The Accuracy of Sentinel Lymph Node Biopsy after Aesthetic Breast Surgery: A Case Series and a Review of the Literature

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Abstract: In the United States, cosmetic surgical procedures on the breast, both augmentation and reduction, are becoming increasingly common. In the year 2008 alone, breast augmentation was the most commonly performed cosmetic procedure, with 307,230 cases, which signifies a 45% increase from the year 2000. Breast reduction is the fifth most common reconstructive procedure, with 88,732 cases in 2008, signifying a 5% increase since 2000 [1]. As this growing population of women age, the dilemma of the ideal method of breast cancer treatment continues to be controversial. Data are limited regarding the morbidity of breast conservation therapy (BCT) in previously augmented women, but some reports indicate that as many as 50% of previously augmented women undergoing BCT have complications that ultimately result in implant removal and mastectomy [2]. Also, there are limited studies on the efficacy of sentinel lymph node biopsy (SLNB) in augmented women. For these two reasons, the preferred treatment for breast cancer in women with breast augmentation has been skin-sparing mastectomy with axillary dissection, and immediate reconstruction. There have been even fewer case reports of the success rate of SLNB in women who have undergone reduction mammoplasty. We report four cases of women who underwent a variety of cosmetic breast procedures and subsequently have gone on to have successful lumpectomy/mastectomy and SLNB. We also performed a literature search in Medline from 1996 to 2010 using the key words "breast cancer, sentinel lymph node biopsy, augmentation, reduction mammoplasty." These case reports lay the foundation for a literature review about the current opinions and practices of cosmetic and oncologic breast surgeons.

Keywords: Sentinel lymph node biopsy, augmentation, reduction mammoplasty.

CASE REPORT

Case 1

A 41 year old woman, status post left mastectomy with delayed saline implant reconstruction, chemotherapy for cancer and right breast reduction at age 22 was found to have a palpable mass in the superior right breast. Imaging showed a 3 cm breast mass and no suspicious nodes. An FNA confirmed carcinoma of the right breast.

On the right, modified radical mastectomy was performed. Since the patient had a prior reduction mammoplasty on the right, a SLNB was planned with the option of doing a complete axillary dissection because of the possibility of disrupted lymphatic drainage to the right axilla. The lymphoscintigram showed an uptake in 5 axillary lymph nodes. In the end, five axillary sentinel lymph nodes were removed, followed by a complete axillary dissection because one of her sentinel nodes was positive. The final pathology was pT2N1M0 (1/15 nodes positive) invasive ductal carcinoma that was ER-/PR-/Her-2-.

She received adjuvant therapy and has not had any recurrence of her cancer after five years. She has subsequently undergone reconstruction with a latissimus dorsi flap reconstruction with saline implant.

Case 2

A 62 year old woman, who had prior bilateral breast augmentation with implants via inframammary fold incisions 29 years prior and subsequent removal via periareolar incisions 13 years prior, presented after self-palpating a right breast mass. Imaging showed a suspicious 1.8 cm retroareolar abnormality in the right breast. The axillary nodes were normal by ultrasound. Ultrasound guided core biopsy revealed infiltrating ductal carcinoma and DCIS.

Because the mass had attachment to the areolar skin scar, the patient underwent a central breast lumpectomy, with SLNB. The lymphoscintigram showed one area of uptake in the right axilla (Fig. **1**). On final pathology the tumor was a pT2N1M0 infiltrating ductal carcinoma that was ER+/PR+/Her-2 -, with the single positive node being the sentinel node. Therefore, the patient was offered either complete axillary node dissection or axillary radiation. She chose radiation, and received chemotherapy and radiation followed by aromatase inhibitor therapy. She has not had a recurrence of the right breast or axilla in two and half years.

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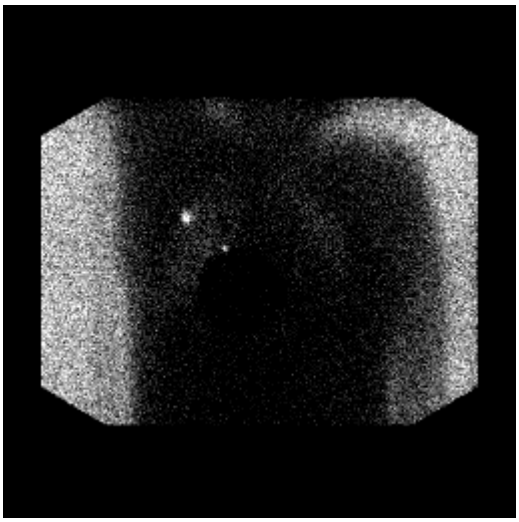

Fig. (1). Lymphoscintigram using 0.479 mCi, technetium 99m sulfur colloid for the patient in Case 2. There is one distinct area of increased uptake in her right axilla, representing a sentinel node, and another focus of uptake in her breast, representing the injection site.

Case 3

A 24 year old woman, who at age 21 had right breast reduction secondary to marked asymmetry, self-palpated a right upper outer breast mass. Imaging showed a suspicious 1.9 cm nodule at the 11 o'clock position, normal nodes and an unremarkable left breast. An FNA diagnosed carcinoma of the breast. She had a strong family history of breast and ovarian cancer, however, the patient herself had not been tested. She had not received any imaging prior to her right breast reduction as her relatives had not known about their positive BRCA1 status at that time, but at presentation bilateral MRI revealed no disease in the left breast.

She underwent a lumpectomy with a SLNB. Lymphoscintigraphy showed four areas of uptake, some of which appeared to be in the breast itself. At surgery, further probing of the skin with the gamma probe in the axilla demonstrated uptake, so it was decided to proceed with a SLNB. The final pathology was a pT1cN0M0 infiltrating ductal carcinoma that was ER-/PR-/Her-2-. Three sentinel nodes were removed, all negative. The patient subsequently received chemotherapy and radiation. She has not had recurrence of her cancer after three years. She is undergoing annual MRI for screening, which have remained negative.

Case 4

A 46 year old woman who had prior bilateral breast mastopexy presented with a palpable 7 cm mass in the upper outer quadrant of her left breast. Imaging revealed malignant characteristics of the breast mass, and a core needle biopsy revealed infiltrating ductal carcinoma. A clip was placed in the tumor prior to chemotherapy in order to localize it for future lumpectomy. Metastatic workup was negative. She underwent four cycles of neo-adjuvant chemotherapy and the palpable mass completely resolved prior to surgery. The patient underwent a left breast needle localization lumpectomy and left SLNB. She had a lymphoscintigram that showed increased uptake in the low axilla. Two sentinel lymph nodes were removed. The final pathology revealed residual infiltrating ductal carcinoma ypT1cN0M0 that was ER-/PR-/Her-2-. She received radiation therapy to her breast, axilla and supraclavicular region. Postoperatively she has not had recurrence of her cancer after two and a half years.

DISCUSSION

As more women who have had aesthetic breast surgery age, the question of how to treat breast cancer in these women will become a more prevalent one. There are limited data on the efficacy of SLNB in these populations. There is controversy over BCT in women with prior augmentations, and the traditional approach is to treat conservatively with skin-sparing mastectomy with axillary dissection, and immediate reconstruction rather than BCT. This is based on several arguments.

First, opponents of BCT in aesthetic patients state that implants prevent the ability of mammography to image the entire breast parenchyma, therefore risking delayed breast cancer diagnosis or delayed diagnosis of recurrence. A comparison by Silverstein *et al.* of pre- and post-augmentation mammograms in 54 women showed a 36 to 44 percent decrease in mammographically visualized breast tissue with subglandular implants and a 15 to 25 percent decrease with submuscular implants [3]. Handel *et al.* showed that capsular contracture was an important determinant of mammographic limitations in his study of 68 patients. Comparisons of pre- and post-augmentation mammography showed a 30 percent reduction in visualized tissue with minimal capsular contracture, whereas moderate or severe contracture resulted in a 50 percent loss of visualized tissue [4]. Furthermore, the breast cancers in patients with implants may not be visualized mammographically. Several studies on women with implants show a false negative mammogram rate ranging from 12-67%; however these studies have a small number of patients [5]. Due to these concerns, mammographers have adopted the use of implant-displaced views.

Despite the mammographic difficulties in patients with implants, long-term studies have not shown an increased risk of delayed detection or a poorer prognosis when that detection occurs. A Los Angeles study looked at 37 women who developed breast cancer from a cohort of 3182 augmented women between 1959 and 1981 and showed a similar stage distribution between augmented and non-augmented controls. Furthermore, the five year survival rate for these 37 women was equivalent to that established by the U.S. National Cancer Institute's Surveillance, Epidemiology, and End Results program [6]. A Canadian study compared the stage, diagnosis and survival of 41 augmented women who developed breast cancer with all other patients with breast cancer (13,246) in Alberta from 1973 to 1990. Lymph node positivity and distant metastases were equivalent, and the 5- and 10- year survival rates did not differ between the two groups [7]. These long-term studies show that despite mammographic challenges in breast cancer detection, previously augmented women do not have an increased risk of delayed detection nor a poorer prognosis when compared to non-augmented women. Interestingly, one study by Skinner *et al.* comparing 99 cancers in augmented and 2857 cancers in non-augmented patients between 1980 and 1999,

showed that augmented women were more likely to have palpable cancers (83% *vs*. 59%) and nodal involvement (48% *vs*. 36%), and less likely to have ductal carcinoma *in situ* (DCIS) (18% *vs*. 28%). There were no differences in breast cancer-specific survival between the augmented and non-augmented patients with a median follow-up of 6.2 and 6.4 years, respectively [8]. The authors concluded that augmented women were actually more likely to have palpable breast cancers due to the decreased breast mass of augmented breasts.

Furthermore, opponents of BCT in aesthetic patients argue that radiation on an augmented breast leads to complications that ultimately result in mastectomy. Karanas *et al.* conducted a retrospective review of 58 breast cancer patients who had previously had augmentation mammoplasty from 1991 to 2001. Thirty-two patients (52%) underwent modified radical mastectomy with implant removal. Twenty-eight patients (48%) were treated with BCT. Of these twenty-eight, twenty-two initially retained their implants. Eleven of those twenty-two (50%) ultimately required completion mastectomy with implant removal because of implant complications, local recurrences, or the inability to obtain negative margins. Nine additional patients experienced complications resulting from their implants, including contracture, erosion, pain and rupture [2]. The author concludes that mastectomy with immediate reconstruction might be a more suitable option for previously augmented women who develop breast cancer.

Finally, opponents of BCT in aesthetic patients believe that surgical manipulation of the breast may disrupt lymphatic channels, thereby making SLNB inaccurate. This premise is based on the theory that the breast skin and underlying glandular tissue share a common lymphatic pathway that drains the axillary nodes [9]. Hence, in the American College of Surgeons Z0010 study, prior ipsilateral axillary surgery or pre-pectoral breast implant were exclusion criteria because of concerns of accurately performing sentinel lymph node mapping [10]. Based on these beliefs, conservative breast surgeons advocate that even prior excisional breast biopsy is a contraindication to SLNB.

However, more evidence is emerging that axillary lymphatic channels can be preserved even after transaxillary augmentation. Munhoz *et al.* demonstrated a 93% correlation between pre-and post-operative lymphoscintigrams in women who underwent transaxillary breast implants. These authors state that proper technique (remaining high and anterior in the axilla, minimizing dissection of the axilla and lateral breast) is important in preserving the lymphatic network of the axilla [11]. Even though newer data show that SLNB is effective and safe in prior cosmetic patients, in practice, many surgeons are still cautious in advocating SLNB in patients with prior cosmetic surgery. A retrospective study by Jakub *et al.* of 4186 breast cancer patients from 1987 to 2002 compared previously augmented women with a non-augmented control group. Forty-nine of the augmented patients underwent lymphoscintigraphy with a 100 percent success rate in identifying the sentinel node [12]. Three of these women had implants through a transaxillary approach. The women with negative SLNB did not have a back-up completion axillary dissection; these false negatives are based on clinical follow-up. The author cautions that even with this evidence, he considers transaxillary implant placement as a relative contraindication for lymphatic mapping. Gray *et al.* in 2004 conducted a retrospective review of 19 previously augmented women diagnosed with breast cancer and treated with BCT and SLN mapping. Eleven patients underwent SLN mapping with an identification rate of 100%. Three of these patients had positive nodes. Nine of these eleven patients had planned Level 1 and 2 axillary lymph node dissection (ALND) to assess the false negative rate. The other 2 patients were excluded because their primary lesion was DCIS or DCIS with microinvasion. The false negative rate was 0%; none of the six patients without SLN metastasis were found to have metastasis after completion ALND of non-SLN. In addition, the two patients with negative SLN who did not have ALND had no evidence of axillary recurrence 20 to 24 months after follow up. Among the 3 patients with SLN metastasis, two had additional metastases within non-SLNs at ALND [13]. The author concludes that implants placed via inframammary or areolar incisions do not interfere with SLNB success. However, he goes on to suggest that transaxillary implants remain a relative contraindication to SLNB, although none of the patients in that study actually had prior transaxillary implant placement.

Most reports of the efficacy of SLNB focus on women who have undergone augmentation. Data on women with breast reductions are few, and the studies available do not look at the efficacy SLNB in their analyses. There have been observational studies that analyze breast cancer risk in women who have undergone reduction mammoplasty; however there are no studies that look at the efficacy of SLNB after these women develop breast cancer. The available data suggest that reduction may confer a protective effect against the development of future breast cancer in high risk populations [14,15]. Tarone *et al*. reviewed a series of observational studies of high risk women who had undergone breast reduction surgery. In these studies, the relative risk of breast cancer development in women who had reduction mammoplasty ranged from 0.2 to 0.7. In one of these studies, removal of <400 g breast tissue resulted in a standardized incident ratio for subsequent breast cancer development of 0.9 (95 percent confidence interval, 0.4 to 1.3); in patients with >600 g removed, the risk was 0.3 (95 percent confidence interval 0.1 to 0.7). This series showed that breast cancer risk decreased as the amount of breast tissue removed increased [15]. While these studies cannot demonstrate unequivocal benefit from this elective surgery, the estimated breast cancer risk reduction is large enough to demonstrate that reduction mammoplasty should be assessed in clinical studies to evaluate primary risk reduction strategies in high-risk women. Similarly, the efficacy of SLNB in women who have undergone reduction mammoplasty and who then subsequently undergo BCT is a relatively understudied issue, and would benefit from future clinical trials. Lastly, because reduction mammoplasty is such a common procedure, cosmetic surgeons should strongly consider preoperative breast imaging for known high risk women, such as the patient described in Case 3. If this imaging were to diagnose breast cancer, the type and timing of cosmetic breast surgery offered to that patient would then depend on their treatment of breast cancer.

We have demonstrated successful treatment of breast cancer in a small group of women who have previously undergone cosmetic surgery. To summarize, two of our patients had undergone unilateral breast reduction, one had bilateral augmentation with subsequent implant removal, and one had bilateral mastopexy. None of our patients have had recurrence of their disease after surgery and adjuvant therapy, thereby demonstrating that in our small subset of patients, SLNB has 100% efficacy. Our report shows that women who have had reductions as well as augmentations are tumor-free after their SLNB. Because there have been no recurrences in our group, we propose that prior cosmetic surgery via periareolar or inframammary incisions is not a contraindication to SLNB. Further research needs to be performed on larger populations of women who have undergone cosmetic surgery to determine long-term outcomes of SLNB. However, the short-term outcomes are excellent.

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