

ASRM Scientific Paper Presentations: Complex Non-Microsurgery Reconstruction

Tuesday, January 16, 2018, 10:15am – 11:00am

10:15 AM - 10:20 AM

RM 153. Freestyle Pedicled Perforator and Propeller Flaps: Introducing the Perforator Preserving Concept

Presenter: Guilherme Cardinali Barreiro, MD, PhD

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Background

Freestyle perforator flaps have been well described for soft tissue reconstructions throughout the body. The flaps are designed according to the defect, surrounding available perforators, and excess regional tissue. Knowledge of the anatomic angiosomes and perforasomes provides a broad spectrum of available pedicled flaps for the reconstructive surgeon. We developed a perforator preserving incision concept for improved reliability and flap outcomes. We present our surgical technique, anatomic studies and clinical application of these flaps for defects of the trunk, head and neck, and extremities.

Methods

Anatomic studies were performed in 35 cadavers to identify reliable perforators based on individual angiosomes throughout the body. Freestyle fasciocutaneous perforator flap technique was developed and includes perforator-preserving incisions followed by subfascial identification of the largest perforator(s). In the clinical setting, perforator-preserving incisions were created in the watershed areas between known perforasomes, and flaps were harvested without the use of a hand-held Doppler or pre-operative imaging. Flaps were designed based on the defect size, location, and nearby available tissue. Dissection of the perforator continued in a retrograde fashion to its main vascular pedicle for optimal mobility and rotation of the flap. Flaps were rotated or tunneled for final inset, and those that included a tertiary angiosome were supercharged as necessary.

Results

From January 2012 to June 2015, 63 patients were reconstructed with freestyle perforator flaps without the aid of handheld Doppler or pre-operative imaging. Donor sites were primarily closed in 82.5% of the cases. Minor complication rate was 20.6%, with 10 patients (15.8%) presenting with distal flap necrosis. All patients healed with readvancement of the flap or conservative management. There were no complete flap losses and all defects were adequately closed with the designed flaps.

Conclusion

Comprehensive understanding of the anatomic perforasomes throughout the body provides the astute reconstructive surgeon with ample reconstructive options for the use of pedicled flaps. Our perforator-preserving surgical technique provides abundant safe and reliable flap options for

trunk, head and neck, and limb soft tissue reconstruction and does not require the use of handheld Doppler or pre-operative imaging.

10:20 AM - 10:25 AM

RM 154. Pedicled Vascularized Bone Grafts for Posterior Occipitocervical and Cervicothoracic Fusion

Baylor College of Medicine, Houston

Presenter: Mohin A Bhadkamkar, MD

Mohin A Bhadkamkar, MD, Alexander Ropper, MD, Edward M Reece, MD, MBA and William C Pederson, MD

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ABSTRACT Background: Successful arthrodesis is critical for achieving favorable outcomes in reconstructive spine surgery. Vascularized bone grafts (VBGs) have been successfully used to augment fusion rates in a variety of skeletal pathologies. While free vascularized bone grafts have been well described, a pedicled VBG has not previously been described for the posterior occipitocervicothoracic region but could provide numerous advantages over free VBGs for high risk patients. Objective: To identify, describe, and assess potential donor sites for pedicled VBGs from occiput to T12 using a cadaver model and to describe important technical considerations for graft harvest and placement. **Methods:** A multidisciplinary team of plastic and neurosurgeons hypothesized that it is feasible to rotate a pedicled VBG from the occiput to T12 via a posterior approach. In 6 cadavers, 3 VBG donor sites were identified as anatomically feasible: occiput, scapula, and rib. **Results:** Split- and full-thickness occipital VBGs were mobilized on a semispinalis pedicle. Occipital VBGs could be mobilized from occiput to T1 and span up to 4 levels. Scapular VBGs were mobilized on a subscapular pedicle and could be mobilized from occiput to T7 and span up to 8 levels. Rib VBGs were mobilized on subcostal pedicles and could be mobilized from C6 to T12. Ribs T2-T4 and T11-T12 could cover 2 levels, and ribs T5-T10 could cover 3 levels. The first rib was anatomically unsuitable as a VBG due to its primarily ventral course. **Conclusion:** Pedicled VBGs can feasibly be applied to posterior spinal arthrodesis from the occiput to T12. Patients at high risk for nonunion may benefit from this reconstructive option.

10:25 AM - 10:30 AM

RM 155. Disparities in the Recipients of Flap Coverage for Patients with Stage Four Pressure Ulcers

Beth Israel Deaconess Medical Center, Boston

Presenter: Anmol Chattha, BA

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Background

Advanced pressure ulcers are a healthcare ‘never event.’ Pressure ulcers may delay recovery and lead to chronic disability for the patient. One management option is that of debridement and autologous reconstruction. Previous literature has demonstrated there are racial disparities in the recurrence of pressure ulcers after flap coverage. This study seeks to understand if disparities exist in the receipt of flap reconstruction for patients with stage four pressure sores.

Methods

Using 2013 - 2014 data from the Healthcare Cost and Utilization Project National Inpatient Sample database, all patients admitted for a stage four pressure ulcer in the lower back region were queried (International Classification of Diseases: Ninth Revision, ICD-9, codes 707.24 and 707.03, respectively). Outcome of interest included flap reconstruction (ICD-9 codes: 86.70 or 86.74). Patient demographics, comorbidities, hospital level and socioeconomic variables were compared and multivariate analysis was performed.

Results

Data for a total of 148,235 patients with stage four pressure sores were retrieved: 4,045 (2.7 percent) underwent flap coverage. Women were significantly more likely to undergo flap reconstruction (OR=1.118, $p=0.002$). Compared with Caucasians, African Americans (OR=0.479, $p<0.001$), Hispanics (OR=0.717, $p<0.001$), Asians (OR=0.363, $p<0.001$), and other non-Caucasians (OR=0.699, $p=0.003$) were less likely to receive flap reconstruction. Patients in the lowest two income brackets (OR=0.807 and 0.895, $p<0.001$ and 0.031), patients with Medicare or Medicaid were less likely to receive flap reconstruction compared with private or Health Maintenance Organization insurance (OR=0.703 and OR=0.498, $p<0.001$ and 0.001). Patients with paralysis (OR=2.227, $p<0.001$), smokers (OR=1.353, $p<0.001$), hypertensives (OR=1.256, $p<0.001$) and peripheral vascular disease (OR=1.157, $p=0.011$) were more likely to undergo flap reconstruction. Patients with coagulopathy (OR=0.479, $p<0.001$), chronic heart failure (OR=0.641, $p<0.001$), COPD (OR=0.749, $p<0.001$), deficiency anemia (OR=0.795, $p<0.001$) and renal disease (OR=0.864, $p=0.004$) had significantly lower odds of undergoing flap reconstruction.

Conclusion

There are significant disparities related to race, income and insurance status in those receiving flap reconstruction. In addition, a variety of different patient comorbidities influence whether a patient is likely to undergo flap reconstruction. Awareness of these disparities may help guide efforts to improve access of certain patient groups to flap reconstruction in the management of pressure ulcers.

10:33 AM - 10:38 AM

RM 156. Reduction in morbidity of external hemipelvectomy reconstruction via standard and microsurgical techniques.

Presenter: Darlene M Sparkman, MD

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Background:

Hemipelvectomies have high levels of wound healing complications. This study evaluated factors that can influence wound healing.

Methods:

The medical records of all patients undergoing hemipelvectomies between the years 2003-2015 were reviewed. Specific variables including demographics, pre-operative oncologic treatment, and plastic surgeon involvement were documented. Fisher exact test was used to determine factors associated with increased risk for postoperative wound healing complications.

Results:

Fifty-eight patients were included in this study. Hospital mortality rate was 5%, and major complications occurred in 59% of patients. Fifty-two percent of patients experienced wound healing complications, 36% of patients required additional operative intervention to address their wounds. Plastic surgery involvement alone was associated with a decreased rate of major wound complications ($p=0.03$) and overall wound complications ($p=0.02$). The use of free flaps over local pedicled flaps or complex closure was also associated with lower wound healing complications ($p=0.02$).

Conclusion:

External hemipelvectomy has low mortality but high morbidity. Postoperative wound complications are common. Plastic surgery involvement is associated with decreased rate of wound healing complications. The use of free flaps for hemipelvectomy reconstruction should be given significant consideration in this challenging patient population.

10:38 AM - 10:43 AM

RM 157. Severe Pectus Excavatum Treated with Free Vascularized Sternum-Rib Complex Flap

Mayo Clinic, Rochester

Presenter: Kian Adabi, BA

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Background

In very severe cases of pectus excavatum, the patient's cardio-pulmonary function may be compromised. For these patients, the conventional method of a simple sternal turnover procedure has a high recurrence rate.

Purpose

To describe and analyze the outcomes of a new technique, "*the free vascularized sternum-rib complex flap*" with delayed breast reconstruction for severe cases of pectus excavatum.

Methods

Patients with severe pectus excavatum that were treated with this technique were included. The sternum-rib complex was elevated as a free flap with the internal mammary artery and vein as the vascular pedicle. It was turned over and microsurgery was performed to restore the blood supply of the bone and cartilages.

One year later, silicone breast implants were placed to improve the contour and volume of the breasts and symmetry of the chest wall. Demographics, etiology, immediate and late complications were recorded. Pulmonary function test (PFT) and transthoracic echocardiogram was performed before and 2 years after surgery

Results

From 1989 to 2015, 15 patients were analyzed. Average age was 23 (range 22-25 yo). Etiology was congenital for all cases. The average follow-up was of 10 years. Regarding complications, two patients complained of chest wall asymmetry due to resorption of cartilage of the chest wall, and two patients presented with cellulitis that resolved with IV antibiotics.

All patients underwent breast reconstruction with silicone implants. One of them required revision due to persistent chest wall asymmetry and one other patient required capsulotomy due to capsular contracture. However, there were no partial or complete flap loss, no reported osteomyelitis or bony malunion. In addition, no patients had recurrence based on physical exam and radiologic imaging. All but one patient reported satisfactory aesthetic outcomes.

Regarding the PFT's, there was a significant difference in FEV1/FVC ratio and FVC ($p < 0.05$) before and after surgery. However, there was no significant difference in the ejection fraction, stroke volume or cardiac output among groups.

Conclusion

The vascularized sternum-rib complex flap combined with delayed breast reconstruction can be an alternative aesthetic and functional solution for patients with severe pectus excavatum. However, further studies with a larger number of patients are required in order to improve our current outcomes.

10:43 AM - 10:48 AM

RM 158. Profunda Artery Perforator Flap for Perineal Reconstruction:a New Indication

The Christie NHS Foundation Trust, Manchester

Presenter: Damir Kosutic, MD PhD FRCS (Plast), Consultant Plastic and Reconstructive Surgeon

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The Christie NHS Foundation Trust, Manchester, United Kingdom

Background

Reconstruction of defects following radical abdomino-perineal resection for advanced or recurrent colorectal cancers are extremely challenging from both anatomical and surgical perspective as maintaining function and providing primary wound healing are critical. Despite the common use of different flaps, they all have serious drawbacks and relatively high complication rates. Recently, profunda artery perforator (PAP) flap has been described as an excellent donor site for breast reconstruction. We report the very first series of PAP flaps used for total perineal reconstruction following radical abdomino-perineal resection for a recurrent anal carcinoma.

Methods

Between June 2014 and May 2017, 22 patients underwent PAP flap reconstruction following total perineal and pelvic resection for recurrent anal carcinoma. Data on complications and outcomes were collected prospectively. Preoperative planning identified a strong Doppler signal at the medial aspect of posterior thigh, on average 7cm below inferior gluteal crease and flap was designed transversely around it in elliptical fashion. Flap was dissected from lateral to medial subfascially until profunda artery perforator was visualized. The perforator was dissected 2 cm intramuscularly to allow adequate flap mobilization. Following full mobilization based on PAP only, the flap was transposed or rotated up to 180 degrees into the defect and sutured tension-free whilst the donor site was closed directly.

Results

There were 26 PAP flaps in total (4 bilateral cases) performed in 13 male and 9 female patients. Average harvesting time was 72min. 23 flaps healed primarily, one flap failed while 2 suffered a partial loss of distal half, which following debridement, healed by secondary intention. Excellent aesthetic and functional outcomes were noted on follow up in all patients.

Conclusion

PAP flap is an excellent option in reconstructing challenging defects following radical abdomino-perineal resection. It provides excellent tissue-quality with low morbidity to the donor site as well as stable long-term functional and aesthetic outcomes.

10:48 AM - 10:53 AM

RM 159. Perioperative Outcomes of Microvascular Flap Coverage for Pressure Ulcers Using National Surgical Quality Improvement Program (NSQIP).

Beth Israel Deaconess Medical Center , Boston

Presenter: Bao Ngoc N Tran, MD

Bao Ngoc N Tran, MD(1), Austin Chen, MD(1), Parisa Kamali, MD(2), Singhal Dhruv, MD(1), Bernard T. Lee, MD, MBA, MPH, FACS(3) and Eugene Y Fukudome, MD(1)

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Background : High complication rates after microvascular flap coverage for pressure ulcers have been reported historically. Patients with pressure ulcers tend to have multiple risk factors associated with poor wound healing and higher complications including marginal nutritional status, prolonged immobilization, and high functional comorbidities index. This study examines the perioperative outcomes of microvascular flap coverage for pressure ulcers (sacral vs. ischial vs. trochanteric) using data from National Surgical Quality Improvement Program.

Methods : All patient undergoing microvascular flap coverage for pressure ulcers from 2005-2014 were identified. Demographic and perioperative information were reviewed along with of complications and reoperation rates. Frequency counts and percentages were calculated for categorical variables and comparisons were made using the Pearson Chi-Square test. Medians and standard deviations were calculated for continuous variables. Binary logistic regression was performed to identify risk factors for complications.

Results: There were 755 cases of flap coverage for pressure ulcers identified, 365 (48%) for sacral ulcers, 321 (43%) for ischial ulcers, and 69 (9%) for trochanteric ulcers. Most patients were older male, with some degree of dependency, neurosensory impairment, high functional comorbidities score, and American Society of Anesthesiologists Class 3 or above. Sacral group had the highest incidence of septic shock (4.7% vs. 0.6% vs. 1.4%) and bleeding (12.3% vs. 6.2% vs. 10.1%) while trochanteric group had the highest incidence of superficial SSI (0.5% vs. 2.2% vs. 4.3%). There was no observed graft failure. There was no statistically difference in overall complication among groups (27.7% vs. 21.5% vs. 26.1%). Total operating time (OR 1.005, p=0.001) and diabetes (OR 1.458, p=0.041) were independent risk factors for overall complications.

Conclusion : Despite of patients with poor baseline functional status, microvascular flap coverage for pressure ulcer patients is relatively safe and effective with low postoperative complications overall. This type of treatment should be considered if patients exhaust local tissue debridement option.

Table 1: Postoperative complication profiles for three groups

	Sacral N=365 (%)	Ischial N=321 (%)	Trochanteric N=69 (%)	Overall N=755 (%)	p
Dehiscence	5 (1.4%)	11 (3.4%)	2 (2.9%)	18 (2.4%)	0.203
Superficial SSI	2 (0.5%)	7 (2.2%)	3 (4.3%)	12 (1.6%)	0.037
Deep SSI	3 (0.8%)	2 (0.6%)	1 (1.4%)	6 (0.8%)	0.779
Organ space SSI	4 (1.1%)	0	0	4 (0.5%)	0.117
Sepsis	20 (5.5%)	14 (4.4%)	4 (5.8%)	38 (5%)	0.764
Septic shock	17 (4.7%)	2 (0.6%)	1 (1.4%)	20 (2.6%)	0.004
UTI	19 (5.2%)	12 (3.7%)	4 (5.8%)	35 (4.6%)	0.588
Bleeding	45 (12.3%)	20 (6.2%)	7 (10.1%)	72 (9.5%)	0.025
DVT	3 (0.8%)	4 (1.2%)	1 (1.4%)	8 (1.1%)	0.817
PE	2 (0.5%)	0	0	2 (0.3%)	0.343
Graft failure	0	0	0	0	
Reoperation	7 (1.9%)	5 (1.6%)	0	12 (1.6%)	0.505
Readmission	9 (2.5%)	7 (2.2%)	3 (4.3%)	19 (2.5%)	0.578
Infection	48 (13.2%)	31 (9.7%)	9 (13%)	88	0.339
1 infection	34	25	5	64	
2 infections	11	6	4	21	
3 infections	3	0	0	3	
Overall	101 (27.7%)	69 (21.5%)	18 (26.1%)	188	0.17
1 complication	85	62	14	161	
2 complications	14	6	4	24	
3 complications	2	0	0	2	
4 complications	0	1	0	1	

Table 2: Regression analysis to identify risk factors for overall complications

Regression	Odd Ratio	Confidence Interval	p value
Total operating time	1.005	1.002-1.007	0.001
DM	1.458	1.015-2.095	0.041