MONDAY BREAST

7:30 AM - 7:35 AM

RM75 Plug N Play: Towards Anastomosable Vascular Networks

Weill Cornell Medical College

ASRM/PSF Combined Pilot Grant

Presenter: Andrew I. Abadeer MD

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Purpose

The promise of an ideal "off-the-shelf" regenerative template has long been predicated upon the availability of an adequate inherent vasculature. Due to this, current dermal regenerative templates such as IntegraTM are clinically limited in scope secondary to their dependence on excellent host wound bed vascularity. This reliance in turn restricts their applicability in any but the most optimal wound beds, all but prohibiting their use in wound beds with exposed bone, tendon, or hardware. Free tissue transfer overcomes this through its inherent hierarchical vascular network, but is in turn is limited by donor site availability and morbidity. Therefore, there exists a great need for a product that bridges the gap between avascular regenerative templates and free tissue transfer. Herein we demonstrate a system for rapid endothelial network formation as well as active endothelial sprouting and invasion from a microsurgically relevant channel towards the aim of creating tissue engineered anastomosable vascular networks.

Methods

Tagged Endothelial cells (EC) were suspended in Type 1 collagen that was impregnated with sphingosine-1-phosphate and monitored using fluorescent microscopy for network development. Constructs were also made with a 1mm central channel that was seeded with ECs. Confocal and fluorescent microscopy were performed to quantify endolumenal diameter, total vessel length, number of sprout endpoints, junction density, and extent of invasion.

Results

Complex network formation was seen as early as day 3 of culture. Axial sections demonstrated robust cellular invasion away from the conduit with sprouts branching and anastomosing into an intricate plexus. Lumen diameters were similar in caliber to deep dermal arteriolar vessels. Constructs treated with S1P had, on average, 10 mm greater vessel length, 170% increase in junction density, and 125% increase in total number of endpoints ($p=0.0003$, $p<0.001$, $p=0.0004$). Constructs exhibited an average endothelial sprout density of 37±8 sprouts/mm2 with an average depth of invasion of 129±58 um.

Conclusion

Whereas the clinical applicability of current dermal replacement products is limited by the absence of an inherent vasculature, herein we have demonstrated the potential for unique prevascularized regenerative template with an inherent hierarchical vasculature. Future work will focus on flow dynamics of this regenerative template towards the ultimate aim of in-vivo microanastomosis.

7:35 AM - 7:40 AM

RM76 Determining Location of Abdominal Wall Sensory and Transversus Abdominis Plane Nerves for Its Utilization in Sensate DIEP Flap: Cadaver Study

Cleveland Clinic, Cleveland

Presenter: **Cagri Cakmakoglu, MD**

Cagri Cakmakoglu, MD(1), Michelle Djohan, BS(2), Rebecca Knackstedt, MD, PhD(1), James Gatherwright, MD(1) and Risal Djohan, MD(1)

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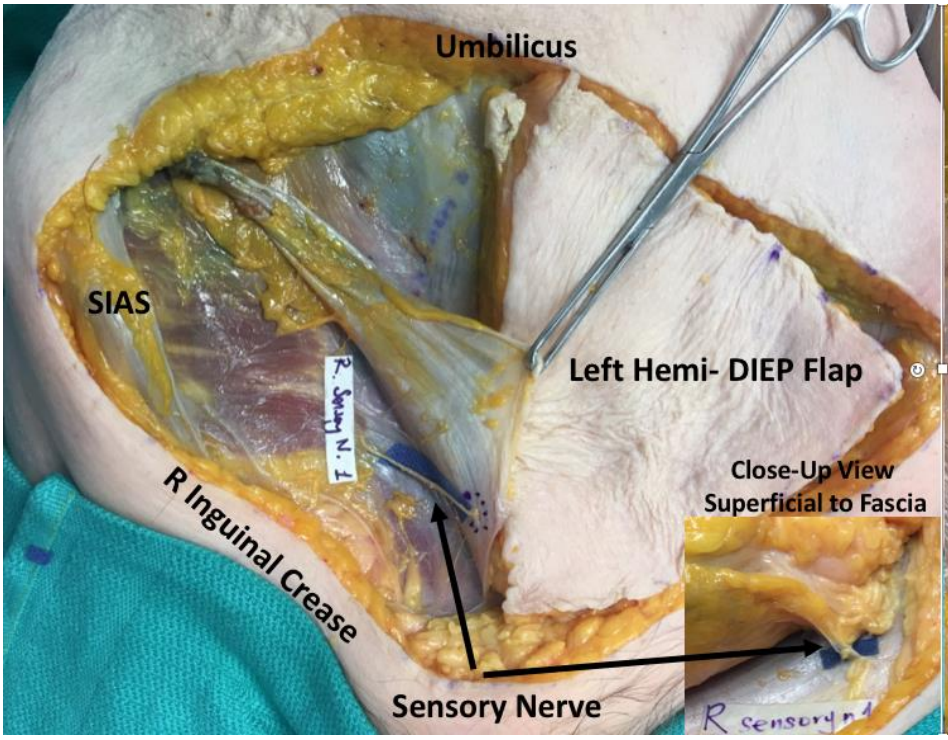
Background: Most of breast reconstruction cases still result in hypoesthesia of the reconstructed breast. Even though there have been attempts to reinnervate the deep inferior epigastric artery perforator (DIEP) flap, with or without nerve grafts, the location of the sensory nerves that are preserved during the flap harvest have not been described well.

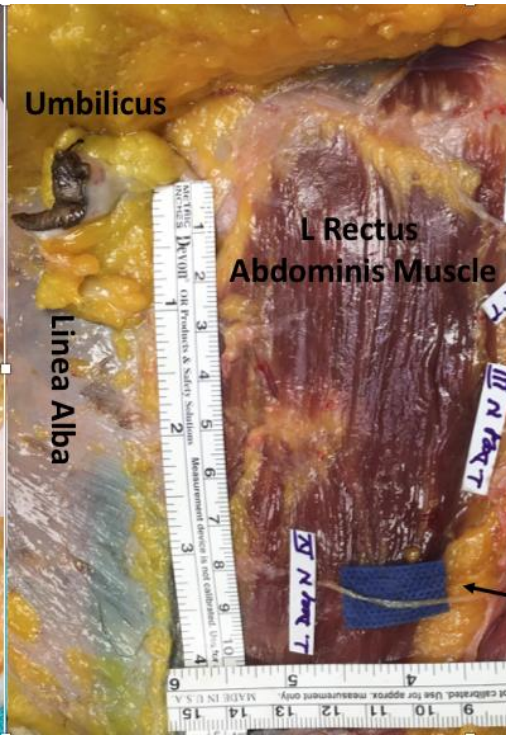
The first aim of this study is to determine the location the sensory nerves of the abdominal wall in consistent distribution during DIEP flap harvest, as well as measure the caliber of the sensory nerves to allow for appropriate size matching during flap neurotization. The second aim of this study is the describe the precise localization of the transversus abdominis plane (TAP) mixed nerves in order to improve effectiveness of TAP block.

Methods: Eleven abdominal wall dissections (22 hemi-DIEP Flap) were performed. Sensory nerves and vessels perforating the external oblique muscles, as well as the rectus muscle fascia, to supply and innervate the abdominal wall were identified. The nerves followed retrogradely until the TAP plane and were measured and recorded according to umbilicus and anterior superior iliac spine (ASIS) landmarks. The caliber of sensory nerves were also recorded.

Results: 44 sensory and 36 TAP mixed nerves were isolated. The mean distance of the sensory nerves from the umbilicus and ASIS were 4.34±3.41cm lateral, 6.14±4.22cm inferior and 9.57±4.20cm medial; 0.18±5.52cm superior, respectively. The mean distance of mixed nerves in the TAP from the umbilicus and ASIS were 10.79±4.32cm lateral, 2.92±5.57cm inferior and 2.07±3.65cm medial; 3.39±5.55cm superior, respectively. 39 out of the 44 nerves were piercing rectus abdominis muscle fascia and 5 of the sensory nerves piercing external oblique fascia were found. The mean thickness of the sensory nerves was 0.15±0.07mm.

Conclusion s: Describing condensed location of the sensory nerves and mixed nerves in the TAP enable surgeons allow for efficient and reproducible localization during neurotization and TAP block. To innervate the flap effectively, the nerves perforating the rectus abdominis muscle fascia, as well as the nerves perforating the external oblique fascia need to be recognized and spared during dissection. Optimal nerve graft size is 0.15 mm in order to minimize size mismatch during coaptation.


Umbilicus
SIAS
Left Hemi- DIEP Flap
R Inguinal Crease
Close-Up View
Superficial to Fascia
Sensory Nerve


Umbilicus
L Rectus
Abdominis Muscle
Linea Alba

7:40 AM - 7:45 AM

RM77 Prada: Primary Radiotherapy and Deep Inferior Epigastric Perforator Flap Reconstruction

Institute of Cancer Research, London

Presenter: **Aadil A. Khan, MD, MPH, PhD, FRCS**

Paul Thiruchelvam, MD, PhD, FRCS(1), Melissa Tan, MD, FRCS(2), Hadjiminas Dmitri, MD, FRCS(3), Susan Cleator, FRCP, FRCR(3), Simon Wood, MD, FRCS(3), Daniel Leff, MD, PhD, FRCS(3), Navid Jallali, MD, FRCS(3), Dorothy Gujral, MD, PhD, MRCP, FRCR(3), Anna Kirby, MD, PhD, MRCP, FRCR(4), Navita Somaiah, MRCP, FRCR, PhD(5), Stuart James, MD, FRCS(2), Rachel O'Connell, MD, MRCS(2), **Aadil A. Khan, MD, MPH, PhD, FRCS**(6), Jenny Rusby, MD, FRCS(2), Peter Barry, MD, MPhil, FRCS(2), Kelvin WD Ramsey, MA, FRCS (Plast.)(2) and Fiona MacNeill, MD, MS, FRCS(4)

(1)Imperial College Hospiitals NHS Trust, London, United Kingdom, (2)The Royal Marsden Hospital, London, United Kingdom, (3)Imperial College Hospitals NHS Trust, London, United Kingdom, (4)The Royal Marsden Hospitals NHS Trust, London, United Kingdom, (5)Institute of Cancer Research, London, United Kingdom, (6)Targeted Therapy Team & Department of Plastic Surgery, The Institute of Cancer Research, London, United Kingdom

Background

The need for post-mastectomy radiotherapy (PMRT) has historically deterred breast multidisciplinary teams from offering immediate breast reconstruction, because of perceived increases in operative complications and negative impacts on aesthetic outcomes as a result of radiotherapy (RT). PRADA aimed to evaluate the safety, and technical feasibility, of performing mastectomy and immediate breast reconstruction with a deep inferior epigastric artery perforator (SSMx+DIEP) shortly after neoadjuvant RT (NART).

Methods

Eligible patients undergoing neoadjuvant chemotherapy (NACT) were recruited to this multi-center, non-radomized interventional study of NART at the Royal Marsden and Imperial College hospitals NHS trusts. Patients received either 40 Gy in 15 fractions to the chest wall and were scheduled for surgery within 6 weeks of receiving the final RT fraction.

The primary outcome was presence of open breast wound >1cm and requiring dressings 4 weeks after surgery. Secondary outcome measures included volumetric and symmetry analyses using 3D-surface imaging and BREAST-Q patient reported outcome measures.

Tissue biopsies were harvested pre-, and post-RT, from the tumor and irradiated normal tissues of the chest wall (skin, fat, blood vessels). Non-irradiated, matched tissue controls were also taken from the DIEP flap. Gene expression analyses using the Nanostring nSolver^{TM} platform were performed to investigate DNA damage responses (DDR) and immunological changes post-RT in both tumor and normal tissues.

Results

Between May 2016- Sept 2017, 30 patients were recruited to receive NART followed by SSMx+DIEP ((mean age = 47.9 y (range: 37-62 y), mean body mass index (BMI) = 27.3 kg/m^2 (range: 19-35 kg/m^2), mean breast weight = 651 g (range: 118-1575 g), mean DIEP flap weight = 635 g (range: 181-902 g)).

The mean interval between completion of NACT and NART was 33 days (range: 12-70 days) and that between completion of NART and SSMx+DIEP was 23.6 days (range: 12-53 days).

Two patients (6.7%) had open wounds at 4 weeks post-operatively. Of note, there were no unplanned returns to theatre and no flap failures. Two patients, in whom NART had been delivered to the internal mammary chain (IMC), required immediate revision of their arterial anastomoses at primary surgery.

Nanostring analysis demonstrated highly differential gene expression in tumour and normal tissues pre-, and post-RT.

Conclusion

Altering the sequence of radiotherapy and surgery did not have a deleterious impact on mastectomy skin flap necrosis or DIEP flap failure. A larger, multi-center, randomized study of NART followed by SSMx+DIEP (PRADA-2) is in development currently.

7:45 AM - 7:50 AM

RM78 The Association between Relationship Status and Patterns of Post-Mastectomy Breast Reconstruction

Duke University Medical Center, Durham

Presenter: **Amanda R Sergesketter, BS**

Amanda R Sergesketter, BS(1), Samantha M Thomas, MS(2), Whitney O Lane, MD(1), Ronnie L. Shammas, M.D.(1) and Scott T. Hollenbeck, M.D.(1)

(1)Duke University Medical Center, Durham, NC, (2)Duke Cancer Institute, Durham, NC

The Association between Relationship Status and Patterns of Post-Mastectomy Breast Reconstruction

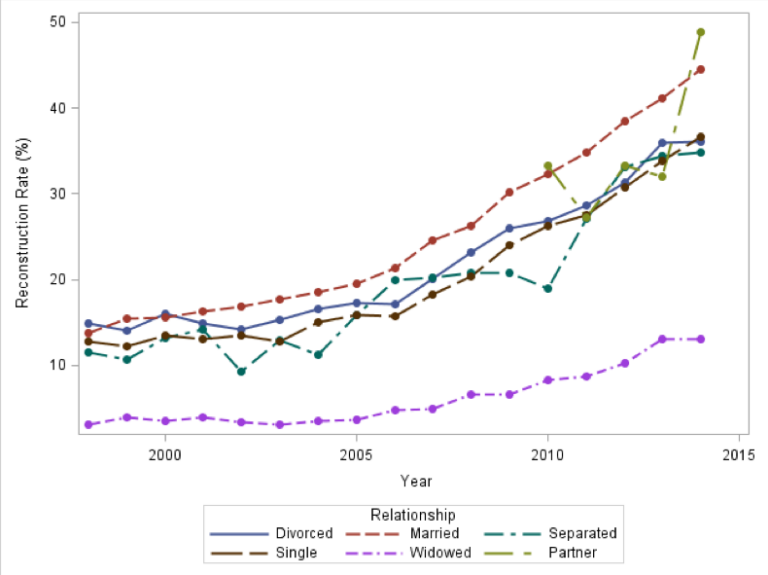
Background: Partner support and marital status have been shown to influence quality of life, survival, and treatment decision-making after breast cancer diagnoses. We sought to determine the impact of relationship status on contemporary patterns of immediate breast reconstruction.

Methods: Surveillance, Epidemiology, and End **Results** (SEER)-18 was used to identify females undergoing mastectomy for stage 0-III breast cancer from 1998-2014. Positive social support was defined to include documentation of a marriage and/or an unmarried partnership, whereas those who were single, widowed, separated, or divorced were defined to have no social support. Multivariate logistic regression was used to estimate the association of relationship status with likelihood of post-mastectomy reconstruction. Patients were grouped by year of diagnosis to assess change in the reconstructed population over time by relationship type. Due to the lack of comorbidities in SEER which may influence reconstruction subtype, a generalized logistic model was used to identify factors associated with type of reconstruction received among younger patients <45 years.

Results: Of 346,418 patients, 21.8% underwent immediate reconstruction. The majority of patients were married (57.4%), with 17.0% widowed, 10.6% divorced and 13.9% single. After multivariate adjustment, reconstruction after mastectomy was more likely to occur in women with positive social support [odds ratio (OR) 1.31; $p<0.001$]. Among relationship subtypes, women who were separated (OR 0.76), single (OR 0.73), and widowed (OR 0.56) were significantly less likely than married women to undergo reconstruction (all $p<0.001$). Change in reconstruction rates over time varied by relationship status (interaction $p=0.02$), with reconstruction rates among divorced patients increasing more slowly compared to married and partnered women (**Figure**). Among women <45 years, reconstruction type varied by age, race, and relationship status: while younger age (OR 1.009; $p=0.01$) and non-Hispanic black race (OR 1.58; $p<0.001$) and Hispanic ethnicity (OR 1.33; $p<0.001$) were associated with increased likelihood of autologous versus implant-based reconstruction, divorced patients were less likely to pursue autologous over implant-based reconstruction compared to married women (OR 0.86; $p=0.03$).

Conclusion: Social support networks may significantly influence breast cancer patients' treatment decision-making regarding pursuit of reconstruction and consideration of autologous options. Non-partnered women may benefit from tailored pre-operative counseling and additional support resources from reconstructive surgeons.

Figure. Breast Reconstruction Rates Over Time by Relationship Status, 1998-2014.



7:55 AM - 8:00 AM

RM79 Genetic Testing for Breast Cancer Susceptibility Should be Offered before Unilateral Abdominal-Based Free Flap Breast Reconstruction

Brigham and Women's Hospital, Boston

Presenter: **Jessica Erdmann-Sager, MD**

Erez Dayan, MD(1), Anu Chittenden, MS(2), Judy E. Garber, MD, MPH(2), Luccie Wo, MD(3), Stephanie A. Caterson, MD(4), Matthew J. Carty, MD(4) and **Jessica Erdmann-Sager, MD**(4)

(1)Plastic Surgery, Harvard Medical School, Boston, MA, (2)Dana Farber Cancer Institute, Boston, MA, (3)University of Miami, Miami, FL, (4)Brigham and Women's Hospital, Boston, MA

Background: Failure to identify deleterious genetic mutations has particular implications for patients undergoing abdominal-based free flap breast reconstruction, as the donor site can only be used once. We sought to determine: (1) how many patients underwent genetic testing prior to unilateral abdominal-based free flap breast reconstruction (FFBR); (2) how often deleterious mutations were detected after abdominal-based FFBR; and (3) the cost effectiveness of expanding genetic testing in this patient population.

Methods: We retrospectively identified all patients who underwent unilateral abdominal-based FFBR at Brigham and Women's Hospital/Dana-Farber Cancer Institute between 2007 and 2016. Chart review was performed to collect relevant demographic and clinical data. Relevant hospital financial data was obtained.

Results: Of the 713 who underwent FFBR, 160 patients met inclusion criteria and mean follow-up was 5.8 years. Three patients (1.9% of 160) were diagnosed with deleterious mutations post-FFBR and then proceeded to have contralateral mastectomy and reconstruction. Two had deleterious *BRCA2* mutations and one had a deleterious *ATM* mutation. Of the three, one met NCCN guidelines and was not tested, one did not meet NCCN guidelines and was not tested, and one was tested for *BRCA1/2* only with a later extended panel revealing a mutation. Overall, 111 patients met NCCN guidelines for genetic testing, but only 55.9% (62 patients) underwent testing (see Figure 1). Financial data revealed that testing all patients would save $262,000.

Conclusion: The present study identified 1.9% of patients (3 of 160) who were diagnosed with deleterious genetic mutations after unilateral abdominal-based FFBR who proceeded to have contralateral mastectomy and reconstruction during a relatively short follow-up period. We expect the actual rate of pathogenic mutations to be around 10% based on a recent study of extended panel genetic testing in all Stage I – III breast cancer patients. [1] Due to the high cost of surgery and the decreased cost of genetic testing, it is cost-effective to test every patient prior to unilateral abdominal-based FFBR, however there are multiple factors to consider (see Table 1). Microsurgeons should take an active role in discussing the implications of genetic testing with patients and other care team providers.

1. Tung, N., et al., *Frequency of Germline Mutations in 25 Cancer Susceptibility Genes in a Sequential Series of Patients With Breast Cancer.* J Clin Oncol, 2016. **34**(13): p. 1460-8.

Figure 1. Breakdown of patients by whether 2016 NCCN criteria for genetic testing were met and whether testing occurred prior to unilateral abdominal-based free flap breast reconstruction (FFBR). Each pink plus sign represents one patient who had a pathogenic mutation discovered after abdominal-based FFBR and later required contralateral mastectomy and reconstruction.

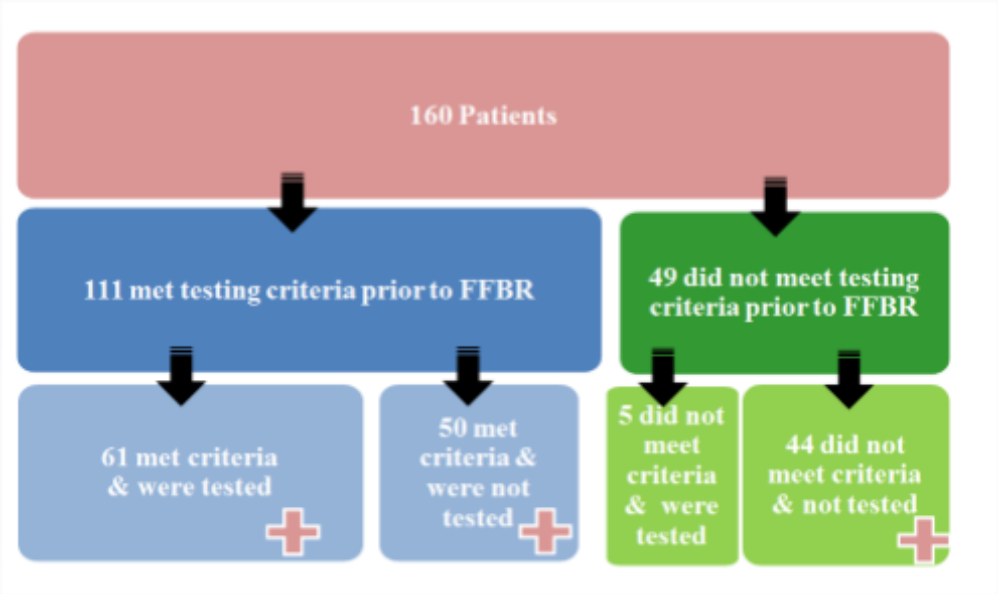


Table 1. The potential advantages and disadvantages of offering genetic testing to all patients who present for unilateral abdominal-based FFBR.

	Costs	Savings
Financial Impact to the Health Care System	*Expected:* • Increased cost of genetic testing, $1000/insured patient and $250/uninsured patient • Professional fees for contralateral mastectomy and FFBR (contralateral surgery usually billed at 50% when performed same day) • Hospital fees for additional time spent in OR for bilateral abdominal-based FFBR *Potential:* • Cost of treating complications on the contralateral side, microsurgical or otherwise -	*Expected:* • Eliminate second hospitalizations for contralateral mastectomy and reconstruction • Avoid need for implant-based reconstruction and associated complications in suboptimal implant candidates • Avoid need for stacked free flaps and free flaps with known higher complication rates (i.e., GAP flap) *Potential:* • Fewer number of revisions as patients will be more symmetric after initial operation
	Risks	**Benefits**
Other Risks and Benefits	*Expected:* • Waiting for genetic results can delay mastectomy/FFBR • Patient anxiety while waiting for test results • Psychological burden if deleterious mutation discovered *Potential:* • Known genetic mutation could negatively affect future health insurance policies	*Expected:* • Decreased risk of contralateral breast cancer • Improved symmetry of reconstruction breasts • Family members alerted to the potential need for testing *Potential:* • More cost-effective for patient as second large deductible is avoided • Less likely to exhaust sick leave due to need for second hospitalization and recovery

8:00 AM - 8:05 AM

RM80 A National Study on the Impact of Timing of Delayed Autologous Breast Reconstruction Following Post-Mastectomy Radiation Therapy on Postoperative Morbidity

University of Michigan, Ann Arbor

Presenter: **Kristoffer B Sugg, MD, PhD**

Kristoffer B Sugg, MD, PhD(1), Nicholas L Berlin, MD, MPH(2), Lin Zhong, MD, MPH(1), Kevin C. Chung, MD, MS(3) and Adeyiza O. Momoh, MD(4)

(1)Section of Plastic and Reconstructive Surgery, University of Michigan, Ann Arbor, MI, (2)University of Michigan, Ann Arbor, MI, (3)Section of Plastic Surgery, Department of Surgery, University of Michigan, Ann Arbor, MI, (4)Department of Surgery, Section of Plastic Surgery, University of Michigan, Ann Arbor, MI

Background: Autologous breast reconstruction in patients with locally advanced breast cancer is typically delayed until after completion of post-mastectomy radiation therapy (PMRT) to optimize outcomes. However, the ideal time to perform reconstruction in these patients is currently unknown. This study evaluated the association between timing of delayed autologous breast reconstruction following PMRT and postoperative complications. Our hypothesis is that postoperative complications decrease with increasing time lapsed following completion of PMRT.

Methods: Patients were selected from the MarketScan Commercial Claims and Encounters database who underwent mastectomy, PMRT and delayed autologous breast reconstruction from 2009 to 2016. Continuous enrollment for six months following reconstruction was required for inclusion. Patients were classified as having undergone reconstruction before three months, between three and six months, between six and 12 months, between 12 and 24 months, and after 24 months following completion of PMRT. Data regarding patient demographics and clinical outcomes including postoperative complications were collected. Multivariable regression models were developed with postoperative complications as the dependent variable and patient demographic and timing of reconstruction as independent variables.

Results: 1,037 patients met the inclusion criteria and were evenly distributed among the reconstruction groups. The overall complication rate for the cohort was 39%. In unadjusted analyses, complications occurred more frequently when reconstruction was performed between three and six months and less frequently when performed before three months or after 24 months (50%, 23% and 22%, respectively; $p<0.001$). An increased rate of flap salvage procedures was observed when reconstruction was performed between six and 12 months compared to before three months or after 24 months (22%, 5% and 8%, respectively; $p<0.001$). In adjusted analyses, patients undergoing reconstruction between three and six months were more than three times more likely to experience complications compared to before three months ($p<0.001$). Patients who underwent reconstruction before three months or after 24 months experienced the same risk for postoperative complications. No significant differences related to the timing of reconstruction were found for infections, hematomas, wound dehiscence and fat necrosis.

Conclusion: Women who underwent delayed autologous breast reconstruction before three months or after 24 months following PMRT experienced fewer complications compared to

women who underwent reconstruction between three and 24 months. These data suggest that plastic surgeons may consider performing Òearly delayedÓ autologous breast reconstruction (before three months) in patients following PMRT without increasing postoperative morbidity. Additionally, earlier reconstruction may reduce the psychosocial implications of mastectomy without reconstruction for women undergoing PMRT.

8:05 AM - 8:10 AM

RM81 Delayed Autologous Breast Reconstruction within Six Months of Postmastectomy Radiotherapy Is Safe

University of Texas MD Anderson Cancer Center, Houston

Presenter: **Brett T Phillips, MD, MBA**

Brett T Phillips, MD, MBA(1), Carrie K. Chu, M.D.(2), Alexander F. Mericli, M.D.(2), Jun Liu, PhD(3), Mark W. Clemens, MD(4), Jesse C Selber, MD, MPH(4), Patrick B Garvey, MD(3), Charles E Butler, MD(3), Donald Baumann, MD(3) and Rene D Largo, MD(5)

(1)Duke University Medical Center, Durham, NC, (2)University of Texas M.D. Anderson Cancer Center, Houston, TX, (3)Plastic Surgery, The University of Texas MD Anderson Cancer Center, Houston, TX, (4)Department of Plastic Surgery, The University of Texas MD Anderson Cancer Center, Houston, TX, (5)The University of Texas MD Anderson Cancer Center, Houston, TX

Background: Studies have demonstrated that delayed breast reconstructions with autologous free flaps following postmastectomy radiotherapy (PMRT) resulted in higher complications compared to reconstructions on patients without PMRT. Other retrospective studies recommended waiting 12 months following PMRT prior to performing delayed free flap reconstruction in an attempt to reduce the risk of complications. More recent small studies have demonstrated no difference in outcomes when delayed autologous reconstruction is performed before or after 12 months. However, these studies have been underpowered. The purpose of this study is to evaluate outcomes following delayed breast reconstruction in a large patient population to more accurately determine the effect of delay time between PMRT and autologous reconstruction. We hypothesized that autologous breast reconstructions performed less than 6 months following PMRT would experience equivalent failure rates as those with longer delay periods.

Methods: We performed a retrospective cohort analysis of locally-advanced breast cancer patients treated with PMRT who subsequently received delayed abdominal-based free flap breast reconstruction at a single tertiary care cancer center between 2006-2017. Inclusion criteria included patients who received chest wall and internal mammary node radiotherapy. The primary outcome measure was flap failure, arterial/venous thrombosis, and reoperation within 30 days. Multivariate logistic regression models analyzed the relationship between patient, treatment factors and outcomes.

Results: A total of 272 patients with a mean age of 50 years and mean BMI of 29 kg/m^2underwent reconstruction an average of 12 months (range 1-127) following PMRT (87 patients <6 months versus 185 patients >6 months following PMRT). Multivariate generalized linear regression model did not demonstrate significant association between the timing of reconstruction following PMRT and flap failure, thrombosis, or overall flap complications(OR=0.51, 95% CI 0.25 – 1.02, p=0.058) after adjustment for BMI, smoking, use of a tissue expander, radiation complications, and free flap type.

Conclusion: This represents the largest series of locally-advanced breast cancer patients who underwent PMRT and delayed free autologous breast reconstruction reported to date. We found no significant relationship between flap complications or failure and the timing of reconstruction

following PMRT. Based on these findings, it appears safe to perform free flap breast reconstruction sooner than 6 months following PMRT.

8:10 AM - 8:15 AM

RM82 Surgical Delay of Abdominal Free Flaps: Make Your Own DIEP

University of Pennsylvania, philadelphia

Presenter: **Suhail Khuzema Kanchwala, MD**

Suhail Khuzema Kanchwala, MD(1) and Eric M. Jablonka, MD(2)

(1)University of Pennsylvania, media, Pakistan, (2)Plastic Surgery, The Mount Sinai Health System, New York, NY

Background

Abdominally-based free-flap breast reconstruction has evolved to provide patients with an acceptable autologous reconstruction while minimizing morbidity at the abdominal donor site. With the aim of improving overall cosmesis and to further reduce surgical morbidity, the authors introduce a two-staged approach by exploiting the advantages of single-perforator free-flap (SPFF) delay.

Methods

Since August 2017, all patients opting for abdominally-based free-flap breast reconstruction were screened for the two-staged SPFF delay using pre-operative CT-angiography (CTA) of the abdomen. Appropriate candidates demonstrated a sizeable, low-positioned perforator with a short intramuscular course on CTA. Such a perforator allows an abdominal flap(s) to be positioned lower than traditional practices; effectively lowering the donor-site scar into a more aesthetic position. In addition, the fascial incision can then be shortened to simplify the perforator-pedicle dissection and greatly reduce donor-site pain. During ***Stage-1***, a skin or nipple sparing mastectomy(s) was performed and a temporary air-filled breast tissue expander was placed in the pre-pectoral position to preserve the breast skin envelope. At this time, the abdominal flap(s) was delayed on the pre-selected perforator of interest while ligating the others along with the SIEA and SIEV vessels; effectively maximizing the volume of abdominal tissue perfused by a single-vessel DIEP (*Figure 1*). ***Stage-2*** commences two weeks later with free-flap transfer from the abdomen up to the chest where the breast pocket has taken an aesthetic shape of the anatomically designed breast tissue expander. Post-operatively, patients were managed via a nonnarcotic ERAS protocol to help facilitate early hospital discharge.

Results

Since August 2017, the senior author (S.K.K.) has performed the SPFF delay procedure on 80 patients (108 flaps). No patient required narcotics during their inpatient hospital stay. Average inpatient length of stay was 1.1 and 2.5 days following *Stage-1* and *Stage-2*, respectively. Two flaps were found to have venous congestion during Stage 2 secondary to failure to ligate the SIEV during Stage 1. There was one complete flap loss (0.01%) due to perforator injury occurring during Stage 2. Over 90% of patients were satisfied with the results of the reconstruction and the lower position of the abdominal donor-site scar.

Conclusion

The two-stage single-perforator free-flap delay for abdominally-based free-flap breast reconstruction creates a well perfused single vessel DIEP flap(s) and allows for more aesthetic control of the breast and abdominal donor-site without increased rates of complete/partial flap loss. This approach also reduces patient surgical-site discomfort and reduces overall inpatient hospital stay when compared to traditional methods.

8:20 AM - 8:25 AM

RM83 Anatomic Location of a Novel Option for Sensate Autologous Medial Thigh Flaps

Cleveland Clinic, Cleveland

Presenter: **Rebecca Knackstedt, MD, PhD**

Rebecca Knackstedt, MD, PhD(1), David E Kurlander, MD(2), Risal Djohan, MD(1) and James Gatherwright, MD(3)

(1)Cleveland Clinic, Cleveland, OH, (2)Case Western Reserve University, Cleveland, OH, (3)MetroHealth Medical Center, Cleveland, OH

Background

The concept of providing sensate autologous breast reconstruction is not novel. With renewed public interest and the development of cadaveric nerve grafts, there has been a surge in the number of publications on this topic. Recent articles and reviews have focused mainly on autologous, abdominal based reconstruction. However, not all patients are candidates for abdominally-based autologous breast reconstruction. The transverse myocutenoues gracilis (TUG*)* utilizes excess skin and fat in the posterior thigh and upper buttock region based on the gracilis branch from the medial femoral circumflex artery. The use of a sensate TUG flap for any recipient site has yet to be described. To that end, we have performed cadaveric dissections to determine the anatomic location and ease of locating the sensory branch to this flap to permit sensate TUG flaps.

Methods

Ten bilateral cadaveric dissections were conducted to locate the sensory branch to the TUG flap. Measurements were made in each cadaver from the anterior superior iliac spine (ASIS) and the pubic tubercle. For the last cadaver, green dye was injected subcutaneously prior to incision at the mean measurements from the ASIS and pubic tubercle from all prior cadavers . Based on our experience, we then determined the most efficient and safest way to access to sensory branch during flap elevation.

Results

The sensory nerve was on average 14.69cm (SD 1.1cm, range 12.5-16.5cm) from the ASIS and 14.54cm (SD 1.1cm, range 12-16cm) from the pubic tubercle. The average caliber of the nerve was 1.1cm (SD 0.47cm, range 0.5-1.5cm). For the last cadaver that was injected with green dye bilaterally, the sensory nerve was easily located bilaterally in the dyed subcutaneous tissue.

Conclusion

This study highlights the potential of providing sensate breast reconstruction with donor sites other than the abdomen. While the sensory innervation to flaps is known based on anatomical textbooks, the location of the sensory nerves in the context of flap dissections in three dimensions has yet to be reported. This is the first study to report on the consistent location of a sensory nerve to the medial thigh flap. We hope this report will enable surgeons to expand their options of donor tissue for patients who desire sensate breast reconstruction.

8:25 AM - 8:30 AM

RM84 Health-Related Quality of Life and Patient Satisfaction after Nipple-Sparing Mastectomy and Breast Reconstruction: Results from a Prospective Cohort of 300 Patients with Long-Term Follow-up.

Johns Hopkins University School of Medicine, Baltimore

Presenter: **Pathik Aravind, _**

Pathik Aravind, _(1), Ricardo J Bello, MD, MPH(2), Mohamad E. Sebai, MBBS(3), Eric L. Wan, BS(4), Charalampos Siotos, MD(5), Sethly Davis, BS(5), David Cui, BS(4), Julie Lee, N/A(4), Michele A Manahan, MD(6), Justin M Sacks, MD, MBA, FACS(7), Carisa M. Cooney, MPH(3) and Gedge D Rosson, MD(6)

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Background

Nipple-sparing mastectomy (NSM) is oncologically safe for select patients. By preserving the nipple-areola complex, this procedure may provide superior cosmetic results. However, patient-reported evidence on these benefits remains to be established in prospective, longitudinal studies. This study aimed to estimate differences in quality of life (QoL) and patient satisfaction among breast reconstruction patients comparing NSM to non-NSM mastectomies.

Methods

We prospectively followed patients undergoing breast reconstruction from 2010-2015 using the Breast-Q© and RAND-36 preoperatively, after tissue expander placement, and 6 and 12 months after final reconstruction. We used simple and multiple linear regression to estimate associations between QoL and receipt of NSM compared to non-NSM types of mastectomy.

Results

Out of 300 patients, NSM was performed on 111 breasts in 66 patients, whereas 363 breasts in the remaining 234 patients underwent non-NSM. Out of the 66 NSM patients most were performed as staged reconstructions (81.8%), 13.6% were immediate and 4.5% were delayed reconstructions. Thirty-nine NSMs were followed with implant-based reconstruction (59.09%), 22 with abdominally-based autologous flap reconstructions (33.33%), and 5 with pure fat grafting (7.58%). At long-term follow-up, median Satisfaction with Breasts for NSM patients (64.5 points, inter-quartile range [IQR]: 50-75.5) was not significantly different compared to Non-NSM types of mastectomy (65, IQR: 53-78, p=0.525). In multivariable adjusted analysis, mean change in Satisfaction with Breasts was 5.96 points lower among NSM patients (95% confidence interval [CI]: -2.42 to 14.35 points lower, p=0.163). NSM was not associated with

benefits in Psychosocial Wellbeing, Sexual Wellbeing, Physical Wellbeing: Chest, Physical Wellbeing: Abdomen, Summary Physical Health, or Summary Mental Health (Table 1).

Conclusion

There have been studies that provide evidence regarding the benefits of NSM. However, based on QOL related outcomes our study does not show NSM to be superior to other types of mastectomy. This is possibly due to patient selection and alternatives available at our institution, such as nipple reconstruction and tattooing. We believe that similar studies should be conducted in different population groups to better estimate the consistency of these findings. Though NSM has proven to be beneficial to patients as per the existing literature, it will be useful to improve metrics to evaluate NSM effectiveness and to identify what exactly these benefits are.

Table 1: Quality of Life, Patient Satisfaction, and Clinical Outcomes in a Cohort of 300 Breast Reconstruction Patients According to Receipt of Nipple-Sparing Mastectomy (NSM).

		Unadjusted Analysis		Adjusted Analysis		
Continuous Outcomes	Group	Median (IQR)	p-value	Mean difference*	95% CI	P-value
Satisfaction with Breasts	NSM	64.5 (50-75.5)	0.525	-5.96	-14.35 to 2.42	0.163
	Non-NSM	65 (53-78)				
Psychosocial Wellbeing	NSM	76 (56.5-92)	0.507	-1.60	-8.64 to 5.44	0.655
	Non-NSM	79 (60-100)				
Sexual Wellbeing	NSM	60 (47-81.5)	0.165	0.61	-7.81 to 9.04	0.886
	Non-NSM	54 (44-67)				
Physical Wellbeing of Chest	NSM	77 (68-91)	0.600	-2.77	-7.76 to 2.22	0.276
	Non-NSM	81 (66-91)				
Physical Wellbeing of Abdomen	NSM	89 (70-100)	0.434	-1.46	-12.69 to 9.76	0.796
	Non-NSM	89 (70-100)				
RAND-36 Physical Health Summary Score	NSM	99.8 (72.5-96.3)	0.552	4.57	-4.69 to 13.83	0.332
	Non-NSM	88.8 (68.8-95)				
RAND-36 Mental Health Summary Score	NSM	84.4 (68.5-87.5)	0.311	-0.45	-9 to 8.10	0.917
	Non-NSM	82 (71-86.5)				
Categorical Outcomes	Group	N (%)	p-value	Odds Ratio*	95% CI	P-value
Postoperative complications - immediate**	NSM	18 (27.27%)	0.026	1.31	1.03 to 1.68	0.027
	Non-NSM	36 (15.38%)				
Postoperative complications - delayed**	NSM	18 (27.27%)	0.458	1.09	0.9 to 1.34	0.361
	Non-NSM	75 (32.05%)				

NSM: Nipple-sparing mastectomy. IQR: Interquartile Range. CI: Confidence Interval.

*Mean differences and Odds Ratios use non-NSM as baseline, hence positive values favor NSM and negative values favor non-NSM.

**Postoperative complications are presented as those recorded after mastectomy and immediate breast reconstruction (or first stage of a staged reconstruction with tissue expanders) and those recorded after delayed reconstruction (or second stage for staged reconstructions).

8:30 AM - 8:35 AM

RM85 Impact of BMI on Length of Stay and Complications in ERAS Abdominal Based Free Flaps for Breast Reconstruction

Baylor Scott & White, Temple
Presenter: **Hope Shin, MD**
Hope Shin, MD, Jasson Abraham, MD, Abigail Rodriguez, MD, Michel Saint-Cyr, MD and Andrew M Altman, M.D.
Baylor Scott & White, Temple, TX

Background: Enhanced Recovery After Surgery (ERAS) is increasingly utilized in Plastic Surgery to optimize patient care. Mitigating the risk of post-operative complications is particularly important in patients with known risk factors, such as obesity. The objective of the study is to evaluate the impact of an ERAS pathway in patients, stratified by BMI, undergoing abdominally based free flap breast reconstruction on length of stay (LOS) and complications.

Methods: A retrospective review of all patients who underwent breast reconstruction with free tissue transfer (CPT 19364, limited to muscle sparing TRAM and DIEP) from January 2014 to December 2017 was performed. Patients were categorized as either ERAS or non-ERAS, and both groups were further subdivided based on BMI: $\leq$25 kg/m^2, 25-29.9 kg/m^2, 30-34.9 kg/m^2, and $\geq$ 35 kg/m^2. Data collected include patient demographics, length of stay, complications (major and minor), and occurrences of 30-day re-operation. Major complications include: partial or total flap loss, return to the OR within 30 days, or severe medical complications. The LOS and complication rates were compared using unpaired two-tailed t-tests and Fisher's exact tests. A p-value of < 0.05 was considered statistically significant.

Results: A total of 123 patients met the inclusion criteria, with 36 non-ERAS and 87 ERAS patients. The mean LOS for non-ERAS patients was 4.69 days vs 4.14 days for ERAS patients (p= 0.049). Higher BMI patients progressively benefited from being in an ERAS pathway: patients with a BMI 30-34.9 kg/m2 (obese) had a LOS difference of 0.99 days (p=0.048) and patients with a BMI $\geq$ 35 kg/m^2 (severe obesity) had a LOS difference of 1.35 days (p=0.093). The complication rates were similar between non-ERAS patients and ERAS patients for both major complications (14% and 18%, respectively) and minor complications (42% and 40%, respectively) (p>0.99). The complication rates were comparable between the non-ERAS and ERAS patients when subdivided into BMI groups. Re-operation rates were also similar with a 14% rate for non-ERAS patients vs 15% rate for ERAS patients (p=1.0)

Conclusion: The utilization of an ERAS protocol for abdominally based free flap breast reconstruction significantly decreases LOS, especially in the obese and severely obese patient groups. These groups benefitted from the ERAS protocol without incurring additional risk of post-operative complications compared to non-ERAS patients of the same BMI ranges.

BMI (kg/m^2)	**non-ERAS (n)**	**LOS**	**ERAS (n)**	**LOS**	**Difference (days)**	**p-value**
≤25	5	3.4	8	3.13	0.28	0.62
25.0-29.9	11	4.36	34	4.09	0.28	0.835

30-34.9	15	4.93	19	3.95	0.99	**0.048**
≥35	5	6.0	26	4.65	1.35	0.093
Total	**36**		**87**			

8:35 AM - 8:40 AM

RM86 Detailed Analysis of the Impact of Surgeon & Hospital Volume in Microsurgical Breast Reconstruction

UC San Diego Medical Center, San Diego

Presenter: **Chris M Reid, MD**

Chris M Reid, MD(1), Michael G Brandel, BA(1), Jason Roostaeian, MD(2), Christopher A Crisera, MD(2), Fernando A Herrera, MD(3) and Ahmed S Suliman, MD(1)

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Background

Delivery of microsurgical breast reconstruction is complex. There is interest in defining factors that optimize safety and efficiency for this type of breast reconstruction. Previous investigations examining the impact of case volume could benefit from more rigorous and accurate statistical methods. An answer was sought regarding what effects surgeon and hospital volumes play in microsurgical breast reconstruction.

Methods

Retrospective analysis of microsurgical breast reconstruction patients was completed using the National Inpatient Sample (NIS). Primary exposures were annual surgeon and hospital volume. Primary outcomes were in-hospital surgical complications and >75th percentile hospitalization cost. Complications were identified using previously accepted definitions.[1]

To establish volume-outcome relationships, surgeon and hospital case volumes were log-transformed and entered in a univariable logistic regression with each binary outcome. Then receiver operating characteristic (ROC) curves were used to identify optimal cut-points for case volume. High-volume was defined as those above the cut-point, and low-volume defined as those below the cut-point. Univariable and multivariable mixed-effects logistic regression analyses were used to correct for clustering of patients within surgeons and clustering of surgeons within hospitals. Multivariable analyses were adjusted for patient and hospital characteristics.

Results

27,020 microsurgical breast reconstruction patients were included. Optimal complications cut-points of greater than 15 cases per year for surgeons, and 77 cases per year for hospitals were identified. Optimal cost cut-points of greater than 15 cases per year for surgeons, and 89 cases per year for hospitals were identified. For high-volume surgeons there was a lower odds of complications (odds ratio [OR]=0.46, p=0.003). High-volume hospitals had lower odds of

complications (OR=0.36, p<0.001) and cost (OR=0.02, p<0.001). When models were adjusted for clustering of patients, surgeon volume was no longer significant. However the association of reduced risk of complications and high cost at high volume hospitals remained statistically significant after removing the bias of clustering.

	Uncorrected		Corrected	
	Complications	Cost	Complications	Cost
High Volume Surgeon	OR=0.46, p=0.003	OR=1.17, p=0.132	OR=0.74, p=0.433	OR=1.29, p=0.366
High Volume Hospital	OR=0.36, p<0.001	OR=0.02, p<0.001	OR=0.50, p=0.020	OR=0.02, p=0.067

*OR = Odds Ratio

Table 1 – Effect of Correcting for Patient Clustering in Microsurgical Breast Reconstruction.

Conclusion

Case volume, particularly hospital volume, has a significant impact on complications and costs in microsurgical breast reconstruction. When rigorously defining high and low case volume, as well as controlling for the effect of patient clustering it appears that hospital volume has the strongest impact on complications and cost. This lends support to centers of excellence in microsurgical breast reconstruction.

ADDIN EN.REFLIST 1. Billig, J.I., et al., *A Nationwide Analysis of Cost Variation for Autologous Free Flap Breast Reconstruction.* JAMA Surg, 2017. **152**(11): p. 1039-1047.

8:45 AM - 8:50 AM

RM87 The Impact of Physician Payments on Microvascular Breast Reconstruction: An All-Payer Claim Database Analysis

Memorial Sloan Kettering Cancer Center, New York

Presenter: **Hina Panchal, MD MPH**

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Background: Across the US, rates of autologous breast reconstruction are relatively stagnant compared to prosthetic techniques. The payment disparity between microsurgical autologous breast reconstruction (MABR) and competing techniques has been proposed as one of several barriers. Physician payment differences between governmental and commercial payers set up a natural experiment to evaluate the impact of payment on the method of breast reconstruction. The study aim is to demonstrate rates and variation in physician payments for MABR and implants by insurance type. The hypothesis is that physician payment is a barrier to MABR.

Methods: The Massachusetts All-Payer Claims Database was queried for women undergoing post-mastectomy immediate breast reconstruction using MABR or implants from 2010–2014. Univariate analysis was performed using Chi-square test. Multivariable logistic regression models were created exploring the association between insurance type and method of immediate breast reconstruction.

Results: 2,879 women were studied with a median age of 49. 82.7% of all women had commercial, while 17.3% had governmental insurance (12.7% Medicaid and 4.6% Medicare). 80% of women received implants, whereas 20% underwent MABR. Women with Medicaid compared to commercial insurance had lower rates of MABR (16.4% vs. 20.3%; p=0.053). Commercial insurance, older age, and obesity independently increased the odds of MABR, whereas, smoking, radiotherapy and chemotherapy reduced the odds of MABR (all p<0.01) (Table-1). When comparing median physician payments, governmental payers reimbursed 76% and 60% less than commercial payers for MABR ($2,125 versus $8,763) and implants ($1,648 versus $4,053), respectively. A second multivariable model, which included payments, showed that greater physician payment increased the odds of MABR, independent of insurance type (p<0.001).

Conclusion: Physician payments for breast reconstruction services are less for governmental than commercial payers. Importantly, women with governmental insurance have lower odds of undergoing MABR, and this was directly associated with physician payment. Current MABR reimbursements may not be commensurate with physician effort when compared to prosthetic techniques.

Table-1: Multivariable Logistic Regression Analysis for Predictors of Microsurgical Compared to Prosthetic Breast Reconstruction [a]

Predictors	**Adjusted OR**	**95 % CI**	***P*-Value**
Age, years	1.03	1.02–1.04	<0.001
Obesity	1.92	1.45–2.57	<0.001
Smoking	0.51	0.34–0.75	<0.001
Radiotherapy	0.30	0.20–0.46	<0.001
Chemotherapy	0.74	0.60–0.92	0.006
Payer			0.005
Commercial	Reference		
Governmental	0.68	0.51–0.89	

OR odds ratio, CI confidence interval

[a] Adjusted for inflation and laterality

8:50 AM - 8:55 AM

RM88 Comparative Operative Outcomes in Second Stage Delayed Vs Radiated Tissue Expander in Breast Reconstruction

MD Anderson Cancer Center, Houston
Presenter: **Genevieve Mercier-Couture, MD**
Genevieve Mercier-Couture, MD
Université Laval, Quebec, QC, Canada

Background: There is significant challenge in achieving good outcomes after post mastectomy radiation therapy (PMRT) for breast cancer patients. The study aims to compare outcomes of microvascular breast reconstruction in the delayed immediate versus delay delayed setting. **Methods:** Two hundred forty-one patients (244 breasts) underwent mastectomy and received radiation at a single center from 2006 to 2016. One hundred thirty-one patients had delay delayed free flap breast reconstruction (non TE group) and one hundred thirteen patients underwent delayed immediate free flap reconstruction after previous irradiated tissue expansion (TE group). The mean follow up was 48.9 months. Patient characteristics, intra-operative complications, post-operative complications, radiation-related complications, and time delay in cancer treatments were evaluated. **Results:** The patients in the non-TE group are more smokers; present more advanced stages and received more chemotherapy than TE group. On average, patients underwent radiation for 44.6 days with an average dose 60 Greys. Radiation duration is significantly longer in TE group ($p=0.041$) but radiation dose is not significantly different between the two groups ($p=0.765$). TE group demonstrates more radiation-related complications ($p=0.019$), and is associated with higher incidence of intra-operative complications during free flap reconstruction ($0=0.012$). Major post-operative complications are not significantly different between the two study groups ($p=0.50$). Overall, TE patients have shorter time interval from mastectomy to free flap reconstruction ($p<0.001$). **Conclusion:** Benefit of delayed immediate reconstruction with interval TE placement remains in that it palliates soft tissue deficit before final reconstruction, but this advantage comes with its complications that should not be underestimated.

8:55 AM - 9:00 AM

RM89 Enhanced Recovery after Surgery (ERAS) Protocols Decrease Outpatient Opioid Use in Patients Undergoing Abdominally Based Breast Reconstruction

Ohio State University, Columbus

Presenter: **Juan L Rendon, MD, PhD**

Juan L Rendon, MD, PhD, Trevor Hodson, BS, Michelle L Humeidan, MD, PhD, Roman J Skoracki, MD and Albert H Chao, MD

Ohio State University, Columbus, OH

Background

Enhanced Recovery After Surgery (ERAS) protocols are now commonly used in patients undergoing abdominally based microsurgical breast reconstruction. These protocols have been shown to decrease inpatient opioid use and length of hospital stay. However, little is known about the impact of ERAS protocols on outpatient recovery. Upon hospital discharge, patients transition into a substantially different environment at home, where they typically have less assistance, more responsibilities, and a physical setting no longer tailored to postsurgical patients for basic activities such as ambulation and hygiene. In addition, transversus abdominis plane blocks are likely to have worn off and infusion pain pumps stopped. These factors may potentially result in a rebound effect, with an increase in pain and need for analgesic medications. The objective of this study was to evaluate the effect of ERAS protocol implementation on outpatient recovery and opioid use following abdominally based microsurgical breast reconstruction.

Methods

A retrospective review of patients who underwent abdominally based breast reconstruction before and after implementation of ERAS at our institution was performed. Our state law mandates that no more than 7 days of opioids may be prescribed at any time, with all prescriptions automatically reported in a statewide prescription medication reporting system. This system was reviewed to determine outpatient opioid utilization.

Results

A total of 105 patients met inclusion criteria, of which 59 (56%) were in the ERAS group and 46 (44%) were in the non-ERAS group. There were no significant differences between the two groups, including with respect to age ($p=0.06$), BMI ($p=0.32$), laterality (unilateral versus bilateral, $p=0.29$), or concurrent lymphadenectomy ($p=0.69$). A significant difference was identified in overall outpatient opioid use, which was less in the ERAS compared to the non-ERAS group (391.0 versus 606.9 Morphine Milligram Equivalents, respectively; $p=0.007$). A significant difference was also identified in pain scores at the first postoperative visit, which was less in the ERAS compared to the non-ERAS group (1.6 versus 3.6, respectively; $p=0.016$).

Conclusion

The beneficial effects of ERAS in patients undergoing abdominally based microsurgical breast reconstruction appear to extend beyond the inpatient setting, resulting in decreased opioid requirements and pain in the outpatient setting. The results of this study provide further support for implementation of ERAS with respect to facilitating recovery in breast reconstruction patients, and highlights its potential as part of the solution to national public health concerns about opioid abuse.

9:00 AM - 9:05 AM

RM90 Does Staged Breast Reduction Prior to Nipple-Sparing Mastectomy Decrease Complications? a Matched Cohort Study between Staged and Non-Staged Techniques

Hansjörg Wyss Department of Plastic Surgery, NYU Langone Health, New York
Presenter: **Ara A. Salibian, MD**
Ara A. Salibian, MD, Jordan D. Frey, MD, Mihye Choi, MD and Nolan S. Karp, MD
NYU Langone Health, New York, NY

Background: Nipple-sparing mastectomy (NSM) in patients with large, ptotic breasts is a reconstructive challenge. Staged breast reduction prior to prophylactic NSM has been shown to decrease complications; however, a direct comparison of outcomes between staged and non-staged techniques is lacking.

Methods: A retrospective review of all patients that underwent staged breast reduction prior to NSM was conducted. Staged cases were matched to non-staged NSM cases according to known risk factors for complications including mastectomy indication, incision pattern, reconstruction type, radiation history and active tobacco use (Figure 1). Individual staged cases with appropriate matches in all these categories were then each paired to two non-staged cases according to the nearest higher and lower mastectomy weight value as a surrogate for breast size (includes breast reduction specimen weight in staged group). Staged and non-staged cohorts were compared with regards to demographics, operative characteristics and reconstructive outcomes.

Results: Eighteen staged breast reductions were identified, performed at an average of 5.0 months prior to NSM. Wise-pattern skin excision was utilized in 16 cases (88.9%) and vertical in 2 cases (11.1%) with medial (44.4%) or superomedial (55.6%) pedicles and an average reduction weight of 383.3 grams (range: 82-1240).

Staged reductions were matched to 36 prophylactic non-staged reductions (Table 1). Average mastectomy weight in the staged group was significantly higher in the staged group (942.1 grams) than in the non-staged group (640 grams) ($p=0.0003$). The rate of major mastectomy flap necrosis was significantly lower in the staged cohort (0% versus 22.2%, respectively; $p=0.0415$) despite a significantly higher average mastectomy weight in the staged group. The staged cohort also had lower rates of minor mastectomy flap necrosis (11.1% versus 16.7%), partial nipple necrosis (11.1% versus 13.9%) and explantation (0% versus 8.3%), though these complications were comparable between the groups. Two breasts in both the staged (11.1%) and non-staged (5.6%) cohorts required correction of nipple malposition ($p=0.5963$).

Conclusion: In patients with large breast size, staged breast reduction prior to NSM had significantly lower rates of major flap necrosis compared to non-staged cases after controlling for other known risk factors for complications.

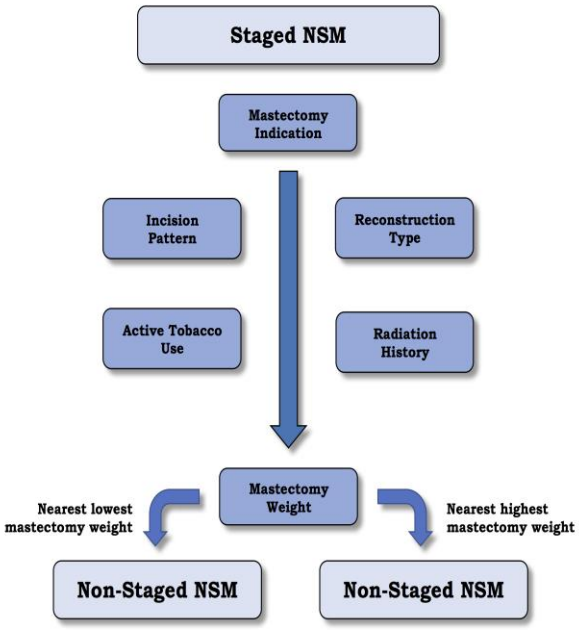

Figure 1. Algorithm for matching one staged NSM case to two non-staged NSM cases. Dark blue boxes represent matching criteria.

Table 1. Comparison of patient demographics, intra-operative characteristics and reconstructive outcomes between staged breast reduction prior to NSM and matched cases

Characteristic	**NSM with Staged BR (n=18)**	**Non-Staged NSM (Matched Cohort) (n=36)**	***p*-value**
Age (years)	43.5	45.6	0.4723
BMI (kg/m^2)	25.5	25.7	0.8049
Diabetes Mellitus	0	0	-
Active Tobacco Use*	0	0	-
Previous Radiation*	0	0	-
Previous Chemotherapy	0	3 (8.3%)	0.5428
Mastectomy Indication*			-
Therapeutic	0	0	
Prophylactic	18 (100%)	36 (100%)	
Reconstructive Technique*			-
Tissue-expander	6 (33.3%)	12 (33.3%)	
Immediate Implant	10 (55.6%)	20 (55.6%)	
DIEP	2 (11.1%)	4 (11.1%)	
Mastectomy Incision*			0.1241
IMF	14 (77.8%)	32 (88.9%)	
Vertical	2 (11.1%)	4 (11.1%)	
Wise-pattern**	2 (11.1%)	0	
Mastectomy weight (grams)*			
Mean	942.1	640.0	**0.0003**
Range	544 - 1690	280- 1324	-
Post-operative Radiation	0	0	-

Post-operative Chemotherapy	0	1 (2.6%)	>0.9999
Reconstructive Complications			
Minor mastectomy flap necrosis	2 (11.1%)	6 (16.7%)	0.7043
Major mastectomy flap necrosis	0	8 (22.2%)	**0.0415**
Partial NAC necrosis	2 (11.1%)	5 (13.9%)	>0.9999
Full NAC necrosis	1 (5.6%)	2 (5.6%)	>0.9999
Minor infection	0	4 (11.1%)	0.2888
Major infection	1 (5.6%)	2 (5.6%)	0.9999
Seroma	2 (11.1%)	1 (2.8%)	0.2550
Hematoma	0	0	-
Reconstructive failure	0	3 (8.3%)	0.5428
NAC Malposition Correction	2 (11.1%)	2 (5.6%)	0.5963
Follow-up Length (mo)	27.3	46.2	**0.0015**

NSM, Nipple-sparing mastectomy; BR, breast reduction; BMI, body mass index; IMF, DIEP, deep inferior epigastric artery perforator flap; inframammary fold; NAC, nipple-areola complex.

*Indicates matching criteria.

**One case of wise-pattern immediate implant staged reconstruction was not able to be matched by incision type. The nearest similar mastectomy weights were utilized to match the case to non-staged immediate implant reconstructions with IMF incisions and the same remaining matching criteria.

In the staged breast reduction cohort, mastectomy weight is a sum of the breast reduction weight and the mastectomy specimen weight.

9:05 AM - 9:10 AM

RM91 Free Flap Salvage in Autologous Breast Reconstruction: The Impact on Long-Term Results

Memorial Sloan Kettering Cancer Center, New York

Presenter: **Michelle Coriddi, MD**

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Background: Multiple studies have demonstrated high rates of flap salvage following microvascular compromise, especially early in the postoperative period. However, few have analyzed the long-term result within the salvaged cohort. Conceivably, flaps with microvascular compromise should undergo salvage only if long-term results are consistently good, with reasonable rates of revision procedures and ultimately a stable reconstruction. Therefore, the purpose of this paper was to examine the long-term result of all autologous breast reconstruction free flaps that underwent a salvage attempt.

Methods: An IRB approved review was performed of all patients who underwent an autologous breast reconstruction from January 2003 to October 2017. Hospital records were used to identify patients who returned to the operating room for a concern for microvascular compromise. Our primary outcome was the long-term result as determined by stable viability of the reconstruction at longest follow up. All salvaged flaps were determined to be either completely salvaged or have partial flap loss and/or fat necrosis as noted on follow up clinic notes. Secondary surgeries were also recorded.

Results: A total of 1814 autologous breast reconstructions were performed. Of those, 55 flaps (3.0%) required post-operative return to the operating room for microvascular compromise. The majority of flaps (n=43, 78.2%) were salvaged with total flap loss occurring infrequently (n=12, 21.8%). Overall flap loss rate was 0.66%. At long term follow up of salvaged flaps, 28 (65.1%) patients had complete salvage while 15 (34.9%) patients experienced partial flap loss and/or fat necrosis. Rate of secondary surgery was not significantly different between groups (20/28 patients with completely salvaged flaps and 10/15 patients with partial flap loss and/or fat necrosis, p=1.0). Follow up time was significantly greater in patients having completely salvaged flaps (37 (29)months), compared to those with partial flap loss and/or fat necrosis (15 (12)months) (p=0.008). Patients with completely salvaged flaps underwent salvage takeback earlier than those who untimely had fat necrosis and/or partial flap loss (average of 33.6 (38.9)h vs. 60.7 (46.6)h after initial reconstruction, p=0.048).

Conclusion: Vascular compromise following autologous reconstruction is a rare event, with a high likelihood of successful flap salvage. However, of salvaged flaps, one third may experience partial loss or significant fat necrosis, though rates of additional revision procedures are similar

to completely salvaged flaps. Operative exploration for salvage attempt is therefore warranted, though up to ½ of patients may ultimately have flap loss or an unsatisfactory result with partial loss or fat necrosis.