**Affiliation: University of Utah, Salt Lake City, UT**

**PURPOSE:** Surgical-site infection is a major concern in prosthetic-based breast reconstruction. Some infections are mild, resolving with outpatient antibiotic treatment, and others are more severe, requiring hospital readmission for treatment with IV antibiotics. Explant of the tissue expander or implant is one of the most feared complications. Thirty-day postoperative readmission rates are a common quality metric, but little is known about readmission rates for later infection after prosthetic-based breast reconstruction. We used the Nationwide Readmissions Database (NRD) to determine the rates and predictors of early and late hospital readmissions associated with infection and explantation after prosthetic-based breast reconstruction.

**METHODS:** Using the 2013–2014 NRD, we identified breast cancer patients undergoing prosthetic-based breast reconstruction (implants and tissue expanders) who had an infectious readmission within 90 days following their procedure using ICD-9 diagnosis and procedure codes. We used univariate and multivariate logistic regression models to identify patient demographics, comorbidities, and hospital predictors of infectious readmission and explantation within the early (0–30 day) and late (31–90 day) postoperative time-periods.

**EXPERIENCE:** In a weighted sample of the NRD, we identified 18,339 patients who underwent prosthetic-based breast reconstruction from 2013–2014. We identified patients who had an infectious readmission within 0–90 days of their index procedure.

**RESULTS:** The overall infectious readmission rate for this group was 4.1% (n=759 patients). Only 49.3% of such readmissions occurred within the initial 30 days after surgery, and 50.7% occurred 31 - 90 days after surgery. Of those admitted for infection, 39.5% (n=300 patients) had their implant or tissue expander explanted. Most explantations occurred during late readmissions (55.1%). Median annual household income <$40,000 (OR 1.44, p=0.030), diabetes (OR 1.52, p=0.040), obesity (OR 1.70, p=0.004), and length of stay during the index procedure (OR 1.07, p=0.045) were independent predictors of overall infectious readmissions. No statistically significant predictors for implant or tissue expander explantation were identified.

**CONCLUSION:** Late hospital readmissions for infections in the setting of prosthetic-based breast reconstruction are common. Traditional thirty-day readmission rates may not be an adequate quality metric for breast reconstruction given the number of late postoperative readmissions, many of which lead to explantation. Early and late infectious readmissions have different predictors, and further work finding interventions that target these predictors may decrease the number of readmissions, saving cost while improving quality for both the patient and the healthcare system.

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**Animation Deformity in Breast Reconstruction Patients: A Quantitative Analysis of Nipple Displacement and Patient Reported Outcomes**

**Presenter:** Cecil S. Qiu, BA

**Co-Authors:** Max Wen-Kuan Chiu, MD; Lauren Feld, BS; Lauren Mioton, MD; Aaron M. Kearney, MD; John Y.S. Kim, MD, FACS

**Affiliation:** Northwestern University Feinberg School of Medicine, Chicago, IL

**PURPOSE:** Animation deformity, characterized by superolateral displacement of the implant with contraction of the pectoralis major muscle, is a complication of reconstructive breast surgery with submuscular implants. Severe cases may warrant corrective surgery. While subjective classification systems have been proposed, there is a paucity of quantitative approaches for assessing animation deformity. We endeavored to develop a reproducible, clinically relevant, quantitative model for grading animation deformity.

**METHODS:** Patients of the senior author presenting for prosthetic breast reconstruction follow-up between April 2017 and February 2018 were recruited for this study. Patient videos and still images were taken at rest and with pectoralis contraction, and nipple position and skin puckering were quantitatively assessed using ImageJ. The degree of nipple displacement and skin puckering for each patient...
was correlated with perioperative variables. Becker grading of animation deformity was used as a legacy scale for comparison. The BREAST-Q survey was used as a validated measure of patient-reported outcomes.

RESULTS: A total 72 patients accounting for 127 reconstructed breasts were included in final analysis. These included 104 (81.9%) bilateral reconstructions, 61 (48.0%) prophylactic reconstructions, and 62 (48.8%) reconstructions in which the pectoralis major was cut inferiorly. Average patient age was 49.5 (SD 8.3) and BMI was 26.2 (SD 6.0) at the time of reconstruction. Median follow-up time to video capture and BREAST-Q administration was 13.2 months after permanent implant placement. Image-based measurements demonstrated mean nipple displacement of 1.99 cm (SD 1.10 cm) and mean breast area with skin puckering of 18.14% (SD 15.80%). Both nipple displacement and skin puckering measurements were moderately right-skewed (skewness 0.76 and 0.54, respectively). Partial inferior myotomy of the pectoralis major during tissue expander placement, which occurred in 84% of cases that used ADM, was associated with 0.64 cm more nipple displacement (p=0.001). A history of infection complicating reconstruction was also associated with increased nipple displacement (p=0.036). No other variables, such as age, BMI, handedness, adjunctive therapy, mastectomy specimen weight, or implant size correlated with measures of animation deformity. A novel classification system was created using convenience cut-points of 2cm nipple displacement and 25% skin puckering: Grade I (<2 cm displacement and <25% skin puckering), Grade II (>2 cm and <25%), Grade III (<2 cm and >25%) and Grade IV (>2 cm and >25%). These grades comprised 59 (46.5%), 24 (18.9%), 12 (9.4%), and 32 (25.2%) breasts, respectively. Grades were significantly correlated with Becker grading (R=0.58, p<0.0001). Patient satisfaction with appearance and rippling were not associated with grades.

CONCLUSION: We performed the first quantitative analysis of animation deformity in breast reconstruction patients. Partial myotomy of the pectoralis major resulted in greater degree of nipple displacement. Lack of association between animation deformity and patient satisfaction highlights the importance of non-aesthetic factors to patient satisfaction. The quantitative grading system presented here may facilitate future research in animation deformity.

**Presenter:** Tony Connell, MBBS, FRACS(Plast)

**Co-Authors:** Damien Grinsell, MD; Mark Lee, MD; Thomas Lam, MD; Natalie Ngan, MD; Matthew Peters, MD; Lily Vrtik, MD

**Affiliation:** Mount Hospital, Subiaco

**OBJECTIVE:** A multi-center, prospective evaluation of the AeroForm Tissue Expander was performed to validate bench testing results following a device modification made to decrease the permeation and gradual loss of volume observed in earlier versions of the device.

**BACKGROUND:** Previously reported results for the AeroForm Tissue Expander have demonstrated that the device can be used as effectively and safely as saline expanders to prepare the surgical pocket for breast implant placement following mastectomy. Modifications made to the device include a new material to form the inner liner which is designed to contain CO2 gas inside the expander. The permeation rate for the current device is improved to 0.3-0.4cc/day compared to previous versions which had a permeation rate of 2-4cc/day. The higher permeation rate in the previous version was observed clinically as a gradual loss of volume over time, particularly when implanted for > 6-months. These measurements were obtained via bench testing and this post-marketing study was undertaken to validate the results in-vivo.

**METHODS:** Thirty (30) women were implanted with 50 AeroForm expanders; 20 bilateral, 10 unilateral reconstructions. Patients were followed prospectively from the time of implant, during the expansion process through the first post-operative visit after the exchange procedure. Success was measured based upon successful exchange to implant, days to complete the expansion process and the total length of time the expanders were implanted. Secondary endpoints measured were patient and physician satisfaction with the expansion process and the results of expansion.

**RESULTS:** Twenty-six (26/30) patients completed their exchange with 4 patients awaiting an exchange date. Data is analyzed by breast with the primary endpoint defined as successful exchange to standard breast implant, precluding non-device related failures (100%). The median number of implant days is 93 with a range of 56–274 days. There have been no reports of gradual loss of volume over time or deflation.