2023 WINNER

Group 1, Abstract #1

Single-Staged Burn Reconstruction: A Paradigm Shifting Approach to Improve Epithelization and Volume Loss

Yadira Villalvazo, MD
University of Pittsburgh Medical Center

The George Manstein, MD Award
Overall 1st Place

SINGLE-STAGED BURN RECONSTRUCTION: A PARADIGM SHIFTING APPROACH TO IMPROVE EPITHELIZATION AND VOLUME LOSS

INTRODUCTION: Thermal burns are highly morbid injuries that present a unique challenge given their complex pathophysiology. Interventions often require stage- reconstruction with multiple revisions which can be time-consuming and unsatisfactory. Currently, there are no single-stage interventions to address full thickness burns. Our team has previously demonstrated the viability of an adipose-derived reconstruction to address hypodermal defects and provide a well vascularized reconstruction for complex burns. Here, we aim to provide a comprehensive approach by demonstrating the efficacy of single-staged minced skin grafting plus autologous adipose grafting in a closed microenvironment with a platform wound device (PWD) to achieve rapid reconstruction after burns.

METHODS: A customized burn device was used to induce sixteen standardized full-thickness burns on the back of Female Yorkshire swine. Delayed escharectomies were performed after 3 days to the level of fascia. In one group, autologous split-thickness skin was minced into pixel-sized grafts and combined with or without autologous adipose. The groups were then divided into a traditional bolster or PWD dressing. PWD dressings were adjusted to provide negative pressure after placement. Wounds were followed for 8 weeks with photography, cutometer, ultrasound, histology, and tension measurements.

RESULTS: The pixel and fat grafts in PWD group enhanced wound closure and improved scar formation. At one week, epithelization started in all PWD groups, with notable acceleration with the use of pixel grafting. Gross appearance of the scars showed distinct differences in topography between the PWD and bolster groups. Cutometer illustrated an enhanced trend to return to baseline elasticity in the PWD group. On histologic analyses the presence of distinct, viable epidermal, dermal, and hypodermal elements were noted, suggesting reconstitution of full-thickness trilaminar cutaneous architecture. Immunofluorescence staining including pan-cytokeratin and CD31 demonstrated the presence of various cutaneous elements. Additionally, perilipin was used to show viability of the grafted adipose tissue.

CONCLUSION: The skin-plus-fat approach allowed us to generate a single-stage trilaminar reconstruction in complex burn defects in a highly translatable swine model. The use of a negative-pressure PWD versus a positive-pressure bolster demonstrated critical implications for accelerated reconstruction. This study introduces a wholistic approach that could challenge the need for the status quo staged reconstruction often performed in complex burns. Further research in clinical translation could demonstrate viability of this approach and reduce overall financial burden of multiple procedures in complex burn reconstruction.

Group 1, Abstract #2

A Competency-Based, Time-Variable Model for Resident Education in Plastic Surgery

Anne Glenney, Student
University of Pittsburgh Medical Center

A COMPETENCY-BASED, TIME-VARIABLE MODEL FOR RESIDENT EDUCATION IN PLASTIC SURGERY

Introduction

In 2016, our institution announced its intention to adopt a Competency-Based, Time-Variable (CBTV) model for resident training, the first of its kind in surgical training in the U.S. This educational model emphasizes performance and skill mastery, rather than time-based benchmarks, as the measure by which residents are deemed fit for graduation. This abstract details our experience with CBTV resident training and highlights the opportunities and challenges of this novel approach to graduate medical education.

Methods

Starting in their PGY1 year, each integrated plastic surgery resident is evaluated regularly via oral board-style Milestone Modular Examinations to assess their knowledge of plastic surgery principles and patient management. Self-assessment of technical and operative competency is directly compared to faculty assessment using the Zwisch Rating Scale, a validated scoring system in rating resident autonomy.

Additionally, a professional coaching program has been instituted to further develop resident goal setting and milestone achievement. Ultimately, the Clinical Competency Committee is responsible for assessing resident progression along an individualized competency pathway.

Results

Our first class of residents matched into the CBTV educational model in 2018. Of this cohort of three residents, two (66%) were deemed clinically competent for graduation after five years of training. One resident elected to defer graduation until after six years of training due to fellowship application timing constraints. The other elected to dedicate a year to research and subsequently graduate after five clinical years of training. Thus, all three residents in the inaugural cohort will graduate after six years at our institution, but with customized experiences based on their specific interests and educational needs.

To accommodate the changing educational paradigm, our institution adopted an educational model with PGY5 residents acting as service chiefs in 2018. Since that time, PGY6 residents have used their resident driven PGY6 experience to explore unique training opportunities both at our institution and around the world.

Conclusion

The CBTV approach to resident training is a viable and important step forward and represents a paradigms shift in surgical education. Our CBTV model has increased the flexibility of our training program to accommodate the individualized educational needs of each resident, allowing them to address surgical deficiencies as well as to further develop their clinical interests. By sharing our program’s successes and pitfalls, we hope to promote the establishment of similar programs in plastic surgery departments and divisions across the country.

Group 1, Abstract #3

Robotic-Assisted Surgery Training in US Plastic Surgery Residency Programs

Taylor Clegg, MD
Penn State College of Medicine

ROBOTIC-ASSISTED SURGERY TRAINING IN US PLASTIC SURGERY RESIDENCY PROGRAMS

Background: Robotic-assisted surgery has emerged within plastic surgery in recent years, gradually expanding its potential applications to include oropharyngeal reconstruction, muscle flap harvest, perforator dissection, and microsurgical anastomoses, among others. The prevalence of robotic-assisted surgery training in plastic surgery residency programs, meanwhile, has not yet been established in the literature. This study seeks to review the state of robotic-assisted surgery training in US plastic surgery residency programs.

Methods: A cross-sectional analysis of all ACGME-accredited, integrated US plastic surgery programs was performed. Official program websites were reviewed for information regarding residents' clinical exposure to robotic-assisted surgery, inclusion of formal robotic-assisted surgery coursework, scheduled rotations on other surgical services likely to employ robotic-assisted surgery (Thoracic Surgery, Minimally Invasive Surgery, Hepatobiliary Surgery, Colorectal Surgery, Urology, Gynecologic Oncology), and publication of journal articles related to robotic-assisted surgery by residents or faculty of that division.

Results: Eighty-eight plastic surgery programs were identified and reviewed. Of these, eight programs (9.1%) describe exposure to robotic-assisted surgery, either clinical (n=5; 5.7%) or in a simulation lab (n=3; 3.4%.) Twenty-six programs provide listings of their recent publications, of which seven (26.9%) include articles related to robotic-assisted surgery. No programs describe any formal coursework or dedicated training in robotic-assisted surgery (0.0%.) Residents in 23 of 60 programs with available curricula (38.3%) rotate on other services that are likely to employ robotic-assisted surgery.

Discussion/Conclusion: While robotic-assisted surgery is an emerging technology within the field of plastic surgery, there is a lack of emphasis on training of plastic surgery residents to adequately perform it. Residents should be afforded more exposure to and training in robotic-assisted surgery if plastic surgeons are to adopt it as another technique in our arsenal.

2023 WINNER

Group 1, Abstract #4

Development of an Innovative Device to Enable On-Site Cryopreservation of Lipoaspirates to Be Used in Repeat Procedures

José Antonio Arellano, MD
University of Pittsburgh Medical Center

1st Place Basic Science

DEVELOPMENT OF AN INNOVATIVE DEVICE TO ENABLE ON-SITE CRYOPRESERVATION OF LIPOASPIRATES TO BE USED IN REPEAT PROCEDURES.

Introduction: The main challenge of autologous fat transfer procedures in patients is the requirement of repeat grafting to compensate for the resorbed fat over time. On average about 40-50% of the grafted fat resorb in 3-6 months post grafting requiring repeat graft procedure. Repeat harvest is a painful and expensive procedure exerting traumatic and financial burden on patient. In addition, it also led to a reduced productivity of the surgeons. Development of strategies that eliminate the requirement of repeat harvest is the need of time. In this direction, we have designed a cryopreservation device and optimized the protocol that enables on-site storage of the excess harvested fat for repeat graft procedures thus eliminate the need for repeat harvest.

Methods: We designed a device that can connect seamlessly to current devices used in fat harvest and grafting. We tested different approaches and methods combinations of cryoprotectant and freezing temperatures, and measured cell viability up to 3 months using viability stains Tryptan blue and Calcin-Am. For in-*vivo* validation, we used Nu/Nu athymic mice injected with human fat cryopreserved for 7 days, 21 days, 3 months, and 11 months. Each group was compared to fresh fat graft. We analyzed graft for weight, volume retention, histology, vacuole formation, and inflammation markers after 9 weeks. Using our method, we determined the optimal time range for cryopreserving the fat post-harvest.

Results: In *vitro* viability analyses showed a combination of 10% DMSO, 2% human serum albumin and storage temperature of -80˚C demonstrated optimal viability of cryopreserved fat comparable to fresh fat. In *vivo* Nude mice studies showed no significant changes in the graft weight and volume retention in between the comparison groups up to 11 months. The histological scoring index for inflammation and vacuole formation also showed no significant changes. Our time range analyses showed best outcome when the fat is cryopreserved within 5 hours post-harvest.

Conclusions: This study shows that the clinical adaptation of our device and protocol can reduce multiple harvest sessions along with the complications of this procedure e.g., ecchymosis, swelling, hematoma, and infections. Fat can be preserved without any morphological, weight, or volume changes for up to 1 year.

Group 1, Abstract #5

Understanding the Signaling Pathways That Promote Oncogenesis in Cancer Cell Lines

José Antonio Arellano, MD

University of Pittsburgh Medical Center

UNDERSTANDING THE SIGNALING PATHWAYS THAT PROMOTE ONCOGENESIS IN CANCER CELL LINES

Introduction: The induction of normal cells into having a neoplastic growth has a chain of a perpetual cascade of signaling that promotes the cell to be unorganized, and unregulated and starts the proliferation of monoclonal cells, with the help of a supportive stroma that provides nutrition through blood vessels and adjacent structures. Our novel perfusion tissue model was injected with oncogenic cell lines that promote the growth of neoplasia to recreate this signaling and to fully understand the mechanism in which a normal cell loses uniformity in size and shape and causes irreversible neoplasia, invasion of basement membrane and invades adipose tissue promoting angiogenesis in adjacent tissue. This study shows the pathways in which tumor cells act insidiously activating or decreasing signaling to proliferate and invade.

Methods: Cancer cell lines (Breast, melanoma, and prostate) were injected into our perfusion model that uses human abdominal tissue recovered from a dermolipectomy/abdominoplasty. We canulate the superficial inferior epigastric artery and vein and perfuse it with high glucose media containing amino acids, antibiotics, and hydrocortisone. We injected cell lines and then proceed to administer an enhancer to promote growth within each cell line. After 10 days we performed an excisional biopsy to remove the tumor, afterwards we stain the samples for H&E and immunochemistry for DAPI and Ki-67.

Results: Tumor cell lines grew, and it was palpable in the physical examination of our human tissue. The H&E stain showed a rapid proliferation of cells that invaded the dermis, promoting angiogenesis in all surrounding tissues, and invading the stroma all the way to adipose tissue, there was a visible metastatic cell in distant parts of our human tissue. Immunochemistry shows the proliferation of cells.

Conclusions: Our perfusion model using human skin has shown promising results to cultivate and proliferating cancer cells to fully understand the behavior of tumor growth. We can begin testing new chemotherapeutics and monoclonal antibodies in our model and stop using animal models that do not have the same behavior as a human.

Group 2, Abstract #6

No Increased Post-operative Bleeding Risk Regardless of Chemoprophylaxis Status in Patients Undergoing Autologous Breast Reconstruction

Alexis Lo, MD
Penn State College of Medicine

NO INCREASED POST OPERATIVE BLEEDING RISK REGARDLESS OF CHEMOPROPHYLAXIS STATUS IN PATIENTS UNDERGOING AUTOLOGOUS BREAST RECONSTRUCTION

Purpose: Use of chemoprophylaxis for venous thromboembolism (VTE) in autologous breast reconstruction remains controversial due to insufficient data regarding incidence of postoperative VTE, optimal timing for chemoprophylaxis, and post-prophylaxis risk of bleeding [1, 2]. However, VTE is a well-documented postoperative complication especially in the setting of malignancy, BMI, and surgical length[3, 4]. The purpose of this study was to evaluate the risk of postoperative bleeding in breast cancer patients undergoing autologous breast reconstruction receiving VTE prophylaxis.

Methods: The TriNetX LLC. National Health Research database was queried to identify breast cancer patients who underwent autologous breast reconstruction surgery between 2002 and 2022. Patient's prophylactic anticoagulation status was assessed and the rate of post-procedural hemorrhage and hematoma of the skin and subcutaneous tissue within 30 days was obtained.

Results: A cohort of 8,620 patients was identified in this study. Approximately 45% of the patients received prophylactic anticoagulation and 55% did not. A total of 229 bleeding complications were recorded. Incidence of bleeding observed in those who did and did not receive prophylactic anticoagulation were 2.53% and 2.76%, respectively. There was no significant difference in risk of bleeding between the two cohorts (p=0.5189) (Table 1).

Conclusion: The use of VTE prophylaxis in breast cancer patients undergoing autologous breast reconstruction does not correlate with an increased risk of bleeding at 30 days postoperatively. Prophylactic anticoagulation in this patient population may be safely administered to prevent VTE without increasing the postoperative bleeding risk of these agents.

Table 1: Overall Rate of Bleeding Complication in Patient Cohort

	N	Bleeding Complication	Risk	*p*
Anticoagulated	3907	99	0.0253	**0.5189**
Not-Anticoagulated	4713	130	0.0276	**0.5189**
Total	8620	229	0.0266	

Group 2, Abstract #7

Upper Extremity Functional Outcomes After Breast Cancer Treatment: An Analysis of DASH Score in Breast Reconstruction Patients

Pooja Humar, Student
University of Pittsburgh School of Medicine

UPPER EXTREMITY FUNCTIONAL OUTCOMES AFTER BREAST CANCER TREATMENT: AN ANALYSIS OF DASH SCORE IN BREAST RECONSTRUCTION PATIENTS

Background: Patients undergoing post-oncologic breast reconstruction can experience upper extremity (UE) functional deficits, often interfering with daily activities. In current literature, there is a lack of research investigating differences in extremity functional outcomes among different types of breast and lymphatic reconstruction. In this study, we utilized the Disability of the Arm, Shoulder, and Hand (DASH) questionnaire to investigate the differences in functional recovery of the extremities between different types of breast cancer treatment and breast reconstruction.

Methods: Breast cancer patients who underwent reconstruction performed by a single surgeon from 2014-2021 were surveyed. Patients were contacted via email, phone, or in outpatient clinic visits. DASH scores were calculated as summative values, ranging from 0-120, with a score of 0 indicating no functional impairment and 4 indicating inability to complete the task. Additionally, a retrospective review was performed to assess these patients' comorbidities, oncologic treatment, and reconstructive modalities.

Results: 146 patients completed the questionnaire. Average age the time of reconstruction was 54.0yrs ± 9.4yrs and 97% of patients were White while the rest were African American. Survey questions were grouped into three main categories including functional impairment, upper extremity symptoms such as pain, numbness, or tingling, and interference of impairment with daily activities. The average DASH score was 9.7 (range 0-63), with 74.1% of patients having a score greater than 0, indicative of some impairment. 70.4% of patients underwent implant-based reconstruction and had significantly higher DASH scores than the 10.9% of patients who underwent only autologous based reconstruction (10.1 vs. 5.4, $p<0.05$). Patients who completed postoperative exercises had significantly lower DASH scores than patients who did not (8.3 vs. 13.7, $p<0.05$). Patients with a BMI>27 had significantly higher DASH scores than patients with a BMI<27 (11.7 vs 7.4, $p<0.05$). 21.8% of patients underwent radiation therapy, and these patients a DASH score that was almost 2 times those without radiation history (15.2 vs. 7.8, $p<0.01$). 44 patients underwent axillary lymph node dissections but had similar DASH scores as those who did not (10.2 vs. 8.7, $p=0.40$).

Conclusion: Implant-based reconstruction, higher patient BMI, radiation history, and lack of postoperative exercise were associated with increased UE functional impairment in patients undergoing breast oncologic and reconstructive surgery. Future work will involve expanding this analysis in a multi-surgeon study to assess differences in practice and patient outcomes to create a predictive model for patients at increased risk of UE impairment.

2023 WINNER

Group 2, Abstract #8

Breast Cancer Risk and Screening Rates in Female-To-Male Transgender Patients

Taylor Clegg, Student
Penn State College of Medicine

2nd Place Basic Science

BREAST CANCER RISK AND SCREENING RATES IN FEMALE-TO-MALE TRANSGENDER PATIENTS

Introduction: The number of individuals who identify as transgender in the U.S. has been steadily increasing. Unfortunately, evidence relating to breast cancers in this population is limited, and current data is insufficient to estimate cancer prevalence in female-to-male (FtM) individuals. Better data is needed to contribute to evidence-based screening guidelines. This study aims to characterize breast cancer risk in FtM transgender patients and evaluate current rates of screening.

Methods: A retrospective cohort study was conducted using a multicenter electronic health record database to identify patients 40-75 years of age and born female from January 2015 to January 2023. Patients were split into two cohorts, cisgender females who had not undergone mastectomy and FtM transgender patients. The latter cohort was further divided based on whether they had undergone gender-affirming mastectomy. Patients with genetic predisposition for breast cancer were excluded. Cohorts were propensity score matched based on age, race, and ethnicity. Using ICD-10 codes, rates of breast cancer screening and patients with a diagnosis of breast cancer were identified.

Results: 6,140,906 patients met inclusion criteria. Of these, 6,132,901 cisgender females who had not undergone mastectomy, 7,742 FtM patients who had not undergone mastectomy, and 263 FtM patients who had undergone mastectomy were identified. Cisgender patients were twice as likely to receive breast cancer screening compared to transgender patients (24.19%vs12.12%, RR:1.995, $p<0.0001$). Transgender patients were 3.2 times more likely to develop invasive breast carcinoma versus the cisgender group (3.67%vs1.14%, RR:0.312, $p<0.0001$). Following mastectomy, cancer screening rates decreased 2.2-fold in the transgender population (4.93%vs10.59%, RR:2.150, $p<0.0288$). No transgender patients developed invasive breast carcinoma after mastectomy (Table 1).

Conclusion: This study shows that transgender patients received breast cancer screening at much lower rates than cisgender females, despite having similar screening recommendations. Furthermore, screening rates drop significantly following mastectomy. The goals of gender-affirming mastectomy are different than mastectomy for cancer resection. This can result is residual breast tissue after surgery, posing a remaining risk for future cancer development and continued need for surveillance. The results of this study highlight the current insufficiency in care of transgender patients and need for interventions to improve healthcare outcomes of gender minorities in the U.S.

Table 1. Incidence of breast cancer screening/ri k of developing cancer in cisgender vs FtM patients, and FtM patients with mastectomy

Group 2, Abstract #9

Development of a Machine Learning Algorithm for Patient-Specific Risk Prediction of Surgical Reintervention Following Microvascular Breast Reconstruction

Juliet Panichella, Student
Temple University Lewis Katz School of Medicine

DEVELOPMENT OF A MACHINE LEARNING ALGORITHM FOR PATIENT-SPECIFIC RISK PREDICTION OF SURGICAL REINTERVENTION FOLLOWING MICROVASCULAR BREAST RECONSTRUCTION

Purpose:
As techniques mature and the popularity of microvascular breast reconstruction grows, attention has turned to advancing post-operative outcomes and improving surgical techniques. Various risk stratification algorithms have been developed to identify patients at risk of perioperative complications. However, to date, no tool has been developed that incorporates patient-specific data to deliver a personalized risk prediction for breast reconstruction. Using a deep learning approach, a predictive model was developed that predicts individual risk of surgical revision after free flap-based breast reconstruction.

Methods:
NSQIP data from 2013-2019 pertaining to breast free-flap reconstruction (CPT 19364) were selected. 42 preoperative variables were selected and one outcome variable, reoperation within 30 days, was chosen as the outcome to model. Rows containing complete datasets in all 43 variables were selected. A multi-layer neural network was developed using the fast.ai package. The resulting dataset was divided into training and validation sets (80% and 20%, respectively) to assess the model's performance on previously unseen data.

Results:
A total of 9482 patients were identified from the NSQIP dataset, and 6604 patients met inclusion criteria. The model demonstrated a positive predictive value of 73% with a specificity of 87%. Feature selection using logistic regression demonstrated that eight factors significantly affected reoperation risk including ASA class, steroid use, smoking, functional status, cardiac status, and inpatient status.

Conclusion:
A personalized medicine screening tool was developed using deep learning techniques to predict individual risk of surgical reoperation following breast free-flap reconstruction. This will allow for appropriate preoperative patient counseling, patient optimization based on risk factors, and postoperative follow-up scheduling.

Group 3, Abstract #10

Quantification of the Burden and Healthcare Utilization Associated with Fragmentation of Care after Immediate Breast Reconstruction: A Nationwide Analysis of 20,334 Readmissions

Theodore Habarth-Morales, Student
Division of Plastic Surgery, University of Pennsylvania

QUANTIFICATION OF THE BURDEN AND HEALTHCARE UTILIZATION ASSOCIATED WITH FRAGMENTATION OF CARE AFTER IMMEDIATE BREAST RECONSTRUCTION: A NATIONWIDE ANALYSIS OF 20,334 READMISSIONS

INTRODUCTION: Preliminary data from a prior study suggested that there may be a significant proportion of patients who are readmitted to a different-than-index hospital following immediate breast reconstruction (IBR). Factors driving this fragmentation of care phenomenon are yet to be elucidated and may expose an important population not captured by existing databases. We sought to quantify and determine factors associated with fragmentation of care following IBR at a national level.

METHODS: The 2010-2019 Healthcare Cost and Utilization Project National Readmissions Database was queried for all adults female patients who underwent mastectomy with concurrent IBR. Patient, clinical and hospital characteristics were extracted and compared between patients who were readmitted to the index hospital where the index procedure was performed vs. other-than-index hospital. The main outcome was fragmentation of care defined as any readmission(s) to other-than-index hospital. Secondary outcomes included complications, reoperations and costs within 12 months of discharge. Risk-adjusted logistic regression was used to determine factors associated with fragmentation of care and complications.

RESULTS: 108,133 patients were identified who underwent IBR, 10,128 (9.4%) who subsequently had an unplanned readmission to a different hospital. The mean age of these patients was 51 years (SD 23), with private insurance (68%), non-obese, low comorbidity burden (Elixhauser Comorbidity Index 1-2 (62.5%) and undergoing unilateral (51%) reconstruction for breast cancer. Patients who experienced fragmentation of care had higher incidence of surgical site complications (5.6% vs 4.5%, $p=0.005$) and also nonsurgical complications (1.9% vs 1.2%, $p<0.001$). Risk-adjusted analyses revealed that public insurance (ref. private, Odds Ratio 1.215 [95% Confidence Interval 1.075-1.374], $p=0.002$), multimorbidity (1.325 [1.232-1.424], $p<0.001$), and having index operations performed at large metropolitan centers (1.678 [1.432-1.965], $p<0.001$) were most associated with discontinuity of care. Patients readmitted to different hospital were also 2.41 times more likely to have a reoperation ($p<0.001$). Fragmentation of care was associated with average incremental costs of USD $7,046 [6,689-7,403], $p<0.001$ relative to patients who were readmitted to the index-hospital.

CONCLUSION: Fragmentation of care among patients who undergo mastectomy with IBR is associated with increased healthcare utilization nationwide as evidenced by an increase in hospital costs and reoperations. Greater care should be taken to reduce the tendency some of patients to seek care at other centers after IBR in order to mitigate the increased costs associated with readmission and overtreatment.

Group 3, Abstract #11

Implications of Early Onset Obesity on Psychiatric Wellbeing in Patients Who Undergo Body Contouring Procedures

Anne Glenney, Student
University of Pittsburgh Medical Center

IMPLICATIONS OF EARLY ONSET OBESITY ON PSYCHIATRIC WELLBEING IN PATIENTS WHO UNDERGO BODY CONTOURING PROCEDURES

Introduction: Childhood obesity is a stigmatizing condition, and its incidence is increasing exponentially. In 1978 only 3% of children aged 3-17 were obese; now, 19.7% of children are obese, and the onset of obesity occurs in younger cohorts each year. Patients who develop obesity early in life suffer unique psychosocial consequences that continue into adulthood. Obesity and history of obesity are extremely prevalent in patients who undergo body contouring procedures. This study aims to assess the relationship between age at onset of obesity, psychological welfare, and self-image in body-contouring patients.

Methods: A retrospective review was performed of patients who presented to a single institution for body contouring procedures between 2002 and 2018. Variables studied included demographic information, medical and psychiatric history, smoking and drinking history, self- image, social support, procedure history, outcomes and follow up. Univariate analysis, two-sample t-tests, and multinomial logistic regressions were performed using R statistical software (Version 1.3.1093).

Results: A total of 1,187 patients underwent at least one body contouring procedure at our institution during the study timeframe. The mean age of patients at presentation was 50.08 ± 0.78 years. The majority of our patient cohort was female (90.1 percent) and Caucasian (93 percent). Mean BMI at presentation was 31.21 ± 10.49 BMI units. Among these patients, 58% were obese before the age of 18 and 42.8% of patients were obese before the age of 11. Notably, patients who were obese before age 11 were 1.7 times more likely to suffer from at least one psychiatric comorbidity. Specifically, these patients were 1.5 times more likely to suffer from Generalized Anxiety Disorder ($p<0.05$), which was the most common psychiatric comorbidity seen in body-contouring patients overall. Childhood onset of obesity was also associated with more negative self-reported body image prior to undergoing body-contouring procedures. Notably, patients who were obese before the age of 18 were 77% less likely to report positive pre-operative body image than patients who developed obesity in adulthood.

Conclusions: Obesity is increasingly prevalent in the pediatric population and has important implications on psychiatric well-being and body image in patients who undergo body-contouring procedures. Body contouring patients with childhood-onset obesity have a higher incidence of psychiatric comorbidities and worse self-rated body- image than patients who develop obesity later in life. These findings have implications on screening, provision of comprehensive interdisciplinary care, and post-operative management of this patient cohort.

Group 3, Abstract #12

The Impact of Body Mass Index on Surgical and Aesthetic Outcomes in Cosmetic Abdominoplasty

Harrison Davis, Student
Division of Plastic Surgery, University of Pennsylvania

THE IMPACT OF BODY MASS INDEX ON SURGICAL AND AESTHETIC OUTCOMES IN COSMETIC ABDOMINOPLASTY

INTRODUCTION: Obesity is widely recognized to increase the risk of post-operative complications in plastic surgery. Current literature regarding the impact of body mass index (BMI) and the associated risk in body contouring remains under question. This study aimed to elucidate the risk of abdominoplasty in overweight and obese patients.

METHODS: A retrospective review of patients undergoing cosmetic abdominoplasty from 2015-2021 by a single surgeon was conducted. Cosmetic abdominoplasty was defined as an abdominal contouring procedure, frequently including liposuction or rectus abdominis plication, that was not covered by insurance. Demographics, surgical site occurrences (SSO), post-operative cosmetic complaints, such as scarring, asymmetry and loose skin, and reoperations were compared. SSOs were defined as infection, delayed healing, dehiscence, seroma, and fat necrosis. Univariate and multivariate logistic regression were used to assess the risk of BMI on clinical outcomes.

RESULTS: One-hundred and thirteen patients underwent cosmetic abdominoplasty. Forty patients (35.4%) were normal weight (BMI ≥18.5–<25), 43 (38.1%) were overweight (BMI ≥25–<30), and 30 (26.6%) were obese (BMI ≥30). The study population was predominantly female (93.0%), and Caucasian (57.5%). Liposuction volume was significantly different (*P*=<0.001) between groups, but diastasis plication was not (*P*=0.490). Twenty-four of 33 instances of SSO were delayed healing. There was no increased risk of SSO, cosmetic complaints, or reoperation in overweight or obese patients compared to normal weight **(FIGURE)**.

CONCLUSION: Although surgeons can be apprehensive of performing abdominal aesthetic surgery in overweight and obese patients, our results support their safety and efficacy in these populations. This study shows no increased risk of SSO, cosmetic complaints, or reoperations.

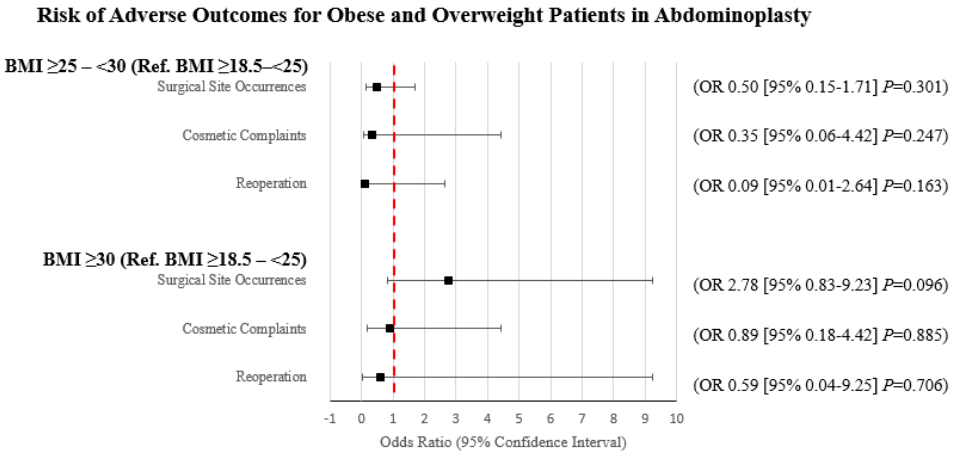


Figure. Risk of SSO, cosmetic complaints, and reoperations by BMI in patients undergoing cosmetic abdominoplasty. SSO defined as infection, delayed healing, dehiscence, hematoma, seroma, and fat necrosis. Cosmetic complaints defined as scarring, asymmetry, and loose skin.
Footnote: Logistic regression model controlled for patient (age, BMI, history of diabetes, history of peripheral vascular disease), operative (concomitant procedures, diastasis plication, liposuction, volume of liposuction) confounders.

Group 3, Abstract #13

3 Month Evaluation of Hyaluronic Acid Facial Fillers: A Prospective Volumetric Analysis with Patient Reported Outcomes

Harrison Davis, Student

Division of Plastic Surgery, University of Pennsylvania

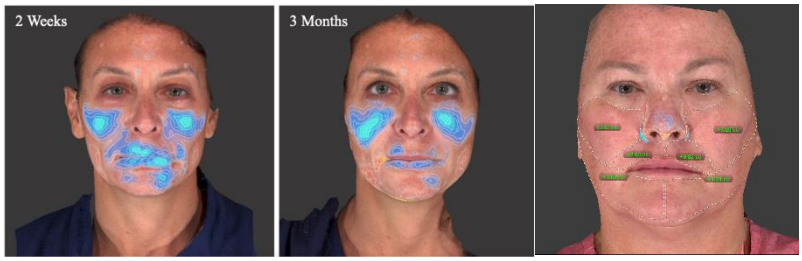
3 MONTH EVALUATION OF HYALURONIC ACID FACIAL FILLERS: A PROSPECTIVE VOLUMETRIC ANALYSIS WITH PATIENT REPORTED OUTCOMES

BACKGROUND: Hyaluronic acid fillers are becoming increasingly popular as a less invasive alternative to cosmetic facial surgery. Long-term quantification of volumetric results or subjective benefit from patient reported outcomes (PROs) is unknown. We aimed to determine and compare volumetric changes up to 12 weeks as well as PROs.

METHODS: Subjects were injected in four regions of the face bilaterally using 3 different dermal fillers. FACE-Q survey consisting and 3-D imaging was performed prior to and at 2 weeks, 4 weeks, and 3 month intervals after injection. (**FIGURE**). Continuous data were compared using Mann Whitney U tests. Risk-adjusted analyses were performed using linear regression.

RESULTS: One hundred and one women were consented. Image analysis revealed volume maintenance of the malar plus extended midface (MEM) through 12 weeks, lower perioral plus jawline (LPJ) and Lips (L) through 1 month, while upper perioral (UP) decreased significantly at 2 weeks. **(FIGURE).** There was no significant difference in volume loss by laterality. Certain PROs such as aging score improved at 2 weeks. Psychosocial distress worsened immediately post-injection, but improved by 2 weeks on. Satisfaction with outcome worsened significantly from post-injection to 2 weeks. Smoking was associated with significantly increased rate of volume loss (-1.523 cc's per cc of volume loss in non-smokers, *P*=0.005).

CONCLUSION: Our results suggest further investigation into the subjective benefits of dermal filler is warranted due to sustained improvement in various PROs and suggest additional counseling in patients with tobacco use may be required.



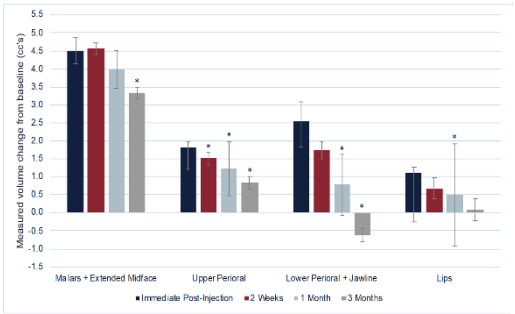


Figure. (A) Interface of Vectra M-3 volume measurement software. (B) Facial regions (bilateral) measured not including lips: malar plus extended midface (MEM), upper perioral (UP), lower perioral plus jawline (LPJ). (C) Maintenance of injected volume over time by region measured. (*) denotes *P* value of <0.05.

Group 3, Abstract #14

10 Year Experience in Burn Eyelid Surgery: A Single Center Retrospective Cohort Study

Tiffany Jeong, Student
University of Pittsburgh School of Medicine

10 YEAR EXPERIENCE IN BURN EYELID SURGERY: A SINGLE CENTER RETROSPECTIVE COHORT STUDY

Background

In the case of full thickness eyelid burns, release and grafting are required. However, there is a paucity of studies on outcomes in eyelid burn treatment, despite concern for permanent ocular damage or loss of vision. This study aims to describe the complication rates in burn eyelid reconstruction at a single center over 10 years.

Methods

We conducted a retrospective study to review outcomes of eyelid burns undergoing plastic surgery reconstruction between April 2009 and December 2022. Medical records were obtained from patients' charts. Gathered data include demographics, past medical history, type of injury, indication for surgery, procedure performed and complications.

Results

A total of 12 patients and 21 eyelids were treated by the plastic surgery team for eyelid reconstruction out of the 901 total patients with burn-related injuries requiring plastic surgery reconstruction. These patients underwent 48 eyelid surgeries with a mean follow-up time of 11.7±14.5 months. Patients were 66.7% males and 32.7% females, with a mean age of 46.4±14.5 years. In 60.4%(n=29) of the cases, the simultaneous reconstruction of both the upper and lower eyelids was necessary. The reconstruction of the upper and lower eyelid alone represented a smaller percentage (29.2% and 10.4%, respectively). Acute eyelid burn treatment represented 45.8% of the cases, while in 54.2% of the cases chronic burn sequelae were addressed. The eyelid procedures performed included: full thickness skin graft (45.8%, n=22), flap reconstruction (16.7%, n=8), debridement (14.6%, n=7), Integra (10.4%, n=5), split thickness skin graft (8.3%, n=4), canthoplasty (8.3%, n=4), TheraGenesis (4.2%, n=2), and fractional lasering (2.1%, n=1). On average, the patients received 4±3.75 eyelid surgeries. Half of all eyelid surgeries included temporary tarsorrhaphy (n=24) that remained in place for an average of 7.25±4.7 days. While only one case received permanent tarsorrhaphy (2.08%). The overall complication rate was 58.3% (n=28). The most common complication was ectropion (33.3%, n=16). Other complications included: lagophthalmos (18.75%, n=9), eye injury (18.75%, n=9), contracture (16.7%, n=8), eyelid infection (12.5%, n=6), sepsis (8.3%, n=4), total graft loss (4.2%, n=2), and partial graft loss (4.2%, n=2).

Conclusion

Full thickness skin graft remains the standard of care for patients with eyelid burns. However, there is a high incidence of ectropion that may require reoperation. Further studies examining the conditions of successful eyelid burn procedures may provide guidance on when patients may benefit from eyelid reconstruction during their burn treatment.

Group 3, Abstract #15

Strabismus and Amblyopia in Craniosynostosis: A Single Center Experience

Ambroise Gilles, MD
Penn State College of Medicine

STRABISMUS IN CRANIOSYNOSTOSIS: AN EVALUATION OF TIME TO PRIMARY CRANIOFACIAL REPAIR AND STRABISMUS SURGERY

Introduction: Early ophthalmologic evaluation in craniosynostosis patients and early diagnosis of strabismus may prevent or delay progression of amblyopia and improve quality of life. This study evaluates practice patterns in the treatment of craniosynostosis patients requiring craniofacial reconstruction and extraocular muscle surgery at a single institution, including time to primary ophthalmic evaluation and time to primary ophthalmic surgical intervention when indicated. Additionally, we aim to describe this patient population in an effort to identify risk factors for strabismus.

Methods: Clinical records of all patients who underwent surgical intervention for craniosynostosis at Penn State Hershey Medical Center and were also evaluated by an ophthalmology provider between January 1, 2010 and November 25, 2022 were reviewed in a retrospective manner.

Results: There were 274 patients that underwent craniosynostosis repair with 106 of them evaluated by an ophthalmologist. Of these, 34 (32%) were diagnosed with strabismus. The median age at primary craniofacial reconstruction was 7.5 months (range 2 months – 5.5 years). There were 12 patients (35%) with unicoronal synostosis, 10 (29%) with bicoronal, 4 (12%) with metopic, 2 (6%) with sagittal, and 6 (18%) with synostosis involving multiple sutures. There were 13 (38%) with syndromic and 21 (62%) with non-syndromic craniosynostosis. The relative risk of developing strabismus in syndromic craniosynostosis was 2.09 compared to non-syndromic patients. Among strabismic patients, there were 14 females (41%) and 20 males (59%) with a median age of 4.5 months (range 0-9 years) at date of first craniofacial evaluation. Twelve patients (35%) developed multifactorial amblyopia. Fourteen (41%) patients underwent at least one strabismus surgery and 20 (59%) were managed conservatively with patching, glasses, or observation. When indicated, strabismus surgery was performed at a median age of 3.1 years (range 11 months – 11.3 years).

Conclusions: In this analysis, children with craniosynostosis that subsequently developed strabismus were evaluated by an ophthalmologist at a median age of 13.5 months (range 0 - 13.8 years). When surgical intervention for strabismus was indicated, it was performed at a median 20 months (range 1 month – 10 years) after primary craniofacial reconstruction. The risk for all-cause amblyopia is high in this population, but the development of strabismic amblyopia may be minimized with early ophthalmic evaluation, especially in syndromic patients at high risk of developing strabismus.

Group 4, Abstract #16

Impact of Surgical Intervention Modality on Adverse Feeding Outcomes of Pierre Robin Sequence Patients

Pooja Humar, Student
University of Pittsburgh School of Medicine

IMPACT OF SURGICAL INTERVENTION MODALITY ON ADVERSE FEEDING OUTCOMES OF PIERRE ROBIN SEQUENCE PATIENTS

Background: Feeding and swallowing dysfunction pose significant morbidity to patients with Pierre Robin Sequence (PRS). Limited literature exists evaluating feeding outcomes after surgical intervention. We present a critical analysis of feeding and swallowing outcomes following mandibular distraction osteogenesis (MDO) or supraglottoplasty in pediatric PRS patients.

Methods: A retrospective review of PRS patients seen at a single institution from 2010-2016 was conducted. Patients were separated into one of three categories including MDO, supraglottoplasty, and no surgical intervention. Patient information of interest included medical and surgical history, pre- and post-intervention modified barium swallow (MBS) studies, and polysomnography data.

Results: 93 patients with PRS (35 female and 58 male) were included in this cohort; 47 (50.5%) underwent MDO, 13 (14.0%) underwent supraglottoplasty, 3 patients underwent both (3.22%), and 30 patients had no surgical intervention. The average gestational age in these patients was 38.1 ± 2.7 weeks with 14.1% of patients being born prematurely. The majority of patients (84.9%) spent time in a NICU immediately after birth or within the first week of life, with average length of stay being 38.8 ± 15.7 days. 54.8% of patients had at least one congenital cardiac anomaly, 61.3% had an airway anomaly, and 16.1% had a nervous system anomaly. Compared to pre-intervention modified barium swallow (MBS) studies post-procedure MBS studies demonstrated significant improvement in sucking tongue movements in patients who underwent MDO ($p=0.048$) as well as vallecular space obliteration ($p=0.001$). Meanwhile, patients who underwent supraglottoplasty had significant improvements to laryngeal penetration ($p=0.003$). Type of procedure did not significantly influence subsequent likelihood of pooling or aspiration. 16.7% of patients who underwent supraglottoplasty were deemed unsafe for oral feeding post-intervention compared to only 6.82% of patients who underwent MDO. The average pre-operative total Apnea-Hypopnea Index (AHI) among patients who underwent any surgical intervention was 23.2 compared to 16.32 among those who did not undergo intervention. When looking at post-operative AHI, there was no significant difference in post-op total AHI among the three groups ($p=0.54$).

Conclusions: Both patients who underwent MDO or supraglottoplasty showed improvements in post-procedure MBS. However, patients with PRS who underwent supraglottoplasty had a higher rate of adverse feeding outcomes than those who underwent MDO. These findings support additional research on the benefits of MDO or supraglottoplasty for PRS patients and other adverse outcomes associated with treatment modality.

Group 4, Abstract #17

A Review of Private Insurance Policies: Coverage of Fat Grafting for Breast and Head & Neck Reconstruction

Yusuf Surucu, MD
University of Pittsburgh Medical Center

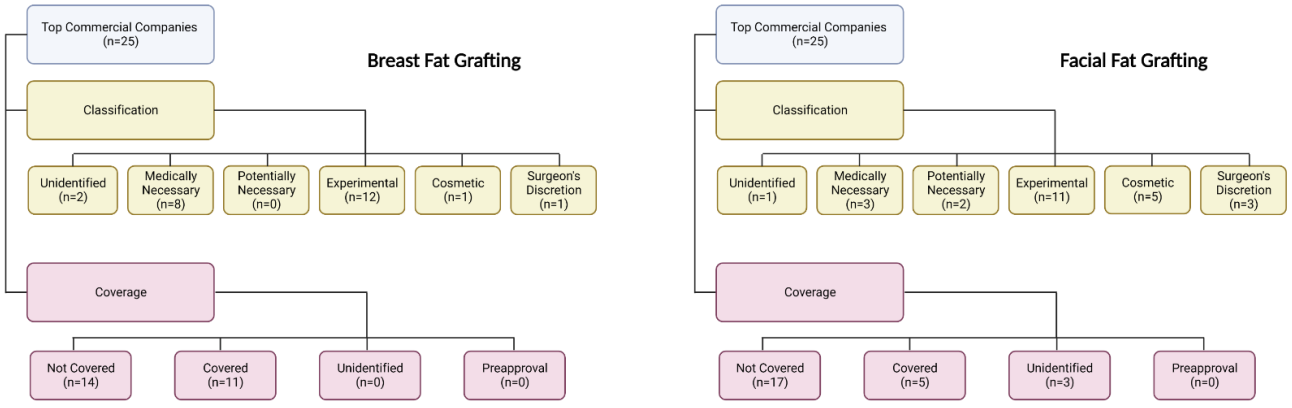
A REVIEW OF PRIVATE INSURANCE POLICIES: COVERAGE OF FAT GRAFTING FOR BREAST AND HEAD & NECK RECONSTRUCTION

Introduction:
The Women's Health and Cancer Rights Act of 1998 codified access to reconstructive surgery to breast cancer patients. Correspondingly, fat grafting when used for oncologic breast reconstruction is routinely covered by insurance providers. However, we suspect that fat grafting applications for other reconstructive goals, particularly to the face, is not as widely covered or reimbursed.

Methods:
Policies of private medical insurance companies were examined for information regarding coverage or reimbursement of fat grafting after breast or head and neck reconstruction. Keywords including “fat grafting,” “lipofilling,” “facial fat graft,” “reconstructive surgery,” “cosmetic surgery,” “breast reconstruction,” and “facial reconstruction” were used on each company’s website.

Results:
The 25 largest private insurance companies based on dollars collected in premiums were included in this study. Eight companies deemed fat grafting for breast reconstruction to be medically necessary, 12 regard it to be experimental, 1 considers it to be cosmetic and 1 leaves the necessity of fat grafting to the discretion of the surgeon. For facial reconstruction, only 3 companies report fat grafting for facial reconstruction as medically necessary, 11 deem it as experimental, 5 consider it cosmetic, and 3 rely on the discretion of the surgeon. Eleven companies report covering fat grafting for breast reconstruction while only 5 private companies include coverage for facial fat grafting. (Figure)

Conclusions:
While fat grafting is widely used for reconstruction of the breast and face, there exists significant variability in insurance coverage for this procedure among the largest insurers in the United States. Moving forward, we aim to compare policies from commercial insurance companies with state-level Medicare and Medicaid guidelines regarding fat grafting.



Group 4, Abstract #18

Long-Term Impact of Mandibular Distraction Osteogenesis: Respiratory, Dental, Neurological, and Scar Outcomes

Lauren Salinero, Student
Children's Hospital of Philadelphia
Craniofacial Research Fellowship

LONG-TERM IMPACT OF MANDIBULAR DISTRACTION OSTEOGENESIS: RESPIRATORY, DENTAL, NEUROLOGICAL, AND SCAR OUTCOMES

Background/Purpose: Mandibular distraction osteogenesis (MDO) shows effective early relief of tongue-based airway obstruction and is commonly indicated in Pierre Robin sequence and genetic syndromes involving micro/retrognathia. However, long-term outcomes and complications are not well established.

Methods: Patients with prior MDO were evaluated at a minimum 4-year follow-up. Motor/sensory nerve function, temporo-mandibular joint function, dental development, and postsurgical scarring were prospectively assessed, including radiographic evaluation by a pediatric craniofacial orthodontist. Data describing respiratory outcomes and feeding patterns were abstracted from the medical record.

Results: Forty-eight patients with a median age of 7 years were evaluated. Of 20 non-syndromic patients, none required additional airway procedures, none required continuous positive airway pressure (CPAP) during sleep, and 19 (95%) fed exclusively by mouth. Among 28 syndromic patients, 7 (25%) required CPAP and 8 (29%) were tube fed. Permanent first molar differences were seen in the majority of subjects (74%); patterns of damage interfering with function were more common in syndromic (43%) compared to non-syndromic (21%; p=.014) subjects. MDO prior to age two was associated with more frequent and worse dental damage (p=.001). Inferior alveolar nerve and marginal mandibular nerve function were fully intact in 38 (79%) and 39 (81%) of patients, respectively. Three patients (6%), all with associated genetic syndromes, demonstrated severe nerve impairment. No cases of temporomandibular joint ankylosis were encountered, though maximal incisal opening was severely reduced in 20% of syndromic patients, and temporomandibular joint-related complaints such as grating were reported by 9 (19%) patients. By the Vancouver scar scale, ≥80% of surgical scars were rated in the most favorable category for each quality assessed.

Conclusion: MDO shows highly favorable long-term respiratory, feeding, nerve, and scar outcomes in non-syndromic patients, although permanent molar changes not precluding tooth viability are commonly seen. Patients with associated syndromes demonstrate respiratory and feeding benefits, but higher rates of dental and nerve abnormalities. Overall, MDO is effective and rarely associated with severe long-term complications, though monitoring of dental development in anticipation of permanent molar injury requiring intervention is advisable.

2023 WINNER

Group 4, Abstract #19

An Evaluation of the Accuracy and Efficiency of the Operative Use of Mixed Reality within Frontal Sinus Setback

Nicolás Kass, Student
University of Pittsburgh School of Medicine

1st Place Clinical

AN EVALUATION OF THE ACCURACY AND EFFICIENCY OF THE OPERATIVE USE OF MIXED REALITY WITHIN FRONTAL SINUS SETBACK

Background
Of the procedures that make up facial feminization surgery, frontal sinus setback has a particularly high impact on gender perception. Mixed reality (MR) is a nascent technology that holds significant promise in plastic and reconstructive surgery. MR allows a user to view and manipulate three-dimensional patient images while superimposing them on the patient. This method allows for direct visualization of deep structures, improving a surgeons understanding of vital patient anatomy in real time. To the best of our knowledge, this is the first usage and evaluation of this technology inside of a plastic surgery operating room in the United States.

Methods
The Medivis SurgicalARsystem was used in conjunction with the Microsoft HoloLens, an MR headset with a see-through visor. CT imaging was uploaded to the SurgicalAR system and a three-dimensional hologram was projected onto the display of the HoloLens. The CT was registered to the patient using a point-to-point framework that relied on bony fiducials identified intra-operatively, namely the supraorbital notches, nasion, and glabella, matched to virtual counterparts. The system relies on a localizing wand with an affixed optical code that the 2D RGB camera on the headset tracks. Time measures and discrepancy from our standard-of-care 3D cutting guide was measured along with survey of the operating surgeon.

Results
Qualitative descriptions demonstrated that 3-dimensional visualization of deep structures improved surgeon confidence and operative decision making. The process of matching the hologram to the patient and cropping to see intended structures took three minutes and twelve seconds. Tracing of the frontal sinuses based on the hologram took 61 seconds. Maximum discrepancy from the 3D cutting guide was 5mm and minimum was exactly the same. In addition, the workflow that was established was both efficient and intuitive.

Conclusion
Mixed reality was shown to be accurate in superimposing a patient's CT on top of their actual skull during surgery, allowing for a tracing of the frontal sinuses. This rapidly developing technology demonstrates promise for being a viable intraoperative image guidance technology and may provide a faster and more effective method of anatomical identification than the current standard of care.

Group 4, Abstract #20

Costochondral Grafts for Hemifacial Microsomia: 24-Year Experience of a Single Surgeon

Carlos Barrero, Student
Children's Hospital of Philadelphia
Craniofacial Research Fellowship

COSTOCHONDRAL GRAFTS FOR HEMIFACIAL MICROSOMIA: 24-YEAR EXPERIENCE OF A SINGLE SURGEON

Background

Costochondral grafts (CCGs) can be used in mandibular reconstruction of Kaban-Pruzansky IIB/III hemifacial microsomia (HFM). Their growth is variable, occasionally necessitating secondary surgery. This study examined one surgeon's 24-year experience to better quantify long-term outcomes and surgical care required in CCG reconstruction of HFM mandibles.

Methods

Serial three-dimensional computed tomography scans, from preoperative to most recent, were analyzed in patients with minimum four years of clinical follow-up following CCG reconstruction. Ramus/graft height, length, volume, bilateral mandibular body length, and chin deviation were measured. Changes in measurements were analyzed at preoperative, immediate postoperative, and most recent imaging. Growth rates per measure were calculated utilizing scans after CCG, but before secondary surgery.

Results

Fourteen patients were analyzed. Mean clinical follow-up was 10.1±3.6 years. One patient developed temporomandibular joint ankylosis secondary to strut-graft malposition, which was repaired without further complications. CCG reconstruction led to immediate improvement in graft/ramus height ($p<0.001$), length ($p<0.001$), volume ($p<0.001$), and chin deviation ($p=0.01$). Growth analysis revealed ramus height ($p=0.9$) and length ($p=0.2$) grew at rates equal to native mandible, but graft volume and mandibular body growth were significantly lower ($p<0.05$). By latest imaging, 63% of patients required secondary surgery, including distraction osteogenesis and/or orthognathic surgery due to differential graft/hemimandible growth behavior. By most recent clinical follow-up, this proportion increased to 93%.

Conclusion

CCGs provide significant short-term mandibular and facial symmetry improvement in HFM IIB/III. Long-term analysis reveals frequent undergrowth requiring secondary intervention to promote and maintain symmetry.

Group 5, Abstract #21

Assessment of Postoperative Symmetry Following Mandibular Reconstruction with Fibula Free Flap

Bhavana Thota, Student
Sidney Kimmel Medical College

ASSESSMENT OF POSTOPERATIVE SYMMETRY FOLLOWING MANDIBULAR RECONSTRUCTION WITH FIBULA FREE FLAP

Background: Mandibular defects can result in significant functional and aesthetic sequelae requiring free flap reconstruction. Advantages of the fibula flap include ample bone stock, low donor site morbidity, and feasibility of dental implantation. Its postoperative aesthetic outcomes, however, have not yet been quantitatively defined. This study examines predictors of postoperative facial symmetry outcomes in patients who have undergone fibula free flap reconstruction of the mandible.

Methods: This was a retrospective review of 32 patients. Resting position postoperative photographs at a minimum of 6 months after mandibular reconstruction were obtained for facial symmetry analysis using Emotrics, an artificial intelligence software. Brow height (BH), marginal reflex distance (MR), oral commissure excursion (CE), smile angle (SA) and dental show (DS) were evaluated. Difference in means using ANOVA and two-tailed T test were significant if $p < 0.05$.

Results: Mean time to postoperative facial photograph assessment was 36.2 months. Cancer diagnosis, as opposed to osteoradionecrosis, was predictive of greater BH, MR, CE, and DS symmetry ($p < 0.05$), as shown in Figure 1A-D. Age, smoking status, and the presence of at least 1 medical comorbidity were not significantly associated with postoperative facial symmetry. Location of mandible resection was also not associated with significant symmetry outcomes. CE symmetry was significantly different among number of fibula bone fragments used ($p < 0.05$).

Conclusions: Increased number of fibula bone fragments utilized in free flap reconstruction of the mandible is significantly associated with postoperative oral commissure symmetry. Osteoradionecrosis patients re at higher risk of poor aesthetic
outcomes and require careful preoperative planning.

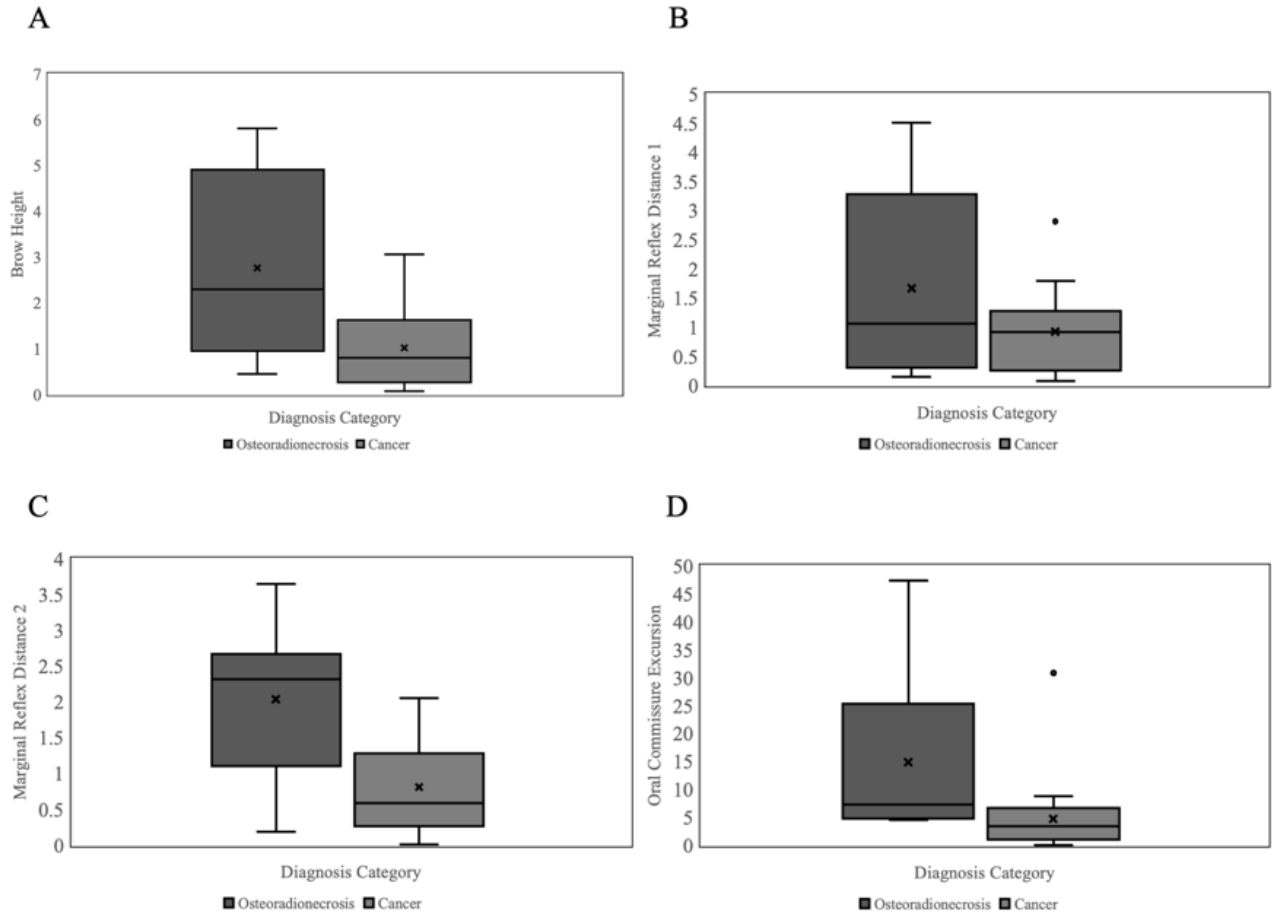


Figure 1. A) Osteoradionecrosis diagnosis is associated with decreased brow height symmetry (2.76 mm versus 1.01 mm, $p < 0.05$). B) Osteoradionecrosis diagnosis is associated with decreased marginal reflex distance 1 symmetry (1.67 mm versus 0.92 mm, $p < 0.05$). C) Osteoradionecrosis diagnosis is associated with decreased marginal reflex distance 2 symmetry (2.03 mm versus 0.81 mm, $p < 0.05$). D) Osteoradionecrosis diagnosis is associated with decreased oral commissure excursion symmetry (14.84 mm versus 4.73 mm, $p < 0.05$).

Group 5, Abstract #22

Transcranial Midface Advancement Surgery in Patients with Syndromic Craniosynostosis: Does Prior Fronto-Orbital Advancement Increase Morbidity?

Connor Wagner, Student
Perelman School of Medicine at the University of Pennsylvania

TRANSCRANIAL MIDFACE ADVANCEMENT SURGERY IN PATIENTS WITH SYNDROMIC CRANIOSYNOSTOSIS: DOES PRIOR FRONTO-ORBITAL ADVANCEMENT INCREASE MORBIDITY?

Purpose

Our center adopted posterior vault distraction osteogenesis (PVDO) as a first-line intervention for cranial expansion in syndromic craniosynostosis in 2008, and we have a growing cohort of patients undergoing transcranial midface advancement who have not had prior fronto-orbital advancement (FOA). The purpose of this study was to evaluate whether a history of FOA influences the risk profile of transcranial midface advancement in patients with syndromic craniosynostosis.

Methods

Patients undergoing transcranial fronto-facial advancement from 2000-2022 were retrospectively divided into cohorts based on preceding history of fronto-orbital advancement (FOA- and FOA+). Perioperative outcomes including operative time, length of stay, intraoperative dural injury, and complications (Clavien-Dindo score) were compared between groups with appropriate statistics.

Results

Thirty-eight patients were included (15 in FOA- group and 23 in FOA+ group). The overall complication rate was 47% (10% minor, 37% major). Compared to the FOA- group, the FOA+ group had a higher incidence of dural tears (65% v 20%, $p = 0.006$) and major complications (48% v 13%, $p = 0.028$). These findings were recapitulated in multivariate logistic regression controlling for other predictors.

Conclusions

Prior FOA is associated with increased rates of major complications and dural tears in patients with syndromic craniosynostosis undergoing fronto-facial surgery. Options for cranial vault expansion that avoid the frontal region, such as PVDO, may favorably alter the risk profile of fronto-facial advancement.

Group 5, Abstract #23

Influence of Molecular Subtypes on Airway Morphology and Upper Airway Obstruction in Apert Syndrome

Connor Wagner, Student
Perelman School of Medicine at the University of Pennsylvania

INFLUENCE OF MOLECULAR SUBTYPES ON AIRWAY MORPHOLOGY AND UPPER AIRWAY OBSTRUCTION IN APERT SYNDROME

Background

Apert syndrome is predominantly caused by two paternally inherited gain-of-function mutations in the FGFR2 gene, Pro253Arg and Ser252Trp. Studies comparing phenotypic features between these two mutations have established differences in syndactyly severity and incidence of cleft palate. Obstructive sleep apnea can be debilitating in a subset of patients with Apert syndrome, yet is not well understood. This study aims to determine whether FGFR2 mutations impart differential effects on airway physiology and morphology.

Methods

Patients with Apert syndrome and confirmatory molecular testing were reviewed for polysomnography, nasal endoscopy, microlaryngoscopy and bronchoscopy, and computed tomography (CT) imaging. Obstructive apnea hypopnea index (OAHI) and oxygen saturation (SpO_2) nadir, nasal airway volumes, choanal cross-sectional area, and midfacial cephalometric dimensions were compared across mutation types.

Results

Twenty-four patients (13 Ser252Trp, 11 Pro253Srg) were included. Severe obstructive sleep apnea (OAHI > 10) occurred in 8 (62%) patients with Ser252Trp mutations compared to 1 (9%) patients with Pro253Arg mutations ($p = 0.009$). CT imaging at one year of age demonstrated that nasopharyngeal airway volumes were $5302 \pm 1076 mm^3$ in the Ser252Trp group and $6832 \pm 1414 mm^3$ in the Pro253Arg group ($p = 0.041$). Maxillary length (ANS-PNS, $p = 0.026$) and Basion-ANS ($p = 0.007$) were shorter in patients with Ser252Trp mutations.

Conclusions

The findings suggest that the Ser252Trp mutation in Apert syndrome is associated with higher severity OSA and decreased nasopharyngeal airway volume. Heightened clinical awareness of these associations may inform treatment planning and family counseling.

Group 5, Abstract #25

Comparative Effectiveness Analysis of Ventral Hernia Repair and Transverse Abdominis Release with and without Panniculectomy: A 4-Year Match-Paired Analysis

Chris Amro, MD
Division of Plastic Surgery, University of Pennsylvania

COMPARATIVE EFFECTIVENESS ANALYSIS OF VENTRAL HERNIA REPAIR AND TRANSVERSE ABDOMINIS RELEASE WITH AND WITHOUT PANNICULECTOMY: A 4-YEAR MATCH-PAIRED ANALYSIS

Introduction:
As the prevalence of obesity continues to increase, the number of concurrent VHR and panniculectomy procedures also rises. However, data regarding long-term outcomes following concurrent TAR and panniculectomy is limited. This study aims to compare long-term clinical outcomes and quality of life (QoL) following TAR with and without concurrent panniculectomy.

Methods:
A single-center, retrospective review from 2016-2022 was performed examining subjects who underwent ventral hernia repair (VHR) with transverse abdominis release (TAR) and panniculectomy. A propensity-scored matching was performed based on age, BMI, ASA, and ventral hernia working group (VHWG). Patients with parastomal hernias were excluded. Data examining demographic characteristics, intraoperative variables, postoperative outcomes, and quality of life (QoL) were analyzed.

Results:
A total of fifty subjects (25 per group) were identified (median follow-up, 48.8 months). Median age and BMI were 57 years (47-64 years) and 31.8kg/m2 (28-36kg/m2), respectively. The average hernia defect size was 354.5cm2±188.5cm2. Patients who underwent VHR with TAR and panniculectomy were majority female (64% vs. 12%, $p<0.05$). There was no difference between the groups regarding hernia recurrence, emergency department visits, readmissions or reoperations ($p>0.05$). However, patients who underwent VHR with TAR and panniculectomy demonstrated a significant increase in delayed healing (44% vs. 4%, $p<0.05$) and seromas (24% vs. 4%, $p<0.05$). QoL analysis identified a significant improvement in postoperative QoL ($p<0.005$) for both groups across all domains, that continued throughout the 4-year follow-up period. There were no significant differences in QoL among VHWG, Wound Class, SSO, or SSOPi ($p > 0.05$). Patients who underwent VHR with TAR and panniculectomy demonstrated greater overall post-operative appearance scores.

Conclusion:
VHR with TAR and panniculectomy can be performed safely with low recurrence and complication rates at long-term follow-up. Despite increased postoperative complications, patients have significant improvement in disease specific QoL and even higher scores in the appearance domain.

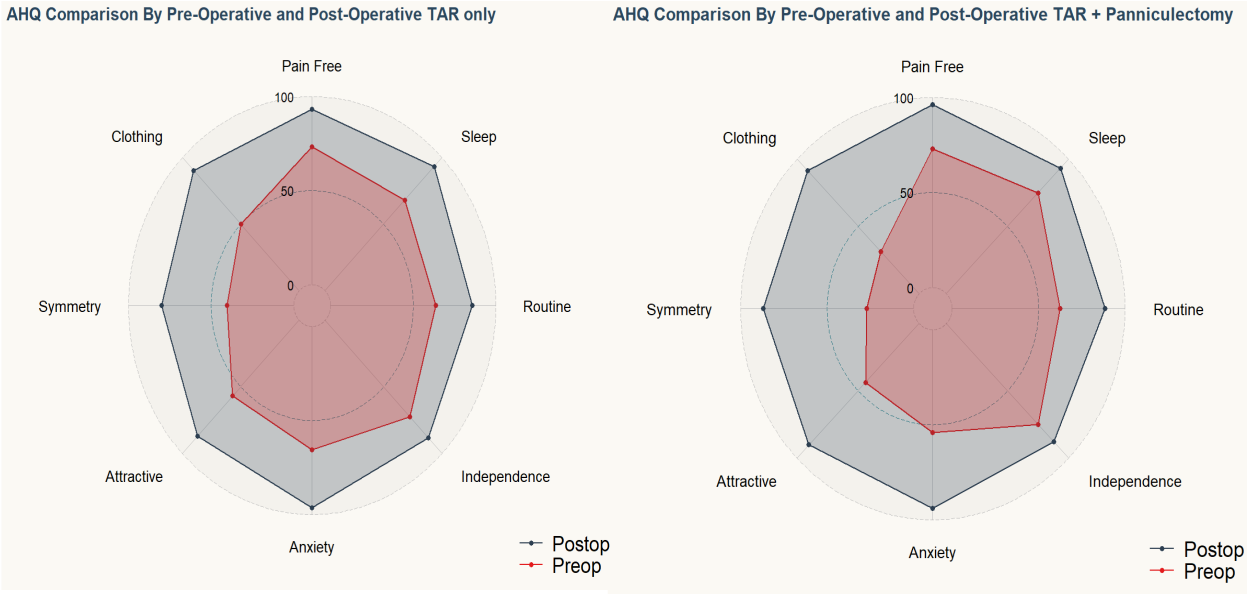


Figure 1: AHQ comparison between Pre-Operative and Post-Operative Follow-Up of VHR and TAR with/without Panniculectomy. Clothing = Satisfaction of feeling normal in clothing, Symmetry = Abdominal Symmetry Satisfaction, Attractive = Satisfaction towards appearance without clothing, Anxiety = Anxiety relief, Independence = Comfortability with self–tasks, Routine = Comfortability with daily routines, Sleep = Satisfaction with sleep, Pain Free = Abdominal pain relief

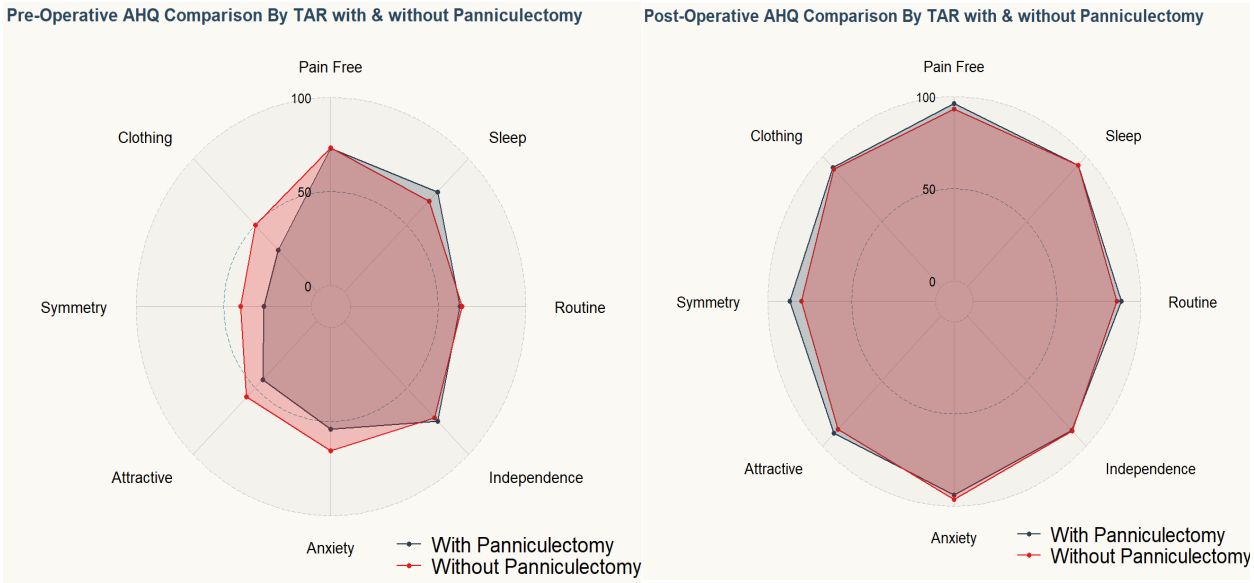


Figure 2: AHQ comparison between Pre-operative only and Post-operative only

2023 WINNER

Group 6, Abstract #26

Topical Spironolactone Promotes Epithelialization in Full-Thickness Wounds

Pooja Humar, Student
University of Pittsburgh Medical School

2nd Place Clinical

TOPICAL MINERALOCORTICOID INHIBITION IMPROVES EPITHELIALIZATION IN FULL-THICKNESS HEALING WOUNDS

Background: Homeostasis between extracellular matrix (ECM) deposition and remodeling is maintained by an array of inter-connected signaling networks with situationally-dependent functions. We previously demonstrated that systemic mineralocorticoid receptor (MR) inhibition improves epithelialization and diminishes collagen deposition without eroding scar strength. MR-inhibition, however, has a range side effects when applied systemically. Consequently, we evaluated the role of local MR-inhibition in wound healing and hypothesize that signaling through the MR on macrophages contributes to a pro-fibrotic phenotype in wound healing.

Methods: Female C57Bl/6 mice sustained bilateral 6 mm full-thickness biopsies with stenting and were stratified into either a) vehicle control, b) 5% topical spironolactone, or c) systemic spironolactone. Systemic spironolactone was delivered intraperitoneally every three days, and topical cream formulations of spironolactone and vehicle control were reapplied every three days. Tegaderm was placed over the wound area. Mice were followed photographically for 6 weeks to allow re-epithelialization and scar formation. Wound biopsies were collected for gross architectural analysis and assess collagen, fibrin, and elastic fibers with Movat's pentachrome.

Results: By day 5, both spironolactone groups showed epithelization with minimal contracture. Scar area was noted to be diminished in both the spironolactone groups versus the control group. Wounds receiving IP spironolactone had the shortest time to complete healing. All wounds in this group had epithelialized by day 14, while wounds with topical application remained open. Two wounds in the topical control group and two wounds in the topical spironolactone group healed by day 17. All wounds were healed by day 21. The greatest decrease in wound size occurred between day 7 and 10 across all three groups. No significant difference in wound size was seen among the 3 groups at any time point ($p>0.05$) (figure). Skin elasticity was improved with topical spironolactone application as compared to topical control. Histology demonstrated persistence of inflammation, wound edema, and immature ECM.

Conclusion: These results corroborate our prior findings of the efficacy of MR-inhibition in improving scar resolution with a systemic delivery. Mice receiving systemic and topical spironolactone healed their wounds quicker than mice receiving a topical control agent. Topical application further highlighted the promising role of ECM-modifying mechanism involved with MR manipulation, with the benefit to minimize side effects and maximize the treatment efficacy. Given that wounds in the systemic spironolactone group healed the earliest, next steps include testing different concentrations of topical Spironolactone to determine optimal wound healing.

Group 6, Abstract #27

Multiple Lower Extremity Salvage Procedures Do Not Delay Time to Amputation in Diabetics with Lower Extremity Wounds

Alexandra Vagonis, Student
University of Pittsburgh

MULTIPLE LOWER EXTREMITY SALVAGE PROCEDURES DO NOT DELAY TIME TO AMPUTATION IN DIABETICS WITH LOWER EXTREMITY WOUNDS

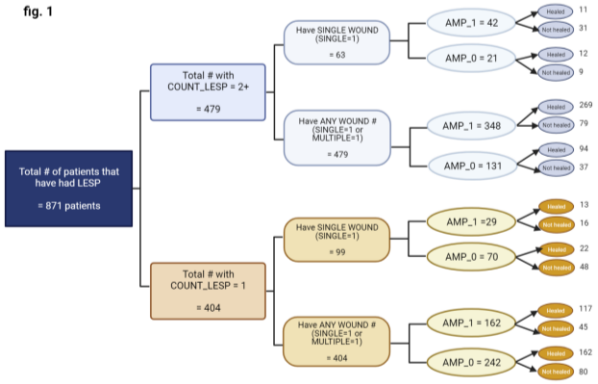
PURPOSE: Lower extremity (LE) wounds are costly and common sequelae of diabetes and vascular disease. These patients may require multiple operative interventions to achieve healing, but some progress to amputation. The 5-year mortality after major amputation in the diabetic foot ulcer population ranges from 40% to 80%. The current management paradigm for diabetic wound patients emphasizes limb salvage with necessary procedures rather than early amputation. However, critical assessment of cost effectiveness, disparities in access to care, and functional outcomes for patients have raised challenges to this paradigm. This study aims to assess if undergoing multiple LE salvage procedures (LESP) has effects on amputation rates, time to amputation, and time to healing of chronic diabetic wounds.

METHODS: A retrospective cohort study of patients with chronic LE wounds treated at a large tertiary care center from 2015-2022 was conducted. Diabetic patients with at least 1 non-traumatic LE wound and at least 1 LESP were included. Fig. 1 depicts the cohort selection process. Cox proportional hazards regression was conducted to assess effects of multiple LESPs on time to limb amputation and time to healing among patients with diabetic wounds. Other confounding variables (race, gender, glycemic control, nutrition status, smoking status, comorbidities, social vulnerability index) were accounted for in the analysis.

RESULTS: There was no significant difference in amputation rate between multiple LESP and single LESP cohorts (73.5% vs. 61.3%, p=0.097). Patients with poor glycemic control (HbA1c >7) had delayed time to healing compared to patients with more optimal control (HR=1.36, CI 1.136-1.514, p=0.04). Time to amputation was not significantly different between multiple LESP and single LESP cohorts (HR: 0.93, 95% CI 0.608-1.418, p=0.7).

CONCLUSION: Multiple surgical interventions to attempt limb salvage may not be warranted in diabetic patients with lower extremity wounds. Based on these data, patients who undergo one salvage attempt versus multiple had no difference in amputation-free survival. In the era of value-based care, this suggests that one operative limb salvage attempt may be warranted, but multiple attempts may incur unnecessary costs and ultimately delay rehabilitation and recovery.

fig. 1



Group 6, Abstract #28

Thoracic Duct Lymphovenous Bypass: Anatomic and Clinical Considerations for Patient Selection

J.Reed McGraw, Student
Division of Plastic Surgery, University of Pennsylvania

THORACIC DUCT LYMPHOVENOUS BYPASS: ANATOMIC AND CLINICAL CONSIDERATIONS FOR PATIENT SELECTION

PURPOSE: Thoracic duct (TD) obstruction carries significant morbidity, leading to recalcitrant lymphedema and chylous pleural effusions or ascites. Microsurgical lymphovenous bypass is a treatment option for patients who have failed conservative therapy; however, as the TD is susceptible to a high degree of anatomic variation, obstructive patterns may vary, and treatment response to bypass is uncertain. The purpose of this study was to identify anatomic patterns of TD obstruction associated with positive treatment response to surgery in order to guide future patient selection.

METHODS: A retrospective review of all adults undergoing TD lymphovenous bypass from 01/2019 to 06/2022 was performed. Demographics, medical history, functional status, and surgical details were collected from the medical chart. Pre- and post-operative lymphangiograms were utilized to identify TD obstructive patterns, which were classified as proximal (i.e. intrathoracic) or distal (i.e. adjacent to the TD-central venous junction). Functional outcomes included changes in chylous ascites, chylothorax, and lymphedema, which were compared to baseline at three months.

RESULTS: Fifteen patients underwent TD bypass (nine females, mean age 47.7 years). Presenting pathologies included: chylous ascites (n=10), chylothorax (n=7), lower extremity lymphedema (n=7), and protein-losing enteropathy (n=6). Fifty-three percent (n=8) of patients had isolated distal TD stenosis at the level of the TD-subclavian venous junction with no other lymphatic abnormalities. One-third (n=5) had both distal and proximal TD occlusion. Thirteen percent (n=2) had congenital lymphatic malformations (one with TD bifurcation, one with drainage into multiple collaterals) at the level of the TD-venous junction. Eight patients (53%) showed clinical and symptomatic improvement at three months, including reduced limb volume (n=4), reduced chylous peritoneal output (n=3) and reduced chylous pleural output (n=1). Of the patients who exhibited positive treatment response, 88% (n=7) had isolated lymphatic occlusion at the TD-subclavian junction without evidence of lymphatic malformation or intrathoracic obstruction. Six patients with proximal TD occlusion or congenital lymphatic malformations experienced no functional change in their presenting pathology, with four patients having persistent chylous ascites and two patients with persistent chylothorax.

CONCLUSION: In patients with isolated distal TD obstruction at the level of the TD-subclavian venous junction, lymphovenous bypass was associated with strong treatment response consisting of clinical improvements in chylous ascites and lymphedema. Patients with proximal, intrathoracic occlusion are less likely to see clinical benefit. Proper patient selection remains critical in the microsurgical treatment of refractory central lymphatic disorders.

Group 6, Abstract #29

Times Have Changed: A Nationwide Analysis of Outcomes and Costs Associated with Early vs. Late Free Flap Reconstruction Following Lower Extremity Trauma in 1043 Patients

Theodore Habarth-Morales, Student
Division of Plastic Surgery, University of Pennsylvania

TIMES HAVE CHANGED: A NATIONWIDE ANALYSIS OF OUTCOMES AND COSTS ASSOCIATED WITH EARLY VS. LATE FREE FLAP RECONSTRUCTION FOLLOWING LOWER EXTREMITY TRAUMA IN 698 PATIENTS

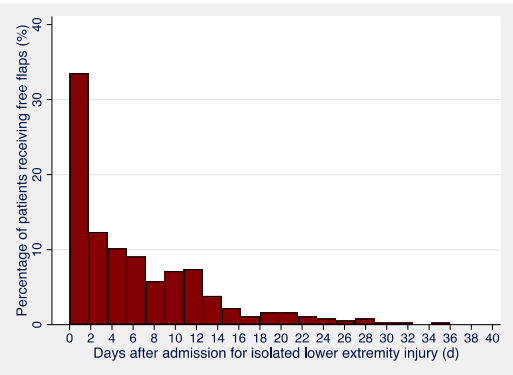
INTRODUCTION: For over 35 years the Godina Principle has governed the timing of free flap reconstruction (FFR) after lower extremity (LE) trauma. We aim to reevaluate the timing of LE FFR within 72 hours of injury.

METHODS: The Nationwide Readmission Database (2015-2019) was queried for all admissions with acute LE trauma who received FFR. The association between flap timing and complications, readmissions, and costs was analyzed using risk-adjusted analyses.

RESULTS: A total of 698 patients undergoing FFR after LE trauma were identified. Timing of FFR was stratified by immediate (0-72 hours), delayed (72 hours-10 days), and late (10+ days). Delay of FFR was not associated with increased risk of amputation or 30-day readmissions for surgical complications, surgical site infection (SSI), or any other complications (**FIGURE**). Delayed FFR was associated with higher predicted length of stay (LOS) (2.9 days [95% CI: 0.02-5.76], *P*=0.048) after FFR but not increased cost (*P*=0.628). Late FFR was also associated with increased LOS post FFR (6.11 days [95% CI: 0.55-11.69], *P*=0.032) but cost was again similar (*P*=0.641).

CONCLUSION: Delay of FFR does not appear to increase risk of amputation, surgical complications, SSI, readmissions, or costs. Despite increased LOS, patients can benefit from FFR regardless of transfer delays to a microsurgery-capable center. Patients who previously were not considered candidates, may now be well-suited for FFR, resulting in improved psyche, quality of life, and societal re-integration.

A.



B.

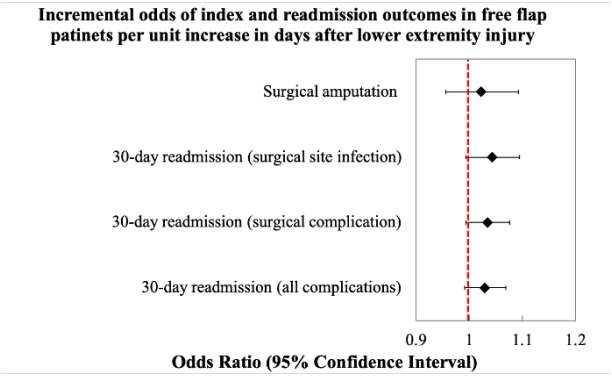


Figure. **(A)** Timing of free-flap reconstruction after isolated traumatic lower extremity injury in a nationally representatuve database from 20015-2019. **(B)** Risk of adverse outcomes and readmissions for per day of delay of free-flap reconstruction after index injury.

Footnote. *Logistic regression models performed treating days after free flap variable as continuous. Odds ratios represent risk per unit increase in days after injury. Models controlled for patient (age, Elixhauser comorbidity index, injury severity score, income, insurance) and hospital (free-flap volume quartile, trauma volume quartile, bed size, teaching status, owner)

Group 6, Abstract #30

Correlations of Psychiatric Comorbidities with Body Image and Maintenance of Weight Loss Following Body Contouring Procedures

Joseph Mocharnuk, Student
University of Pittsburgh School of Medicine

CORRELATIONS OF PSYCHIATRIC COMORBIDITIES WITH BODY IMAGE AND MAINTENANCE OF WEIGHT LOSS FOLLOWING BODY CONTOURING PROCEDURES

Introduction: An estimated 46,000 patients undergo body contouring procedures in the U.S. each year. This patient population has a high prevalence of obesity and is subject to significant stigma. The relationship between obesity and psychiatric comorbidities is widely documented, and it has been estimated that anywhere between 20 and 60 percent of patients who pursue bariatric surgery suffer from axis I psychiatric disorders. However, there is comparatively less research regarding psychosocial functioning of post-bariatric patients preparing to undergo body contouring surgery. This study aims to describe the implications of specific psychiatric comorbidities, including major depressive disorder (MDD) and generalized anxiety disorder (GAD) on the management and outcomes of body contouring patients.

Methods: A retrospective review was performed of patients who presented to a single institution for body contouring procedures between 2002 and 2018. Variables studied included demographic information, medical and psychiatric history, smoking and drinking history, self- image, social support, procedure history, outcomes and follow up. Univariate analysis, two-sample t-tests, and multinomial logistic regressions were performed using R statistical software (Version 1.3.1093).

Results: A total of 1,187 patients received at least one body contouring procedure within the study timeframe. The mean age of patients at presentation was 50.08 ± 0.78 years. Most of our patient cohort was female (90.1%and Caucasian (93%). Mean BMI at presentation was 31.21 ± 10.49. A total of 50.2% of our patient cohort had history of at least one psychiatric comorbidity. GAD was found in 26.4% of the overall patient population. Patients with history of GAD were 1.4 times less likely to rate their pre-operative body image as “somewhat positive” or “very positive” ($p<0.05$) and were 1.69 times less likely to maintain 6-month post-op weight loss through regular exercise than patients without GAD ($p<0.02$). History of MDD or other psychiatric disorders was not significantly associated with lower ratings of pre-operative self-image ($p>0.05$). When controlling for the effects of a history of anxiety, larger decreases between a patient’s historical maximum BMI and BMI at the time of pre-operative body contouring association were significantly associated with a 2% increased likelihood of reporting a “somewhat positive” or “very positive” self-image ($p <0.05$).

Conclusion: Psychiatric comorbidities such as GAD have important implications on management and outcomes in patients undergoing body contouring procedures. Patients with GAD are less likely to report positive pre-operative body-image and are less likely to maintain weight loss than patients without GAD.