PURPOSE: Breast implant–associated anaplastic large cell lymphoma (BIA-ALCL), a rare but potentially deadly complication of device-based breast reconstruction, has an incidence estimated to be as high as 1 in every 3,817 cases of textured device implantation and has been implicated in 17 deaths worldwide. Present hypotheses of BIA-ALCL pathogenesis propose that bacterial biofilms present on textured implants may lead to T-cell dysregulation in the setting of chronic inflammation or genetic susceptibility, but this theory remains lacking in experimental evidence partly due to the inadequacy of present in vivo and in vitro models. The purpose of this study is to utilize our high-fidelity ex vivo biomimetic, 3-dimensional breast model to study the effects of implant shells on patient-derived BIA-ALCL cells.

METHODS: Healthy patient-derived breast tissue was processed for its individual cellular constituents including adipocytes, organoids, and the stromal vascular fraction (which also includes immunologic cells). These constituents were then suspended within 50 µl of 0.3% type I collagen matrix along with patient-derived BIA-ALCL cells at a density of 200,000 cells/ml before being plated into 6 mm wells. As a control, BIA-ALCL cells were also suspended within type I collagen at the same seeding density and volume but without any breast components. Before plating, wells were lined with either textured, smooth, or no implant shells. These were 1 × 2 cm pieces of implant shell dissected from the whole implant, cleaned of any underlying residual silicone gel, and autoclaved before being placed into the wells with the superficial aspect of the shell facing into the well. Eight wells were plated per implant shell type: 4 biomimetic platform wells and 4 collagen-only controls. All groups started at an equal density of approximately 1,000 cells per 3-dimensional confocal snapshot. Wells were then imaged immediately and every other day using confocal microscopy before being processed using Imaris software to analyze cell proliferation over time.

RESULTS: BIA-ALCL cell proliferation was significantly more robust in the biomimetic platform relative to the collagen-only groups regardless of implant shell type. BIA-ALCL cells in both the textured and smooth shell biomimetic groups grew nearly 30% faster than those within biomimetic wells lacking implant shell, with statistical differences as early as day 2 following plating. By day 10, mean cell counts in the textured and smooth shell biomimetic groups were 4,021 ± 999 and 4,281 ± 633, respectively, compared with 2,399 ± 355 in the biomimetic group lacking implant shell (P = 0.015). There was no statistical difference in BIA-ALCL cell proliferation between the textured and smooth biomimetic groups or among any of the collagen-alone groups.

CONCLUSIONS: Using our unique tissue-engineered 3-dimensional ex vivo model of BIA-ALCL, we have demonstrated that BIA-ALCL cells thrive within the biomimetic platform when compared with collagen alone and that incorporation of smooth and textured implant shell leads to significantly increased BIA-ALCL cell proliferation when compared with no implant shell. These findings contribute to the implication of breast implant materials in the development of BIA-ALCL, and they demonstrate the promise of our platform for use in further investigation of BIA-ALCL pathogenesis and therapeutics.

How Do We Raise the Bar in Autologous Breast Reconstruction? The Use of Progressive Tension Sutures for Donor Site Closure

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BACKGROUND: The abdomen is the most common location from which tissue is harvested for autologous breast reconstruction.¹ The evolution from musculocutaneous flaps to muscle-sparing perforators flaps has decreased donor site complications such as abdominal bulge and hernia; however, complications remain. The development of progressive tension suture placement for donor site closure has the potential to decrease complications and increase the esthetics of the abdomen after breast reconstruction.²

PURPOSE: To present our institutional experience using progressive tension sutures for a tensionless closure of the donor site to improve outcomes and optimize abdominal donor site esthetics.

METHODS: A retrospective cohort study was conducted over a 2-year period. Sixty-six consecutive patients who underwent abdominally based autologous breast reconstruction were divided into an experimental group (36 patients), in which the donor site was closed using progressive tension sutures, and a control group (31 patients), in which the donor site was closed without the use of this technique. A comparison between both groups was conducted in terms of demographic characteristics, perioperative variables, and donor site–related postoperative complications.
RESULTS: No significant differences were found between the 2 groups in terms of demographic characteristics including age, body mass index, smoking status, comorbidities, and previous abdominal surgery ($P > 0.05$). No significant differences were noted with respect to unilateral versus bilateral donor sites, operative times, and length of hospital stay ($P > 0.05$). With regard to donor site complications, the wound dehiscence rate was significantly higher for the control group (27.8% versus 6.5; $P = 0.023$). No differences were noted in terms of infection, seroma formation, hematoma formation, abdominal bulge, or abdominal hernia rates between the 2 groups.

CONCLUSION: In the cohorts of patients analyzed, the use of a tensionless technique for the closure of the donor site after an abdominally based autologous breast reconstruction decreased the rates of donor site wound dehiscence. Seroma and hematoma formation rates remained the same across both groups.

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Breast Reconstruction Completion in the Obese Women: Does Reconstruction Technique Make a Difference in Its Achievement?

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Breast reconstruction completion is the goal of the reconstructive process. Reconstruction completion may be defined as breast mound creation allowing the use of clothing without prosthetics or the stigmata of mastectomy. Creation of the nipple areolar complex (NAC) may also be considered reconstruction completion because many women do not feel like it is their breast again until the NAC in place. In normal body mass index (BMI) patients undergoing breast reconstruction, perioperative complication risk is similar between implant-based and autologous reconstructions. This is not the case in the obese women where breast reconstruction operations are associated with increased risk of perioperative complications. We hypothesize that perioperative complications may affect the eventual completion of reconstruction in the obese women. Our aim is to determine whether reconstruction technique affects the achievement of reconstruction completion in the obese women. An Institutional Review Board–approved retrospective study of consecutive obese women (BMI ≥30) who underwent mastectomy and implant-based or autologous reconstruction over a 10-year period was performed. Patient demographics, comorbidities, oncologic treatments, reconstructive procedures, and their complications were analyzed. Two hundred twenty-five women with 352 breast reconstructions were included with mean follow-up of 27 months. Seventy-four women underwent 111 autologous breast reconstructions and 151 underwent 241 implant reconstructions. Mean age of included women was 52 years. Mean BMI in the autologous group was 33 and 36 in the implant group. There were no differences between groups in terms of age and presence of medical comorbidities. Active tobacco use was noted in 5.4% of the autologous group and 14.5% of implant patients ($P = 0.47$). Chemotherapy, radiation, and delayed reconstruction timing were more common in the autologous patients compared to the implant group ($P = 0.01$, $P = 0.09$, and $P < 0.0001$, respectively). Minor and major complications occurred more frequently in the implant group compared to the autologous group ($P ≤ 0.0001$). Breast mounds were completed in >98% of autologous cases compared to 76% of implant cases ($P \leq 0.001$). NAC creation was completed in 57% of autologous patients and 33% of implant patients ($P = 0.0009$). The rate of successfully completing the breast mound and the NAC is higher in the autologous patient group (mound: odds ratio [OR], 3.32; 95% confidence interval [CI], 1.36–5.28; and NAC: OR, 2.7; 95% CI, 1.50–4.69) compared to the implant group. Occurrence of a major complication in the implant group decreases the rate of reconstruction completion (OR, 13.0; 95% CI, 4.9–34.1). Obese women undergoing implant-based breast reconstruction are more likely to have perioperative complications, and 24% of these patients fail to achieve mound completion. Obese women who undergo autologous breast reconstruction are more likely to achieve breast reconstruction completion (both mound creation and completion NAC reconstruction) when compared to obese women who undergo implant-based breast reconstruction.

Breast Reconstruction Using a 3-dimensional Absorbable Mesh Scaffold and Autologous Fat Grafting: A Composite Strategy Using Tissue Engineering Principles

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