularity for the treatment of diabetes and, more recently, weight loss. While the study of perioperative GLP1-RA use has primarily focused on delayed gastric emptying and aspiration risk, the impact on postoperative surgical outcomes remains poorly understood. A recently published propensity score matched cohort study demonstrated that GLP-1RA may decrease postoperative complications in diabetic patients. As GLP-1RA users make up a growing

share of plastic surgery patients, understanding their effect on the postoperative outcomes is paramount. Here, we examined rates of surgical complications and readmissions in both diabetic and nondiabetic plastic surgery patients and compared outcomes between patients with active perioperative GLP-1RA prescriptions and those without.

METHODS: All patients who underwent a plastic surgery procedure (defined by CPT/HCPCS code) at a multicenter quaternary-care healthcare system between February 2020 to July 2023 were retrospectively identified, and all procedures included. Patients were split into diabetic (type 1 or 2) and non-diabetic cohorts. The following outcomes were analyzed in patients with and without an active GLP-1 RA prescription: 30-day readmission, and/or documented dehiscence, infection, hematoma, and bleeding within 180 days after surgery. The occurrence of at least one complication (dehiscence, infection, hematoma, bleeding) was defined as 'any complication'. In the non-diabetic cohort, propensity score matching was performed based on comorbidities and demographics, and the outcomes reanalyzed. The diabetic cohort was not matched due to limited sample size.

RESULTS: 10,505 surgical procedures in 6,788 patients were identified, of which 2.9% were performed in the setting of an active GLP-1RA prescription. In 1,069 plastic surgery procedures in 731 diabetic patients (38.4% men, median [IQR] age, 65 [56, 73], BMI, 29.3 [25.8, 33.8]), the active GLP-1RA prescription group had reduced rates of any complication (n=13, 7.8% versus n=99, 11.0%) and readmission (n=9, 5.4% versus n=66, 7.3%), though this did not reach statistical significance (potentially because of an underpowered cohort). In 9436 procedures in 6057 nondiabetic patients (30.0% men, age, 56 [43, 69], BMI, 25.9 [22.7, 30.1]), the active GLP-1RA prescription group had a significantly higher rate of postoperative hematoma (n=3, 2.1%) versus no GLP-1RA use (n=10, 0.1%; p<0.001) as well as a higher rate of any complication (n=14, 10.0% versus n=399, 4.3%; p=0.002). Of note, in both diabetic and nondiabetic unmatched cohorts, GLP-1RA users had a significantly higher median BMI than non-users (diabetic, 31.6 [28.3, 35.9] versus 28.8 [24.9, 33.0]; nondiabetic, 33.1 [28.9, 6.5] versus 25.7 [22.6, 29.8]). After propensity score matching of nondiabetic patients (including for BMI), active GLP1-RA use was still associated with a significantly greater risk of any complication (n=12, 12.1% versus n=16, 5.5%; p=0.048).

CONCLUSIONS: Nondiabetic plastic surgery patients with an active perioperative GLP-1RA prescription, presumably for weight loss, may be at higher risk for postoperative complications than non-users. Conversely, this increased risk was not apparent in the diabetic population; in fact, previous studies suggest a potential protective GLP-1RA

effect in diabetic patients. These data suggest a differential effect of the GLP-1RA mechanism of action for diabetic and nondiabetic patients in the postoperative period.

Cranioplasty Outcomes Based On Implant Materials - Development Of A Long-term Predictive Model Based On Kaplan-Meier Curves Of 2,379 Patients

Abstract Presenter: Abdulaziz Elemosho MD

Abstract Co-Author(s): Ryan Enslow, Caroline Gillespie, Kerry-Ann Mitchell MD, PhD

Introduction: Cranioplasty after decompressive hemicraniectomy is associated with failure rates as high as 30-50%. The search for optimal material for cranioplasty with excellent complication profile continues. Using high quality data from Kaplan Meier curves of level 1-4 studies, the goal of this study was to evaluate survival data for most commonly utilized cranioplasty implant materials.

Methods: We analyzed 21 Kaplan Meier curves from 10 high quality studies. All industry sponsored studies, and curves with <50 were excluded. Curves were digitized using WebPlotDigitizer (autometris.io), and data were collected. 1-phase exponential decay non-linear regression analysis NLRA allowed us to calculate overall survival, while 2-phase exponential decay NLRA enabled us to determine the proportion of patients that will develop a failure. Curves fitting 2-phase decay model on NLRA means there are two subsets within the population: those that are stable (repairs unlikely to fail), and those that are destined to have a procedural failure (% Short).

Results: A total of 21 Kaplan Meier curves representing 2,379 patients were analyzed. Cranioplasty materials assessed were autologous bone grafts, titanium, polymethyl methacrylate PMMA, and Polyetheretherketone. PMMA had the longest overall survival half-life and autologous bone graft had the shortest. Among the included biocompatible implants, titanium implants had the shortest overall half-life, with its survival data similar to that of autologous cranioplasty. (Table 1). PMMA had the smallest subset of population that will fail (7%) and again, autologous cranioplasty (22.8%) and titanium plate (22.95%) cranioplasty had the highest.
Half-life short is the half-life for those that will potentially have a procedural failure to indeed develop a failure. Interestingly, this was similar across all cranioplasty materials, except for PMMA that is slightly higher (19 months). Finally, long term outcome predictions for a specific cranioplasty material can be easily made using the basic half-

life formula [EXP(− tn × 0.693/t1/2)" where "tn" is the time interval of interest and "t1/2" is the subpopulation's short half-life. Similarly, this formula can be used to determine the proportion of patients within the potentially cured subgroup that will eventually relapse.

Conclusion: We have demonstrated that cranioplasty survival data fit into the 2-phase decay model and developed the first ever population survival kinetics data on cranioplasty. This model also validates the existing data suggesting PMMA may have slightly better long term outcomes compared to than other cranioplasty materials.

Characterization of Long-Term Sensory Recovery at the Abdominal Donor Site Following Autologous Breast Reconstruction

Abstract Presenter: Deena Akras

Abstract Co-Author(s): Arash Momeni MD, Michael Januszyk

Background: Autologous breast reconstruction using abdominal tissue has become the gold standard approach to reconstruction following mastectomy. However, long term sensory loss at the donor site is a common but understudied complication. This study aims to characterize abdominal sensory changes over time (> 3 years) to guide patient-surgeon discussions.

Methods: 71 patients who underwent unilateral or bilateral abdominal free flap reconstruction (MS-TRAM or DIEP) were stratified by follow-up time into four cohorts (<1 year, >1 year, >2 years, and >3 years post-op, ranging 0.24 to 6.79 years). Sensation was assessed using Semmes-Weinstein monofilaments at 93 abdominal sites. Data were analyzed using generalized linear models in R, and heat maps were generated to visualize sensory changes. Patient-reported outcomes were evaluated via the BREAST-Q 2.0 questionnaire.

Results: Sensory heat maps revealed improved sensation over time, with the infraumbilical midline and areas below the transverse scar most affected by sensory loss. Generalized linear models showed time significantly improved sensation and abdominal scar appearance, while higher BMI and bilateral reconstruction were associated with reduced sensory recovery.

Conclusion: Abdominal sensory loss and scar appearance are common concerns following autologous breast reconstruction, but both improve significantly over time. Sensory recovery is most limited in infraumbilical midline zones, while lateral zones show near-complete recovery, with bilateral reconstruction and higher BMI associated with poorer outcomes. These findings can enhance preoperative counseling by providing a comprehensive picture of anticipated sensory changes.

Understanding Burns and Diabetes: A 12-Year analysis into Outcomes and Challenges in Lower Extremity Reconstruction

Abstract Presenter: Hilary Liu

Abstract Co-Author(s): Christopher Fedor, Jose Antonio Arellano MD, Mare Kaulakis, Alexis Henderson, Francesco Egro MD, Msc, MRCS

PURPOSE: Burn injuries significantly contribute to accidental injuries and fatalities worldwide, affecting an estimated eight million people annually. At the same time, diabetes impacts approximately 422 million people globally, with the majority living in low- and middle-income countries, and is directly responsible for 1.5 million deaths each year. Both the number of cases and the prevalence of diabetes have been steadily increasing over the past few decades. As a chronic metabolic disease, diabetes is characterized by elevated blood glucose levels, which impair small blood vessels and hinder wound healing, posing unique challenges for burn management. Our study, conducted at a single institution, provides a comprehensive 12-year analysis of outcomes and complications in diabetic patients undergoing lower extremity burn reconstruction, addressing these complex interactions between diabetes and burn recovery.

METHODS: A retrospective analysis was carried out on diabetic patients with lower extremity burns treated at a single ABA-verified burn center from 2012 to 2023. The data collected included demographics, burn characteristics, treatment methods, and outcomes. Logistic regression was used to examine the associations between burn-related factors and the probability of requiring surgical intervention.

RESULTS: A total of 571 patients were included in the analysis, 65.3% of whom were male. Among them, 100 patients (18.0%) had diabetes, while 454 (82.0%) did not. The overall surgery rate was 52.5%, with no significant difference between diabetic and non-diabetic patients (p=0.691). There were no significant differences in the risk of hypertrophic scarring (p=0.091), contracture formation (p=0.326), or graft loss (p=0.250). However, diabetic patients had a higher risk of reoperation (54.0% vs. 38.6%, p=0.004), osteomyelitis (5.8% vs. 0.48%, p<0.001), and cellulitis (46.2% vs. 27.5%, p<0.001). In multivariate analysis, adjusting for age and total body surface area (TBSA), diabetes was associated with twice the odds of re-intervention (OR=2.00, 95% CI [1.25, 3.20], p=0.004) and six times the odds of developing osteomyelitis (OR=6.04, 95% CI [1.10, 33.22], p=0.038). However, after adjustment, diabetes was no longer a significant predictor of cellulitis (OR=1.55, 95% CI [0.94, 2.55], p=0.084).

CONCLUSION: Diabetic patients undergoing lower extremity burn reconstruction have significantly higher risks of reoperation and osteomyelitis, emphasizing the need for targeted surgical strategies and careful postoperative management. While diabetes does not increase scarring, contracture, or graft loss, its link to serious complications underscores the importance of early intervention.

GLP-1 Receptor Agonist Use and Surgical Outcomes in Diabetic Patients Undergoing Soft Tissue Reconstruction for Foot Ulcers: A Propensity Score-Matched Retrospective Cohort Study

Abstract Presenter: Jared Zhang

Abstract Co-Author(s): Jeffrey Khong, Rachana Suresh MD, John Nguyen DO, Mohammed Shahid MD, Samarth Krishna, Zachary Zamore, Ala Elhelali, Charles Hultman MD, MBA, FACS, FABA, Sami Tuffaha MD

Purpose: Diabetic patients undergoing soft tissue reconstruction for foot ulcers are at risk for postoperative complications, including surgical site infections (SSI), wound dehiscence, and amputation. Glucagon-like peptide-1 receptor agonists (GLP1-RA) have been shown to improve glycemic control, reduce inflammation, and enhance vascular function which may impact surgical outcomes and healthcare utilization. However, their effect on this population remains unclear. This study aims to evaluate whether GLP1-RA use is associated with improved surgical outcomes, reduced

complications, and lower healthcare utilization in diabetic adults with soft tissue reconstruction for foot ulcers.

Methods: Using the TriNetX database, we conducted a retrospective cohort study of adult patients with diabetes mellitus who underwent soft tissue reconstruction for foot ulcers between January 2016 and February 2025. Using ICD-10 and CPT codes, we queried procedures to include split and full-thickness skin grafts, local flaps, pedicled flaps, and free flaps. Baseline demographic and clinical variables were collected including age, sex, BMI category (underweight, normal weight, overweight, obese) tobacco use, A1C (below and above 6.5), hypertension, peripheral artery disease, stroke, heart failure, and chronic kidney disease. 1:1 propensity score matching was performed to adjust for these variables. Cohorts were stratified by GLP1-RA use. Risk ratios compared 90-day postoperative outcomes, including surgical revisions, surgical site infections, emergency department utilization, amputation rates, wound dehiscence, DVT, pulmonary embolism, sepsis, and mortality.

Results: A total of 5875 procedures were identified, with 1061 patients in the GLP1-RA group and 4814 patients in the non-GLP1-RA group. After propensity score matching based on baseline demographic and clinical variables, 1049 patients were included in each of the cohorts. All baseline characteristics were similar between the cohorts after matching ($p>0.05$). Postoperatively, GLP1-RA users had significantly lower rates of surgical site infections (4.58% vs. 7.25%, RR: 0.63; CI: 0.45-0.90, $p=0.0095$) and surgical revisions (3.72% vs. 6.29%, RR: 0.59; CI: 0.40-0.87, $p=0.0069$) compared to non-users. Additionally, GLP1-RA users had a significantly lower risk of deep vein thrombosis (2.10% vs. 4.96%, RR: 0.42; CI: 0.26-0.69, $p=0.0004$), emergency department utilization within 90 days (19.16% vs. 23.07%, RR: 0.83; CI: 0.70-0.98, $p=0.0283$), and all-cause mortality (2.38% vs. 4.58%, RR: 0.52; CI: 0.32-0.83, $p=0.0061$). No significant differences were observed between the cohorts in rates of wound dehiscence, pulmonary embolism, sepsis, and amputation rates ($p>0.05$).

Conclusion: GLP-1 receptor agonist use in diabetic patients undergoing soft tissue reconstruction for foot ulcers was associated with lower rates of surgical site infections, surgical revisions, DVT, emergency department utilization, and all-cause mortality compared to non-users. These findings suggest a potential protective role of GLP1-RA in surgical recovery. However, the lack of significant differences in wound dehiscence, pulmonary embolism, amputation rates, and sepsis indicates that further investigation is needed to clarify the full impact of GLP1-RA on surgical outcomes. Future research should focus on elucidating the mechanisms of GLP1-RA in driving these associations in diabetic foot reconstruction.

Overcoming The “No Linear, No LVA” Paradigm: Feasibility Of Lymphaticovenular Anastomosis Without Indocyanine Green Linear Patterns

Abstract Presenter: Melis Salman MD

Abstract Co-Author(s): Shih-Lun Lo, Berk Ozmen MD, David Chon Fok Cheong, Wei Chen MD, FACS

Purpose: The presence of "linear" indocyanine green lymphography (ICGL) pattern is widely accepted as a prerequisite to successful lymphaticovenular anastomosis (LVA), with its absence considered a contraindication. However, studies have demonstrated that absence of lymphographic patterns does not equate to true anatomic absence of lymph vessels. Given the anatomic parallel between the superficial lymphatic and venous systems, we tested a "follow-the-vein" (FV) approach in performing LVA and evaluated its effectiveness in comparison to the conventional "follow-the-linear" (FL) approach.

Methods: All patients who underwent LVA from January 2020 to December 2023 at Cleveland Clinic were included in the study, with the control group being those who demonstrated "linear" pattern on ICGL and the study group being those who demonstrated its absence. The surgical feasibility and outcomes were evaluated and compared with patient reported outcomes (PRO), surgical times, ICGL and volume reduction rate.

Results: In our study, 98 patients underwent LVA, with 70 treated using the FL approach and 28 using the FV approach. Demographics were comparable. The FV group exhibited more severe lymphatic dysfunction, with a higher proportion of contracted (58.2%) and sclerotic (7.0%) lymphatic vessels, whereas the FL group had a greater proportion of ectatic (52.7%) and normal (12.0%) vessels. The FV group required significantly more incisions (5.11 vs. 4.56, p=0.002) and anastomoses (8.71 vs. 7.16, p=0.016). The Octopus anastomosis technique was more frequently utilized in the FV group (78.6% vs. 61.4%, p=0.166), reflecting the need for more complex reconstruction. Despite these differences, operative time (p=0.202), PRO improvements (97.1% vs. 89.3%, p=0.276), ICGL enhancement (94.3% vs. 96.4%, p=1.0), and volume reduction rate (9.7% vs. 9.2%, p=0.790) remained comparable between the two groups.

Conclusion: The absence of a linear pattern in ICGL is not a contraindication for LVA. The "follow-the-vein" method provides a reliable alternative for patients without clear ICGL guidance.

1.Suami H, Taylor GI, Pan WR. The lymphatic territories of the upper limb: Anatomical study and clinical implications. Plast Reconstr Surg. 2007;119:1813-1822.

Reconstruction of Massive Ventral Hernias with Free Latissimus Dorsi Flap: Patient Reported Outcomes Analysis

Abstract Presenter: Ramin Shekouhi

Abstract Co-Author(s): Syeda Hoorulain Ahmed MD, Harvey Chim MD

Purpose: This study aims to present the postoperative functional and quality of life (QoL) outcomes associated with using the free non-innervated latissimus dorsi (LD) muscle flap in combination with transversus abdominis release (TAR) and retrorectus mesh for reconstruction of the anterior rectus sheath in abdominal wall reconstruction (AWR) for patients with massive ventral hernias. Additionally, we sought to evaluate factors influencing patient outcomes following AWR.

Methods: This study reviewed a consecutive cohort of patients who underwent AWR with a free LD flap for massive ventral hernias, defined as hernias exceeding 15 cm in length or width or with an area greater than 150 cm². Patients were contacted at least two years postoperatively and assessed using standardized patient-reported outcome measures (PROMs), including Visual Analog Scale (VAS) for pain, Short-Form Health Survey (SF-12), Hernia-Related Quality-of-Life Survey (HerQLes), and Carolinas Comfort Scale (CCS). Data were analyzed using t-tests and linear regression models.

Results: A total of 18 patients were enrolled in the study, with a mean age of 53.0 ± 15.1 years. Of them, 13 (72.2%) and 5 (27.8%) were male and female patients, respectively. Most patients were ASA class III (n= 15, 83.3%), with 3 (16.7%) categorized as ASA class II. The mean BMI was 31.6 ± 5.1 kg/m2. Comorbidities included diabetes (27.8%), COPD (5.6%), smoking (5.6%), and immunosuppression for liver or kidney transplants (16.7%). Steroid use was noted in 11.1% of patients, and all had prior abdominal surgeries and hernia repairs. The majority of hernias (n=8; 44%) were classified as modified VHWG grade 3 or 2, while grade 1 was observed in 2

patients (11.1%). Mean hernia dimensions were 28.6±6.8 cm in length and 20.3±4.5 cm in width, with mean flap dimensions of length 26.9±2.6 cm × width 17.7±2.6 cm. The mean clinic follow-up was 8.9 months, with no flap failures or hernia recurrences. Medical complications occurred in 3 patients, and 5 patients (27.8%) experienced 8 surgical complications. Two patients died of unrelated causes. Of 16 survivors, 8 (50%) completed phone surveys at a mean follow-up of 36.8 months. In all of these patients, there was no hernia recurrence. The mean VAS, Mental Component of SF-12 (MCS-12), and Physical Component of SF-12 (PCS-12) scores were 5.5 ± 3.0, 48.3 ± 8.4, and 32.1 ± 13.9, respectively. Also, the mean HerQLes and CCS scores were 36.2 ± 33.7 and 60.7 ± 45.6, respectively. Increasing age was positively correlated with PCS-12 [0.70, $P<0.05$] and HerQLes scores [1.94, $P<0.05$] but negatively with CCS scores [-2.40, $P<0.05$]. Larger abdominal wall defects were associated with lower PCS-12 [-2.31, $P<0.05$] and HerQLes scores [-6.40, $P<0.05$], while CCS scores increased with defect size [8.20, $P<0.05$]. Higher body mass index (BMI) was linked to lower MCS-12 [-1.60, $P<0.05$].

Conclusions: This study shows that the free noninnervated LD flap is viable for reconstructing massive ventral hernias. Age positively impacted quality-of-life scores, while higher BMI and larger defects negatively influenced outcomes. These results highlight the complex interplay between patient characteristics and postoperative outcomes, emphasizing the importance of tailored approaches in VHR.

Technique and Early Outcomes of Thoracodorsal Lymph Node Transfer for Lymphedema Prevention and Treatment Following Axillary Lymph Node Dissection

Abstract Presenter: Zain Aryanpour MD

Abstract Co-Author(s): Dulcy Wolverton, Sarah Tevis, Katie Egan MD

Background: Lymphedema following breast cancer surgery has a significant impact on quality of life. Immediate lymphatic reconstruction with lymphovenous bypass has shown favorable, but varied efficacy in the current literature. Thoracodorsal lymph node transfer (TDLNT) has been employed as both a pedicled and free lymph node transfer for treatment of secondary lymphedema. Here we present a novel technique and case series with early outcomes for TDLNT as a prophylactic pedicled lymph node transfer following axillary lymph node dissection for invasive breast cancer.

Methods/Technique: Patients who underwent prophylactic TDLNT were prospectively followed and a chart review was performed to obtain data regarding patient demographics, surgical characteristics, and post-operative. The primary outcome of interest was post-operative lymphedema; secondary outcomes of interest included operative complications. In terms of surgical technique, following completion of the axillary lymph node dissection by the breast surgeon, the senior plastic surgeon (KGE) performs a pedicled TDLNT. The operative area is first inspected to identify remaining vascular bundles to isolate for TDLNT. Latissimus muscle is retracted posteriorly to identify the lymphatic tissue between the serratus and latissimus muscles. The thoracoepigastric artery and vein or serratus branch of the thoracodorsal artery and vein are identified. The lymph node flap is designed to contain adipose tissue and lymph nodes centered on the proposed pedicle. The flap is then isolated, and the pedicle is raised to its origin. Lymphatic vessels going into the flap are clipped on the chest wall side to prevent lymphatic leak. SPY angiography is performed to verify perfusion throughout the flap. The flap is then transposed over the axillary vein and sutured into place.

Results: Between years 2024-2025, five patients underwent lymphatic reconstruction with pedicled TDLNT. Mean follow-up time was 123 days. All patients had a diagnosis of invasive ductal carcinoma with positive axillary nodes, and all patients were high risk for developing post-operative lymphedema. Mean number of lymph nodes removed in patients undergoing primary resection was 13.5 nodes. One of five patients had recurrent cancer limited to the breast and axilla with preoperative stage 1 lymphedema. Of these patients who underwent TDLNT, three patients did not develop post-operative lymphedema, one patient developed stage 0 post-operative lymphedema, and one patient's prior lymphedema clinically improved. One patient experienced post-operative cellulitis which was managed conservatively, and another patient experienced a minor breast wound that was managed conservatively; there were no major post-operative complications.

Conclusion: Our data suggests that TDLNT is safe and may be used prophylactically and/or therapeutically to prevent and/or treat upper extremity lymphedema following axillary dissection for invasive breast cancer. Additional data is needed to better quantify outcomes following TDLNT.

Clearing the Air: Impact of COPD on Inhalation Injury Outcomes

Abstract Presenter: Christopher Fedor

Abstract Co-Author(s): Jose Antonio Arellano MD, Hilary Liu, Mare Kaulakis, Francesco Egro MD, Msc, MRCS

Background: Chronic obstructive pulmonary disease (COPD) is characterized by obstruction of small airways (chronic bronchitis) and emphysema, which lead to air trapping and shortness of breath in response to physical exertion. Such a disease process can inhibit the vital physiologic functions that are necessary to keep the lungs healthy and free of pathogens. In patients with inhalation injuries, where there can be significant airway damage, COPD patients may thus be less equipped to heal. This study examines the effect of COPD comorbidity on short-term clinical outcomes for patients with inhalation injuries.

Methods: A 12-year retrospective analysis was conducted utilizing patient records from a single tertiary care ABA-certified burn center. Cases included were inhalation injuries diagnosed via fiberoptic bronchoscopy. Outcome variables including hospital length of stay, ventilator days, and complications were compared between patients with or without a prior diagnosis of COPD.

Results: 184 patients were diagnosed with inhalation injury. 69 (37.5%) had COPD. These patients were older ($p<0.001$) and more likely to be current smokers ($p<0.001$). COPD did not predict a difference in hospital days ($p=0.060$), ventilator days ($p=0.487$), nor rates of complications. Moreover, COPD did not raise the mortality rate following smoke inhalation injuries (OR=0.61, 95% CI: 0.24-1.53, $p=0.297$). Instead, carbon monoxide poisoning arose as the predominant risk factor of mortality (OR=3.80, 95% CI: 1.41-10.25, $p=0.008$). Although mortality rate was the

same regardless of COPD status, among patients who died, those with obstructive disease survived 6.0 days longer ($p=0.007$).

Conclusions: COPD status did not significantly impact short-term clinical outcomes in patients with house fire related inhalation injuries. Rather, the extent of cutaneous burns and systemic toxicity proved to be stronger predictors of these outcomes. Among patients who succumbed to these injuries, those with COPD had a few extra days to live. This could be due to the protective effects of COPD-related respiratory therapies, or it may simply reflect the outcomes of heightened critical care efforts in these patients.

Global Disparities in Burns: Analyzing Outcomes from the WHO Global Burn Registry Across Resource Settings

Abstract Presenter: Daniel Najafali

Abstract Co-Author(s): Megan Najafali, Hilary Liu, Kayvon Jabbari, Jose Antonio Arellano MD, Sameer Patel MD, Victor Stams, Francesco Egro MD, Msc, MRCS, Erik Reiche MD

Introduction: Burn injuries remain a significant global health burden, particularly in lower-resource settings. Understanding disparities in outcomes between low-resource and high-resource regions is needed to inform interventions. We hypothesize that burns managed in low-resource countries are an independent risk factor for mortality.

Methods: We queried the World Health Organization (WHO) Global Burn Registry (GBR) from inception to September 2024. Individuals were stratified based on care in low-resource (LRC) and high-resource countries (HRC). Descriptive statistics between cohorts (LRC vs. HRC) were leveraged to summarize demographics, burn characteristics, facility resources, and hospital care outcomes. Multivariable logistic regression analysis was performed for mortality while controlling for confounding factors.

Results: There were 9,274 cases with 4,169 (45%) managed in LRC and 5,105 (55%) in HRC. The median age at time of burn injury was 24 years (IQR: 4-40 years). The male population was 54% in LRC and 65% in HRC (P< 0.001). The median total body surface area (TBSA) burned was higher in LRC (20%, IQR: 10-40%) compared to HRC (15%, IQR: 5-25%, P< 0.001). Inhalation injury was also more prevalent in LRC (23%) than in HRC (9%, P< 0.001). Both the median Baux and modified Baux scores were higher for LRC, 50 and 52, respectively, compared to HRC, 41 and 42, respectively (P< 0.001). Flame injuries were significantly higher in LRC (56% vs. 43% HRC, P< 0.001). There was a significantly higher proportion of head and neck, trunk, and lower extremity burn injuries in LRC (P< 0.001). Critical care resources, computer and internet access, operating room availability, rehabilitation capabilities, and specialist capabilities were significantly lower in LRC (P< 0.001). A higher proportion of patients in HRC underwent surgery (61% vs. 40% LRC, P< 0.001). Discharge was significantly higher (82% vs. 59%) in HRC and mortality was significantly lower (11%) compared to LRC (29%, P< 0.001). After adjusting for demographics and burn-related factors, management in an LRC significantly increased the odds of mortality (OR 2.69, 95%CI 2.25-3.24, P< 0.001).

Conclusions: Individuals treated in LRC had higher mortality, even after adjusting for demographic and burn injury-related characteristics. These findings underscore the need for greater access to specialized care and targeted interventions in low-resource settings to improve burn care.

Comparing Reconstructive Options and Outcomes Following Scalp SCC Excision

Abstract Presenter: R'ay Fodor

Abstract Co-Author(s): Abigail Meyers MD, Amy Nowacki, Karina Brito, Tamara Sussman, shlomo koyfman, Antonio Rampazzo MD, Bahar Bassiri Gharb MD, PhD, Neil Woody

Background: Scalp squamous cell carcinomas (SCC) are more aggressive than SCCs in other body sites, often necessitating adjuvant radiotherapy. The effects of postoperative radiation on reconstructive outcomes remain unclear. We hypothesize that the effect of radiation on complication rates depends on reconstructive modality [i.e., free flap (FF) vs scalp flap (SF)].

Methods: An IRB-approved retrospective study was performed including patients who underwent soft tissue reconstruction with a SF or FF following SCC resection from 2003-2024. Details of procedures, comorbidities, medications affecting wound healing, and postoperative radiotherapy were documented. High-risk tumors were classified as being T2b or above. Multivariable logistic regression was used to evaluate the interaction between postoperative radiation and flap type.

Results: Ninety-eight patients (87.8% male; mean age: 71.8±10.5 years) were included. Common comorbidities included diabetes (39.8%) and obesity (38.8%). Immunosuppressant medications were reported in 34.7% of patients.

Eighty-five patients (85.7%) underwent solitary soft tissue reconstruction (81.2% SF, 18.8% FF). FFs and SFs were not performed at significantly different rates in patients whose tumors were recurrent (31.3% vs. 24.6%, p=0.2), demonstrated perineural invasion (56.3% vs. 20.3%, p=0.07), or were poorly differentiated (31.3% vs. 17.4%, p=0.3). Tumors were larger in the FF group (7.2±5.1cm vs 3.3±2.3cm; p<0.0001). Tumors in the FF group more often invaded deeper than fat (68.8% vs 37.7%, p=0.01).

Eighty-one percent of tumors in the FF group were high-risk compared to 42.0% in the SF group (p=0.006). Radiation following reconstruction was more frequent in FFs (68.8% vs 27.5%; p=0.003). Postoperative survival was not significantly different between groups [FF: 32 months (IQR: 18-52), SF: 52 months (IQR: 25-76), p=0.2]. The proportion of patients who experienced complications was not significantly different between groups (FF: 37.5%, SF: 33.3%, p=0.75). The most common complications were partial flap loss (17.4%) and delayed wound healing (13%) in the SFs and delayed wound healing (12.5%) in FFs. In the FF group, immunosuppressed patients had higher reoperation rates (p=0.04). In the SF group, flap loss significantly increased with age (p = 0.01) and showed a marginal association with postoperative radiation (p = 0.09). Overall complication rates were higher in irradiated patients (p = 0.04). Reoperation rates were significantly higher in immunosuppressed (p=0.007) and postoperatively irradiated patients (p=0.008). The interaction between radiation and flap type was found to be significant, with increased complication risk following radiation in SFs (OR: 4.48, 95% CI: 1.50-13.4) but not FFs (95% CI: 0.03-2.32, p=0.02).

Twelve patients underwent cranioplasty and soft tissue reconstruction (4 SF, 8 FF). In SF cranioplasty patients only, hardware exposure and flap loss both increased with patient age (p=0.03, both comparisons).

Conclusions: Immunosuppression was associated with increased reoperation rates for both SF and FF reconstructions. Postoperative radiation was associated with increased complications and reoperation rates in SF only. Multivariable logistic regression revealed a significant interaction between radiation and flap type on complication rate, with radiation increasing the odds of experiencing a complication following SF but not FF reconstruction. FFs may therefore be the preferred option for patients with high-risk tumors that may require adjuvant radiotherapy.

Predicting Graft and Flap Failure in Lower Extremity Burns: The Impact of TBSA, Excision Number, and Anatomical Subsite

Abstract Presenter: Emily Miller

Abstract Co-Author(s): Christopher Kujalowicz, Taylor Schumann, Jayde Powell, Bianca Di Chiaro MD, Irena Helenowski, Manuel Portalatin, Timothy King MD, PhD, MBA, MSBE, FAAP, FACS

Background: Current literature suggests that lower extremity burns have higher rates of complications, graft failure, and flap failure than upper extremity and trunk injuries (1-3). There is scarce evidence analyzing the factors that contribute to graft and flap failure in these patients. Our group aims to explore the impact of affected total body surface area (TBSA), number of burn excisions, anatomical site of injury, and type of skin substitute on rates of graft and flap complications in acute burns of the lower extremity.

Methods: This retrospective cohort study analyzed all patients admitted to a single institution for treatment of acute burns of the lower extremity from 2007-2024 who underwent graft or flap based reconstruction for their injuries. Excluded patients were less than 18 years of age and those with electrical burns. Demographic data including age, sex, race/ethnicity, BMI, insurance type, and length of stay were collected. Complications, comorbidities, readmission data, and surgical details were collected. TBSA, flap and graft details, skin substitute type, and additional complications were collected via operative and postoperative reports.

Results: 98 patients met study criteria, with 284 individual grafts and 13 flaps included in analysis. Older patients were more likely to experience delayed wound healing; there were no significant changes in complication rates associated with sex, race, ethnicity, BMI, or smoking. Patients with larger TBSA% and higher number of burn excisions had no change in flap complications but had significantly increased rates of graft complications, including partial and total graft failure, delayed graft healing, and graft infection. Initial categorical analysis identified 21%-40% TBSA or greater as significantly associated with an increase in graft complications ($p<0.001$). Continuous variable analysis also confirmed a strong dose-response relationship, with complications rates rising proportionally with increasing TBSA% ($p< 0.001$). Burns affecting the foot had the lowest rate of complications, while burns affecting the buttocks had the highest rate of complications. Cadaveric-based grafts had the highest rate of graft complications, while Stratagraft, Suprathel, Primatrix, and Integra showed no significant increase in graft complications. Finally, patients with increased length of stay and any infection were more likely to experience total graft failure in multivariable models.

Conclusion: This study is the first to analyze complication rates of lower extremity grafts and flaps across a number of demographic, operative, and therapeutic strata, and further bolsters the growing rate of literature showing increased complications in lower extremity burns. Additionally, while previous studies have broadly classified lower extremity burns, this study further stratifies results by anatomical subsite, identifying site-specific risks and facilitating a more granular analysis of complication patterns. Future work should aim to extrapolate these findings to large, multicenter studies.

References:
1: Reddy S, El-Haddawi F, Fancourt M, et al. The Incidence and Risk Factors for Lower Limb Skin Graft Failure. Dermatology Research and Practice. 2014;2014:1-3. doi:https://doi.org/10.1155/2014/582080

2: Kasmirski JA, Alessandri-Bonetti M, Liu H, et al. Free Flap Failure and Complications in Acute Burns: A Systematic Review and Meta-analysis. Plastic and Reconstructive Surgery – Global Open. 2023;11(10):e5311. doi:https://doi.org/10.1097/GOX.0000000000005311

3: Stankiewicz M, Coyer F, Webster J, Osborne S. Incidence and Predictors of Lower Limb Split-Skin Graft Failure and Primary Closure Dehiscence in Day-Case Surgical Patients. Dermatologic Surgery. 2015;41(7):775-783. doi:https://doi.org/10.1097/dss.0000000000000391

Accelerating Bone Regeneration in Distraction Osteogenesis: A Systematic Review on Biologic Therapies and Biomaterials

Abstract Presenter: Avery Apostle

Abstract Co-Author(s): Meghan Momand, Yamila Salazar, Kathryn Sharp, Lance Lamore, Dr. Benjamin Massenburg MD

Background/Purpose: Distraction osteogenesis (DO) is widely used for craniofacial, orthopedic, and reconstructive procedures but remains limited by prolonged healing times. Adjuncts such as stem cells, growth factors, other biological therapies have the potential to accelerate bone regeneration, yet their clinical application remains underexplored. This systematic review evaluates the efficacy of biologic adjuncts in DO and their impact on bone remodeling and healing.

Methods: A systematic review was conducted electronically through PubMed following PRISMA guidelines. The search query combined terms related to distraction osteogenesis (DO), such as "distraction osteogenesis," "mandibular distraction," "callus distraction," and "limb lengthening," with terms related to biologic adjuncts, including "biocompatible materials," "biomaterials," "stem cells," "growth factors," and "platelet-rich plasma (PRP)." Only studies in English involving human DO procedures or in vivo animal models with clear translational relevance were included. Exclusively in vitro

studies, case series with fewer than five patients, and non-original research (e.g., reviews, editorials, opinion pieces) were excluded.

Results: The initial search yielded 641 publications, with 55 studies meeting inclusion criteria. Of these, 96% were preclinical experimental studies, primarily utilizing animal models (89%), while 7% included both animal and human models, and 4% were clinical studies. The clinical studies consisted of one retrospective cohort study (2%) and one randomized controlled trial (2%).
Among interventions, 47% of studies evaluated stem cells, 21% biomaterial scaffolds, 15% signaling modulators, 11% growth factors (e.g., VEGF, PDGF), 11% bone morphogenetic proteins (BMPs), and 7% platelet-rich plasma (PRP). Of these, 16% investigated more than one intervention concurrently. Studies assessed multiple outcome measures, including bone regeneration (100%), callus formation (69%), consolidation time (60%), biomechanical properties (55%), and functional or patient-reported outcomes (5%). Overall, 96% of studies reported that biologic adjuncts facilitated or improved DO outcomes.

Conclusion: This systematic review highlights the extensive preclinical research on biologic adjuncts in distraction osteogenesis but reveals a critical gap in clinical validation. While 96% of studies demonstrated improved bone regeneration outcomes, nearly all were preclinical, with only 4% involving human subjects. The promising potential of stem cells, PRP, BMPs, other grown factors, and biomaterial scaffolds must be validated through well-designed clinical trials to assess their safety, efficacy, and long-term outcomes. Bridging this gap is essential to integrating biologic adjuncts into clinical practice and optimizing patient care in craniofacial and orthopedic reconstruction.

Research & Technology

The Departmental Scholarly Index: A Temporal Metric for Evaluating Research Productivity and Quality in Plastic Surgery Programs

Abstract Presenter: Noah Alter

Abstract Co-Author(s): William Lineaweaver, Brian Drolet MD, Galen Perdikis MD, Muhammad Daiem MD, Marcelina Puc, Matthew Pontell MD, Patrick Assi MD, Wesley Thayer MD

Purpose: Academic influence is often equated with research volume, yet per-publication impact varies widely across institutions. The Departmental Scholarly Index (DSI) was developed to standardize institutional comparisons by integrating publication volume and journal impact factor, offering a balanced assessment of scholarly output. Unlike cumulative metrics, DSI generates scores for individual calendar years, offering a temporal snapshot of research productivity and quality.

Methods: A systematic PubMed search identified all plastic surgery publications from the 22 Southeastern institutions from 2019–2023. Journal impact factors were obtained from Clarivate's Journal Citation Reports. The DSI was calculated by dividing each institution's total impact score (TIS) per year by its annual publication count, yielding an average per-publication impact.

Results: A total of 1,731 plastic surgery publications were identified across the 22 institutions over the five-year period. Vanderbilt University led in publication volume (258 articles) and Total Impact Score (634.1), followed by Duke University (202 articles, TIS: 483.1) and Mayo Florida (231 articles, TIS: 313.6). Despite lower publication volumes, the University of North Carolina achieved the highest average DSI (3.24), followed by Virginia Tech Carilion (3.06) and University of Kentucky (2.97). The five-year mean DSI across all institutions was 1.93 ± 0.76.

Institutional research strategies varied markedly. Virginia Tech Carilion (DSI rank: 2nd; TIS rank: 20th) prioritized low-volume, high-impact publications, achieving substantial influence per article despite limited output. In contrast, Mayo Florida (DSI rank: 19th; TIS rank: 3rd) employed a volume-focused strategy, yielding high productivity but lower per-publication impact. Balanced institutions such as Vanderbilt (DSI rank: 4th; TIS rank: 1st) and Duke (DSI rank: 5th; TIS rank: 2nd) maintained high DSI and TIS through sustained productivity, illustrating an equilibrium between quantity and per-publication impact.

Regression analysis revealed a strong correlation between publication volume and TIS ($R^2 = 0.876$), confirming that high productivity drives cumulative impact. Conversely, the weak correlation between DSI and TIS ($R^2 = 0.22$) highlights a disconnect between publication quality and volume. These findings suggest that institutions with higher research outputs may not always produce the most impactful works on a per-publication basis.

Conclusion: By distinguishing between research volume and per-publication quality, the DSI offers a refined framework for assessing institutional productivity and promoting meaningful comparisons across academic programs. This preliminary analysis validates the utility of DSI in academic plastic surgery programs and suggests its potential for broader application across diverse research fields.

Monitoring Hyperbaric Oxygen Therapy treated Post-Operative Flap Ischemic Tissue Using FLIR Thermography Imaging: Does it work?

Abstract Presenter: Rebecca Friedman

Abstract Co-Author: Ernest Chiu MD, FACS

Background: Early detection of compromised tissue perfusion and timely intervention are critical to prevent irreversible damage following ischemia.1 Ischemia to tissues can lead to cellular dysfunction, necrosis, and significant morbidity if not identified and managed promptly.2,3 Traditional methods for assessing tissue perfusion, such as clinical observation and invasive diagnostics, can be time-consuming, inefficient, subjective, or limited in scope. Consequently, there is a growing need for noninvasive, objective, and timely techniques to identify ischemic regions and monitor therapeutic effectiveness in resolving ischemia. This case series evaluates the utility of Forward-Looking Infrared (FLIR) thermographic imaging, using a handheld portable plug-in device to detect ischemic regions and monitoring responses to hyperbaric oxygen therapy (HBOT) for ischemia management across diverse clinical scenarios.

Methods: FLIR thermographic imaging was performed before and after HBOT to detect temperature gradients associated with impaired perfusion in various cases of post-surgical flap ischemia recovery. Darker colors represent lower temperatures suggesting limited blood flow; brighter colors representing warmer temperatures suggest more robust perfusion to an area. Patients received standard HBOT sessions for their indications. Pre- and post-HBOT thermograms were obtained to assess changes in tissue temperature and perfusion within sessions and over the patients' clinical course. Outcomes including tissue viability, resolution of ischemia, and functional improvements were analyzed.

Results: Ten (n=10) patients presented with post-surgical ischemic complications. Indications for HBOT included tissue necrosis after oncologic mastectomy, penile implant surgery, soft tissue filler injection forehead vein removal, gender-affirming mastectomy, and rhytidectomy. Additionally, HBOT was used to treat digit ischemia resulting from heparin-induced thrombocytopenia (HIT),

FLIR monitoring demonstrated that FLIR imaging identified localized areas of reduced blood flow in all patients, correlating with clinical diagnoses of ischemia. Following HBOT, thermograms showed increased tissue temperature in the previously ischemic zones, suggesting improved oxygenation and perfusion. These findings were associated with appropriate wound healing, and with serial FLIR imaging, we successfully tracked healing trajectory and documented progressive improvements in blood flow over time.

Conclusion: This case series highlights the potential use of FLIR thermographic imaging for assessment of post-operative tissue recovery. It is a rapid, efficient, and low-cost noninvasive tool for both detecting ischemia and evaluating therapeutic response to HBOT and other therapies. Broader adoption of this technology may assist in clinical decision-making, leading to earlier interventions and more favorable outcomes in patients with compromised tissue perfusion.

References:

Razavi, S.A., A.L. Hart, and G.W. Carlson, Ischemic Complications After Bilateral Nipple-sparing Mastectomy and Implant-based Reconstruction: A Critical Analysis. Ann Plast Surg, 2021. 86(6S Suppl 5): p. S526-s531.

Javed, H., et al., Challenges and Solutions in Postoperative Complications: A Narrative Review in General Surgery. Cureus, 2023. 15(12): p. e50942.

Nasr, Hani Y. MD; Rifkin, William J. MD; Muller, John N. MD; Chiu, Ernest S. MD. Hyperbaric Oxygen Therapy for Threatened Nipple-Sparing Mastectomy Flaps: An Adjunct for Flap Salvage. Annals of Plastic Surgery 90(5S):p S125-S129, May 2023. | DOI: 10.1097/SAP.0000000000003441

How Well is Skin Tone Represented in Plastic Surgery Literature?

Abstract Presenter: Hector Caceres

Abstract Co-Author(s): Elizabeth Dominguez MD, Alexandra Savage, Meeti Mehta BS, Shayan Sarrami MD, Aniekanabasi Ufot, Carolyn De La Cruz MD

Purpose: Minority patients have historically been underrepresented in medical research, including in plastic surgery. Previous studies have highlighted that 80% of images on plastic surgery websites and social media depict white individuals, and 30% of surgeons' social media accounts lack images of non-white patients. (1,2) Few studies have assessed visual representation in plastic surgery literature, but all demonstrate inequitable representation. (3,4) This study evaluates the equity of skin tone representation in visual materials published in plastic surgery journals.

Methods: Four independent reviewers completed an inter-rater reliability test, which was assessed using Cohen's Kappa. A comprehensive review of four plastic surgery journals, Aesthetic Surgery Journal, Plastic and Reconstructive Surgery, Annals of Plastic Surgery, and Journal of Plastic Reconstructive and Aesthetic Surgery, was conducted for articles published from September 2019 to September 2024. Articles were categorized by subspecialty and evaluated for images, graphics, or videos depicting human skin. Skin tones were rated using the Massey-Martin Skin of Color Scale, where scores of 1–3 indicated light skin tones, 4–6 medium skin tones, and 7–10 dark skin tones.

Results: A total of 5,349 articles were analyzed, of which 2,461 contained visual representations of skin, with an average of 2.2 images per article. The overall average Massey-Martin Score (MMS) was 1.8. Within subtopics, cosmetic surgery and breast surgery had an average MMS of 1.7. Head and neck reconstruction and trunk reconstruction had an average MMS of 1.8, followed by hand/peripheral nerve with an average of 1.9. Craniofacial and lower extremity reconstruction both had an average MMS of 2.0. Finally, burn related articles had an average of 2.3. There was a statistically significant difference in the average MMS across subspecialties ($p < 0.001$). Breast had a significantly lighter average MMS compared to craniofacial, burn, and lower limb reconstruction ($p < 0.01$, $p < 0.001$, $p = 0.01$, respectively). Cosmetic had a significantly lighter average MMS compared to craniofacial, lower limb reconstruction, and burn ($p < 0.001$, $p = 0.03$, $p < 0.001$, respectively). Hand/peripheral nerve, head and neck reconstruction, and trunk reconstruction also had significantly lighter MMS than burn ($p = 0.043$, $p = 0.02$, $p = 0.04$, respectively).

Conclusions: Plastic surgery literature predominantly features lighter skin tones, with breast and cosmetic surgery articles showing significantly lighter skin tones compared to other subspecialties. These findings highlight the need for more equitable visual representation to better reflect the diversity of patient populations and improve educational and clinical relevance in plastic surgery. Promoting diverse representation can enhance inclusivity and accuracy, ultimately benefitting both education and patient care.

1. Ali MM, Chatterjee A, Khoo LS, Sinno S, Rizk E. Patient Representation and Diversity in Plastic Surgery Social Media. Plast Reconstr Surg. 2021;147(1):128-134. doi:10.1097/PRS.0000000000007481

2. Cavazos-Rehg PA, Krauss MJ, Costello SJ, Kaiser N, Cahn ES, Fitzsimmons-Craft EE, Wilfley DE. Patient Representation and Diversity in Plastic Surgery Social Media. Plast Reconstr Surg. 2021;147(1):128-134. doi:10.1097/PRS.0000000000007481

3. Cho DY, Kneib CJ, Massie JP, et al. "Visual Representation of Racial Diversity in Aesthetic Surgery Literature." J Plast Reconstr Aesthet Surg. 2021;74(1):223-243. doi:10.1016/j.bjps.2020.05.048

4. Cho DY, Kneib CJ, Massie JP, et al. "Underrepresentation of Racial Minorities in Breast Surgery Literature: A Call for Increased Diversity and Inclusion." Annals of Surgery. 2021;273(2):202-207. doi:10.1097/SLA.0000000000004481.

Towards the Fabrication of Scalable Engineered Vascularized Tissue: Reset Adult Vascular Endothelial Cells Form Microvascular Networks in Ribosylated Collagen Extracellular Matrices

Abstract Presenter: Abby Chopoorian Fuchsman

Abstract Co-Author(s): Riley Mayne, Sophia Salingaros, Kate Guion Manley, Samuel Medina, Matthew Liao, Xue Dong MD, PhD, Jason Spector MD

PURPOSE: Autologous tissue grafts are used by reconstructive surgeons for defect restoration but are limited by their diffusion dependence for nourishment. Engineering flaps by promoting angiogenesis within transferred tissue might potentially overcome this diffusion barrier and promote early revascularization. A novel cell line, reset

vascular endothelial cells (R-VECs), consists of human umbilical vein endothelial cells transduced to express ETV2, an embryonic transcription factor that regulates early angiogenesis and is not normally expressed after 20 weeks in gestation. R-VECs have been shown to form microvascular networks in fibrin matrices within microfluidic systems. However, fibrin is not a component of human extracellular matrix and therefore limits the translatability of this network. Collagen is a more biocompatible substrate for R-VECs and ribosylated collagen, which is plain collagen incubated with ribose to cause non-enzymatic glycosylation and stiffening, has enhanced structural integrity. This study aims to demonstrate that R-VECs are capable of forming stable microvascular networks in matrices of increasing collagen compositions.

METHODS: A total of 300,000 GFP-tagged R-VECs were suspended in 30ul of extracellular matrix composed of 0, 25, 50, and 100% 3 mg/mL ribosylated collagen. The remaining percentage for each was composed of fibrin. Suspensions were plated in a microfluidic chip via an inlet well, which flowed across a channel to an outlet well. The chips with collagen were incubated until the matrix polymerized and 1cc cylinders were attached to each well and filled with media at the inlet side. The microfluidic chip systems were then placed in an incubator at an angle to encourage flow through the channel via gravity. After 48 hours, they were transferred to a rocking machine in an incubator, applying shear force and continuous perfusion for the microvascular structures. Media was changed every 1 to 2 days and day 6 immunofluorescent VE-Cadherin staining of constructs was performed to characterize the formed endothelial network. Immunofluorescent beads and heparinized murine blood were flowed through the microfluidic chip to confirm perfusability of the network.

RESULTS: Light microscopy confirmed the presence of vessel-like structures of differing morphology in each extracellular matrix. R-VECs in pure fibrin and 25% ribosylated collagen formed capillary-like microvascular networks that demonstrated capacity for fluorescent bead and heparinized murine blood flow, whereas the 50% group formed vessel-like structures, but did not survive until day 6 due to contraction. R-VECs in 100% ribosylated collagen formed vessel-like structures that were longer and wider than those observed in fibrin and partial collagen, resembling individual vessels more than capillary networks. These vessels appeared to have a lumen, sprouts, and branches. Fluorescent imaging identified GFP tagged R-VECs comprising the vessel-like structures.

CONCLUSIONS: This study demonstrates the formation of microvascular networks by R-VECs in vitro in matrices of different collagen compositions. This supports their potential as a bioengineered solution to diffusion dependent tissue flap barriers. Additionally, the differing caliber of these vascular structures may be promising for the

generation of hierarchical blood vessels for tissue engineering and microsurgical settings. Ongoing work is focusing on characterizing morphological differences between vessels formed in different matrices.

Forward Strides in Academic Plastic and Reconstructive Surgery Gender Representation: 2025 Update

Abstract Presenter: Holly Cordray

Abstract Co-Author(s): Adina Singer, Helen Molteni, Said Azoury MD

Purpose: Although academic plastic and reconstructive surgery has trended toward dismantling gender disparities over the last decade, gaps remain within program leadership. This study mapped gender distributions of plastic surgery chiefs and program directors (PDs) in context of faculty and trainees to understand whether the field is advancing toward gender parity, and specifically to characterize how current program leadership reflects and shapes the broader gender landscape.

Methods: In a national cross-sectional study of the 89 accredited integrated plastic surgery residency programs (including independent tracks) in the 2024-2025 academic year, data on academic plastic surgery leaders, faculty, and trainees were extracted from program websites and/or social/professional media, determining gender using documented pronouns. Career metrics were collected for all leaders. Differences by gender were evaluated using Chi-square/Fisher's exact tests, independent-samples t-tests, and analyses of covariance. Associations among female representation in program leadership, faculty, and trainees were examined.

Results: Compared to prior reports, developments occurred in gender representation at all levels and in parity regarding career advancement opportunities. As of 2025, women comprise 26.4% of faculty and 50.9% of residents; 0.1% identify as nonbinary. In comparison, 13.5% of department/division chiefs, 22.5% of primary PDs, and 43.1% of associate PDs are female. Associate PDs are significantly more likely than chiefs or primary PDs to be female ($P < .001$), indicating expansion of women entering leadership positions. Analyses of career metrics supported gender parity in selection and advancement of program leaders. Qualification variables, including average post-residency years in practice, clinical fellowships completed, board certifications, additional graduate degrees, total publication count, or h-index, did not differ significantly by gender at any level of program leadership. Professional attainment

variables, including professor rank and holding an endowed chair or journal editorship, likewise did not differ significantly by gender. Female vs male leaders at all levels were associated with significantly greater female faculty representation within their programs (approximately 150% relative magnitudes, $P \leq .005$). Although chief and faculty gender were unrelated to female representation among trainees, PDs may shape trainee gender distributions. Significant associations suggested greater inclusion of female residents at programs with female primary and/or associate PDs (approximately 120% relative magnitudes, $P \leq .03$).

Conclusions: Gender inclusion has progressed throughout academic plastic surgery. The gender composition of trainees has achieved an equal gender balance, forecasting further evolution of female representation in the field, as women currently comprise just over a quarter of faculty. Female representation among department/division chiefs is lower, though plausibly proportional to the cohort of surgeons who have accrued the longer career experience traditionally expected before heading a department/division. The gender distribution of PDs appropriately reflects the broader population of academic plastic surgeons and indicates a growth trend of female leadership. Associations between PD and resident gender may be attributable to the perceived importance of shared mentor-mentee gender and racial/ethnic identities for budding surgeons who are female and/or under-represented in medicine. We anticipate an ongoing forward trajectory of inclusiveness in plastic surgery as the contemporary gender balance of trainees remodels the field.

Endothelial Dysfunction in Keloid Formation and Therapeutic Insights

Abstract Presenter: junxian wen

Abstract Co-Author(s): Zhijin Li, Nanze Yu MD, Xiao Jun Wang

Background: Keloids are fibroproliferative skin disorders characterized by excessive extracellular matrix deposition, persistent growth, and high recurrence rates. While fibroblast hyperproliferation has been extensively studied, vascular dysregulation and endothelial dysfunction (ED) have received less attention. Emerging evidence suggests that keloid progression is driven by abnormal angiogenesis, increased vascular permeability, and endothelial injury. These vascular abnormalities contribute to a hypoxic microenvironment that promotes fibroblast activation, immune cell infiltration,

and chronic inflammation. However, the precise role of ED in keloid formation remains unclear.

Methods: A comprehensive literature review was conducted across Medline, Embase, Web of Science, and the Cochrane Library to identify studies investigating vascular and endothelial mechanisms in keloid pathogenesis. Key search terms included "keloid," "vascular dysfunction," "angiogenesis," and "endothelial-to-mesenchymal transition (EndoMT)." The impact of ED on fibrosis was analyzed by reviewing studies on endothelial injury markers, vascular distribution patterns, and endothelial-fibroblast crosstalk. Additionally, current and emerging treatment strategies targeting vascular dysregulation were systematically reviewed.

Results: Keloids exhibit increased vascular density at the periphery, while the central regions experience vascular occlusion, ischemia, and fibrosis. This spatial heterogeneity suggests that hypervascularized edges support outward keloid expansion, whereas central hypoxia stabilizes excessive collagen deposition. Mechanistically, ED contributes to keloid formation through both direct and indirect pathways. Directly, EndoMT converts endothelial cells into fibroblast-like cells, driving fibrosis. Indirectly, ED enhances inflammation, immune cell recruitment, and hypoxia-driven metabolic reprogramming, which sustain a pro-fibrotic environment. Dysregulated signaling pathways, including VEGF, TGF-β, and nitric oxide, further reinforce this vascular dysfunction.
Based on these findings, we propose that endothelial dysfunction plays a dual role in keloid persistence and recurrence. At the peripheral margin, an excessive, disorganized vascular network facilitates continuous fibroblast proliferation, collagen synthesis, and outward expansion, resembling tumor-like growth. In contrast, the central regions of keloids experience progressive vascular occlusion and ischemia, promoting collagen cross-linking and tissue stiffening, leading to a fibrotic core. This vascular paradox may explain why keloids resist treatment and frequently recur post-excision-surgical removal may leave behind an unstable vascular environment, predisposing residual endothelial cells to reinitiate fibroproliferative responses. Moreover, we hypothesize that dysregulated endothelial cells in keloids may remain in a "primed" but inactive state, poised to drive fibrosis when triggered by microenvironmental cues such as injury, inflammation, or mechanical stress. This could provide a mechanistic explanation for the high recurrence rates observed in keloids despite multimodal treatments.

Conclusion: Targeting endothelial dysfunction and vascular dysregulation presents a promising approach for improving keloid management. Therapeutic strategies such as anti-angiogenic drugs, radiotherapy, hyperbaric oxygen therapy, compression therapy, and laser treatments show potential in modulating vascular function. Future studies

should focus on early vascular-targeted interventions to reduce recurrence rates and improve treatment outcomes. Understanding keloid pathogenesis from a vascular perspective offers novel insights that could lead to more effective and durable treatment strategies.

Improving Surgical Outcomes Through the Synergistic Effects Combining a Hospital-Wide Prehabilitation Program and Targeted Messaging Campaign — A NSQIP Study

Abstract Presenter: George Corpuz MD

Abstract Co-Author(s): Eleanor Kilbane, Dylan Kim, Nancy Strange, Jennifer Waljee MD, William Wooden MD

Purpose: The Indiana University Health Pre-Operative Wellness and Enhanced Rapid Recovery (POWERR) Program is a multifaceted surgical prehabilitation program implemented within a hospital system aimed at addressing the shortcomings of enhanced recovery after surgery (ERAS) protocols. This initiative includes immunonutritional supplementation, cleansing agents, MRSA decolonization, smoking cessation, pulmonary and physical preconditioning, preoperative hydration, carbohydrate loading, and nutritional assessment and counseling. Prior work from our group has demonstrated that this program has been associated with statistically significant reductions in hospital length of stay, harm events, surgical site infection rates, overall cost of care, and key complications. Patient messaging platforms have been shown to increase therapeutic adherence in various fields. Alongside its role in decreasing peri-operative complications, we sought to understand whether the use of a patient-specific targeted messaging platform 'TWISTLE' to promote patient engagement within the POWERR program might improve its conferred benefits to plastic surgery patients given that these procedures are often associated with high risks.

Methods: We identified 141 patients undergoing plastic surgery procedures at a large academic medical center from 2020-2024. Our primary exposure included TWISTLE scores, representing the number of messages patients had opened of reminders regarding their POWERR preoperative optimization pathway.This was used as a surrogate to measure patient engagement and compliance; a TWISTLE score of 0 was interpreted as no involvement with POWERR, these patients were not included in our study. Patients from this cohort were stratified by their TWISTLE scores into quartiles.

Postoperative complications were referenced through the IU Health NSQIP database. Multivariable logistic regression was used to analyze the relationship between TWISTLE engagement and the presence of at least one postoperative complication within the first 30 days of surgery (Table 1).

Results: Rates of at least one postoperative complication within the first 30 days after surgery were not significant between TWISTLE score quartiles 1-3 (Table 1). The top quartile of TWISTLE scores, however, was associated with a significant odds ratio of 0.18 (p=0.0499; 95% CI 0.03-1.00) relative to quartile 1 regarding the presence of at least one postoperative complication (Table 1).

Conclusions: Our study is the first to characterize the added benefit of patient messaging platforms to improve engagement and compliance of surgical patients enrolled in a prehabilitation program. The implications of our data suggest that the messaging platform 'TWISTLE' in providing patients with time-sensitive reminders to complete each step of the POWERR pathway yields an added benefit in reducing postoperative complications among all plastic surgery patients enrolled in the POWERR plan. Our work contributes to the ongoing discussion on surgical optimization and its role in decreasing preventable adverse events within our specialty.

Algorithmic Bias in AI-Driven Medical Education: Uncovering Implicit Racial and Gender Disparities

Abstract Presenter: Andrew Salib

Abstract Co-Author(s): Paula Flores Perez, Omar Allam MD, Ismail Ajjawi, Albert Rancu, Jake Moscarelli, Martin Kauke-Navarro MD, Paris Butler MD, MPH, Michael Alperovich MD, MSc

Introduction: As AI technology becomes increasingly prevalent, its role in medical education is expanding. Many educational startups now incorporate large language models (LLMs), such as ChatGPT APIs, into their platforms. However, since these models are trained on existing data, they may inadvertently perpetuate gender- and race-based inequities, reflecting broader historic societal biases. Prior research has demonstrated a decline in the percentage of underrepresented individuals in medicine (URiM) along the surgical career pipeline. However, it remains unclear whether AI-driven career guidance reinforces these disparities. This study aims to identify potential

biases in AI-generated career advice by assessing the influence of sex and race on ChatGPT's 4o specialty recommendations.

Methods: A total of 200 unique applicant profiles were generated, systematically varying sex, race, and academic achievement. Each profile was queried for specialty recommendations using a standardized prompt that demonstrated an interest in a surgical residency, and ChatGPT 4o top three suggestions were recorded.

Specialties were ranked on a 4-point scale by competitiveness based on NRMP data. For each profile, a competitiveness score was calculated as the sum of assigned points for recommended specialties, and the number of surgical specialties suggested was recorded.

Multivariate linear regression assessed the effects of academic achievement, race, and sex on (1) the number of surgical specialties recommended and (2) the competitiveness score. Bonferroni correction was applied for multiple comparisons ($p<0.05$). Statistical analyses
were conducted in RStudio 2023.

Results: Racial disparities were observed, with Black, Hispanic, and South Asian students receiving fewer surgical specialties and lower competitiveness scores compared to White students. Specifically, Black students were recommended significantly fewer surgical specialties (Coef = -0.48, $p = 0.003$) and had the largest decrease in competitiveness scores (Coef = -2.58, $p < 0.0001$). Hispanic students exhibited a similar pattern, with fewer surgical specialties recommended (Coef = -0.43, $p = 0.008$) and lower competitiveness scores (Coef = -2.23, $p < 0.0001$). Asian students showed lower competitiveness scores (Coef = -0.90, $p = 0.03$) but did not experience a significant difference in the number of surgical specialties recommended (Coef = -0.25, $p = 0.115$).

Higher Step 2 scores and publication counts were significantly correlated with higher competitiveness scores and number of surgical specialties recommended. Female students were significantly less likely to receive surgical specialty recommendations, though their competitiveness scores did not differ significantly from male students (Coef = -0.69, $p < 0.0001$; Coef = -0.23, $p = 0.3773$).

Conclusion: ChatGPT specialty recommendations exhibit algorithmic implicit biases related to sex and race, with female and URIM students receiving fewer surgical

recommendations and lower competitiveness scores compared to white students with similar academic standing. These findings are particularly concerning given the rapid expansion of AI-driven startups utilizing these LLM in medical education. This underscores the urgent need for transparency and bias mitigation strategies to prevent the reinforcement of existing inequities.

Consulting as a Plastic Surgeon: What Makes Companies Value Your Opinion?

Abstract Presenter: Grace Gasper

Abstract Co-Author(s): Kala Pham, Liam Cato, Brody King MD

BACKGROUND: Healthcare consulting is currently estimated to be a $9.1 billion dollar industry.(1) The majority of this revenue is focused on strategic and financial management of hospitals and pharmaceutical companies. However, there is a unique need for physician consultants in the product development sector. The purpose of this study is to investigate the frequency, size, and distribution of consultation fees made to plastic surgeons by leading companies in the plastic surgery instruments market. We hypothesize that payment allocations will be dependent on a surgeon's practice type, clinical experience, and research output.

METHODS: The top ten largest companies within the global plastic surgery instruments market were selected based on total revenue.(2) Companies subsidiaries with products related to plastic surgery were also identified. The Centers for Medicare & Medicaid Services' Open Payments database was used to find all financial payments made by each company to U.S. healthcare providers. Consulting payments made in 2023 to physicians who completed independent or integrated plastic surgery programs were included. Each plastic surgeon's practice type, years of clinical experience, and educational background was identified by reviewing a combination of LinkedIn profiles and institutional clinical profiles. Physician's H-Index was obtained from Scopus (missing rate was 10.1%).

RESULTS: A total of 702 consulting payments to 234 different plastic surgeons were evaluated. The median payment was $2,460 [IQR $529-$10,967]. The mean number of payments per plastic surgeon was 3.1 (SD 5.6) and the mean years of clinical experience was 18.07 (SD 10.3, ranging from 2 to 46). Clinical experience, fellowship type, and practice type all had no significant effect on consulting payment amounts

(p=0.242, 0.540, 0.540 respectively). The only predictor that showed a significant effect on payment amounts was H-index (p=0.004). In a multivariable model, taking into account the above variables, H-Index remained significantly associated with payment amount in USD for plastic surgeons receiving payments from the top 10 medical device companies (p=0.0297).

CONCLUSION: Only about 3% of board-certified plastic surgeons received consulting payments from the top 10 medical device manufacturers in 2023. This analysis shows that years of clinical experience, fellowship training, and practice type had no significant effect on the payment amount. H-index, which was used to approximate each physician's research output, was the only factor shown to have a significant correlation between payment amount. These results provide insight into what these companies value when seeking advice on their new products. They can also be used as a frame of reference for any plastic surgeons interested in becoming a medical device consultant.

REFERENCES:
1. Fine, T. Healthcare Consultants in the US. OD5496. IBISWorld. June 2024.
2. Top 10 Companies in Plastic Surgery Instruments Market in 2023. ER_00458. Emergen Research. July 2023.

Small-Diameter Artery Grafts Engineered From Pluripotent Stem Cells Maintain 100% Patency in an Allogeneic Rhesus Macaque Model

Abstract Presenter: Robert George MD

Abstract Co-Author(s): Weifeng Zeng MD, Peter Nicksic MD, Ellen Shaffrey MD, Samuel Poore MD, PhD

Background: Synthetic grafts, including ones made from expanded polytetrafluoroethylene (ePTFE), have traditionally performed well for high-flow, large diameter vessels. However, these grafts generally fail for smaller diameter vessels (<6mm). The poor performance of small diameter ePTFE vascular grafts is primarily due to early thrombotic occlusion. Prior clinical research has demonstrated that lining synthetic grafts with autologous endothelial cells prior to implantation improves the patency of ePTFE grafts. Our study investigated whether lining small diameter ePTFE grafts with arterial endothelial cells (AECs) derived from embryonic stem cells could decrease the rate of occlusion and therefore improve graft performance.

Methods: We developed a rhesus macaque model for lower extremity arterial bypass (femoral-femoral) grafts. Using this model, we assessed graft failure rates in naked (lacking an AEC lining) 3 mm ePTFE grafts to serve as a control as well as two experimental groups which were cellularized with wild-type AECs or engineered AECs. Interposition ePTFE grafts were placed in the superficial femoral artery of seven rhesus macaques in each group. Patency was visualized by ultrasound and grafts were explanted if they demonstrated occlusion or at the study endpoint, which was designated as 6 months post-implantation.

Results: The control group revealed 43% patency of naked ePTFE grafts at six months, with failure generally occurring by thrombosis within the first five weeks. The grafts that remained patent developed intimal hyperplasia by the study endpoint, with cells infiltrating only a few millimeters into the proximal and distal ends of the graft, while the middle portion remained free of infiltration. The patency rates of the wild-type AECs group and the engineered AECs group were 100% and 50%, respectively.

Conclusion: Over 50% of naked ePTFE interposition grafts failed within the first five weeks of implantation in this novel rhesus macaque model. By cellularizing these grafts with a scalable and defined source of embryonic stem cell-derived AECs, we aim to improve the performance of readily available small diameter arterial grafts with applications in cardiac and vascular surgery, as well as reconstructive microsurgery. In addition, assessment of the immunogenicity of grafts containing either wild-type AECs or AECs engineered to elicit a minimal immune response are forthcoming.

Real-Time Biomechanical Monitoring of Burn Wound Healing Using Digital Image Speckle Correlation (DISC) in a Porcine Model

Abstract Presenter: Gurtej Singh

Abstract Co-Author(s): Shi Fu MD, Huiting Luo, Divleen Singh MD, Shiffoni Sukhlal, Ethan Lester, Miriam Rafailovich, Marcia Simon, Sami Khan MD, Duc Bui MD, Alexander Dagum MD

PURPOSE: Traditional wound evaluation methods, such as visual inspection and histology, are often limited by their invasiveness and high cost. This study explores the

use of Digital Image Speckle Correlation (DISC) as a non-invasive technique for quantifying wound healing progress through spatially resolved imaging of mechanical properties. By detecting subtle mechanical changes in tissue, DISC allows for frequent, real-time assessments without requiring invasive biopsies. This capability has the potential to improve patient-specific wound management and advance telemedicine applications (1).

METHODS: The DISC approach applies controlled mechanical deformation using a modified tensiometer for direct imaging. Digital image correlation algorithms track natural surface features (e.g., pores, hair follicles) to measure displacement and strain, distinguishing intact, healing, and regenerated tissue. A deep partial-thickness burn model was created on Yorkshire pigs using a standardized vertical progression burn method. Wounds were treated with collagen-fibrin scaffolds, followed by autologous skin cell suspension (ASCS) from the RECELL Autologous Cell Harvesting Device.
DISC imaging was conducted at multiple time points before biopsy collection (Days 14 and 28), providing real-time force propagation analysis. Heatmaps and displacement profiles were used to assess scaffold integration and mechanical changes in the wound bed, with control measurements taken from healthy skin. Histological cross-sections were obtained using a 3 mm biopsy punch at specific wound locations-10 mm from the corners at early time points and from the center at the final time point. Although the locations of histology samples and DISC force measurements were not identical, DISC imaging enabled a dynamic, quantitative assessment of healing before tissue extraction.
RESULTS: DISC and histological analysis revealed distinct differences in force propagation and tissue remodeling:
Control Skin:
• Heatmaps showed uniform force propagation, indicating optimal mechanical stability.
• Histology displayed a well-organized epidermis, dense collagen, and stable vasculature, characteristic of mature tissue.
Wound (Day 14):
• Heatmaps showed disrupted force propagation, suggesting incomplete scaffold integration.
• Histology revealed partial epithelialization, disorganized collagen, and limited vascularization.
Wound (Day 28):
• Heatmaps indicated improved force uniformity, approaching control levels.
• Histology showed complete epithelialization, organized collagen, and increased vascularization, marking the final maturation phase.

CONCLUSION: DISC presents a promising, non-invasive, and quantitative approach to wound assessment by detecting subtle mechanical changes in tissue. It enables timely

interventions, reduces dependence on invasive biopsies, and enhances patient-specific wound management. Preliminary findings suggest that long-term DISC tracking could offer valuable insights into contracture-related biomechanical changes and hypertrophic scarring. Further studies beyond Day 28 are needed to optimize scaffold-based therapies for burn injuries.

1. Fritz JR, Phillips BT, Conkling N, et al. Comparison of native porcine skin and a dermal substitute using tensiometry and digital image speckle correlation. Annals of plastic surgery. 2012;69(4):462-467.

Optimizing Global Surgical Access: Evaluating Effective Models for Sustainable Impact in Resource-Poor Settings

Abstract Presenter: Hannah Soltani

Abstract Co-Author(s): Ariel Figueroa MD, Arun Gosain MD

Background: According to the 2015 Lancet Commission on Global Surgery, approximately 5 billion people lack access to safe and affordable surgical care. This burden is particularly severe in resource-poor settings, where trauma and burn injuries contribute significantly to surgical morbidity and mortality. However, low- and middle-income countries (LMICs) often prioritize other healthcare needs due to financial constraints, limited workforce, and competing public health concerns. In response, various global surgery models have emerged to address the gap in care. These include mission-based surgery, high-volume surgical trips, Centers of Excellence (CoEs), partner hospital models, and reciprocal institutional collaborations. Each model presents distinct benefits and challenges in sustainability, scalability, and training impact.

Methods: We conducted a review of publicly available data on global surgical initiatives in plastic surgery, including Operation Smile, Smile Train, and academic institutional partnerships. Surgical volume, local training initiatives, capacity-building efforts, and program longevity were assessed to evaluate each model's effectiveness.

Results: Mission-based surgery (e.g., Operation Smile) has provided over 220,000 cleft surgeries since 1982, delivering immediate care but with minimal follow-up and limited emphasis on local workforce development. High-volume surgical programs follow a similar model, with notable examples like Operation Smile's efforts in Asunción,

Paraguay, where 125 cleft surgeries were performed by five surgeons in one week. While such efforts improve access during an intensive brief period, they lack continuity and training focus. Centers of Excellence (CoEs), such as Operation Smile's program in Guwahati, India, have performed 5,000 cleft cases in five years through partnerships between government and global surgeons. These centers enhance local capacity but are resource-intensive and require sustained funding and collaboration. The partner hospital model, exemplified by Smile Train, emphasizes local training and long-term sustainability. Between 1999 and 2014, Smile Train facilitated one million cleft surgeries across 87 countries, working with over 1,100 partner hospitals. Additionally, training initiatives for physicians and nurses led to a 30% increase in follow-up and secondary procedures. However, this model lacks significant engagement from trainees in resource-rich settings, limiting global bidirectional learning. Reciprocal institutional collaborations, such as the Vanderbilt-Kijabe and ReSurge International partnerships, have shown significant success in capacity building. In 2022, 14 trainees from the College of Surgeons of East, Central, and Southern Africa (COSECSA) took the Plastic Surgery Board Exams, the highest number to date, demonstrating the growing impact of these programs on long-term workforce development. However, these partnerships require detailed coordination and adherence to regulatory requirements for international rotations.

Conclusion: We provide a comprehensive review of available models for plastic surgery care in low-resource settings to address the burden of surgical disease. While mission-based and high-volume trips provide immediate surgical care, they lack long-term sustainability. CoEs and partner hospital models enhance local capacity but require significant investment. Reciprocal collaborations foster bidirectional learning and workforce development but demand intensive coordination. We propose the benefit of a hybrid approach that integrates the strengths of these models offering a sustainable solution for expanding access to surgical care in underserved regions.

Applying Latent Profile Analysis to CLEFT-Q Data: A Novel Approach to Understanding Patient-Reported Outcomes in Cleft Care

Abstract Presenter: Nicholas Han

Abstract Co-Author(s): Isabel Ryan BS, Philip Tolley MD, Allison Hu MD, Oksana Jackson MD, David Low MD, Scott Paul Bartlett MD, Jesse Taylor MD, Eric Chien-Wei Liao MD, PhD, Jordan Swanson MD, MSc

Purpose: Patient-reported outcomes (PROs) play a crucial role in evaluating the quality of care for patients with cleft lip and/or palate (CL/P). CLEFT-Q, a validated PRO instrument, provides valuable insights into patients' perceptions of their appearance, function, and psychosocial well-being. However, translating CLEFT-Q data into actionable clinical insights remains challenging due to its high-dimensional structure. This study employs latent profile analysis (LPA), a statistical clustering method commonly used in psychology and personality research, to categorize CLEFT-Q responses into meaningful patient phenotypes. LPA has been increasingly applied in healthcare research, including geriatric quality-of-life and healthcare worker resilience studies, to identify subpopulations within heterogeneous datasets that would otherwise be missed using conventional analysis. By leveraging LPA, this study aims to facilitate a deeper understanding of patient experiences.

Methods: Following institutional review board approval, all CLEFT-Q responses collected at a tertiary pediatric craniofacial center from September 2021 to March 2024 were analyzed. Patients aged 8 to 29 years with complete CLEFT-Q responses were included. LPA was conducted in R on 11 CLEFT-Q domains to identify distinct response profiles. Clinical characteristics and profile stability over time were assessed.

Results: Responses grouped into six general profiles: two Universally Affected (UA1-Moderate, UA2-Severe), two primarily focused on Facial Appearance (FA1-Moderate, FA2-Severe), one primarily with Social, School, and Speech issues (SSS), and one Minimally Distressed (MD). Most patients fell into moderate or benign profiles, FA1 (148, 21.7%), UA1 (176, 25.8%), and MD (174, 25.6%), with smaller proportions in severe, FA2 (35, 5.1%) and UA2 (77, 11.3%), or specific, SSS (71, 10.4%), profiles. Patients in the more severe profiles were older (FA2: 14.9 years, UA2: 14.2 years) compared to the cohort average of 13.0 years (ANOVA $p<0.001$) and more likely to have complete cleft lip (UA2: 83.1%, cohort average: 79.1%, ANOVA $p<0.001$). Patients in the MD profile were younger (12.0 years vs. cohort average of 13.0 years) and more likely to have cleft palate only (MD: 43.7%, cohort average: 28.9%, ANOVA $p<0.001$). Among patients with multiple CLEFT-Q responses, 46.1% remained in the same profile over time without surgical intervention, suggesting moderate profile stability. The FA2 (60.0%), UA1 (55.8%), and MD (51.4%) profiles were the most stable, while FA1 (33.3%) and SSS (29.4%) demonstrated greater variability. Patients undergoing surgery exhibited a lower profile stability (38.2%), with procedures such as rhinoplasty leading to more favorable profile shifts. For instance, rhinoplasty patients commonly transitioned from universally affected profiles to those primarily affected by facial appearance concerns, reflecting improved psychosocial function.

Conclusions: This study demonstrates the utility of LPA in distilling high-dimensional CLEFT-Q data into clinically relevant patient phenotypes. LPA enables the identification of nuanced patient subpopulations that may be overlooked in conventional analyses, offering a data-driven approach to cleft care. The identified profiles correlate with key clinical factors such as age, cleft severity, and surgical history, providing a framework for more personalized patient care. As PROs gain prominence in cleft care, integrating profiling methodologies like LPA may enhance the translation of patient-reported data into meaningful clinical decision-making.

Development and Evaluation of a Cooperative Robotic System for the Bilateral Sagittal Split Osteotomy Using an In-Plane Motion Constraint

Abstract Presenter: Katherine Zhu

Abstract Co-Author(s): Jesse Haworth, Manish Sahu, Jacob Hammond, Hisashi Ishida, Adnan Munawar, Robin Yang MD, Russell Taylor

Background: Bilateral sagittal split osteotomy (BSSO) can significantly improve a patient's quality of life by aligning the jaw, improving the airway, and correcting dentofacial asymmetry. However, there is a high risk of neurosensory disturbance and injury due to the complexity of the anatomical space and limited visualization. Robot-assisted surgery offers a promising solution for BSSO by providing stable, tremor-free control of the surgical tool during the procedure. We aimed to develop and validate a cooperatively controlled robot system to enhance the precision and efficacy of the BSSO.

Methods: We designed a cooperatively controlled robot system using the Galen robotic platform. This system had two modes to execute a patient-specific surgical plan: haptic guidance to help the surgeon align the surgical saw to the planned osteotomy plane and an active constraint to restrict deviations from the osteotomy plane. To evaluate the system, a medical student, resident, and attending each performed both a freehand osteotomy and a robot-assisted osteotomy on 3D printed mandible models from six different patients. Postoperative CT scans were taken, segmented, and compared to preoperative CT scans. We computed the cut volume from the difference between pre- and postoperative segmentation. The distance from each cut voxel to the planned plane was used to the determine accuracy and precision of the osteotomy. All participants

took a NASA Task Load Index (TLX) survey to assess the mental workload of the freehand and robotic operations.

Results: When cutting freehand, the medical student's osteotomies had the highest deviation from the planned plane (2.16 +/- 0.98 mm) compared to the resident (1.74 +/- 0.95 mm) and the attending (1.64 +/- 0.85 mm). In comparison, the robot-assisted cuts resulted in significantly lower deviations from the planned plane, indicating the accuracy of the cut, and lower standard deviations, indicating the precision of the cut (medical student: 0.71 +/- 0.53 mm, p=0.0015; resident: 0.53 +/- 0.35 mm, p=0.0010; attending: 0.63 +/- 0.24 mm, p=0.0024). The NASA TLX survey showed that the robot-assisted system made the mental, temporal, and physical demands of BSSO easier for the attending and the resident, whereas the medical student found both freehand and robot-assisted procedures to be difficult.

Conclusions: Our results show that the cooperatively controlled robot system can significantly enhance the precision of the surgical cutting in BSSO. The medical student, resident, and attending were able to improve performance with robotic assistance, effectively narrowing the skill gap.

A Treatment Algorithm for Patients with Lipedema

Abstract Presenter: Kassandra Carrion

Abstract Co-Author(s): Nitya Devisetti, Athena Le, Kelsey Lipman MD, David Perrault MD, Anita Mohan MBBS Phd, Dung Nguyen MD

Purpose: Lipedema is a debilitating disease involving chronic accumulation of subcutaneous fat that is resistant to compression garments and lifestyle change. Lipedema affects approximately 19% of women. Past research has examined outcomes and patient satisfaction post liposuction for lipedema treatment at various individual institutions, but there remains limited literature on lipedema treatment algorithms and staging recommendations. We present a treatment algorithm based a single institution experience, including patient treatment of various obesity classes.

Methods: We utilized a treatment algorithm whereby patients were first assigned one of four stages of disease progression as described by Herbst(figure 1). In order to rule out other concurrent pathology, if indicated, we recommend lymphoscintigraphy, venous

ultrasound, or CT/MRI. Patients with Stage I/II lipedema with single areas involved (bilateral upper extremities or bilateral lower extremities involving hips but not buttocks) undergo single stage LVL where both extremities are treated within the same operative session. Patients with Stage III/IV and multiple affected anatomical regions (such as lower extremities involving hips and buttocks, all extremities, and any involvement of the abdomen) undergo staged treatment. that the most afftected area is treated first. Typically, the hips and legs are more affected so we begin with the hips, anterior, medial, and lateral thigh, followed by liposuction bilaterally below the knee, the buttock and posterior thighs, the abdomen, and the arms. A maximum of 10 L of fat is removed per operative session or can be achieved within 3 hours of operating time. We limit operating time to 3 hours or less to minimize risks of thromboembolic events. Timing between each procedure is 3-4 months. A retrospective chart review was performed for all patients diagnosed with lipedema at a single institution from 2016 to 2024. Number of liposuction procedures and the volume collected per procedure was collected. All liposuction procedures were performed by one surgeon (DN).

Results: A total of 76 patients with a total of 126 liposuction procedures were included in this study. Maximum collected lipoaspirate volume was 10L. BMI average was 36.68 ± 7.93 kg/m2 (range 19.7-56.5 kg/m2. Average outpatient follow up time was 101.4 ± 113.42 days. BMI was not a significant predictor of the likelihood of complications in this analysis (OR = 0.17, 95% CI: 0.006–4.59, p = 0.226). Patients who had liposuction reported having none or less limitations in usual work, household, or school activities (61.5%), vigorous activities (53.8%), moderate activities (69.2%), bathing(69.2%) than before surgery. Upper extremity (61.5%), lower extremity (61.5%), and hip (53.8%) pain was reported to be less severe than before surgery.

Conclusions: We propose a treatment algorithm that allows for safe large volume liposuction and staged treatment, even in the setting of high patient BMI, and high lipoaspirate volume collected. Our approach successfully improved patient mobility, completion of daily activities, and pain.

Analysis of Learning Objective Quality in National Plastic Surgery Meeting Educational Sessions

Abstract Presenter: Joey Liang

Abstract Co-Author(s): Liban Mohamed, Tara Pillai, Ash Patel MBChB, FACS

Introduction: Learning objectives, written statements that outline expectations of learners after an educational activity, are critical for focusing the teaching experience for both educators and learners.[1] While mandated learning objective criteria exist at every stage of medical training, including Continuing Medical Education (CME), the implementation and quality of educational learning objectives in plastic surgery remains unclear.[2], [3], [4] This study evaluated the quality of learning objectives in all 2023 and 2024 educational sessions at Plastic Surgery The Meeting (PSTM) assessed by SMART goal setting criteria and Bloom's Taxonomy levels.[1], [5]

Methods: This study was a cross-sectional study of all educational sessions in the 2023 and 2024 meetings of PSTM. Educational sessions with missing or incomplete learning objectives were excluded. Learning objectives were stratified according to the program track of the educational session. Adherence to SMART goal setting criteria and Bloom's Taxonomy concordance between learning objectives and the primary verb used to communicate each learning objective were compared.

Results: In total, 193 educational sessions were included in the study, corresponding to 513 learning objectives. Comparison of SMART criteria showed that learning objectives were overwhelmingly Attainable (92.50%), Relevant (99.21%), and Time-Bound (99.80%), but not Specific (60.16%) or Measurable (24.06%). Learning objectives predominantly included learning goals in Bloom's Taxonomy Levels 1 – Remember (38.3%) and 2 – Understand (38.1%). However, learning objectives primarily used verbs in Bloom's Taxonomy Level 2 (58.3%). A comparison of discordant verbs showed that presenters most often assigned verbs from the "Understand" category to learning objectives in the "Remember" category. Learning objectives tended to be deficient in the "Specific" and "Measurable" criteria across all program tracks; however, the fewest deficiencies were observed in Craniomaxillofacial and Head and Neck educational sessions. The mean Bloom's Taxonomy level of learning objectives significantly differed by track ($p < 0.001$). Mean Bloom's Taxonomy levels were highest in the Reconstructive (2.41/6) and Aesthetic (2.32/6) program tracks and lowest in the Breast track (1.54/6).

Conclusions: Educational sessions in national plastic surgery meetings tend to communicate Achievable, Relevant, and Time-Bound learning objectives, but not Specific or Measurable outcomes. Current learning objectives also tend to prioritize learner goals in lower Bloom's Taxonomy levels, with the most discordance in learning objectives and verbiage used occurring between the "Remember" and "Understand" Bloom's Taxonomy categories. Future guidelines should emphasize these two validated

frameworks (SMART criteria and Bloom's Taxonomy) for future plastic surgery trainee and CME activities.

REFERENCES:

[1] E. M. Webb, D. M. Naeger, T. B. Fulton, and C. M. Straus, "Learning objectives in radiology education: why you need them and how to write them," Acad. Radiol., vol. 20, no. 3, pp. 358–363, Mar. 2013, doi: 10.1016/j.acra.2012.10.003.
[2] "Standards, Publications, & Notification Forms | LCME." Accessed: Jul. 28, 2024. [Online]. Available: https://lcme.org/publications/
[3] "Program Requirements and FAQs and Applications." Accessed: Jul. 28, 2024. [Online]. Available: https://www.acgme.org/specialties/plastic-surgery/program-requirements-and-faqs-and-applications/
[4] "Criteria," ACCME. Accessed: Jul. 28, 2024. [Online]. Available: https://accme.org/rules/criteria/
[5] D. Chatterjee and J. Corral, "How to Write Well-Defined Learning Objectives," J. Educ. Perioper. Med. JEPM, vol. 19, no. 4, p. E610, Oct. 2017.

Attrition in Academic Research Among Plastic Surgeons: A Longitudinal Cohort Study Across Three Decades

Abstract Presenter: Lauren Lowe

Abstract Co-Author(s): Dylan Kim, Lee Yang, Maggie Zhou, Christine Rohde MD, MPH

Introduction: Attrition from academic research, defined as the cessation of publication, is a phenomenon that disrupts medicine and science, with considerable impact on the field of plastic surgery. Existing literature has demonstrated a gender disparity in research attrition rates, yet despite the rising research trends in plastic surgery, there has not yet been an investigation into how these considerations affect the specialty. This study aims to examine the trends in research attrition amongst currently practicing plastic surgeons across three decades.

Methods: A longitudinal cohort study was conducted using a cohort of plastic surgeons identified from the American Society of Plastic Surgeons (ASPS) directory who published at least two articles in different years since 2000 with the keyword "plastic surgery." Articles were identified via Scopus search. The year of initial board certification, span of publishing, gender, fellowship training, and affiliation with an

academic center were collected for each surgeon. The main outcome of interest was attrition in academic research, quantified as a lack of academic publication in the last three years or more. The probability of attrition over time was measured with Kaplan-Meier curves, and predictors of attrition were evaluated with a Cox proportional hazards model ($p<0.05$).

Results: The final cohort included 1,389 currently practicing plastic surgeons, 1,129 (81.3%) of which were male. The most common geographic region was New England/Middle Atlantic (322, 23.2%). The majority of surgeons were affiliated with an academic center (745, 53.6%) and were fellowship-trained (812, 58.5%). The median (IQR) number of publications was 6 (3-12), and the median span of publication was 10 (5-17) years. The overall rate of attrition was 58.7% (815 surgeons). The 20-year probability of attrition was significantly higher for female surgeons than male surgeons (72.1% vs. 64.8%, $p=0.020$). In a multivariable Cox proportional hazards model, male gender (HR: 0.78, 95% CI: 0.66-0.93, $p=0.0067$) and academic affiliation (HR: 0.61, 95% CI: 0.52-0.71, $p<0.001$) predicted a significantly lower likelihood of attrition. When compared to no fellowship training, aesthetic fellowship did not predict a significantly different likelihood of attrition (OR: 1.11, 95% CI: 0.88-1.40, $p=0.38$), whereas craniofacial, hand, and microsurgery fellowships all predicted a lower likelihood of attrition ($p<0.05$). Geographic region was not a significant variable in this model ($p>0.05$).

Conclusion: Female plastic surgeons are significantly more likely to leave academics than their male colleagues. Additionally, aesthetic fellowship may constitute a marker for the pursuit of a non-academically affiliated career. Those who maintained affiliation with an academic hospital were more likely to continue publishing. These trends highlight the continued gender imbalances in the field of plastic surgery and the need for organizational shifts that support and foster growth for all physicians who desire to remain in academic practice.

The Pregnancy and Postpartum Experiences of Plastic Surgery Residents

Abstract Presenter: Catherine Tang

Abstract Co-Author(s): Abra Shen MD, Thais Calderon MD, Mia Do BS, John Henry Pang MD, Rachel Lentz MD, Wendy Chen MD, MS

Introduction: Plastic surgery trainees report delayed childbearing due to the perceived incompatibility of surgical training with early family planning. Surgeon infertility rates are higher than that of the lay population and surgical training occurs during peak reproductive years, which contribute to poorer fertility, perinatal, and maternal outcomes. The unique challenges in the postpartum period that residents face including lactation and pumping once returning to clinical roles have not been studied. This survey aims to better understand plastic surgery trainees' experiences with parenthood and advocate for the normalization of the many facets of family planning.

Methods: An electronic Qualtrics-based survey was adapted from previously validated surveys in the medical literature. This survey was distributed to the 113 plastic surgery resident members of the American Council of Educators Plastic Surgeons (ACEPS). Data on demographics, parenthood knowledge, experiences, and perceptions were collected and analyzed.

Results: A total of 39 responses were received and of those who reported their sex, 85.2% were female and 14.8% were male, for a total response rate of 34.5%. One-quarter of respondents (25.6%) were unsure about whether a parental leave policy existed in either their residency program or through the American Board of Plastic Surgery. Fourteen trainees, representing over one-third of the respondents (35.9%), had children during residency training. Of those who answered, eleven had children by birth, one had a child via adoption, and one had a child with their partner as the birthing parent. All took parental leave, with eight people taking leave in the form of family and medical leave (FMLA), four as vacation, and four as elective or research time. The mean amount of leave was eight weeks, with a range of 3 to 12 weeks. More than half (53.4%) experienced guilt during parental leave, of which 57.1% experienced guilt from themselves and 42.9% experienced guilt associated with their co-residents. Eleven trainees (28.2%) were the birthing parent during training. Of these, nine (72.7%) intended to pump. On average, respondents pumped for a total of 8.1 months during residency. Two respondents reported that faculty made them feel uncomfortable pumping at work. Complications related to inadequate pumping, including diminished milk supply and mastitis, affected half of trainees. Over half of trainees (55.6%) ceased pumping earlier than they would have liked due to insufficient time and diminished milk supply. 75% of trainees reported that residency limited their ability to pump due to reasons such as insufficient time, increased stress, and inability to adequately nourish themselves to produce milk.

Conclusions: Plastic surgery trainees experience significant barriers during parenthood including inadequate parental leave, few resources for parental leave policies and lactation support, and insufficient time to allow for pumping. A more supportive culture,

conscious colleagues and faculty, and informed policy change can improve parenthood for plastic surgeons.

Mechanical Stimulation After Volumetric Muscle Loss Injury Improves Functional Recovery and Tissue Repair/Regeneration in a Large Animal Model.

Abstract Presenter: Eddy Rios

Abstract Co-Author(s): Daniah Alnafisee MD, Hiroshi Fujimaki MD, Mitchell Kennedy, Ariana Fantakis Ettorre, Neha Kamireddi, Samantha Kroon, Monica Royo, Nicole Ayres, Bilal Chaudhry MD, Giorgio Giatsidis MD, PhD

Purpose: Over 40,000 traumatic open fractures leading to volumetric muscle loss (VML) injuries are estimated to occur annually in the US (1,2). Even ~20% muscle loss causes disproportionate lasting strength deficits of 30 - 90% (3). The current gold standard, physical therapy, only achieves partial functional recovery of 17 - 58% (4, 5). Our prior murine model of VML showed that passive external mechanical stimulation (MS) improves muscular torque recovery (MMT +26%) and reduces fibrosis (-21%). Here, we hypothesize that MS has similar outcomes in a large animal model.

Methods: Left Peroneus Tertius muscle (PTM) VML injury was surgically induced in female (38-42 kg) Yucatan pigs; animals received no treatment (n=10) or MS of the PTM (n=8). Outcomes included post-injury day 35 (PID35) recovery of pre-injury MMT and baseline activity level (step count), PID35 strength in newton-centimeters per gram PTM (ncm/g), weekly gait assessments (Tarlov Score), PID 35 recovery of pre-injury fatigue resistance, PID35 Masson staining, and PID35 MRI for PTM inflammation/edema (T2) and fat fraction.

Results: MS significantly improved recovery of MMT (32±25% vs 12±6%; p=0.00019) and activity (110±75% vs 67±62%; p=0.028), increased PID35 PTM strength (3.3±3.1 ncm/g vs 1.5±1.4 ncm/g; p=0.0049), improved gait at PID 14 (4.9±0.7 vs 4.4±1.0; p=0.042) and 28 (5.0±0 vs 4.6±1.0; p=0.045), and insignificantly improved recovery of fatigue resistance (55±100% vs 26±31%; p=0.11). Histology and MRI showed reduced fibrosis (16±12% vs 24±16%; p=0.048) and reduced PID35 T2 signal (-27%) and fat fraction (-44%).

Conclusions: In a translational large animal model, MS promotes strength recovery, reduces fibrosis, and reduces inflammation/fat fraction after VML injury. These results should be confirmed in a pilot clinical trial.

References:
1. Court-Brown CM, Bugler KE, Clement ND, Duckworth AD, McQueen MM. The epidemiology of open fractures in adults. A 15-year review. Injury. 2012 Jun;43(6):891-7. doi: 10.1016/j.injury.2011.12.007. Epub 2011 Dec 27. PMID: 22204774.

2. Population clock. https://www.census.gov/popclock/.

3. Garg K, Ward CL, Hurtgen BJ, Wilken JM, Stinner DJ, Wenke JC, Owens JG, Corona BT. Volumetric muscle loss: persistent functional deficits beyond frank loss of tissue. J Orthop Res. 2015 Jan;33(1):40-6. doi: 10.1002/jor.22730. Epub 2014 Sep 18. PMID: 25231205.

4. Corona, B.T. et al. (2013) 'Autologous minced muscle grafts: A tissue engineering therapy for the volumetric loss of skeletal muscle', American Journal of Physiology-Cell Physiology, 305(7). doi:10.1152/ajpcell.00189.2013.

5. Aurora, A. et al. (2014) 'Physical rehabilitation improves muscle function following volumetric muscle loss injury', BMC Sports Science, Medicine and Rehabilitation, 6(1). doi:10.1186/2052-1847-6-41.

A Novel Scoring System to Assess Vascularized Composite Allograft Preservation with Adipose Stem Cell Media

Abstract Presenter: Abigail Royfman

Abstract Co-Author(s): Dominika Pullmann-Carpio MD, Alay Shah MD, Sachin Chinta, Ata Moshiri, Daniel Ceradini MD, Eduardo Rodriguez MD, Piul Rabbani

Background: Vascularized composite allografts (VCAs) offer a promising solution for complex reconstructive procedures. However, their clinical application is constrained by a narrow preservation window, with prolonged ischemia hindering graft viability and post-transplant longevity. The University of Wisconsin (UW) preservation solution, the gold standard perfusate, extends viability by reducing cellular edema and scavenging

for free radicals. However, its efficacy declines beyond the conventional 4–6-hour storage window, a significant drawback for muscle tissue, which is highly susceptible to ischemia. Muscle viability in VCAs, partly defined by structural characteristics, is difficult to assess due to the lack of a dedicated histological scoring system. Considering these challenges, adipose-derived stem cell-conditioned media (ADSC-CM), enriched with numerous growth factors and cytokines may mitigate ischemic damage. We therefore propose supplementing UW with ADSC-CM, creating UW-CM, to improve graft preservation, with evaluation using a novel histopathological injury scoring system (HISS).

Methods: Rat osteomyocutaneous grafts, comprising a superficial inferior epigastric artery skin flap, vascularized muscle, and femur, were perfused with and stored in one of three conditions: 1) saline, 2) UW, or 3) UW-CM. We evaluated graft muscle viability using hematoxylin and eosin (H&E) staining and a histological scoring system that categorized muscle integrity based on endomysium and fiber appearance (1 = normal, 2 = mild/moderate degradation, 3 = severe degradation). We performed pairwise comparisons using the Mann-Whitney U test where sample size allowed. Furthermore, inter-rater reliability was evaluated using Cohen's Kappa. Two independent raters analyzed a total of 84 regions of interest (ROIs) across 21 flaps.

Results: At 6 hours, the saline group exhibited the highest mean score for endomysium and fiber injury (2.38 ± 0.48), indicating moderate to severe muscle degradation. In comparison, UW-treated grafts achieved a mean score of 1.50 ± 0.13, while UW-CM-treated grafts reached a mean score of 1.81 ± 0.17, suggesting that both UW and UW-CM reduce the degree of histological injury relative to saline. At 24 hours, UW-CM-treated samples recorded a lower mean injury score (1.88 ± 0.63) compared to both UW (2.39 ± 0.48) and saline (2.38 ± 0.95). By 48 hours, UW-CM maintained a numerically lower mean score (2.20 ± 0.39) relative to UW (2.53 ± 0.33). Although the Mann-Whitney U test did not reach statistical significance at 48 hours ($p = 0.234$), these findings suggest that UW-CM may still offer slight improvements in preserving muscle integrity. Additionally, inter-rater reliability analysis showed substantial agreement (Cohen's Kappa = 0.691).

Conclusion: These findings indicate that supplementing UW with ADSC-CM may improve graft preservation by enhancing muscle integrity during extended storage. While UW alone provides consistent protection at early time points (6 hours), the addition of ADSC-CM appears to confer additional benefits at 24 and 48 hours. However, the lack of statistically significant differences at 48 hours highlights the need for further studies with larger sample sizes and optimized ADSC-CM concentrations. Overall, ADSC-CM shows promise as a supplement to extend VCA viability and improve

reconstructive outcomes. Additionally, the scoring system provides a simple, useful tool for evaluating graft viability.

Impact of Topical Deferoxamine Used as a Radioprotective Agent on the Efficacy of Radiation Therapy in a Murine Model of Human Breast Cancer.

Abstract Presenter: Bianka Progri Phd

Abstract Co-Author(s): Joanna Ledwon, Gabrielle Rodriguez MD, Kathryn Reisner, Parul Rai, Anitesh Bajaj, Arun Gosain MD

Purpose: This study investigates the impact of Deferoxamine Intradermal Delivery Patch (DIDP, Tautona-Group), applied topically as a skin radioprotectant, on the efficacy of radiation therapy. While the radioprotective properties of DIDP on the skin have been well-established in previous in vivo studies, its potential protective effects on cancer cells subjected to radiotherapy remain largely unexplored. Therefore, this research aims to elucidate whether the application of DIDP on the skin overlying tumor interferes with the induction of apoptosis in cancer cells following radiation therapy. Our research provides valuable insights into the interplay between DIDP as a radioprotective agent and the therapeutic effectiveness of radiation therapy in cancer treatment.

Methods: The study was performed on a murine model of human breast cancer developed by injecting 1x10^6 MCF7-Luc2 cancer cells (ATCC) into the mammary gland of 8-week-old female immunodeficient NSG mice. Once tumors reached an intensity of ~1x108 photons/s, mice were assigned to one of two cohorts: control and DFO-treated. DIDP were applied daily for 30 days until study endpoint. Radiation therapy (5 x 2 Gy dose daily; total 10 Gy) was administrated on the last 5 days of DIDP treatment using the RS-2000 irradiator (RadSource). The non-irradiated control mice were used to establish a baseline. Pre- and post-radiation in vivo tumor size was assessed using luciferin injection and LAGO bioluminescence imaging system. The day following radiation therapy, skin and tumor samples were preserved in 10% formalin and embedded in paraffin for downstream analyses. TUNEL staining (Abcam) and ImageJ software were utilized to detect and quantify the number of apoptotic cells. Statistical analysis was performed using ANOVA and GraphPad Prism software, with $p < 0.05$ considered significant.

Results: The quantitative analysis of TUNEL staining revealed a significant increase in the number of apoptotic cells in both the control group (FC=3.81, $p<0.0001$) and the DFO-treated group (FC=3.95, $p<0.0001$) following radiation therapy, indicating that irradiation was effective in both cohorts. Importantly, no significant differences were observed in the number of apoptotic cells when comparing irradiated control to irradiated DFO-treated mice (FC=0.8, $p=0.131$), suggesting that DIDP does not interfere with the efficacy of radiation therapy. Additionally, bioluminescence assays demonstrated no significant differences in tumor size after radiation therapy between the control and DFO-treated groups (FC=0.8, $p=0.486$). These findings further confirm that DIDP does not influence negatively the therapeutic effects of radiotherapy in breast cancer cells.

Conclusion: This study highlights the importance of evaluating the in vivo effects of radioprotective agents on cancer treatment outcomes to ensure their oncological safety. Specifically, we address the gap in understanding the interaction between DIDP and radiation therapy. The presented findings indicate that topical DFO treatment poses minimal risk of interfering with radiation therapy, as shown by no significant difference in tumor growth and tumor cell apoptosis following radiation therapy. DIDP does not compromise the efficacy of radiation therapy, most likely due to its inability to penetrate deeper tissues. In conclusion, our study suggests that DIDP may be safely used as a radioprotective treatment in oncological settings.

Evidence-Based Perioperative Incisional Care in Plastic Surgery: A Narrative Review

Abstract Presenter: Daniel Rouhani

Abstract Co-Author(s): Steven Zeng, Kimberly Khoo MD, Mingxiao Ma, Sarah Bishop MD, Jeffrey Janis MD

Introduction: Perioperative incisional care is essential in plastic surgery for minimizing complications and optimizing outcomes, yet conflicting guidelines from major health organizations, such as the World Health Organization (WHO) [1], the Centers for Disease Control and Prevention (CDC) [2], and the Society for Healthcare Epidemiology of America (SHEA) [3], create variability in clinical practice. A survey of American Society of Plastic Surgeons (ASPS) members highlights this variability, revealing a lack of consensus on best practices incisional care techniques [4]. Further complicating

surgical protocols, the FDA's removal of bacitracin in 2020 due to nephrotoxicity concerns has altered the use of triple antibiotic solution, leading to a shift toward alternative irrigation strategies [5]. Given these ongoing changes and practice inconsistencies, an evidence-based approach to perioperative incisional care in plastic surgery is critical for improving patient safety and surgical outcomes.

Methods: A comprehensive literature search of PubMed, MEDLINE, and Embase (2000–2025) was performed using defined terms ("clean surgical wounds," "plastic surgery," "incisional care"). Randomized controlled trials, systematic reviews, and meta-analyses focusing on six key areas-antiseptic preparation, wound irrigation, suture materials, wound closure devices, dressings, and topical agents-were prioritized. Studies pertaining to non-English publications, contaminated wounds, chronic wounds, and animal models were excluded. References were further compared with guidelines from health organizations, including the NIH, WHO, CDC, and ASPS. A narrative review was chosen over a systematic or scoping review to provide a structured synthesis of diverse evidence, integrating various study designs, expert consensus, and clinical guidelines to better inform clinical decision-making in plastic surgery.

Results: Six evidence-based recommendations emerged. First, 4–5% alcohol-based CHG is preferred for preoperative antisepsis. Second, antiseptic solutions (e.g., CHG or PVP-I) are recommended for irrigation over normal saline, and routine antibiotic irrigation is discouraged to mitigate antimicrobial resistance. Third, standard sutures are generally favored over barbed or antimicrobial-coated sutures. Fourth, 2-octyl-cyanoacrylate adhesives pose a high risk of hypersensitivity reactions, while silk fibroin strips offer improved biocompatibility and paper tapes remain useful for low-tension incisions. Fifth, traditional dressings remain adequate for most clean wounds, while closed-incision negative pressure wound therapy (ciNPWT) and silver dressings may benefit chronic wounds. Sixth, plain petrolatum is a safe topical agent, as antibiotic ointments confer no additional benefit and increase antibiotic resistance risks.

Conclusion: This narrative review synthesizes current evidence to offer six actionable, perioperative recommendations tailored to Class 1 clean incisions in plastic surgery. By synthesizing current evidence, this review serves as a comprehensive resource to guide clinical decision-making and optimize surgical outcomes for plastic surgeons.

References:

[1] WHO. Global Guidelines for the Prevention of Surgical Site Infection. 2018. NCBI.

[2] Berríos-Torres SI, et al. CDC Guideline for SSI Prevention. JAMA Surg. 2017;152(8):784. doi:10.1001/jamasurg.2017.0904.

[3] Anderson DJ, et al. SSI Prevention in Acute Care: 2014 Update. Infect Control Hosp Epidemiol. 2014;35(6):605-627. doi:10.1086/676022.

[4] Epps MT, et al. Pocket Irrigation in Reconstructive Surgery: ASPS Survey. Ann Plast Surg. 2019;82(6S):S427-S432. doi:10.1097/SAP.0000000000001790.

[5] Oleru OO, et al. Bacitracin Ban & Infection Rates in Breast Reconstruction. Clin Breast Cancer. 2023;23(3):e103-e108. doi:10.1016/j.clbc.2022.12.019.

Inguinal Lymph Nodes Flap Transfer Promotes Lymphatic Channel Formation in the Rat Sciatic Nerve

Abstract Presenter: Daiki Kitano MD, Phd

Abstract Co-Author(s): Shayan Sarrami MD, Chanel Reid, Chiaki Komatsu MD, Kacey Marra PhD, Carolyn De La Cruz MD

Introduction: The potential role of the lymphatic system in peripheral nerve regeneration is explained by its ability to prevent edema, thereby reducing the risk of intraneural compartment syndrome and subsequent demyelination. Additionally, its anti-inflammatory properties and contribution to neovascularization help create a supportive environment for nerve regeneration. However, the presence and functional significance of the lymphatic system in peripheral nerves remain poorly understood.
Objectives: Our primary objective is to investigate the presence and characteristics of the lymphatic structures within the normal rat sciatic nerve. The secondary objective is to develop a lymphatic tissue transfer model and evaluate its ability to promote lymphatic channel formation within the nerve.

Methods: Immunofluorescence (IF) staining was performed on Wister Lewis rat sciatic nerve using podoplanin (PDPN), a specific marker for lymphatic endothelium, along with CD31, an endothelial marker for blood vessels that is also expressed in lymphatic vessels [1]. For lymphatic tissue transfer, rat inguinal lymph nodes (LN) were harvested with adipose tissues as a pedicled SIEA flap [2] and positioned around the transected and repaired sciatic nerve, ensuring close proximity of the LN to the neural repair site.

Eight weeks post-surgery, IF staining was performed on the nerve covered by the inguinal LN flap. The number of PDPN- and/or CD31-positive areas within a 500 um square region was counted by five independent volunteers who were not associated with this project. The averages were then compared among three groups: normal nerve (control), transected and repaired nerve (neurorrhaphy only), and transected and repaired nerve covered by the inguinal LN flap (LN flap coverage).

Results: IF staining of the normal rat sciatic nerve revealed that PDPN/CD31 double-positive areas adjacent to CD31 single-positive areas on the outer side of the nerve fibers, specifically within the fibrofatty tissue surrounding the epineurium. Counting by five independent volunteers demonstrated that the average number of PDPN/CD31 double-positive areas was significantly higher in the LN flap coverage group than in the control (45.6 vs. 2.6, $p = 0.0002$) and the neurorrhaphy-only groups (45.6 vs. 2.0, $p = 0.0002$).

Discussion: Our results confirm the presence of lymphatic vessels adjacent to blood vessels in the fibrofatty tissue of the normal rat sciatic nerve. Considering that lymphatic channels were nearly absent within the nerve fibers in the control and neurorrhaphy-only groups, the significant increase observed in the LN flap coverage group suggests that the transferred inguinal LN facilitated lymphatic channel formation, potentially supporting nerve regeneration.
Conclusion: The inguinal LN flap transfer significantly promotes lymphatic channel formation within sciatic nerve fibers. This suggests that the transferred LN contributes to lymphatic channel induction, potentially enhancing nerve regeneration and tissue repair following peripheral nerve injury.

References

[1] Breiteneder-Geleff S, et al. Angiosarcomas express mixed endothelial phenotypes of blood and lymphatic capillaries: podoplanin as a specific marker for lymphatic endothelium. Am J Pathol. 1999 Feb;154(2):385-94.
[2] Saffari TM, et al. The Superficial Inferior Epigastric Artery Fascia Flap in Rats. J Reconstr Microsurg Open 2020; 05(01): e7-e14.

Shaping the Future of Plastic Surgery: Training and Career Paths of Residency Program Directors

Abstract Presenter: Krishna Unadkat

Abstract Co-Author(s): Micah Goode, Pooja Dhupati, Camryn Payne BA, Olachi Oleru MD, Shelley Noland MD

Introduction: Diverse residency cohorts are essential to alleviating health disparities and improving patient outcomes. Residency program directors (PD) play a critical role in selecting and mentoring the next generation of plastic surgeons, influencing the academic, clinical, and demographic landscape of the field. Understanding the training background, fellowship pathways, and geographic distribution of current plastic surgery PDs can help guide future workforce development. The goal of this study is to analyze the educational and professional trajectories of plastic surgery PDs across accredited integrated plastic surgery residency programs in the United States.

Methods: PD demographic and training information was extracted from 89 accredited integrated plastic surgery residency programs identified through the American Society of Plastic Surgeons (ASPS) website. Medical school, residency program, and fellowship program data were collected through publicly available sources, including institutional faculty pages and LinkedIn.

Results: Among the 89 PDs analyzed, 77% were male and 22% were female. Regarding fellowship training, 24% did not pursue a fellowship beyond plastic surgery residency. Among those who completed fellowships, 24% specialized in hand surgery, 22% in craniofacial surgery, 12% in reconstructive/microsurgery, and 6% in breast/aesthetic surgery. Fellowships in burn, pediatric, critical care, cosmetic surgery, or microvascular surgery were pursued by 2% or fewer PDs. Additionally, 26% of PDs hold advanced degrees, with MBAs (30%) and PhDs (17%) being the most common. 19.1% of PDs completed training before 1990, 32.6% in the 2000s, 42.7% in the 2010s, and 1.1% in the 2020s. 4.5% of PD training years were not publicly available. Geographically, 21% of PDs remained in the state where they completed their plastic surgery residencies. 4.5% of PDs are directors of their medical school alma mater. 15.7% of program directors completed a general surgery residency where they serve as PDs and 22.5% of PDs completed their plastic surgery residency where they serve as PDs.

Conclusions: A majority of PDs are fellowship-trained, with the most common specializations being hand and craniofacial surgery. Female PDs remain underrepresented in program leadership. There is a prevalence of advanced degrees, particularly MBAs and PhDs, among PDs. Additionally, most PDs completed their training after 2000. These findings may inform future efforts to diversify leadership, optimize training pathways, and enhance the residency training experience.

Assessment of Patient Handouts on Burns created by Burn Surgeons compared to ChatGPT-4o

Abstract Presenter: Mauz Asghar

Abstract Co-Author(s): Huzaifah Khan, Xi Ming Zhu MD

Background: Educating patients may be difficult for physicians in plastic surgery due to limited time. Large language models (LLMs), such as ChatGPT, have illustrated promising results in patient education across various specialties. The present study's aim was to investigate the reliability and accuracy of ChatGPT-generated patient handouts regarding burns and compare these results to a published handout.

Methods: We asked ChatGPT-4o to generate and regenerate patient handouts for seven topics regarding burns: Burn injuries, burn surgery, skin care, nutrition, exercise, daily activities, and coping with your burns. These 14 handouts, along with a patient handout with similar topics published by Hamilton Health Sciences, were assessed. A panel of seven individuals involved in burn care, including 1 occupation therapist, 1 physiotherapist, 1 social worker, 3 board-certified burn surgeons, and 1 senior plastic surgery resident, assessed the handouts. The Quality of Generated Language Outputs for Patients (QGLOP) scale was used to assess handouts based on accuracy/comprehensiveness, bias, currency, and tone, where each domain was scored out of 4 for a total of 16. The Simple Measure of Gobbledygook (SMOG) score was calculated to assess handout readability. The threshold for statistical significance was set at $p<0.05$.

Results: The mean (SD) QGLOP scores for the ChatGPT-4o generated handouts and the published handout did not significantly differ (11.19 (2.12) vs. 11.03 (2.35); p=0.522). The mean (SD) QGLOP scores between ChatGPT-4o and the published handout were not significantly different for accuracy (2.79 (0.61) vs. 2.69 (0.71); p=0.646), bias (2.79 (0.61) vs. 2.83 (0.61); p=0.582), currency (2.76 (0.70) vs. 2.72 (0.66); p=0.575), or tone (2.85 (0.62) vs. 2.78 (0.76); p=0.379). ChatGPT-4o had lower scores on the topic of skin care (9.80 (1.44) vs. 11.20 (1.64); p=0.046), but higher scores on coping with burns (12.10 (3.11) vs. 11.00 (2.35); p=0.046). The two groups did not significantly differ for any other topic. The SMOG score for all ChatGPT-4o and published handouts were 11.23 and 9.82, respectively.

Conclusions: In this study, we found that ChatGPT was capable of producing patient education handouts on burns with scores comparable to those of a patient handout published by a burn unit, suggesting that plastic surgeons would have a similar level of satisfaction for both groups. The SMOG score of ChatGPT-generated handouts were higher than the published handout, suggesting that both groups require at least a high school level of education to comprehend the text, but the LLM may pose greater challenges for patients with lower levels of education. Our results replicate studies in ophthalmology. (1) Further studies are needed to investigate patient perspectives on handouts generated by LLMs, explore whether LLMs confer a productivity benefit when writing handouts for physicians in plastic surgery, and determine the most ethical and least harmful approach to utilizing LLMs effectively in medicine.

References:
1. Tao BK, Handzic A, Hua NJ, Vosoughi AR, Margolin EA, Micieli JA. Utility of ChatGPT for Automated Creation of Patient Education Handouts: An Application in Neuro-Ophthalmology. J Neuroophthalmol. 2024;44(1):119-124. doi:10.1097/WNO.0000000000002074

Predicting Breast Cancer-Related Lymphedema (BCRL) following Axillary Lymph Node Dissection (ALND): A Systematic Review of Current Prediction Models

Abstract Presenter: Yizhuo Shen

Abstract Co-Author(s): Stav Brown MD, Felix Klimitz MD, Alexzandra Mattia, Bohdan Pomahac MD, Siba Haykal MD, PhD, FRCSC, FACS

Background: Breast cancer-related lymphedema (BCRL) is a debilitating complication affecting one-third of patients undergoing axillary lymph node dissection (ALND). Since BCRL is incurable, early risk identification is essential for prevention. Prediction models have been developed to assess BCRL risk based on demographic, oncologic, and treatment-related factors. However, variability in study populations and model performance has led to inconsistent findings, limiting clinical applicability. This systematic review critically evaluates existing prediction models for BCRL, identifies key risk factors, and synthesizes current evidence to enhance risk stratification.

Methods: A systematic review was conducted on PubMed, Embase, and Web of Science to identify studies reporting prediction models for BCRL in patients undergoing ALND in accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines . Outcome data included the cumulative incidence of lymphedema, time from ALND to BCRL diagnosis, model performance (Area Under the Curve), predicted risk factors, odds ratio (OR), and hazard ratio (HR). Studies that include patients who have not had ALND, less than 12 months of follow-up (mean or median), lymphedema before ALND, or lacking incidence of BCRL were excluded. Only statistical models with more than two clinical risk factors were included.

Results: Of 1,827 screened articles, 38 met the inclusion criteria. Overall, 21,466 patients with a mean follow-up time of 50.8 months were included. 27.5% of patients developed BCRL on average 16.9 months following ALND. The predictors most commonly associated with BCRL were BMI (19 models), radiation (18 models), chemotherapy (17 models), number of axillary lymph nodes removed (11 models), age (7 models), surgical complications (7 models), level III ALND (5 models), race (3 models), and number of positive lymph nodes (3 models).

Higher BMI was significantly associated with an increased risk of BCRL, with BMI >30 showing ORs ranging from 2.36 to 5.27 ($p<0.05$). Non-white race was linked to a higher BCRL risk (OR 2.34–4.54, $p<0.05$). Radiation therapy (OR 1.93–15.34, HR 1.38–4.90; $p<0.05$) and chemotherapy (OR 1.39–5.30, HR 1.45–4.14, $p<0.05$) significantly increased the risk. The extent of ALND was a key predictor, with the removal of more than 10 nodes associated with ORs of 1.71–2.57 ($p<0.05$), while the removal of more than 20 nodes had an OR of 5.65 ($p<0.05$). Level III dissection also elevated risk (OR 2.02–7.89, HR 2.39; $p<0.05$). Surgical complications within 30 days, including seroma and infections, were significantly associated with BCRL development (OR 1.46–5.27, $p<0.05$).

Conclusion: This systematic review is the most comprehensive study that synthesizes existing prediction models for BCRL to date. Patients with higher BMI, racial minorities, and those who receive radiation, chemotherapy, or require more extensive ALNDs are more likely to develop BCRL following surgery. Despite variations in predictive models, these risk factors were consistently identified. However, differences in model validation highlight the need for a standardized, clinically applicable prediction tool to guide prevention strategies.

Size Matters: The Impact of Lipoaspirate Processing Technique on Adipocyte Cell Size in Autologous Fat Grafting

Abstract Presenter: Makayla Kochheiser

Abstract Co-Author(s): Sophia Arbuiso, Caleb Kutz, Lucy Wei, Nancy Qin, Anna Vaeth Linlan Qiao, Kristy Brown, David Otterburn MD

Purpose: Autologous fat grafting (AFG) is a minimally invasive procedure in which a patient's own adipose tissue is transferred to a targeted area for volume retention. While commonly used in breast reconstruction, there is significant variation in fat graft volume retention. Our previous study demonstrated differences in volume retention based on lipoaspirate processing techniques, with standard decantation resulting in worse volume retention compared to active wash and filtration (AWF) or low-pressure (LP) decantation. However, specific factors affecting volume retention remain unclear, with adipocyte cell diameter being a potential influence, as smaller cells may be less prone to shearing. This study aims to evaluate adipocyte cell size in AFG using these three techniques.

Methods: A prospective, blinded, randomized clinical trial was conducted at our institution from March 2021 to July 2023 (ClinicalTrials.gov identifier: NCT04891510). Patients were randomized to receive either standard decantation, AWF, or LP decantation. Approximately 10 cc of lipoaspirate was collected, fixed overnight in 10% formalin, dehydrated with 70% ethanol, and embedded in paraffin. Hematoxylin and eosin (H&E) slides were sectioned for microscopy, and cell diameter was measured using Zeiss software by two independent investigators. ANOVA was used to compare adipocyte diameter between groups, and linear regression assessed the correlation between adipocyte size and volume retention.

Results: Forty-four patients were enrolled in the trial: 17 (38.6%) patients received standard decantation, 16 (36.4%) received AWF, and 11 (25.0%) received LP decantation. Groups did not differ significantly in age or body mass index ($p > 0.05$). There was no significant difference in average cell size across standard decantation, AWF, and LP decantation (88.1 microns vs. 90.1 microns vs. 90.1 microns; $p > 0.05$). However, the distribution of cell sizes varied by technique. The AWF method resulted in a skew toward smaller cell sizes, while both standard and LP decantation techniques exhibited a normal distribution around the mean. Simple linear regression analysis revealed no significant correlation between adipocyte size and volume retention.

Conclusions: Our findings suggest that larger adipocyte cells may be filtered out with the AWF technique, indicating that lipoaspirate processing techniques may be used to select for different adipocyte cell sizes. Although our data did not show a correlation between adipocyte size and volume retention, further research is needed to explore the relationship between the adipocyte microenvironment and fat graft retention.

Advancing Competency Based Training in Plastic Surgery: Developing Entrustable Professional Activities

Abstract Presenter: Chelsea Yim

Abstract Co-Author(s): Esther Kim MD, Olle ten Cate

Introduction: In 2023, the American Board of Surgery introduced Entrustable Professional Activities (EPAs) as a framework to assess general surgery residents' competence, advancing the shift toward standardized competency-based education (CBE) (1). EPAs define discrete units of professional practice (tasks) that trainees can be entrusted to perform independently once they demonstrate sufficient competence. However, the broad clinical scope of plastic and reconstructive surgery (PRS) presents unique challenges in defining a comprehensive EPA framework. To address this gap, this study aims to develop and validate PRS-specific EPAs, creating a competency-based framework tailored to PRS residency training.

Methods: A modified multi-stage methodology, based on Dr. ten Cate's established approach to EPA development (2,3), was employed. A 12-member task force from the American Council of Educators in Plastic Surgery (ACEPS) was convened and received structured guidance from Dr. ten Cate. The task force followed a structured timeline that included literature review and educational videos, expert consultation, and consensus-driven prioritization of PRS-specific EPAs.

Results: Using the Nominal Group Technique (NGT) (4), the ACEPS Task Force systematically identified and prioritized PRS-specific EPAs. An initial long list of EPAs was generated, followed by iterative refinement through anonymous voting, merging, and categorization. Some EPAs were designated as sub-EPAs within broader core EPAs, while others were reclassified as skills, knowledge, and attitudes (KSA) necessary for entrustment rather than standalone EPAs.

A preliminary list of 17 core PRS EPAs has been developed, encompassing key domains such as oncological breast reconstruction, craniofacial trauma surgery, acute and traumatic hand, and aesthetic surgery of the face. For each core EPA, detailed activity descriptions including focus, and the scope of practice are currently being refined by the ACEPS Task Force.

Conclusion: The next phase of development will involve a modified Delphi consensus process consisting of two rounds of review by ACEPS members to refine and validate the EPAs. Additionally, entrustment level descriptions will be mapped to ACGME competencies and milestones.

This study represents a critical step in defining competency-based training in PRS. By employing a systematic approach, we have developed a preliminary EPA framework that reflects the complexity of PRS practice. Further efforts will focus on piloting these EPAs in a multicenter study, with the goal of establishing a validated competency-based training model for plastic surgery residency programs.

ACEPS Task Force
Chair: Esther Kim
EPA Expert Consultant: Olle ten Cate
Members: Keith Brandt, Kim Bjorklund, Amanda Gosman, Scott Lifchez, Vu Nguyen, Peter Taub, Don Mackay, Aaron Mason, Mike Neumeister, David Tang, David Ross

References:
1. American Board of Surgery. (2024, December 20). Entrustable Professional Activities (EPAs) | ABS. https://www.absurgery.org/get-certified/epas/
2. ten Cate, O., Nel, D., Hennus, M.P., Peters, S.., Romao G.S.- For which entrustable professional activities must medical students be prepared if unsupervised patient care without further training is an expectation? An international Global South study: BMJ Global Health 2024;9:e016090.
3. Ten Cate, O., & Taylor, D. R. (2020). The recommended description of an entrustable professional activity: AMEE Guide No. 140. Medical Teacher, 43(10), 1106–1114. https://doi.org/10.1080/0142159X.2020.1838465
4. Lee SH, ten Cate O, Gottlieb M, Horsley T, Shea B, Fournier K, Tran C, Chan T, Wood TJ, Humphrey-Murto S. The use of virtual nominal groups in research: an extended scoping review PLoS One 2024;19(6): e0302437.

Transforming Powder Dressing for Lower Extremity Wounds in Patients with Diabetes: A Multinational Case Series

Abstract Presenter: Bradley Melnick

Abstract Co-Author(s): Jeewon Chon MA, Anmar Abu-Romman, Rahim Laiwalla, Antoinette Nguyen, Rena Li, Robert Galiano MD

Purpose: Lower extremity wounds, particularly diabetic foot ulcers (DFUs), present a significant challenge due to impaired healing, high infection rates, and the risk of amputation. Advanced wound care strategies are needed to address the multifactorial nature of these wounds, particularly in resource-limited settings. Transforming Powder Dressing (TPD) offers a novel approach by creating a moisture-retentive, semi-occlusive environment that enhances granulation tissue formation, reduces exudation, and prolongs dressing intervals. This multinational case series evaluates the real-world efficacy of TPD in managing diabetic lower extremity wounds across diverse healthcare settings.

Methods: A retrospective, multicenter case series was conducted across four regions (Egypt, India, Palestinian Territories, and UAE) with seventeen patients between 2019 and 2020. DFU's classified as Wagner Grade 2 or 3 were included. TPD was applied to the wound bed and covered with a secondary dressing, with dressing changes performed every 5–7 days. Outcomes assessed included time to complete epithelialization, dressing change frequency, pain reduction, and complications. Statistical analyses compared healing times across wound classifications.

Results: The mean age of the cohort was 57.6 years (range: 37–68), with 76.5% (n=13) male patients. The majority of wounds (88.2%, n=15) were located on the feet, with 76.5% (n=13) classified as Wagner Grade 3. Mean wound duration before TPD application was 9.4 months (range: 1 week–18 years). The average time to full wound closure was 46 days (range: 19–116 days). Wagner Grade 2 ulcers healed faster (mean: 37 days) than Grade 3 ulcers (mean: 48 days). Dressing change intervals averaged 7 days, significantly reducing dressing frequency compared to standard wound care. Pain reduction was reported after the first application in most cases, and no cases required amputation during the study period. Complications were minimal, with only one case of minor blistering that resolved without intervention.

Conclusions: Transforming Powder Dressing (TPD) demonstrated significant promise as an advanced wound care modality for lower extremity wounds, offering faster healing times, reduced dressing changes, and improved patient comfort. Its ability to manage

Wagner Grade 3 ulcers highlights its potential in treating complex wounds, particularly in diabetic populations. The findings suggest that TPD could provide a cost-effective alternative to standard dressings while minimizing complications. Further prospective, controlled studies are warranted to validate these results and assess the long-term impact of TPD in wound care protocols.

Impact of Muscle Fiber Composition on RPNI Performance in a Rodent Model

Abstract Presenter: Aref Rastegar

Abstract Co-Author(s): Julien Levy, Yucheng Tian, Melanie Wang MD, Alissa Wierenga, Paul Cederna MD, Stephen Kemp PhD

Introduction: Amputation can significantly decrease quality of life, highlighting the need for functional and intuitive neuroprosthetics (1). While there have been major improvements in the engineering front in developing advanced neuroprosthetics, lack of a biologic interface has limited their application. Regenerative Peripheral Nerve Interface (RPNI) has demonstrated the ability to amplify small efferent action potentials from peripheral nerves, allowing for direct recording from reinnervated muscles in the form of electromyography (EMG) signals for neuroprosthetic control (2). RPNIs are created by securing a transected nerve into a denervated muscle graft, allowing reinnervation of the muscle graft (3). Currently, muscle graft selection is based on the availability of donor muscle regardless of its fiber type composition. To date, no studies have looked into the effect of muscle fiber type composition on the amplitude of muscle signals generated by RPNI constructs. This study aims to investigate how muscle grafts composed of different fiber types impact compound muscle action potentials (CMAPs) elicited from RPNIs in a rodent model.

Methods: Nine 6-weeks old male Fischer rats were assigned to 3 different groups based on the muscle graft used to create the RPNI construct: soleus (composed of 80% type I fibers), peroneus longus (PL) (composed of 42% type IIx fibers), and extensor digitorum longus (EDL) (composed of 64% type IIb fibers). Muscles were harvested from the ipsilateral side of each rat, and common peroneal (CP) nerve was isolated, transected, and secured into the center of the muscle graft. In total, 18 RPNIs were created bilaterally, with six RPNIs per group. After a maturation period of 3 months, the constructs were isolated, CMAP measurements were recorded, and RPNIs were harvested for histological analysis.

Results: Preliminary results showed excellent revascularization in all groups, as evidenced by adequate turgor. Muscle contractions were observed in all constructs, indicating functional reinnervation. Varying degrees of muscle graft atrophy were noted: soleus at 28%, PL at 22%, and EDL at 12%. Post-maturation construct weights were: soleus 79 mg, PL 85 mg, and EDL 83 mg. Soleus, PL, and EDL produced a maximum CMAP amplitude of 6.5 mV, 7.1 mV, and 9.9 mV, with a signal-to-noise ratio of 32.2 dB, 30.6 dB, and 38.3 dB, respectively. Histological analysis revealed normal muscle fiber morphology across all groups.
Conclusion: We demonstrated that RPNIs are able to generate reliable and significant muscle signals in a rodent model in situ with high signal-to-noise ratio regardless of the initial muscle fiber type composition.

References:
1. Yamamoto M, Chung KC, Sterbenz J, et al. Cross-sectional international multicenter study on quality of life and reasons for abandonment of upper limb prostheses. Plastic and Reconstructive Surgery - Global Open. 2019;7(5). doi:10.1097/gox.0000000000002205
2. Vu PP, Irwin ZT, Bullard AJ, et al. Closed-loop continuous hand control via chronic recording of regenerative peripheral nerve interfaces. IEEE Transactions on Neural Systems and Rehabilitation Engineering. 2018;26(2):515-526. doi:10.1109/tnsre.2017.2772961
3. Vu PP, Vaskov AK, Irwin ZT, et al. A regenerative peripheral nerve interface allows real-time control of an artificial hand in upper limb amputees. Science Translational Medicine. 2020;12(533). doi:10.1126/scitranslmed.aay2857

Developing an Innovative Scalpel that Provides Improved Surgical Views and Reduced Beveling

Abstract Presenter: Connor Young

Abstract Co-Author: Guilherme Barreiro MD

Background: The surgical scalpel has been used for thousands of years in one form or another. In the late 1800s, Schott patented the idea of attaching a disposable blade to the scalpel, allowing for sharp blades to be used in sterile fields (1). Since this time, little innovation has occurred in the field of scalpels. The current scalpel is linear, unable to show a view of what is being cut. This can cause inexperienced surgeons to tilt their blades-also known as beveling-to gain a view of what is being cut. This causes

inaccurate and beveled incisions which can lead to poor incision healing and patient dissatisfaction. In this project, we sought to improve these current flaws with a new scalpel design.

Methods: To improve the scalpel, we began to think about ways to create a scalpel that allowed improved visualization while creating a surgical incision. The major goal was to allow a view of the upcoming line where we would be cutting. We began by sketching out various designs to find what would allow visualization. We proceeded to model the designs using 3D modeling software. We continued by 3D printed our designs and receiving feedback on each iteration. The goal from each iteration was the improve the field of view of the scalpel and the comfort of the scalpel.

Results: We had a total of 12 different designs that we considered in this process. Our final design (figure 1) includes a tail that splits apart into two handles, connected by a bridge style finger grip, before joining into the tip where the blade attaches. This design allows for full visualization of the upcoming cut and allows the surgeon to easily follow the pre-drawn incision line. This design also reduces beveling because there is no longer a need to tilt the scalpel to see the line. We also were able to add grips to the scalpel on the sides and top to improve comfort and ease of use.

Conclusions: Through this project, we have created a new scalpel which we believe may allow surgeons to create more accurate incisions, cut at a consistent depth, reduce beveling, increase efficiency, and improve comfort. We have begun comparing the new scalpel to current scalpels with agar gels that mimic human skin. We are comparing cuts made on the agar gel using ultrasound and optical coherence tomography to allow us to see if there is a benefit to our new scalpel and in which use cases it would function best.

1. Elson NC, Yoder LM, Dick KD, Meister KM, Wexelman BA. Mathilde Schott, A Woman's Influence in the Revolution of the Scalpel in the 1890s. Am Surg. 2023 Nov;89(11):5044-5046. doi: 10.1177/00031348221142574. Epub 2022 Nov 25. PMID: 36426756.

PPAR-γ modulates aging associated mitophagy dysfunctions in dermal adipose tissue

Abstract Presenter: junxian wen

Abstract Co-Author(s): Zhijin Li, Nanze Yu MD, Xiao Jun Wang

Background: In various skin diseases, adipocyte progenitor cells within the dermis and dermal fat layer are disrupted by upstream signaling interference, resulting in impaired adipogenesis. This dysfunction in dermal adipose tissue(dWAT) leads to compromised anti-infective and metabolic regulatory capabilities. DWAT dysfunction has been observed in the aging skin microenvironment. However, whether the loss of dWAT directly contributes to the deterioration of the dermal microenvironment remains unclear. The objective of this study was to investigate the mechanistic role of PPAR-γ loss in dermal adipose dysfunction and its impact on skin aging and fibrosis.

Methods: In this study, we established a murine model of dermal adipose dysfunction using the PPAR-γ inhibitor GW9662 and analyzed the dermal microenvironment to determine the regulatory role of dermal adipose tissue. In vitro, we induced cellular senescence in the murine preadipocyte cell line 3T3-L1 using hydrogen peroxide (H_2O_2) and assessed adipogenic capacity and extracellular matrix (ECM) remodeling. Furthermore, we co-cultured 3T3-L1 cells with murine fibroblasts to evaluate the paracrine effects of adipocytes on fibroblast proliferation, migration, and collagen synthesis. To determine whether PPAR-γ is a key regulator of mitochondrial quality control in adipocytes, we monitored mitochondrial damage, autophagy, and mitophagy in 3T3 cells with PPAR-γ overexpression (OE) and knockdown (KD).

Results: Mice with dermal adipose dysfunction exhibited exacerbated dermal fibrosis and aging-related changes. Senescent 3T3 cells demonstrated impaired adipogenesis and reduced paracrine effects on fibroblasts. PPAR-γ downregulation was accompanied by increased TGF-β1 expression, enhanced fibrosis, and upregulated α-SMA, a marker of myofibroblast differentiation, indicating adipocyte-to-myofibroblast transition (AMT) in dermal adipose tissue. Proteomic analysis of dermal adipose tissue identified an enrichment of mitochondrial-associated proteins. Senescent 3T3 cells also exhibited mitochondrial damage and disrupted mitophagy. In PPAR-γ KD 3T3 cells, mitochondrial swelling, fragmentation, impaired mitochondrial respiration, and decreased PINK1-PARKIN-mediated mitophagy were observed.

Conclusion: Our study demonstrates that dermal adipose dysfunction is present in the aging skin microenvironment and serves as a pathogenic factor contributing to skin aging and fibrosis. PPAR-γ regulates adipocyte function through mitophagy modulation, thereby influencing the dermal microenvironment.

Trends and Gender Differences in Publications by Matched Plastic Surgery Applicants from 2019 to 2024

Abstract Presenter: Anjali Om MD

Abstract Co-Author(s): Ishan Patel, Dev Dwivedi, Amulya Addepalli, Aditya Agarwal, Vishnu Iyer, Dhruv Viswanathan, Stephanie Bray MD, MS

Background: Publications are a key element of a successful plastic surgery residency application. Trends in the number of publications across years and the subspecialties within plastic surgery that successful applicants publish in is not well studied.

Methods: A list of all integrated plastic surgery programs was obtained from the American Society of Plastic Surgery website and current residents were identified using corresponding residency program webpages. Manuscripts published prior to residency were queried using PubMed and ResearchGate and filtered into the following categories: craniofacial, aesthetic, breast, gender affirming, microsurgery, hand, basic science, non-plastic surgery, and nonsurgical. The number of first author publications was noted.

Results: A total of 914 residents from 87 programs were included. From 2019 to 2024, the overall number of publications (12.4 vs. 7.00), first author papers (3.80 vs 1.89), and percentage of open access publications (16.1% vs. 28.9%) significantly increased ($p<0.05$). Male applicants had more total publications (11.9 vs 8.51) and first author publications (3.79 vs 2.66) than female applicants ($p<0.05$). Applicants from "Ivy League" medical schools also had significantly more total publications than their counterparts (18.0 vs 9.31, $p<0.05$). On average, applicants had the most non-plastic surgery (2.30), nonsurgical (1.73), and craniofacial (1.49) papers published and had the least microsurgery (0.509), hand (0.324), and gender affirming (0.348) papers. From 2019 to 2024, the number of aesthetic (1.16 vs 0.272), breast (1.42 vs. 0.628), hand (0.824 vs. 0.193), microsurgery (0.824 vs 0.235), gender affirming (0.503 vs 0.125), and non-plastic surgery (2.77 vs. 1.22) papers significantly increased ($p<0.05$) (Figure 2).

Conclusion: The number of total and first author publications from successful plastic surgery applicants have significantly increased over the past six years, with applicants increasingly publishing aesthetic, breast, hand, microsurgery, gender affirming, and non-plastic surgery publications. Male applicants overall publish more than female applicants, and applicants from Ivy League medical schools publish more than their counterparts. The number of open access publications has also significantly increased.

Cutting Through the Clot: Rethinking Venous Thromboembolism Prophylaxis in Plastic Surgery with Aspirin, Direct Oral Anticoagulants, and Low Molecular Weight Heparin

Abstract Presenter: Jose Foppiani MD

Abstract Co-Author(s): Shannon Zhou, Molly Vance, Zeling Yu, Daniah Alnafisee MD, Thomas Suszynski MD, Umar Choudry MD, Dr. Samuel Lin MD

Background: Venous thromboembolism (VTE) remains a critical concern in plastic and reconstructive surgery due to factors such as prolonged operative duration, perioperative immobility, and procedure-specific risks (1). To mitigate this, prophylactic anticoagulation, traditionally with low-molecular-weight heparin (LMWH), has been widely adopted. However, following trends in other specialties, the use of direct oral anticoagulants (DOACs) and aspirin (ASA) is gaining traction as viable alternatives (2,3). This scoping review aims to summarize current practices surrounding the use of these medications in VTE prophylaxis for plastic surgery patients. There is limited consensus among plastic surgeons regarding standardized VTE prophylaxis protocols, which is why this scoping review specifically examines various approaches to thromboprophylaxis across various plastic surgery procedures.

Methods: A systematic search of Embase, PubMed, and the Cochrane register of clinical trials was conducted following PRISMA guidelines. Studies focusing on prophylaxis in plastic surgery were included, specifically those evaluating VTE rates, complications, or clinical outcomes with ASA, DOACs, or LMWH. Non-plastic surgery specialties or studies combining multiple anticoagulants without separate analysis were excluded. Data extraction included drug dosage and duration, follow-up, VTE rates, bleeding or hematoma, reoperation, and other complications. Descriptive statistics and qualitative analysis were performed.

Results: Of 884 studies screened, 241 full texts were analyzed, and 7 met inclusion criteria. In total, 3,475 patients were included (35% male, 65% female). Among the included studies, two examined the use of ASA (n=402), four focused on DOACs (n=2056), and four evaluated LMWH (n=802). While interventions varied, the most common regimens were ASA 325mg for 5 days postoperatively and DOAC 10mg for 10 days, while LMWH doses varied widely. VTE rate was similar across ASA (0.7%), DOAC

(0.2%), LMWH (0.6%). The incidence of hematoma was lowest in the DOAC group (0.8%) when compared to ASA (4%), and LMWH (2%). Reoperation within 30 days was highest in the ASA group (6%), while both DOAC (1%) and LMWH (1%) had the lowest rates. Other complications (e.g. infection, seroma) were lowest in the DOAC group (5%) when compared to ASA (34%), and LMWH (13%).

Conclusion: This review underscores the existing evidence on VTE prophylaxis in plastic surgery, highlighting differences in efficacy and safety among ASA, DOACs, and LMWH. While VTE rates were comparable across all groups, the ASA group exhibited the highest risk of hematoma and reoperation. These findings emphasize the need to balance thromboprophylaxis efficacy with bleeding risk, particularly in high-risk surgical populations. The absence of standardized guidelines underscores the need for large-scale, procedure-specific randomized controlled trials to optimize prophylaxis strategies, minimize variability in care, and reduce complications associated with VTE management.

References

1. Gould, M. K., Garcia, D. A., Wren, S. M., Karanicolas, P. J., Arcelus, J. I., Heit, J. A., & Samama, C. M. (2012). Prevention of VTE in nonorthopedic surgical patients: antithrombotic therapy and prevention of thrombosis: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest, 141(2), e227S-e277S.
2. Morales Jr, R., Ruff, E., Patronella, C., Mentz III, H., Newall, G., Hustak, K. L., ... & Bush, A. (2016). Safety and efficacy of novel oral anticoagulants vs low molecular weight heparin for thromboprophylaxis in large-volume liposuction and body contouring procedures. Aesthetic Surgery Journal, 36(4), 440-449.
3. Fan, K. L., Black, C. K., Abbate, O., Lu, K., Camden, R. C., & Evans, K. K. (2019). Venous thromboembolism in plastic surgery: the current state of evidence in risk assessment and chemoprophylactic options. Journal of Plastic Surgery and Hand Surgery, 53(6), 370-380.

Modulation of Digit Regeneration by Gene Therapy based on Conserved Epidermal Factors

Abstract Presenter: Erin Brush

Abstract Co-Author(s): Katja Koll, Madeleine Landau, Kendall Reitz, Rochelle Bitolas, David Salven, David Brown MD, PhD

The loss of limbs presents a significant challenge in clinical practice. Gene therapy offers promising approaches for regenerative treatments, yet established methods for precise control of molecular signaling pathways and the development of suitable vectors are still lacking (1). The mouse fingertip regeneration model is widely recognized for studying regeneration following amputation injuries in mammals, as adult mice can successfully restore the distal phalanx after transverse amputations involving the nail matrix (2). In all species capable of appendage regeneration, the initial formation of a specialized regeneration epidermis (RE) over the amputation site is essential for restoring lost structures (3). The RE functions as a key signaling unit that directs blastema formation and subsequent appendage regrowth (4). However, the mammalian RE remains relatively unexplored, particularly in comparison to highly regenerative species.

To promote tissue regeneration after limb loss, we gained insights from organisms with a high endogenous capacity for tissue regrowth. First, we analyzed the regeneration epidermis (RE) of the zebrafish caudal fin using single-cell RNA sequencing, identifying the Sp family as key epidermal transcription factors, acting upstream of Fgf8 signaling. Subsequently, we observed a significant impairment in bony fingertip regeneration in mice with a basal epidermis-specific knockout of Sp6 and Sp8, as confirmed by computed tomography (CT) scans at 28 days post-amputation (dpa), compared to wild-type mice, as shown in Image 1.

Further, we utilized spatial transcriptomics (BGI StereoSeq) to investigate the spatial organization of the mammalian RE. Mapping distinct zones within the mouse digit RE enables the identification of targeted gene therapy interventions. By using adeno-associated viral (AAV) vectors with fluorescent reporters, we screened multiple serotypes and enhancers for efficient and localized transduction of the mouse digit tip. Our experiments demonstrated restricted viral gene expression to the amputated digit and liver, which persisted over an approximate 10-day period.
To enhance mammalian digit regeneration, we engineered AAV constructs to overexpress Fgf8 in the mouse digit RE. This AAV-based gene therapy successfully improved fingertip regeneration in Sp-knockout mice and accelerated fingertip regeneration in wild-type mice. Further research is ongoing to elucidate transcriptional changes associated with Sp family knockout and to assess the potential of AAV-based therapies in rescuing digit regeneration phenotypes.

Our findings indicate that key components of the RE are conserved across evolutionarily divergent species and that the Sp-Fgf pathway is a fundamental modulator of appendage regeneration. This research deepens our understanding of

regenerative mechanisms and introduces a gene therapy-based strategy for enhancing mammalian digit regeneration. By applying these insights, we can advance translational applications in innovative therapeutic strategies for limb loss and tissue reconstruction.

References:
1. Kohn DB, Chen YY, Spencer MJ. Successes and challenges in clinical gene therapy. Gene Therapy. 2023/11/01 2023;30(10):738-746. doi:10.1038/s41434-023-00390-5
2. Goldman JA, Poss KD. Gene regulatory programmes of tissue regeneration. Nat Rev Genet. Sep 2020;21(9):511-525. doi:10.1038/s41576-020-0239-7
3. Aztekin C. Tissues and Cell Types of Appendage Regeneration: A Detailed Look at the Wound Epidermis and Its Specialized Forms. Front Physiol. 2021;12:771040. doi:10.3389/fphys.2021.771040
4. Tassava RA, Loyd RM. Injury requirement for initiation of regeneration of newt limbs which have whole skin grafts. Nature. Jul 7 1977;268(5615):49-50. doi:10.1038/268049a0

Clinical Documentation Quality in PRS: A Comparative Analysis of Medical Student Notes and LLM-Generated Documentation

Abstract Presenter: Micaela Tobin

Abstract Co-Author(s): Mohammed Yamin, Tricia Mae Raquepo, Sophia Ahn, Bradley Colarusso, Ryan Cauley MD MPH, Anirudh Kulkarni

Purpose: Medical documentation is particularly important in plastic and reconstructive surgery (PRS), where detailed operative planning, complex wound assessments, and precise anatomical descriptions directly impact patient outcomes. Despite its importance, documentation remains challenging for trainees. As artificial intelligence tools such as large language models (LLMs) emerge, their potential application in plastic surgery warrants exploration. We evaluated the role of ChatGPT in improving patient summaries and mitigating medical student knowledge gaps through a quantitative evaluation of documentation quality in common PRS clinical scenarios.

Methods: A prospective, blinded assessment of clinical documentation was conducted across three authorship modalities: medical student-generated summaries, AI-generated summaries prompted by medical student notes, and AI summaries transcribed from the same clinical encounters. Standardized patients were assigned

three common plastic surgery presentations: burn management, flexor tendon repair, and zygomatic arch fracture. Documentation quality was evaluated using the validated Physician Documentation Quality Instrument (PDQI-9) by two evaluators blinded to note authorship. ChatGPT o3-mini was used for all AI assessments. Summary statistics were generated, and continuous variables were analyzed using t-tests. Significance was set at $p<0.05$.

Results: Ten medical students who had already completed a PRS third-year rotation and planned to apply to PRS residency programs, participated in all three patient encounters. While all documentation methods produced clinically acceptable notes, medical student documentation (n=30) demonstrated significantly lower overall quality scores (40.9±2.4) compared to AI-prompted notes (43.0±1.6) and AI-transcribed notes (44.6±0.8; $p<0.001$). The most substantial disparities were observed in thoroughness (medical students: 3.9±0.7 vs. AI-transcription: 4.9±0.2, $p<0.001$), organization (4.1±0.6 vs. 5.0±0.1, $p<0.001$), and usefulness (4.3±0.6 vs. 4.9±0.2, $p<0.001$). Medical students demonstrated relative strengths in being succinct (4.8±0.4) and internally consistent (4.9±0.3). Diagnostic accuracy was significantly higher in AI-generated documentation (97%) compared to medical student notes (83%, $p<0.001$). Student notes were consistently shorter (137±46 words) than AI-prompted (186±27 words) and AI-transcribed (179±25 words) documentation ($p<0.001$). After completing the encounter, 5 students (50%) believed that ChatGPT better summarized the encounter, and only 2 students (20%) thought that they had created a better summary statement.

Conclusions: AI has significant potential as a complementary tool in PRS documentation, particularly when paired with strong history-taking skills. The findings that ChatGPT was found to be superior to medical students in organization, thoroughness, usefulness, and comprehensibility validate previous studies that show ChatGPT's ability to summarize medical histories based on transcriptions. Concurrently, concise documentation is important in this surgical field, and AI tends to dilute clinical information with excessive words. Medical education should, therefore, focus on teaching students to work effectively with these tools and consider using ChatGPT as a comparison group to assess longitudinal medical student improvement.

The Future of Healthcare: Leveraging Machine Learning to Establish a Point-of-Care Tool

Abstract Presenter: Tobi Somorin

Abstract Co-Author(s): Wenzheng Tao, Janina Kueper MD, Nicolas Kass, Angel Dixon, Nawazish Khan, Krithika Iyer, Jake Wagoner, Ashley Rogers MD, Ross Whitaker, Shireen Elhabian, Jesse Goldstein MD

Introduction: Objective assessment tools are essential for accurate diagnosis, proper management, research collaboration, and patient education. Many medical conditions lack such objectivity, resulting in opinion-based care and inconsistent management. This study describes how we developed a point-of-care (POC) tool using machine learning to objectively quantify craniosynostosis severity for clinical use.

Methods: Our POC tool development involved two components: (1) a machine learning processing pipeline and (2) an accessible web platform. The pipeline (Figure 1) began with an internet-based survey administered to expert craniofacial providers who evaluated the severity of metopic and sagittal craniosynostosis cases alongside normal controls. These ratings validated a principal-component-analysis ML model that generates metopic severity scores (MSS) and sagittal severity scores (SSS). We also developed an unsupervised machine learning model that produces cranial morphology deviation (CMD) scores to quantify skull variation from normal parameters. The web platform was developed using frontend and backend frameworks to ensure accessibility for clinicians. The system was programmed to process Digital Imaging and Communications in Medicine (DICOM) files, the most common format for computed tomography scans. When providers upload a patient's CT image, without including any protected health information, they receive a quantitative severity score in less than 1 hour.

Results: Since its clinical deployment in 2020, our diagnostic platform has facilitated the analysis of over 440 patient radiological examinations. The system has contributed to 150+ research presentations and generated more than 10 peer-reviewed publications. Currently, the platform maintains an active user base of 189 healthcare professionals and clinical researchers.

Conclusions: Our utilization metrics demonstrate substantial adoption and integration into existing clinical workflows, suggesting the potential for broader implementation. Clinicians can now leverage machine learning to objectively assess craniosynostosis severity at the point of care through our tool. This has significantly advanced craniosynostosis research, fostered global collaborations, and most importantly helped to inform enhance health literacy and guide patient care. We believe this methodology can be widely applied to other medical conditions that currently lack objective assessment tools.

Collagen is a Promising Substrate for Engineering Clinically Relevant Vascularized Tissue Flaps Using “Reset” Vascular Endothelial Cells

Background: Autologous tissue transfer is commonly used by reconstructive surgeons for defect restoration. However, a common complication of this is skin necrosis due to insufficient re-vascularization and perfusion. Engineering vascularized tissue flaps might limit these complications by promoting revascularization and perfusion while sparing donor sites. Past research in our lab has shown that reset vascular endothelial cells (R-VECs) (human umbilical vein endothelial cells transduced to express ETV2, an embryonic transcription factor that regulates early angiogenesis and is normally not expressed after 20 weeks in gestation) can self-assemble into microvascular networks in microfluidic chip systems using 3 mg/mL collagen as a biocompatible extracellular matrix. This study aims to demonstrate that R-VECs can form microvascular networks in collagen extracellular matrices of various concentrations in both microfluidic systems and a 3 cm2 collagen "flap" stimulated by shear stress.

Methods: For the microfluidic system, 300,000 R-VECs were suspended in 30 µl of extracellular matrix composed of 3 mg/ml, 4 mg/ml, 5 mg/ml, or 6 mg/ml collagen isolated from rat tail tendons. Suspensions were plated in a microfluidic chip via an inlet well, which flowed across a channel to an outlet well. The chips were incubated until the matrix polymerized and 1 cc cylinders were attached to each well and filled with media at the inlet side. The microfluidic chip systems were incubated at an angle to encourage gravitational media flow to exert shear stress on the R-VECs. For human-scale flaps, 10 million R-VECs were suspended in 2 mL of 8 mg/ml collagen (same cell to collagen proportions as the microfluidic system) and poured into a mold creating 2 empty channels representing an artery and vein within the flap. The construct is allowed to polymerize to a solid and then perfused anterograde through the artery channel and retrograde through the vein channel with media at 1 dyne using a peristaltic pump to apply shear stress. All constructs were imaged using light or fluorescent microscopy after 24 hours for the microfluidic system and 4 days for the "flap" to assess microvascular network formation.

Results: Microvascular networks formed after 24 hours in 3, 4, and 5 mg/mL groups, suggesting that R-VECs suspending in collagen up to 5 mg/ml are capable of forming microvascular networks in a microfluidic system. These networks appeared to have similar morphology between groups. 6 mg/ml collagen-R-VEC suspension would not

flow through the microfluidic system due to high viscosity. After 4 days of perfusion, the R-VECs within the 8 mg/ml collagen "flap" showed morphologic and behavioral changes characteristic of early microvascular network formation but required more time for the network to reach maturity.

Conclusions: This study demonstrates the formation of microvascular structures by RVECs within extracellular matrices of increasing collagen concentrations up to 5 mg/ml in a microfluidic system and early microvascular network formation in 8 mg/ml collagen in a 3 cm2 "flap". Further optimization of this technology holds promise for developing scalable and hierarchical vascular networks for engineering human scale tissue flaps for surgical anastomosis.

The Research Quality Index (RQI): A New Method to Analyze Plastic Surgery Residency Applications

Abstract Presenter: William Bohler

Abstract Co-Author(s): Zachary Koenig MD, James Burmeister, Ethan Dimock, Ava Harvey, Kongkrit Chaiyasate MD

Purpose: In March 2024, the first class of integrated plastic surgery (IPS) applicants matched without numeric Step 1 scores. In a recent survey of IPS program directors (PD), 68.1% agreed that it was more difficult to differentiate candidates without these numeric scores (1). This same study showed an applicant's scholarly activity was consistently ranked as a top 3 most important metric to evaluate applicants (1). As expected, the research production of successfully matched applicants this past year has risen significantly (2). Concurrently, there are concerns regarding the incentives for medical students to avoid time-consuming, high-quality research in favor of producing high quantities of publications. These efforts have been termed "research pollution" and are seen as a way to game the application system (3). These concerns underscore a need to develop an objective metric in which PDs can account for both the quantity and quality of an applicant's scholarly work. Herein, we set forth to design a novel method to evaluate the publications of applicants while testing this new metric on the three most recently matched IPS residency classes.

Methods & Materials: First, we developed a new metric to analyze applicant publications that we call the "Research Quality Index" (RQI). During development, there

were three factors we felt necessary to balance: publication quantity, quality, and student involvement in project. As such, we created the following equation to determine an applicant's RQI: RQI = (Total Publications X 2) + 1st Author Publications + (2nd Author Publications X 0.5) + Average Impact Factor + Weighted Relative Citation Ratio (RCR). Weighted RCR, an aggregate measure used to assess the influence of a scientific article, was collected through the NIH's iCite webpage (4).

To give PDs considering the use of this metric a relative idea as to the average RQI of an applicant, we collected the necessary data for the last three IPS residency classes and then conducted a one-way ANOVA to compare the mean RQI of each class ($p=0.05$).

Results: Pertinent data on over 4,000 articles authored by 503 applicants was collected. RQI's for each applicant were subsequently calculated. A yearly increase in average RQI was observed, with the most recently matched class recording an average RQI of 31.4. One-way ANOVA testing resulted in a p-value of 0.037 which revealed a significant difference in the mean RQIs. Of note, the average total number of publications across each class remained relatively unchanged (~7) indicating the rise in RQI was due to increases in factors related to authorship involvement and article quality.

Conclusion: This study demonstrates the Step 1 score change has not necessarily led to the adoption of a high-quantity, low-quality publication strategy for successful IPS applicants. Instead, the quality of and involvement in publications has increased, indicating successfully matched applicants are still participating in largely high-quality research. Further given the dynamic nature of the RQI, programs and even other specialties, can adjust the variables contained within this formula to best suite the priorities of their program.

References:

1. Boyd LR, Lin LO, Janis JE. Matching Into Integrated Plastic Surgery: The Impact of USMLE Step 1 Transition to Pass/Fail: Did the 2019 Predictions Come True in 2024?. Plast Reconstr Surg Glob Open. 2025;13(1):e6417. Published 2025 Jan 16. doi:10.1097/GOX.0000000000006417

2. Charting OutcomesTM: Characteristics of U.S. MD Seniors Who Matched to Their Preferred Specialty: 2024 Main Residency Match®. NRMP. August 20, 2024. Accessed September 22, 2024. https://www.nrmp.org/match-data/2024/08/charting-outcomes-

characteristics-of-u-s-md-seniors-who-matched-to-their-preferred-specialty-2024-main-residency-match/

3. Elliott B, Carmody JB. Publish or Perish: The Research Arms Race in Residency Selection. J Grad Med Educ. 2023;15(5):524-527. doi:10.4300/JGME-D-23-00262.1

4. iCite | New Analysis | NIH Office of Portfolio Analysis. Accessed February 25, 2025. https://icite.od.nih.gov/analysis

A Novel Microsurgery-Specific Artificial Intelligence Large Language Model: MicrosurgeryLlama2

Abstract Presenter: Berk Ozmen MD

Abstract Co-Author: Graham Schwarz MD

Background: Large language models (LLMs) like ChatGPT have demonstrated remarkable capabilities in processing vast datasets and generating coherent text. However, their application in specialized medical fields remains limited due to a lack of domain-specific knowledge. Aim of this study is to develop a novel domain-specific LLM for microsurgery, addressing the need for AI-driven tools in surgical education and clinical decision support.

Methods: To develop a domain-specific LLM for microsurgery, we curated a corpus of 9,086 microsurgery research abstracts from PubMed, spanning from 2010 to 2024. The open-source Llama-2-13b model served as our foundation. We first trained the model on the curated research abstracts dataset, then fine-tuned it using PyTorch and HuggingFace frameworks. We used Parameter-Efficient Fine-Tuning (PEFT) with Low-Rank Adaptation (LoRA) to enhance model adaptability and reduce computational overhead.

Results: The resulting model, named MicrosurgeryLlama2 demonstrated superior performance compared to the base Llama-2 model across multiple metrics. We observed improvements in BLEU (0.0371 vs. 0.0209), METEOR (0.2249 vs. 0.1168), ROUGE-1 (0.2459 vs. 0.2280), and ROUGE-L (0.1806 vs. 0.1740) scores. These enhancements indicate an improved capability in generating domain-specific, coherent text relevant to microsurgery.

Conclusion: This study introduces MicrosurgeryLlama2 which represents a significant advancement in applying AI to microsurgery education and practice. By leveraging a specialized corpus and advanced fine-tuning techniques, our model outperforms the native LLM, Llama2 in generating relevant, accurate content for the field. This innovation paves the way for AI-assisted clinical decision support and enhanced research capabilities in microsurgery.

Impact of Research Publications on Match Success in the Post-Step 1 Pass/Fail Era: A Comparative Analysis of 2022 and 2024 NRMP Data

Abstract Presenter: Robert Sampson MD, MBA

Abstract Co-Author(s): Kevin Hazelton, Aleksandra Krajewski MD

Background: USMLE Step 1 transitioned to pass/fail scoring in January 2022, eliminating a critical metric in residency selection. This study analyzes how research publications impact match success by comparing plastic surgery match data before and after this transition, focusing on the interplay with Step 2 CK scores. The 2024 match cycle represents the first cohort predominantly experiencing pass/fail Step 1 throughout their application.

Methods: Data from NRMP's Charting Outcomes™ report for 2022 (n=158) and 2024 (n=152) match cycles was analyzed for US MD seniors applying to integrated plastic surgery (1). We stratified by Step 2 CK scores and publication counts, then consolidated into broader categories (0-15 vs. ≥16 publications) for statistical analysis using Fisher's exact test, calculating odds ratios (OR) with 95% confidence intervals.

Results: In 2022, applicants with ≥16 publications had significantly higher match rates than those with 0-15 publications (74.4% vs. 48.7%, p=0.001, OR 3.04, 95% CI 1.49-6.33) across all Step 2 ranges. Within the Step 2 ≥250 subgroup, publications remained a significant predictor of match success (p=0.010, OR 3.19).

In 2024, overall match rates increased (80.2% vs. 61.3% for ≥16 vs. 0-15 publications), but statistical significance weakened (p=0.034) with confidence interval crossing 1.0 (95% CI 0.98-6.25). However, within the Step 2 240-249 range, publications had a

pronounced effect (p=0.012, OR 16.10), indicating Step 2 performance became a more important determinant of outcomes.

Analysis of publication thresholds revealed a shift in optimal numbers. In 2022, match rates for Step 2 ≥250 peaked at 16-20 publications (85.7%) with no further benefit. By 2024, this point shifted upward: for Step 2 ≥250, match rates increased from 68.8% (16-20 publications) to 87.5% (21-25 publications), plateauing thereafter (86.2% with 26+). The 240-249 range showed a similar pattern.

Conclusions: As the first analysis of match outcomes in the post-Step 1 pass/fail era, this study provides valuable guidance for programs and applicants navigating this significant transition.

The shift to pass/fail Step 1 has altered how research influences match outcomes. In 2022, publications were broadly important regardless of Step 2 scores. By 2024, their impact became stratified-serving as a critical differentiator for mid-tier Step 2 scores but with diminishing importance for exceptional scores.

Our data indicates the point of diminishing returns for publications has shifted from approximately 16-20 publications in 2022 to 21-25 publications in 2024 (2).

These findings suggest three key implications: First, Step 2 CK has emerged as a crucial metric that programs rely on in the absence of numeric Step 1 scores. Second, substantial research provides significant advantage, especially for candidates with mid-tier Step 2 scores. Third, the data suggests potentially enhanced outcomes with increasing publications up to the 21-25 range, though individual circumstances may vary.

References:
1. NRMP. Charting Outcomes™: USMLE Step 2 CK Exam Baseline. 2020-2024. Available at https://www.nrmp.org/match-data/2024/08/charting-outcomes-usmle-step-2-ck-exam-baseline/. Accessed December 1, 2024.
2. Elemosho A, Sarac BA, Janis JE. The Law of Diminishing Returns in the Integrated Plastic Surgery Residency Match: A Deeper Look at the Numbers. Plast Reconstr Surg Glob Open. 2024;12(7):e5937. Published 2024 Jul 3. doi:10.1097/GOX.0000000000005937

Metformin Topical Ointment Reduces Acute Damage in Irradiated Human Skin by Blocking TGFβ Signaling Through Modulation of AMPK and mTOR

Abstract Presenter: Alexa Rivera del Rio Hernandez MD

Abstract Co-Author(s): NARESH MAHAJAN, Jose Antonio Arellano MD, Ethan Banks, Fuat Baris Bengur MD, Shawn Loder MD, Samantha Bosco, Aniekanabasi Ufot, Jeffrey Gusenoff MD, Francesco Egro MD, Msc, MRCS, J. Peter Rubin MD, Asim Ejaz PhD

INTRODUCTION: Radiation therapy has a pivotal role in modern cancer treatment, benefiting nearly half of all patients. Despite efforts to minimize its impact on healthy tissues, radiation-induced damage remains a significant concern. Skin, as the first-line defense, is particularly vulnerable to radiation injury. Acute radiation exposure can result in radiodermatitis, and prolonged exposure can lead to radiation-induced skin fibrosis (RISF), leading to functional and anatomical impairments. Ionizing radiation promotes fibrosis through the generation of reactive oxygen species (ROS), TGF-ß and mTOR signaling pathways. Metformin shows promise in mitigating fibrosis by targeting crucial proteins involved in these pathways, ultimately downregulating the fibrotic process. Previous research has explored the use of intraperitoneal metformin showcasing its potential to alleviate skin fibrosis in mice. Once established the potential of metformin as a therapeutic agent for RISF, we conducted a protocol to assess its capability to mitigate fibrosis on a human skin model.

METHODS: We devised a controlled experimental protocol using our ex vivo human skin perfusion system, where a human tissue was subjected to radiation-induced damage at a dosage of 15 Gy. The experimental intervention involved the topical application of metformin cream, control cream and no intervention. Skin biopsies were scheduled at specific time points to assess the histological and molecular changes.

RESULTS: Therapeutic metformin showed promising results in mitigating radiation damage to epithelial cells. Histological sections from the metformin-treated group consistently showed reduced cell damage, fibrosis, and epidermal-dermal disruption, when compared to the non-treated groups. Additionally, in the metformin-treated group, TUNEL results demonstrated the lowest percentage of cell death and γ-H2AX results showcased lower levels of DNA damage, compared to the other two groups. We observed increased elastogenesis in metformin treated skin. When looking at the gene expression, metformin treated skin showed a higher expression of: ECM remodeling, antioxidant, DNA repair, cellular proliferation and antiapoptotic markers, with a lessened expression of proinflammatory markers. We were able to observe metformin's capability

to downregulate pro-fibrotic pathways, as showcased by a reduced activity of the proteins mTOR, p70S6K and TGF-ß1, as well as an increased activity of AMPK.

CONCLUSION: The results demonstrated that metformin decreases the activity of proteins involved in the oxidative stress and metabolic reprogramming pathways that drive fibroblast activation. By doing this, metformin helps maintain the structural integrity of skin after radiation injury and enhances cellular resilience under stress. Metformin also has a protective effect against DNA damage and enhances DNA repair mechanisms. These findings indicate that metformin's properties make it a promising therapeutic agent to mitigate radiation-induced damage and to enhance tissue repair and regeneration. This research has important clinical implications for preventing cutaneous functional and anatomical impairments in patients receiving radiation therapy and improving the quality of life of those affected by radiation-induced skin fibrosis.

Integrating Photogrammetry with Mixed Reality Platforms for Intraoperative Feedback during Cranial Vault Remodeling

Abstract Presenter: Julia Schmidt

Abstract Co-Author(s): Kiefer Forseth, Michael Brandel, Dr. Benjamin Massenburg MD, Michael Levy, Amanda Gosman MD

Premature fusion of cranial sutures results in cranial and skullbase deformity. Surgical intervention for craniosynostosis simultaneously improves cosmetic development and reduces intracranial pressure. This is accomplished with fronto-orbital advancement for metopic and unilateral coronal synostoses. Essential intraoperative feedback on vault remodeling is currently limited to qualitative judgement.

An iPhone 15 acquired simultaneous video and LiDAR for 60 seconds after bony exposure and after remodeling. Scale-invariant features were extracted and matched between frames, enabling camera pose estimation and dense point cloud reconstruction of scene geometry (A). The pre- and post-remodeling point clouds were aligned using M-estimator sample consensus of fast point feature histogram descriptors, which identified and registered the intact biparietal convexity (C). These were similarly aligned to a skull mesh derived from the preoperative CT.

Intraoperative imaging was completed in 11 patients. Absolute error (mean 2.3mm) was measured between landmarks on the preoperative CT mesh and the pre-remodeling point cloud (D). Relative error (mean 1.7%) was measured using the affine scaling factor between pre- and post-remodeling point clouds. Cranial vault volume was calculated above a plane traversing the nasion and bilateral zygomatic roots (mean +90cc). Cranial vault symmetry highlighted areas requiring correction (E). These masks were projected onto the surgical scene through a mixed reality platform, enabled by the co-registration to the preoperative CT.

Pairing widely available camera technology with this fast and robust algorithmic pipeline delivers timely intraoperative feedback to guide the definitive correction of cranial vault deformity without radiation.

Can Artificial Intelligence Offload Some of the Faculty Burden of Resident Education?

Abstract Presenter: Paulina Le MD

Abstract Co-Author(s): Harold Friedman, Edward Luce MD

Introduction: Artificial intelligence (AI) has been touted as a vehicle to improve resident education and lessen the strain of the teaching responsibilities of faculty. A study was designed to test the hypothesis by a challenge of an AI platform to generate faculty discussion guides on three distinct topics: breast reduction, frontal sinus fractures, flexor tendon.

Methods: A bibliography of readings was created and a faculty discussion guide composed from the readings. Both were vetted by an additional faculty member and senior resident for completeness of the bibliography and validity and comprehensiveness of the discussion guide. The same investigators developed a series of cardinal teaching points drawn from the composed faculty discussion guides.
The readings were subsequently programmed into the platform, Chatly®, and challenged to generate a faculty discussion guide for each of the three topics for application in a seminar setting. Repetitive iterative prompts demanded refinement of the output until the responses flattened in quality. Six residents, PGY1-6, compared the cardinal teaching points from the faculty-generated and AI-generated discussion guides for completeness, specificity, and absence of hallucinations on a scale of 1 (poor) to 10 (superb).

Results: The intra-class correlation coefficient for the refereed cardinal points for each of the three topics was 0.85 (high concordance). The composite resident assessment mean ranged from breast reduction (4.39), frontal sinus fractures (3.39) and flexor tendon repair (2.67). The curves are presented in Figure 1.

Conclusions: As complexity of topic increased from breast reduction to frontal sinus fractures to flexor tendon repair, AI performance deteriorated from distinctly mediocre to poor, indicating AI at present lacks the sophistication to facilitate resident education.

Evolution and Efficacy of Virtual Training in Plastic Surgery Education in LMICs

Background: Limited access to specialized surgical care in Low- and Middle-Income Countries (LMICs) contributes to high morbidity and mortality from trauma, burns, and congenital anomalies-conditions frequently treated by plastic surgeons. Short-term surgical missions, while beneficial, are unsustainable due to high costs, lack of long-term integration, and minimal training for local providers. In recent years, virtual training has gained traction as a scalable approach to expanding plastic surgery education in LMICs and reducing reliance on external missions. This systematic review evaluates the evolving impact of virtual plastic surgery training in LMICs.

Methods: A PRISMA-guided systematic review searched PubMed, Embase, Scopus, and Cochrane Library (2009–2025) using terms like "virtual plastic surgery training," "tele-mentoring," and "LMICs." Studies assessing digital or remote surgical training with measurable outcomes in LMICs were included, while those exclusive to high-income countries or lacking defined interventions or outcomes were excluded. Data extraction focused on study design, country, training methods, effectiveness, and challenges.

Results: Nineteen studies from multiple LMICs were included. The most common training modalities were tele-mentoring/video conferencing (26.3%), digital simulation (26.3%), augmented/virtual reality (15.8%), mobile/social media-based education (15.8%), and hybrid models (15.8%). Virtual training demonstrated strong educational benefits, with 89.5% of studies reporting improved surgical knowledge, skills, or confidence, and 73.7% showing high satisfaction. However, 10.5% favored in-person training, particularly for skill-intensive procedures, with one study finding a significant preference for in-person engagement ($p=0.04$). Tele-mentoring and digital simulation had the highest satisfaction rates (84.5% ± 4.94). Virtual training significantly expanded

access to education, reaching up to 148 countries-far exceeding the geographic limitations of in-person training. However, challenges persisted, with 94.7% of studies citing internet connectivity as a major barrier. Additional obstacles included high equipment/setup costs (42.1%), limited hands-on training (36.8%), ethical concerns (15.8%), and logistical constraints (15.8%). While 42.1% of studies were multi-country, only 21.1% examined regional differences in usage, and none directly compared training outcomes across regions. A majority of studies (57.9%) included Sub-Saharan/COSECSA region countries, reflecting a strong focus on this area for virtual plastic surgery training initiatives.

Conclusion: Virtual training has enhanced accessibility and skill development in plastic surgery education in LMICs where training is limited. Despite years of virtual outreach, internet connectivity remains the most persistent barrier pointing towards unresolved infrastructure challenges. The scalability of virtual training is one of its greatest strengths, allowing for broader global reach and enabling training for more individuals who would otherwise lack access. Still, virtual training alone does not fully replace the benefits of hands-on learning, suggesting a role for hybrid models that integrate virtual education for theoretical learning while reserving in-person training for skill-intensive procedures. Future research should assess whether certain virtual training approaches-such as AR versus simulation-yield better outcomes in specific regions or if effectiveness is consistent across settings. Additionally, longitudinal studies evaluating the impact of virtual training on reducing workforce gaps in LMICs are needed to determine its long-term sustainability. Virtual training is a transformative tool in surgical education– optimizing its role within hybrid models may provide the most effective and sustainable solution for LMICs.

Controlled Super-Zero Cooling After Volumetric Muscle Loss Injury Improves Functional Recovery in a Large Animal Model.

Abstract Presenter: Eddy Rios

Abstract Co-Author(s): Daniah Alnafisee MD, Hiroshi Fujimaki MD, Francisco Batiz-Fabela, Mitchell Kennedy, Samantha Kroon, Monica Royo, Bilal Chaudhry MD, Giorgio Giatsidis MD, PhD

Purpose: Over 40,000 traumatic open fractures leading to volumetric muscle loss (VML) injuries are estimated to occur annually in the US (1,2). Even ~20% muscle loss

causes disproportionate lasting strength deficits of 30 - 90% (3). The current gold standard, physical therapy, only achieves partial functional recovery of 17 - 58% (4, 5). Our prior murine model of VML showed that optimized post-injury treatment with controlled cooling fluid (CCF) above freezing improved recovery of baseline maximal muscle torque (MMT; +30%) and resistance to fatigue (RF; +66%). We hypothesized CCF would have similar results in a large animal model of VML.

Methods: Left Peroneus Tertius muscle (PTM) VML injury was surgically induced in female (38-42 kg) Yucatan pigs; animals received no treatment (n=10) or CCF of the PTM (n=4). Outcomes included post-injury day 35 (PID35) recovery of pre-injury MMT, baseline activity levels (step count), and baseline RF. PID35 strength in newton-centimeters per gram of PTM (ncm/g) and weekly gait assessments (Tarlov score) were also recorded.

Results: Compared to controls, CCF-treated animals had significantly improved recovery of pre-injury MMT (40±27% vs 18±14%; p=0.00012) and RF (37±26% vs 26±31%; p=0.0013) with nonsignificantly improved recovery of baseline activity level (127±194% vs 67±62%; p=0.17). CCF also significantly improved PID 35 PTM strength per gram of PTM (3.4±3.6 ncm/g vs 1.5±1.4 ncm/g; p=0.016) and did not significantly modify gait.

Conclusions: In a translational large animal model, CCF seems to promote functional recovery. These results should be validated in a larger cohort of animals with molecular analyses before a pilot clinical trial.

References:

1. Court-Brown CM, Bugler KE, Clement ND, Duckworth AD, McQueen MM. The epidemiology of open fractures in adults. A 15-year review. Injury. 2012 Jun;43(6):891-7. doi: 10.1016/j.injury.2011.12.007. Epub 2011 Dec 27. PMID: 22204774.
2. Population clock. https://www.census.gov/popclock/.
3. Garg K, Ward CL, Hurtgen BJ, Wilken JM, Stinner DJ, Wenke JC, Owens JG, Corona BT. Volumetric muscle loss: persistent functional deficits beyond frank loss of tissue. J Orthop Res. 2015 Jan;33(1):40-6. doi: 10.1002/jor.22730. Epub 2014 Sep 18. PMID: 25231205.
4. Corona, B.T. et al. (2013) 'Autologous minced muscle grafts: A tissue engineering therapy for the volumetric loss of skeletal muscle', American Journal of Physiology-Cell Physiology, 305(7). doi:10.1152/ajpcell.00189.2013.
5. Aurora, A. et al. (2014) 'Physical rehabilitation improves muscle function following volumetric muscle loss injury', BMC Sports Science, Medicine and Rehabilitation, 6(1). doi:10.1186/2052-1847-6-41.

Revolutionizing Aesthetic Documentation: AI-Powered Photo Standardization for Optimizing Clinical Outcomes in Plastic Surgery

Abstract Presenter: Humberto Palladino MD

Background: High-quality, standardized before-and-after photography is essential in plastic surgery, directly impacting clinical decision-making, patient expectations, and outcome assessment and communication. Despite its importance, significant variability in lighting, positioning, and framing leads to documentation inconsistencies that compromise reliable progress tracking and limit objective outcome evaluation. This study presents ClinicOS, a novel AI-powered imaging platform that leverages computer vision and deep learning to standardize pre- and post-operative photography, ensuring reproducibility while enhancing clinical accuracy across diverse patient populations.

Methods: We developed and validated an AI-driven photo capture and management platform that integrates multiple machine-learning models to standardize patient photography. The system includes:
AI-Powered Image Alignment – Convolutional neural networks automatically detect anatomical landmarks, patient posture, and camera angles across all skin tones (Fitzpatrick I-VI), ensuring precise before-and-after comparisons regardless of patient demographics.
Intelligent Pose Guidance – Real-time feedback through augmented reality overlays guides both patients and clinical staff in capturing consistent photos, reducing human error and improving inter-operator reliability.
Automated Feature Recognition – A deep learning segmentation model (U-Net) identifies and selectively blurs distinguishing features such as tattoos and faces while preserving surgical landmarks. This ensures HIPAA compliance and patient privacy by anonymizing sensitive regions while maintaining critical medical details.
Workflow Integration with Outcomes Analysis – The software seamlessly integrates with EMRs, enabling automated photo organization, metadata tagging, and correlation with surgical outcomes data.

Results: In a prospective multi-center study across 12 plastic surgery practices (n=487 patients), our AI system demonstrated significant improvements in documentation quality and efficiency. Key findings include:

86.4% improvement in photo consistency metrics ($p<0.001$) compared to standard photography protocols
63.7% reduction in time spent on image capture and organization (average 5.8 minutes saved per patient)
92.3% accuracy in automated anatomical landmark detection

Conclusion: AI-driven photo standardization represents a significant advancement in plastic surgery documentation and outcomes assessment. By ensuring precision, efficiency, and consistent quality across diverse patients, ClinicOS empowers surgeons with reliable visual data for clinical decision-making while enhancing patient understanding and engagement. This technology not only improves current documentation standards but also establishes a foundation for data-driven, objective evaluation of aesthetic outcomes.

Significance: This work introduces a clinically-validated AI approach to plastic surgery imaging that addresses several challenges in aesthetic documentation: standardization across diverse patient populations, objective outcomes assessment, and workflow efficiency. Future applications include AI-powered predictive outcome visualization, automated surgical planning, quantitative scar analysis, and longitudinal outcome tracking to support evidence-based practice in aesthetic surgery.

Addressing Nerve Size Mismatch in Targeted Muscle Reinnervation: Does Size Match Make a Difference for Analgesia?

Abstract Presenter: Jose Zepeda

Abstract Co-Author(s): Gabriella Mraz, Gwendolyn Hoben MD, PhD

Introduction: Targeted Muscle Reinnervation (TMR) is a surgical technique designed to enhance prosthetic control and alleviate post-amputation pain. A key but understudied feature of TMR is the size mismatch between
large, mixed motor-sensory nerves and relatively smaller motor nerve branches. Despite clinical evidence showing TMR's efficacy in pain reduction even with this mismatch, it is unknown if a better size match
would improve analgesia outcomes This study investigates how varying levels of nerve size discrepancy influence spontaneous and reflexive pain behaviors following tibial nerve injury (TNI).

Study Methods: A total of 24 male Sprague-Dawley rats were randomly assigned into three cohorts: (1) TNI-only, (2) TMR with the tibial nerve coapted to the motor branch to semimembranosus (large size mismatch, TMRsm),
and (3) TMR with the tibial nerve coapted to a near size-matched configuration (branches to semimembranosus, biceps femoris long head, biceps femoris short head; Multi-TMR). Behavioral
assessments were conducted at baseline, 2, 4, 6, 8, 10, 12, and 14 weeks, including von Frey (mechanical hypersensitivity), acetone (cold hypersensitivity), pin test (hyperalgesia), brush testing (allodynia),
guarding (spontaneous pain), and dynamic weight bearing. Anxiety and exploratory behaviors were evaluated at week 12 via the open field maze and elevated plus maze.

Results: In this all-male study, both TMR-sm and Multi-TMR significantly reduced mechanical (Von Frey), cold (acetone), brush, and pin hypersensitivity compared to TNI-only rats after the first two weeks postsurgery ($p < 0.05$). However, Multi-TMR and TMR-sm diverged in brush-evoked responses at weeks two ($p = 0.003$) and four ($p = 0.025$), with Multi-TMR showing higher noxious responses-differences that resolved by week six. No group experienced actual weight loss; nonetheless, TMR-sm weighed consistently less than Multi-TMR starting at week two ($p < 0.05$).

Conclusion: This study provides the first in vivo evaluation of nerve size mismatch in TMR, revealing that TMR sizematched procedures do not dramatically alter spontaneous or reflexive pain behaviors compared to TNI alone-although some variation emerged among TMR groups. Further analysis of axonal counts and neuroma formation will clarify these differences. Although counterintuitive to nerve repair dogma, this
study did not identify any advantage to improved size match.

References

1. Roth E, Linehan A, Weihrauch D, Stucky C, Hogan Q, Hoben G. Targeted muscle reinnervation prevents and reverses rat pain behaviors after nerve transection. Pain. 2023;164(2):316 -324.
doi:10.1097/j.pain.0000000000002702
2. Tanner N, Ayalon O. The neurobiology of targeted muscle reinnervation for post-amputation pain. Plast Aesthet Res. 2023;10:11. doi:10.20517/2347-9264.2022.95
3. Fox IK, Brenner MJ, Johnson PJ, Hunter DA, Mackinnon SE. Axonal regeneration and motor neuron survival after microsurgical nerve reconstruction. Microsurgery. 2012;32(7):552-562. doi:10.1002/micr.22036

4. Eberlin KR, Brown DA, Gaston RG, et al. A consensus approach for targeted muscle reinnervation in amputees. Plast Reconstr Surg Glob Open. 2023;11(4):e4928. doi:10.1097/GOX.0000000000004928
5. Unal-Cevik I, Oaklander AL. Comparing partial and total tibial-nerve axotomy: long-term effects on prevalence and location of evoked pain behaviors. Pain Pract. 2011;11(2):109 -119. doi:10.1111/j.1533-2500.2010.00429.x
6. Oliveira KMC, Pindur L, Han Z, Bhavsar MB, Barker JH, Leppik L. Time course of traumatic neuroma development. PLoS One. 2018;13(7):e0200548. Published 2018 Jul 16. doi:10.1371/journal.pone.0200548
7. Berberoglu I, Sabbagh SW, Cederna PS, Kemp SWP. A novel animal model of symptomatic neuroma for assessing neuropathic pain. Neurosci Lett. 2024;836:137896. doi:10.1016/j.neulet.2024.137896
8. Dehdashtian A, Timek JH, Svientek SR, et al. Sexually dimorphic pattern of pain mitigation following prophylactic regenerative peripheral nerve interface (RPNI) in a rat neuroma model.
Neurosurgery. 2023;93(5):1192-1201. doi:10.1227/neu.0000000000002548

Hemoglobin A1C as a Predictor of Cancer-Related Lymphedema: A Laboratory-Based Predictive Model

Abstract Presenter: Stav Brown MD

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Purpose: Lymphedema is a common and debilitating complication affecting 20-40% of breast cancer patients undergoing axillary lymph node dissection (ALND), with current interventions being largely palliative, relying on lifelong physiotherapy and compression. Despite evidence linking inflammation and insulin resistance to lymphatic dysfunction, the role of metabolic markers in predicting which patients will develop lymphedema remains unclear. This decade-long study aimed to identify laboratory markers associated with lymphedema development in patients undergoing ALND.

Methods: Data from 15,666 patients undergoing ALND at Yale Cancer Center (2013-2024) were analyzed. Preoperative Thyroid Stimulating Hormone (TSH), C-Reactive

Protein (CRP), Low-Density Lipoprotein (LDL), total cholesterol, triglycerides, and Hemoglobin A1c (Hb A1C) were collected alongside demographic and clinical factors, including age, BMI, race, ethnicity, chemotherapy, and radiation. Univariate and multivariate regression models evaluated associations between laboratory markers, lymphedema development, and onset.

Results: Lymphedema developed in 2,345 patients (14.9%), with an average onset of 20.5 months post-ALND. Higher Hb A1C at the time of ALND was identified as an independent risk factor for lymphedema development (OR=1.114, 95% CI 1.001 to 1.237, p=0.0447), accounting for clinical and demographic variables. Chemotherapy (OR=2.296, 95% CI 1.522 to 3.539, p<0.0001) and BMI > 30 (OR=1.051, 95% CI 1.028 to 1.075, p<0.0001) were also significant predictors. On multivariate regression, elevated Hb A1C levels were associated with delayed lymphedema onset (β=3.708, 95% CI 1.244 to 6.171, p=0.0120) alongside BMI > 30 (β=12.18, 95% CI 3.432 to 20.92, p=0.0120). TSH, CRP, LDL, total cholesterol, or triglyceride levels at the time of ALND were not associated with lymphedema development.

Conclusions: This is the first study to propose a laboratory-based predictive model for cancer-related lymphedema after ALND, highlighting Hb A1C levels at the time of ALND as a novel predictive marker. Identifying metabolic markers at the time of ALND may enable personalized prevention strategies, including immediate lymphatic reconstruction and early physical therapy to reduce lymphedema incidence and severity.

AAV Gene Therapy for Digit Regeneration Informed by Spatial Transcriptomics

Abstract Presenter: Madeleine Landau

Abstract Co-Author(s): Erin Brush, Alyssa Ehrhardt, Katja Koll, Melissa Tran, Colleen Milligan, Kendall Reitz, Rochelle Bitolas, David Salven, David Brown MD, PhD

Introduction: Limb loss presents a significant clinical challenge that stands to benefit from fields such as gene therapy. Mouse digit tip (MDT) regeneration serves as a mammalian model of complex tissue regeneration that can provide insight into strategies for enhancing tissue repair and bone lengthening after limb amputation. However, little is known about optimal gene therapy methods for manipulating this process. This study employed spatial transcriptomics to identify gene promoters active in key anatomic regions of the regenerating MDT. Subsequently, promoter sequence

fragments were tested in adeno-associated viral vector (AAV) assays for their ability to enhance bone regeneration by driving overexpression of a potent osteogenic effector gene (BMP2).

Methods: Hindpaw digits of 8-week-old BALB/cJ mice were amputated at the level of the middle (P2) or distal (P3) phalanx. Fourteen days post-amputation (dpa), samples were processed through the STOmics Stereo-seq platform to delineate gene expression in anatomic sub-regions of the regenerating digit. Proximal promoter fragments (2 kb) were cloned from the Krt16, Postn, or Col1A2 genes and placed upstream of the BMP2-3xFLAG coding sequence, followed by plasmid synthesis and packaging into AAV8 vectors. AAV8 CMV:GFP vectors were used as controls. At 10 dpa, vectors were systemically delivered by retro-orbital injection. At 14 dpa, digits were harvested for histological analysis or Stereo-seq. P3- and P2- amputated digits were collected at 21 dpa and 28 dpa timepoints, respectively, for micro-CT analysis. Scans were reconstructed and scaled in ImageJ. Whole and segmental measurements of length, thickness, and volume were obtained for regenerating bone, then normalized by comparison with corresponding original amputated digit tips.

Results: Stereo-seq analysis revealed a rich architecture of genetically distinct regions of the digit. Differential gene expression in keratinocyte populations allowed for segregation of epidermal cells into computationally defined clusters, localized to the regeneration epidermis (RE). Osteogenic genes, such as Ibsp, Sparc, Spp1, Postn, Bglap, and Alpl, were induced in both P3 and P2 amputations compared to uninjured P3 digits. Spatially localized GFP expression in areas of the MDT suggested successful transduction of injected AAV constructs, whereas anti-FLAG immunofluorescence revealed promoter-specific patterning of viral construct expression. Mice injected with AAV8 POSTN:BMP2-3xFLAG demonstrated increased P3 regenerated volume when normalized and compared to the GFP control mice (mean 550% ± 250% vs 190% ± 60%, p=0.0085), and increased P2 regenerated volume relative to GFP control mice (mean 180% ± 86% vs 98% ± 47%, p=0.0159). AAV8 KRT16:BMP2-3xFLAG showed increased thickness (mean 72% ± 10% vs 49% ± 3.7%, p=0.0086) and volume (190% ± 81% vs 98% ± 47%, p=0.0467) in P2 regenerated digits. Trabecular structural properties appeared similar between mice injected with AAV8 COL1a2:BMP2-3xFLAG and those injected with control virus.

Conclusion: This study presents a novel methodology for identifying AAV control sequences in the MDT and suggests that bony digit regeneration can be enhanced by spatially directed overexpression of BMP2. Ongoing work seeks to probe cell type-specific dynamics and associated signaling pathways modulated by these vectors. This

work may lead to new approaches for treating complications of limb loss through AAV gene therapy.

How Informed are Visiting Medical Students? A Content Analysis of Online Information Regarding Plastic Surgery Away Rotations

Abstract Presenter: Madeline Tierney MD

Abstract Co-Author(s): Rose Maisner MD, Sarah Thornton, Jessieka Knazze, Stephen Ortmann, Daniel Cho MD, PhD

Purpose: Visiting student externships are essential to the plastic surgery residency application process. By providing opportunities for students to learn about programs through direct experience and for programs to evaluate applicants' clinical performances, externships allow a bidirectional assessment of fit. Multiple studies suggest that strong performances on sub-internships can improve one's chances of matching at a given institution1-2. This study aims to characterize plastic surgery residency program website content for visiting student externship information. This study aims to characterize information on externships posted by plastic surgery residency program websites and the visiting student learning opportunities (VSLO) platform.

Methods: All integrated and independent plastic surgery externship listings on residency program websites and VSLO were assessed for information regarding the rotation application process, logistics, and details. Chi-Squared and Fisher's Exact testing were used to compare comprehensibility by program characteristics including the residency model, program size by resident and faculty number, age in years by ACGME accreditation, amount of NIH/VA funding, Doximity ranking by prestige, and social media presence by number of Instagram posts and followers. McNemar testing was used to compare program information between websites and VSLO.

Results: A total of 104 residency programs were identified, with 85.6% listing information on their websites and 76.0% on VSLO. Information regarding rotation applications, logistics, and details, is listed on 87.6%, 85.4%, and 71.9% of websites and 100.0%, 100.0%, and 68.4% of VSLO pages. VSLO had significantly more information on the application process and rotation logistics than program websites ($p \leq 0.004$), while program websites had more rotation descriptions ($p=0.003$), information on call schedules ($p = 0.011$), presentations ($p = 0.036$), and simulation

opportunities (p=0.008). Independent programs were significantly less likely to provide online information on their externships (p<0.001).

Conclusions: Program websites and VSLO are valuable tools for recruiting medical students to their externships, and eventually, to their residency programs. While most describe the application process and logistics of their externships, fewer provide detailed descriptions of what the rotation experience is like, making informed decisions on where to apply and rotate challenging. In addition, the content and degree of online information provided on these two platforms is variable. Improving the comprehensibility, accessibility, and consistency, of online plastic surgery externship listings will ultimately improve the residency recruitment process for all, especially orphaned medical students who otherwise lack resources and connections to the field.

1. Drolet BC, Brower JP, Lifchez SD, Janis JE, Liu PY. Away Rotations and Matching in Integrated Plastic Surgery Residency: Applicant and Program Director Perspectives. Plast Reconstr Surg 2016;137:1337-43.
2. Sergesketter AR, Glener AD, Shammas RL, et al. The Association between Away Rotations and Rank Order in the Integrated Plastic Surgery Match. Plast Reconstr Surg 2021;147:1050e-6e.

Institutional Experience in Virtual Surgical Planning and Three-Dimensional Printing in Plastic Surgery

Abstract Presenter: Nicole Sanchez Figueroa MD, Msc

Abstract Co-Author(s): Samyd Bustos MD, Jonathan Morris MD, Basel Sharaf MD, Uldis Bite MD, Aparna Vijayasekaran MBBS

Background: 3D printing has revolutionized plastic surgery by enabling detailed preoperative planning with lifelike anatomical models, enhancing surgical precision and outcomes. This study focuses on understanding the indications, characteristics, and outcomes of 3D-printed models produced through an institutional in-house, streamlined printing process at a radiology anatomic modeling unit (AMU).

Methods: This retrospective review included all the Plastic Surgery Division AMU orders at our institution. Orders from other departments were excluded. Data was

categorized into two patient age groups (≤25 years, N=43; >25 years, N=52). Indication, segmentation times, CAD processing times, anatomical structures modeled, intended use, technologies used, and delivery time. Statistical analysis was performed with ANOVA and Chi-squared tests in BlueSky Statistics© 2024.

Results: In total 1400 AMU orders were requested at Rochester, of those, 95 were from our division placed by seven plastic surgeons from 2019 to 2024. Craniofacial structures were the most frequently modeled (61.7%), with specific models including skull reconstructions (34.6%) and combined structures such as the mandible and maxilla (21.0%). Chest models (6.2%) included the newly added indication for external breast prostheses customization (6.1%). Indications varied, with congenital conditions (27.7%) (primarily in patients ≤25 years) and trauma/reconstruction (31.9%) (more common in patients >25 years). Gender dysphoria cases (21.3%) were predominant in patients >25 years. The highest number of models were produced in 2020 (30.5%), followed by 2023 (22.1%) and 2019 (14.7%). Technological Insights: "Vat Photopolymerization" was the most used technology (64.2%), followed by "Material Jetting" (13.6%). Formlabs was the primary 3D printer brand (66.2%), particularly the "Form 3B" model (53.2%). The mean calculated final printing time was 28.16 ± 19.60 hours, and post-processing cleaning averaged 1.68 ± 1.36 hours. Multi-color models (58.3%) were produced more frequently than mono-color. Beyond clinical cases, the in-house printing process also facilitated the creation of medical simulation models, such as chest micro anastomosis models for breast reconstruction and comprehensive head and neck models, enhancing surgical training.

Conclusion: In-house 3D-printed anatomical models are vital for plastic surgery, especially in craniofacial and reconstructive procedures. The streamlined, institution-based process, predominantly using Formlabs technology and "Vat Photopolymerization," demonstrates high efficiency and quality. The addition of models for external breast prostheses highlights the expanding scope of 3D printing for non-surgical applications aimed at improving patient quality of life through enhanced body contour and fitting solutions. Future studies should investigate the correlation between 3D model use and patient outcomes and the benefits of medical training.

Effectiveness of Multimedia Preoperative Surgical Patient Education Interventions on Surgical Outcomes: A Systematic Review and Meta-Analysis

Abstract Presenter: Anne Hall Abstract

Co-Author(s): Amanda Perrotta, Alexander Andrew Argame, Kaavian Shariati, Archi Patel, Justine Lee MD, PhD, FACS

Introduction: Preoperative anxiety is a common experience prior to surgery and has been increasingly recognized for its impact on surgical outcomes. Traditional preoperative education largely focuses on discussing procedural information and expectations regarding the perioperative pathway and postoperative recovery, however, it varies widely based on surgeon preferences, institutional practices, and time constraints. Multimedia-based education, delivered through videos, websites, and mobile apps, has shown promise in reducing anxiety and opioid use while improving satisfaction and knowledge. Given the evolving landscape of digital technologies, their role in surgical education warrants further exploration. In plastic and reconstructive surgery, where patient expectations, aesthetic concerns, and psychological readiness plays a significant role in surgical outcomes, these multimodal modalities may further enhance perioperative care. This systematic review aims to evaluate the impact of multimedia preoperative educational interventions and explores its potential integration in standard surgical care.

Methods: A systematic review and meta-analysis of randomized controlled trials (RCTs) from 2004-2024 were conducted per PRISMA guidelines to evaluate the effect of preoperative surgical patient educational interventions on surgical outcomes. RCTs were retrieved from MEDLINE, CENTRAL, and EMBASE databases (December 2024) utilizing terms such as "surgery," "preop*," "patient education*," and "preoperative information." RCTs were included if they had a sample size of over 45 adult patients, assessed a preoperative education intervention beyond standard care, and measured relevant postoperative outcomes such as pain, anxiety, LOS, knowledge, and quality of life. Random-effects meta-analysis was utilized to estimate pooled effect sizes.

Results: 850 articles were initially identified. Upon review, 47 articles met inclusion criteria, comprising 4,580 patients across 13 surgical subspecialties. Various educational formats were used with videos being the most common (27.4%), followed by multimedia materials combining text, video, and animations (21.3%), written booklets (21.3%), and in-person sessions (12.8%). As for outcomes, anxiety was the most frequently assessed (48.9%), with studies also examining pain (36.2%), satisfaction (36.2%), knowledge (29.8%), quality of life (17.0%), and length of stay (8.5%). Pooled analysis showed that for studies assessing anxiety, the preoperative educational intervention significantly reduced anxiety postoperatively compared to the control group (standard mean difference (SMD) = 1.14, 95% confidence interval (CI): [0.02,2.26], $p < 0.045$, $I2 = 95.0\%$). Similarly, pooled results from studies measuring postoperative pain

demonstrated a significant reduction in postoperative pain among the intervention group (SMD = 0.56, 95% CI: [0.04, 1.06], p = 0.03, I2 = 74.9%). Lastly, analysis of studies on satisfaction found that the intervention significantly increased satisfaction compared to the control group (Odds Ratio = 1.98, CI: 1.44-2.73, p<0.0001, I2 = 0.00%).

Conclusion: Our systematic review found that multimedia preoperative educational interventions significantly reduce postoperative anxiety and pain while improving patient satisfaction. Given the impact of mental health on postoperative recovery, implementing such interventions may further improve surgical outcomes and overall patient care. In plastic and reconstructive surgery, where mental preparedness readiness is crucial, integrating such interventions into preoperative care can further strengthen patient confidence, enhance patient engagement, and improve adherence to postoperative care protocols.

Metformin-Enhanced Proliferation and Angiogenesis of Adipose-Derived Stem Cells in Living Scaffolds for Improved Wound Healing

Abstract Presenter: Kristina Khaw

Abstract Co-Author(s): Max von Suskil, Andrew Bohner, Steven Bonawitz MD, Ping Zhang

Purpose: Metformin (MTF) has demonstrated pleiotropic effects, including the promotion of mesenchymal stem cell (MSC) proliferation and differentiation to enhance angiogenesis, particularly in diabetic wound healing. Adipose-derived stem cells (ASCs) are of great interest for wound healing due to their ability to differentiate into various cell types, including endothelial cells (EC), which are essential for neovascularization and tissue repair. Small intestinal submucosa (SIS), a biological scaffold commonly used in surgical tissue repair, has shown promise in regenerative medicine. In this study, we present a model using SIS as a scaffold for human ASCs to explore the role of metformin in enhancing ASC attachment, proliferation, and EC differentiation on the SIS scaffold.

Methods: Human ASCs were treated with metformin at varying concentrations (0–10 mM). Cell viability and proliferation were evaluated using the MTT assay and growth curve analysis. Growth factor secretion by ASCs was quantified via ELISA. Tracker Green-labeled ASCs were cultured on SIS scaffolds for three days, and cell adherence

was assessed through live-cell staining and confocal microscopy. To assess endothelial differentiation and angiogenic potential, ASCs were cultured on SIS in EC induction media with or without MTF, followed by qPCR and immunofluorescence staining. RNA sequencing was conducted to characterize gene expression differences between MTF-treated and untreated groups.

Results: Metformin (0.1 mM) significantly increased ASC proliferation (1.8-fold, $p = 0.05$) and reduced doubling time compared to controls ($p < 0.05$). MTF-treated ASCs also exhibited enhanced secretion of FGF (1.8-fold, $p < 0.01$) and VEGF (1.2-fold, $p < 0.05$). Laser confocal microscopy demonstrated that MTF significantly improved ASC attachment and retention on the SIS scaffold membrane compared to untreated groups (46.7% vs. 37.2% in controls, $p = 0.05$) under normal and high glucose conditions. After 8 days of culture in endothelial growth media, MTF-treated ASCs showed increased mRNA expression of the EC-specific marker CD31 (2.44 ± 0.17 vs. 1.55 ± 0.21, $p = 0.05$) compared to controls. Immunofluorescence analysis further confirmed a higher distribution of CD31-expressing cells throughout the scaffold in the MTF-treated group. RNA-seq analysis revealed that metformin modulates ASC gene expression by regulating key transcription factors and signaling pathways associated with pro-angiogenesis and wound healing. An ongoing in-vivo study is evaluating the wound-healing effects of MTF-treated ASCs on scaffolds in a murine model.

Conclusion: These results indicate that: (1) Metformin enhances ASC proliferation, adhesion, and delivery while promoting endothelial differentiation on SIS scaffolds; and (2) coating a biological scaffold with metformin-treated ASCs may serve as an effective strategy to enhance the patency and functionality of stem cell-based therapies, particularly for wound healing, surgical reconstruction, and fat grafting in patients.

The Impact of Subspecialty Exposure on Plastic Surgery Training and Fellowship Trends

Abstract Presenter: Christina Chopra MD

Abstract Co-Author(s): Tara Huston MD, Alexia Lucas

Background: The perceived preparedness of graduating integrated plastic surgery (PRS) residents varies widely, potentially influenced by disparities in subspecialty exposure. Although the ACGME and ABPS provide general guidelines, residency

curricula lack standardization. This study quantifies the variability in subspecialty exposure across integrated PRS programs, highlighting potential implications for competency development and the need for curricular reform.

Methods: Rotation schedules, fellowship programs, and graduate career trends from 36 integrated PRS residency programs were analyzed. Subspecialties evaluated included hand, craniofacial, microsurgery, aesthetics, burn, gender affirmation, pediatrics, and wound care. Data were extracted to determine the number of dedicated weeks allocated to each subspecialty and identify statistical differences between programs. Variability was assessed using descriptive statistics and correlation analysis to examine the relationship between subspecialty exposure and fellowship pursuit.

Results: Subspecialty exposure varied significantly across programs. The mean duration of exposure ranged from 4.1 weeks (SD: 1.8) in microsurgery to 2.8 weeks (SD: 1.8) in gender affirmation surgery, with only one program offering a dedicated gender affirmation rotation. While 50% of programs had dedicated rotations in hand, craniofacial, burn, and aesthetics, less than half provided structured exposure to microsurgery. Programs with dedicated microsurgery, craniofacial, or aesthetics fellowships allocated significantly fewer weeks to these subspecialties during residency ($p < 0.05$), suggesting a reliance on post-residency training to supplement exposure. Conversely, programs with burn and pediatric fellowships provided significantly increased exposure to these fields. Correlation analysis revealed key trends. Microsurgery and gender affirmation surgery exhibited a negative correlation (-0.33 to -0.44) with fellowship matches, suggesting that residents with limited residency exposure in these fields are more likely to pursue specialized fellowships to supplement their training. In contrast, craniofacial surgery showed a slight positive correlation (+0.35), indicating that greater residency exposure may encourage further specialization but is not a strong predictor of fellowship pursuit. Aesthetics and hand surgery exhibited no significant correlation ($p > 0.3$) with fellowship choices, implying that personal career goals, mentorship, and market demand may be stronger determinants than exposure duration.

Conclusions: This study provides a comprehensive quantitative analysis of subspecialty exposure across integrated PRS residency programs, revealing substantial inconsistencies. The findings suggest that reliance on fellowship training to supplement gaps in residency education may not be sustainable, particularly for niche subspecialties like gender affirmation and microsurgery. Correlation analysis indicates that limited residency exposure may be driving fellowship pursuit in certain fields, emphasizing the need for curricula to provide baseline competency in high-demand subspecialties. To best address and obviate such inconsistencies, programs should

clarify whether subspecialty exposure is explicitly structured or incorporated within general plastics rotations, as some training experiences may not be separately advertised but remain embedded in residency training. Standardized minimum exposure durations could enhance consistency in training and optimize resident preparedness for independent practice. Further discussions within the PRS education community are warranted to establish evidence-based curricular reforms.

PlasticSurgeryGPT: Development of a Proof-of-Concept Plastic Surgery Specific Artificial Intelligence Large Language Model

Abstract Presenter: Berk Ozmen MD

Abstract Co-Author: Graham Schwarz MD

Background: The advent of general-purpose large language models (LLMs) like ChatGPT has revolutionized natural language processing, but their applicability in specialized medical fields like plastic surgery remains limited due to a lack of domain-specific knowledge. This study aims to develop and evaluate PlasticSurgeryGPT, a dedicated LLM fine-tuned on plastic surgery literature, to enhance performance in clinical decision support, surgical education, and research within the field.

Methods: A comprehensive dataset of 25,389 plastic surgery research abstracts published between January 1, 2010, and January 1, 2024, was retrieved from PubMed. The abstracts underwent rigorous preprocessing, including text cleaning and tokenization. We fine-tuned the pre-trained GPT-2 model on this dataset using the PyTorch and HuggingFace frameworks. The performance of PlasticSurgeryGPT was evaluated against the default GPT-2 model using BLEU, METEOR, and ROUGE-1 metrics.

Results: The fine-tuned model, named PlasticSurgeryGPT, demonstrated substantial improvements over the generic GPT-2 model in capturing the semantic nuances of plastic surgery text. PlasticSurgeryGPT outperformed GPT-2 across BLEU, METEOR, and ROUGE-1 metrics, with scores of 0.135519, 0.583554, and 0.216813, respectively, compared to GPT-2's scores of 0.130179, 0.550498, and 0.215494.

Conclusion: PlasticSurgeryGPT represents the first plastic surgery-specific LLM, demonstrating enhanced performance in generating relevant and accurate content

compared to a general-purpose model. This work underscores the potential of domain-specific LLMs in improving clinical practice, surgical education, and research in plastic surgery. Future studies should focus on incorporating full-text articles, multimodal data, and larger models to further enhance performance and applicability.

Analyzing ICG Pattern Recognition Between ChatGPT and Lymphatic Surgeons

Abstract Presenter: Viraj Govani

Abstract Co-Author(s): Alexis Henderson, Chanel Reid, Meeti Mehta BS, Shayan Sarrami MD, Carolyn De La Cruz MD

Purpose: Artificial intelligence (AI) is growing increasingly useful in medicine to help guide practitioners and recognize patterns within patients. While previous research has explored AI's role in staging indocyanine green (ICG) lymphography patterns, none have utilized ChatGPT. This study evaluates ChatGPT's ability to differentiate between varying severities of dermal backflow using ICG lymphography, offering an easily accessible diagnostic tool for lymphatic surgeons and therapists.

Methods: We utilized a dataset comprised of 40 upper extremity ICG lymphographs diagnosed as either diffuse, linear, splash, or stardust by a lymphatic surgeon. Three reviewers independently used ChatGPT to stage the ICG images provided. Cohen's Kappa statistics were used to compare inter-rater reliability between the various ChatGPT responses and in comparison, to the professional diagnoses.

Results: Overall, we found that ChatGPT was 93% accurate in recognizing the presence of dermal backflow. Inter-rater reliability between the reviewer responses indicated fair agreement between the three groups ($\kappa=0.24$ ($p<0.001$) and $\kappa=0.32$ ($p<0.001$)). After combining each reviewer's ratings into a composite ChatGPT group, we compared ChatGPT responses to the lymphatic surgeon diagnoses. We found that ChatGPT exhibited a fair agreement with the reference staging of lymphatic patterns with a Cohen's kappa of 0.4 ($p<0.001$). ChatGPT's accuracy in identifying lymphatic patterns was 80% for linear, 50% for splash and stardust, and 40% for diffuse.

Conclusion: ChatGPT demonstrated fair levels of agreement with a lymphatic surgeon's staging of various dermal backflow patterns. It was most accurate in identifying linear flow patterns but showed promise in identifying more severe forms of

lymphatic disruption. With increased utility, this learning model may become a useful tool to aid in diagnostic imaging.

How Has the Switch to Pass/Fail Changed Medical Student Representation in Plastic Surgery Journals?

Abstract Presenter: Michael Ruta

Abstract Co-Author(s): Krishna Sinha, Jonathan Jeger MD, Edward Reece MD

Purpose: The United States Medical Licensing Exam Step 1 has historically been an important criteria used to assess the competency of medical students applying for plastic surgery residency. However, in 2022, Step 1 transitioned from a numerical score to a pass/fail grading system, redirecting emphasis towards other components of students' portfolios, particularly research. This study aims to understand if the change to pass/fail has had a measurable impact on student authorship trends in plastic surgery journals.

Methods: Publications from 2017 to 2024 in Plastic and Reconstructive Surgery and Aesthetic Surgery Journal were reviewed. Authors were categorized based on their credentials. "Student authors" were defined as authors having only the following degrees: BA, BS, MA, MS, MSE, or MPH. "Doctor authors" were defined as authors with any of the following degrees: MD, DO, PhD. Articles were divided into "pre-Pass/Fail" (2017–2021) and "post-Pass/Fail" (2022–2024) cohorts. Independent two sample t-tests were used to compare means.

Results: 9,557 articles were identified: 6,560 (64%) in the pre-Pass/Fail cohort and 3,267 (36%) in the post-Pass/Fail cohort. There were 41,581 authors across all publications, including 3,453 (8%) students and 34,101 (82%) doctors. 2,086 (22%) manuscripts included a student author, while 7,471 (78%) did not. Publications with a student author averaged 6.13 total authors (SD=2.72), compared to 3.85 (SD=2.68) for publications without a student ($p<0.001$). In the pre-Pass/Fail cohort, there were, on average, 0.31 student authors and 3.37 doctor authors per publication. This rose to 0.46 students ($p<0.001$) and 3.96 doctors ($p<0.001$) in the post-Pass/Fail cohort, representing 48% and 18% increases, respectively. 2022, the year Step 1 changed to Pass/Fail, saw the greatest increase (30%) in students per publication. In six of the

seven years analyzed (86%), the average number of student authors per publication either increased or remained unchanged.

Conclusions: The transition to a pass/fail grading system for Step 1 has coincided with an increase in the average number of student authors per publication in both Plastic and Reconstructive Surgery and Aesthetic Surgery Journal. However, our data also reveals a consistent yearly rise in average authorships for both students and physicians. This finding may reflect a broader trend in biomedical research, as prior research has shown that the mean authors per publication increased by 57% over the last two decades. However, the greatest increase in student authors occurred in 2022, the year that Step 1 was changed, suggesting that the switch may have amplified the existing trend. Our analysis also indicated that publications featuring students had a greater number of authors. Moreover, the 3,453 students in our sample were concentrated into 2,086 manuscripts. Together, these findings suggest a shift towards collaborative, multi-student projects as students aim to strengthen their academic portfolios. The growing number of authors in academic publications raises questions about the value of individual contributions in publications. Further research is warranted to better understand the impact of the increasing authorships and to determine if these trends persist in other plastic surgery journals.

Quantitative Analysis and 3D Visualization of Breast Plastic Surgery Based on Object Detection and Depth Estimation: Preoperative and Intraoperative Applications

Abstract Presenter: Shuo Li

Abstract Co-Author(s): Mengdi Zhang, Binghan Wang

Objective: Breast-related plastic surgeries, such as implant placement, breast reduction, and breast reconstruction, require detailed preoperative planning. Parameters such as breast area, volume, and bilateral symmetry play a crucial role in selecting implant size, determining the amount of glandular tissue and fat to be removed, and preserving the thickness of the nipple-areola vascular pedicle. In clinical practice, these assessments are typically based on manual markings and subjective evaluations by surgeons using their experience. Artificial intelligence and neural networks can automatically and rapidly identify breast features, enabling fast, accurate, and three-dimensional objective assessments of breast-related metrics.

Methods: This study prospectively included 300 patients scheduled for breast plastic surgery, collecting multi-angle macroscopic photographs preoperatively. Based on deep learning, preoperative breast feature calculation models were constructed using these photographs as input. The main models developed include: an automated breast segmentation model, a feature point detection model (identifying the suprasternal notch and bilateral nipple-areola complexes), a 3D information estimation model, and a symmetry analysis model. These models enabled the automatic calculation of preoperative breast-related features and provided preoperative and intraoperative visualizations to guide surgical decision-making and intraoperative adjustments.

Results: In this study, the automated breast segmentation model achieved a correlation of 0.93 with measured values in identifying breast area size. The feature point detection model achieved a 100% detection rate for the suprasternal notch and bilateral nipple-areola complexes. For the 3D information estimation and symmetry analysis models, the visualized images received a 90% satisfaction rate for preoperative utility, 95% for intraoperative utility, and a 96% long-term patient satisfaction rate during follow-up.

Conclusion: By integrating multi-stage deep learning models, this study established an automated quantitative analysis and 3D visualization evaluation system for breasts based on macroscopic photographs. The system achieved breast area measurement, volume estimation, and symmetry assessment from 2D images. It demonstrated high segmentation accuracy and volume estimation performance, enabling further evaluation of implant size, refinement of preoperative surgical decisions, and prediction of postoperative outcomes. Intraoperative bilateral symmetry visualization allowed for dynamic quantitative adjustments to the surgical plan, achieving high clinical satisfaction. This system provides objective, rapid, and precise breast assessment, offering robust support for refined and personalized treatment of breast plastic surgery patients.

Subcutaneous Ischemic Biomarkers Closely Correlate with Intramuscular Biomarkers and Can Be Used to Detect Peripheral Compartment Syndrome in a Swine Model

Abstract Presenter: Bilal Chaudhry MD

Abstract Co-Author(s): Maria Bejar-Chapa, Eddy Rios, Mitchell Kennedy, Hiroshi Fujimaki MD, Jenna Lambert, Jaeyoung Lee, Katharine Playter, Aviv Liani, Giorgio Giatsidis MD, PhD

Purpose: Peripheral compartment syndrome (PCS) occurs in up to 10% of tibial fractures, with mortality rates as high as 15% in patients requiring fasciotomy. Diagnosis relies on clinical evaluation and intracompartmental pressure (ICP) measurements, which identify only 68% of cases. Prior research shows that although invasive, intramuscular (IM) biomarkers can diagnose PCS. We hypothesized that subcutaneous (SC) biomarkers closely correlate with IM metabolic changes and can detect PCS.

Methods: PCS was induced in the peroneus tertius of Yorkshire swine (Male, ~60 kg, n=22 limbs) using a tourniquet on bilateral thighs. ICP was measured every 30 minutes, and PCS was maintained for ~6 hours. Microdialysis was used to collect hourly interstitial fluid (ISF) samples from muscle (n=22) and overlying SC tissue (n=10). IM and SC ISF were analyzed for glucose, pH, and lactate.

Results: ICP increased after tourniquet inflation (pre-inflation: 15.6mmHg ± 3.9 vs. 6 hours: 54.4mmHg ± 37, $p<0.0001$). There were no significant differences in SC and IM biomarkers at any time point. IM and SC pH decreased significantly at 2 hours ($p=0.005$, $p=0.0007$, respectively) and were highly correlated ($R^2 = 0.911$). SC pH <7.2 had a 100% positive predictive value for detecting PCS. SC and IM glucose showed the highest correlation ($R^2=0.98$). IM glucose decreased significantly at Hour 2, but this was not seen in SC glucose. SC and IM lactate levels increased non-significantly in parallel ($R^2=0.61$).

Conclusions: SC ischemic biomarkers closely correlate with IM changes in a porcine model of PCS. Positive results require confirmation in a pilot clinical trial.

Implementing Advanced Chunking for Improving Retrieval-Augmented Generation Large Language Models' Patient Postoperative Care In Rhinoplasty

Abstract Presenter: Prabha Srinivasagam Phd

Abstract Co-Author(s): Cesar Abraham Gomez Cabello MD, Sahar Borna MD, Syed Ali Haider M.B.B.S., Ariana Genovese, Maissa Trabilsy, Cui Tao, Antonio Forte MD, PhD, MS

INTRODUCTION: Effective postoperative guidance is essential for optimizing patient outcomes and satisfaction after any plastic surgery procedure. Using Retreival-Augmented Generation (RAG), Large Language Models (LLMs) become safer tools for providing accurate postoperative support. However, their performance is dependent on how information is organized for retrieval. Thus, an optimal chunking strategy can notably enhance the accuracy and relevance of the models's responses. In this study, we implemented three different advanced chunking techniques to determine whether they could outperform a naïve RAG-based LLM in providing reliable, precise postoperative advice for rhinoplasty patients.

METHODS: Four different RAG architectures were implemented into Gemini 1.0 Pro, leveraging distinct chunking techniques: (1) proposition, (2) semantic, (3) adaptive, and (4) fixed token-dependent (naïve). Each model was presented with 30 postoperative questions addressing common patient concerns after rhinoplasty, and performance was evaluated in terms of medical accuracy, relevance, precision, recall, and F1 score. A 3-point Likert scale (LS) was used for the former two, and metrics were compared using ANOVA and Tukey's post hoc analysis.

RESULTS: The adaptive chunking model demonstrated the highest medical accuracy of 87% (LS 2.37±0.72), which was significantly superior to the naïve model with a score of 50% (LS 1.63±0.72), p-value of 0.001. The proposition (LS 2.07±0.78) and semantic (LS 2.03±0.76) chunking models achieved 73% accuracy, showing no statistical difference compared to the naïve model. The adaptive chunking model provided the most relevant responses, scoring 93% (LS 2.90±0.40), while the semantic chunking model scored 90% (LS 2.87±0.43), the proposition chunking one scored 87% (LS 2.80±0.55), and the naïve model 80% (LS 2.60±0.81). There was no statistical difference between the models (p=0.18). For precision, recall, and F1 score, the model employing adaptive chunking outperformed the rest by scoring 0.50, 0.88, and 0.64, respectively, followed by the proposition (0.39, 0.71, 0.50), semantic (0.33, 0.75, 0.46), and naïve (0.17, 0.40, 0.24) models.

CONCLUSION: This study demonstrates the critical role of optimizing chunking strategies in enhancing the performance of RAG-based LLMs for postoperative care after rhinoplasty. Although adaptive chunking proved to be significantly superior to fixed-sized chunking, both proposition and semantic chunking improved the models' performance scores. These findings highlight the importance of continuing to identify the best methods for segmenting medical knowledge to improve LLMs' understanding and retrieval. Optimal chunking could ultimately lead to safer and more effective postoperative support.

Post-Injury Controlled Cooling Improves Functional Recovery and Modifies RNA Expression in a Rodent Model of Volumetric Muscle Loss Injury

Abstract Presenter: Eddy Rios

Abstract Co-Author(s): Bilal Chaudhry MD, Hiroshi Fujimaki MD, Daniah Alnafisee MD, Francisco Batiz-Fabela, Giorgio Giatsidis MD, PhD

Purpose: Over 40,000 traumatic volumetric muscle loss (VML) injuries are estimated to occur annually in the US (1,2), with ~20% muscle loss causing disproportionate lasting strength deficits of 30 - 90% (3). The current gold standard rehabilitation, physical therapy, only achieves partial functional recovery of 17 - 58% (4, 5). Our prior murine model of VML showed that post-injury treatment with controlled cooling fluid (CCF) improved recovery of baseline maximal muscle torque (+30%) and resistance to fatigue (+66%); however, molecular mechanisms underlying these changes have not been studied. We performed RNA sequencing analysis to elucidate underlying expression of 'Pro-regenerative' (PR) and 'Anti-regenerative'(AR) genes.

Methods: Female Sprague Dawley rats (n=10 per group) were subjected to excisional injury of the Tibialis Anterior muscle. Post-injury, animals were either followed up with no treatment or subjected to CCF of injured muscles. At 28 days post injury muscle tissue was collected. A differential gene expression analysis tool was used to calculate the log2 fold change (log_2FC) and the p-values between the two groups. Genes were then analyzed to determine function and classify into PR or AR genes.

Results: Compared to controls, CCF-treated animals had 1265 genes with significantly different expression ($p<0.05$ and $log_2FC > 0.2$), with 947 (75%) of them being downregulated in the CCCF group. Among the genes with clear PR and AR functions, 16 of the upregulated genes were PR, 9 of the upregulated genes were AR, 108 of the downregulated genes were PR, and 59 of the downregulated genes were AR. 3 AR genes related to downregulation of angiogenesis, 5 related to slowing of cell cycle progression, 4 related to inflammation, and 1 related to inhibition of structural development were all downregulated in the CCF group.

Conclusions: In rats, CCF improves functional recovery after VML by significantly modifying the expression of over 1000 genes, notably decreasing expression of genes

that inhibit angiogenesis, slow the cell cycle, and increase inflammation. Further testing is needed in a large animal model of VML.

References:

1. Court-Brown CM, Bugler KE, Clement ND, Duckworth AD, McQueen MM. The epidemiology of open fractures in adults. A 15-year review. Injury. 2012 Jun;43(6):891-7. doi: 10.1016/j.injury.2011.12.007. Epub 2011 Dec 27. PMID: 22204774.
2. Population clock. https://www.census.gov/popclock/.
3. Garg K, Ward CL, Hurtgen BJ, Wilken JM, Stinner DJ, Wenke JC, Owens JG, Corona BT. Volumetric muscle loss: persistent functional deficits beyond frank loss of tissue. J Orthop Res. 2015 Jan;33(1):40-6. doi: 10.1002/jor.22730. Epub 2014 Sep 18. PMID: 25231205.
4. Corona, B.T. et al. (2013) 'Autologous minced muscle grafts: A tissue engineering therapy for the volumetric loss of skeletal muscle', American Journal of Physiology-Cell Physiology, 305(7). doi:10.1152/ajpcell.00189.2013.
5. Aurora, A. et al. (2014) 'Physical rehabilitation improves muscle function following volumetric muscle loss injury', BMC Sports Science, Medicine and Rehabilitation, 6(1). doi:10.1186/2052-1847-6-41.

Normalizing Parenthood in Plastic Surgery

Abstract Presenter: Abra Shen MD

Abstract Co-Author(s): Catherine Tang, Mia Do BS. Thais Calderon MD, John Henry Pang MD, Rachel Lentz MD, Wendy Chen MD, MS

Introduction: Trainee physicians often experience feelings of guilt and fear of judgment surrounding pregnancy and lactation. Plastic surgery residents report a negative stigma attached to pregnancy and frequently delay childbearing until after training. Prior studies show that a barrier to parenthood experienced by many trainees is a lack of support and resources by their program. To further investigate, this study aims to examine and understand faculty knowledge and perceptions surrounding family planning, parental leave, and lactation.

Methods: A 21-question Qualtrics-based survey was created based on previously validated surveys in medical literature. This survey was distributed to the American

Council of Academic Plastic Surgeons (ACAPS) membership which includes 503 faculty members. Data on demographics, personal experiences with parenthood, perceptions, and knowledge regarding lactation was collected and qualitatively analyzed.

Results: 35 faculty members completed the survey. The majority of respondents were within the 40 to 49-year age range, 54.3% identified as female, 40% identified as male, and two respondents declined to report their demographics. A large majority (88.7%) of faculty reported having children. Nineteen had a child/children during residency and nineteen had a child/children as an attending. Of those who had children during residency, 31.6% did not take parental leave during residency and 42.1% used vacation time as parental leave. The mean amount of time of parental leave in training was 5.39 weeks, ranging from 0 to 16 weeks. Regarding attitudes towards resident lactation, 100% of faculty members feel comfortable discussing a resident's lactation needs, while all but one strongly support a resident's need to pump. 88.9% of faculty strongly believe their institution has a supportive culture towards lactating residents. 34.3% of faculty agree that there is enough time in the workday for residents to pump. However, over half of faculty (54.3%) agree that the workflow of the operating room is impacted when a resident breaks scrub to pump.

Conclusions: Family planning impacts all levels of plastic surgeons from residents to faculty. Residency programs and faculty are becoming increasingly aware of the importance of supporting lactation in the hospital. However, challenges and stigma remain, especially surrounding the time needed for parental leave and pumping coupled with the intense hours of surgical training. By fostering a more supportive culture within plastic surgery, all plastic surgeons can work towards a healthy balance between surgery and parenthood.

Scrolling for Answers: Assessing the Quality of Information on Youtube Regarding Breast Reconstruction

Abstract Presenter: Natalia Mejia MD

Abstract Co-Author(s): Kevin Vega MD, Alexander Chang, Sydney Barone, Sameer Patel MD

Background: Social media is one of the most accessible sources of information for patients. Symptoms, diagnoses, and treatment options are commonly searched topics

on these platforms which present an overwhelming amount of information. Previous work has shown low quality and reliability of Youtube videos regarding varying medical issues (1). The primary objective of this study was to measure the quality of information presented to a searcher on YouTube regarding breast reconstruction after mastectomy, one of the most common reconstructive plastic surgery procedures.

Methods: A YouTube account was created to reduce search algorithm confounding from prior search history. Breast reconstruction was searched and videos were filtered by popularity. The first unique 100 videos that comprehensively addressed the search term were included. Each video was evaluated by two surgeons using JAMA and DISCERN scoring systems (2)(3). Videos were categorized as hospital or non-hospital affiliated. Two sample t-test was used for statistical analysis.

Results: 60 percent of the videos were hospital affiliated. When analyzed with JAMA and DISCERN scores, there was no difference in quality between hospital-affiliated and non-hospital affiliated videos. On average, both groups scored fair quality (approximately 3 out of 5 points) for the information presented. When DISCERN variables were compared between hospital and non-hospital affiliated videos, we found that non-hospital affiliated videos were significantly better at providing information for authorship and citing references than Hospital-affiliated videos (2.1 vs 2.7, p <0,04). Notably, we found that there is no statistically significant difference in views between non-hospital and hospital affiliated videos (711600 vs 2049600, p . 0,6) and a significantly higher number of likes for videos that were non-hospital affiliated. (5,511vs 3105, p <0,04).

Conclusion: Youtube has now become an essential tool for patient education. Providers should be aware of the quality of content that patients are consuming. Awareness of the quality of content can be an invaluable tool utilized to aid patients' education about complex medical procedures when discussion at the office comes up as short. This study elucidates that video developers can utilize these scoring tools to identify areas of improvement and increase the quality of information offered.

References

1. Kara M, Ozduran E, Mercan Kara M, Hanci V, Erkin Y. Assessing the quality and reliability of YouTube videos as a source of information on inflammatory back pain. PeerJ. 2024;12:e17215. Published 2024 Apr 11. doi:10.7717/peerj.17215
2. Charnock D, Shepperd S, Needham G, Gann R. DISCERN: an instrument for judging the quality of written consumer health information on treatment choices. J Epidemiol Community Health. 1999;53(2):105-111. doi:10.1136/jech.53.2.105

3. Silberg WM, Lundberg GD, Musacchio RA. Assessing, Controlling, and Assuring the Quality of Medical Information on the Internet: Caveant Lector et Viewor-Let the Reader and Viewer Beware. JAMA. 1997;277(15):1244–1245. doi:10.1001/jama.1997.03540390074039

Purified Exosome Product (PEP) Enhances Skin Graft Donor Site Healing: A Phase 1b Clinical Trial

Abstract Presenter: Rou Wan MD

Abstract Co-Author: Steven Moran MD

INTRODUCTION: Exosomes represent the latest cell-free strategy in wound care. However, a readily available clinical-grade exosome product is lacking. Purified Exosome Product (PEP) is a novel, off-the-shelf, clinical-grade exosome product derived from human platelets, with consistent batch quality and a shelf life of 24 months at room temperature. The objective of this study was to determine the safety of the first clinically used PEP in the United States for open wounds.

METHODS AND MATERIALS: This was a phase 1b, prospective, open-label, controlled, randomized, evaluator-blinded clinical trial of PEP in subjects with at least two equal sized split-thickness skin graft (STSG) donor site wounds with one donor site treated with standard of care (SOC) for wounds and the other treated with PEPs. Patients were then divided into low-dose PEP-only group, high-dose PEP-only group and high-dose PEP-TISSEEL group. TISSEEL is a commercially available fibrin based tissue sealant and served as a carrier for PEP in this study. Safety evaluations included occurrence of adverse events, laboratory values, vital signs, and physical examination findings. Wound healing was evaluated using the Vancouver Scar Scale (VSS) and the Photographic Wound Assessment Tool (PWAT) by a board-certified plastic surgeon and a board-certified dermatologist together. The trial is registered at ClinicalTrials.gov (NCT04664738).

RESULTS: Seven subjects were enrolled in the study, with a mean age of 49.3 years (range, 19 to 79). Three male patients and four female patients were included. There were no adverse events related to the treatments. By 4 weeks after treatment, all wounds reached 50% re-epithelialization and 6 (85.7%) of 7 subjects reached 100% re-epithelialization. The application of PEP significantly accelerated wound healing, with

the PEP-treated sites reaching 100% re-epithelialization in an average of 21.8 days, compared to 60.6 days for the SOC sites ($P < 0.05$). The median VSS score was the lowest in the high-dose PEP-only group after 6 months of PEP application across all groups. The total PWAT score was significantly reduced in the high-dose PEP-only group compared to the low-dose PEP-only group at 3 months and 6 months after PEP administration ($P<0.05$). All donor site wounds in the high-dose PEP-only group, including those treated with PEP and those receiving SOC, were closed with intact overlying skin indicated by PWAT=0.

CONCLUSION: PEP is a clinical-grade exosome product that can benefit wound healing with immediate clinical translation. The results of this phase 1b trial showed that a single application of PEP at a dose up to 20% (2 vials) was safe and support additional clinical investigation of PEP in wound management. Wound healing was significantly accelerated in the PEP-treated wounds compared to SOC, with a dose-response effect. Guided by the FDA, this study delivers exosome-based therapies to patients to achieve advancements in wound management safely, conveniently and efficiently. Further clinical efficacy studies are warranted.

A Preliminary Review of the Role of Perioperative Antibiotics in Pediatric Cutaneous Surgery

Abstract Presenter: Cindy Vu

Abstract Co-Author(s): Xinfei Miao, Chizoba Mosieri, James Antongiovanni, Jenny Ventura, Miles Pfaff MD, MHS

Purpose: Antimicrobial resistance is a growing global health concern, associated with heightened treatment failures and increased morbidity and mortality. In surgery, the misuse of perioperative antibiotics has contributed to this issue, highlighting the need for standardized prophylactic protocols. While much research has focused on adults, data on pediatric populations remain scarce, particularly in cutaneous surgery. Despite guideline-driven practices discouraging prophylactic antibiotics for cutaneous surgery, discrepancies still persist. This combined retrospective and prospective study evaluates the impact of these prescribing patterns on clinical outcomes, offering insights into infection risks and plastic surgery-specific practices in pediatric cutaneous procedures.

Methods: A retrospective medical chart review was conducted for patients <18 years of age who underwent cutaneous surgery between August 2014 and January 2025 at a tertiary pediatric hospital. Inclusion criteria required complete medical, antibiotic, and follow-up records (≥30 days), with Class I or II surgical case classifications. Exclusion criteria included infections at the time of surgery, insufficient medical records, or additional concurrent procedures. Data extracted included patient demographics, surgical details (operation type, length, and closure method), case classification, and antibiotic use (duration, type, frequency, and timing relative to surgery). Complications and follow-up information were reviewed, with a surgical site infection (SSI) defined, per CDC guidelines, as an infection of the cutaneous and subcutaneous tissue occurring within 30 days post-surgery. Chi-Square Tests and Fisher's Exact Test were conducted to compare SSI rates between groups.

Results: A total of 338 patients were included, with 284 receiving perioperative antibiotics while 54 did not. Among the antibiotic group, 273 patients received intraoperative antibiotics only, 1 received postoperative antibiotics only, and 10 received both intraoperative and postoperative antibiotics. SSIs occurred in 4 patients (1.41%) in the antibiotic group and 1 patient (2.08%) in the no-antibiotic group. In the antibiotic group, SSIs occurred following superficial excisions on the head, face, chest, and face, while the SSI in the no-antibiotic group occurred after a scalp excision. The documented SSIs included wound drainage, purulence, abscess, and wound cellulitis. The most commonly administered perioperative antibiotic was cefazolin (100 mg/mL). There was no statistically significant difference in SSI rates between the groups (OR 0.76, 95% CI 0.083–6.91, p = 0.58), with the number needed to treat as 227. These findings suggest that perioperative antibiotic use may not significantly impact the risk of SSIs in pediatric cutaneous surgery.

Conclusion: This preliminary review demonstrated low SSI rates in pediatric cutaneous surgery, regardless of perioperative antibiotic use, highlighting the potential for more judicious antibiotic prescribing practices in this population.

Innovative Solutions in Microsurgery: A Validation Study of a Novel, Inexpensive 3D Printed Microscope for Microsurgical Education

Abstract Presenter: Emily Zona

Abstract Co-Author(s): Sahand Eftekari MD, Elizabeth Wu, Mary Carbullido MD, Ellen Shaffrey MD, Weifeng Zeng MD, Aaron Dingle PhD, Samuel Poore MD, PhD

Purpose: Microsurgery is a critical component of plastic and reconstructive surgery. However, the high costs associated with training and equipment pose significant barriers to its adoption, especially in low-resource nations. To address these challenges, the 3D printed microscope was developed by the Microsurgery and Regenerative Medicine Lab within the Division of Plastic Surgery at the University of Wisconsin. This 3D-printed microscope has already been utilized for microsurgery education and training both in the United States and internationally. The primary objective of this study was to validate the use of this novel microscope in microsurgery training and education by surveying surgical residents and attending surgeons about their experiences using this tool relative to traditional magnification methods (e.g., surgical loupes, benchtop microscopes, operating room microscopes).

Methods: In this prospective, multi-institutional validation study, surgical residents and attending surgeons with varying levels of experience in microsurgery were invited to perform a single end-to-end microsurgical anastomosis on blue-blood chicken thigh femoral artery vessels using the 3D printed microscopes. Upon completion of the exercise, the participants completed two surveys evaluating and sharing their experience with the microscope. The surveys collected demographic information of the participants and assessed the microscope's adequacy for microsurgical training, ease of use, educational value, and its potential to enhance teaching capacity both locally and globally.

Results: Among the participants for the first survey (n=26), 10 (38.5%) were attending surgeons, 2 (7.7%) were fellows, and 14 (53.8%) were residents. Of the respondents, 79.2% (19/24) reported that performing the end-to-end anastomosis was either easier or equivalent under the 3D printed microscope compared to using surgical loupes. All participants expressed a willingness to use the 3D printed microscope for microsurgery teaching and practice, citing its adequate quality and educational value. Additionally, 92.3% (24/26) believed that access to 3D printed microscopes would enhance their capacity to teach microsurgery at their institutions, and 96.0% (24/25) agreed it would improve their ability to teach microsurgery in other settings, such as global surgery trips. Comments provided in the survey reflected overwhelmingly positive feedback, with suggestions for enhancements related to ergonomics and lighting.

Conclusion: This validation study of the 3D printed microscopes supports the continued development and refinement of the design based on expert and trainee insight. Implementing these improvements will optimize the microscope's utility in both

local and global microsurgery education courses, ultimately expanding access to microsurgery training worldwide.

Medical Student Perceptions of Global Surgery Practices in Plastic Surgery: Are We Meeting the Mark?

Abstract Presenter: Connor Peck MD

Abstract Co-Author(s): James Clune MD, Jeffrey Friedrich MD

Introduction: Plastic surgery has played a key and visible role in the development of global surgery programs worldwide, which attracts many medical students to the field. This study aimed to identify interest in and perceptions towards global surgery among US medical students interested in plastic surgery, and compare them to students interested in other surgical specialties.

Methods: Medical students matriculating at US-based medical schools were distributed an online survey via Qualtrics. Respondents anonymously answered several questions about personal background and future medical interests, and rated agreement with multiple statements about global surgery on a 5-point Likert scale. Descriptive statistics were used characterize survey responses, with logistic regression used to compare survey answers between students interested in plastic surgery and those in other surgical specialties.

Results: Surveys were completed by 726 students from 37 US-based medical schools. There were 107 (14.7%) students who reported interest in plastic surgery (PS) as a specialty, although the majority of these students (94.4%) also reported interest in at least one other surgical subspecialty. Among all PS students, 58 (54.2%) reported being "very" or "extremely" interested in participating in global surgery programs as a part of their future careers. Students predominantly expressed in participating in surgical trips/missions (91.1%) and research (91.1%), but a majority also expressed a desire to participate in global policy work and/or advocacy (55.4%). Only 26 (44.8%) of PS students interested in global surgery identified as having a mentor in global surgery. Students reported that their mentors predominantly participated in short term trips (80.8%), with less frequent participation in research (57.6%), education (46.1%), or advocacy/policy (26.9%). Only a minority of PS students perceived current global surgery practices to be ethical (44.5%). There were no significant differences in the proportion of students interested in global surgery and mentorship, the perceptions of

global surgery, or future goals in global surgery when comparing PS students with students interested in other surgical specialties.

Conclusion: Despite demonstrating a strong desire to incorporate global surgery into their future careers, students interested in plastic surgery lacked mentorship and reported high concerns about the ethics of current global surgery practices. Efforts to develop – and promote – holistic and ethical global surgery practices may help improve the overall perception of plastic surgery and recruit motivated trainees to the specialty.

Treating Vascular Malformations by Using the ARTIS-pheno System: The Experience of National Taiwan University Hospital

Abstract Presenter: Po-Cheng Huang MD

This study evaluates the effectiveness of using the ARTIS-pheno robotic C-arm system in a Hybrid Operating Room (HOR) for treating vascular malformations. Traditionally, such treatments require separate procedures in an angiography suite followed by surgery in an operating room, increasing risks due to patient transfers. To address this, a HOR was established in 2022, enabling both radiological and surgical interventions in one room, thus enhancing procedural efficiency and patient safety.

Between 2022 and 2024, six cases of vascular malformations were treated using the ARTIS-pheno system, including eyebrow arteriovenous malformations (AVMs), occipital residual AVM, frontal AVM, lymphatic malformations, a large AVM in the right thigh, and an elbow arteriovenous fistula. The procedure involved angiography followed by transarterial embolization using coils or embolization agents, with balloon dilation for flow control by a radiologist. Subsequently, a plastic surgeon performed ligation, excision, and reconstruction in the same setting, eliminating the need for patient transfers.

All vascular malformations were completely resolved, confirmed by follow-up angiography, with no recurrences after six months. Patients reported high satisfaction with their outcomes. This integrated approach significantly reduced the complexity and risks associated with traditional multi-step procedures, leading to improved workflow and enhanced patient safety.

The ARTIS-pheno robotic C-arm system allowed for precise imaging and real-time navigation, facilitating effective embolization and surgical intervention. Additionally, the development of a procedural algorithm improved safety and efficiency by streamlining workflow and reducing patient movement between different rooms.

This study demonstrates that the ARTIS-pheno system in a HOR is an effective and safe approach for treating vascular malformations, offering several advantages, including improved patient safety, better procedural efficiency, and high patient satisfaction. The results suggest that this integrated approach provides high-quality treatment while reducing the risks of traditional methods. However, further studies with larger case numbers are needed to validate these findings and assess the broader applicability of this approach for complex vascular malformations and other intricate surgical procedures.

In conclusion, the use of the ARTIS-pheno robotic C-arm system within a Hybrid Operating Room offers significant advantages in treating vascular malformations. This innovative approach has the potential to improve patient outcomes and procedural efficiency, paving the way for advancements in the management of complex vascular conditions.

A Gamified Approach to Burn Education Among Brazilian Youth: The "Burn Game" Experience

Abstract Presenter: Felipe Goncalves

Abstract Co-Author(s): Vinicius Reis, Vinícius Alves, Bruno Terada, Emily Sampaio, Joao Luis Freitas, Rolf Gemperli, Cristina Pires Camargo MD, PhD

Purpose: Burn injuries are a major global health issue, affecting 8.4 million people annually, with most cases occurring in low- and middle-income countries (1, 2). Children are particularly vulnerable, with 24% of cases affecting those under fifteen, primarily from scald injuries (3). Given the high incidence of burns, prevention strategies are essential. Gamified educational models have gained attention, especially among Generation Z, but digital approaches have faced high dropout rates. This study evaluates the effectiveness of an in-person gamified educational intervention in teaching young students about burn prevention and first aid.

Methods: This study was conducted between October 2023 and August 2024 in three high schools (HS) and one vocational school (VS), totaling four Brazilian public schools. Initially, all students completed a 21-question online test (Pre-Test) focused on the classification and prevention of burns, without access to their scores or the correct answers. Following the test, our group presented a 30-minute lecture covering the same topics as the questionnaire to reinforce the understanding of burn classification and prevention. After the lecture, the students were divided into groups to compete in an interactive online trivia game designed to enhance learning retention and engagement (Burn Game). To further motivate participation, the winning team received customized prizes. Finally, all participants individually retook the 21-question online test (Post-Test). The primary outcome of the study was the difference in scores on Pre- and Post-tests.

Results: A total of 134 young students were enrolled in the study. Out of these, 73 were from VS, and 61 were from HS. The global mean age was 18.58 ± 4.86 years, and 98 (73.13%) participants were female. Analyzing the scores, 132 out of the 134 participants had better scores after the intervention. Globally, we found a 73.9% increase comparing the mean scores of the Pre- and Post-Test (12.66 ± 3.57 vs. 19.82 ± 1.97, $p < 0.001$). In the subgroup analysis, VS students showed a 53.2% increase (14.18 ± 3.01 vs. 20.26 ± 1.28, $p < 0.001$), while HS students showed a 98.6% increase (10.84 ± 3.37 vs. 19.30 ± 2.48, $p < 0.001$).

Conclusion: With substantial difference in scores between the Pre- and Post-Test, our study suggests that gamified teaching was indeed able to significantly increase students' knowledge about burn prevention and classification.

(1) Yakupu A, Zhang J, Dong W, et al. The epidemiological characteristic and trends of burns globally. BMC Public Health. 2022;22(1):1596. doi:10.1186/s12889-022-13887-2.
(2) Rybarczyk MM, Schafer JM, Elm CM, et al. A systematic review of burn injuries in low- and middle-income countries: epidemiology in the WHO-defined African region. Afr J Emerg Med. 2017;7(1):30-37. doi:10.1016/j.afjem.2017.06.003.
(3) Haynes HJG. Fire loss in the United States during 2016. National Fire Protection Association. Published 2017. Accessed November 15 2023. https://www.cafsti.org/wp-content/uploads/osFireLoss.pdf.

Exploring the Scope of TriNetX in Plastic Surgery: Large-Scale Insights into Aesthetic and Reconstructive Procedures

Abstract Presenter: Yash Mehta

Abstract Co-Author(s): Steven Molina, Medha Vallurupalli, Christopher Reid MD

Background: Large, multi-institutional databases have increasingly enabled robust and efficient research in plastic surgery by aggregating real-world patient data. TriNetX stands out as a powerful data and analytics platform that centralizes de-identified health records from numerous healthcare systems. This global federated real-world network allows investigators to perform comprehensive outcomes research with advanced statistical capabilities such as propensity score matching and logistic regression. Previous TriNetX-based studies in plastic surgery have compared surgical site occurrences in different breast reconstruction techniques, examined the impact of COVID-19 on procedural volumes, and investigated risk factors such as obesity for postoperative complications. These examples underscore the platform's versatility for analyzing trends, patient characteristics, and outcomes across diverse populations. This study aims to demonstrate the utility of TriNetX in plastic surgery research by analyzing sample sizes for common procedures and highlighting its potential for advanced statistical analyses.

Methods: We queried the TriNetX Global Collaborative Network to identify patient samples associated with several frequently performed plastic surgery procedures, spanning both aesthetic and reconstructive domains. Our primary goal was to assess the magnitude of available datasets rather than to perform an in-depth clinical comparison. We also reviewed TriNetX's in-platform analytical features-including propensity score matching, logistic regression, and time-to-event analysis-to evaluate their applicability in plastic surgery outcomes research.

Results: TriNetX queries revealed substantial cohorts, including over 77,000 patients for breast reduction and more than 20,000 for breast augmentation. Blepharoplasty and liposuction also had large sample sizes, reflecting the platform's breadth. A total of 233 TriNetX-related plastic surgery publications were found on Google Scholar and 34 on PubMed. Google Scholar listings rose from 8 in 2020 to 113 in 2024, while PubMed results increased from 3 in 2021 to 20 in 2024-likely due to Google Scholar's broader indexing criteria. These trends underscore TriNetX's growing prominence in the field, and a systematic review is pending to further evaluate the scope and impact of these studies.

Conclusions: TriNetX offers an unprecedented opportunity for large-scale, evidence-based research in plastic surgery by integrating diverse clinical data and advanced analytics in a single platform. Researchers can use TriNetX to efficiently examine trends in procedural volume, explore patient demographics and comorbidities, and compare

techniques using robust propensity score methods. Future investigations leveraging TriNetX are poised to advance best practices in plastic surgery through improved identification of risk factors, evaluation of novel interventions, and ongoing assessment of surgical outcomes. By capitalizing on the platform's wide-ranging data and real-time analytic features, plastic surgeons and researchers can enhance patient care, refine clinical guidelines, and drive innovation throughout the specialty.

Ex-vivo Preservation and Study of a Non-Human Primate Partial Face Transplant Model Using Sub Normothermic Machine Perfusion.

Abstract Presenter: Haizam Oubari MD

Abstract Co-Author(s): Loic Van Dieren, Yanis Berkane MD, Msc, Korkut Uygun, Curtis Cetrulo Jr., MD, FACS, Alexandre Lellouch

PURPOSE: Vascularized composite allografts (VCAs) face substantial challenges, particularly in immunosuppression and ex vivo preservation. Subnormothermic machine perfusion (SNMP) offers a promising alternative to conventional static cold storage for preserving and reconditioning VCAs. This study evaluates our extended SNMP protocol, optimized for non-human primate (NHP) VCAs, and its impact on graft immunogenicity, paving the way for future ex vivo preconditioning strategies.

METHODS: Partial facial grafts were procured from non-human primates (NHPs) that had undergone terminal organ donor procedures, with body weights ranging from 4 to 8 kg (n=6). The grafts were perfused for 18 hours using a non-recirculating Steen+ solution under a low-flow, high-oncotic protocol previously optimized for VCAs. Parameters including pressure, flow, weight gain, and metabolic markers (lactate, pH, O_2, ions) were monitored every hour for the first 6 hours and every 3 hours for the remaining 12 hours of perfusion. Pre- and post-perfusion tissue samples were collected to analyze the skin immune compartment (FACS), gene expression profiling, and tissue histology. Outflow perfusate samples were taken at every time point for cytokine and Lactate Dehydrogenase analysis (Multiplex).

RESULTS: The grafts had a mean warm ischemia time of 3 hours before perfusion initiation. Following 18 hours of continuous SNMP, mean weight gain remained below 10%. Perfusion parameters and histological analysis indicated stable ex vivo metabolic equilibrium and well-preserved tissues, consistent with findings from previous models.

Leukocyte viability was maintained in the skin. The leukocyte count in the skin remained stable throughout the experiment with no significant perfusion washout effect observed, while the number of leukocytes in the outflow decreased at H18, though not reaching statistical significance. Endothelial cells constituted less than 20% of the cellular population in the perfusate throughout the experiment. The cellular stress response to perfusion was characterized, with IL-6 showing the most significant increase during perfusion.

CONCLUSIONS: We present the first application of continuous SNMP in the experimentally relevant NHP partial face transplant model, advancing the understanding of the model's response to extended ex vivo preservation and laying the foundation for future ex vivo preconditioning strategies in conjunction with tolerance induction protocols.

An Analysis of Autologous Flap vs. Implant Breast Reconstruction Content on TikTok

Abstract Presenter: Kristina Khaw

Abstract Co-Author: Stephen Lu MD

Purpose: Breast reconstruction after mastectomy entails a complex discussion of multiple options and a nuanced balance of risks, benefits, and alternatives. Social media, however, remains a common source of sharing and receiving information, medical or otherwise, for many patients and family members. This study aims to evaluate the TikTok breast reconstruction landscape and analyze the representations of implant versus free flap reconstructions.

Methods: A review of 500 TikTok posts discovered using #DIEP, #diepflap, #flap, #freeflap, #breastreconstruction, #breastimplant, #siliconeimplant, #salineimplant, on TikTok was performed on June 28th, 2024. Engagement (likes, comments, bookmarks, shares), post categories (reconstructive option, content, audience) and creator characteristics (followers, relation, main content) between platforms were collected. An ANOVA analyzed engagement metrics and followers while a chi-square test analyzed the post and creator characteristics between types of reconstructions.

Results: 263 mentioned free flaps (52.6%), 174 mentioned implants (34.8%), and 63 (12.6%) mentioned both. However, free flap reconstructions had substantially less engagement, with significantly fewer average views (free flap: 54333.2, implant: 230287.7, both: 25185.5, $p < 0.001$), likes (free flap: 54333.2, implant: 230287.7, both: 25185.5, $p < 0.001$), and bookmarks (flap: 83.3, implant: 266.2, both: 76.6, $p = 0.025$). However, comments (free flap: 177.0, implant: 111, both: 50.9) and shares (free flap: 160.0, implant: 110.8, both: 65.9) were not significantly different. Although free flap and implant posts did not have a significantly different audience, posts about both targeted patients (82.5%, $p = 0.002$). Free flap posts were more likely to be update videos (40.7%, $p < 0.001$) while implant (27.6%) and posts about both (38.1%) were more likely to be educational. Implant-based post creators had significantly more average followers (441069.6, free flap: 33718.5, both: 25185.4, $p < 0.001$). Free flap post creators were also more likely to be patients (73.4%, $p < 0.001$) compared to implant creators (59.8%). Posts about both reconstruction options were more likely to be a medical provider (57.1%). Main content categories were significantly different ($p < 0.001$) with most free flap creators making daily life (33.1%) and cancer journey (25.9%) videos compared to the mainly medical educational posts of others (implants: 31.0%, both: 46.0%).

Conclusion: Although free flap reconstructions were mentioned in the majority of breast reconstruction posts (65.2%), those posts had significantly less "influence" based on audience engagement and creator impact. Implant videos were often cross-tagged with aesthetic videos, potentially increasing their visibility within TikTok's algorithm and elevate post interaction. This study highlights the positive efforts of patients and providers to increase awareness of free flap breast reconstruction, while also emphasizing the need for greater engagement and higher quality education for both patients and the general public.

Predicting Match in Integrated Plastic Surgery Utilizing Applicant Letters of Recommendation

Abstract Presenter: Skyler Palmer

Abstract Co-Author(s): Zain Aryanpour MD, Nargis Kalia, Ansley Wallace, Phuong Nguyen MD, Katie Egan MD

Introduction: Integrated plastic surgery is amongst one of the most competitive residencies to match. Previous studies have identified predictors of matching such as

research productivity, Step 1 scores, and ranking in the standardized letter.1 The importance of narrative letters of recommendation (LOR) is well known; however, previous models to predict match have not incorporated data from them. The purpose of this study is to develop a model that incorporates applicant data and the content and authorship of LOR to accurately predict matching into integrated plastic surgery.

Methods: A retrospective review was performed on all integrated plastic surgery applicants in the 2023-2024 application cycle. Applicant demographics, scores, research productivity, narrative LOR, and standardized letters with scores were obtained. Letter author characteristics were also obtained from each letter of recommendation. Applicants with key demographic variables missing were removed from the final analysis.

Linguistic analysis was performed on all narrative LOR with Linguistic Inquiry and Word Count (LIWC-22) using a customized data dictionary. To explore the relationship between the key variables and matching, LASSO (Least Absolute Shrinkage and Selection Operator) was used to build the multivariable logistic model. Receiver Operating Curve was used to evaluate the predictive performance of the model with and without narrative letter analysis and letter author data using the area under the curve (AUC).

Results: A total of 189 applicants were included. The model revealed variables most predictive of matching were higher Step 2 scores (OR=1.06, p=0.003), greater number of podium presentations (OR=1.09, p=0.01). Furthermore, greater mentions of words describing an applicant as likable/communal within the narrative LOR was predictive of match. Applicants who are not MD seniors (OR=0.30, p=0.07) or who had an overall rank >5 in the standardized letter may have worse odds of matching (OR=0.23, p=0.04).

The AUC for the model without narrative letter analysis and author data was 0.8081. However, when letter content and author data was added to the final model, the AUC improved to 0.8875 demonstrating a successful prediction of match 88.75% of the time.

Discussion: This is the first study to utilize applicant letters of recommendation to predict matching into integrated plastic surgery. Step 2 scores, number of podium presentations, and likability were predictive of successful match, while lower overall rank and DO or IMG applicant status were predictive of not matching. Furthermore, addition of the content and authorship data improved the accuracy of the model demonstrating the importance of these variables in predicting match.

References:

Thomas HC, Chen S, Narisetti L, Janis JE, Perdikis G, Drolet BC. The Utility of the Plastic Surgery Standardized Letter of Recommendation Form in Predicting Residency Match Outcomes. J Surg Educ. 2023 Jul;80(7):948-956. doi: 10.1016/j.jsurg.2023.04.012. Epub 2023 May 5. PMID: 37150702.

Development of a deep learning-based tool to assist wound classification

Abstract Presenter: Pan Yi-Hsiang MD

Abstract Co-Author: Cherng-Kang Perng M.D., Ph.D.

Purpose: Accurate wound classification is essential for effective wound management, yet well-trained specialists are often unavailable in primary healthcare settings perfectly. This study presents a deep learning-based wound classification tool capable of identifying five key wound conditions-deep wounds, infected wounds, arterial wounds, venous wounds, and pressure wounds-using color images captured by readily available cameras. The model's performance was evaluated against medical personnel to assess its clinical applicability.

Methods: A convolutional neural network (CNN)-based multi-task deep learning model was developed to classify wounds based on images obtained from 1,429 patients (900 men, 529 women; mean age: 62.6 ± 18.5 years) at a single institution. A total of 2,149 wound images were reviewed by a wound specialist and annotated for five binary classification tasks. The dataset was divided into training (80%) and testing (20%) cohorts, ensuring patient-level partitioning. Model performance was assessed using accuracy, sensitivity, specificity, and the area under the receiver operating characteristic curve (AUC). A comparison with seven medical personnel (two attending surgeons, two residents, one nurse practitioner, and two registered nurses) was conducted using Cohen's kappa coefficient.

Results: The model demonstrated high classification performance across all five wound types, with AUC values of 0.804 for deep wounds, 0.751 for infected wounds, 0.897 for arterial wounds, 0.924 for venous wounds, and 0.940 for pressure wounds. When compared to human medical personnel, the model exhibited significantly superior or non-inferior performance across all classification tasks. Sensitivity analysis revealed that the model performed comparably to experienced wound specialists but outperformed junior personnel in key classification tasks. The model struggled with

venous wound classification due to class imbalance, which was reflected in a lower sensitivity (63.2%) despite maintaining high specificity (97.5%). Receiver operating characteristic (ROC) analysis further confirmed that the model's performance was either comparable to or exceeded that of human raters, particularly in arterial and pressure wound classification.

Conclusion: The proposed deep learning model provides a reliable and efficient method for wound classification, with performance that is either comparable to or exceeds that of human medical personnel. Its compact architecture allows for potential deployment in telemedicine applications, facilitating automated wound assessment in primary care settings where wound specialists are not readily available. By integrating deep learning into wound care, this model could improve diagnostic accuracy, optimize resource allocation, and enhance patient outcomes. Further research is needed to improve model generalizability by incorporating additional imaging datasets and integrating non-visual patient data such as clinical history and laboratory findings.

References

(1) Harding K, et al. Adv Wound Care. 2013;2(5):149-150.
(2) Sen CK. Plast Reconstr Surg. 2009;124(4 Suppl):10S-17S.
(3) Frykberg RG, Banks J. Adv Wound Care. 2015;4(9):560-582.
(4) Chang M, et al. Int Wound J. 2021;18(3):276-286.
(5) Yadav G, et al. IEEE Access. 2020;8:147479-147492.

Does metformin lotion mitigates UVB-induced damage and hyperpigmentation in human skin? An ex-vivo study.

Abstract Presenter: Aniekanabasi Ufot

Abstract Co-Author(s): NARESH MAHAJAN, Alexa Rivera del Rio Hernandez MD, Jose, Antonio Arellano MD, Samantha Bosco, Ethan Banks, Francesco Egro MD, Msc, MRCS, Jeffrey Gusenoff MD, J. Peter Rubin MD, Asim Ejaz PhD

Introduction: Ultraviolet B (UVB) radiation is a significant environmental stressor that causes various skin disorders, including DNA damage, inflammation, hyperpigmentation, and epidermal structural changes. Chronic UVB exposure leads to cumulative skin damage, contributing to photoaging and carcinogenesis, while acute high-dose exposure results in immediate epidermal injury and inflammation. Although

melanin production is protective, it is often dysregulated, causing hyperpigmentation disorders therefore identifying effective therapeutic agents to mitigate UVB-induced skin damage is critical. Metformin, an antidiabetic drug with antioxidant, anti-inflammatory, and DNA repair properties. This study investigates metformin's protective effects on human skin perfusion model exposed to acute and chronic UVB radiation.

Materials and Methods: Full-thickness human skin flaps, obtained as surgical waste, were maintained on a perfusion system and exposed to UVB radiation. The study was comprised of three study groups, Control (no exposure), chronic UVB (received 200 mJ/cm² UVB daily for seven days), and acute UVB (received a single dose of 1400 mJ/cm²). Each group was subdivided into metformin-treated and without metformin groups, with a non-UVB-exposed as control. Topical metformin (0.5%) was applied immediately after each UVB exposure in the UVB exposed groups. Skin biopsies were collected at days 0, 1, 3, 5, and 8. Histological analysis was performed using Hematoxylin and Eosin (H&E) staining for epidermal and dermal integrity, Fontana-Masson staining for melanin deposition, and gamma-H2AX (γH2AX) staining to detect DNA double-strand breaks as a marker of DNA damage.

Results: Both acute and chronic UVB exposure induced visible epidermal thinning, separation of the dermo-epidermal junction, and increased melanin production. Fontana-Masson staining confirmed an increase in melanin deposition in both UVB treated groups, with the chronic exposure showing cumulative pigmentation over time. However, both chronic and acute UVB treated groups with metformin-treatment showed reduced melanin levels in comparison. H&E staining showed widespread epidermal separation and structural disorganization in only UVB exposed groups, particularly at later time points (days 5-8). In contrast, metformin-treated UVB exposed groups exhibited improved epidermal integrity and reduced separation, suggesting enhanced tissue resilience. γH2AX staining revealed elevated DNA damage in the acute UVB group from 24 hr post-exposure and beyond, while chronic UVB exposure showed progressive DNA damage. Metformin-treated UVB exposed group showed fewer γH2AX positive cells, indicating protection against UVB-induced DNA strand breaks. Control biopsies remained intact with minimal pigmentation and no/baseline DNA damage.

Conclusions: Metformin demonstrated a protective role in mitigating UVB-induced skin damage, hyperpigmentation, and genetic injury in an ex vivo skin perfusion model. Metformin offers a promising therapeutic strategy for preventing UV-induced skin disorders, and this model serves as a valuable platform for further research on UVB-induced damage and protective agents. Further investigation is underway to confirm the protective effects and will be repeated to check the reproducibility of the data.

Dollar Microsurgery – A Highly-Accessible Microsurgical Training Platform for Internal Mammary Vessel Anastomosis

Abstract Presenter: Ryan Bender MD

Abstract Co-Author(s): Rachel Rohrich, Ryan Lin MD, Kenneth Fan MD, David Song MD, MBA, FACS

Background: For many plastic surgery residents, early microsurgery training involves anastomoses of artificial vessels pinned to a flat platform. This practice, while valuable, provides limited application to microsurgery within a depressed cavity, as is the case for internal mammary (IM) artery and vein anastomosis during microsurgical breast reconstruction, commonly performed with a deep inferior epigastric perforator (DIEP) flap. With the severity of possible complications arising from access of the IM vessels for microsurgical anastomosis - including flap failure, pneumothorax, and hemorrhage - it is critical to maximize resident pre-operative preparedness. Given the rising access to 3D printers in the academic setting, our team developed an ultra-low-cost microsurgical platform, using a 3D-printed base to replicate the sternum and ribs, with a 3D-printed retractor and customizable layers of commonly-available dressing supplies to mimic the mastectomy skin flaps and typical retractor placement.

Methods and Materials: DICOM data from a de-identified non-contrast CT Chest was used to generate a 3D model of the sternum and ribs, then printed in poly-lactic acid (PLA) with a 3D-printer (Ender 3). A modified Richardson retractor was designed and 3D-printed in similar fashion. Foam tape and 4x4 gauze were used to imitate soft tissue to mimic the mastectomy flaps, with foam tape and a 500 mL bag of normal saline used to mimic the bulk of the DIEP flap. Practice vessels were generated from the cuffs of sterile gloves which were prepared into tubular segments (1). The components were then arranged to mimic IM vessel access as encountered in a DIEP flap. Residents from PGY1 to PGY6 practiced microsurgical anastomoses on the model and then completed a survey evaluating the model and their microsurgical competencies using a Likert scale (with 5 being highest competency and strongest agreement).

Results: The designed components were printed in PLA for $1.00 per rib model and $0.45 per Richardson ($0.015/g filament). Plastic surgery residents across several years of training utilized the model effectively, with the majority of participants noting

increased competency in vessel access, anastomosis technique, hand-eye coordination, and overall confidence after model use.

Conclusions: Our ultra-low-cost model promotes anticipation of and preparation for the challenges of internal mammary vessel microsurgery, enabling training within the anatomic confines of the third rib access site. Our model can be replicated worldwide by anyone with access to a 3D-printer and common medical supplies.

1 - Almarghoub MA. A Simple and Cost-effective Method for Practicing Microsurgery. Plast Reconstr Surg Glob Open. 2019 Mar 14;7(3):e2146. doi: 10.1097/GOX.0000000000002146. PMID: 31044117; PMCID: PMC6467636.

Evaluating the Utility of Virtual Reality DIEP Flap Vessel Mapping in Plastic Surgery Trainee Education

Abstract Presenter: Joseph Quick

Abstract Co-Author(s): Ali Foroutan, Berk Ozmen MD, Stephanie Wythe MD, William Albabish, Graham Schwarz MD

Background: Standard two-dimensional (2D) computed tomography angiography (CTA) is the current gold standard for preoperative visualization of the abdominal vasculature prior to deep inferior epigastric artery perforator (DIEP) flap autologous breast reconstruction. Virtual reality (VR) technologies offer an immersive, three-dimensional (3D) view of abdominal CTA scans that may enhance the visuospatial understanding of the DIEP flap vessels critical to this procedure. In this proof-of-concept study, the authors explore the educational efficacy of 3D VR compared to 2D CTA visualization in the context of DIEP flap vessel mapping.

Methods: A prospective, proof-of-concept case study using a female cadaveric model was conducted at a single academic institution. Post-mortem CTA images were obtained and then reconstructed and exported to a VR headset. The abdominal vasculature was then visualized using both VR and CTA modalities by two advanced plastic surgery trainees. Following visualization with the different modalities, participants drew 3D maps of the abdominal vasculature in a virtual environment. Participants also completed a comprehensive questionnaire evaluating their anatomical understanding of the DIEP vessels and individual experience using the technology. Participant drawings

were evaluated in multiple domains by a blinded board-certified plastic surgeon using a five point Likert scale.

Results: Plastic surgery trainees identified more perforators when using 3D VR compared to 2D CTA. Plastic surgery trainee drawings were also rated to have a greater degree of anatomical completeness, detail, and clarity compared to 2D CTA. Furthermore, participants survey results showed trainees felt that 3D VR outperformed 2D CTA in providing a better understanding of DIEP vessel anatomy and complex vascular relationships. Trainees also rated 3D VR higher in terms of ease of identifying perforators, and felt that 3D VR was more intuitive, efficient, and user-friendly compared to 2D CTA. Overall, it was found that trainees preferred 3D VR over 2D CTA and performed equally or better when using 3D VR, highlighting its potential as an alternative modality for preoperative DIEP flap planning.

Conclusion: This preliminary analysis shows that VR visualization may prove useful in DIEP flap vessel mapping and plastic surgery trainee education. Future directions include obtaining additional data from plastic surgery trainees and performing cadaveric dissections to determine if enhanced anatomical understanding from preoperative 3D VR visualization translates to enhanced surgical precision and skill.

Exploring the Therapeutic Potential of Adipose-Derived Stem Cells in Attenuating Skin Fibrosis: Insights from a Bleomycin-Induced Murine Model

Abstract Presenter: Liquan Wang MD

Abstract Co-Author: Xiao Long MD

Background: Scleroderma, characterized by excessive collagen deposition and dysregulated immune responses, leads to debilitating skin fibrosis. Adipose-derived stem cells (ADSCs) exhibit antifibrotic and immunomodulatory properties, but their dynamic interactions within fibrotic microenvironments remain underexplored. This study investigates the temporal effects of ADSCs on skin fibrosis and elucidates their molecular mechanisms.

Methods: A bleomycin (BLM)-induced skin fibrosis model was established in C57BL/6J mice. GFP-labeled ADSCs were subcutaneously injected into fibrotic lesions, with follow-up analyses at days 1, 7, 14, and 21 post-injection. Histopathological evaluation

(H&E, Masson's trichrome, α-SMA staining), qRT-PCR, flow cytometry, and RNA sequencing were performed to assess fibrosis progression, inflammatory cytokine levels, and ADSC behavior. In vitro co-culture experiments with human scleroderma-derived fibroblasts validated key pathways.

Results: ADSCs localized preferentially to hair follicles and perivascular regions, with survival declining by day 21. BLM-induced dermal thickening, collagen disorganization, and α-SMA expression were significantly reduced by ADSC treatment ($p<0.05$). Proinflammatory cytokines (TNF-α, IL-6, IL-1β) surged post-BLM induction but decreased sharply after ADSC administration. RNA sequencing revealed time-dependent transcriptomic shifts: immunomodulatory pathways (e.g., IL-6 production, VEGF signaling) dominated at day 7, while antifibrotic pathways (collagen matrix regulation, TGF-β/Smad inhibition) emerged by day 14. TSG-6, a critical antifibrotic mediator, was upregulated in ADSCs within fibrotic environments. Silencing TSG-6 in ADSCs abolished their antifibrotic effects, restoring COL1 and α-SMA expression in fibroblasts ($p<0.05$). In vivo, TSG-6-deficient ADSCs failed to suppress TGF-β/Smad2/3 activation, confirming its pivotal role.

Conclusion: ADSCs exert dual-phase therapeutic effects: early immunomodulation (days 1–7) followed by sustained antifibrotic action (days 14–21), mediated partly via TSG-6-dependent TGF-β/Smad pathway inhibition. These findings highlight ADSCs as a promising cell-based therapy for fibrotic skin disorders, offering insights into optimizing timing and mechanisms for clinical translation.

Computer Vision for Classification of Pain Sketch for Amputees Using Custom Convolutional Neural Networks

Abstract Presenter: Arya Rao

Abstract Co-Author(s): Floris Raasveld MD, Omar Moussa MD, Anna Luan MD, Krystle Tuano MD, Ian Valerio MD, MS, MBA, FACS, Kyle Eberlin MD

Purpose: Pain sketches can qualitatively depict neuropathic pain and predict surgical outcomes after targeted muscle reinnervation (TMR) in lower extremity (LE) amputees (1-5). This study aims to develop a machine learning (ML) tool to automate the analysis of these drawings.

Methods: Pain sketches were obtained from adult transtibial or transfemoral amputees who underwent unilateral primary or secondary TMR at a tertiary care center (2021-2024). Sketches were resized, grayscaled, and mirrored. Clinical experts labeled the images based on pain categories: focal (FP), radiating (RP), diffuse (DP), or no pain (NP). A convolutional neural network (CNN) was trained to classify sketches into the categories. Data was split into training, validation, and test sets (70%, 15%, 15%). Binary classification models were built and evaluated using precision, recall, F1-score, and area under the receiver operator characteristic (AUROC).

Results: We included 588 sketches from 68 primary and 138 secondary LE TMR patients. The NP vs. DP classification model achieved the highest AUROC (0.799), while other models ranged from 0.587 to 0.760. Unsupervised clustering revealed distinct pain patterns not captured by human categorization.

Conclusions: Computer vision and ML techniques can be used to successfully classify pain sketches in LE amputees, automating the identification of common pain distributions. This tool has potential clinical utility in assisting surgeons with preoperative planning for neuroma-related surgical interventions, particularly for patients undergoing TMR.

1. Hwang CD, Hoftiezer YAJ, Raasveld FV et al. Biology and Pathophysiology of Symptomatic Neuromas. Pain. Published online 2023. doi:PAIN-D-22-01167R1
2. Eberlin KR, Ducic I. Surgical algorithm for neuroma management: A changing treatment paradigm. Plast Reconstr Surg Glob Open. 2018;6(10):1-8. doi:10.1097/GOX.0000000000001952
3. Gfrerer L, Hansdorfer MA, Ortiz R, et al. Patient Pain Sketches Can Predict Surgical Outcomes in Trigger-Site Deactivation Surgery for Headaches. Plast Reconstr Surg. 2020;146(4):863-871. doi:10.1097/PRS.0000000000007162
4. Gomez-Eslava B, Raasveld F V, Hoftiezer YA, et al. Pain Sketches Demonstrate Patterns of Pain Distribution and Pain Progression following Primary Targeted Muscle Reinnervation in Amputees. Plast Reconstr Surg. Published online May 26, 2023:online ahead of print.
5. Raasveld F V., Hao D, Gomez-Eslava B, Hwang C, Valerio IL, Eberlin KR. Predictive Value of Pre-operative Pain Sketches in Lower Extremity Amputees Undergoing Secondary Targeted Muscle Reinnervation for Treatment of Neuropathic Pain. J Am Coll Surg. under peer review.

Do it Again: The Case for Better Methodologic Transparency in NSQIP (Plastic Surgery) Research

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BACKGROUND: The American College of Surgeons' National Surgical Quality Improvement Program (NSQIP) database tracks 30-day postoperative outcomes across >150 perioperative variables. To analyze NSQIP data, researchers write code in languages like R or Python. However, most clinical journals do not require the publication of analytical code, making reproduction of NSQIP-based research challenging. Without the original code, researchers must infer methodological details that impact study findings. As experimental protocols are necessary for reproducing wet lab experiments, specific code is essential for replicating computational analyses. For example, in a study on 30-day readmission rates, researchers use NSQIP's readmission classifications of "Yes" (readmitted), "No" (not readmitted), or "NA" (missing data). In 2021, 95% of cases were labeled "NA", forcing researchers to exclude these cases or assume patients were not readmitted. Such choices go unreported yet influence study outcomes. This study assesses reproducibility in NSQIP-based research by replicating three plastic surgery studies, evaluating the impact of undisclosed methodological decisions on patient cohort selection and statistical outcomes.

METHODS: A PubMed search identified studies using NSQIP. Articles using pediatric, geriatric, procedure-targeted, or additional datasets were excluded as they require additional access. Three plastic surgery articles were selected for reproduction using NSQIP data from 2005-2023. Each study's methodology was reviewed, and an independent analysis was performed following the described methods. Reproduced statistical results were compared with published findings.

RESULTS: The literature search identified 2,699 studies using adult NSQIP data, including 252 plastic surgery articles. None of the studies published their code. Three articles were selected from the Journal of the American College of Surgeons, Aesthetic Surgery Journal, and Microsurgery examining immediate breast reconstruction (IBR), outpatient cosmetic outcomes, and free flap outcomes by frailty index, respectively. None of the patient cohorts or statistical analyses were fully replicated. In reproducing the IBR study, 14,260 cases were identified compared to 18,194 cases published. Both the original and reproduced analyses showed significant associations between race, cardiovascular comorbidities, and complication rates. However, the reproduced analysis

also identified a significant association between pulmonary comorbidities and complication rates not reported in the original study. Similarly, reproduction of the cosmetic study identified 2,586 outpatient cosmetic cases compared to 2,879 published. The original analysis found operative time as a significant predictor of readmission, whereas the reproduced logistic regression instead identified obesity. For the free flap study, demographic trends across frailty scores were similar, but statistical significance varied. Both original and reproduced analyses found length of stay, mortality, and infection rates differed by frailty, but unplanned readmission was only significant in the original study.

CONCLUSIONS: NSQIP is a widely used database in plastic surgery; however, our attempt to replicate three studies revealed that without access to the original methodology or code, patient cohorts and statistical findings could not be fully reproduced. As the original studies were well-designed and peer-reviewed, these discrepancies do not invalidate their findings, but instead highlight how unreported methodological choices influence results and hinder reproducibility. Journals should encourage clear methodological reporting, including code publication, to enhance verification and trust in NSQIP-based research.

Modulation of Key Lymphangiogenic Pathway and its Effect on Lymphedema: a Mouse Model

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Purpose: Breast cancer related lymphedema (BCRL) is a chronic disease with a significant impact on patients lives. The disease pathology is driven by Th2 mediated inflammation, resulting in fibrosis, chronic inflammation, and skin changes. Previous therapies targeting the vascular endothelial growth factor (VEGF) pathway, particularly VEGF-C (the primary ligand for VEGFR3), have promoted lymphangiogenesis but also increased inflammation, vessel leakage, and tumor spread. Therefore, our lab aimed to investigate a VEGFC independent method to modulate lymphatics and used an intracellular modulation of receptor tyrosine kinase signaling to bypass the effect of VEGF-C and assess the effect on secondary lymphedema pathology. We used

lymphatic gain and loss of function models, by employing PTEN-deficient and PI3K-deficient mice to test this hypothesis.

Methods: We utilized two mouse models, LEC specific PTEN knockout (LECPTEN) and LEC specific PI3K knockout (LECPI3K), with wild type (WT) mice as controls. We performed tail lymphatic excision to induce lymphedema and euthanized the mice at the 6-week time-point, after which we performed flow cytometry, H&E and immunofluorescence staining. We also performed a functional study using TritC conjugated to high molecular weight dextran, ensuring the molecule is only taken up by lymphatic vessels. For statistical analysis, we used the Kruskal Wallis test to identify differences between our three groups.

Results: Following tail lymphatic excision, LECPTEN mice demonstrated significantly increased lymphangiogenesis evidenced by an increase in both lymphatic vessel density distal to the wound, and bridging vessel formation across the wound, as compared to LECPI3K and WT mice ($p<0.0001$). Functional analysis showed that LECPTEN mice had increased amounts of TritC uptake, as compared to LECPI3K and WT mice, showing that the observed lymphangiogenesis resulted in vessels that were effective ($p=0.002$ overall). Epidermal thickness differed across the groups, with LECPTEN showing the thinnest epidermal thickness, and LECPI3K mice the thickest (LECPTEN vs. LECPI3K mice, $P=0.0053$). Interestingly, tail lymphedema and fibrosis following surgery did not differ between groups (overall $P=0.2423$, $n=6$/group), despite the above-mentioned differences. In addition, we did not find significant differences in tissue inflammation using flow cytometry to analyze T cells, macrophages, and neutrophils.

Conclusion: This study suggests that increased lymphangiogenesis alone is not a viable method of decreasing the pathologic changes of lymphedema thus highlighting the importance of inflammation in this disease. These findings may provide a rationale for the inconclusive findings of prior clinical trials using lymphangiogenic approaches. Thus, modulation of inflammatory responses (with or without changes in lymphangiogenesis) may be a more fruitful approach.