



## ASRM Short Presentations

January 18, 2016 – 4:15 PM to 5:15 PM

4:15 PM - 4:18 PM

### **Management of Complex Abdominal Wall Defects in the Intestinal Transplant Population: Review of Our Multidisciplinary Experience**

Medstar Georgetown University Hospital, Washington, DC, USA

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**Introduction:** The multi-visceral (MVT) or intestinal (IT) transplant population has unique challenges as these patients have lost portions of their abdominal wall from multiple operations and fistulization. *Medstar Georgetown Transplant Institute* is a referral center for short gut syndrome and complex intestinal fistulas. Currently, there is a paucity of literature to guide the management of these complex abdominal wall patients. We report our experience and outcomes following treatment of these patients in the period of MVT and IT transplantation.

**Methods:** Between 2012 and 2015, 15 patients with complex abdominal wall defects who were in the evaluation process for MVT and/or IT transplant were retrospectively reviewed. Demographic data, abdominal wall pathologies, reconstructive methods, length of follow up, and outcomes were evaluated.

**Results:** A total of 15 patients met our study criteria were categorized into three major sub groups. Group 1 consisted of 6 patients who had undergone either MVT or IT resulted in complex abdominal wall hernias. These patients underwent components separation with biologic mesh underlay. At an average length of follow up of 388 days (r, 8-875), all patients healed with functional transplants (Table 1).

Group 2 consisted of 5 patients in evaluation for intestinal transplant due to large complex abdominal wall defects and fistulas eventually received total enterectomy and reconstruction with pedicled anterolateral thigh (ALT) flaps. In this group, all ALT flaps went on healing. At an average length of follow up of 280 days (r, 123-433), 2 patients were deceased, 1 patient presented with fistula recurrence, and 2 patients have been listed for MVT.

Group 3 consisted of 4 patients underwent pre-transplant evaluation for abdominal wall defects and complex fistulas that were eventually amenable to takedown and establishment of small bowel continuity and were subsequently reconstructed with components separation with biologic mesh. At an average length of follow up of 64 days (r, 43-85), 2 patients have been listed for MVT and the remaining 2 have successfully undergone bowel rehabilitation and did not require transplantation.

**Conclusions:** We present the first series of patients with complex abdominal wall pathologies who have been evaluated for multi-visceral or intestinal transplant. Utilizing the principles of wound care and plastic surgery techniques, we were able achieve complete healing in a high percentage of patients. The importance of a timely multidisciplinary team approach cannot be overemphasized. Successful re-establishment of a stable abdominal domain is essential to enhance functional capacity and quality-of-life in these patients.

**Table 1: Group 1-Transplanted Patients**

Patient No.	Age (yr.) & Gender	Type of Transplant	Interval from Transplant to Definitive Reconstruction (Months)	Types of Repair	Outcomes			
					Reoperation	Length of Follow-Up (Days)	Wound Healed	Functional Transplant
1	55M	MVT	18	CST+Strattice	0	875	Yes	Yes
2	61M	IT	33	CST+Strattice	0	220	Yes	Yes
3	47M	MVT	135	CST+Strattice	1	43	Yes	Yes
4	62M	IT	8	CST+Strattice	1	261	Yes	Yes
5	53M	IT	36	CST	1	8	Yes	Yes
6	48M	MVT	0.1	CST+Strattice	2	62	Yes	Yes
Ave	54	-	38	-	0.8	338	-	-

\* MVT, multi-visceral transplant, IT, intestinal transplant, CST, component separation techniques, Strattice, Strattice Reconstructive Tissue Matrix (LifeCell, Bridgewater, NJ).

4:18 PM - 4:21 PM

### **Diminishing Wound Breakdown After Pressure Sore Closure with Assistance of the VAC Device**

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**INTRODUCTION:** An estimated 2.5 million pressure ulcers are treated annually in the United States, at a cost of \$11 billion. Unfortunately, patients who are prone to pressure sore formation have a high incidence of dehiscence and recurrence – 70% or more reported in the literature. Wound dehiscence often necessitates reoperation, which places patients at risk for additional complications, and longer hospital stay, which in turn increases cost. Vacuum Assisted Closure (VAC) devices have been used in to prepare pressure sores for surgical closure, however to date; the effects of using a VAC device as an adjunct to flap closure have not been investigated.

**METHODS:** The charts of all patients with spinal cord injuries who underwent pressure sore closure between 2011 and 2015 were reviewed. Seventy-eight pressure sores met inclusion criteria. Pressure sore closure with the VAC applied at the time of flap closure was compared to

those repaired with flap closure alone. Primary end points include wound breakdown/dehiscence (within 6 weeks of surgery) and complications requiring reoperation.

**RESULTS:** Thirty-one patients had pressure sore closure with a flap and the VAC and 47 patients underwent closure with flap alone. Dehiscence was 9.6% in patients with combined flap and VAC closure, whereas dehiscence was 63.8% of patients with flap closure alone ( $P < 0.05$ ). Reoperation rate in VAC patients was 16.1%, 5 of 31 patients; 4 were on therapeutic anticoagulation and developed hematomas. All went on to successful wound closure after reoperation. No patients in the flap group required re-operation.

**CONCLUSION:** The VAC device used in combination with flap closure improves outcomes with a 90.4% successful closure rate compared to only a 37.2% success rate with flap alone. The VAC does impart an increased risk of re-operation for bleeding when used on patients receiving therapeutic anticoagulation therefore careful consideration is paramount in this population. This review provides reasons to support the VAC use along with flap closure in pressure sore patients.

4:21 PM - 4:24 PM

### **Using Dynamic Infrared Thermography To Optimize Color Doppler Ultrasound Mapping of Cutaneous Perforators**

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#### Introduction

The high technical demands associated with perforator flaps demand a precise preoperative identification and evaluation of perforator vessels. Color Doppler Ultrasonography (CDU) and Dynamic Infrared Thermography (DIRT) are currently used for preoperative perforator mapping. Each individual technique has advantages and disadvantages. The purpose of this paper is to analyze the value of combining the two methods in order to optimize the process of preoperative perforator mapping.

#### Material and Methods

Ten PIC-FII-337 hybrid breed pigs, averaging 42.3 kg were used. The upper abdominal region was subdivided into four 10x10cm quadrants, and preoperative perforator mapping of each quadrant was performed, first using CDU and afterwards DIRT. Total number of perforators, localization, and identification of the dominant perforator was analyzed for each method.

#### Results

Each quadrant was analyzed separately. The location and number of perforators identified by CDU and DIRT were compared with the intraoperative findings. The total number of perforators identified during surgery was 202. Preoperative CDU mapping identified 194 perforators, 189 of

those being confirmed during surgery. DIRT visualized 238 perforators, with 192 confirmed by surgery. The calculated sensitivity for CDU was 93.56%, with a positive predictive value of 97.42%. DIRT had a sensitivity of 95.05%, but because of the high number of false positive results the PPV was only 80.67%.

CDU failed to identify a perforator visualized during surgery 6.43% of the time. The emergence of the perforator through the fascia, as identified by CDU, was confirmed in all cases during surgery. The mean duration of CDU mapping was 40 minutes.

DIRT mapping produced a higher number of false positive results, attributable to perforator branching at skin level. The position of “hot spots” was situated laterally to the fascial emergence of the perforators identified during surgery. DIRT mapping had a mean duration of 10 minutes.

Superimposition of the images acquired during CDU and DIRT showed that the location of “hot spots” on the skin was located within an average distance of 0.9 cm from the point the perforator pierces the fascia.

The fascial emergence of perforators with a short, vertical trajectory correlated better with the visualization of “hot spots”, while oblique perforators were identified more laterally during DIRT.

The dominant perforator identified by both CDU and DIRT correlated with surgical findings in all cases.

## Conclusions

Used in combination, CDU and DIRT complete each other, shortening operative time, lowering complication rates and ensuring an overall better result.

4:27 PM - 4:30 PM

## **Pharmacologic Prophylaxis for Venous Thrombosis After Abdominal-Based Free Flaps: Does Site of Administration Matter?**

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### **Background**

Administration of subcutaneous unfractionated or low-molecular weight heparin is an important tool for prevention of deep venous thrombosis after breast reconstruction. As there is significant amount of undermining at the donor site after an abdominal-based free flap operation, an injury to a blood vessel during a subcutaneous injection over the abdominal donor site can potentially lead to the accumulation of a hematoma, resulting in infection and wound complications which may require additional operations. Our study is the first to investigate whether site of heparin administration affects the incidence of major abdominal donor site complications that require additional operations.

## **Methods and Materials**

A retrospective chart review was performed for a single surgeon performing abdominal-based free flaps between October 2013 and June 2015 at our institution. Inclusion criteria were patients who had transverse abdominal-based free flap operations and received routine scheduled subcutaneous heparin or enoxaparin for DVT prophylaxis post-operatively. Exclusion criteria were vertically oriented flaps and patients receiving therapeutic heparin dosage or heparin drips. A student t-test was performed to assess statistical significance.

## **Results**

A total of 36 patients and 57 flaps were included. There were 53 deep inferior epigastric perforator (DIEP) flaps and 4 superficial inferior epigastric artery (SIEA) flaps. 27 of 36 (75%) patients received subcutaneous heparin or enoxaparin in the abdomen and 5 of 27 (19%) had abdominal donor site complications which required additional operations. Of the 5 complications, two occurred in the acute post-operative setting and were both hematomas. The 3 complications with delayed (post-discharge) presentation requiring eventual operative intervention include a seroma, an abscess, and a wound dehiscence of the donor site. Of the 9 of 36 (25%) patients who did not receive subcutaneous heparin or enoxaparin in the abdominal donor site, there were no donor site complications requiring operative intervention. Total ( $p=0.01$ ) as well as delayed ( $p=0.04$ ) donor site complications were statistically significant between patients receiving abdominal heparin and those not receiving abdominal heparin. Acute donor site complications was not statistically significant between patients receiving abdominal heparin and those not receiving abdominal heparin ( $p=0.08$ ).

## **Conclusions**

Our data demonstrate that after abdominal-based free flap surgery, donor site complications that require operative intervention are more likely to occur when post-operative venous thromboembolism prophylaxis is administered to the abdominal donor site, though complications are more likely to manifest after discharge. Abdominal administration of thromboembolism prophylaxis may increase donor site complications and we recommend alternative sites of injection.

4:30 PM - 4:35 PM

## **Discussion**

4:35 PM - 4:38 PM

### **Three-Dimensional Computed Tomographic Study of the Vascular Perfusion of the Facial Skin by Selective Injection of the Facial versus Superficial Temporal Arteries: Implications in Allotransplantation of Facial Aesthetic Subunits**

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BACKGROUND

Face transplantation allows the possibility to replace those facial tissues that are lost in patients with severe facial deformities. As the VCA field develops, it may be possible to transplant segments of facial skin to replace facial aesthetic subunits in selected cases. The aim of this study is to evaluate the vascular supply of the facial aesthetic subunits to identify the more reliable vascular pedicles of each subunit for its use in transplantation

## METHODS

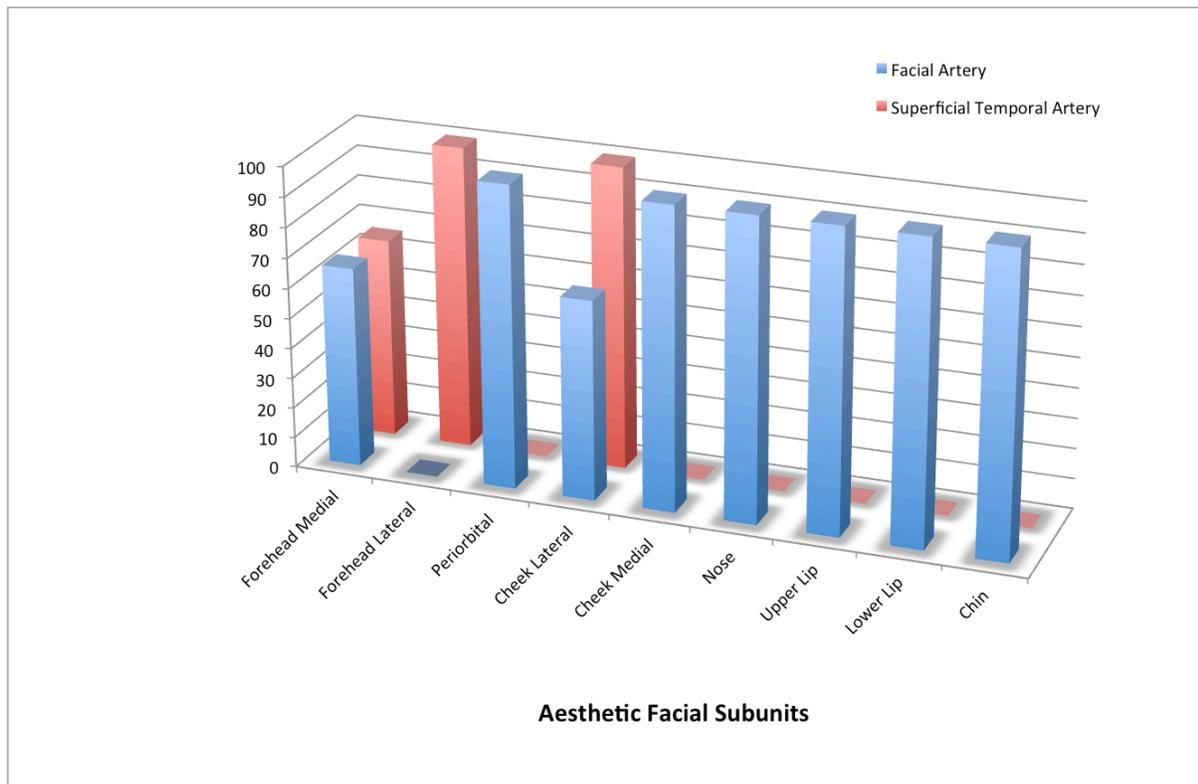
Six adult human cadaveric heads were used in this study. Full-facial soft tissue flaps were harvested and the external carotid arteries were identified and cannulated proximally to the facial arteries (FA). Next, the injection with the radiopaque contrast (barium sulfate/gelatin mixture) was performed and in three of the facial flaps, the FA was clamped, therefore allowing the contrast to run into the superficial temporal artery (STA) territory and in the other three facial flaps, the vascular clamp was located at the external carotid artery distally to the origin of the facial artery, therefore allowing the contrast to fill the facial artery territory in the face. Following vascular injections, three-dimensional computed tomographic arteriographies of the faces were performed. Images were viewed using OsiriX Imaging Software allowing analysis of the arterial anatomy and perfusion in different facial aesthetic subunits by observing radiopaque filling arterial patterns.

## RESULTS

The chin, lower lip, upper lip, medial cheek, nose and periorbital units were perfused in all facial flaps where the FA was injected and in none of those injected by the STA. The lateral cheek was perfused in 100% of the STA flaps and in 66% of the FA flaps. The lateral forehead contained contrast in 100% of the STA injected flaps and in 0% of the FA injected flaps and the medial foreheads contained contrast in 66% of the FA injected flaps and in 66% of the STA flaps. (Figure).

## CONCLUSIONS

Single facial aesthetic subunits could be potentially be transplanted based on FA or STA pedicles. The majority of the facial subunits can be harvested based on the FA pedicle with the exception of the lateral forehead that is based on the STA.



4:38 PM - 4:41 PM

### **A New Supermicrosurgical Anastomosis Training Model of Saphenous Artery and Great Saphenous Vein for Development of Advanced Microsurgical Skills. A Preliminary Study**

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**Introduction:** The anastomosis of vessels smaller than 0.5 mm, common during infantile and pediatric replantations and clinical perforator free flap microsurgery, remains a challenge for the majority of experienced microsurgeons. The aim of the study was to confirm the technical feasibility and reliability of anastomosis of saphenous artery and great saphenous vein procedures as a training procedure and to compare the one-way up technique to the currently used standard end-to-end anastomosis technique.

**Methods:** Fifteen microsurgical anastomoses were performed in male Sprague-Dawley rats weighing 200 to 250 g. The saphenous artery and great saphenous vein were explored, and the diameter and length of the vessels were measured. Anatomic dissections of eight legs from four rats were performed. The left saphenous arteries (Group 1A, n=4) and great saphenous veins (Group 1B, n=4) anastomoses were performed using standard end-to-end anastomosis technique. The right side saphenous arteries (Group 2A, n=4) and great saphenous veins (Group 2B, n=3) anastomoses were performed using the one-way up technique with 11-0 monofilament interrupted sutures (Ethicon). The duration of the two anastomosis methods and technical

challenges were compared. The anastomoses patencies and emergence of complications, such as thrombosis or suture rupture, were assessed following anastomosis.

**Results:** The diameter of saphenous artery and great saphenous vein were 0.3 mm and 0.35 mm respectively, which qualify these vessels for performing supermicrosurgical training. The vessels are easily accessible and convenient for dissection. Both of the anastomosis techniques were feasible. No suture rupture was observed. The one-way up technique was proven to be faster compared to the standard technique, 1 hour vs. 1.5 hours (from the skin incision to skin closure), respectively. However, small diameter veins were more prone to thrombosis (25% for standard end-to-end anastomosis and 34% for one-way up technique) following vascular clamp application with both techniques. Short-term patency rates for arteries were 100% for both techniques, and 71% for veins.

**Conclusion:** Both, the standard end-to-end anastomosis and one-way up techniques, confirmed technical feasibility with 100% for saphenous arteries and 71% for great saphenous veins. We confirmed that saphenous pedicle is suitable for practicing the ultrafine motor skills which are required for creating a self-controlled, supermicrosurgical training. To the best of our knowledge, this is the first report on supermicrosurgery model of saphenous artery and vein in the rat.

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### **Vascularized Brachial Plexus Allotransplantation--Experimental Study in Lewis Brown Norway and Lewis Rats**

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#### **Background:**

To study the feasibility of brachial plexus allotransplantation between Lewis Brown Norway and Lewis rats and analyze its functional outcomes after transplantation.

#### **Methods:**

A free vascularized brachial plexus and its chimeric skin paddle compound flap based on the subclavian vessels was designed in a Lewis Brown Norway rat and transferred to a Lewis rat. The nerve segment was 3.5 cm in length including five spinal nerves proximally and seven distal terminal branches. Animals were divided into four groups: Group I: en bloc resection of the whole brachial plexus without transplantation; Group II: vascularized brachial plexus allotransplantation with treatment(cyclosporine A); Group III: vascularized brachial plexus allotransplantation without treatment; and Group IV: vascularized brachial plexus autotransplantation as control. Functional assessment was performed including grooming test, muscle strength, muscle weight, electrodiagnosis, histomorphometry of the targeted muscles and nerves.

#### **Results:**

The average grooming test scores at 16 weeks were 0.25 in Group I; 3.5 in Group II; 1.4 in Group III; and 3.75 in Group IV. Group II and IV demonstrated similar results in muscle strength, muscle weight and electrodiagnostic tests, whereas group I and group III showed significant muscle atrophy. Histo-morphometry revealed severe degeneration of axons and inflammatory cell infiltration in allogeneic nerves without immunosuppression. In contrast, groups II and IV demonstrated well vascularized and myelinated regenerating axon fibers.

### **Conclusions:**

This study demonstrated a useful vascularized brachial plexus allotransplantation rodent model. With immunosuppression vascularized brachial plexus allotransplants survived well and forelimb function returned.

4:44 PM - 4:47 PM

### **Lumbar artery perforator free flap: Anatomical Study and clinical experience in Breast reconstruction**

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### **Introduction**

Breast reconstruction with lumbar artery perforator (LAP), which was described only in one case report, is indicated in patients with unfavorable abdominal donor site. In addition to our clinical experience with LAP free flap breast reconstruction, we present an anatomical study of the origin and course of the perforators.

### **Material and methods**

Images of multi-detector computerized tomography MDCT scan were used to visualize the location of the dominant lumbar artery perforator in 20 patients. X- (horizontal line connecting the highest points on both iliac crests) and Y-axes (the midline along the spinal processi) were used as landmarks to localize the lumbar perforators. The medical files of our patients who underwent LAP breast reconstruction were also analysed.

**Results:** MDCT imaging in 20 female patients with mean age 47-year old revealed an equal number of dominant perforators (10 left, 10 right); 60% were at the level L3-4, 30% at the level L4-5 and the remaining at the level L2-3. The dominant perforators were mainly located 42.6mm

from the Y axis at their origin at the transverse process, and 69.5mm (4 fingers breadth) when emerging in the subcutaneous tissue.

Six patients had 9 successful LAP flaps for breast reconstruction. Average operative time was 270 min. Due to shortness of pedicle and mismatching between diameter of lumbar artery and internal mammary artery (IMA), vascular bypass (harvested from the deep inferior epigastric vessels) was required in 4 cases. The major complication at the donor site was seroma (80%).

## Conclusion

The lumbar artery perforator has a constant anatomical location. The free LAP flap provides ample amount of tissue for breast reconstruction, however, its major disadvantages are small artery diameter, shortness of the pedicle; and high seroma rate at the donor site.

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4:47 PM - 4:50 PM

### **The protective effect of abdominal scars on DIEP flaps and motor nerve preservation**

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Purpose: To evaluate the effect of previous abdominal scarring on the number of perforators taken and the rate of intercostal nerve sacrifice during DIEP flap harvest.

Methods: This study was a subset analysis of “A Randomized Clinical Trial Comparing the Breast and Abdominal Related Morbidity of DIEP and SIEA Flaps”. A standardized set of intra-operative anatomical and surgical variables were prospectively recorded on 88 DIEP flaps. SIEA flaps were excluded. Template data included abdominal scar type and location; the size, number, and location of perforators harvested; and the number of intercostal nerves sacrificed. Perfusion of the flap intra-operatively was based on clinical assessment when the flap was still attached to the abdomen. The number of perforators harvested was determined by the clinical appearance of the flap as the perforators were clamped off sequentially. Although data was collected prospectively, the analysis of scarred vs. non scarred abdomens was done retrospectively.

Results: 54 of 88 patients had abdominal scars, ranging from 1-5 in number. There was no statistical difference in BMI, smoking, age, preoperative breast size, or co-morbidities. The clinically determined need to harvest more than one perforator was significantly higher in abdomens without scars (44.1%) compared to abdomens with scars (11.5%),  $p < 0.05$ . Patients with a flap harvested on a single perforator were more likely to have multiple abdominal scars than patients with flaps harvested on  $>1$  perforator,  $p = 0.01$ . The prevalence of nerve damage was significantly lower in scarred abdomens (20.4%) compared to abdomens without scars (44.1%),  $p < 0.05$ . Patients without any intercostal nerve damage had a greater number of scars than those with intercostal nerve damage. There was no statistically significant difference between rates of nerve damage when a medial vs. lateral row perforator was harvested.

Conclusions: Preexisting abdominal scars appear to confer a protective effect towards lower numbers of perforators harvested and lower rates of intercostal nerve damage. Previous scars may invoke a delay phenomenon and cause the abdomen to undergo ischemic preconditioning likely resulting in dilation of choke vessels and larger angiosomes increasing the ability of a single perforator from the DIEP system to support the full volume of the flap. This decreases the amount of dissection required, likely decreasing rates of intercostal nerve damage. These findings challenge the assumption that abdominal scars are a contraindication to use of the DIEP flap and provide evidence for the feasibility of abdominal based free flap harvest in scarred abdomens.

4:50 PM - 4:55 PM

### **Discussion**

4:55 PM - 4:58 PM

### **Capillary perforator flap : New possibility for Local Skin Flaps**

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Local flaps are widely used for treatments of local tissue loss or ulcers. Systemic anatomy on perforator revealed in recent years, and reports on topical perforator flap have been increased.

However, decision of donor site and design for flaps are limited, because large perforators are essential to include for maintenance of flap blood circulation. In this report, new capillary perforator flaps which are nourished with smaller perforators and invisible (less than 0.3 mm) and are flexible in donor sites and designing.

Capillary perforator flap is a flap with perforator less than 0.3mm in diameter.

So far, thoracodorsal artery capillary perforator (TAPcp) flaps with capillary perforators of the lateral descending branch of thoracodorsal system were reported as a typical capillary perforator flap (Fig.1). As other capillary flap, follows are very important; the transverse cervical artery capillary perforator in the neck region, thoracoacromial artery capillary perforator flap in the chest, paraspinous perforators (Fig.2) and capillary from the descending branches of the circumflex scapular artery in the back region, capillary flap using pedicle from the superficial (deep) circumflex iliac artery perforators, digital artery capillary flap, radial (ulnar) artery capillary flap in the forearm, radial and ulnar collateral artery capillary flaps in the elbow, capillary perforator flaps from the standard perforators in the thigh and lower legs (Fig,3), flaps with the lateral calcaneal and plantar artery perforators in the ankle,

For elevation of capillary flap, the axis of flap designing is placed through the sensory nerve, because the nerve has much tiny capillaries. The application of these flaps would be useful as local flap to cover middle size ulcers associated with exposure of the bones less than 10 cm in length. As other application, transferred large flaps could be split to cover for neighboring tissue (concave recessed defects) in two-stage transfer as a or perforator-on-perforator flap (banking flap, switch flap, green flap, eco-flap).

Fig.1



Fig.2

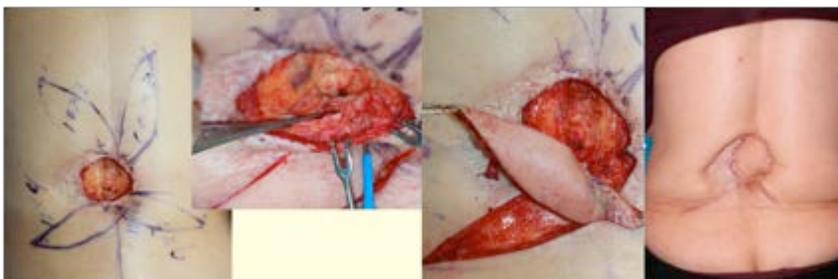




Fig.3

4:58 PM - 5:01 PM

### **Decision Regret and Patient Reported Outcomes Autologous Breast Reconstruction**

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Background: Arterial or venous compromise that results in an unsalvageable flap requiring explant is a devastating, however uncommon, complication even in the hands of experienced microsurgeons. Flap loss patients may view the reconstructive process negatively, or with regret, and dissuade potential future candidates in the breast cancer community from seeking autologous reconstruction. We sought to determine if, and to what extent, do patients with failed autologous breast reconstruction regret the decision compared to controls and compare the patient reported outcomes using the BREAST-Q.

Methods: A prospectively maintained database was used to identify patients who had a flap loss after autologous reconstruction requiring explant between 2005 and 2013. We collected baseline demographic characteristics, perioperative chemo/radiotherapy and comorbidities and identified a matched patient cohort without the complication of free flap loss as control. Phone interviews were conducted. Outcome variables include score on the Decision Regret Scale (0 complete regret, 100 is no regret) and patient reported outcomes from BREAST-Q. Multivariate regression analysis was performed to determine which factors predicted patients with flap loss to experience regret.

Results: Out of 4015 patients in the database, we identified forty-nine patients with complete flap loss and selected matching controls. Response rate was 76% for a total of seventy-four patients. Compared to controls, patients who did have flap loss had lower Regret Decision Score ( $p < 0.0001$ ), lower BREAST-Q score ( $p < 0.001$ ) and more likely to express regret (31% vs. 6%,  $p < 0.0001$ ). However, the majority of patients with flap loss, 69%, expressed no regret. Majority of flap loss patients, 87.5%, would recommend autologous breast reconstruction to another mastectomy patient. Multivariate adjusted regression showed factors that predicted regret include

high number of revision surgeries ( $p=0.02$ ), not receiving definitive reconstruction on the explanted side ( $p<0.001$ ) and having had or desiring to have professional counseling at the time after flap loss ( $p=0.03$ ).

Conclusions: Although patients with flap loss are more likely to experience regret after autologous reconstruction compared to controls, vast majority of them experienced no regret and would even recommend reconstruction to other patients. Factors predicting regret include increased number of total surgeries it took to achieve stable reconstruction, final state of reconstruction and requiring professional counseling during reconstructive process. Flap loss is inevitable in a busy microsurgical practice; understanding factors leading to decision regret can help surgeons to better counsel patients and guide them through a difficult period.

5:01 PM - 5:04 PM

### **Staged Composite Mastopexy Following Nipple-Sparing Mastectomy and Autologous Breast Reconstruction; Improving Aesthetic Outcomes**

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Background

Nipple sparing mastectomy (NSM) is associated with enhanced patient satisfaction and significant aesthetic benefit. However, patients with significant ptosis or relatively-insufficient autologous donor tissue are often precluded from NSM due to creation of aesthetically unacceptable nipple ptosis following reconstruction. Moreover, nipple areolar complex (NAC) mobilization at the time of mastectomy to correct malposition can lead to necrosis. In such patients, a superior aesthetic result can be achieved utilizing NSM with immediate autologous reconstruction if a second-staged mastopexy is performed to transpose the NAC to the center of the new breast mound on a composite pedicle derived from the flap reconstruction.

#### Methods

NSM reconstructions utilizing abdominally-based autologous breast reconstruction were analyzed to identify patients who underwent autologous breast reconstruction with significant preoperative ptosis or mismatch between breast size and available donor tissue volume. Demographic and clinical information was analyzed including: indication for NSM, autologous reconstruction technique, preoperative ptosis grade, sternal-notch to nipple distance, bra-size, BMI, delay between initial reconstruction and second stage mastopexy, adjunctive procedures during secondary mastopexy, history of radiation, surgical complications and aesthetic result/correction of ptosis.

#### Results

7 patients met criteria (13 breasts) following NSM (12 DIEP, 1 MS-TRAM). Invasive cancer was the indication for NSM for 4 breasts (31%), while prophylactic mastectomies were

performed for the remainder, including 4 breasts with BRCA mutations. The median patient was 50 years; average BMI was 24.6. Bra size ranged from 34B to 36F. 3 patients had grade I ptosis (46%), 4 patients had grade II ptosis (53%), and no patients had grade III ptosis. Sternal-notch and nipple averaged 24cm. 2 patients suffered total or partial nipple loss, prior to second-stage mastopexy. 197 days was average between mastectomy and mastopexy. The only complication post-mastopexy was a seroma; there was no incidence of NAC necrosis or loss. Autologous fat grafting was performed in 2 patients at the time of mastopexy to augment flap volume.

## Conclusions

Lack of sufficient donor flap volume to fill the NSM envelope to maintain or correct NAC position is perceived to limit autologous reconstruction. Our staged technique of immediate autologous reconstruction followed by mastopexy expands the indications for NSM in women with larger breasts or ptosis with superior aesthetic results. Our technique not only allows for immediate autologous reconstruction, but obviates the need for strategies that employ mastopexy or breast reduction prior to mastectomy that have the potential to risk NAC survival or delay oncologic treatment.

5:04 PM - 5:07 PM

## **Single Dominant Perforator DIEP Breast Reconstruction: A Review of Clinical Outcomes and Risk Factors**

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**Introduction:** The use of lower abdominal tissue is a popular autologous reconstructive choice post mastectomy. Commitment to a single perforator in a DIEP flap has potential benefit of a simpler flap dissection, but may have increased rates of fat necrosis or other perfusion related complications in comparison to multiple perforator harvest.

**Methods:** A retrospective study was performed of all patients who underwent DIEP breast reconstruction performed by the senior surgeon (M.S.C) at Mayo Clinic between May 2012-May 2015. Data was collected on patient demographics, comorbidities, BMI, radiation and chemotherapy, number of perforators, perforator row, perforator size, inclusion of CT dominant perforators, conversion to MS-TRAM and postoperative complications.

**Results:** A total of 183 flaps were performed in 105 patients over the 3 year period. 86% (N=156) were bilateral and 14% (n=25 flaps) were unilateral reconstructions. Conversion to MSTRAM occurred in 2/25 (8%) flaps in the unilateral group and in 15/156 (9.5%) in the bilateral group. Mean age was 47.8 (SD=8.4) and Mean BMI was 29.1 (SD=5.3). There was a similar distribution of patients in the non-obese (BMI<25), overweight (25<BMI<30), and obese (BMI >30). Among the DIEP flaps, single dominant perforators were used in 121 (75%) and 2-3 perforators were used in 41 (25%) flaps. In the normal BMI group single perforators were used in 57.1%, and 42.9% used multiple; however in the higher BMI groups (overweight/obese) single perforators were used in 81% and multiple perforators 19% (P=0.01).

Of the 113 flaps with recorded final flap weights, 9 were over 1000g. Of these 33.3% were single perforator and 66.6% were multiple perforator flaps, compared to flaps weighing 500-1000g and less than 500g, 80% and 74% were single perforator flaps respectively (P=0.01). A review of factors including BMI, flap weights and flap type (DIEP and MSTRAM) independently on total and specific complications, demonstrated no statistically significant differences. Logistic regression analysis of risk factors including age, BMI, flap weight, radiation exposure, smoking history, flap type and perforator numbers demonstrated chemotherapy as a risk factor in incidence of any complication (P<0.01).

**Conclusions:** Single dominant perforator flaps in DIEP breast reconstruction can be safely performed with good clinical outcomes even up to 1000g. Identification and inclusion of a large perforator is paramount. When multiple perforators are harvested they should be harvested within the same row to minimize morbidity. Conversion to a MS-TRAM is uncommon and generally reduces based on increased clinical experience.

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**Coupling a Superficial Vein in DIEP Flaps to an Axillary Vessel before Internal Mammary Anastomoses Reduces Venous Complications with Minimal Increased Operative Time**

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**INTRODUCTION:** Success in microsurgery relies upon adequate venous drainage. The deep inferior epigastric artery perforator (DIEP) flap has the innate advantage that the superficial inferior epigastric venous (SIEV) system can augment venous outflow. In nearly all DIEP flap breast reconstructions based on internal mammary recipients, a secondary superficial flap vein can be anastomosed to the axillary system to augment venous drainage.

**METHODS:** Retrospective review of DIEP flap breast reconstructions performed over 18 months was performed. Total operative time, number of venous anastomoses, method of anastomosis, complications including take-backs for venous congestion or hematoma, total flap failure, fat necrosis and wound healing problems were evaluated.

**RESULTS:** 63 DIEP flaps in 34 patients were performed (17 unilateral, 23 bilateral). All had primary arterial and venous anastomoses to the internal mammary system by hand-suturing. 36 cases (57%) included a second venous anastomosis from a flap SIEV to a venous branch of the axillary system by anastomotic coupler (10 unilateral, 26 bilateral). Average coupler size was 2.0 mm. Total operative time for unilateral single-vein cases was 4 hours 34 minutes vs. 5 hours 3 minutes for cases anastomosing a second vein (+31 minutes). Total time for bilateral single-vein DIEPs was 6 hours 40 minutes vs. 7 hours 5 minutes for two-vein cases (+35 minutes). Three take-backs occurred in single-vein flaps; all were salvaged by anastomosing a second SIEV from the flap to an axillary vessel. No take-backs occurred in two-vein flaps. A single flap failure occurred in a unilateral single-vein DIEP flap; salvage was abandoned due to preoperative anemia and Jehovah's Witness faith. No fat necrosis occurred. One patient had

minor mastectomy skin flap necrosis and one had donor site dehiscence requiring operative closure.

**DISCUSSION:** DIEP flap complications create loss of time, energy and effort. Building a secondary route of venous outflow eliminated operative take-backs with minimal additional surgery time. We therefore began anastomosing a second vein to the axillary system whenever possible. Situations where this may not be possible include a lengthy lower abdominal scar, diminutive SIEV size, intraoperative vessel injury or lack of available axillary veins.

**CONCLUSIONS:** Performing a second venous anastomosis from an SIEV to the axillary system as a routine component of DIEP flaps eliminated take-backs and venous complications without significant additional of operative time (31 and 35 minutes for unilateral and bilateral cases). We have incorporated this detail in our reconstructions whenever possible to ensure microsurgical peace of mind.

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**Discussion**