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CASE REPORT

Extending the Indications for Autologous Breast Reconstruction Using a Two-Stage Modified Goldilocks Procedure: A Case Report

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■ **Abstract:** Post-mastectomy reconstruction is performed using implant-based or autologous techniques. Many women refuse or are poor candidates for implant-based reconstruction. We previously described a single-stage autologous technique that was most applicable in obese women with significant ptosis that made use of the mastectomy skin flap and subcutaneous tissue to reconstruct a breast mound. Here, we extend this technique to smaller breasted women by incorporating a second stage of skin tailoring and fat grafting. This technique does not require donor site surgery nor extended operative and recovery times. It extends the indications for autologous reconstruction to nonideal candidates and to developing countries where cost limits access. ■

Key Words: autologous breast reconstruction, lipotransfer, oncoplastic surgery

Completely autologous breast reconstruction is most commonly performed with abdominal based tissue flaps. These are long surgeries with potential for significant complications (1). Bilateral pedicled transverse rectus abdominis (TRAM) flaps can have appreciable consequences on abdominal wall dynamics (2). Bilateral deep inferior epigastric or free TRAM flaps require microvascular surgery and postoperative monitoring. Combined with an oncologic procedure, these operations require extended operative times. When informed of the prolonged surgical times and recovery, many women are hesitant to proceed. In addition, these extended theater times can place women with medical comorbidities at significant perioperative risk. These reconstructive techniques involve donor sites which carry intrinsic complication rates and frequently require revision (3). In addition, free flaps require microvascular surgical expertise that is not readily available in every community (4). We recently described a single-stage autologous method that utilized the mastectomy skin flap and subcutaneous tissue to reconstruct a breast mound that was found to be most applicable in obese patients with ptosis (5). Here, we extend this technique to patients with smaller breasts by incorporating a second stage of skin envelope tailoring and volume supplementation with lipotransfer. We believe this to be a straightforward, safe, cost-effective, and more broadly applicable autologous technique that does not require a prosthesis or subspecialty reconstructive training. It should be considered in every patient undergoing autologous breast reconstruction.

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DESCRIPTION OF TECHNIQUE

Bilateral mastectomy and lymph node evaluation is performed through a Wise pattern. A typical patient with moderate-sized breast is demonstrated in Figure 1. The skin within the pattern is deepithelialized preserving the dermis and nonbreast subcutaneous tissue. The inferior dermis and fat is sculpted into a breast mound as previously described. Vertical limbs are approximated over the reconstructed mound in the inframammary fold. The nipple areola complexes are free grafted into ideal position to complete the definitive reconstruction. Patients are discharged on postoperative day 1 after bilateral mastectomy and single-stage autologous reconstruction. This patient's

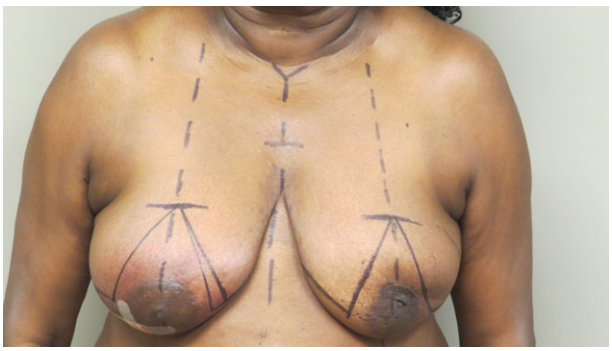

Figure 1. A 66-year-old diabetic female with 5 cm of right breast ductal carcinoma in situ with a history of multiple surgical breast biopsies demonstrating atypia marked with preoperative Wise pattern. [Colour figure can be viewed at wileyonlinelibrary.com]

Figure 2. Three months postoperative from bilateral mastectomy and single-stage autologous breast reconstruction with free nipple grafts. Her autologous reconstruction was performed using the deepithelialized mastectomy skin flap and subcutaneous tissue. [Colour figure can be viewed at wileyonlinelibrary.com]

result at 3 months is demonstrated in Figure 2. At this point, many women are pleased with their final result and the reconstructive process is finished. However, a significant proportion of women who initially had small to moderate-sized breasts desire additional volume and improved shape. We offer these women a skin tailoring and fat grafting procedure to further "cone" the breast and supplement volume at a minimum of 3 months after their initial surgery. This second stage effectively extends our unique approach to the majority of women with some degree of ptosis and excess adipose tissue.

In Figure 3, we demonstrate the triangle of skin that is deepithelialized and involuted to cone the breast and provide additional volume. The upper poles of the breasts and retroareolar regions are then augmented with lipotransfer. Figure 4 demonstrates the intraoperative skin triangles to be deepithelialized and areas targeted for lipotransfer. In Figure 5, we

Figure 3. Preoperative markings before second-stage revision of skin retailoring and fat grafting to cone the breast and add additional volume. The triangle of skin is deepthelialized and involuted to improve breast shape and add volume. The upper poles and retroareolar regions are targeted for fat grafting. [Colour figure can be viewed at wileyonlinelibrary.com]

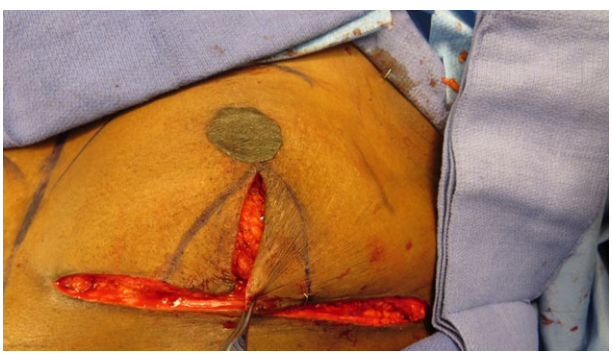

Figure 4. Intraoperative design of flaps to be undermined and skin triangles to be deepthelialized and involuted followed by lipotransfer. [Colour figure can be viewed at wileyonlinelibrary.com]

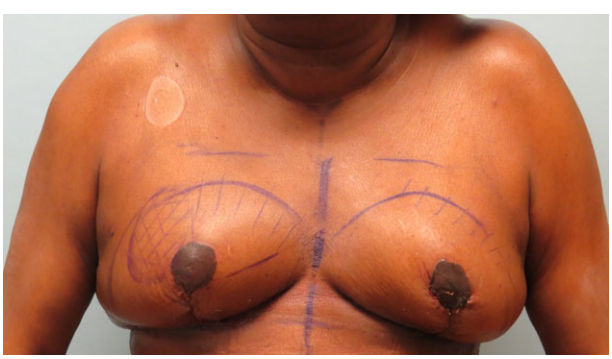

Figure 5. Final results 1 week postoperative from secondary revision with improved breast shape and increased volume. [Colour figure can be viewed at wileyonlinelibrary.com]

demonstrate this patient's result 1 week after her second-stage revision.

DISCUSSION

Post-mastectomy reconstruction is most commonly performed using implant-based techniques (6). In the United States, this usually involves placement of a temporary tissue expander followed by a subsequent exchange for a definitive prosthesis. The appeal of implant-based reconstruction includes shorter operative times, the absence of donor site scars, its relative simplicity and quicker recovery. The disadvantages include the frequent need for additional surgery for implant complications, following the recommended guidelines to indefinitely monitor the integrity of silicone implants, increased complication rates in patients requiring radiotherapy, the poor results in very large or obese patients and the potential infections associated with foreign bodies (1).

Completely autologous reconstruction requires increased patient commitment as well as surgeon and facility resources (7). The advantages of this strategy are: the longevity and more "natural feel" of the reconstruction, the relative resistance to radiotherapy and decreased likelihood of infectious complications (5). The disadvantages include: significantly longer operative and recovery times, the complications involving donor sites and the well documented morbidity of the TRAM flap on abdominal wall dynamics. Perforator flaps avoid some morbidity on abdominal wall function, but require special expertise and significantly longer operative times. From the point of view of cost, materials, tools, operative times, and availability of expertise, we believe that perforator flaps cannot practically address the need for all autologous post-mastectomy reconstruction required to be performed worldwide (7). We believe our strategy may help address this need without the requirement for significant retraining of additional surgeons and facilities.

The technique described here extends the indications for post-mastectomy reconstruction to women of more advanced age, with comorbidities with no stringent exclusions based on BMI and anatomy. Our operative times are similar or quicker than those required for implant-based reconstruction. The initial surgery typically takes between 2.5 and 4 hours (mastectomy and reconstruction) and the secondary revision, if required, can be performed in less than an hour. We believe the first stage provides a layered, vascularized autologous lattice facilitating second-stage lipotransfer.

We believe that our technique incorporates many of the advantages of the simplicity of implant-based reconstruction while avoiding the complications and issues of using a prosthetic. Additionally, we predict it may provide many of the benefits of more traditional autologous reconstructions ("natural feel" of the tissue, longevity, resistance to radiotherapy, decreased risk of infection) while avoiding the issues of donor site surgery, compromise of abdominal wall function, extended operative and recovery times, and the need for subspecialty surgeons and specially equipped hospitals.

There are several oncological considerations that must be addressed with this technique. Free nipple grafting is only performed if intraoperative frozen section demonstrates a negative sub-areolar biopsy. This has been demonstrated to be a reliable technique to insure safe nipple preservation (8). The nature of the free grafting procedure allows us to extensively sample the tissue behind the nipple and areola which also facilitates the success of the graft and insures adequate sampling.

This technique relies upon aggressive preservation of the skin and subcutaneous tissue to reconstruct a breast mound which may not be possible with more extensive breast cancers. All patients undergo preoperative breast MRI and conventional imaging. All areas suspicious for carcinoma are sampled with preoperative needle biopsy to determine the safety of preserving the overlying skin envelope. In cases where there are multiple areas in question, we often use a "delayed-immediate" strategy where we first perform the cancer resection, confirm clear margins and then proceed with reconstruction in a second stage. We routinely use intraoperative gross and frozen section evaluation to insure that we have clear margins if we do not delay reconstruction. Any areas in question are clipped or marked with suture to allow us to return and resect the area in question if necessary. This technique mandates meticulous correlation between imaging and pathology insuring that all areas in question are extensively evaluated by the pathologist to make certain that the carcinoma has been adequately resected and the overlying skin and fat is safe to preserve.

With regards to postoperative monitoring, in contrast to other post-mastectomy patients who have undergone reconstruction and do not require routine

mammography, we feel these patients should undergo mammographic screening and manage them as we do our breast conservation patients. This technique buries a significant amount of skin and fat deep within the reconstructed breast which may hide a post-mastectomy recurrence on clinical exam. The use of mammography in these patients is unproven but is reasonable and may even facilitate earlier detection than routine physical exam performed in the standard reconstructed post-mastectomy patients. These screening issues require careful study and more long-term follow-up.

Finally, with regard to cost, our strategy does not require purchase of an expander, definitive implant, or acellular dermal matrix. It does not require the use of microscopes, flow monitoring devices, extended theater times, or skilled postoperative care. Our strategy may be of special interest in developing countries where cost prohibits access to reconstruction.

CONCLUSION

We have developed a cost-effective and safe method of autologous post-mastectomy reconstruction that is broadly applicable to most women with some degree of ptosis and excess adipose tissue by adding a second stage of skin tailoring and lipotransfer to our previously described single-stage technique that was most applicable in larger women. It extends the indications for reconstruction to women who would not typically be considered ideal candidates. It requires less extensive theater and recovery times and avoids donor site surgery. We believe this is a useful additional technique in the armamentarium of breast surgeons that should be considered in women who require or desire autologous reconstruction.

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CONFLICTS OF INTEREST

None.

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