A Prospective Randomized Trial to Assess Perfusion and Patient Satisfaction in Nipple-Areola Skin Sparing Mastectomy with Immediate Reconstruction

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Background: Nipple-areola and skin sparing mastectomy (NASSM) is an accepted and sought after option for eligible patients, and the rate of women undergoing this operation continues to climb. The main advantage of the procedure is the ability utilize existing skin envelope and NAC for improved shape, fewer operations, and less psychological impact on patients. There are many possible incisions, each providing its own advantage from an oncologic or reconstructive perspective. Studies suggest that perfusion is received primarily from superior, medial, and lateral contributions. Therefore the lateral radial (LR) incision may lead to improved perfusion, however the mastectomy is more difficult via an inframammary (IMF) incision and this could lead to a higher complication rate. We aim to assess perfusion to nipple-areola complex in these two incision patterns and determine the impact of the incision type on overall outcomes, complications, and patient satisfaction.

Methods: Patients with age >18 with BMI 18-35, with estimated breast size 100-800g were included in this prospective study. Patients were randomized to receive either an IMF or LR incision unless one was given a strong preference by patient or surgeon. A BreastQ survey was administered preoperatively, and three-dimensional images of both breasts were captured. Mastectomies were performed by experienced breast surgical oncologists. Laser angiography (SPY system, Lifecell) was performed at 3 distinct time points: pre-operatively, post-NASSM, and post-reconstruction. Blood pressure was monitored closely throughout the operation. Patients were followed for at least 3 months after their permanent implant placement for complications. Three months post-operatively, the BreastQ survey was again administered and three-dimensional images were captured to measure aesthetic landmarks. Two-tailed Mann-Whitney U and Chi-squared tests were used to compare group medians and proportions with $P<0.05$ indicating significance.

Results: Fifty-five received an IMF incision, and twenty-four a LR incision. There was no difference in demographics, comorbidities, specimen weight, initial implant volume, or intraoperative blood pressure between groups. Similarly, there was no there a difference in distribution of breast perfusion pattern. The LR group did have a longer operative time (155 min vs 177 min, $p=0.02$). The decrease in perfusion to the whole breast did not differ between groups at each surgical stage. Patients with an IMF incision had significantly lower remaining perfusion to the inferior (21.94% vs 36.89%, $p=0.001$) and lateral portions of the flap (23.08% vs 40.70%, $p=0.003$) after reconstruction. Perfusion to the nipple was not significantly different (29.87% vs 40.03%, $p=0.15$) when adjusting for covariates. Rates of complications, including necrosis, infection, implant exposure or malposition, and explant did not differ between incision types. There was no difference in patient satisfaction based on BreastQ scores between incision types. Finally, there was no significant difference in mammographic measurements on three-dimensional imagining between groups.

Conclusions: There is a significant decrease in blood flow to the inferior and lateral portions of the skin envelope using the IMF incision when compared to the LR incision, possibly due to differences in retraction and difficulty in technique. Despite this, there is no difference in

complications, outcomes, or patient satisfaction with their surgical reconstruction over a 3 month period.