Aesthetic Outcomes in Breast Conservation Therapy

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BACKGROUND: Since the National Surgical Adjuvant Breast and Bowel Project B06 (NSABP-B06) trial demonstrated equivalent survival outcomes between patients with breast cancer undergoing modified radical mastectomy versus lumpectomy and radiation, an increasing number of patients are seeking breast conservation therapy. Traditionally, only patients who have undergone total mastectomy have been referred for reconstruction.

OBJECTIVE: The purpose of the study was to determine the number of dissatisfied patients treated with breast conservation therapy who have suboptimal cosmesis and should be referred for reconstruction.

METHODS: After obtaining approval from the Institutional Review Board and patient consent, patients identified as more than 1 year posttreatment from breast conservation therapy (1999–2004) were interviewed and photographed. Data were gathered by use of a questionnaire that included patient aesthetic score, patient satisfaction, and change in body image. Photographs were shown to a surgical oncologist, a general surgeon, and a plastic surgeon for a physician aesthetic score.

RESULTS: Thirteen of 46 patients (28.3%) were dissatisfied with their cosmetic result. Women who were dissatisfied with their cosmetic result were more likely to have a negative change in their body image when compared with patients who were satisfied with their cosmetic result (46.2% vs 6.1%, P = .02). Additionally, dissatisfied patients were more likely to rate their cosmetic result as poor (15.4% vs 0%, P = .007) and were more likely to consider reconstruction (46.2% vs 9.1%, P = .01) when compared with satisfied patients. Risk factors to predict dissatisfaction in our patient population included age younger than 52 years and the resection of tumor from the upper inner quadrant.

CONCLUSIONS: Twenty-eight percent of patients in this study were dissatisfied with their cosmetic result. Furthermore, a large portion of these patients would consider reconstruction if it were offered. Although this study only identified a few broad risk factors for suboptimal cosmetic outcome, it confirms our hypothesis that many patients who have undergone breast conservation therapy should be referred for plastic surgery consultation. (Aesthetic Surg J 2008;28:165–170.)
for those women who would benefit from reconstructive or corrective surgery after conservative breast therapy.

While the Women’s Health and Cancer Rights Act mandated insurance coverage of breast reconstruction after mastectomy in 1999, no additional insurance coverage was offered for reconstruction in women who have undergone breast conservation therapy. Therefore the goal of this study is to evaluate the cosmetic results of breast conservation surgery at our institution and to determine the level of patient satisfaction with the procedure and its cosmetic consequences. Our hypothesis is that many of our patients treated with breast conservation therapy have suboptimal cosmesis and should be referred for reconstruction or corrective surgery.

**MATERIALS AND METHODS**

After IRB approval, the University of Texas Health Science Center Department of Surgery Procedures Outcomes and Complications database was used to identify patients who had undergone breast conservation therapy for breast cancer from 1999 through 2004. A database query revealed that 462 patients had undergone an operation for breast cancer between 1999 and 2004. Of these 462 patients, 300 mastectomies had been performed, and 162 (35.1%) patients underwent breast conservation therapy. Forty-six (28.4%) eligible patients still being monitored in the surgical oncology clinic for post-operative surveillance were contacted and consented to participate in the study. None of the patients had previously been seen by a plastic surgeon. Patient data obtained from the enrolled patients included age, weight, height, ethnicity, location of tumor resection, volume of tumor resected, TNM stage, and existing comorbidities.

On enrollment, patients were asked to complete an 11-question written survey modified from the Cancer Rehabilitation Evaluation System—short form to ascertain patient satisfaction with breast conservation therapy, post-operative pain control, and the cosmesis provided by their treatment. Patients were asked to rate their outcomes on a four-point scale: 1 = Poor (marked deformity), 2 = Fair (modest deformity), 3 = Good (minor deformity), and 4 = Very good (normal/ near normal). Additional data regarding complications were derived from review of the clinical chart. The patients were then examined for scarring, deformity, asymmetry, and overall cosmetic result. The assessment was subjectively rated by providers via photographs on the same 4-point scale (Figure 1).

**STATISTICS**

Associations between multiple choice outcomes and binary responses were assessed with Fisher’s exact test, where appropriate. Means were contrasted by use of
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analysis of variance. All statistical testing was two sided, with a significance level of $P < .05$ (SAS Version 9.1, SAS Institute, Cary, NC).

RESULTS

Demographics
Over the previous 4 years, 35% of patients with early breast cancer at our institution elected breast conservation management. Forty-six patients (28.6%) from this population were located and enrolled in the study (Table). The mean age was 58.7, with an average body mass index of 32.7. The ethnicity of the study group reflected that of South Texas, with 69.6% of our subjects being Hispanic, 15.2% Caucasian, 10.9% Asian, and 4.3% African-American. Average follow-up was 36.7 months. All patients undergoing breast conservation therapy had early-stage breast cancer, with most of our patients having T1 (82.6%), and the remainder having T2 (17.4%). The average volume of tissue excised was 295.0 ± 305.7 cc.

Tumor Location
The distribution of tumors is graphically represented in Figure 2. There was a statistically significant association between cosmetic result (dissatisfied, satisfied) and the location of the tumor removed ($P = .02$). When examining the two most common tumor locations, patients with tumors removed from the upper outer quadrant were twice as likely to be satisfied with their cosmetic results, whereas patients with tumors removed from the upper inner quadrant were twice as likely to be dissatisfied with their cosmetic results. The remainder of the quadrants had too few patients for statistical analysis.

Table. Demographic data

<table>
<thead>
<tr>
<th></th>
<th>Dissatisfied (n = 13)</th>
<th>Satisfied (n = 33)</th>
<th>All (n = 46)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (SD)</td>
<td>52.3 (13.5)</td>
<td>61.2 (11.2)</td>
<td>58.7 (12.5)</td>
<td>.03</td>
</tr>
<tr>
<td>Body mass index (SD)</td>
<td>31.0 (5.5)</td>
<td>33.4 (7.1)</td>
<td>32.7 (6.7)</td>
<td>.29</td>
</tr>
<tr>
<td>Volume excised (SD)</td>
<td>307.1 (356.6)</td>
<td>290 (288.7)</td>
<td>295.0 (305.7)</td>
<td>.87</td>
</tr>
<tr>
<td>T stage (tumor size)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (&lt;2 cm)</td>
<td>10 (76.9%)</td>
<td>28 (84.8%)</td>
<td>38 (82.6%)</td>
<td>.67</td>
</tr>
<tr>
<td>2 (2-5 cm)</td>
<td>3 (23.1%)</td>
<td>5 (15.2%)</td>
<td>8 (17.4%)</td>
<td>.02</td>
</tr>
<tr>
<td>Quadrant of resection</td>
<td></td>
<td></td>
<td></td>
<td>.08</td>
</tr>
<tr>
<td>Upper inner (%)</td>
<td>5 (38.5)</td>
<td>5 (15.6)</td>
<td>10 (22.2)</td>
<td></td>
</tr>
<tr>
<td>Lower inner (%)</td>
<td>0 (0)</td>
<td>6 (18.8)</td>
<td>6 (13.3)</td>
<td></td>
</tr>
<tr>
<td>Upper outer (%)</td>
<td>4 (30.8)</td>
<td>18 (56.3)</td>
<td>22 (48.9)</td>
<td></td>
</tr>
<tr>
<td>Lower outer (%)</td>
<td>2 (15.4)</td>
<td>3 (9.4)</td>
<td>5 (11.1)</td>
<td></td>
</tr>
<tr>
<td>Infraareolar (%)</td>
<td>2 (15.4)</td>
<td>0 (0)</td>
<td>2 (4.4)</td>
<td></td>
</tr>
<tr>
<td>Follow-up months (SD)</td>
<td>43.8 (172)</td>
<td>33.9 (16.8)</td>
<td>36.7 (17.3)</td>
<td></td>
</tr>
</tbody>
</table>

Patients who were dissatisfied with the cosmetic outcome of breast conservation therapy were younger when compared with those patients who were dissatisfied (52.3 vs 61.2; $P = .03$). The quadrant of resection was also significant in determining patient dissatisfaction ($P = .02$).

Figure 2. Tumor location. Most of the lesions were located in the upper outer quadrant (50%), whereas lesions of the upper inner quadrant accounted for 10 (22%), those of the lower inner quadrant for 6 (13%), and those of the lower outer quadrant for 5 (11%). Lesion in the infraareolar location accounted for the fewest cases (2 [4%]).

Patient Satisfaction
In response to the written questionnaire, 80.4% of patients indicated that they were satisfied with their choice of treatment and would choose breast conservation therapy again over mastectomy. Consequently, few patients were dissatisfied with their choice of treatment (8.6%) (Figure 3). However, patient responses regarding satisfaction of cosmetic result differed significantly, with 58.7% of patients satisfied with their cosmetic result ($P = .007$). Patients who were dissatisfied with their cosmetic result were younger than those who were satisfied (52.3 years vs 61.2 years; $P = .03$). Patients who were not satisfied equaled 28.3% (Figure 4). We found no statistical relationship between volume of breast removed and patient satisfaction with cosmetic outcome (307.1 cc vs 290 cc; $P = .87$) or between the preoperative cup size and patient satisfaction ($P = .43$).
When questioned about their perception of body image after breast conservation therapy, most satisfied patients (57.6%) had no change in body image. Thirty-six percent of patients had an improved self-image, whereas 6.1% stated that they had a worse perception of body image. Further analysis of these results demonstrates that patients who were satisfied with their cosmetic result were much more likely to state that they had either no change or a positive improvement in body image (Figure 5). Patients who were dissatisfied with their cosmetic result, however, were much more likely to have had a negative change in body image when compared with the satisfied group of patients (46.2% vs 6.1%).

**Comparison of Cosmesis**

Patients who were dissatisfied with their cosmetic outcome were much more likely to rate their result as poor than were patients who were satisfied with their cosmesis (15.4% vs 0%; $P = .007$) (Figure 6).

**Consideration of Reconstruction**

When asked if they would consider reconstruction after conservation therapy, 90.9% of satisfied patients answered that they would not consider reconstruction. In contrast, patients dissatisfied with their cosmetic result were more likely to consider reconstruction when compared with patients satisfied with their cosmetic result (46.2% vs 9.1%; $P = .01$) (Figure 7).

**DISCUSSION**

In the recent literature, steadily increasing numbers of women with stage I or II breast cancer are choosing breast conservation therapy, which involves tumor removal with adequate margins, possible sentinel lymph node or axillary dissection, and postoperative radiation.$^6$ Between 10% and 40% of patients diagnosed with early-stage breast cancer elect conservative management. Our population reflects that of recent studies, which found a steadily increasing rate of breast conservation therapy from 1985 to 2001 from 16% to 47%.$^6$ Although the measurable outcomes of breast-conserving therapy are survival, local recurrence rates, cosmesis, and patient satisfaction, few studies before 1985 examined the cosmetic and patient satisfaction outcomes. Therefore, while the 1985 results of the NSABP-06...
breast cancer trial demonstrated equivalent survival rates between breast conservation therapy and mastectomy, it did not address or compare patient satisfaction regarding cosmetic outcomes. Currently, women who choose mastectomy are offered the option of breast reconstruction, which is covered by health insurance. The same is not true for women who choose breast conservation therapy. Furthermore, radiation therapy offered in conjunction with breast conservation can add to the complexity of breast reconstruction and make cosmetic results less satisfactory.

This study sought to determine the cosmetic outcomes of breast conservation therapy and to determine the level of patient satisfaction with those results. This study also attempted to identify risk factors to predict patients with poor cosmetic outcomes. As such, most women are satisfied with their choice of surgical treatment, as well as their cosmetic results from breast conservation therapy. More importantly, this study identified that 28.3% of our subjects were dissatisfied with their cosmetic result after undergoing breast conservation therapy. Dissatisfied patients were more likely to have a negative change in body image, more likely to consider reconstruction, and more likely to be younger than satisfied patients. Thus, consistent with our hypothesis, the study shows that a significant percentage of women are dissatisfied with their cosmetic results after breast conservation therapy.

Despite changes in the surgical and radiologic approaches to breast cancer, our study demonstrates that the satisfaction rates with breast conservation are essentially unchanged when compared with a study by Beadle et al., which demonstrated that 75% of patients were satisfied with their cosmesis at 48 months. Although identification of patients who are likely to have suboptimal cosmetic results after breast conservation therapy would be very valuable, few statistically significant variables associated with patient dissatisfaction with the cosmetic result of breast conservation therapy were identified in our study. One of these was patient age. The mean age of unsatisfied patients was 52.3 years, whereas the mean age of satisfied patients was 61.2 years. This indicates that younger patients may be at greater risk of poor cosmetic outcomes, as has been demonstrated in other studies.

This is consistent with other reviews of risk factors for poor conservation therapy cosmetic outcomes, which cite a mean age of 55 as a risk factor for future consideration of reconstruction after conservative therapy. In addition, they noted significant asymmetry in all of the patients interviewed. In 1995 one of the only comprehensive evaluations of cosmesis after breast conservation therapy and postoperative radiation identified several risk factors that led to a poor cosmetic outcome. This analysis indicated that the 13% of their patients with a fair-poor satisfactory score were more likely to have a large tumor volume (21-50 mm), large breast tissue resection volume (>100 cm³), be of African-American descent, undergo tumor excision, and have resection of skin area >20 cm³ than their satisfied patients. Axillary dissection did not affect cosmetic outcomes. In our study, patient satisfaction was significantly associated with quadrant of resection, where patients were twice as likely to be dissatisfied if their tumor was removed from the upper inner quadrant. However, patients were twice as likely to be satisfied if resections involved the upper outer quadrant, which was the most common (48.9%) area of resection. Other resection areas had too few numbers for further evaluation. Tumor volume resected and preoperative breast cup size were not reliable predictors of patient satisfaction.

As indicated by Figure 7, of the 28% of women dissatisfied with their cosmetic outcome after breast conservation, 46.2% would consider reconstruction, whereas only 9.1% of those satisfied would consider further surgery. These women were extensively counseled before their initial treatment for breast cancer in the surgical oncology clinic and chose breast conservation therapy at that time. However, years after surgery and radiation, these women remained unsatisfied with their asymmetry and poor outcomes and were willing to consider reconstruction on the affected breast or a matching procedure on the opposite breast. Although reconstruction can diminish or eliminate nipple sensitivity, women who had a poor outcome were very concerned with asymmetry that made wearing a bra difficult. The questionnaire did not specifically ask patients if they would prefer symmetry to nipple sensitivity, but most of the revision surgeries would be breast-matching procedures with low risk of permanent nipple insensitivity to treat the asymmetry. That is why we believe preoperative referrals for reconstruction counseling would serve to educate patients of the cosmetic consequences of breast conservation surgery versus those of mastectomy and reconstruction.

Furthermore, patients should be informed that because radiation is offered uniformly with breast conservation, the cosmetic result of any reconstruction may be negatively affected. Recent studies indicate that breast reconstruction is best deferred after radiation therapy. Therefore, if patients are unsatisfied with the outcome of breast conservation and radiation therapy, they may have to wait a significant amount of time after radiation before being candidates for reconstruction. Alternatively, if patients choose to undergo a mastectomy, they still may have a tissue expander placed to help retain the inframammary fold and give them a breast mound during chemotherapy. The expander may be deflated during radiation, reinflated afterward, and kept in place until definitive autologous tissue reconstruction can be achieved.

Several recent publications offer alternative methods of surgery that can be applied during or within a few weeks of the initial breast conservation operation, namely oncoplastic surgery. Petit et al. suggest several methods at the time of initial surgery to minimize breast asymmetry that can be performed by an oncolgic, non-plastic surgeon. They refer to closure of the glandular defect with undermining of the overlying skin, periareolar centralization, and opposite healthy breast quadrantectomy. Other more severe positioning and volume defects should be addressed by a plastic surgeon.
Similarly, Shrotria\textsuperscript{15} in 2001 noted that careful preoperative marking and patient involvement in site selection are important in obtaining good cosmesis. In the primary operation for lumpectomy, use of a periareolar incision, fish-tailing of the lateral aspect of the resection, myocutaneous flaps for volume defects, and the use of breast reduction incisions can be very valuable to improve the cosmetic results of surgery. Reduction mammoplasty incisions are indicated when dealing with unilateral cancers in large ptotic breasts likely to require a contralateral mastopexy to correct symmetry.\textsuperscript{15-17}

If preoperative referral to a plastic or oncoplastic surgeon is not possible, our study suggests that more than 25% of women receiving breast conservation therapy would benefit from a referral to a plastic surgeon. This population requires preoperative or postoperative identification by the general or oncologic surgeon, followed by a prompt referral to the plastic surgeon. The techniques of breast reconstruction have expanded and improved over the past 30 years, and even the difficulties of irradiated breast tissue can be overcome to provide these patients with symmetry and a good overall cosmetic result.

Although these preliminary results are of value, further extension of this study is currently underway to expand the number and increase the ethnic diversity of the patient group to apply these findings to the population as a whole. As in the study by Taylor et al.,\textsuperscript{10} cosmetic results were more likely to be poor in the minority population of African Americans. They were also less likely to undergo chemotherapy or radiation. Our population is almost 70% Hispanic, with a higher incidence of poor cosmetic results. Increasing the ethnic diversity will most likely reduce the percentage of poor cosmetic results. Larger numbers will also allow a more critical analysis to identify additional risk factors for poor cosmetic outcomes. For continuing research, we will use a recently validated questionnaire to assess and validate our own questionnaire. The expanded number of patients and the validation of the questionnaire will greatly enhance the impact of this study to assist women affected by breast cancer in choosing the right surgical option for optimal outcomes.

CONCLUSION

In our study, more than 25% of women who underwent breast conservation surgery were dissatisfied with their cosmetic results. Furthermore, of these patients, a significant percentage would consider breast reconstruction to improve their results. Although it is not standard practice to refer patients undergoing breast conservation for reconstructive options, our study clearly shows that these women would benefit from a plastic surgery or oncoplastic consultation early in their diagnosis and treatment.

DISCLOSURES

The authors have no disclosures with respect to the contents of this article.