Sunday, January 12, 2014 - Breast Scientific Paper Session - 9:45am - 12:00pm

9:45am - 9:49am
Descriptive Vascular Anatomy of the Profunda Artery Perforator flap
Duncan Hughes, MD; Michael DeLong, BA; Steven Thomas, MS; Daniel Boll, MD; Michael R. Zenn, MD
Institution where the work was prepared: Duke University, Durham, NC, USA

Background The profunda artery perforator flap (PAP) has recently been described as a fasciocutaneous free flap option for breast reconstruction. However, little is known about the profunda perforator anatomy with regards to symmetry, gender differences, vessel diameters, branching patterns, and overall spatial vascular density. Our study was designed to investigate these characteristics.

Methods. Computed tomography angiography (CTA) scans were retrospectively examined using the TeraRecon software to trace and measure profunda perforator vessels. Data were analyzed using simple descriptive statistics, bivariate linear regression regressions with repeated measures, and spatial autocorrelation.

Results Bilateral legs from 50 patient CTA's were included in the study for a total of 100 legs. Females comprised 60% (n=30) of the patients and the cohort average age was 59.1 years old. All legs had at least two perforators, with 85% having three or greater. On average perforators were located 6.2 centimeters below the gluteal crease, and roughly equal numbers of perforators were observed in the medial and lateral halves of the leg. No differences were observed between left and right legs. The average perforator diameter at origin off profunda was 2.7 centimeters, and was significantly greater in vessels in the lateral leg ($p < 0.001$), as well as in patients with higher Body Mass Index (BMI) ($p < 0.05$), and decreased age ($p < 0.05$). Males were more likely to have perforators that shared a common trunk off the profunda artery ($p < 0.05$), but this branching pattern was unrelated to perforator anatomic location. Lastly, correlative spatial heat maps were generated to reveal general trends in perforator location demonstrating perforators to be most common in medial and lateral vertical bands on the leg.

Conclusions The profunda perforator anatomy is complex and highly variable from patient to patient although key trends emerge. Generally vessels are equally likely to be located along two distinct bands running vertically on the posterior thigh and no significant differences exist between left and right legs. The average perforator diameter is adequate for microvascular transfer, although larger perforators are observed laterally, and in younger patients with higher BMI. Additionally, males were more likely to have perforators that shared a common trunk off the profunda proper.

9:49am - 9:53am
Economic Implications of Recent Trends in U.S. Autologous Breast Reconstruction

Claudia R. Albornoz, MD, MSc; Peter Cordeiro, MD; Babak J. Mehrara, MD; Colleen McCarthy, MD, MS; Joseph J. Disa, MD, MS; Andrea Pusic, MD, MHS; Evan Matros, MD, MMSc
Institution where the work was prepared: Memorial Sloan-Kettering Cancer Center, New York, NY, USA

Background: Recent trends in U.S. breast oncology and autologous reconstruction, such as greater use of contralateral prophylactic mastectomies(CPM) and microsurgery, may have increased reconstructive complication rates and costs. With declining reimbursement for autologous reconstruction, the increased complexity of these procedures may have concentrated the market to a limited number of specialized centers. The aims of the current study are 1) to measure cost of autologous reconstruction in the setting of microsurgical technique, CPM, and high-volume centers, and 2) analyze trends in U.S. market share of these procedures. Since cost and quality are major aspects of healthcare addressed by the Affordable Care Act, knowledge of this information is particularly timely.

Methods: Inflation-adjusted hospital charges were analyzed for immediate autologous procedures using the Nationwide Inpatient Sample database (1998 to 2010). A subgroup analysis for microsurgical cases was performed for 2008-2010. Median charges were adjusted by patient case-mix and analyzed by outcome (non-complications, surgery-specific complications, systemic complications or both), type of procedure (bilateral reconstructions, microsurgical cases), and hospital volume using Mann-Whitney test. Market share was analyzed through examination of trends in number of hospitals performing autologous reconstruction, mean number of procedures in high-volume centers and autologous reconstruction rates.

Results: Overall U.S hospital charges for the 21,076 autologous reconstructions analyzed were $22,198. The cost was higher for bilateral mastectomies ($34,202) and microsurgical cases ($57,449). Hospital charges increased from $20,315 (no complications), $27,402 (surgery-specific complications), $36,481 (systemic complications), to $42,210 (both complication types)(Figure 1, p<0.01). Procedures performed in high-volume hospitals reduced charges by 7.5% and had lower costs in the

setting of complications (*p*<0.01). Hospitals performing autologous reconstructions in the U.S decreased 35% with increasing annual procedures in high-volume centers (48.3 to 73.3, *p*<0.01) (Figure 2).

Conclusion: Recent U.S. trends of increased use of bilateral mastectomies and microsurgical technique are associated with greater reconstructive cost and complications. The market concentration of autologous reconstruction to high-volume centers is one method to reduce charges; however, the long-term financial and public health implications of this trend are unknown. Major provisions of the Affordable Care Act such as value based and bundled payments will necessitate increased physician fiscal awareness.
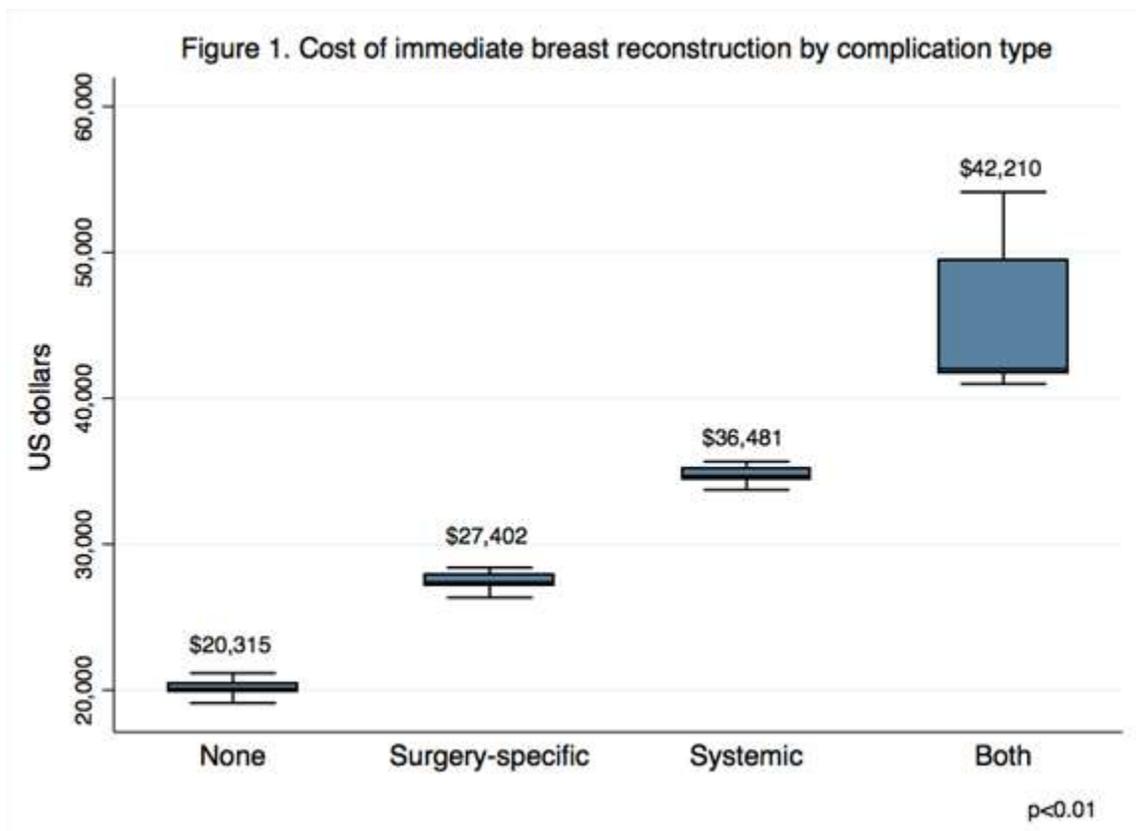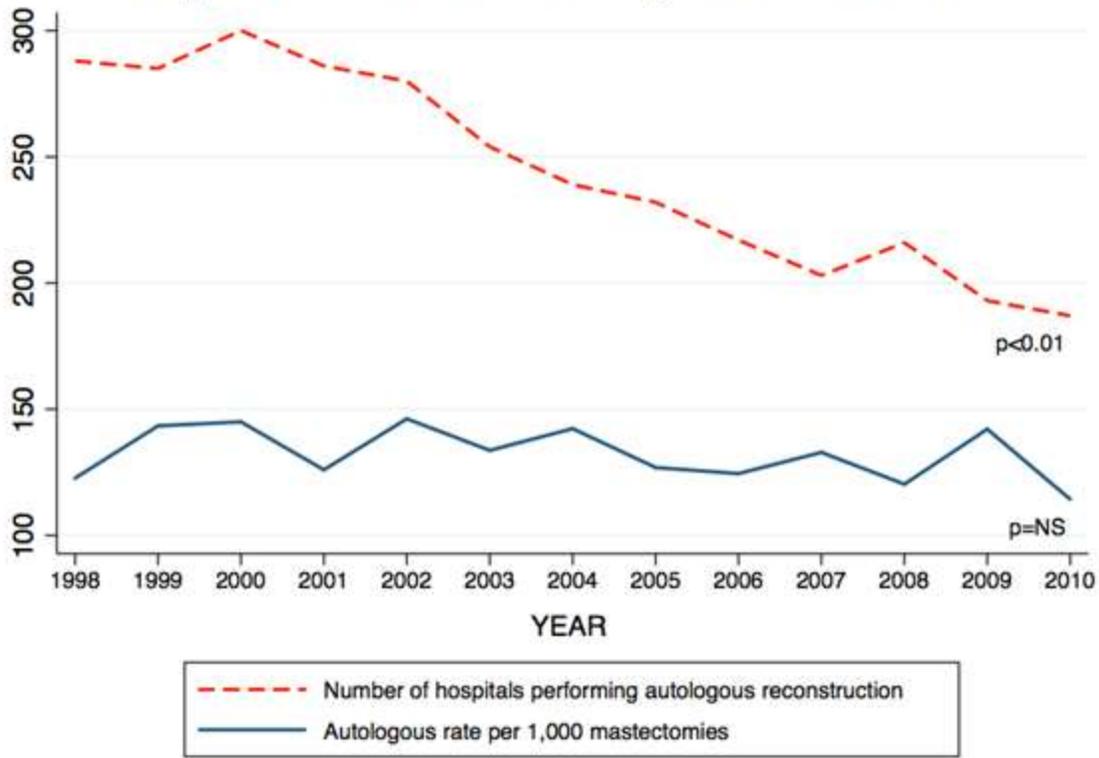
Figure 1.

Figure 1. Cost of immediate breast reconstruction by complication type

Figure 2.

Figure 2. Market concentration of autologous breast reconstruction

Legend:
- - - - Number of hospitals performing autologous reconstruction
——— Autologous rate per 1,000 mastectomies

Flap Morbidity Following Intra-operative Salvage of Deep Inferior Epigastric Perforator (DIEP) Flap Venous Congestion with Augmentation of Venous Outflow

Oscar Ochoa, MD; Steven Pisano, MD; Minas Chrysopoulo, MD; Peter Ledoux, MD; Gary Arishita, MD; Chet Nastala, MD
Institution where the work was prepared: PRMA Plastic Surgery, San Antonio, TX, USA

Background: Breast reconstruction with deep inferior epigastric perforator (DIEP) flaps has gained considerable popularity due to high flap reliability and reduced donor site morbidity. Previous studies have identified the superficial venous system as the dominant outflow to DIEP flaps. Venous outflow insufficiency occurs if outflow remains dependent on the superficial venous system or selected deep venous perforators are incapable of venous drainage. Although augmentation of venous outflow through a second venous anastomosis may relieve venous congestion, effects on flap morbidity remain ill defined.

Methods: A retrospective analysis of 1616 patients that underwent 2618 DIEP flap breast reconstructions between March 2005 and January 2012 was performed. Patients with evidence of intra-operative venous congestion underwent a second venous anastomosis to relieve venous insufficiency. Pre-operative demographic data and methods utilized to relieve venous congestion were recorded. Incidence of flap morbidity was calculated and compared to historical controls.

Results: Intra-operative venous congestion was observed in 81 (5.0 percent) patients undergoing 87 (3.3 percent) DIEP flaps during the study period. Venous outflow augmentation was effective utilizing the superficial inferior epigastric vein or accompanying deep inferior epigastric venae comitantes. The most frequently used recipient vessels were a second internal mammary vein or intercostal perforating vein. Interposition vein grafts were required in 15 (17.2 percent) cases. Pre-operative comorbidities were similar between both groups including neo-adjuvant therapies. Patients requiring a second venous anastomosis had a longer operative time and length of hospital stay. Flap soft tissue infection was more common in patients without additional venous anastomoses. Overall flap morbidity, delayed wound healing, fat necrosis, and flap loss were similar to controls. In a multivariate logistic regression model, flaps based on a greater number of perforators were significantly ($p < 0.01$) associated with an *increased* risk of venous congestion requiring a second venous anastomosis. On the other hand,

previous abdominal surgery was significantly ($p = 0.03$) associated with a *decreased* risk of requiring a second venous anastomosis

Conclusion: Arterial and venous anatomies play unique roles in flap reliability. DIEP flap venous congestion must be treated expeditiously with an additional venous anastomosis in order to relieve venous congestion and contain flap morbidity.

9:57am - 10:01am
Internal Mammary Lymph Node Biopsy During Microsurgical Breast
Reconstruction: Should this be Routine?

Eric J. Wright; Arash Momeni, MD; Gordon Lee
Institution where the work was prepared: Stanford University Hospital, Palo
Alto, CA, USA

Background:

Evaluation of axillary lymph nodes in patients with clinically node negative invasive breast cancer is considered standard of care, despite the well-known fact that alternative lymphatic drainage pathways exist, e.g. via the internal mammary lymph node. Sampling of internal mammary lymph nodes, however, is not part of the diagnostic workup in breast cancer. The advent of microsurgical breast reconstruction using the internal mammary vessels as recipients has allowed sampling of the internal mammary lymph nodes with technical ease at the time of reconstruction. In the present study, we reviewed our experience and advocate for the routine biopsy of the internal mammary lymph nodes.

Methods:

A retrospective analysis of patients who underwent internal mammary lymph node biopsy at the time of autologous breast reconstruction utilizing the internal mammary vessels between 2004-2012 was performed. Parameters of interest included age, unilateral vs. bilateral reconstruction, immediate vs. delayed reconstruction, postoperative complication rate, pre- and post-operative cancer stage as well as pathology findings of the internal mammary lymph nodes. For patients with positive internal mammary lymph nodes, resultant changes in oncologic management were reviewed.

Results:

A total of 204 patients (i.e. 264 breast reconstructions) met inclusion criteria. Six patients (2.9%) were found to have positive internal mammary lymph nodes. The mean age in these patients was 44.5 years. No correlation between BRCA positivity, hormone receptor status, or tumor location within the breast and internal mammary lymph nodes positivity was noted. None of the patients with lymph positive nodes displayed macroscopic changes at the time of sampling. Interestingly, 5 of the 6 patients had preoperative PET scans that suggested no internal mammary lymph node involvement. Internal mammary lymph node positivity altered the cancer stage and oncologic management (i.e. additional radiation therapy) in all affected

patents. There were no complications related specifically to biopsying of the lymph nodes.

Conclusion:

Although very limited data exists to support widespread internal mammary lymph node sampling, our results indicate that in 2.9 % of patients this practice resulted in alteration of adjuvant management. As such, we submit that during microsurgical breast reconstruction, this additional step should be incorporated into routine practice as it can be performed with relative ease at the time of internal mammary recipient vessel preparation. Furthermore, our series demonstrates no increased morbidity with possible substantial implications for our patients. Larger prospective studies with long-term follow-up are warranted to further analyze and establish the role of this practice.

10:01am - 10:05am
Evolution of Bilateral Breast Reconstruction with Autologous Flaps Over 10 Years: Differences in Delayed vs. Immediate Reconstruction
Edward I. Chang, MD; Eric I. Chang; Miguel A. Soto-Miranda; Hong Zhang; Shadi Ghali; Naveed Nosrati; David W. Chang
Institution where the work was prepared: MD Anderson Cancer Center, Houston, TX, USA

Abstract

Background: There is an increasing trend towards bilateral mastectomies as more and more patients are pursuing a contralateral prophylactic mastectomy (CPM). In certain settings, one breast will be reconstructed in a delayed fashion while the CPM is reconstructed in an immediate fashion. We aim to assess the changing trend in bilateral breast reconstruction and hypothesize that such patients will need more revisions to obtain an optimal reconstruction compared to patients when both breasts are reconstructed in the same time frame.

Methods: Retrospective review of single institution's experience with bilateral free flap breast reconstruction from 2000-2010.

Results: Overall, there is a 62.3% increase in patients undergoing bilateral reconstruction from 2000-2005 (186 vs. 302) compared to bilateral reconstruction from 2006-2010. A total of 488 patients (average age: 47.9±9.1, average BMI: 28.3±5.7kg/m^2) underwent bilateral breast reconstruction (bilateral immediate: 283, bilateral delayed: 93, and unilateral immediate/delayed: 112). Five patients (1.0%) underwent bilateral prophylactic mastectomies for deleterious BRCA mutations, while 81 patients (16.6%) had bilateral breast cancer. There was a trend towards undergoing a revision and pursuing multiple revisions with any form of delayed reconstruction (p=0.09). However, subgroup analysis demonstrated patients undergoing a unilateral delayed/immediate reconstruction were significantly more likely to undergo a revision and to have significantly more overall revisions (p=0.05). Any delayed reconstruction significantly increased the likelihood of a contralateral flap revision (OR: 1.53; p=0.03). Any delayed reconstruction or obesity (BMI>30) was significantly associated with postoperative complications. Obesity, smoking, and radiation increased fat necrosis rates 2.77 (p=0.01), 2.31 (p=0.03), and 2.38 times (p=0.03) respectively.

Conclusions: There is an increasing trend toward bilateral mastectomies and autologous reconstruction. Unilateral delayed/immediate reconstruction has high revision rates of the prophylactic breast. Patients seeking bilateral reconstruction who are obese, smokers, and have had prior radiation should be counseled about increased complication rates.

10:19am - 10:23am
Health Related Quality Of Life After Breast Reconstruction Surgery

Rika Ohkuma, MD[1]; Anne Tong Jia Wei, MD[1]; Marcelo Lacayo-Baez, MD[1]; Eric B. Schneider, PhD[1]; Ariel N. Rad, MD/PhD[1]; Michele A. Manahan, MD[1]; Justin M. Sacks, MD[1]; Damon S. Cooney, MD, PhD[2]; Carisa M. Cooney, MPH[2]; Gedge D. Rosson, MD[2]; (1)Johns Hopkins University, (2)Johns Hopkins University School of Medicine
Institution where the work was prepared: Johns Hopkins Hospital, Baltimore, MD, USA

Purpose: Breast reconstruction following mastectomy has been shown to improve quality of life (QoL). The goal of this study is to quantify and compare QoL scores for breast cancer patients undergoing different surgical procedures.

Methods: We performed an IRB-approved prospective study of patients undergoing breast reconstruction at the Johns Hopkins Hospital between November 2010 and April 2013. Two validated questionnaires, the RAND-36 and BREAST-Q©, were administered at four time points: preoperatively, after tissue expander (TE) placement in staged cases), and at 6 and 12 months post-reconstruction. Patient QoL scores were compared at each time points and between the groups of autologous vs. implant reconstruction and staged vs. non-staged reconstruction. Responses were analyzed using the paired t-test. Multivariate logistic regression model was performed in the 6 month follow up questionnaire outcomes.

Results: Of 122 female patients eligible for study [mean age: 48.6±9.0 (range 26-72), mean BMI: 25.3±4.6 (range 15-37)], 93 patients (76%) underwent staged reconstruction.

93 staged reconstruction patients were found to have significantly lower scores for satisfaction with breasts, physical well-being on the chest, sexual well-being (all p<0.001), and pain (p=0.015) by TE placement.

Of 122 eligible patients, 66 patients completed 6 month follow-up questionnaires (mean length of follow up: 9.0±6.2 month); 49 autologous flap reconstructions (2 DIEP, 3 SGAP, 4 msTRAM) and 17 implant reconstructions. Overall patients were found to have significant lower satisfaction scores for physical well-being on the abdomen (p=0.040) at 6 month after the major reconstruction surgery comparing to the baseline. However, 6 month follow up scores showed significant improvement in satisfaction with breasts, psychosocial well-being, and sexual well-being

compared to the scores when TEs were in place (all p<0.01). At 12 month follow up, satisfaction with physical well-being on the chest and the abdomen returned to the baseline level with significant improvement between postoperative 6-12 months (both p<0.03). There was no significant difference at both postoperative time points between cohorts; staged vs. non-staged or flap vs. implant.

Multivariate logistic regression model showed extended adjuvant chemotherapy after major reconstruction surgery was associated with lower satisfaction with breasts, overall outcomes, psychosocial well-being and sexual well-being (all p<0.05), and complications were related to lower satisfaction with overall outcome (p=0.047).

Conclusions: Patients' post-operative QoL is worsened after TE placement, however, significantly improved following reconstruction with a positive psychological impact on patients' psychosocial well-being. The role of QoL is an important concept when counseling and planning breast reconstruction.

10:23am - 10:27am
Patient Reported Satisfaction and Quality of Life Following Breast Reconstruction in Patients with a Low Body Mass Index: A Comparison Microvascular Free Flap and Prosthetic Implant Recipients

Katie E. Weichman, MD; Stelios C. Wilson, BS; Jamie P. Levine, MD; Mihye Choi, MD; Nolan S. Karp, MD; Alexes Hazen, MD
Institution where the work was prepared: New York University, New York, NY, USA

Introduction

Patients undergoing autologous breast reconstruction have higher overall satisfaction rates when compared to those undergoing prosthetic reconstructions. However, due to a limited abdominal donor site in patients with low body mass indices (BMI), autologous reconstruction is often not offered. Given recent rises in alternative perforator flaps, stacked flaps, and the use autologous fat grafting as an adjunct, the indications for autologous reconstruction have expanded. The purpose of this investigation was to evaluate the effect of microvascular free flap and prosthetic implant reconstructions in the low BMI populations on patient reported outcomes and quality of life following breast reconstruction.

Methods

After obtaining IRB approval, a review of all patients undergoing breast reconstruction at a single institution from November 2007 to May 2012 was conducted. Patient with preoperative documented body mass index less than or equal to 22kg/m^2 were included for analysis. Patients were divided into two cohorts: those undergoing free tissue transfer and those undergoing tissue expander/implant reconstruction and then mailed a BREAST-Q survey for response. Additionally, the demographic information, complications, and need for secondary revisionary procedures were analyzed in comparison. BREAST Q satisfaction was then analyzed using Q-Score software developed by Rasch Unidemnsional Measurement Models Laboratory (Perth, Australia).

Results

During the study period, 273 patients met inclusion criteria. 18.3% (n=50) of patients underwent free tissue transfer while 81.6% (n=223) underwent tissue expander/implant reconstruction. Patients in each cohort were similar in age, mastectomy weight, smoking status, unilateral and bilateral reconstructions, and indications for surgery (prophylactic versus therapeutic). However, autologous reconstructions were more likely to undergo delayed reconstructions at 16% (n=4) when compared to prosthetic

reconstructions 0% (n=0). Additionally, patients undergoing autologous free tissue transfers were more likely to undergo secondary revisionary surgeries (46% (n=23) versus 26.4% (n=59)), and autologous fat grafting (30% (n=15) versus 16.9% (n=38). BREAST-Q responses showed patients undergoing free tissue transfer were more satisfied with their breasts at 73.8 versus 63.2 (p=0.005) and had higher overall psychosocial well-being 82.3 versus 74.2 (p=0.05). However, both cohorts had similar satisfaction in overall outcome, sexual well-being, and physical well being.

Conclusions

Autologous microvascular breast reconstruction should be considered in all patients with BMI less than or equal to 22 kg/m^2. When compared to patients with tissue expander/implant reconstructions, patients undergoing microvascular breast reconstruction display higher overall breast satisfaction and psychosocial well-being. However, they require greater secondary revisionary surgery and the common use of autologous fat grafting as an adjunct.

10:27am - 10:31am
Cost and Complication Analysis after Breast Reconstruction: A review of 96855 patients

Ziya Baghmanli; Weikai Qu; Munier Nazzal; Marlene Welch
Institution where the work was prepared: The University of Toledo, Toledo, OH, USA

Introduction: Recent data from American Cancer Society estimate that, 232,340 new cases of invasive breast cancer will be diagnosed in women in 2013. As the options for reconstruction have increased more women are undergoing mastectomy and prophylactic bilateral mastectomy. Our hypothesis is tissue expander/implant base reconstruction has lower in hospital complication rate, length of stay and cost compare to autologous tissue based reconstruction.

Materials and Methods: Utilizing The Healthcare Cost and Utilization Project (HCUP) database we identified the patients who underwent following types of breast reconstruction in 2008-2010: Tissue expander placement (TE), *Latissiumus Dorsi*muscle flap reconstruction (LDM), deep inferior epigastric artery perforator (DIEP) free flap reconstruction, transverse rectus abdominis myocutaneous (TRAM) free flap, TRAM pedicled flap reconstruction. Variables evaluated included age, race, comorbidities, the number of operations, insurance status, length of hospital stay, total hospital charge and complications.

Results: A total of 96855 patients were included in the study. TE was the predominant method for breast reconstruction (69.4%). Statistically significant decrease noted in the percentage of tissue expander placement in 2009 (61.7%) and 2010 (64.9%) compare to 2008 (87.1%). Conversely, significant increase was noted in the percentage of all autologous tissue based reconstruction types in 2009 and 2010 compare to 2008. TE was more common amongst white population, while autologous tissue based reconstruction was more common in remaining races. Mean length of stay and median total hospital charge was lower in TE group. TE was the most common performed operation in all insurance types. Pedicled TRAM flap was more common among self-payer patients, while private insurance patients saw highest number of DIEP flap reconstruction. The incidence of complications were lowest in TE group in following categories; skin infection, wound disruption, mechanical complications, DVT/PE, postop shock, SIRS.

Conclusion: Our analysis revealed that tissue expander placement resulted shorter LOS, lower hospital charge and in hospital complications. The results

also show increase in autologous based reconstruction in recent years. Further studies are required to determine patient satisfaction and long-term results, however these findings can be used in preoperative planning and discussion to choose accurate reconstruction modality for the patients.

10:31am - 10:35am
Venous thromboembolism (VTE) risk following immediate breast reconstruction (IBR) – analysis of the 2005-2011 ACS-NSQIP datasets

John P. Fischer; Ari M Wes; Jonas A Nelson; Liza C. Wu
Institution where the work was prepared: Hospital of the University of Pennsylvania, PA, USA

Background:

Venous thromboembolism (VTE), including deep venous thrombosis (DVT) and pulmonary embolism (PE), is a morbid and costly complication following surgical procedures, but is the most preventable form of death in hospitalized patients. In our current analysis, we aim determine whether IBR is associated with increased risk of VTE.

Methods:

The 2005-2011 ACS-NSQIP datasets were utilized to identify female patients undergoing mastectomy with or without IBR. Year-appropriate CPT codes were used to identify and distinguish patients undergoing mastectomy alone and immediate implant or autologous reconstruction. The dependent variable and our primary outcome was 30-day VTE. VTE events were treated as a dichotomous variable (none vs. DVT or PE). All complications were identified within 30 days of the surgical procedure. Preoperative and intraoperative variables with a P ≤0.10 on univariate analysis were included in a multivariable logistic regression analysis, with the occurrence of VTE as the dependent variable. All tests were two-tailed, with statistical significance defined as P<0.05.

Results:

A total of 48,634 patients were identified who underwent either mastectomy or IBR. Postoperative VTE occurred in 184 patients (0.4%), including DVT (N=118) and PE (N=82). Bivariate analysis of preoperative factors associated with VTE demonstrated an association with race (P=0.017), WHO classified obesity (P<0.001), functional status (P=0.04), and the presence of a pulmonary (P=0.028) or renal (<0.001) co-morbid conditions. Analysis of intraoperative factors associated with VTE demonstrated an association with inpatient status (P=0.025), immediate breast reconstruction (P<0.001), and operative time (P<0.001). Multivariate regression analysis demonstrated that immediate breast reconstruction, either implant (OR=1.65, P=0.01) or autologous (OR=2.14, P=0.009), was associated with a greater odds of VTE.

Furthermore, operative time (hours) was an independent predictive factor (OR=1.13, P=0.001). Obesity was also identified as risk factor for VTE: class I (OR=2.20, P<0.001), class II (OR=1.6, P<0.092), and class III (2.88, P<0.001). Impaired patient functional status (OR=2.56, P=0.035), recent radiation (within 90 days) (OR=3.60, P=0.03), and underlying renal co-morbidities (OR=5.60, P<0.001).

Discussion:

Our analysis identifies several key independently associated risk factors for VTE in breast surgery, which included: immediate reconstruction, operative time, and obesity. This analysis uniquely prescribes a modality-specific risk of VTE in IBR and a progressive added risk of VTE with increased BMI. Risk-adjusted models demonstrate higher VTE risk in morbidly obese patients undergoing autologous reconstruction. In recognition of modality-specific added risk of VTE in IBR, appropriate preoperative counseling and risk reduction strategies should be used in patients undergoing IBR.

A Simplified Algorithm For Unilateral Breast Reconstruction Using Double Pedicled Abdominal Free Flaps

Gangadasu Reddy, MD, MS; Nicholas T. Haddock, MD; Bardia Amirlak, MD; Jonathan J. Cheng, MD; Sumeet S. Teotia, MD
Institution where the work was prepared: UT Southwestern Medical Center, Dallas, TX, USA

Background: Double pedicle abdominal free flaps for unilateral breast reconstruction have been described. Variability in vascular anatomy poses preoperative and intraoperative decision-making and technical aspects challenging. These variables include pedicle length, perforator location and size, vascular branching patterns, presence of vertical midline scar, and adequacy of abdominal tissue. We propose a simplified algorithm taking these variables into account.

Methods: Unilateral autologous breast reconstruction using bipedicled, non-split abdominal flaps was performed in 22 patients. We proposed a simplified algorithm to decide the vascular inflow/ outflow for the flap. Preoperative CT imaging assisted in perforator selection. Intraoperative Indocyanine Green angiography was used to assess flap perfusion in 13 patients.

Results: Average age was 59 years (range 42-73); 14 were delayed and 8 were immediate reconstructions. DIEA-DIEA pedicle was used in 13 patients, DIEA-SIEA in 7 patients, SIEA-SIEA in 1 patient and DIEA-MS FreeTRAM in 1 patient. The non-dominant DIEA/V or SIEA/V of one hemi-abdomen was anastomosed over the abdomen to the dominant contralateral DIEA/V in patients that had cranial extension of the DIEA/V of at least 1.5mm in caliber with visible and palpable pulsations (15 patients). The composite flap was then anastomosed to the cranial IMA/V. When cranial extension of DIEA/V was inadequate, we performed two separate anastomoses to the cranial and caudal IMA/V in antegrade and retrograde fashion (7 patients). Pedicle length was a critical factor in performing cranial-caudal anastomosis to IMA/V and for flap inset, with average length of each pedicle being 14cm in this group. There were no complete or partial flap losses. 1 patient had venous thrombosis that was salvaged on first postoperative day.

Conclusion: A simplified algorithm is presented to make bipedicled flaps a successful option for unilateral breast reconstruction based on variable vascular architecture.

10:53am - 10:57am
Comprehensive Evaluation of the Financial Impact of Breast Reconstruction at a Single Academic Institution

Ian C. Sando, MD; Sunitha Malay; Jeffrey H. Kozlow; Kevin C. Chung; Adeyiza O. Momoh
Institution where the work was prepared: University of Michigan Health Systems, Ann Arbor, MI, USA

OBJECTIVE: Despite changing mastectomy patterns in the United States, rates of breast reconstruction remain low, disparities still exist, and there continues to be concern over low reimbursement through third party payers. The authors aim to study the financial implications of providing all forms of breast reconstruction at a single academic institution with insurance as the primary mode of reimbursement. We also evaluate potential differences between various forms of reconstruction after the introduction of abdominal-based perforator free flap procedures into the practice.

METHODS: We reviewed the billing records of 157 patients who underwent various forms of post-mastectomy breast reconstruction offered at the University of Michigan for the 2011 fiscal year. Professional and facility revenue, cost, and earnings were calculated by applying actual collection rates and charges. Similar financial data was then compiled for 49 patients who went on to complete nipple reconstruction to evaluate the financial impact of subsequent reconstructive stages and revisions.

RESULTS: The professional revenue and costs allocated to breast reconstruction were $649,280 and $591,184, respectively [net profit of $74,699 (11.5% margin)]. Health care system facility revenue and costs were $2,787,492 and $2,795,609, respectively [net loss of $8,117 (-0.3% margin)]. Tissue expander and abdominal-based perforator free flap reconstruction comprised the highest percentage of total revenue for the academic practice at 31.8% and 24.3%, respectively. Physician reimbursement by surgical time was highest for delayed tissue expander placement ($2,891/hour in the operating room) and lowest for pedicled TRAM reconstruction ($459/hour of operating room). The facility received the greatest average direct margin on latissimus dorsi muscle flap/tissue expander reconstructions (28.6%) and lost money on tissue expander reconstructions (-20.3%) and single-stage implant reconstructions (-18.3%). The average number of procedures necessary before completion of breast reconstruction was greatest with latissimus dorsi reconstructions (4.0) and lowest for free TRAM and single-stage implant reconstructions (2.6). The greatest net revenue was seen after completion of abdominal-

based perforator free flap reconstructions ($16,131 per reconstruction) and lowest for pedicled TRAM reconstructions ($4,857 per reconstruction).

CONCLUSION: Post-mastectomy breast reconstruction for this academic surgical practice is fiscally profitable; however, there appears to be a small financial loss for the health care system, which may be related to low insurance reimbursement rates. Abdominal-based perforator flap reconstruction reimbursed through standard insurance plans can be financially advantageous for the academic surgical practice.

10:57am – 11:01am
Wound healing complications after autologous breast reconstruction: targeting the risk factors

Jonas A. Nelson; john P. Fischer; Ritwick Grover; Emily Cleveland; joseph M. Serletti; liza C. Wu
Institution where the work was prepared: jonas a nelson, philadelphia, PA, USA

Introduction: Delayed wound healing is the most common postoperative complication following autologous breast reconstruction and is costly to the patient and the health care infrastructure. While a number of risk factors have been established leading to wound healing difficulties, a comprehensive examination has not been performed in autologous breast reconstruction. The purpose of our study was to address this lack of data in a large cohort of patients in an effort to identify modifiable risk factors which, if altered, could lead to improvements in patient outcomes.

Methods: We performed a retrospective cohort study involving all free autologous reconstructions at the Hospital of the University of Pennsylvania between 2005 and 2010. Patients who experienced delayed wound healing (defined as operative wounds requiring dressing changes for longer than 3 weeks) were compared to patients with normal wound healing. Variables assessed focused multiple aspects of the reconstruction including anesthetic management, intraoperative and postoperative complications and outpatient follow up. Subgroup analyses were performed examining delayed healing at the breast incisions and at the abdominal donor site.

Results: Overall, 682 patients reconstructed with 1,039 flaps were included in the study. Delayed wound healing impacted 297 (44%) of patients overall. Patients experiencing delayed wound healing were older($p=0.02$), with higher BMI($p<0.0001$), and higher rates medical comorbidities ($p<0.001$), active smoking($p=0.02$) and bilateral reconstruction($p=0.02$). Patients with delayed healing received a lower rate/kg of volume resuscitation intraoperatively($p=0.001$) and were more likely to receive vasopressors($p=0.004$). Furthermore, a greater proportion were under-resuscitated($<3.5kg/ml/24hr$) on postoperative day0($p=0.02$). A multivariate logistic regression demonstrated that obesity($OR=2.6$, $p<0.001$), active smoking($OR=1.7$, $p=0.03$), bilateral reconstruction($OR=1.5$, $p=0.01$), and utilization of vasopressors($OR=1.5$, $p=0.04$) were all significantly associated with delayed wound healing. Patients experiencing delayed healing had higher rates of major delayed complications including hernia or operative debridements($p<0.001$) as well

as postoperative infections. The cost of their reconstructions were also significantly higher (p=0.003). Finally, multivariate logistic subgroup analysis demonstrated that obesity(OR=2.0, p<0.001) and vasopressor administration(OR=1.5, p=0.046) were associated with delayed breast incision healing while age(OR=1.0, p=0.03), obesity(OR=2.1, p=0.001), diabetes (OR=2.1, p=0.04) and bilateral reconstruction (OR=1.6, p=0.02) were associated with abdominal donor site delayed healing.

Conclusions: This study identifies factors associated with wound healing complications, some of which are modifiable and others which are patient disease. Modifiable factors include the use of vasopressors, active smoking and impaired glucose control. Targeted, focused measures should be undertaken with the potential to ultimately reduce wound healing complications and reduce cost.

11:01am - 11:05am
Comparison of Outcomes for Patients Undergoing Free Flap Autologous
Breast Reconstruction Utilizing a Multimodal Enhanced Recovery Pathway
Versus Traditional Care

Niles J. Batdorf, MD; Ronnie Mubang, MD; Whitney J. Goede, Pharm, D,
RPh; Karla V. Ballman, PhD, HSR; Jenna K. Lovely, Pharm, D, RPh; Pamela
L. Grubbs, RN, CNS; Lisa D. Bungum, RN; Andria L. Hinckley, RN, CNP;
Valerie L. Lemaine, MD; Michel Saint-Cyr, MD, FRCS(C)
Institution where the work was prepared: Mayo Clinic, Rochester, MN, USA

Background: Accelerated recovery pathways have been utilized in other surgical specialties and been shown to reduce length of hospital stay after surgery, but they have not been described for patients undergoing free flap breast reconstruction.

Methods: An enhanced recovery pathway (ERP) was developed through multidisciplinary collaboration between plastic surgeons, anesthesiologists, pharmacists, and nursing staff. The ERP pathway included preoperative analgesia, limitation of intravenous fluids, use of intraoperative liposomal bupivacaine in the surgical site, avoidance of postoperative opioids, pre-emptive nausea and vomiting treatment, avoidance of routine intensive care unit monitoring, immediate resumption of diet, and early ambulation. All patients were included on the pathway once it was instituted. All patients in the study were operated on and under the care of a single staff surgeon within a 12 month period. Postoperative outcomes were retrospectively analyzed and compared to a historical cohort of patients treated in a traditional care (TC), non-pathway manner. Patients were excluded from the study if they had a pre-operatively diagnosed coagulopathy or a chronic pain syndrome.

Results: A total of 42 patients were analyzed, 17 treated with TC, and 25 patients with ERP. The flaps were either deep inferior epigastric perforator flaps (n=62), muscle sparing transverse rectus abdominis flaps (n=5), or transverse upper gracilis flaps (n=5). The total number of flaps in the cohort was 72. Hospital stay averaged 4.4 days with TC, but decreased to 3.0 days with ERP (p=0.008). None of the ERP patients were admitted to the ICU post-operatively. Total inpatient postoperative opioid usage for the first three days, calculated in oral morphine equivalents, was 321.3 mg for TC, but decreased to 146.3 mg with ERP (p=0.016). Pain goal and scores (from 1-10) were analyzed for the first 3 days at 8 time points. At 24 hours postoperatively, pain scores were significantly better than TC (p=0.037), however, this was the only time point with a statistically significant difference. Thirty day complication rates were analyzed and were not significantly different between the two groups.

Conclusion: The initiation of an Enhanced Recovery Protocol for breast free flap reconstruction significantly reduced hospital stay in our study, which in turn decreases cost. The protocol also significantly decreased the amount of opioids used post-operatively by more than 50% without a consequent increase in patient reported pain scores. An Enhanced Recovery Protocol is a powerful tool to deliver high-value, quality care and decrease costs.

11:05am - 11:09am
The Financial Impact of Microsurgical Breast Reconstruction at an Academic Medical Center

Ibrahim Khansa, MD; Michael J. Miller, MD; Christopher Kaiser, CPA; Julian Bell, MBA; Albert H. Chao, MD
Institution where the work was prepared: Ohio State University, Columbus, OH, USA

Background: The demand for and availability of microsurgical breast reconstruction has increased, but limited data exists on the financial impact of this service both within a plastic surgery department and at an academic medical center.

Methods: A review of new patient consultations and surgical cases between 2005-2012 was performed, during which microsurgical breast reconstruction was introduced. Billing records were reviewed to determine associated professional and facility revenues, costs, and earnings. This data was compared between different areas of plastic surgery, which were categorized as aesthetic, breast reconstruction, burn/trauma, general, and oncologic reconstruction.

Results: A total of 12,020 consultations and 5,741 surgical cases were reviewed.

New patient volume for breast reconstruction demonstrated the highest overall absolute and relative growth (+332, +237.14%), followed by aesthetic (+114, +83.8%), oncology (+13, +12.9%), general (-127, -16.9%), and burn/trauma (-285, -75.0%). Breast reconstruction exhibited consistently positive annual growth (+4.3% to +62.8%), in contrast to other areas (aesthetic, -34.0% to +173.2%; burn/trauma, -46.1% to +44.1%; general, -40.8% to +27.8%; oncology, -35.8% to +56.1%).

The conversion rate from consultation to surgery was highest in breast reconstruction (57.0±3.1%) and oncology (56.9±6.6%), followed by burn/trauma (47.0±6.8%), general (46.1±3.5%), and aesthetic (37.0±4.8%). For primary breast reconstruction, 42.3% of cases were microsurgical and 57.7% were non-microsurgical.

Professional revenues for breast reconstruction exhibited the highest annual and overall growth (+59.8%, +1241.4%, respectively), followed by oncology (+50.9%, +378.4%), general (+24.2%, +159.7%), aesthetic (+23.2%, +130.6), and burn/trauma (+15.4%, -20.9%). Breast reconstruction

comprised 12.8% of professional revenues in 2005, compared to 47.7% in 2012, of which microsurgical cases comprised 78.1% and non-microsurgical cases comprised 21.9%.

Facility revenues for breast reconstruction grew at an annual rate of +39.0%, compared to +26.1% for other areas of plastic surgery. Breast reconstruction comprised 16.3% of facility revenues in 2005, compared to 53.2% in 2012. For primary breast reconstruction, microsurgical reconstruction grew +38.0% annually, followed by pedicled flaps (+33.2%) and tissue expanders (+20.8%). For secondary breast reconstruction (revisions), facility revenues grew +99.7% annually, driven primarily by patients who had undergone microsurgical primary breast reconstruction.

When costs were factored in to determine professional and facility earnings, similar trends were observed.

Conclusions: Breast reconstruction confers a stable source of new patient volume that grows over time, with a relatively high conversion rate to surgery. These two factors were associated with financial benefits to both plastic surgeons and the hospital. Microsurgical breast reconstruction specifically demonstrated a greater financial impact than non-microsurgical breast reconstruction.

11:09am - 11:13am
Breast Reconstruction Using Abdominal Free Flaps and Simultaneous Implants
Sarosh Zafar, MD; Pierre Chevray, MD, PhD
Institution where the work was prepared: The Methodist Hospital System, Houston, TX, USA

Background: Abdominal free flaps are capable of reconstructing a naturally shaped, soft, mobile and warm breast that is superior to a prosthetic implant based reconstruction. However, some patients do not have sufficient donor tissue. We show that augmenting the volume of a breast reconstructed using available abdominal tissue by simultaneously placing an implant is safe, reliable, and we believe can improve the aesthetic result of a tissue-only or implant-only reconstruction.

Methods: We reviewed 653 consecutive breast reconstructions using abdominal free flaps performed between July 2001 and March 2013. Seventy-one reconstructed breasts had simultaneous placement of a prosthetic breast implant. We compared patient age, BMI, history of radiation, smoking history, and timing of surgery. Intraoperative variables examined included flap type, operating time, flap ischemia time, and implant type. Post-operative complications including flap failure and emergent reoperation. Finally, aesthetic outcome using photographic documentation was evaluated.

Results: During the 12 year study period, we performed 653 breast reconstructions using abdominal free flaps. Of these, 71 breasts had simultaneous placement of an implant between the flap and pectoralis major muscle. As expected, patients in the simultaneous implant group had a lower mean BMI (24 vs 29), and younger mean age (45 vs 50) when compared to patients whose breasts were reconstructed with a free flap alone. Also, as expected, mean operating time was longer in the simultaneous implant group (651 vs 615 minutes). There were no emergent reoperations or flap losses among the 71 breasts reconstructed with abdominal free flaps plus simultaneous breast implants. Photographic documentation shows that breasts reconstructed with abdominal free flaps with the addition of a simultaneous breast implant can have aesthetic results that surpass those of breasts reconstructed with either an implant alone, or abdominal free flap alone.

Conclusions: Prosthetic breast implants can be safely placed at the same surgery as an abdominal free flap for immediate or delayed breast

reconstruction. While this increases operative time, it does not increase the rate of complications, including free flap loss, or emergent reoperation. This technique affords patients with a low BMI, or insufficient abdominal donor tissue, the opportunity to avoid an additional operative procedure to achieve desired breast volume. Furthermore, our experience is that this technique results in improved central breast projection and a reconstructed breast shape that is aesthetically superior to that typically achieved with a breast implant alone, or autologous tissue alone, or delayed placement of an implant.

11:27am - 11:31am
The Profunda Artery Perforator (PAP) Flap Experience for Breast Reconstruction

Robert J. Allen, Jr. MD[1]; Z-Hye Lee, BS[1]; James L. Mayo, MD[2]; Maria M. LoTempio, MD[3]; Constance M. Chen, MD, MPH[4]; Ali Sadeghi[2]; Joshua L. Levine, MD[5]; Christina Y. Ahn, MD[1]; Robert J. Allen, MD[1]; (1)New York University Langone Medical Center, (2)Louisiana State University Health Science Center, (3)Medical University of South Carolina, (4)Weill Cornell Medical College, (5)New York Eye and Ear Infirmary
Institution where the work was prepared: NYU Langone Medical Center, New York, NY, USA

Introduction:

Perforator flaps are a popular choice by patients and physicians for their use in breast reconstruction. The profunda artery perforator (PAP) flap was first introduced as a modality for breast reconstruction in 2010. Herein, we analyze the results of all PAP flaps performed by our group thus far in order to optimize patient selection and outcomes. We aim to prove that the PAP flap is a reliable option for breast reconstruction.

Materials and Methods:

A systematic review of the PAP flaps performed by the senior surgeon since 2010 was performed. Patient demographics, indications, operative techniques, flap specifics, complications, and number of operations were recorded.

Results:

73 patients have undergone 127 PAP flaps for breast reconstruction since 2010. Reconstructions were performed for congenital breast deformity (4.8%) and following mastectomy for prophylaxis (35.7%) and for breast cancer (59.5%). The average age of the patients was 48 years (24-64 years), with an average BMI of 22.5 kg/m^2. Significant past medical history included smoking (18.8%), chemotherapy (38.8%), radiation therapy (18%), and previous abdominal surgery (60.4%). The first 6 cases were performed with the patient in the prone position; however, all subsequent flaps were harvested in supine frog-legged position. Average flap weight was 367.4g, and average pedicle length was found to be 10.2-cm. Flap dimensions averaged 27.2-cm x 6.3-cm. The success rate of the PAP flap was >99%, with a 3% take back rate and only one flap loss recorded

(technical error, salvaged with DIEP flap). Complications included hematoma (1.9%), seroma (6%), fat necrosis (7%), and donor site infection (1.9%).

Conclusions:

The PAP flap is an excellent option for breast reconstruction with a high success rate and low complication rate. Advantages include a reliable blood supply, long pedicle, thick donor tissue and a favorable donor site. Currently, the profunda artery perforator flap is second only to the deep inferior epigastric artery perforator flap in our armamentarium for breast reconstruction.

11:31am - 11:35am
The Effect of Chronic Tamoxifen Usage on Flap Survival

Fatih Zor, MD[1]; Serdar Ozturk[1]; Demirhan Dal[2]; Armagan Gunal[2]; Selcuk Isik[1]; (1)GULHANE MILITARY MEDICAL ACADEMY, (2)Gulhane Military Medical Academy
Institution where the work was prepared: Gulhane MilitaryMedical Academy, Ankara, Turkey

Purpose:

Breast CA is the most frequent neoplasia in female. Mostly surgical treatment is total mastectomy. Selective estrogen receptor modulators (SERM)are used for all estrogen positive tumors as post mastectomy adjuvant therapy. Tamoxifen (TMX) is the most popular. It is a partial estrogen analog, however it inhibits both angiogenesis and growth factor releasing.

Pedicled TRAM flap is frequently used for late breast reconstruction. We detected that, partial flap necrosis was common if the patient had used TMX.

We aimed to evaluate the effects of chronic tamoxifen usage on flap viability and optimum preoperative time to stop tamoxifen usage to prevent its possible adverse effects.

Material and methods:

0.3mg/kg/day was given to rats for 14 days by oral gavage to stimulate chronic TMX usage. We used ischemic flap model (Rat dorsal area,3x10cm,included panniculus carnosus, superior pedicled peninsula skin flap) and observed necrosis end of 1 week. We know that TMX is metabolized in 5-7 days and active metabolites elimination last 14 days, so our experimental protocol:

24 Sprague Dawley rats

1.Group: Dorsal rat flap (DRF) n=6

2.Group: TMX + DRF n=6

3.Group: TMX - 7 tmx free days + DRF n=6

4.Group: TMX - 14 tmx free days + DRF n=6

we assessed both macroscopic and histological necrosis.We used a scoring system for histological necrosis:

Grade 1: epidermis and dermis

Grade 2: grade1 + subcutanous tissue

Grade 3: grade2 + striated muscle

Results:

Least necrosis was detected in group4, there was a statistically difference between group2 - group4, and group3 and group4 (p<0,05).

Concluction:

Chronic tamoxifen usage has adverse effects

on ischemic flap survival.

We demonstrated that, after chronic usage of tamoxifen, the adverse effects of the drug continue for the following 2 weeks.

We recommend that, late breast reconstruction with TRAM flap should be planned following at least 14 days of cessation of tamoxifen usage.

11:35am - 11:39am

The Predictive Value of Breast Resection Weight Specimen For Complications in Breast Reconstruction

Michele A. Manahan[1]; Anne Tong[2]; Marcelo J. Lacayo Baez, MD[1]; Li Xie[2]; Christopher Bailey[1]; Pablo Baltodano[3]; Gedge Rosson[2]; (1)Johns Hopkins Hospital, (2)The Johns Hopkins Hospital, (3)Johns Hopkins University
Institution where the work was prepared: Johns Hopkins Hospital, Baltimore, MD, USA

Background:

Patients with macromastia receiving oncologic breast reconstruction present a challenge as the excess skin, widened pockets, and decreased vascularity reliability along long skin flaps may contribute to complications after breast reconstruction. Although many regarded body mass index (BMI) as a predictor for complications, the amount of resected mammary tissue has not been specifically studied. In our series, we explore the complication rates of patients who received breast reconstruction with implants or autologous flaps, including staging with tissue expanders, with the hypothesis that the weight of the mastectomy specimen forms an important predictor for postoperative complications.

Methods:

We performed an IRB-approved retrospective review of all patients who received breast reconstruction from January, 2007, to October, 2011. Data on patient demographics, comorbidities, type of breast reconstruction, amount of excised breast tissue and postoperative complications were collected. We looked at the morbidity profiles of patients who received breast reconstruction with (i) tissue expanders (TE) as an initial stage, (ii) autologous flaps, and (iii) prosthetic implants. Total complications were divided into 2 groups: (a) major events were complications that required additional surgical intervention (b) minor events required conservative treatment without reoperations.

Results:

A total of 408 patients (200 unilateral reconstruction, 208 bilateral reconstruction) operated upon by four plastic surgeons were evaluated in this study. All of patient demographics and clinical characteristics of the

surgery are tabulated in Table 1. The mean follow-up for patients was 22.84 months. A multivariate regression analysis was conducted to identify predictors of total complication counts. After adjusting for demographics, comorbidities and cancer treatments, we found that weight of mastectomy specimen formed a significant predictor of total complication count in patients receiving TEs (**P value=0.002**) and autologous flaps (**P value=0.0467)**. Other significant predictors in the autologous group were age (**P value=0.0178**), pulmonary disease (**P value=0.0217)** and gastrointestinal comorbidities (**P value=0.0485**). Body mass index (BMI) was not a predictive criterion yet **Image 2** shows a near 1:1 correlation between specimen weight and BMI.

Conclusion:

Our study shows that breast size may be predictive of complications after breast reconstruction with tissue expanders and autologous flaps yet not implants, possibly because these patients were selected during the counseling process as poor candidates for implant reconstruction. This criteria should be highlighted in the surgical approach of macromastia patients receiving breast reconstruction.

TABLE 1

Demographic and clinical characteristics	Total (n=408)	Tissue expanders (n=348)	Autologous flap (n=165)	Prosthetic implant (n=170)
Ethnicity				
Caucasian	303	253	127	135
African American	61	57	24	17
Asian	21	19	5	9
Hispanic	5	3	4	0
Other	18	16	4	9
Age (years)	50.7 ± 9.9	50.7 ± 9.7	50.3 ± 9.3	50.7 ± 10.2
Body mass index (BMI)	26.7 ± 6.0	26.6 ± 6.2	28.1 ± 5.5	25.2 ± 6.2
Comorbidities				
Diabetes mellitus	23	22	6	7
Hypertension	90	83	37	27
Hypothyroidism	44	36	14	20
Hypercholestrolemia	66	57	26	26
Cardiovascular	20	17	5	9
Immune	11	9	6	4
Gastrointestinal	45	39	24	16
Pulmonary	31	27	16	12
Active Smoker	20	16	7	13
Pre-reconstruction breast cancer treatment				
Hormonal therapy	75	73	33	29
Chemotherapy	145	140	48	56
Radiation therapy	139	102	54	60
Mammary tissue excision weight (grams)	402.0 ± 359.6	434.5 ± 403.5	434.5 ± 432.9	377.5 ± 303.5
ψ Complications per cohort (number of patients,%)				
❖*Major complications*	97 (23.8%)	73 (21%)	14 (8.5%)	10 (5.8%)
Minor complications	57 (14%)	17 (4.9%)	24 (14.6%)	16 (9.4%)

ψ *Complication counts include breast surgical-site infection , seroma, hematoma, fat necrosis, vascular compromise(thrombosis/congestion), delayed wound healing.*

❖ *Markers for major complication were any complications that led to tissue expander removal, prosthesis implant removal, or flap loss (total/partial).*

Image 2
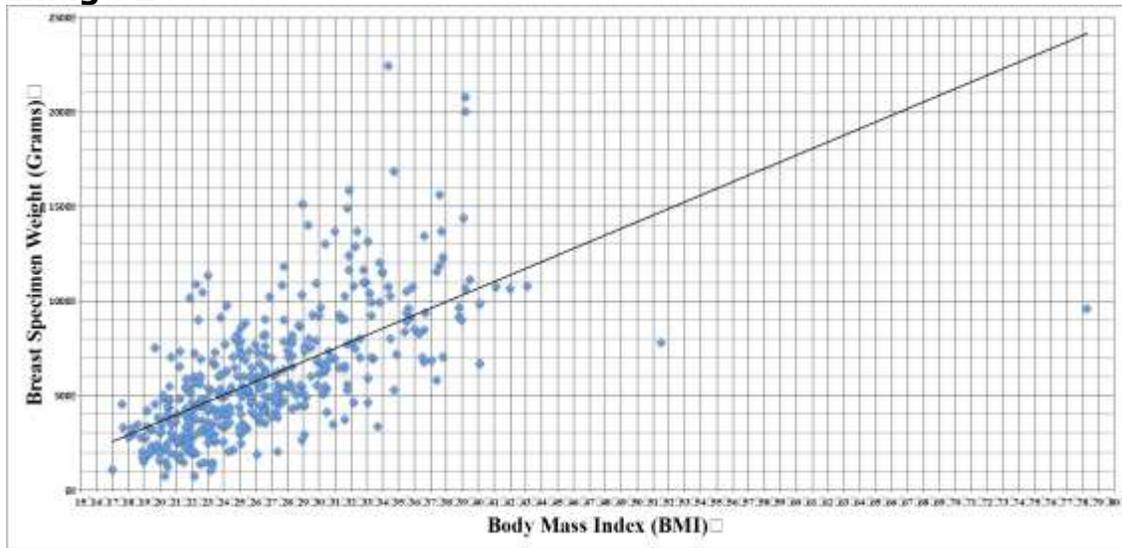
11:39am - 11:43am
The Cost of Failure: A Review of 1,945 Breast Reconstructions
Ari M. Wes; John P. Fischer, MD; Chen Yan; Suhail Kanchwala, MD; Stephen Kovach, MD; Joseph M. Serletti, MD; Liza C. Wu, MD; University of Pennsylvania
Institution where the work was prepared: Hospital of the University of Pennsylvania, Philadelphia, PA, USA

Background: Both autologous and implant-based breast reconstructions offer the opportunity for women affected by breast cancer to regain a sense of normalcy and femininity in their lives. In the event of flap/device failure however, what is typically a straight forward operative course becomes increasingly burdensome to both the patient and surgeon. In this study, we aim to assess the total cost of failure by reconstructive modality.

Methods: A prospectively maintained database was queried identifying all patients undergoing tissue expander/implant (TE/I) and free flaps (FF) between 2005 and 2011. Flap failure was defined as total free flap loss or a complication requiring implant removal. Cost data was obtained for each patient encounter in the postoperative period to characterize the total cost of each patient's reconstructive course. Within each reconstructive modality, perioperative factors were compared between patients experiencing flap/device failure and those who did not through univariate analyses.

Results: A total of 1,241 patients were identified who underwent 1,945 breast reconstruction procedures with an average follow-up of 32 months. 1,028 patients underwent FF and 213 underwent 2-stage TE/I. A total of 22 flaps/devices (1.1%) failed, 14 of which were FF reconstructions (0.9%). FF patients who experienced failure incurred significantly higher total costs than typical FF patients for the primary reconstruction ($28,684.44±$7,596.83 vs. $19,222.23±$4,524.86, P<0.0001), all additional encounters ($19,050.33±$19,770.75 vs. $3,707.45±$6,301.91, P<0.0001), as well as for the cost of the entire reconstructive course ($47,734.76±$19,176.37 vs. $22,906.13±$8,144.77, P<0.0001). TEX patients who experienced failure incurred significantly higher total costs than their non-failed counterparts for encounters excluding the primary reconstruction ($26,888.64±$19,535.59 vs. $9,107.16±$6,193.19, P=0.0013) as well as the cost of the entire reconstructive course ($54,455.41±$34,298.98 vs. $21,797.82±$8,390.23, P=0.0009). Neither the total number of procedures (P=0.982), the total cost (P=0.8378), nor the cost of all procedures following the initial reconstruction (P=0.2458) differed significantly between patients experiencing flap failure and those experiencing expander/implant failure.

Discussion: Failed reconstruction is associated with a significant psychosocial burden for patients; this study assesses the increase in cost that accompanies flap/device failure. Our analysis reveals the magnitude of cost associated directly with flap/device failure as well as that of associated revisions.

11:43am - 11:47am
Aesthetic Outcomes Associated with Reconstruction after Prophylactic Mastectomy: A Satisfaction and Quality of Life Paradox
Michele A. Manahan[1]; Pablo A. Baltodano, MD[2]; Li Xie[3]; Jose M. Flores[4]; Karim A. Sarhane, MD, MSc[2]; Christopher R. Bailey, BA[5]; Mark M. Melendez, MD, MBA[3]; Anne Tong[3]; Carisa M. Cooney, MPH[1]; Gedge D. Rosson, MD[5];
(1)Johns Hopkins University School of Medicine, (2)Johns Hopkins University, (3)The Johns Hopkins Hospital, (4)Johns Hopkins School of Public Health, (5)Johns Hopkins Hospital
Institution where the work was prepared: Johns Hopkins University School of Medicine, Baltimore, MD, USA

Background: This is the first study presenting a correlation between plastic surgeon's graded aesthetic outcomes and patient satisfaction/quality of life (QoL) associated with breast reconstruction after prophylactic-mastectomy using the validated BREAST-Q© instrument.

Methods: We performed an IRB-approved retrospective chart review of 55 patients who underwent reconstruction after prophylactic mastectomy (18 bilateral, 37 contralateral) and of 29 control patients who underwent reconstruction after therapeutic mastectomy. Fourteen plastic surgery experts performed an aesthetic evaluation of the reconstructions. Subsequently, we compared pre- and post-operative BREAST-Q© scores within and between our study and control populations. Finally, we pursued a correlation between the aesthetic and satisfaction/QoL outcomes. Univariableland multivariable analyses compared satisfaction/QoLoutcomes between the groups.

Results: The demographic characteristics and postoperative morbidity rates were similar between the groups. The aesthetic assessment showed that breast reconstruction after contralateral ($p>0.05$) and bilateral ($p<0.0001$) prophylactic-mastectomy is associated with similar or even higher aesthetic scores compared to reconstruction after therapeutic mastectomy. Paradoxically, the BREAST-Q© scores adjusted-comparison showed that breast reconstruction after contralateral ($p=0.03$) or bilateral ($p=0.05$) prophylactic mastectomy is associated with significantly lower satisfaction with breasts compared to breast reconstruction after therapeutic mastectomy (Table 1).

Conclusion: Even though our aesthetic assessment showed that breast reconstruction after prophylactic mastectomy results in superior aesthetic outcomes, this population is paradoxically less satisfied with their breasts

when compared to reconstruction after therapeutic mastectomy. Further studies should strive to investigate the psychological intricacies associated with prophylactic mastectomy in order to enable optimal preoperative counseling.

Table 1. Multivariable linear regression coefficients

Variable	BREAST Q © Satisfaction with Breasts Domain		
	Estimate	Standard Error	p-value
Intercept (TM)	59.04	17.85	<0.01
CPM	-11.78	5.42	0.03*
BPM	-13.33	6.80	0.05*
Age	0.05	0.28	0.87
BMI	0.56	0.44	0.19
Race (White)	-2.24	6.69	0.73

*$p \leq 0.05$: statistically significant, TM: therapeutic mastectomy, CPM: contralateral prophylactic mastectomy, BPM: bilateral prophylactic mastectomy, BMI: body mass index.