Dorsal Placement of Vascularized Submental Lymph Node Flaps at the Wrist Improves Outcomes in Breast Cancer Related Lymphedema Treatment: A Case - Control Study

Chang Gung Memorial Hospital, Taipei
Presenter: Charles Anton Fries, MA, MB, BChir, FRCS (Plast)
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Background

Breast cancer related lymphedema is a debilitating condition that can be treated by physiologic lymphatic microsurgery. Vascularized lymph node transfers to the wrist are effective; the non-anatomic dependant position of the transferred nodes maximises the catchment area and pumping effect of the lymphatic pump mechanism. This study compared the treatment response of breast cancer related lymphedema to the placement of vascularized submental lymph node flaps at the wrist, between dorsal and volar recipient sites. Dorsal placement was hypothesised to offer superior outcomes due to favourable venous drainage, however the more visible flap in this position, compared to the volar side, was a cosmetic concern for patients. The results of this study were used to modify the treatment protocol employed by this unit.

Methods

A prospective longitudinal study of patients receiving submental flaps to the wrist, performed by a single surgeon, enrolled 15 patients during a 17-month period. Clinical and biometric analysis, including quality of life questionnaires, circumference measurements and number of infections was performed.

Results

Seven patients underwent flap transfer to the dorsal wrist; eight patients received flaps to the volar wrist. All patients showed improvements in quality of life, reduced episodes of cellulitis and reduced limb circumference measurements compared to pre-operatively. After one year dorsal placement, compared to volar placement, delivered significant reductions in limb circumference, measured 10cm above and 10cm below the elbow (p=0.04, p=0.04), and in overall function and overall satisfaction domains in the lymphedema specific quality of life questionnaire (p=0.02, p=0.04). Conversely, the volar placement group showed improved results in the appearance domain of the quality of life questionnaire (p=0.04). Venous outflow was greater in the dorsal recipient veins (P<0.0001).

Conclusion

Patients electing to undergo vascularized lymph node transfer to the wrist may be counselled that, while both options are effective, dorsal placement offers greater improvement in outcomes despite reduced cosmesis. It is hypothesised that this finding is due to higher flow rates in the outflow vessels of this site. These results have been incorporated into an evidence-based treatment algorithm that can inform patient and physician decision-making (Figure 1).
Figure 1 – Treatment algorithm for Breast Cancer Related Lymphedema
WHOLE EYE TRANSPLANTATION: EFFECTS IN THE CONTRALATERAL NATIVE EYE

Presenter: Wendy Chen, MD, MS

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Background

Whole-eye transplantation (WET) may be an exciting opportunity to provide viable retinal ganglion cells and a complete optical system to patients with irreversible vision loss. We have previously established a viable orthotopic rodent model for vascularized WET. The purpose of this study is to characterize the effect of syngeneic WET surgery on the contralateral, unoperated eye, which we call the “native eye.”

Methods

Twelve Lewis (RT1) rats underwent WET. The donor flaps included ocular tissue anterior to the optic chiasm, eyelid and periorbital tissue, and external ear. The recipient site was prepared by removing a similar region of skin and ocular tissue with optic nerve division at its exit from the globe. Vascular anastomoses and optic nerve coaptation were performed after inset of the donor flap. The animals underwent optical coherence tomography (OCT) at post-operative weeks 1, 3, 5, 7, and 24. Ocular examinations and intraocular pressure measurements were performed at 2- and 6-months by a retinal specialist. Histopathology was reviewed by an ocular pathologist.

Results

Six syngeneic transplants were performed. There were no instances of flap infection or necrosis. One animal expired at 22 weeks from anesthetic causes. Five of the six transplanted animals survived until the study endpoint. Examinations under anesthesia (EUA) of the anterior segment of native eyes demonstrated normal anterior chambers, lenses, irides, and pupils. The cornea was normal in the 3-month post-operative examination, however there were central superficial punctate keratopathy in three of five rats at 6 months. Fundoscopy revealed normal retinas and optic nerve heads, without inflammation in the vitreous or retina. The average IOP for the native eye was 10 mmHg (SD +/- 0.63) at 2 months and 10.4 mmHg (SD +/- 1.14) at 6 months, which were within normal range.

The native cornea appeared normal under OCT, with the exception of one animal observed to have moderate corneal thickening at the 5-week examination, resolving at 7 weeks. The retina was observed to have maintenance of structural integrity in all of the native eyes (Figure 3). The histology of the cornea, retina, and optic nerve of the native eyes displayed normal findings (Figure 4).
Conclusion

Mild changes were observed in the native corneas during ocular examination, which are likely due to exposure keratopathy. However, using multiple modalities of examination, we have seen no worrisome clinical or histopathological changes in the native eye after whole-eye transplantation.
Background

The superiority of flap reconstruction and closure of abdominoperineal resection (APR) defects as compared to primary closure has been well described. APR has extremely high complication rates secondary to a high incidence of radiated tissue and extensive dead space. Up to 66% of patients develop complications when only primary closure is employed. Flap reconstruction decrease overall complications to 5-33%, with severity also decreasing to predominantly non-operative minor complications. In cases where these surgeries are performed robotically, the benefits of robotic surgery can only be maintained if a non-abdominal flap is utilized (with lower success rates than rectus flaps) or the flap harvest is also performed robotically.

Our series also includes robotic rectus harvest performed for posterior vaginal wall reconstruction and rectovaginal fistulas requiring interposition of vascularized tissue to decrease the likelihood of recurrence. The objective of our study is to demonstrate the continued superiority of the rectus abdominis flap when harvested robotically in all three of these settings and to highlight the evolution of technique with regards to closure of the posterior rectus sheath.

Methods

From 2014 to present, a single surgeon harvested 14 robotic, pedicled rectus abdominis flaps. The indications for reconstruction included APR (n=10) with partial vaginal wall reconstruction (n=3) and without (n=7), and rectovaginal fistula (n=4). The vast majority of patients (13 of 14) had been treated with neoadjuvant radiation therapy. In all cases of APR the defect was closed primarily over the flap. In 11 of the 14 cases the posterior sheath was left open. Follow up ranges from 2 months to 3 years.

Results

No major complications (deep pelvic abscess, pelvic hernia or evisceration) were encountered. All minor (8/14) wound dehiscence was treated with local wound care. One patient developed anterior rectus sheath attenuation, leading development of our technique to include posterior rectus sheath closure and reinforcement with acellular dermal matrix (ADM) drawing on techniques of laparoscopic hernia repair (n=3). No rectovaginal fistulas recurred since takedown with flap reconstruction. Other factors assessed include patient factors (smoking, diabetes, BMI, and other comorbidities), procedural factors (robot time, incision length), and additional outcomes (ie hospital length of stay).

Conclusion

Robotic rectus harvest produced the success previously seen with flap reconstruction in all 3 settings and maintained the benefits of extirpative robotic surgery. We also demonstrate a potential need for closure of the posterior rectus sheath in certain settings and a technique for doing so efficiently.
Comparing Radiographic Progression of Bone Healing in Gustilo IIIB Tibial Fractures Treated with Muscle versus Fasciocutaneous Flaps

New York University Langone Medical Center, New York

Presenter: Salma A Abdou, BA

Salma A Abdou, BA(1), Devan D Mehta, BA(1), John T. Stranix, M.D.(2), Philipp Leucht, MD, PhD(3) and Vishal D Thanik, MD(2)

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Background: Soft tissue defects in Gustilo IIIB tibial fractures necessitate muscle or fasciocutaneous flap coverage. Animal models have suggested enhanced callus formation and higher bone mineral density under muscle flaps, but there is no analogous clinical data comparing the bone regenerative milieu specific to each flap type. In this study we evaluated our experience with muscle versus fasciocutaneous flaps for the treatment of Gustilo IIIB tibial fractures with the primary outcome of radiographic bone union.

Methods: We identified patients with Gustilo IIIB tibial fractures at our institution that received muscle or fasciocutaneous flaps and had primary radiographic follow up for at least six months. The radiographs of each patient were reviewed by a single, blinded author and assigned a radiographic union score for tibial (RUST) fractures. Number of patients reaching bony union (defined as RUST score of 10 or higher) as well as mean RUST scores in each group were compared at time of injury, 6 months, and 12 months from the original fracture date.

Results: 49 patients met our inclusion criteria. 19 patients received fasciocutaneous flaps (38.8%) and 30 patients received muscle flaps (61.2%). At 6 months, one patient in each group achieved union (p=0.99). With 67% follow-up (33 patients) at 1 year, 7 (70.0%) patients in the fasciocutaneous group achieved union while 20 (83.3%) patients in the muscle group achieved union (p=.394). There was a significant difference (p=0.033) in the mean RUST score at 6 months between the muscle group (8.41+/1.90) and the fasciocutaneous group (7.07+/- 2.30). Multivariate analysis found that smoking status, diabetes, osteomyelitis, malignancy, bone gap and fracture comminution did not significantly influence RUST scores at 6 months. Interestingly, there was no significant difference (p=.603) in the mean RUST score at 12 months between the muscle (10.52+/- 2.33) and fasciocutaneous groups (10.20+/-2.15).

Conclusion: This is the largest clinical series evaluating muscle vs fasciocutaneous flaps and bone healing in Gustilo IIIB fractures. This data demonstrates that patients with muscle flaps have higher RUST scores at 6 months but equal union rates compared to fasciocutaneous flaps. Ultimately, there is no difference in union rates at 12 months. This may suggest that muscle flaps have more of a positive impact on the biology of early fracture healing without a net benefit at the time of union.
Figure 1: Mean RUST Scores Between Tibial Fractures with Muscle versus Fasciocutaneous Coverage at A) Baseline, B) 6 months, and C) 12 months. *** denotes statistical significance.
Background: Previous abdominal surgery (PAS) can affect wound healing, vascular anatomy, and complication rates in women undergoing DIEP flap breast reconstruction. This study examines the effect of PAS on flap, donor-site, and overall complications and assesses whether pre-operative CT angiography (CTA) mitigates these outcomes.

Methods: All consecutive DIEP flaps performed between 2004-2015 were identified retrospectively. Patients were categorized into a cohort with PAS and a control group without PAS. Of the patients with PAS, those with CTA were separately assessed. Complications and operative times were compared between groups with adjusted odds ratios calculated to account for confounding variables.

Results: Over a 12-year period, 425 patients (640 flaps) had PAS, and 393 patients (547 flaps) had no PAS. Of the patients with PAS, 67 (16.5%) patients underwent pre-operative CTA and 333 patients (83.5%) did not. Patients with PAS were more likely to have donor site wound dehiscence (adjusted OR 1.82, CI 1.15-2.87, p=0.01), fat necrosis $\geq 2$cm (OR 1.39, CI 1.0-1.94, p=0.05), and overall flap complication (adjusted OR 1.37, CI 1.07-1.74, p=0.01). Pre-operative CTA did not reduce risk of complications and did not affect operative times.

Conclusion: DIEP flap reconstruction can be safely performed in women with PAS. However, these patients should be counseled that they are at increased risk for donor site wound breakdown, fat necrosis, and overall flap complication. Pre-operative CTA does not reduce the risk for donor-site complications, flap complications, or overall complications, and did not effectively reduce operative times.
<table>
<thead>
<tr>
<th></th>
<th># Flaps in Pts with PAS (%)</th>
<th># Flaps in Pts with No PAS (%)</th>
<th>Odds Ratio (95% Confidence Interval)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial flap loss</td>
<td>11(1.72%)</td>
<td>12(2.19%)</td>
<td>0.83(0.36-1.90)</td>
<td>0.66</td>
</tr>
<tr>
<td>Mastectomy skin loss</td>
<td>75(11.76%)</td>
<td>51(9.32%)</td>
<td>1.32(0.90-1.92)</td>
<td>0.16</td>
</tr>
<tr>
<td>Breast Hematoma</td>
<td>24(3.76%)</td>
<td>25(4.57%)</td>
<td>0.86(0.48-1.53)</td>
<td>0.60</td>
</tr>
<tr>
<td>Breast Seroma</td>
<td>14(2.19%)</td>
<td>11(2.01%)</td>
<td>1.24(0.55-2.78)</td>
<td>0.60</td>
</tr>
<tr>
<td>Fat Necrosis &lt;2cm</td>
<td>104(16.3%)</td>
<td>67(12.25%)</td>
<td>1.19(0.84-1.70)</td>
<td>0.32</td>
</tr>
<tr>
<td>Fat Necrosis ≥2cm</td>
<td>87(13.64%)</td>
<td>64(11.70%)</td>
<td>1.39(1.0-1.94)</td>
<td>0.05*</td>
</tr>
<tr>
<td><strong>Any flap complication</strong></td>
<td>315(49.37%)</td>
<td>230(42.05%)</td>
<td>1.37(1.07-1.74)</td>
<td>0.01*</td>
</tr>
<tr>
<td></td>
<td># Pts with PAS (%)</td>
<td># Pts with No PAS (%)</td>
<td>Odds Ratio (95% Confidence Interval)</td>
<td>p-value</td>
</tr>
<tr>
<td>Donor Site Hematoma</td>
<td>5(1.18%)</td>
<td>0(0%)</td>
<td>0(0-0)</td>
<td>0.99</td>
</tr>
<tr>
<td>Donor Site Seroma</td>
<td>20(4.72%)</td>
<td>25(6.36%)</td>
<td>0.66(0.36-1.22)</td>
<td>0.66</td>
</tr>
<tr>
<td>Donor Site Bulge</td>
<td>6(1.42%)</td>
<td>4(1.02%)</td>
<td>1.24(0.35-4.48)</td>
<td>0.74</td>
</tr>
<tr>
<td>Donor Site Hernia</td>
<td>3(0.71%)</td>
<td>0(0%)</td>
<td>0(0-0)</td>
<td>0.99</td>
</tr>
<tr>
<td>Donor Site Open Wound</td>
<td>60(14.15%)</td>
<td>33(8.4%)</td>
<td>1.82(1.15-2.87)</td>
<td>0.01*</td>
</tr>
<tr>
<td>Umbiliconecrosis</td>
<td>13(3.20%)</td>
<td>16(4.20%)</td>
<td>0.67(0.316-1.43)</td>
<td>0.30</td>
</tr>
<tr>
<td><strong>Any donor site complication</strong></td>
<td>90(21.18%)</td>
<td>64(16.28%)</td>
<td>1.33(0.93-1.9)</td>
<td>0.13</td>
</tr>
<tr>
<td><strong>Any complication</strong></td>
<td>242(56.94%)</td>
<td>192(48.85%)</td>
<td>1.31(0.99-1.73)</td>
<td>0.06</td>
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4:18 PM - 4:21 PM
RM 101. Use of Microvascular Free Flaps in Pediatric Lower Extremity Trauma
NYU Langone Medical Center, New York
Presenter: Z-Hye Lee, MD
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Background:
Free flap reconstruction of the traumatized lower extremity is known to be associated with higher complication rates compared to other microvascular procedures. There is a dearth of literature dedicated to specifically evaluating use of free flap reconstruction in pediatric lower extremity traumas. While earlier series recommended prudence in children due to reports of vasospasm and smaller vessel size, further improvements in technique suggest that children may safely undergo microsurgical reconstruction.

Methods:
Retrospective review of 481 free flaps in our lower extremity database (1979-2017) identified all free flaps performed for traumatic reconstruction in children less than 18 years of age at our institution. Patient demographics, operative characteristics, and outcomes were examined using chi-square, logistic regression, and unpaired t-tests.

Results:
Fifty-three free flaps (11.1%) were performed in 49 pediatric patients. The majority of flaps were muscle flaps (66%) vs. fasciocutaneous flaps (34%) and nearly half (47.2%) were for foot and ankle coverage. There were total of 10 flap failures (18.9%) all occurring in flaps used for coverage above the ankle. Arterial injury was present in 19 patients (35.8%) and associated with significantly higher flap failure rates compared to patients without arterial injury (77.8% vs. 8.8%, p = 0.012) with OR = 6.0.

There was no difference in average flap artery or vein size in flaps that survived compared to flaps that failed; however, both recipient artery and vein were significantly larger in flap failures versus successful flaps (artery: 2.4mm vs. 2.2 mm, p=0.003; vein: 2.7 mm vs. 2.4 mm, p=0.01). The average artery size mismatch in flap failures was 0.7 ± 0.68 mm, while that in successes was 0.2 ± 0.36 mm, and the average vein size mismatch was 0.7 ± 0.28 mm vs. 0.2 ± 1.0 mm in flap failures and successes, respectively. Overall, patients who suffered flap failure had a significantly larger vessel size mismatch (arterial: p=0.006; venous: p=0.011). Flap type, mechanism of injury, and timing to flap coverage did not significantly affect outcomes.

Conclusion:
Free flap reconstruction in the pediatric trauma population is safe with similar survival outcomes when compared to the adult population. Arterial injury was associated with a six times increased risk of flap failures suggesting extra caution and planning in these patients. Vessel size mismatch was associated with significantly higher flap failure rates providing evidence for using similar sized vessels as much as possible in the pediatric population.
Determine Axonal Load and Anatomic Topography of Zygomatic and Buccal Facial Nerve Branch Systems in 100 Cadaveric Hemifaces: Implications for Facial Reanimation Surgery

University Hospital Regensburg

Presenter: Andreas Kehrer, MD

Andreas Kehrer, MD(1), Simon Engelmann, cand. med.(2), Robert Bauer, M.D.(2), Christian Taeger, M.D.(2), Lukas Prantl, Prof. Dr. med.(2) and Veronika Mandlik, M.D.(2), (1)Department of Plastic, Hand, and Reconstructive Surgery; University Hospital Regensburg, Regensburg, Germany, (2)University of Regensburg, Regensburg, Germany

Background: Facial expression is determined through a complex dynamic neuromotor and psychomotor interplay which channels emotions into involuntary and voluntary mimic movements. Facial paralysis causes debilitating impairments including asymmetry, limited eye closure, oral incontinence and social dysfunction. Dysfunction of the facial nerve may be congenital or acquired. Facial reanimation surgery achieves functional recovery through cross-face nerve grafting (CFNG). Prerequisites for favorable clinical results are axonal load exceeding 900 axons and duality of donor nerves. We conducted a histological and anatomical study of buccal and zygomatic branch systems to clarify the highest individual axonal capacity in relation to anatomic topography hypothesizing one single optimal donor branch is present.

Methods: From 1/2015-9/2016 a total of 100 fresh frozen cadaveric facial halves were prepared under loupe magnification. A hemiparotidectomy was performed followed by an antegrade dissection. Any branch topographically located superficial to the zygoma or touching it was defined as a zygomatic branch. Any inferior neighboring branch as buccal. Only branches with clinically relevant sizes were noted. Biopsies were obtained from main and subordinated peripheral branches at the level of the anterior border of parotid. Microscopically the largest branch was recorded and correlated with axon counts. Specimen were PPD-stained and digitalized at 200x magnification. A semi-automated computer based nerve morphometry was used for axon counts.

Results: Facial nerve branch patterns demonstrated great variety. A total of 2.98 ± 0.86 (2-5) zygomatic and 3.45 ± 0.96 (2-5) buccal branches were counted. In the zygomatic system, one single largest branch could be noticed in 50%, two in 9% and in three in 1%. Buccal branches demonstrated one single largest branch in 66%, two in 12.6% and three in 1%. The most inferior of the zygomatic branches was usually the largest which was significant with paired sample sign test. No significance was found for the distribution of the largest buccal branch. Main zygomatic and buccal branches showed higher axon capacities as subordinate branches. More than half of subordinate branches contained <900 axons. Main branches demonstrated a range of 232-4597 and subordinated 84-3370 axons.

Conclusion: In both systems, more than half of the specimen showed a single largest donor branch supplying an axonal load >900. These may be identified with loupe magnification. Electrostimulation is recommended in a clinical setting to detect redundant smaller branches with equal function. Examination should focus on the largest branch dissected and neighboring fibres. Branches proximal to main stems feature higher axonal capacity.
Background

The literature reports a wide variety of reconstructive methods for pharyngolaryngoesophageal (PLO) defects. Several reports indicate that anterolateral thigh (ALT) and radial forearm (RFF) free flaps can achieve comparable fistula and stricture rates with superior functional outcomes to the jejunal free flap (JFF), which is frequently criticised for producing ‘wet’ poorly intelligible speech. Yet, as contrasting studies have also been published affirming the continued value of JFF, controversy still remains over which is the best reconstructive option. In addition, as a large number of PLO extirpation now are performed as salvage treatments, determining the role of radiotherapy in influencing postoperative complication rates is becoming ever more important. This study aims to compare the updated surgical and functional outcomes of the fasciocutaneous ALT and RFF versus the intestinal JFF for PLO defects and determine if radiotherapy influences the postoperative fistula and stricture rates.

Methods

A literature search and systematic review was performed using PubMed for reports published for the most recent 10 years between 2007 to 2017. Reconstructive outcomes and the radiotherapy effects were meta-analysed for statistical comparison using SPSS for Windows, Version20 (Chicago, IL, USA).

Results

A total of 50 papers were reviewed. There were 2203 patients in total, with the largest number in JFF (n=965) followed by ALT (n=788) and RFF (n=450). There were no statistical differences in fistula, stricture, tracheoesophageal speech and oral alimentation rates between ALT and RFF. However, fistula (p<0.0005) and stricture (p = 0.018) rates were significantly lower in JFF than ALT. Fistula (p<0.0005) and stricture (p = 0.003) rates were also significantly lower in JFF than RFF. There was no statistical difference in tracheoesophageal speech rates when comparing ALT and RFF independently to JFF. There was also no statistical difference in oral alimentation rates between RFF and JFF but oral alimentation rates were significantly higher in JFF than ALT (p = 0.005). Analysis of the following groups of patients - 1) with and without pre-operative radiotherapy; 2) with and without post-operative radiotherapy - showed no statistically significant difference in fistula and stricture rates within each group.
Conclusion

Compared with the ALT and RFF free flaps, the JFF still remains an excellent first choice for PLO reconstruction due to the lower fistula and stricture rates, higher oral alimentation rates and comparable speech rates. In addition, radiotherapy has not been found to affect surgical outcomes of reconstruction in both fasciocutaneous free flaps and JFF.
RM 104. The Feasibility Of Sensate Profunda Artery Perforator Flap: An Anatomic Study For Clinical Application

Presenter: Bin Song, MD, MPH
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**Background:** Profunda artery perforator (PAP) flap has been proved to be an effective method of autologous breast reconstruction, especially when the abdominal donor site is contraindicated. However, to date, there are no reports regarding the sensate PAP flap. The objective of this study was to describe the feasibility and anatomic location of the sensory nerves supplying the PAP flap in relation to the surface landmarks.

**Methods:** In this anatomic study, 10 cadavers’ lower limbs were microsurgical dissected. We investigated the posterior femoral cutaneous nerve (PFCN), which supplies sensation to the skin of the posterior thigh, in relation to the PAP flap. The midline of posterior thigh and gluteal crease were used for the surface landmarks. The diameter and length of the nerve branches were documented.

**Results:** There were 3 (2 to 5 branches) PFCN branches can be found to the PAP flap, in average. Measurements were taken from the gluteal crease and midline to the nerve branch. The average distance caudal to the gluteal crease was 2.4 cm (0 to 7cm). The average distance medial to the midline was 4.3 cm (0.2 to 8.1 cm). The average diameter of the nerve branches was 1.8mm (1 to 2.5mm). The average length of nerve branches from the flap to the fascia was 2.0 cm (1.5 to 2.4cm). The maximum length of the nerve branch from the flap to the main trunk of PTCN was 7.8cm when tracing up through the intramuscular approach.

**Conclusion:** The findings from our study provide an anatomic basis for the sensate PAP flap that would add a potential additional dimension to this perforator flap. The preliminary results are promising but further physiological studies are warranted to validate this sensate flap.

Fig 1 shows the posterior femoral cutaneous nerve branch to the PAP flap
Fig 2 shows the maximum length of the nerve branch from the PAP flap to the main trunk of posterior femoral nerve.
**Background**

Facial transplantation (FT) experience has grown exponentially in the past decade, with almost 40 FTs performed worldwide. Technical feasibility was demonstrated early on, but success in this innovative and complex field had yet to be defined. The purpose of this study is to determine attitudes regarding the failures in FT.

**Methods**

An anonymous, IRB-approved 20-question survey was designed to capture opinions of FT failure and preferences for management of such failures. This survey was administered to all of the attendees of two different meetings, the 2016 American Society of Reconstructive Transplantation (Nov 3rd to 5th, 2016) and 2017 State of the Art: Facial Reconstruction and Transplantation (May 19th to 21st, 2017). There were 112 and 271 attendees at each meeting respectively for a total of 271 participants.

**Results**

There were 80 attendees who completed the survey for a response rate of 29.5%. The respondents were predominantly male (81.3%). Over one third of respondents had previously performed a face transplant (38.0%) and more than half of the respondents (53.8%) were part of an institution with an IRB for some type of vascularized composite allotransplantation. When considering preoperative counseling for candidates of FT, the respondents stated that it was “absolutely essential” to discuss the possibility of failure (93.8%), the possibility of mortality (91.1%) and the treatment options for chronic rejection (78.8%). 56.4% of respondents cited the failure rate as unknown and 44.7% cited the 5-year mortality as unknown. 25.6% of the respondents rated the failure rate as <25% while 18.0% of respondents rated the failure rate as >25%. Among those with direct experience with FT, 51.2% of respondents did not have clear criteria for defining the success of FT or have an institutional protocol for managing chronic rejection. Finally, 78.8% of respondents believed that a patient with a failed FT should be considered for another FT with 25.3% stating impaired functional outcomes (25.3%) or aesthetic dissatisfaction (25.6%) as reasons for a second FT.

**Conclusion**

While most involved in FT agree on the importance of discussing failure and mortality with transplant candidates, there is uncertainty and inconsistency regarding the rates. Furthermore even in institutions with experience in FT, specific protocols for dealing with chronic rejection is lacking. As the FT patient cohort increases and long-term outcomes begin to emerge, expert consensus surrounding definitions of the success or failure of FT and institutional protocols for management of failures is strongly needed.
Background: Vascularized fibula epiphysis transfer for pediatric extremity reconstruction aims to preserve limb growth and function. However, due to relatively rare need for this procedure, few cases are reported in the literature, and outcomes are poorly characterized.

Methods: A systematic review was performed through a MEDLINE search using keywords “pediatric” OR “epiphyseal” AND “vascularized fibula.” Patients were divided into upper or lower extremity groups. Patients undergoing head and neck reconstruction were eliminated. Indication, vascular pedicle, donor and recipient site complications, and need for secondary surgery were noted. Functional outcomes were categorized as “full, impaired, or no function” based on physical exam, activities of daily living, or Musculoskeletal Tumor Society Scoring System (MSTS), Enneking or Mankin scores. Growth outcomes were categorized as “full, partial, or no growth” based on x-ray measurements or limb length discrepancy. Descriptive statistics were performed.

Results: Twenty-one articles with 63 patients were included. Mean age was 5.6 years (range 0.75-12) and mean follow-up 5.8 years (range 0.75-22). Indications included sarcoma (60%), congenital deformity (21%), trauma (13%), and infection (6%). The most common pedicle was anterior tibial artery (65%), followed by peroneal (28%), and inferior geniculate (7%). Seven patients suffered donor site complications, 5 (8%) with lasting peroneal nerve injury, one (2%) with ankle instability requiring screw fixation, and one (2%) with foot hypotrophy. Fifty-three patients had upper extremity reconstruction, including 25 for humerus and 28 for forearm reconstruction. Complications were reported in 76% of upper extremity reconstruction patients, most commonly fracture (20%). Twenty-two percent of patients required secondary surgery, most commonly flap salvage (7%) or Ilizarov distraction (4%). Among these upper extremity patients, 3% achieved full function and 93% impaired function. Full growth was observed in 25% of patients, partial in 56%, and no growth in 4%. Ten patients underwent lower extremity reconstruction, including 7 for femur and 3 for tibia/fibula reconstruction. Eighty-eight percent of lower extremity reconstruction patients required secondary surgery, most commonly for derotational osteotomy (25%). Among these lower extremity patients, 44% achieved full function, 44% impaired function, and one patient no function due to hip disarticulation for sarcoma recurrence. Full growth was observed in 40% of patients, partial growth in 40%, and no growth in 20%.

Conclusion: Vascularized fibula epiphysis transfer for pediatric extremity reconstruction can accomplish full long-term function and growth. However, patients and surgeons must expect frequent complications, revision surgery, and potential for chronically impaired function.

Background Vascularized lymph node transfer is a promising surgical treatment for lymphedema. This study investigates the effect of ischemia on the lymph drainage efficiency of vascularized lymph node flaps and the critical ischemia time of lymph nodes. Methods Twenty-four lymph nodes containing groin flaps in 12 Sprague-Dawley rats were dissected. Clamping of the vascular pedicle was performed for 0, 1, 3, 5, 6, and 7 hours; then, reperfusion of the vascular pedicle was allowed for one hour. Perfusion and ischemic changes were assessed using indocyanine green (ICG) lymphography, laser Doppler flowmetry, and histological studies with associated LYVE-1, CD68, DAPI, TUNEL and GSH assay stains. Results The mean latency period of the groin lymph node flaps was 247±67, 83±15, 72±42, 30±18, and 245±85 seconds in the 0-, 1-, 3-, 5-, and 6-hour groups, respectively. Perfusion detected by laser Doppler was 85.2±14.5, 87.2±36.7, 129.8±33.7, 140.4±148.5, 156.1±91.4 and 41.2±34.8 perfusion units at ischemia times of 0, 1, 3, 5, 6, and 7 hours, respectively. Cell damage measured by glutathione was 46.8±10.2, 67.7±14.2, 62.8±15.4, 126.6±5.9, 259.0±70.3, and 109.1±27.5 at ischemia times of 0, 1, 3, 5, 6, and 7 hours, respectively. Histologically, as ischemia time increased, hemorrhage and congestion became more severe. Conclusion The critical ischemia time of vascularized lymph nodes was 5 hours, as verified by the ICG lymphatic fluid uptake, laser Doppler perfusion, and histologic assessments. Lymphatic drainage and perfusion of vascularized lymph nodes improve with increased ischemia time up until 5 hours.

Presenter: Anmol Chattha, BA

Anmol Chattha, BA(1), Alexandra Bucknor, MBBS, MRCS, MSc(1), Austin D. Chen, BS(1), Bernard T. Lee, MD, MBA, MPH, FACS(2) and Samuel J. Lin, MD, MBA, FACS(2)

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Background

Indocyanine Green (ICG) angiography has gained popularity in breast reconstruction due to its ability to assess the viability of both mastectomy skin and tissue flaps. We aim to analyze trends and outcomes associated with the use of ICG angiography in breast reconstruction.

Methods

Using 2012-2014 data from the Healthcare Cost and Utilization Project National Inpatient Sample, Agency for Healthcare Research and Quality, we identified women undergoing both immediate and delayed breast reconstruction with or without the use of ICG angiography (ICD-9 code: 17.71). Trends over time were assessed using the Cochran-Armitage test. The primary outcome of interest was in-hospital debridement. The secondary outcomes of interest to denote resource utilization were length of stay (LOS) and total hospital charges. Outcomes were assessed using logistic regression and generalized linear modeling.

Results

Over the study period, 110,320 patients underwent breast reconstruction: 107,005 (97.0%) without the use of ICG and 3,315 (3.0%) with the use of ICG angiography. Indocyanine green angiography use increased over time: 750 patients (1.9%) in 2012, increasing to 1,275 patients (3.7%) in 2013 (p<0.001). Smokers (p=0.018), hypertensive patients (p=0.046), obese patients (p<0.001), and those with a higher comorbidity index (p<0.001) were more likely to undergo ICG angiography. Autologous reconstruction was more frequently combined with ICG angiography as compared with tissue expander reconstruction (4.5% versus 2.1%; p<0.001). There was a significant increase in odds of debridement associated with ICG angiography use (OR=1.404, p<0.001; 95% CI 1.201-1.640). Mean hospital charges were higher in the ICG group ($79,242) compared with the non-ICG group ($65,624; p<0.001). Mean LOS was shorter in the ICG angiography (2.37 days) compared to the non-ICG angiography group (2.47 days; p<0.001).

Conclusion

The use of indocyanine green angiography in breast reconstruction has been increasing in recent years and in the present study is associated with higher debridement rates. Indocyanine green angiography use is associated with patient characteristics known to increase the risk of mastectomy skin necrosis and may reduce the incidence of this post-operative complication. However, given the increase in charges, clinicians should continue to be mindful of unnecessary debridement of tissue and further, large-scale research is needed to determine whether there is a true reduction in skin necrosis rates.
Background

Incisional hernias are a costly and morbid surgical problem with high rates of long-term recurrence. Although synthetic mesh reinforcement is an effective strategy for hernia repair, long-term mesh complications represent a significant surgical and patient concern. Biologic mesh while an innovative surgical tool, has notable downsides including complications and cost. Biosynthetic mesh leverages many of the benefits of synthetic and biologic mesh and may permit reconstruction across diverse defects, patients types, and wound classes. This study reports a consecutive, prospective review of a single surgeon’s experience with biosynthetic poly-4-hydroxybutyrate (P4HB) mesh for treatment of abdominal wall defects.

Methods

A prospectively maintained hernia database was queried for all P4HB (Phasix mesh) cases during 10/2015-3/2017. Data was retrospectively reviewed. Patient characteristics and attributable hernia risk factors were identified, such as obesity, smoking, and contamination. Defect size, VHWG classification, CDC wound class, presence of bridged repair, pre and postoperative outcomes and quality-of-life using the Carolina Comfort Scale and HerQLes questionnaire data were also prospectively assessed. Descriptive statistical analysis was performed.

Results

41 consecutive P4HB cases were analyzed. Patients were 59 years of age, with a BMI of 33 kg/m2, mean defect size of 432 cm2, 1.6 average prior hernia repairs and 12% were smokers. Most cases were VHWG II/III (86%) and 2.5% were VHWG class IV. In 71% of cases Phasix was placed in the retromuscular space, TAR was used in 26% of cases. The overall incidence of hernia recurrence at the early time point of 9 months was 2.5%. 1 seroma (2.5%) and 2 surgical site infections (5%) were the only surgical site occurrences noted. Heath-related quality of life was demonstrated to significantly improve following reconstruction. Carolina Comfort Scale (CCS) and HerQLes data was collected preoperatively and postoperatively. CCS scores measuring for pain (1.69) and movement (1.6) improved to 1.20 and 0.93 respectively. HerQLes scores improved from an average of 3.53 to 2.64.

Conclusion

In this early analysis of outcomes using P4HB for complex hernia, good clinical and patient reported outcomes across a wide range of complex defects, patient comorbidities, and wound contamination is noted. Phasix appears to be a versatile mesh leveraging the strengths of synthetic and biologic mesh in a wide range of patients with reliable early results. Further long-term evaluation of long-term outcomes is needed.
ANATOMIC BASIS OF THE GASTROEPIPLOIC VASCULARIZED LYMPH NODE TRANSFER: A RADIOGRAPHIC EVALUATION USING COMPUTED TOMOGRAPHY ANGIOGRAPHY (CTA)

University of Southern California, Los Angeles
Presenter: Anna C Howell, MD
Anna C Howell, MD(1), Daniel Joseph Gould, MD PhD(2), Ketan M Patel, MD(3) and Cameron Hassani, MD(4)
(1)Keck School of Medicine of USC, Los Angeles, CA, (2)Keck School of Medicine of USC, Los Angeles, CA, (3)Plastic Surgery, Keck School of Medicine at USC, Los Angeles, CA, (4)University of Southern California, Los Angeles, CA

Background

The omentum, nourished by the gastroepiploic vessels, has gained popularity as an option for vascularized lymph node transfer (VLNT). The actual anatomic details related to the gastroepiploic vascular axis and lymph nodes (LN) have not been investigated. The purpose of this study is to describe the right gastroepiploic artery (GEA) and related structures by using computed tomography angiography (CTA).

Methods

A retrospective analysis was conducted on ten patients with no known abdominal or pelvic malignancy who received CTA. These scans were reviewed for objective donor-site characteristics by one reviewer (CH). Statistical models were used to identify the specific LN basin and right GEA characteristics.

Results

The right GEA was identified in nine of ten patients. It was found to have an average diameter of 2.98mm at its origin (SD0.89, range 1.7-4.4). The distance from right to left GEA origin was 17.9cm (SD6.34, range 10.3–29.9). The gastroduodenal artery length prior to right GEA takeoff was 3.78cm (SD1.29, range 2.19–5.92). Nine patients had identifiable lymph nodes in the right GEA lymphosome. There were 3.3 LNs identified per patient (SD3.0, range 0-10). The average distance from each LN to the right GEA origin was 7.50cm (SD3.51, range 2.04-15.4). The distance from the right GEA origin to the most proximal LN was 4.13cm (SD1.65, range 2.04-7.13). The distance from the GEA origin to the third LN was 8.91cm (SD2.90, range 7.11-13.2). Each LN was within 8.55mm (SD7.9, range 1-28.7) of the right GEA.

Conclusion

The gastroepiploic VLNT may be a valuable option when selecting a donor site for the surgical treatment for lymphedema. On average, three lymph nodes exist along the right GEA, which is comparable to other favorable and commonly used donor sites. When using the right GEA donor site for VLNT, the plastic surgeon should anticipate using a pedicle length of no more than 4cm, a total flap length of 9cm with a 3cm cuff of tissue in order to obtain at least 3 lymph nodes for transfer. CTA is an effective imaging modality that can be used to preoperatively plan for vascularized lymph node transfer.
4:48 PM - 4:51 PM
RM 111. Tolerance Inducing Therapy of Human Multi-Chimeric Cells for Vascularized Composite Allograft: A Preliminary Study.
University of Illinois at Chicago, Chicago
Presenter: Maria Siemionow, MD PhD DSc
Joanna Cwykiel, MSc, George Rafidi, BS and Maria Siemionow, MD PhD DSc
University of Illinois at Chicago, Chicago, IL

Background: Cellular therapies are a promising approach for tolerance induction in solid organ and vascularized composite allotransplantation (VCA) patients that could reduce the negative impact of life-long immunosuppression. We propose a novel cellular therapy of ex vivo created umbilical cord blood derived multi-chimeric cells (mCC) as an alternative approach to bone marrow based therapies in support of VCA. The aim of this study was to develop the fusion protocol and characterize in vitro the phenotype, genotype, viability and proliferative potential of fused human mCC.

Methods: Eighteen ex vivo fusions of human umbilical cord blood (UCB) cells were performed. Mononuclear cells (MNC) were isolated from UCB originating from three unrelated donors. Next, MNC were stained separately by PKH26, PKH67 and eFluor670 proliferation dye and fused using polyethylene glycol (PEG). Triple PKH26/PKH67/eFluor670 stained mCC were sorted and assessed by confocal microscopy (CM) and flow cytometry (FC) for the efficacy of the cell fusion procedure. The viability of mCC and distribution of hematopoietic surface markers (CD3, CD4, CD8, CD19, CD45 and CD90) were performed by FC. PCR-rSSOP (Antigens: A, B, C, Bw, DRB1, DQB1, DR51, DR52 and DR53), and STR-PCR (Loci: TH01, D21S11, D5S818, D13S317, D7S820, D16S539, vWA, TPOX) characterized the genotype of mCC. Proliferative potential of mCC was assessed by colony forming unit (CFU) assay.

Results: FC and CM analysis confirmed UCB fusion and creation of human mCC. Using PCR-rSSOP and STR-PCR assays, we determined that human mCC are sharing HLA class I and class II antigens, as well as selected loci specific for all three UCB donors used for fusion. After fusion 90-95% of cells were viable. Phenotype characterization showed similar percentage and pattern of hematopoietic markers distribution on the surface of mCC and UCB donors. Maintenance of proliferative properties of mCC was confirmed by CFU assay.

Conclusion: We have successfully confirmed the feasibility of ex vivo fusion procedure and creation of human mCC. We characterized the phenotype, genotype, viability and proliferative potential of mCC. This unique concept of mCC introduces a novel universal therapy for tolerance induction in solid organ and VCA transplantation.
4:51 PM - 4:54 PM  
RM 112. The "Racing Stripe" Modification of the Radial Forearm Free Flap: Experience with 661 consecutive cases.  
University of Texas HSC Medical School in Houston, Houston  
Presenter: Emmanuel G Melissinos, MD  
Emmanuel G Melissinos, MD(1) and Erik S Marques, MD(2)  
(1)University of Texas HSC Medical School in Houston, Houston, TX, (2)Division of Plastic and Reconstructive Surgery, University of Texas Health Science Center- Houston / McGovern Medical School, Houston, TX

**Background:** The traditional radial forearm free flap has proven to be a useful tool for the reconstructive microsurgeon. Its major drawbacks are related to donor site morbidity especially when coverage of sizable defects is attempted.

**Methods:** The “racing stripe” modification of the radial forearm free flap involves harvesting a large segment of the deep forearm fascia with only a narrow strip of skin overlying the radial vessels. The final design of the flap was based on years of clinical observations indicating that a) The deep fascia initially becomes congested and subsequently hypertrophies, b) Large vessels supplying small amount of tissue remain patent, and c) Careful dissection at the suprafascial plane of the forearm is well tolerated. The flap is designed with a 1- to 2.2 cm skin island centered on the axis of the vessels. Dissection commences is carried out on the suprafascial plane, exposing a large segment of the deep fascia from 1 cm radial to the cephalic vein to 1 cm ulnar to the palmaris longus tendon. The fascia is elevated on the subfascial plane, incorporating the cephalic vein and preserving the branches of the superficial radial nerve. The radial vessels are ligated at the wrist and proximally up to their origin, depending on length requirements. Following transfer the flap is covered with a STSG. The cutaneous island of the flap can be deepithelialized in some exposed areas for aesthetic reasons. The donor site is easily closed without tension.

**Results:** 661 consecutive cases performed from March 1996 to February 2017 are reviewed. 541 of the flaps were used for coverage of foot and ankle defects, where bulk is not well tolerated. Overall 89.5% of the flaps were used in the lower extremity, 9.3% in the upper and 1.2% in head and neck reconstruction. There were two late flap failures. Complication rate was 3.2% including 1.8% unscheduled returns to the OR due to vascular compromise and hematomas. The exceptional reliability of the flap is mainly due to the presence of a large artery and the availability of both the cephalic vein and venae committantes to be used alone or in combination as a venous outflow system.

**Conclusion:** The “racing stripe” modification permits reliable coverage of medium size defects with primary closure of the donor defect, minimizing donor site complications.
Predictive Factors For Microsurgical Reconstruction in the Management of Foot Degloving Injuries
NYU Langone Medical Center, New York
Presenter: Oriana D. Cohen, M.D.
Oriana D. Cohen, M.D.(1), James Mayo, M.D.(2), Jessica Billig, M.D.(3), Vishal D Thanik, MD(4), Pierre B Saadeh, MD(4) and Jamie P Levine, MD(1)
(1)NYU Langone Medical Center, New York, NY, (2)UF Health Cancer Center, Orlando, FL, (3)University of Michigan Health Systems, Ann Arbor, MI, (4)Hansjorg Wyss Department of Plastic Surgery, NYU Langone Medical Center, New York, NY

Background:

Foot and ankle degloving injuries represent a complex clinical problem. There is currently no consensus on their optimal management, however, microvascular free flap (MVFF) reconstruction to achieve limb salvage is often necessary. Herein, we evaluate a series of foot degloving injuries in order to evaluate predictive factors for MVFF reconstruction.

Methods:

Patients treated for isolated traumatic foot avulsion injuries at New York University Langone Medical Center (NYULMC) and Bellevue Hospital Center between July 2000 and November 2013 were reviewed. Demographic data and clinical variables surrounding the patient’s initial injury, hospital stay, and reconstruction were evaluated. Additionally, long-term follow-up and surgical outcomes were assessed. Statistical analyses were performed using Fisher’s exact test, independent samples t-test, and descriptive analyses.

Results:

Twenty-one patients with isolated foot degloving injuries were identified (13 STSG, 8 MVFF) with an average follow-up of 14 ± 18 months. Patients who underwent MVFF were significantly younger than those who underwent STSG (26.6 ± 15 years vs. 50 ± 25 years; p=. 033). However, there were no significant differences in gender, BMI, smoking history, or history of medical comorbidities between the two groups.

Patients who underwent MVFF had higher rates of open ankle fractures, distal tibia/fibula fractures, and calcaneal injuries in contrast to our STSG group where metatarsal and phalangeal fractures were more prevalent. Additionally, our MVFF cohort demonstrated higher rates of soft tissue injury, with complete initial heel pad degloving or subsequent debridement in 62.5% vs. 23%; p=. 077. Lastly, plantar sensation was more likely diminished or absent in patients who underwent MVFF (present in 50% of MVFF vs. 84.6% of STSG; p .0975).

There was no significant difference in time to reconstruction between the two groups (23.6 ± 27.4 days MVFF vs. 10.3 ± 10 days STSG; p=. 12), or complication rates (50% MVFF vs. 53.8% STSG; p=. 868). All patients were ambulatory post-operatively.

Conclusion:

This large series of foot degloving injuries demonstrates that extent of bone injury, soft tissue injury, and plantar sensation, serve as predictive factors for MVFF reconstruction. We report similar treatment times, complication profiles, and post-operative outcomes in patients who
underwent STSG vs. MVFF, underscoring the importance of injury stratification in the initial evaluation of foot degloving injuries.
Background

In traumatic extremity reconstruction, it is preferable to perform microvascular anastomoses outside the zone of injury. In certain situations (extensive trauma, anatomic constraints, limited pedicle length) a vein graft is required to perform a vascular anastomosis outside of the zone of injury. Alternatively, a thrombectomy can be performed within the zone of injury to improve the arterial inflow, thereby avoiding the use of a vein graft. We present the outcomes of microvascular anastomosis within the zone of injury after thrombectomy and placement on an anti-thrombotic pharmacologic regimen. We compared this group to patients who underwent primary anastomosis outside (based on visual inspection and adequate arterial inflow) the zone of injury.

Methods

We retrospectively reviewed patients who underwent free tissue transfer for traumatic extremity reconstruction performed by a single surgeon from 2013 to 2017. Basic demographic data were gathered as well as fracture type, time to reconstruction, flap type, recipient vessels, ischemia time, use of thrombectomy, post-operative anticoagulation, and flap outcomes. Patients who had poor arterial inflow in an otherwise visibly appropriate vessel underwent thrombectomy with a Fogarty catheter with subsequent microvascular anastomosis and initiation of therapeutic anticoagulation with a heparin drip.

Results

A total of 22 patients were identified. Ten underwent recipient-vessel thrombectomy and post-operative anticoagulation. In this group, there was only one case of total flap loss due to a late wound infection, resulting in a 90% overall success rate. In another patient, the recipient-vessel anastomosis did not remain patent after thrombectomy. This was identified intraoperatively, and a vein graft was used to perform an anastomosis proximal to the zone of injury. There were no cases of partial flap loss. Of the 12 patients who underwent primary vascular anastomosis outside of the zone of injury, there were 4 cases of total flap loss, resulting in a 75% overall success rate. One patient required re-operation for a hematoma and revision of the venous anastomosis with flap salvage.

Conclusion

When possible, it is preferred to perform a vascular anastomosis outside the zone of injury. When this is not possible and the artery appears to be visibly appropriate with weak arterial inflow, we propose performing a vascular anastomosis after thrombectomy and the initiation of anticoagulation before proceeding with a vein graft. This study suggests that this protocol may be safe with greater than 90% flap survival; however, further research is required to confirm our results.
Long-term Clinical Outcomes Comparison Among Different Vascularized Lymph Nodes Transfer: A 6-Year Single Center Experience Approach in the Treatment of Lymphedema

Presenter: Pedro Ciudad, MD, PhD
Pedro Ciudad, MD, PhD(1), Mouchammed Agko, MD(1), Oscar J. Manrique, MD(2) and Hung-chi Chen, MD, PhD, FACS(3)
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Background

In lymphatic surgery, physiologic and excisional procedures have been described in the treatment of lymphedema. Vascularized lymph node transfer (VLNT) is a physiologic procedure that attempt to restore or improve lymphatic flow. Excisional procedures such as liposuction, radical reduction with preservation of perforators and the Charles’ procedure aim to decrease the lymphatic load by removing the diseased tissue in advanced stages. Herein, we retrospectively evaluated our experience in the past 6 years with the use of different VLNTs in patients with extremity lymphedema. In addition, we discuss our algorithm, the clinical outcomes, complications and additional excisional procedures we have performed to improve final outcomes.

Methods

Between July 2010 and July 2016, all patients with ISL stage II-III who underwent VLNT from different donor sites for treatment of extremity lymphedema were identified. Demographic data, preoperative assessment including etiology of lymphedema, duration of symptoms, limb(s) affected, lymphedema stage were recorded. Objective clinical assessment was performed with photography and limb circumferential measurements were performed pre-operatively and post-operatively. Lymphoscintigraphy was performed preoperatively and at 6 and 12 months, postoperatively in all patients. Complications, additional excisional procedures after VLNT performed were analyzed. Patients required at least 18-months of continuous follow-up in order to be included in this study.

Results

A total of 83 patients met inclusion criteria. A total of 13 % were diagnosed with primary lymphedema, and the remaining 87% with secondary lymphedema. Total patients’ mean follow-up time was 30.2 months. The lymph node flaps used and included in this study were: groin(n=13), supraclavicular(n=25), gastroepiploic(n=42), appendicular(n=1) and ileocecal(n=2). Total mean circumference reduction rate was 29.1 (Stage II) and 17.9 (Stage III) (p<0.05). A paired t-test showed VLNT statistically significant decreased the number of infections (p<0.05). Three patients no reported symptoms improvement. A total of 24 patients underwent additional excisional procedure after VLNT. Lymphatic leakage (2) and hematoma (1) were reported complications from donor site. At recipient site: two flaps presented venous congestion and one flap loss were the major complications reported. During the follow-up period, there were no patients with any signs or symptoms of donor site lymphedema.
Conclusion

VLNT is a promising technique used for the treatment of lymphedema and appears to be more effective in Stage II. Patients with lymphedema Stage III may benefit with an additional excisional procedure. However, long-term, prospective studies are needed to compare, standardize treatments, improve clinical outcomes, minimize donor site morbidity and avoid potential iatrogenic lymphedema.
Background

Liposuction is an effective bulk-reducing treatment of extremity lymphedema. The skin excess created as a result of bulk removal is classically left behind due to wound healing concerns. Problems associated with this approach include contour irregularity, seroma/hematoma, and skin breakdown. We modified the technique by excising the excessed skin immediately following liposuction. We described our experience of this new technique and compare its outcomes with the traditional approach.

Methods

Power-assisted liposuction was performed using the standard tumescent technique under tourniquet control for both upper and lower extremities. Following liposuction, brachioplasty or thigh lift was immediately performed following liposuction to remove the skin excess (Fig 1A - D).

16 consecutive cases of liposuction with immediate skin excision (LISE) performed between February 2016 to June 2017 were recruited into the study. Their outcomes were compared with 16 consecutive cases of standard liposuction (SL) without skin excision performed immediately prior to our adoption of the new approach. There were 8 upper extremity and 8 lower extremity cases in 12 patients in the LISE group. In the SL group, there were 6 upper and 10 lower extremity cases in 10 patients. All patients had solid-predominant, Campisi III D V disease. The outcomes assessed were contour, hematoma, ulceration, wound dehiscence, and patient satisfaction.

Results

In all 32 cases, patients experienced notable extremity bulk reduction (average of 1280 cc from upper extremity, 3940 cc from thigh, and 2650 cc from leg). Patients in the LISE had higher satisfaction score than those in the SL group (9.25 vs 7.8). In the SL group, 38% (6 of 16) showed notable contour irregularities (Fig 2), 13% (2 of 16) experienced hematoma requiring percutaneous drainage, 18% (3 of 16) developed cutaneous ulceration (Fig 2). In contrast, in the LISE group, 13% (2 of 16) showed mild contour irregularities, none experienced hematoma, and none developed ulceration or other wound healing-related complications (Fig 3).
Conclusion

Excision of redundant skin following liposuction for extremity lymphedema is safe. It is associated with lower risks of postoperative complications, higher patient satisfaction, and provides additional contouring benefits.

Figure 1A

Pinch test showing the skin excess following liposuction.

Figure 1B

Skin marked for excision.
Figure 1C

Tailor-tacking to avoid over-excision.

Figure 1D

Immediate result on the table.
Figure 2

Multiple skin ulceration and contour irregularities are evident.

Figure 3

Representative postoperative result of the LISE approach.
**Background:** Despite the popularity of latissimus dorsi (LD) flap in breast reconstruction, augmentation with a breast implant is often necessary to achieve sufficient volume. Prior reports describe fat grafting to the LD flap primarily as a secondary procedure to correct contour deformities and improve volume after initial reconstruction. Our institution has instituted autologous breast reconstruction with a latissimus dorsi myocutaneous flap and immediate fat transfer (LIFT) in a single stage to provide a completely autologous reconstruction. **Methods:** A retrospective review of all patients undergoing the LIFT procedure over three years was undertaken. Data were collected pertaining to patient age, timing of reconstruction, total volume of fat transfer, length of follow up, need for adjuvant therapy, and complications. The procedure begins with harvest of the LD flap and fat as previously described. Prior to disorigination of the latissimus muscle, fat is injected in a fan-like pattern to evenly distribute it throughout the muscle. The flap harvest is then completed and inset to create a breast mound. Revision fat grafting is performed as necessary if a determination is made that inadequate volume has been achieved. **Results:** Eighteen patients underwent unilateral LIFT procedure over three years with an average follow up of 8.7 months (range, 2-24). Mean patient age was 50.5 years (range, 40-62). Four breasts (22.2%) had previously received adjuvant radiation therapy. Fifteen patients (83.3%) required additional rounds of fat grafting on average 3.8 months (range, 3-6) following index operation. The mean total fat grafting volume was 515.5 ml (range, 325-730) per breast. The average estimated fat graft take was 66.8% (range, 50-80%). Four patients (22.2%) experienced complications which included donor site seroma (n=3, 16.7%) and delayed wound healing (n=1, 5.6%). **Conclusion:** Autologous augmentation of the LD flap with lipotransfer has previously been reported as a means to avoid placement of a breast implant. We improve upon these initial reports by performing lipotransfer in the immediate setting during index reconstruction. Furthermore, we have refined this technique to perform lipotransfer prior to disorigination of the LD muscle to minimize trauma to the flap and increase the speed and efficiency of fat grafting. Our experience demonstrates that this technique is a viable autologous alternative to microsurgical breast reconstruction.
Anatomic Study of the Deep Branch of the Superficial Circumflex Iliac Artery

University of Vienna, Vienna

Presenter: Hidehiko Yoshimatsu, MD

Hidehiko Yoshimatsu, MD(1), Chieh-Han Tzou, M.D.(2), Johannes Steinbacher, MD(2) and Takuya Iida, M.D.(3)

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Background

Harvesting a superficial circumflex iliac artery (SCIA) perforator (SCIP) flap, the sartorius muscle, and the iliac bone based on the deep branch of the SCIA presents a challenging procedure due to the topographic variation of the SCIA system. The aim of this study was to evaluate anatomical landmarks regarding the deep branch system.

Methods

The authors examined the characteristics and landmarks of 20 groin regions in 10 fresh cadavers. The diameter and location of the branching of the deep branch, the sartorius muscle branch, and the iliac bone branch and their relation to bony anatomic landmarks were measured. In addition, perfusion via the muscle branch and the bone branch was evaluated using indocyanine green angiography.

Results

The average distance along the inguinal ligament from the pubic tubercle to a vertical line crossing the bifurcation of the SCIA was 61 mm, and the distance along the vertical line from the inguinal ligament to the bifurcation of the SCIA was 30 mm. The average distance from the anterior superior iliac spine (ASIS) to the most proximal branch to the sartorius muscle was 52 mm. The average distance from the ASIS to the most proximal branch to the iliac bone was 12 mm. In all specimens, the ICG was confirmed in the proximal 8 cm of the sartorius muscle and the superficial portion of the iliac bone (up to 2 cm deep).

Conclusion

The superficial and the deep branch could be identified in all specimens. The deep branch constantly gave off branches to the sartorius muscle and the iliac bone. Proximal portion of the sartorius muscle and the superficial portion of the iliac bone were perfused by the deep branch of the SCIA.
Background

When lower extremity salvage is not possible after a traumatic amputation, providing a stump with adequate length and durable, sensate coverage is crucial for functional recovery. Soft tissue reconstruction of the stump can be achieved using tissue from the amputated part, a local flap or a free flap. Free flaps are often the best option for providing adequate tissue bulk that can withstand the stresses of weight bearing. The purpose of this study was to describe and evaluate our experience using free tissue transfer for coverage of traumatic lower extremity amputation stumps.

Methods

Retrospective review of our institutional flap registry from 1979-2016 included 806 lower extremity free flap reconstructions. Any free flaps used for coverage of a traumatic amputation site including transmetatarsal, below-knee and above-knee amputations were included. Primary outcome measures were perioperative complications and return to ambulation.

Results

There were a total of 27 free flaps that met inclusion criteria. Sites for flap coverage included transmetatarsal amputations (74.1%) and below-knee amputations (25.9%). The most commonly used flaps were parascapular flaps (n=8) followed by latissimus flaps (n=6) and rectus (n=4). Musculocutaneous flap were more commonly used compared to fasciocutaneous flaps (55.6% vs. 44.4%). Average flap size was 289 +/- 146.8 cm². Average follow-up was 40 +/- 39.6 months. Major complications occurred in 7 patients (29.2%) with 5 flaps requiring an emergent return to the operating room (18.5%), 1 partial flap failure (3.7%) and 1 total flap failure (3.7%). Ambulation was achieved in 46.4% of these patients.

Conclusion

Microvascular free tissue transfer is an invaluable option for preserving bone length and providing stable soft tissue coverage in traumatic amputations of the lower extremities. This is the largest series to date demonstrating successful free flap reconstruction of trans-metatarsal and below-knee amputation sites with high flap success rates.
Background: The medial sural artery perforator free flap can provide stable, reliable coverage in areas that require thin resurfacing. Unlike the comparable standard, the radial forearm free flap, donor site morbidity is negligible: skin grafting is typically not required, a major vessel is not harvested, the consequences of wound breakdown does not imperil tendons of the hand, and aesthetics are vastly improved. This prospective cases series investigated the application of this flap for unique and complex defects of the head and neck.

Methods: From July 2016 to June 2017, 15 patients underwent reconstruction of the oral cavity, palate, tongue, cheek, parotid region, pharynx, esophagus and trachea with a medial sural artery perforator free flap. Patient demographics, flap characteristics, flap inset and clinical outcomes were described.

Results: The harvested flap size ranged from 6-17cm long by 3-8cm wide, though multiple skin paddles were trimmed and de-epithelialized with final inset. Mean pedicle length was 10.7cm (range 8-12cm). 13 out of 15 flaps were raised with a single perforator (range 1-2). Mean flap thickness was 8 mm (range 5-12mm). Mean venous coupler size was 2.86 (range 2.0-3.5mm). Arterial diameter ranged from 1.5-3.0mm. Defects included the buccal mucosa with or without a marginal mandibulectomy (1), complete and partial palatal defects (3), circumferential pharyngoesophageal defect (1), full thickness cheek defect (1), parotidectomy defects for recontouring and facial nerve protection (5), floor of mouth and glossectomy defects (2), as well as tracheoesophageal and pharyngocutaneous fistulas (2). 7/15 flaps were inset in a folded or tubed fashion. One flap was harvested as a chimeric flap with the gastrocnemius muscle on a separate pedicle. Primary closure was achieved in 13/15 donor sites. 14/15 flaps remain viable with excellent functional outcomes. There have been no major donor site complications with normal postoperative ambulation.

Conclusion: The medial sural artery free flap is a versatile and reliable option for complex three-dimensional defects of the head and neck, where its use has not been previously well described. It is preferable to the western anterolateral thigh free flap with its ability to provide thinner resurfacing and to the radial forearm flap by minimizing donor site morbidity with primary closure while still providing adequate pedicle length.
Figure 1: Folded MSAP Flap for Tracheoesophageal Defect.

Figure 2: Tubed MSAP Flap for Circumferential Esophageal defect.
Predictors, Classification and Management of Umbilical Complications in DIEP Flap Breast Reconstruction

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Background
In recent years, the deep inferior epigastric perforator (DIEP) flap has become the workhorse flap for autologous breast reconstruction. Despite increased reports on DIEP flaps, umbilical complications have not been previously studied. The aesthetics of the umbilicus dictates the beauty of abdomen, and it is critical for plastic surgeons to minimize the scarring of the umbilicus. In this study, we retrospectively reviewed patients who underwent DIEP flaps to determine the predictors of umbilical complications, and created a classification system of these wounds.

Methods
Retrospective review of 323 patients who underwent DIEP flap from 2009 to 2016 was performed. Umbilical stalk heights, widths of fascial diastasis, and abdominal wall thicknesses were measured from computed tomography scans. Demographic and patient characteristics data were collected.

Results
Of the 323 patients, there were 58 patients that had umbilical complications (18%). These patients had statistically higher BMI, heavier flaps, and thicker abdominal walls (p-value<0.05). Also, they had statistically higher umbilical stalk heights (29.3 vs 18.7mm), and analysis showed that likelihood ratio of having umbilical complication is 2.05 at 20.1mm, 3.05 at 25.4mm, and 6.43 at 30mm. Logistic regression analysis revealed that umbilical stalk height, fascial diastasis, age, procedure time, and flap weight were significant predictors (p-value<0.05).

Conclusion
Umbilical complication in patients undergoing DIEP flap for breast reconstruction has not been previously studied. Our study shows that the umbilical stalk height plays a significant role, and umbilical wounds can be classified into 5 types (no wound, minor wound, wound dehiscence, partial necrosis, and total necrosis).
Background: After complete five level root brachial plexus injury, free functional muscle transfer (FFMT) and intercostal nerve transfer (ICN) to musculocutaneous nerve (MCN) are two potential reconstructive options for elbow flexion. The aim of this study is to determine the outcomes of FFMT versus ICN to MCN transfers with respect to strength, and determine the role of microsurgical reconstruction using gracilis FFMT after a pan-plexus injury.

Methods: Sixty-two patients who underwent FFMT (neurotized by SAN or ICN) reconstruction or ICN to MCN transfer for elbow flexion following a pan-plexus injury were included. The two groups were compared with respect to postoperative elbow flexion strength according to the British Medical Research Council grading system, preoperative and postoperative DASH scores, time from injury to operation, number of donor nerves as well as demographic characteristics.

Results: In the FFMT group 67.7% patients achieved M3 or M4 elbow flexion. In the ICN to MCN group 41.9% patients achieved M3 or M4 elbow flexion. The difference was statistically significant (p-value < 0.05). Changes in DASH scores were not statistically significant. Average time from injury to surgery was significantly different (p-value < 0.01) in both groups. The number of ICN used for the MCN transfer did not correlate with better elbow flexion grade. No differences between ICN or SAN for FFMT neurotization were found.

Conclusion: Based on this study, gracilis FFMT reconstruction achieves better elbow flexion strength than ICN to MCN transfer for elbow flexion after pan-plexus injury. The role of microsurgical reconstruction using a gracilis FFMT should be carefully considered in acute reconstruction.
Background

The National Comprehensive Cancer Network recommends surgical management as curative for early stages of breast implant associated anaplastic large cell lymphoma (BIA-ALCL) confined to the capsule. Ideal adjuvant treatment in advanced disease has not been established, however, the antibody-drug conjugate brentuximab vedotin (BV) has demonstrated promising results in clinical trials for relapsed/refractory (R/R) systemic ALCL. This retrospective case series reports on the use of BV for targeted therapy in R/R BIA-ALCL.

Methods

We retrospectively reviewed patients diagnosed with advanced BIA-ALCL (Lugano Class IIE-IV, MDA Class IIB-IV) from 1999 to 2016. Patients were categorized into either treatment with brentuximab vedotin (BV) versus a standard anthracycline-based chemotherapy. Outcomes were

Results

35 patients with advanced BIA-ALCL were included. Of the 9 BV patients, disease status was classified as effusion with regional lymph node involvement (IIB, n=2), capsular mass with regional lymph node involvement (III, n=5), and distant organ metastasis (IV, n=2, liver and small intestine). All BV cycles were administered following anthracycline-based regimen failure. Median number of BV cycles was 4. 7 patient deaths were reported in the anthracycline-only regimen, and none in the BV cohort. The rates of CR for BV and anthracycline only regimens were: 11/11 (100%) and 17/26(65%, p=0.04) at a median follow-up of 11 months. Figure 1 is a swimmer plot demonstrating the impressive temporal response patterns after BV treatment to anthracycline resistant tumors. Figure 2 includes CT (PET) imaging of a large chest wall mass with para-aortic nodal involvement, and 18 month follow up images post BV showing complete resolution.

Conclusion

The high rate of CR suggests that BV is an effective treatment for R/R BIA-ALCL and warrants consideration as front-line therapy. Larger international prospective trials are needed to determine duration of response, the optimal sequence of systemic therapies, and ultimately, mechanisms of resistance to BV for advanced BIA-ALCL.
Each bar represents one subject in the study.
* All brentuximab vedotin patients were relapsed or refractory to previous anthracycline based regimen treatment.
Background

Patients with connective tissue disease (CTD), or collagen vascular disease, are at risk of higher morbidity after autologous breast reconstruction. However, previous studies on this topic are limited by small patient numbers. We investigated the complication profile in CTD vs. non-CTD patients undergoing immediate autologous breast reconstruction on a national scale.

Methods

A retrospective analysis of the Healthcare Cost and Utilization Project National Inpatient Sample Database (NIS) between 2010-2014 was conducted for patients ≥18 years admitted for immediate autologous breast reconstruction. Connective tissue disease was defined as systemic lupus erythematosus, rheumatoid arthritis, systemic sclerosis, scleroderma, Raynaud’s syndrome, psoriatic arthritis or sarcoidosis. Wilcoxon-Mann-Whitney was used to compare continuous variables and the Pearson χ² was used for categorical variables. Outcomes of interest were assessed using multiple linear regression for continuous variables and multiple logistic regression for categorical variables.

Results

There were 22,064 patients admitted for immediate autologous breast reconstruction from 2010 to 2014. Of these patients, 21,657 (98.2%) did not have CTD and 408 (1.8%) did. The CTD patients were significantly more likely to be of African American ethnicity (19.6% vs. 15.0%, p=0.010). In addition, they were more often diabetic (13.0% vs. 7.7%, p<0.001), in the fourth quartile of income (47.1% vs. 40.6% p=0.009) and admitted to urban, non-teaching hospitals (24.5% vs. 17.7%, p<0.001). They were more likely to have a bilateral mastectomy with immediate reconstruction (49.3% vs. 42.1%, p=0.004), with greater long-term steroid (1.2% vs. 0.2%, p=0.002), NSAID (1.2% vs. 0.1%, p<0.001) and anticoagulant use (1.2% vs. 0.4%, p=0.035). After adjustment for potential confounders, CTD patients had a significantly higher incidence of wound-based complications (2.5% vs. 0.6%, p<0.001), hematoma/hemorrhage/seroma (9.6% vs. 4.2%, p=0.009) and transfusion (13.5% vs. 11.1%, p=0.002).

Conclusion

Autologous breast reconstruction is an important part of treatment for many women with breast cancer. As such, identification of risk factors for complications is of great importance. In the present study, connective tissue disease is associated with a higher incidence of wound-based complications, hematoma, hemorrhage, seroma and transfusion following autologous breast reconstruction.
reconstruction. This information may help clinicians be aware of this increased risk when determining patients for reconstruction.
Lymphovenous Bypass for the Management of Intractable Chylothorax in Infants: A Novel Microsurgical Approach to a Devastating Problem

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Background: In the emerging field of lymphedema surgery, clinical initiatives have unveiled new avenues in support of novel microsurgical techniques. Described herein is the first reported use of lymphovenous bypass (LVB) surgery to manage recalcitrant chylothoraces in infants.

Chylothorax is an increasingly common postoperative complication after pediatric cardiac surgery, with a reported incidence of up to 9.2% in infants. While conservative nutritional therapy has a reported 70% success rate in this patient population, failed conservative management leading to persistent chylothorax is associated with a significant risk of multisystem complications and mortality. Once conservative medical strategies are deemed unsuccessful, surgical or radiologic interventions, such as percutaneous thoracic duct-embolization or ligation are often attempted. However, these procedures lack high-level evidence in the infant population, and remain a challenge given the small size of the lymphatic vessels. This purpose of this review is twofold: (1) to report our experience with the microsurgical management of thoracic duct occlusion, and (2) to discuss the microsurgeon’s role in the multidisciplinary management of this life-threatening problem.

Methods: A single-institution retrospective review was performed in effort to identify patients with clinically-significant persistent chylothoraces. Only patients who failed or were not candidates for embolization were included. Outcome measures included anastomotic patency, resolution of chylothorax, and complication-profile.

Results: Two patients met inclusion criteria, accounting for three operations. The first patient was a 6-week-old male who developed left subclavian vein thrombosis and thoracic duct occlusion. Given that the thrombus was not amenable to thrombolysis, and the development of bilateral pleural effusions, LVB was performed between the thoracic duct and a venule in the neck. Lymphangiography 1-week postoperatively revealed patent flow, resolution of chylos ascites, and near complete resolution of collateral flow. The second patient (4-month-old male) suffered a thoracic duct transection during cardiac surgery for congenital-heart-disease. He underwent a lymphaticovenous anastomosis between a lymphatic conduit in the neck and the external jugular vein. Lymphangiography at 2-weeks confirmed patent anastomosis. Microlymphatic surgery provided the ability to liberate patients from mechanical ventilation and enabled expeditious return to enteral feeding.

Conclusion: As part of the evolving microsurgery frontier, physiologic operations, such as LVB, may have a considerable role in the management of refractory pediatric chylothoraces. In our experience, the microsurgical management of thoracic duct occlusion mitigates morbidity through restoration of normal physiologic lymphatic circulation. This represents a novel intervention which contributes to the continuously expanding field of microsurgery.
Clinical Outcomes of Jejunal Interposition Flaps in Salvage of Complex Esophageal Reconstruction

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Background: Complications following esophagectomy for benign or malignant disease can be devastating and lead to a challenging salvage reconstruction. These patients may have undergone multiple surgeries that create a hostile field for reconstruction. Jejunal interposition with or without vascular supercharging provides a suitable reconstructive method with unique characteristics that make it suitable for esophageal reconstruction. This study evaluates the outcomes following long segment jejunal flap interposition for salvage reconstruction.

Methods: A retrospective review was conducted of all patients who underwent jejunal interposition flap for esophageal reconstruction at Mayo Clinic between April 2006 and April 2017. Patient demographics, indications for surgery, postoperative course and outcomes were collected through a comprehensive chart review.

Results: Eighteen patients were included in the study (11 males, 7 females), with an average age 58 years (range 25-78). Original etiology included adenocarcinoma in 44%, squamous cell carcinoma in 22% and non-cancer in 33.3% cases and 44% had previous chemo radiation. Twelve reconstructions were delayed after esophageal diversion and 16 were salvage procedures following previous multiple surgeries. Fifteen flaps were pedicled, 10 were supercharged and three were free flaps. There were no differences in operative times between pedicled, supercharged versus free flaps (p>0.05). Additional procedures, including local flap coverage, were used in 9 patients. The commonest recipient arteries were the left internal mammary (LIMA) (n=8) and transverse cervical artery (n=5) and recipient vein was the external jugular (n=8) left internal mammary (n=4) and internal jugular (n=1). Early flap complications included anastomotic leak/fistula (n=4) and partial take of Integra (n=1). Other early complications (n=11) included respiratory (n=4), infection (n=3) bleeding (n=2), other medical (n=2). Four leaks were identified from the first upper GI study. Prior chemo-radiation did however significantly increase the development of leaks (p=0.02) but not overall complications overall. Four patients developed strictures requiring dilatation. The occurrence of early or late complications was not associated with type of flap used, use of local tissue coverage, nor malignant and benign disease. The average total follow up was 26.7 months.

Conclusion: Salvage reconstruction can be extremely challenging and complex surgery for benign or malignant disease that can be devastating for the patient. Many patients have had multiple procedures, complications however the pedicled jejunal interposition may provide a safe and suitable option to bring well vascularized tissue into the area and re-establish esophageal continuity in the context of a hostile setting.
Background

The abdominal donor site remains the gold standard for autologous, free flap breast reconstruction. However, for women in whom the abdomen is unavailable or insufficient, several other perforator-based flaps have been described. In particular, the lumbar artery perforator (LAP) flap can provide adequate tissue for breast reconstruction with an aesthetically appealing donor site for patients who have a relative excess of fatty tissue over the flanks and lower back, colloquially known as the “love handle”. This study summarizes our experience with using free LAP flaps for autologous breast reconstruction, a flap for which little has been published.

Methods

Consecutive patients undergoing autologous breast reconstruction with LAP flaps were retrospectively reviewed. Microvascular anastomoses were performed directly between the flap pedicle and the anterograde internal mammary (IM) vessels, or using bridging arteriovenous grafts harvested from the deep inferior epigastric artery and vein. Clinical characteristics and outcomes were recorded.

Results

Six patients underwent autologous breast reconstruction with 10 LAP flaps in an immediate (n=5) or delayed (n=5) setting. Average age was 48.4 ± 4.1 years, with a median follow-up of 11.3 months. Three (30%) flaps received pre-reconstruction radiation therapy. All patients had preoperative abdominal imaging using magnetic resonance angiography. Reasons for not using the abdomen included unavailable abdominal flaps because of prior surgery (n=7, 70%) and inadequate tissue for breast reconstruction (n=5, 50%). Four patients underwent bilateral reconstructions: three in a staged fashion and one as bilateral simultaneous. The majority of flaps (n=8, 80%) were harvested in lateral decubitus. The six most recent flaps utilized arteriovenous grafts. There were no total or partial flap losses and no significant fat necrosis. All patients reported satisfaction with their reconstructive symmetry and final aesthetic results at the breasts and donor site.

Conclusion

Our study, the largest reported in the United States, demonstrates that autologous breast reconstruction with LAP flaps is safe and reliable in patients that have an insufficient or unavailable abdominal donor site. The LAP flap can provide adequate soft tissue for breast reconstruction with a particularly aesthetic donor site, making it an appealing alternative to other non-abdominal perforator flaps. Our growing experience has allowed for refinements in technique aimed at improving safety, efficiency and reliability, including meticulous flap harvest to minimize donor site morbidity, arteriovenous grafts to improve pedicle length and size match, and the staging of bilateral reconstructions. Continued work with the LAP flap will help establish it as a useful tool for the reconstructive microsurgeon.