



Direct to implant breast reconstruction: visualized technique

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Abstract: Over the past 19 years, direct to implant (DTI) breast reconstruction has been found to decrease medical system cost, improve psychosocial morbidity, and optimize cosmetic outcomes. Acellular dermal matrices (ADMs) have further improved reconstructive outcomes, as the tissue incorporates with new angiogenesis and tissue regeneration. ADMs have been used by the senior author since 2000, and have since become a cornerstone of implant-based reconstruction. The senior author began using contoured perforated ready to use ADM in 2015 and is currently studying the effect of this change on breast reconstruction outcomes. This article details the senior author's technique in performing DTI breast reconstruction and highlights the operative components necessary for success.

Keywords: Direct to implant (DTI); breast reconstruction; acellular dermal matrix (ADM)

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Introduction

As compared with delayed reconstruction, immediate reconstruction has been found to decrease cost, improve psychosocial morbidity, and optimize cosmetic outcomes facilitated by nipple sparing and skin-sparing mastectomies (1-4). Direct to implant breast reconstruction has become the preferred method of reconstruction after mastectomy in select patients. The advantage over traditional tissue expander/implant reconstruction includes the potential for fewer surgical procedures. Furthermore, the use of implant-based breast reconstruction immediately after mastectomy provides the additional advantage of decreased recovery time without the donor site morbidity when compared to autologous tissue reconstruction.

Direct to implant reconstruction has been furthered by the use of acellular dermal matrices (ADMs), which are human, bovine, or porcine derived biotechnologically engineered tissues that encourage angiogenesis and tissue regeneration. They were first used in direct to implant (DTI) reconstruction by the senior author in 2000, and have since become a cornerstone of implant-based breast reconstruction (5,6). This article details the senior author's technique in performing DTI breast reconstruction and highlights the operative components necessary for success.

Operative technique

Prior to performing a DTI breast reconstruction, a thorough consultation with the patient must take place to ensure appropriate patient selection. Ideal candidates for this approach have a moderate breast size with a modest degree of ptosis and are undergoing nipple or skin sparing mastectomies. Furthermore, the patient's body habitus must also be considered, as those who are morbidly obese are at higher risk of postoperative complications (7). Preoperative planning should include careful measurement of the patient's chest wall, as well as 3D imaging photography of landmarks and volumetric measurements to aid in implant selection. The skin volume and not the actual weight of breast tissue must guide the implant volume selection. The patient's desires are of the utmost importance and skin reduction mastectomies are always an option for those who do not want a large volume.

As the breast surgeon performs the mastectomy prior to the reconstruction, the plastic surgeon should be an active advocate of careful skin handling in order to ensure minimal skin traction injury and use of low electrocautery settings or radiofrequency cutting devices to avoid tissue damage, as optimal skin flap quality is crucial for operative success.

After the mastectomy has been performed, and after



Figure 1 DTI reconstruction using a retropectoral/ADM approach (8). DTI, direct to implant; ADM, acellular dermal matrix.

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hemostasis has been ensured, the reconstruction begins with the creation of a subpectoral pocket beginning on the lateral edge of the pectoralis major muscle, extending up to the second rib superiorly, to the sternal fibers medially, and out to the anterior axillary line laterally. Inferomedial muscle elevation of pectoralis origin is also performed to allow for anatomic placement of the implant. Bupivacaine liposome injectable suspension mixed with 0.25% Marcaine in 0.9% NaCl is injected circumferentially inside the pocket and directly into the pectoralis muscle. Depending on the patient's anatomic measurements, a sheet of perforated medium or large contoured ADM is then sutured in a running fashion using 2-0 or 3-0 Vicryl with a tapered needle along the entire inferior border of the pectoralis major muscle from medial to lateral and extending down to the serratus fascia to create and define the lateral mammary fold. At the level of inframammary fold, this suture is stopped temporarily. Another suture is started again at the superomedial edge of the ADM and continued with deep insertion into muscle or fascia in a running fashion from a superior to inferolateral direction to secure the medial edge of the ADM to the chest wall and recreate the medial breast border. At the level of the inframammary fold, this suture is also temporarily stopped.

While suturing, the edges of the ADM are folded over in order to create a double layer of material that secures a strong insertion, which helps define the inframammary fold and prevents implant descent over time. Of note, this technique involves no elevation of the serratus anterior muscle. The pocket is then irrigated with triple antibiotic

solution (1 liter 0.9% NaCl with 1 gm cephalosporin, 80 mg gentamycin, and 50,000 units bacitracin), and subsequently the skin and pocket entrance are re-prepped with povidone-iodine.

Following confirmation of implant size by surgical judgement and mastectomy tissue weight, surgical gloves are changed and the implant is then carefully inserted beneath the pectoralis-ADM layer. The ADM is then sutured to the inframammary fold by continuing the sutures that had been used to secure the lateral and medial edges of the implant pocket, which are then tied to each other. The risk of seroma formation is decreased by ensuring a hand-in-glove fit of the implant in the subpectoral-ADM pocket, as well as subsequent placement of two 15 French Blake suction drains inferiorly, both subcutaneously and subpectorally through a perforation in the ADM. The skin and subcutaneous tissue are then closed in multiple layers, using absorbable sutures in the deep tissue and 3-0 barbed suture in the subcutaneous layer.

The surgeon should observe the "perfect shape" at this point without an expectation of postoperative settling. A cyanoacrylate tissue adhesive and wound closure tape dressing is placed over each of the inframammary incisions, and chlorhexidine-impregnated sponge dressings are placed around the drains. Skin viability is evaluated using clinical judgement, and after the mastectomy and implant insertion, using indocyanine green laser angiography [see the video (*Figure 1*) for visualized operative technique].

The patient typically remains in the hospital for 24-48 hours after the operation. Drains are generally removed when their output is less than 20 to 30 mL over 24 hours. This is never before 7 days postoperatively and can be as long as 10 days. Furthermore, patients are instructed to wear a supportive surgical bra to help shape the breast.

Comments

The introduction of the DTI technique utilizing ADM has greatly expanded the reconstructive repertoire in select patients after nipple sparing mastectomy, and it is an attractive option for those who wish to undergo a single-stage implant-based breast reconstruction at the time of mastectomy. Outcomes for the technique described by the senior author have been reported at 8 and 13 years postoperatively, and include good cosmetic results with low incidence of capsular contracture (0.4%) and low overall complication rate (3.9-8.6%) (9,10). As mentioned above, skin flap quality is crucial to operative success, thus patient

selection and intraoperative evaluation of skin flap viability are key components of the DTI technique. In addition to intraoperative clinical judgement of flap quality, we also employ indocyanine green laser angiography in DTI breast reconstructions to ensure adequate blood flow throughout the flap, as this has previously been found to decrease ischemic complications (11,12).

Although the authors describe a retropectoral/ADM DTI approach in this operative technique, a prepectoral approach using ADM is a viable alternative in select patients with adequate mastectomy flaps who may want implants and whose lifestyle includes a high level of physical activity. While the prepectoral approach has been shown to have comparable results to the retropectoral/ADM approach, patients who undergo prepectoral implant placement often require fat grafting to conceal visible implant rippling and wrinkling (13), which is an additional procedure that some patients may wish to avoid and need to understand preoperatively.

The use of ADM in breast reconstruction has grown tremendously over the past two decades after the initial use in the breast by the senior author, and a variety of subpectoral and prepectoral techniques using ADM have been reported (5,6). The evolution of techniques used in implant-based breast reconstruction have involved a variety of alterations including the type and composition of ADM used. Many surgeons have begun using perforated or fenestrated ADM, which has been shown to decrease seroma formation with comparable cosmetic results; though no effect on capsular contracture formation as compared with non-fenestrated ADM has been detected (14,15). We began using contoured perforated ADM in 2015 and are now currently evaluating a head to head comparison of perforated and non-perforated ADM and the effect of this change on breast reconstruction outcomes.

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None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Informed Consent: Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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