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PURPOSE: Post-mastectomy breast reconstruction significantly improves quality-of-life among breast cancer survivors. However, some patients still report concerns over the impact of breast reconstruction on survival. This study aimed to estimate the association between breast reconstruction and overall survival among women who undergo mastectomy for breast cancer.

METHODS: We analyzed data from our institution’s prospectively collected National Cancer Institute-Designated Comprehensive Cancer Center Tumor Registry. We compared mastectomy-only patients to post-mastectomy breast reconstruction patients. We built Kaplan-Meier curves for both groups and compared unadjusted survival statistics using Log-rank test. We then used Cox Proportional Hazards to adjust for potential confounders.

RESULTS: From 2000 to 2014, 2,599 women underwent mastectomy for breast cancer. Of these, 1,052 (40.5%) underwent mastectomy only and 1,547 (59.5%) also underwent breast reconstruction. Most reconstructions were autologous (65.1%), followed by implant-based (26.8%), and mixed (8.1%). Five-year survival among mastectomy-only patients was 83.6% (95% CI=80.9–86.0); 5-year survival among post-mastectomy patients who received breast reconstruction was 91.9% (95% CI=90.2–93.4). Kaplan-Meier curves showed that survival was better among women who underwent post-mastectomy breast reconstruction, compared to women who underwent mastectomy only (Log-rank test=p<0.001). However, a Cox Proportional Hazards model adjusting for cancer stage, patient age, smoking status, radiotherapy, chemotherapy, hormone therapy, and axillary lymph node status did not show any evidence of a survival benefit for breast reconstruction (Hazard Ratio=0.80; 95% CI=0.60–1.08; p=0.1500). Estimates comparing mastectomy and breast reconstruction to mastectomy only patients showed lower risk for cancer recurrence in patients who underwent breast reconstruction (Adjusted Hazard Ratio=0.68, 95% CI=0.48–0.96, p=0.030).

CONCLUSION: Our results demonstrate that breast reconstruction does not negatively impact patient survival. In fact, risk of developing recurrences over time may be lower in breast reconstruction patients. Improved survival outcomes observed for this self-selected patient population are likely due to other patient and treatment characteristics. However, these data may be helpful to surgical oncologists and plastic surgeons and reassuring to patients when discussing the safety and survival outcomes related to breast reconstruction.

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PROCEEDURES AND ELECTIVE REVISIONS TO ACHIEVE A STABLE BREAST RECONSTRUCTION: AN EXAMINATION OF THE MASTECTOMY RECONSTRUCTION OUTCOMES CONSORTIUM (MROC) STUDY

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PURPOSE: To determine the total number of procedures required to achieve a stable breast reconstruction and to determine the frequency of elective revision surgery among this cohort of patients.

METHODS: Women enrolled at one of 11 MROC centers who underwent first-time breast reconstruction were considered eligible for inclusion. Reconstructive modalities included direct-to-implant (DTI), tissue-expander/implant (TEI), latissimus dorsi (LD), pedicle TRAM (PTRAM), free TRAM (FTRAM), DIEP and SIEA reconstructions. Clinical and demographic information were prospectively collected with two year follow up. Patients who experienced a failure in their initial reconstructive modality were excluded from the final analysis. We analyzed two main cohorts of patients: 1) patients without complications and 2) patients with complications. Mixed-effects regression modelling identified factors associated with elective revisions.

RESULTS: In total, 2113 MROC patients were identified, with 1996 (94.5%) achieving a stable reconstruction at 2 years for analysis. Of these patients, 1534 (76.9%) had a complication free postoperative course. Within this cohort of patients
without complications, 40.2% underwent elective revisions, with significant differences noted by reconstructive modality (p<0.001) (min. DTI 25%, max. LD 59%). The average number of elective revisions also differed by modality (p<0.001) (min. TE 0.7 (SD 1.3), max. fTRAM/DIEP/SIEA 1.3 (SD 1.5)). Average total number of procedures in patients without complications at two years was 2.9 (SD 1.6), ranging from 1.7 for PTRAM to 3.3 for TEI (p<0.001). Reconstructive complications occurred in 462 (23.1%) patients achieving a stable reconstruction at 2 years. Within this cohort, 67.1% underwent elective revision procedures and differences were noted by reconstructive modality (p=0.041) (min DTI 56%, max LD 80%). The mean number of procedures to achieve reconstruction in patients with complications was 3.6 (SD 2.0), and also differed by reconstructive modality ranging from 2.5 in DTI to 4.2 in TEI (p<0.001). Controlling for clinical and demographic characteristics, patients undergoing DIEP, FTRAM, and LD were more likely to undergo elective revisions (p<0.05) compared to TEI patients; OR 2.66 (CI 1.83, 3.86), OR 2.26 (CI 1.35, 3.78), and OR 1.98 (CI 1.07, 3.64) respectively. While patients undergoing DTI reconstruction (p=0.035) or requiring post-operative radiation (p=0.012) were less likely. Having a postoperative complication further increased the odds of undergoing elective revision procedures (p<0.001) OR 3.21 (CI 2.52, 4.10).

CONCLUSIONS: Breast reconstruction involves multiple procedures to achieve a final satisfactory result, with the average number of revisions differing by reconstructive modality and when complications are encountered. Patients experiencing complications undergo more elective revision procedures in comparison to patients without complications, with differences noted across reconstructive modalities in terms of total procedures performed. Patients should be counselled that the average patient without a complication undergoes nearly 3 procedures to achieve a satisfactory reconstruction. Whereas if a complication occurs, the number of procedures increases.

Utilizing Shear Stress to Optimize Endoluminal Linings with Pre-Vascularized Engineered Tissues

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PURPOSE: Regeneration of thicker or larger tissues of clinically relevant size remains a challenge due to poor oxygen diffusion into cells that are contained within non-vascularized tissue-engineered constructs. Another major obstacle in the ability to precisely replicate the intricate design of the vascular system is due to a lack of proper endothelialization on the luminal surface of vessels. However, without exposing the vascular lining cells to flow, their functionality and in vivo stability are suboptimal. In physiological conditions, hemodynamic shear stress alters cellular morphology and biological activity, especially luminal endothelial cells within blood vessels. In our previous work, we have fabricated tissue engineered constructs with microvasculature comprised of anatomically correct neointimal and neomedial layers. Here, we “prime” these constructs by dynamically perfusing them and determine how flow induced shear stress optimizes the endoluminal surfaces of our tissue-engineered vessels.

METHODS: Pluronic F127 fibers, were sacrificed in type-I collagen, creating a central looped microchannel. Twenty-four hours following fiber sacrifice, a cell suspension mixture of normal human dermal fibroblasts and human aortic smooth muscle cells was seeded into the microchannel. The following day, another cell suspension of human placental pericytes and human umbilical vein endothelial cells was seeded into the microchannel. All constructs underwent daily cell media changes in static culture for 72 hours, and then perfused at 10 dynes/cm² for an additional 1, 3, 5 or 7 days using a peristaltic pump in a bioreactor. Scaffolds were processed for histology and immunohistochemical analysis. Images were quantified using ImageJ (NIH). A two-tailed unpaired t-test was used to compare variables between experimental groups.

RESULTS: After culture, all constructs formed intact endoluminal linings along the microchannel with increasing thickness over time. CD31 expressing endothelial cells were noted along the luminal surface after 7 days and throughout the endoluminal lining after 14 days, establishing a neo-intima. Constructs undergoing static and dynamic culture had robust, vascular linings that spanned the entire microchannel. Representative slides were taken from each construct, and the area of robust cellular lining was measured and normalized to channel diameter. Perfused constructs had a 59% significantly thicker lining in the channel than compared to constructs cultured under static conditions (p=0.0057). In addition, cellular proliferation (measured by calculating the