**Single Stage Permanent Implant Reconstruction Has Better Outcome Than Tissue Expander/Implant in Patients Treated with Postmastectomy Radiation**

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**Purpose/Objective(s):** To identify which type of implant based reconstruction has the most favorable outcome in the setting of post mastectomy radiation (PMRT).

**Materials/Methods:** We conducted a retrospective cohort study of 1179 breast cancer patients who underwent a total of 1729 mastectomies of which 76% (1329) underwent implant based reconstruction; 56% (739) involved tissue expander/implant (TE/I) exchange and 44% (590) were single-stage permanent implants (PI); 23% (400) had autologous tissue reconstruction (ATR), all treated at one institution from 1997-2014. Of the total breasts undergoing mastectomy, 29% (507) received PMRT and 71% (1222) did not. Median prescribed PMRT dose to the chest wall was 50 Gy (range 45-50.4 Gy); of which 61% (311) received a chest wall boost (10- 16 Gy). Forty percent (495) of mastectomies were performed prophylactically in an uninvolved breast. Primary outcome was defined as implant removal (IR) due to complications requiring surgical intervention, with or without rereconstruction. The association of clinical and pathologic parameters with IR was evaluated using logistic regression models, and the cumulative incidence of outcome was estimated using the Kaplan-Meier method.

**Results:** The median follow-up was 64 months. In patients who received PMRT, the 5-year risk of IR was 33.8% vs 16.4% for TE/I and PI; respectively (P = 0.0007). Similarly, patients with TE/I had a higher risk for IR with failed implant replacement compared to patients with PI (18.6% vs 9.3%; respectively; P = 0.0098); as well as a higher 5 yr predicted IR with successful rereconstruction (18.7%, vs 7.8%; respectively; P = 0.025). In the absence of PMRT, 5-year predicted incidence of IR did not differ between TE/I and PI (13.9% vs 8.4%; respectively; P = 0.074). Neither did the 5-yr IR with failed implant replacement (3.9% vs 2.3% respectively; P = 0.31); nor 5-yr IR with successful re-reconstruction (10.4% vs 6.3%; respectively; P = 0.14). The 5-yr complication rate among patients with ATR was not significantly different with and without PMRT (18.2% vs 16.6%; respectively; P = 0.97). The 5- yr complication rate was not significantly different between irradiated ATR and irradiated single stage (PI) (18.2% vs 16.4%; respectively; P = 0.99); while this was significantly lower compared to irradiated TE/I (18.2% vs 33.8%; respectively; P = 0.015). In multivariate analysis, PMRT, tissue expander/implant (TE/I) reconstruction and active smoking were significant predictors for implant removal (Odds Ratio [OR] = 7.2, P < 0.001; OR = 5.8, P = 0.001 and OR = 3.5, P = 0.02; respectively). Neoadjuvant chemotherapy, surgery related parameters as reconstruction timing, and implant size were not predictive of IR.

**Conclusion:** These data suggest that in the setting of PMRT, two stage tissue expander/implant (TE/I) has significantly higher rate of implant removal compared to Single Stage PI and ATR. PI could be considered a preferable alternative to TE/I when PMRT is indicated.