The use of immediate breast reconstruction with prosthetic devices following mastectomy has increased over the past decade. In 2010, more than 93,000 breast reconstructions were undertaken in the United States, and in more than 80% (74,872) of those reconstruction was undertaken with prosthetic devices. This significant change may be a reflection of a greater patient awareness of this modality, greater surgeon acceptance, and more women opting for immediate reconstruction after mastectomy or prophylactic subcutaneous mastectomy.

Subcutaneous Mastectomy
Breast cancer affects 1 in 4 women diagnosed with cancer in the United States and rates in the top 3 of most common cancers among women. Surgical management has evolved from Halsted’s initial description of a radical mastectomy in 1894, Urban’s extended radical mastectomy in the 1960s, and Toth and Lappert’s description of skin-sparing mastectomy in the early 1990s. Skin-sparing mastectomy includes resection of the nipple-areolar complex (NAC) with all breast parenchyma, with or without axillary clearance.

However, the increased expansion of mammographic screening resulting in the detection of smaller and subtler primary invasive cancers as well as genetic testing of BRCA1 and BRAC2 have led women to elect prophylactic conservative mastectomies in increasing numbers.

Postmastectomy Reconstrucive Options
For breast microsurgeons, autologous tissue options for postmastectomy breast reconstruction using perforator flaps, such as the superficial or deep inferior epigastric perforator, or superior gluteal artery perforator flaps that preserve donor-site muscles have been preferred options. However, these surgeons face aesthetic hurdles in attempting to match the shape, size, symmetry, and color of the original breast.

Presently, prosthetic devices are available as shaped devices and in cohesive silicone gels, allowing immediate and 2-stage implant-based postmastectomy reconstruction, which has increased by 16% in the United States over the past 12 years. These innovations and advancements have served to provide women with safer and more effective prosthetic options for those considering reconstruction after mastectomy. Unfortunately, the cost to the patient and the health system and the possibility of complications remain significant determinants to patient and surgeon.

Ringberg reported an 8.4% early failure rate, whereas others report failure rates between 10% and 13%. The anatomic limitation of the prosthetic device reconstruction (single or multiple stage) is coverage of the lower pole of these devices, especially when the pectoralis muscle is violated. Implants placed in a
complete prepectoral position after mastectomy have a tendency to displace superiorly and fail to create a natural ptotic breast shape.\textsuperscript{30} Complication rates associated with this technique approach 40%\textsuperscript{31} and include loss of implant, capsular contracture, rippling of the implant, and mechanical shift of the implant.\textsuperscript{32} A major advantage for prosthetic reconstruction remains its cost, although up to 40% of patients may require revision surgery.\textsuperscript{33}

**Acellular Dermal Matrix in Breast Reconstruction**

In 1994, acellular dermal matrix (ADM), a bioprosthetic, was introduced for use in reconstruction of significant abdominal wall defects and in patients with burns.\textsuperscript{34} It was not until 2005, however, that Breuing and Warren\textsuperscript{35} introduced ADM for use in breast reconstruction. This soft tissue replacement has allowed surgeons to create customized breast pockets, thereby improving the overall breast symmetry and natural contour and shortening the reconstructive timeline in women of all ages and in a variety of breast volumes.\textsuperscript{36,37}

Many of these bioprosthetics have also been reported to have regenerative potential and are capable of revascularization, recellularization, and provision of a supportive scaffold upon which the patient’s own cells can repopulate.\textsuperscript{38} Currently, surgeons may select from 2 sources of ADM: (1) human-derived variants, such as FlexHD (Ethicon, Somerville, NJ), freeze-dried AlloDerm (LifeCell, Branchburg, NJ), Neoform (Mentor, Santa Barbara, Calif), and DermaMatrix (Synthes, West Chester, Pa); and (2) porcine-derived Permacol (Covidien, Boulder, Colo) and Strattice (LifeCell).\textsuperscript{39} Studies comparing the different bioprosthetic ADM options remain rare.\textsuperscript{40}

When partial muscle coverage without ADM is performed after subcutaneous mastectomy, there is an increased risk of rippling and wrinkling along the lower pole, especially when the lower mastectomy skin flap is thin. This may also displace the implant laterally and inferiorly.\textsuperscript{41} In addition, there is an increased risk of device exposure in the event of delayed healing as well as a higher likelihood of seroma (pooled odds ratio, 3.9%; 95% confidence interval, 2.4–6.2), infection (pooled odds ratio, 2.7; 95% confidence interval, 1.1–6.4), and capsular contracture as found in the meta-analysis by Ho and colleagues\textsuperscript{42} and the review by Agrawal and colleagues.\textsuperscript{43} Complexity is further increased in unilateral reconstruction when the surgeon attempts to match the unaffected side.

Although implants placed partially under pectoralis muscle coverage with ADM theoretically minimize rippling and wrinkling because of the added thickness, they also better define the natural breast landmarks, provide additional tissue support, and minimize device exposure in the event of delayed healing.\textsuperscript{44} Vardanian et al\textsuperscript{45} evaluated other parameters of ADM usage and reported a capsular contracture rate of 3.8% in the ADM cohort compared with 19.4% in the non-ADM cohort. In addition, there was less bottoming out (4.8% versus 12.4%), rippling (3.8% versus 10.9%), and mechanical shift (1.9% versus 9.3%) in the ADM cohort.

Selber et al\textsuperscript{46} described the ideal bioprosthetic as “free from potentially antigenic material, reliable and rapidly repopulated by host cells, able to promote early revascularization, resistant to infection, easy to process” and “inexpensive or ideally free of cost.”

\textbf{Figure 1.} Preoperative markings on a 43-year-old female patient for bilateral subcutaneous prophylactic mastectomies.
Aesthetically, to create lower-pole fullness yet still provide complete tissue coverage, ADMs and fat grafting have been recruited into the complex decision-making process. Acellular tissue matrices are associated with risks of infection (3.1%), explantation (1.5%), hematoma (1.5%), and seroma (4.6%) as well as significantly high financial costs to the patient or health service providers. Hartzell and associates reported a cost of $3536 to $4856 per breast (depending on the thickness and size of the matrix).

The purpose of this report is to propose an alternative option to primary breast reconstruction in patients undergoing prophylactic mastectomy using lower abdominal donor dermal graft after de-epithelialization and creating an ideal lower pole sling to support the breast implant. Hudson and associates previously reported success with this technique.

**Case Study**

A 48-year-old woman (see Figures 1 and 2) with a body mass index of 26 elected to have a prophylactic subcutaneous nipple-sparing mastectomy and immediate reconstruction with saline implants after a history of numerous lumpectomies between 1993 and 2014 for epithelial atypia masses and scattered calcifications left her with significant deformed and distorted breast parenchyma. The patient had a family history

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**Figure 2.** Preoperative right and left oblique views of the patient.
of breast cancer, and rheumatoid arthritis and hypothyroidism were also noted.

Bilateral subcutaneous mastectomies were undertaken through submammary incisions (see Figure 3A). Reconstruction was done with submuscular, smooth, round Moderate Plus Profile Saline implants of 400 mL (Mentor, Irving, Tex) filled to 440 mL bilaterally. Abdominal laxity and diastasis were noted preoperatively, and formal abdominoplasty and double-layer plication of the diastasis recti were undertaken through a mini-abdominoplasty incision. A dermal graft of 15 cm by 20 cm was harvested from the apron and sutured around the lower pole of the implant (see Figure 3B). The dermal graft was anchored to the inframammary fold and the pectoralis major border (see Figure 4). Multilayer closure over drains was performed for all wounds. The total operating time was 4.5 hours, and recovery was uneventful.

Nine months after reconstruction the patient had obtained soft, symmetrical, and anatomical reconstructed breasts with full lower poles. The abdominal wound healed successfully (see Figures 5 through 7).

**Discussion**

The use of immediate breast reconstruction after prophylactic mastectomy has increased over the past decade. With the advent of nipple-sparing mastectomy adding to the complexity of the decision-making process,
implant-based breast reconstruction in the setting of advances of breast conservative therapy for those with locally advanced breast cancer is now a surgical option.

The introduction of implants and ADMs into breast reconstruction has allowed surgeons to create customized breast pockets for implants, shorten the reconstructive timeline, and improve the aesthetics. However, these bioprosthetics are not without significant risks of infections and seroma, and there are financial burdens to both patient and the health system.

This report demonstrates that autologous dermal grafts harvested from lower abdominal skin may be used as an alternative to high-cost ADM in the setting of prophylactic mastectomies.

The ideal patient is one who electively chooses to have reconstruction with a prosthetic device and who has a lax abdomen that would benefit from an abdominoplasty. The de-epithelialized tissue, which is normally discarded, can supply the appropriate amount of dermis needed to secure the lower border of the pectoralis major and re-contour the breast lower pole while securing to the inframammary fold with low complication rates and significant patient satisfaction and safety.
Figure 7. Nine month postoperative AP view of the patient after bilateral subcutaneous mastectomies with subpectoral saline implants and autodermal graft harvest from the lower abdomen.

References


Authors Queries

Journal: AJCS
Paper:
Title: Autoderm: An Alternative Option for Immediate Primary Breast Reconstruction After Mastectomy—A Case Report

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