Breast Reconstruction Using a Staged Nipple-Sparing Mastectomy following Mastopexy or Reduction

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Background: To address those patients who do not meet anatomical criteria for nipple-sparing mastectomy, the authors use a staged approach: (1) mastopexy or breast reduction, (2) nipple-sparing mastectomy through the mastopexy incisions after a minimum of 3 to 4 weeks, and (3) the final reconstruction.

Methods: Fifteen patients underwent nipple-sparing mastectomy at Georgetown University Hospital between 2007 and 2010 after planned or unrelated mastopexy or reduction. An institutional review board–approved retrospective chart review recorded demographic information and outcomes such as skin necrosis and device failure.

Results: Fifteen patients (24 breasts) underwent nipple-sparing mastectomy after mastopexy or reduction with an average follow-up of 13 months. The staged procedure was planned in 10 patients [19 breasts (79 percent)] and unplanned, or coincidental, in five [five breasts (21 percent)]. The mastectomy was prophylactic in 17 breasts (71 percent) and therapeutic in seven (29 percent). Four of the 24 operated breasts (17 percent) experienced a complication. Two patients [two breasts (8 percent)] developed skin flap necrosis. Two patients [three breasts (13 percent)] developed minimal partial nipple-areola complex necrosis. One patient [one breast (4 percent)] had an expander explanted for infection related to skin flap necrosis. Fourteen patients [23 breasts (96 percent)] successfully recovered following nipple-sparing mastectomy and prior mastopexy or reduction without residual effects of nipple-areola complex or skin flap necrosis.

Conclusions: The authors are comfortable offering the staged approach to nipple-sparing mastectomy to patients with moderately large or ptotic breasts. It may not be suitable for the very large or ptotic breast. (Plast. Reconstr. Surg. 129: 572, 2012.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

During the past decade, major advances in surgical breast cancer treatment and post-mastectomy reconstruction have given way to less disfiguring procedures with comparable levels of oncologic safety.¹⁻⁶ This foundation of improved cosmetic outcomes gives women better options when choosing between breast conserva-
tion therapy and mastectomy. One advance in particular, nipple-sparing mastectomy, has had a profound impact on the potential for dramatically improved cosmetic results.⁷⁻⁹ Preservation of the nipple has been demonstrated to have a positive influence on patient satisfaction after breast reconstruction.¹⁰

Until now, the option of a nipple-sparing mastectomy has been largely limited to women with relatively small, non- ptotic or minimally ptotic breasts with small, early-stage, peripheral cancers or for prophlaxis.¹¹,¹² Although there are breasts that are clearly too large or too ptotic to be con-

Disclosure: Dr. Spear is a paid consultant for LifeCell and Allergan. The remaining authors have no financial interest in any of the products or devices mentioned in this article.
sidered for a nipple-sparing mastectomy, the ques-
tion remains of whether it is possible to extend the
anatomical criteria—by reducing the breast size
or degree of ptosis with a staged procedure—to
some breasts that were previously too large or
ptotic to be considered. The challenge in the
larger or more ptotic breast is to maintain the
oncologic benefit of the mastectomy while maxi-
mizing cosmetic results and minimizing surgical
risks such as flap necrosis, nipple-areola complex
carcinoma, infection, and seroma.13

In 1987, Woods described his approach for
nipple-sparing mastectomy, including simultane-
ous mastopexy using various techniques.14 Al-
though the group at the Mayo Clinic had been
performing subcutaneous mastectomy for several
decades, Woods was the first to suggest that, for
women whose cosmetic outcomes would otherwise
have been compromised, the nipple could be
spared and the skin envelope reduced at the time
of mastectomy to create a better aesthetic result.
That option has fallen out of favor because of the
need to retain substantial quantities of breast tis-
tissue on the breast flaps to ensure nipple and flap
viability.

Over the past decade at our institution, we
have had increasing experience performing nip-
ple-sparing mastectomy in the prophylactic and
therapeutic settings for patients who meet certain
oncologic and anatomical criteria15–17 (Fig. 1). To
address those patients who would not otherwise
meet anatomical criteria for nipple-sparing mas-
tectomy, we hypothesized that we could offer a
two-stage approach with a mastopexy or reduction
before the mastectomy for the carefully selected
patient with ptosis or macromastia. Because of
concerns for vascularity of the otherwise long mas-
tectomy flaps, a mastopexy could be performed as
a first-stage procedure, repositioning the nipple
on the mound to a more favorable position and
reducing the skin envelope, and thus shortening
the length of the anticipated future mastectomy
flaps. A second stage would take place a minimum
of 4 weeks later, when a nipple-sparing mastec-
tomy would be performed ideally through one of
the previous mastopexy incisions or through a new
incision in the inframammary fold. This research
project was approved by the Georgetown Univer-
sity Hospital Institutional Review Board.

During the same time period, several of our
patients who had previously undergone an unre-
lated reduction mammoplasty or mastopexy pre-
sented for mastectomy for various indications, in-
cluding risk reduction. As the nipple-areola
complex had already been repositioned and the

<table>
<thead>
<tr>
<th>Screening Oncologic Criteria</th>
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<tbody>
<tr>
<td>Tumor size &lt; 3cm</td>
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<tr>
<td>Tumor &gt; 2cm from nipple</td>
</tr>
<tr>
<td>Clinically negative axillary nodes</td>
</tr>
<tr>
<td>No skin involvement or inflammatory CA/Paget's disease</td>
</tr>
<tr>
<td>*Possible preop MRI to exclude nipple involvement</td>
</tr>
<tr>
<td>*Possible preop ultrasound-guided mammotome biopsy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient Anatomic Criteria</th>
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</thead>
<tbody>
<tr>
<td>No excessively large breasts</td>
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<tr>
<td>No excessively ptotic breasts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operative Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraop frozen section negative</td>
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<tr>
<td>Permanent pathology negative</td>
</tr>
</tbody>
</table>


skin envelope reduced, a nipple-sparing proce-
dure was offered, with an access incision in the
vertical limb of the previous scar pattern or in the
inframammary fold.

**INDICATIONS FOR THE PLANNED PROCEDURE**

After consultation with the breast surgeon, if
a patient desires prophylactic nipple-sparing mas-
tectomy or has a diagnosis of cancer and meets
stringent oncologic criteria according to our al-
gorithm (Fig. 1)—namely, small, peripheral tu-
mors with clinically negative nodal evaluation—
and still desires nipple-sparing mastectomy, an
anatomical examination is performed. If the
breasts are determined to be of grade 2 or 3 ptosis,
and preservation of the nipple-areola complex is
of sufficient importance to the patient, we discuss
with the patient the possibility of this staged pro-
cedure, emphasizing that an additional procedure
is needed, and that nipple-areola complex viability ultimately still cannot be ensured.

**TECHNIQUE FOR THE PLANNED PROCEDURE**

The criteria for selection for this staged approach include meeting the oncologic criteria according to our algorithm displayed in Figure 1 but failing the anatomical criteria because the nipple-areola complex is too low, the breast is too ptotic or too large, or some combination of the above. We believe nipple-sparing mastectomy in these breasts otherwise would likely result in a strong likelihood that the nipple-areola complex will end up too low, there will be excess skin, there will be flap necrosis, or there will be necrosis of the nipple-areola complex. These problems in turn set the patient up for further complications, including seroma, infection, and failure of the reconstruction.

In the proposed initial staged procedure, a circumvertical or Wise-pattern skin reduction is marked preoperatively (Fig. 2). In the operating room, the new nipple-areola complex size is marked with the aid of a cookie cutter, and the excess periareolar doughnut of skin is then deepithelialized. The critical portion of the initial procedure involves maintaining the majority of the circumference of the periareolar dermis and superficial blood supply intact as much as possible, particularly superiorly from approximately the 9-o’clock to 3-o’clock positions (Figs. 3 and 4).

**Fig. 2.** Patient example 1 was a 26-year-old *BRCA1*-positive woman. She was 5 feet 3 inches tall, weighed 180 pounds, and had grade 3 ptosis. The patient elected to initially undergo a bilateral circumvertical reduction. Five months later, a prophylactic nipple-sparing mastectomy with immediate reconstruction with tissue expanders and acellular dermal matrix was performed. (Above, left) Circumvertical reduction pattern is marked preoperatively. (Above, right) Intraoperative view of the deepithelialized periareolar area. The critical portion involves maintaining an intact periareolar dermis circumferentially. (Below, left) Intraoperative view demonstrating intact blood supply to the nipple-areola complex during mastopexy. (Below, right) The patient is shown 1 year after tissue expander exchange to High Profile 650-cc silicone implants (Allergan, Inc., Irvine, Calif.).
parenchyma is excised, it is typically from a central inferior wedge, leaving the superior deepithelialized dermal vasculature intact. In the planned/staged procedure, this is typically a skin-only reduction or a small parenchymal reduction, with specimen weights for the most part less than 100 g per breast (Fig. 5).

The second-stage nipple-sparing mastectomy takes place a minimum of 3 to 4 weeks later. However, in some of the patients with cancer, once the mastopexy/reduction is healed, the patient may commence adjuvant chemotherapy, depending on the discussion with the surgical and medical oncologist, much as they would before radiation therapy if they were on track for breast conservation therapy rather than mastectomy. The second-stage nipple-sparing mastectomy takes place typically 4 to 6 weeks after the completion of chemotherapy with the return of normal immune function. The guiding principle in the patient with a diagnosis of breast cancer is that the tumor is removed entirely with clear margins as is done for breast conservation therapy, the axilla is properly surgically staged and treated, and the mastopexy/reduction are all performed before the initiation of chemotherapy with minimum or no delay in treatment. This is intended to be identical or analogous to the patient undergoing breast conservation therapy with oncoplastic repair. The difference is that a mastectomy comes later rather than radiation therapy.

Once the first stage is complete, the patient returns for the nipple-sparing mastectomy, which is performed through the vertical limb of the mastopexy or through the inframammary fold by one of four breast surgeons with whom we work. As we have previously reported, the nipple-sparing mastectomy technique at our institution involves intraoperatively obtaining a retroareolar button of tissue that is sent for permanent pathologic evaluation.15,16 If the final pathologic evaluation of this specimen reveals ductal carcinoma in situ or invasive cancer, the nipple and/or areola is excised in a separate operative procedure. Reconstruction is performed as one would otherwise with tissue expander or implant and acellular dermal matrix. The patient then returns for final exchange of expander to implant or other revisions as necessary.

**RESULTS**

Fifteen patients (24 breasts) underwent nipple-sparing mastectomy after mastopexy or reduction. The staged procedure was planned in 10 patients [19 breasts (79 percent)] and unplanned, or coincidental, in five patients [five breasts (21 percent)]. The mastectomy was prophylactic in 17 breasts (71 percent) and therapeutic in seven breasts (29 percent). In the planned group, five of 10 patients (50 percent) and five of 19 breasts (26.3 percent) had cancer; in the unplanned group, two of five patients and breasts (40 percent) had cancer. The average patient age was 45 years (range, 27 to 68 years) and the average body mass index was 23 (range, 19 to 30). In the prophylactic group, five of 10 patients (50 percent) tested positive for a breast cancer mutation (BRCA1).

All patients underwent immediate reconstruction after mastectomy with tissue expanders (13 patients, 21 breasts) or implants (two patients, three breasts). Silicone gel implants were placed in both patients with direct-to-implant reconstructions. Acellular dermal matrix was used in all 15 patients (24 breasts), as this is the standard reconstruction at our institution. One patient (one breast) received Strattice (LifeCell Corp., Branchburg, N.J.), and AlloDerm (LifeCell) was used in the other 23 reconstructions.

The average time from mastopexy or breast reduction to nipple-sparing mastectomy was 3.4 months (range, 38 to 346 days) in the planned group and 6 years (range, 139 to 3650 days) in the unplanned group. For those five patients with cancer in the planned group, the average time to mastectomy was lower at 2.6 months (range 38 to 158 days). Two of these five patients (40 percent) underwent adjuvant chemotherapy after the mas-

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**Fig. 3.** Patient example 2 was a 45-year-old BRCA1-positive woman with a strong family history of breast cancer. She was 5 feet 4 inches tall, weighed 116 pounds, had significant asymmetry and ptosis, and desired the two-stage nipple-sparing mastectomy procedure.
topexy and before the nipple-sparing mastectomy, substantially prolonging the time until mastectomy to an interval of 4.4 months. Although this is substantially longer than the average for the whole planned group of 3.4 months, these two patients were in fact not delaying their cancer treatment but were undergoing planned chemotherapy during this interval.

The average time from immediate reconstruction to expander exchange to implantation was 7.4 months (range, 108 to 282 days) in the planned group and 6.2 months (range, 125 to 251 days) in the unplanned group. However, at the time of this publication, one cancer patient in the planned group had yet to undergo final exchange from expander to implant. Another patient in the planned group did not complete reconstruction because of mastectomy flap necrosis and ultimate device explantation. She was an active smoker throughout her surgical process. The average follow-up time of 13 months is from the completion of reconstruction for the remainder of the 13 patients. No patient in this study underwent therapeutic irradiation.

**Complications**

Complication data are listed in Table 1. Overall, three of 15 patients (20 percent) or four of 24 breasts (17 percent, one bilateral) experienced a complication (such as necrosis or infection) requiring a return to the operating room. Two patients [two breasts (8 percent)] developed erythema that resolved with oral antibiotics, one patient in the planned prophylactic group and one patient with cancer in the unplanned group. Two patients in the planned group [three of 24 breasts (13 percent)] developed minimal partial nipple-areola complex necrosis, one bilateral patient with a unilateral breast cancer and a second prophylactic breast. However,
no patient lost a significant portion of her nipple-areola complex because of necrosis. Three patients [four breasts (17 percent)] required a return to the operating room for débridement of either partial nipple-areola complex necrosis or skin flap necrosis, one patient bilaterally.

Two of these patients (three breasts) were in the planned group and one patient (one breast) was in the unplanned group. One patient [one of 24 breasts (4 percent)] had an expander explanted for infection related to skin flap necrosis. She was an active smoker at the time of surgery. In addition, this patient contributed to the higher rates of partial nipple-areola complex necrosis and the rate of flap necrosis requiring a return to the operating room in the planned group, as she sustained bilateral necrosis requiring débridement, likely attributable to the smoking. Fourteen patients [23 breasts (96 percent)] successfully recovered following nipple-sparing mastectomy and prior mastopexy or reduction without residual effects of nipple-areola complex or skin flap necrosis. The patient that underwent device explantation went on to have autologous tissue salvage reconstruction. Length of follow-up for the patients in our series averaged 13 months from the completion of reconstruction (for those who at the time of this publication had completed reconstruction without device explantation). There were no new cancer events or recurrences in that time frame.

**DISCUSSION**

Given the improved cosmetic results and subsequent increase in patient satisfaction with reconstruction following nipple-sparing mastec-
tomy as documented in the literature, the next logical step was to see whether the nipple-sparing mastectomy inclusion criteria could be safely expanded to more patients. To this end, we developed the staged procedure described in this article to include women with moderately large or ptotic breasts in our nipple-sparing mastectomy algorithm.

New strategies to prevent skin flap necrosis, nipple-areola complex necrosis, infection, and seroma are of critical importance in this challenging patient population. In the initial mastopexy or reduction procedure, the key technical principle is keeping periareolar dermis intact to preserve the maximum cutaneous nipple-areola complex blood supply at the time of the future mastectomy. At the time of nipple-sparing mastectomy, a special degree of attention is taken to ensure consistent skin flap thickness to minimize damage to the superficial blood supply. Maintaining appropriate skin flap thickness and postoperative evaluation of flap perfusion are both essential steps in this staged approach. We believe a working relationship with the breast surgeon is critical to attempt this procedure and to maximize its execution and success. At our institution, we routinely work with as many as four breast surgeons, and our comfort and confidence in the procedure is a result of knowledge of flap thickness at the end of the mastectomy. Our routine use of an acellular dermal matrix—in our case, AlloDerm—also may add additional security in prosthetic reconstruction in the setting of thin mastectomy flaps.

Having taken steps to perform nipple-sparing mastectomy on large or ptotic breasts, the question remains of how the risks of our staged procedure compare with the traditional skin-sparing mastectomy and nipple-sparing mastectomy. A literature review was performed to evaluate skin flap necrosis, nipple-areola complex necrosis, and device explantation rates following skin-sparing mastectomy and nipple-sparing mastectomy with and without the use of acellular human dermis.

Tables 2 and 37,11,18,20–27 compare our two-stage nipple-sparing mastectomy results with data published on nipple-sparing mastectomy followed by immediate device-based reconstruction using acellular dermal matrix. The reported rate of skin flap necrosis ranges from 1.1 to 23 percent. There were reports ranging from 0 to 13 percent for partial nipple-areola complex necrosis, 0 to 3.5 percent for total nipple-areola complex necrosis, and 1.3 to 19.2 percent for explanted devices. Our experience with a skin flap necrosis rate of 17 percent, partial nipple-areola complex necrosis

| Table 1. Patient Characteristics and Complication Rates |
|----------|-----------------|----------------|-----------------|
| No. of Patients | No. of Breasts | Average Time from Mastopexy to NSM (mo) | Average Time from NSM to Final Implantation (mo) |
| Planned | Cancer | 10 | 3.4 | 7.5 |
| Cancer | Prophylactic | 5 | 13 | 8.3 |
| Planned | Unplanned | 5 | 5 | 6.2 |
| Cancer | Prophylactic | 24 | 5 | 6.2 |
| Total complications | NSM, nipple-sparing mastectomy; NAC, nipple-areola complex; OR, operating room. | 2/24 breasts (8%) | 3/24 breasts (12.5%), 2/15 patients (13%) |

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Table 2. Nipple-Sparing Mastectomy followed by Immediate Reconstruction Literature Review

<table>
<thead>
<tr>
<th>Study</th>
<th>No. of Patients</th>
<th>No. of Breasts</th>
<th>Reconstruction Design</th>
<th>Skin Flap Necrosis</th>
<th>Partial NAC Necrosis</th>
<th>Total NAC Necrosis</th>
<th>Devices Explanted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yueh et al., 20097</td>
<td>10</td>
<td>17</td>
<td>NSM followed by either device-based (n = 15) or autologous tissue (n = 2) reconstruction</td>
<td>23.5%</td>
<td>17.6%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Djohan et al., 201011</td>
<td>116</td>
<td></td>
<td>NSM followed by either device-based (n = 84) or autologous tissue (n = 32) reconstruction</td>
<td>1.3%</td>
<td>2.6%</td>
<td>0</td>
<td>NR</td>
</tr>
<tr>
<td>Sacchini et al., 200618</td>
<td>123</td>
<td>192</td>
<td>NSM followed by subpectoral implant (n = 124), subpectoral expander (n = 31), or TRAM flap (n = 37)</td>
<td>10%</td>
<td>6.8%</td>
<td>4.7%</td>
<td>1%</td>
</tr>
<tr>
<td>Salzberg et al., 201119</td>
<td>260</td>
<td>466</td>
<td>NSM followed by implant reconstruction with ADM</td>
<td>1.1%</td>
<td>0%</td>
<td>0</td>
<td>1.3%</td>
</tr>
<tr>
<td>Komorowski et al., 200620</td>
<td>38</td>
<td></td>
<td>NSM followed by implant or expander reconstruction</td>
<td>2.6%</td>
<td>5.3%</td>
<td>7.9%</td>
<td>NR</td>
</tr>
<tr>
<td>Chen et al., 200921</td>
<td>66</td>
<td>115</td>
<td>NSM/areola-sparing mastectomy followed by expander/implant reconstruction with ADM</td>
<td>NR</td>
<td>13%</td>
<td>3.5%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Range</td>
<td></td>
<td></td>
<td></td>
<td>1.1–23.5%</td>
<td>0–18%</td>
<td>0–7.9%</td>
<td>0–2.6</td>
</tr>
<tr>
<td>Spear two-stage, 2011</td>
<td>15</td>
<td>24</td>
<td>Two-stage NSM followed by expander or implant reconstruction with ADM</td>
<td>4 breasts (17%)</td>
<td>3 breasts (13%)</td>
<td>0</td>
<td>1 breast (4%)</td>
</tr>
</tbody>
</table>

NAC, nipple-areola complex; NSM, nipple-sparing mastectomy; NR, not reported; TRAM, transverse rectus abdominis myocutaneous; ADM, acellular dermal matrix.

Table 3. Skin-Sparing Mastectomy or Nipple-Sparing Mastectomy followed by Immediate Device-Based Reconstruction with Acellular Human Dermis Literature Review

<table>
<thead>
<tr>
<th>Study</th>
<th>No. of Patients</th>
<th>No. of Breasts</th>
<th>Reconstruction Design</th>
<th>Skin Flap Necrosis</th>
<th>Partial NAC Necrosis</th>
<th>Total NAC Necrosis</th>
<th>Devices Explanted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salzberg et al., 201120</td>
<td>260</td>
<td>466</td>
<td>NSM followed by implant reconstruction with ADM</td>
<td>1.1%</td>
<td>0%</td>
<td>0%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Liu et al., 201121</td>
<td>476</td>
<td></td>
<td>SSM followed by expander or implant reconstruction</td>
<td>13.9%</td>
<td>NA</td>
<td>NA</td>
<td>4.9%</td>
</tr>
<tr>
<td>Spear et al., 200822</td>
<td>43</td>
<td>58</td>
<td>SSM followed by expander or implant reconstruction</td>
<td>3.4%</td>
<td>NA</td>
<td>NA</td>
<td>1.7%</td>
</tr>
<tr>
<td>Nammoun, 200923</td>
<td>20</td>
<td>29</td>
<td>SSM (90%) or NSM (10%) followed by expander reconstruction with ADM</td>
<td>3.4%</td>
<td>0%</td>
<td>0%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Chen et al., 200927</td>
<td>66</td>
<td>115</td>
<td>NSM/areola-sparing mastectomy followed by expander/implant reconstruction with ADM</td>
<td>NR</td>
<td>13%</td>
<td>3.5%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Lanier et al., 201024</td>
<td>52</td>
<td></td>
<td>SSM followed by expander or implant reconstruction</td>
<td>15.4%</td>
<td>NA</td>
<td>NA</td>
<td>19.2%</td>
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<tr>
<td>Chun et al., 201025</td>
<td>269</td>
<td></td>
<td>SSM followed by expander or implant reconstruction</td>
<td>23%</td>
<td>NA</td>
<td>NA</td>
<td>5.9%</td>
</tr>
<tr>
<td>Antony et al., 201026</td>
<td>96</td>
<td>153</td>
<td>SSM followed by expander reconstruction with ADM</td>
<td>4.6%</td>
<td>NA</td>
<td>NA</td>
<td>7.2%</td>
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<tr>
<td>Range</td>
<td></td>
<td></td>
<td></td>
<td>1.1–23%</td>
<td>0–13%</td>
<td>0–3.5%</td>
<td>1.3–19.2%</td>
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<tr>
<td>Spear, two-stage, 2011</td>
<td>15</td>
<td>24</td>
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<td>4 breasts (17%)</td>
<td>3 breasts (13%)</td>
<td>0</td>
<td>1 breast (4%)</td>
</tr>
</tbody>
</table>

NAC, nipple-areola complex; NSM, nipple-sparing mastectomy; ADM, acellular dermal matrix; SSM, skin-sparing mastectomy; NA, not applicable; NR, not reported.
rate of 13 percent, no total nipple-areola complex necrosis, and 4 percent device explantation rate is within the published range of immediate breast reconstruction assisted with acellular human dermis. We acknowledge that our patient sample is smaller than those of the studies listed within these series. However, we are aware that a single patient in a small series with multiple complications can also distort the results.

We have also learned that a few technical points are important to consider while planning and executing a two-stage nipple-sparing mastectomy for the patient with large or ptotic breasts. First, the preserved nipple-areola complex tends to migrate superiorly following a mastectomy. A slight underestimation of the vertical elevation of the nipple-areola complex when planning the mastopexy or reduction is advisable to prevent overelevation of the final nipple position. Second, the skin envelope reduction needs to account for the desired final breast implant size. We have observed that many women elect to have a slightly larger implant placed than originally anticipated; thus, overreducing the skin envelope at the first stage may place increased tension on the skin flaps.

Although the two-stage nipple-sparing mastectomy is readily acceptable in the prophylactic patient, patient selection is slightly more complex in the patient with breast cancer. The staged procedure must be carefully planned so that it does not significantly delay or hinder treatment in this patient population. For example, our staged algorithm is applied in a fashion similar to the process of breast conservation where a patient undergoes a lumpectomy and postoperative chemotherapy and eventually irradiation. In our scenario, the mastopexy or reduction can be performed at the time of the lumpectomy and before chemotherapy; then, instead of proceeding to radiation therapy, a nipple-sparing mastectomy can be performed at the completion of chemotherapy. This logical concept has been readily accepted by our surgical and medical oncology colleagues.

CONCLUSIONS

Performing a mastopexy or reduction before mastectomy is an option for some patients with ptotic or large breasts. Thoughtful planning is essential at each stage to maximally preserve adequate blood supply to the skin flaps and nipple-areola complex. Having demonstrated a level of safety with the staged approach comparable to that of nipple-sparing mastectomy, we are comfortable offering this procedure to patients with moderately large or ptotic breasts. Nipple-sparing mastectomy may not be suitable for the very large or ptotic breast but may be possible using this staged approach for patients who are only modestly too large or too ptotic to have been considered previously.

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REFERENCES


