Breast Surgery

Reduction Mammaplasty and Mastopexy in Previously Irradiated Breasts

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Abstract

Background: Little data exist on the safety of elective breast surgery following breast conservation therapy.

Objectives: The authors evaluate their experience performing reduction mammaplasties and mastopexies in previously irradiated breasts.

Methods: A retrospective chart review was conducted of all reduction mammaplasties and mastopexies in previously irradiated breasts performed by the 2 senior authors (MYN and SLS) from 1995 to 2012 (n = 18). Patient records were analyzed for demographics, perioperative and postoperative details, and complications.

Results: During the study period, 12 reduction mammaplasties and 6 mastopexies were performed on breasts previously treated with breast conservation therapy. The average study participant age was 49.5 years, and average body mass index was 29. Average preoperative bra cup size was D/DD. One patient was a former smoker; 17 were nonsmokers. Eleven of the 18 patients had been previously treated with chemotherapy; average time between radiation therapy and surgery was 2.5 years. Average specimen weight in the 12 reduction mammaplasties was 623 g. Twenty-two percent (n = 4) of patients experienced a total of 5 minor complications; none required a return to the operating room. One patient (6%) experienced a major complication resulting in approximately 50% loss of breast tissue, which was reconstructed with a latissimus dorsi musculocutaneous flap. Seventeen patients (94%) had successful outcomes with preoperative goals achieved.

Conclusions: In the previously irradiated breast, reduction mammaplasty and mastopexy should be approached with extra caution, but the surgeries may still be safely and successfully performed.

Level of Evidence: 4

Keywords
reduction mammaplasty, mastopexy, radiation, breast surgery, breast irradiation, wound healing, breast conservation therapy

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The combination of lumpectomy followed by radiation, termed breast conservation therapy (BCT), is a mainstay of breast cancer treatment. The combined effect of a unilateral resection of breast tissue and radiation therapy sets up subsequent breast asymmetry. While some degree of breast asymmetry is normal, BCT can cause severe asymmetries and, occasionally, unilateral disfigurement of the radiated breast. The known or expected risks of performing reduction or mastopexy surgery to improve asymmetries or deformities after BCT has deterred many plastic surgeons from trying to help these patients. In 1992, Handel et al were among the first to publish a report of a single patient for whom they performed a postradiation breast reduction. She experienced delayed healing, prolonged erythema, substantial necrosis of the nipple, partial-thickness loss of the areola, and loss of nipple-areola pigmentation following a postradiation free nipple-areola graft reduction mammaplasty. Spear et al subsequently reported 3 cases of reduction mammaplasty following BCT that employed a modified surgical technique with several...
different pedicles, with a single complication of prolonged edema in 1 patient. Since then, remarkably little has been written about performing breast reductions or mastopexies following BCT. The result is that surgeons are aware of increased risks with these surgeries but are unclear how to quantify or manage these risks. The purpose of this study was to shed additional light on this controversial topic. By expanding the previous reviews to include our gradually widening experience of post-BCT reduction mammoplasties and mastopexies, we can better quantify the risks, test our concepts, and refine the results.

METHODS

The charts of all patients who underwent reduction mammoplasties and mastopexies with either of the 2 senior authors (MYN and SLS) after BCT between 1995 and 2012 were retrospectively reviewed. Mastopexy was defined as a subset of reduction with a resection of less than 100 g, while reduction was defined as a resection greater than 100 g. Patient records were analyzed for demographics, smoking status, chemotherapy and radiation histories, procedures performed, and complications (nipple necrosis, hematoma, seroma, wound dehiscence, delayed healing, prolonged induration/edema lasting longer than 1 month, infection, fat necrosis, and breast skin necrosis). Eighteen cases were identified for inclusion in this study.

Perioperative Management

To meet patient expectations of surgery outcomes, preoperative patient evaluation and education is paramount. Risks related to wound-healing complications and nipple loss are discussed more thoroughly for the patient group included in our review compared with patients without radiation exposure. In addition, if wound formation occurs, healing is generally prolonged within this cohort. Patient selection is equally important to ensuring consistent outcomes. Patients with a high degree of radiation skin damage likely have a higher risk of postoperative wound-healing issues. Thus, avoiding reduction techniques may be warranted. Breast amputation techniques with free nipple grafting are a valuable option for patients with excessively large breasts. Postoperative care, including dressings, shower restriction, drain care, and supportive garments, is similar to patients who have not had radiation therapy. Steri-Strips (Nexcare, 3M, St Paul, Minnesota) and/or surgical glue are used along with absorbable monofilament suture, and drains are typically removed at the first postoperative visit, at which time unrestricted showering can occur.

RESULTS

During the study period, 12 reduction mammoplasties exceeding 100 g and 6 mastopexies were performed. All patients had previously undergone BCT. The average patient age was 49.5 years (range, 35-69 years). Average body mass index was 29 (range, 23.1-39.6). The average preoperative bra cup size was D/DD (range, B-F). One patient was a former smoker, while 17 were nonsmokers. Eleven of the 18 patients had been previously treated with chemotherapy. The average time between the completion of radiation therapy and subsequent breast surgery was 2.5 years. Average specimen weight in the 12 reduction mammoplasties was 623 g (range, 141-1139 g). A variety of pedicles were used in reductions, including inferior, medial, central mound, superomedial, superolateral, and McKissock (Figure 1). Mastopexies employed circumvertical, inferior wedge excision, and free nipple graft techniques (Figure 2). Four (22%) of the patients experienced a total of 5 minor complications (Figure 3A, B), including delayed healing at the trifurcation junction (n = 3), infection (n = 1), and breast skin necrosis (n = 1). None of these complications required a return to the operating room or ultimately interfered with achieving the desired result. One (8%) of the 12 reduction mammoplasty patients (8% of the cohort; 6% of the overall population) experienced a major complication resulting in loss of the nipple and approximately 50% of the breast; this ultimately led to a reconstruction with a latissimus dorsi musculocutaneous flap (Figure 4). Seventeen (94%) patients had successful outcomes that included achievement of preoperative goals. Average follow-up was 26.3 months (range, 1.8-119.3 months).

DISCUSSION

Given the concern about increased postoperative complications, the historical approach to performing reduction mammoplasty or mastopexy in previously irradiated breasts has been to either avoid it or proceed with extreme caution. Little has been written regarding this type of post-BCT surgery. Previous publications on this topic have been small case series or have included a subset of patients within broader studies. 1-7 Our study, which includes 18 patients (12 reduction mammoplasties and 6 mastopexies), is the largest reported series on this topic to date and shows these procedures can usually be performed safely.

Our protocol has been to lower the risk of complications by designing flaps with shorter, wider, and broader pedicles and whenever possible to avoid undermining flaps in favor of wedge resections. By following these principles, we achieved the reported results and low complication rate. Also, pedicle selection should be based on the previous lumpectomy’s location. For instance, if the previous lumpectomy was performed in the inferior pole of the breast, then an inferior pedicle should not be used in the breast reduction following irradiation. Instead, a pedicle excluding the area of the lumpectomy defect should be used. This has been demonstrated in our series, as a range of pedicle techniques were used to address a variety of lumpectomy defect locations. These aforementioned principles are embraced in another modification—the omega pattern breast reduction—described by Christiansen et al. 2
With regard to mastopexies, our main technical modification when operating on the previously irradiated breast is to avoid tissue undermining. We try to perform the mastopexies in these patients by deepithelialization alone. In some cases, small reductions (<100 g) are also performed, but these typically involve an inferior wedge excision without any significant undermining.

When minor complications such as delayed healing or small wound dehiscences do occur, standard dressing changes and frequent postoperative visits constitute appropriate treatment. When wound-healing or ischemic-related complications are noted in the immediate postoperative period, hyperbaric oxygen therapy may be beneficial. In fact, application of preoperative hyperbaric

Figure 1. (A) This 47-year-old woman presented after previous right breast irradiation. (B) The patient is shown with preoperative markings for Wise-pattern reduction with a superomedial pedicle. (C) Fourteen months after reduction mammoplasty, in which 816 g was resected from the right breast.

Figure 2. (A) This 49-year-old woman presented after previous right breast irradiation. (B) Three weeks after a bilateral mastopexy.
oxygen has been described in this high-risk patient population.\(^5\)

Unfortunately, the management of major complications with nipple loss and/or a significant portion of breast parenchyma is more complicated. One of these major complications occurred in our series: the patient (Figure 4) experienced wound dehiscence, delayed healing, prolonged induration, infection, fat necrosis, and breast skin necrosis resulting in an open wound and loss of approximately 50% of the breast. This patient later underwent a latissimus dorsi musculocutaneous flap for breast reconstruction. That flap procedure was also complicated by delayed healing and incorporated postoperative hyperbaric oxygen therapy.

With concern for postoperative complications serving as the major deterrent to performing elective breast surgery on a previously radiated breast, understanding and discussing complication rates with prospective patients must be paramount. Patel et al\(^6\) found a 60% complication rate when performing these delayed oncoplastic reduction mammoplasties in 5 patients, although no major complications were reported for this patient cohort. Christiansen et al\(^2\) noted mild, persistent edema in 2 of 5 (40%) patients with whom their omega incision technique was employed; however, no other significant complications were described. Kronowitz et al\(^7,8\) performed breast reduction following lumpectomy and radiation in 8 patients with a 50% complication rate. Complications included nipple necrosis, seroma, wound dehiscence, infection, and fat necrosis. They concluded that flap reconstruction in the delayed setting might result in lower complication rates compared with reduction techniques. However, this approach may not be appropriate for the patient subset desiring the physical benefits of

Figure 3. (A) This 35-year-old woman had previously undergone a left breast lumpectomy and radiation therapy. (B) Six months after bilateral breast reduction using the medial pedicle technique; 870 g was resected from the left breast. She had a postoperative trifurcation junction wound that healed with dressing changes.

Figure 4. (A) This 39-year-old woman had previously undergone lumpectomy and radiation therapy to the left breast. Her left breast developed an inferolateral wound with significant loss of skin and breast tissue. (B) One week after a pedicled latissimus dorsi myocutaneous flap procedure. The inferolateral subunit was replaced with flap skin. The patient later underwent hyperbaric oxygen therapy following incisional wound formation along the lower vertical incision.
reduction mammaplasty while conserving their own native breast tissue.

In our series, 28% (n = 5) of patients experienced postoperative complications, with a 22% (n = 4) minor complication and 6% (n = 1) major complication rate. This number should be considered in perspective with a previously reported series of 279 breast reductions from our institution that found similar complications following reduction mammoplasties in nonirradiated patients. In that series, 18% of patients experienced postoperative complications, with a minor complication rate of 13.4% and a major complication rate (defined as requiring a return to the operating room) of 4.6%.9

Although this study evaluates the largest reported series on this subject, a number of limitations should be noted. First, the study’s retrospective nature introduces potential bias in patient selection and outcome measures. Next, outcomes of a small sample size such as this patient subset make data interpretation less reliable than a larger cohort. In fact, while our study included 4 patients with less than 3 months follow-up, excluding them from analysis would have made reporting meaningful data even more difficult. Finally, our outcome measure was simply achievement of preoperative goals—namely, improved symmetry and volume reduction in the breast reduction cohort. Although more subjective and objective outcome measures would have provided better data, due to the retrospective nature of the study, such information was unavailable.

CONCLUSIONS

Reduction mammaplasty and mastopexy in the previously irradiated breast should be approached with caution, but these procedures may indeed be safely and successfully performed.

Disclosures

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REFERENCES