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# Surgical, oncologic, and cosmetic differences between oncoplastic and nononcoplastic breast conserving surgery in breast cancer patients

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**KEYWORDS:**Breast;  
Oncoplasty;  
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Short term;  
Long term**Abstract**

**BACKGROUND:** There is a lack of information regarding the safety, complication rate, and cosmetic outcome of oncoplastic breast conserving surgery. The purpose of this study is to evaluate and compare oncoplastic and nononcoplastic procedures.

**METHODS:** A retrospective review was conducted of patients treated with oncoplastic or nononcoplastic lumpectomies. Immediate and long-term complication rates and cosmetic satisfaction were compared.

**RESULTS:** Of the 142 surgeries, 58 were oncoplastic lumpectomies (40.8%). Oncoplastic patients were younger than nononcoplastic patients (60.9 vs 65.2 years,  $P = .043$ ). Immediate complications were similar with the exception of nonhealing wounds (oncoplastic = 8.6% vs nononcoplastic = 1.2%,  $P = .042$ ). Cosmetic complaints were similar, but fat necrosis was more common in the oncoplastic group (25.9% vs 9.5%,  $P = .009$ ). Time to radiation and number of future biopsies were similar between the groups.

**CONCLUSION:** Oncoplastic lumpectomy is a safe alternative to standard lumpectomy for selected breast cancer patients.

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Multiple long-term studies have demonstrated comparable oncological results in breast cancer patients who chose breast conserving surgery (BCS) over mastectomy. In recent years, BCS has expanded beyond simple lumpectomies,

combining with a variety of plastic surgery techniques and given the term “oncoplastic breast conserving surgery” or “oncoplastic lumpectomy.” In this technique, breast cancer tissue is surgically removed, and several different techniques are employed to reshape, replace, or rearrange the noncancerous breast tissue.<sup>1,2</sup> In addition, oncoplasty may incorporate surgery on the healthy, contralateral breast to improve breast symmetry.

Oncoplastic lumpectomy carries the potential to further expand the inclusion criteria of breast conserving surgery to women whose tumor to breast size ratio may have been previously prohibitive, and when combined with breast reduction surgery may potentially enlarge surgical margins.<sup>1</sup> Articles

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reporting on the results of oncoplastic techniques have begun to address certain topics such as cosmesis, technique success in specific tumor locations, and short-term complications. The purpose of this study is to compare the immediate complications and long-term consequences between oncoplastic and nononcoplastic breast conserving surgeries.

## Methods

A retrospective review featuring an observational, cohort study design was conducted from a single breast surgeon's records of patients treated with BCS. Medical records of patients diagnosed with breast cancer who underwent a lumpectomy between December 1, 2006 and April 30, 2011 were evaluated to determine if they qualified for study inclusion. Eligible patients were 18 years of age or older, female, and had been treated with lumpectomy, either oncoplastic or nononcoplastic. Subjects were stratified according to the type of BCS performed, either oncoplastic or nononcoplastic. The surgeon made the decision along with the patient on which type of surgery would be best. This was based on the patient's breast size and the size of the cancer that needed to be removed. Oncoplastic procedures included adjacent tissue transfers, donut mastopexy, and therapeutic mammoplasty, all of which were treated the same for statistical analysis. Two plastic surgeons worked with the breast surgeon on the reduction mammoplasty technique. Patients were excluded if they received a mastectomy within 6 months of the lumpectomy, and/or if they received <6 months of follow-up after their procedure. Data were collected from the patients' medical records from the date they underwent lumpectomy until their last visit.

The following variables were collected for analysis: demographics (age and body mass index [BMI]), if oncoplasty was performed, tumor margin status, need for re-excision, size of the cancer by the pathology report, use of radiation, time to radiation after lumpectomy, number of biopsies following surgery, immediate complications, long-term complications, reports of breast pain, patient reported dissatisfaction with cosmetic result (cosmetic information was identified from the patient's chart, as opposed to a formal validated patient questionnaire), and length of follow-up. Immediate complications included infection, nonhealing wounds, wound dehiscence, nipple necrosis, hematomas, and seromas. Long-term complications included skin retraction and fat necrosis. Complaints of breast pain were recorded in the following intervals: 3 to 6, 6 to 12, 12 to 18, 18 to 24, and 24 to 30 months.

Primary analyses were conducted comparing patients based on breast conserving surgery type (ie nononcoplastic vs oncoplastic). Quantitative data were analyzed with one-way analysis of variance. If data were not normally distributed, the Mann-Whitney test was utilized. Qualitative data were analyzed using Pearson's chi-square analysis or the Fisher's exact test in instances when appropriate. All statistical tests were two-tailed and the results were considered significant if the resultant *P* value was <.05. All analyses were conducted

using SPSS version 19.0 (IBM Corp, Somers, NY). This study was approved by the institutional review board of the University of Kansas School of Medicine - Wichita.

## Results

A total of 140 patients met inclusion criteria and these women underwent 142 lumpectomies. One patient had bilateral cancer and underwent bilateral oncoplastic lumpectomies. An additional patient developed cancer in the contralateral breast at a later date, but still within the study period. There were 58 (40.8%) oncoplastic lumpectomies. Fourteen patients had therapeutic mammoplasty, 43 had adjacent tissue transfer, and 5 had donut mastopexy. Some of these patients received a mixture of multiple oncoplastic techniques.

Data related to patient demographics, tumor details, and follow-up are shown in [Table 1](#). Women in the oncoplastic group were younger than those in the nononcoplastic group (60.9 vs 65.2 years, respectively; *P* = .043). However, body mass index, number of patients requiring re-excision for positive or close margins, size of cancer, number of biopsies following surgery, interval between surgery and radiation, and follow-up interval were all similar when comparing treatment groups. All margins, whether close or positive, were negative after re-excision. A higher percentage of oncoplastic patients received postoperative radiation (93.1%) when compared to the non-oncoplastic group (70.2%; *P* = .001).

A comparison of immediate complications is detailed in [Table 2](#). The incidence of postoperative seromas, hematomas, infection, and wound dehiscence were all similar between treatment groups. Infection rate among the oncoplastic group was 8.6% and among the nononcoplastic group was 9.5% (*P* = .854). Total infections between both groups were 13 – specific examples from certain patients included mastitis, infected seromas, abscesses, and infected fat necrosis. There was a higher incidence of nonhealing wounds in the oncoplastic group (8.6% vs 1.2%; *P* = .042). However, this did not prolong time to radiation within the oncoplastic group. Of the 5 oncoplastic patients who had a nonhealing wound, 1 was very mild and resolved within 1 week, and another required bilateral reduction surgery secondary to severe deformity because of her nonhealing wound. There were no cases of nipple necrosis.

Data regarding complaints of breast pain for various postoperative intervals are detailed in [Table 2](#). The interval from 6 to 12 months proved to be the only time period in which reported complaints of breast pain were different between the treatment groups, with the nononcoplastic group reporting more pain (*P* = .042). The breast pain sample sizes diminished during the later time intervals as patients were lost to follow-up.

A comparison of the long-term complication rates are shown in [Table 2](#). The number of patients with skin retraction and cosmetic complaints was similar between the study groups. However, the incidence of fat necrosis was significantly higher in the oncoplastic group (25.9% vs 9.5%).

**Table 1** Comparison of patient demographics, details regarding tumors, and follow-up for patients receiving nononcplastic versus oncplastic breast conserving surgery

| Parameter                                                   | Nononcplastic group |             |           | Oncplastic group |             |           | P value |
|-------------------------------------------------------------|---------------------|-------------|-----------|------------------|-------------|-----------|---------|
|                                                             | n                   | Result      | Range     | n                | Result      | Range     |         |
| Age (y)                                                     | 84                  | 65.2 ± 12.7 | 38–91     | 58               | 60.9 ± 11.8 | 35–85     | .043    |
| Body mass index                                             | 83                  | 31.2 ± 9.6  | 18.9–66.1 | 58               | 30.0 ± 6.9  | 17.5–49.1 | .952    |
| Number requiring re-excision                                | 84                  | 11 (13.1%)  |           | 58               | 3 (5.2%)    |           | .156    |
| Size of cancer from pathology report (mm)                   | 83                  | 10.8 ± 7.3  | .0–39.0   | 58               | 11.0 ± 9.8  | .0–50.0   | .878    |
| Number of biopsies following surgery                        | 84                  | .3 ± .7     | 0–5       | 58               | .3 ± .7     | 0–3       | .978    |
| Number receiving postoperative radiation therapy            | 84                  | 59 (70.2%)  |           | 58               | 54 (93.1%)  |           | .001    |
| Interval between surgery and radiation, no chemotherapy (d) | 35                  | 51.1 ± 23.2 | 23–145    | 41               | 56.0 ± 20.4 | 31–126    | .330    |
| Total follow-up (m)                                         | 84                  | 26.2 ± 16.5 | 2.9–59.8  | 58               | 24.6 ± 10.2 | 2.9–44.7  | .828    |

Data are reported as mean ± standard deviation or as number of observations (percentage).

This complication did not, however, increase the number of biopsies necessary, breast pain or cosmetic outcome. One patient had a local recurrence. She was a 90-year-old woman who was treated in the nononcplastic group and did not receive any postsurgical adjuvant treatment.

The majority of patients were pleased with the cosmetic outcome as subjectively reported by the patient: 13.8% of oncplastic and 7.1% of nononcplastic patients reported an unfavorable cosmetic outcome. One patient had an unfavorable outcome secondary to nipple retraction. One unfavorable cosmetic result was reported in the patient mentioned above with the nonhealing wound. Four patients (1 oncplastic who had a therapeutic mammoplasty and 3 nononcplastic) were not pleased with their cosmesis because of size discrepancy. All 4 of these patients received radiation.

## Comments

Oncplastic lumpectomies have recently become an option for the surgical treatment of breast cancer, but the procedures do require additional time, specialist training, and, overall, can be technically and surgically demanding. This study is unique since it specifically compares both immediate and long-term complications of oncplastic lumpectomies.

## Age

There is a trend for younger patients to elect oncplastic techniques. One study reported a mean age of 49 years in their oncplastic group and a mean age of 56 years in their nononcplastic group.<sup>3</sup> Mean age reported by Spear et al<sup>4</sup>

**Table 2** Comparison of immediate and long-term complications, breast pain, and cosmetic complaints for patients receiving nononcplastic versus oncplastic breast conserving surgery

| Parameter                | Nononcplastic group | Oncplastic group | P value |
|--------------------------|---------------------|------------------|---------|
| Number of observations   | 84                  | 58               |         |
| Immediate complications  |                     |                  |         |
| Seroma                   | 15 (17.9%)          | 10 (17.2%)       | .925    |
| Hematoma                 | 8 (9.5%)            | 10 (17.2%)       | .174    |
| Infection                | 8 (9.5%)            | 5 (8.6%)         | .854    |
| Wound dehiscence         | 4 (4.8%)            | 4 (6.9%)         | .716    |
| Nonhealing wound         | 1 (1.2%)            | 5 (8.6%)         | .042    |
| Nipple necrosis          | 0 (0%)              | 0 (0%)           | –       |
| Complaint of breast pain |                     |                  |         |
| 3–6 months               | 8/84 (9.5%)         | 2/58 (3.4%)      | .199    |
| 6–12 months              | 11/76 (14.5%)       | 2/56 (3.6%)      | .042    |
| 12–18 months             | 5/61 (8.2%)         | 2/43 (4.7%)      | .697    |
| 18–24 months             | 6/43 (14.0%)        | 2/37 (5.4%)      | .275    |
| 24–30 months             | 3/31 (9.7%)         | 2/25 (8.0%)      | 1.000   |
| Long-term complications  |                     |                  |         |
| Skin retraction          | 21 (25.0%)          | 21 (36.2%)       | .150    |
| Fat necrosis             | 8 (9.5%)            | 15 (25.9%)       | .009    |
| Cosmetic complaint       | 6 (7.1%)            | 8 (13.8%)        | .191    |

Data are reported as number (percentage).

of reduction mammoplasty patients was 53 years. Our data also parallel these trends, as average patient age in the oncoplastic group was significantly younger than in the nononcoplastic group (61 vs 65 years).

### Positive margins

In the case of positive margins with oncoplastic lumpectomy, re-excision may prove difficult because of the extensive rearrangement of the breast tissue during the oncoplasty. However, since oncoplastic lumpectomy requires wider surgical margins, the theoretical risk of positive margins should actually be reduced. Although we did not conduct intense evaluations of the cases requiring re-excision, all margins were negative after re-excision. Many studies have already reported on their negative and positive margin rate, and the results vary, but are overall favorable. Kaur et al<sup>3</sup> specifically observed the rate of positive margins in their oncoplastic surgery and standard quadrantectomy patients; in their 2 groups, positive margins were seen in 5 of 30 or 16.7% of patients, and 13 of 30 or 43.3% of patients ( $P = .05$ ), respectively. In our study, the surgeon's preference was to have 2-mm margins, and only 3 patients (5.1%) required re-excision in the oncoplastic group and 11 (13.1%) required re-excision in the nononcoplastic group. Although it appears numerically that there was a reduced need for re-excision in the oncoplastic group as compared to the nononcoplastic group, this difference was not statistically significant ( $P = .156$ ).

### Cosmesis

The motives underlying oncoplasty continue to appear largely cosmetic. Chang et al<sup>5</sup> reported on cosmesis in 20 patients with macromastia who had undergone therapeutic mammoplasty. Fourteen of these patients rated cosmesis as excellent, even though the majority (55%) experienced cosmetic changes after radiation. Our study is slightly different in that it compared cosmesis between women with or without oncoplasty and demonstrated no treatment effect. In addition, there was excellent patient satisfaction with only 13.8% of oncoplastic patients and only 7.1% of nononcoplastic patients reporting a cosmetic complaint.

### Radiation

Applying radiation to a smaller amount of breast tissue may avoid many of the undesirable effects of radiation because of large breasts, ie chronic pain, radiation toxicity to skin, vasculitis, and breast parenchyma fibrosis.<sup>6</sup> Brierly et al<sup>7</sup> demonstrated late-radiation fibrosis occurring in 36% of patients with larger breasts, compared with 3.6% for smaller breasted women. It, therefore, may be of benefit to reduce breast size by utilizing oncoplastic techniques, but complications of the procedure should not negatively impact time to treatment. Favorably, our data demonstrated that the oncoplastic technique does not prolong the time to radiation,

with the mean interval between surgery and the initiation of radiation for the oncoplastic patients being 51.1 days versus 56.0 days for the nononcoplastic patients.

### Oncological benefit

Local recurrence rates have been extensively studied for oncoplastic surgeries. In the study by Clough et al,<sup>8</sup> the local recurrence rate was 9.4%. Rietjens et al<sup>9</sup> demonstrated, in 148 patients with lumpectomy and bilateral reconstruction surgery, a local recurrence rate of 3%. Spear et al<sup>4</sup> had no local recurrences after following 22 reduction mammoplasty patients for an average of 24 months. Our study coincides with these data as there was only 1 patient with a local recurrence in the nononcoplastic group and no recurrences in the oncoplastic group.

### Complications

Few authors have focused on the immediate and long-term complications of oncoplastic surgery. Those authors who have commented on complications have mainly concentrated on the complications of fat necrosis. For example, Chang et al<sup>5</sup> reported a 16% rate of fat necrosis in bilateral reduction patients. McCulley and Macmillan<sup>10</sup> reported fat necrosis as their most common complication in their 50 therapeutic mammoplasty patients, at a rate of 8%. They also commented that complications in general were higher in the therapeutic mammoplasty group than in the routine mammoplasty group. Three of the 11 reduction mammoplasty patients (27.3%) evaluated by Spear et al<sup>4</sup> had fat necrosis, and this was also the most common complication in their series. Our results correlate closely with the above mentioned with respect to fat necrosis with a 25.9% incidence in our oncoplastic group versus a 9.5% incidence in the nononcoplastic group. In addition, we also observed a higher rate of nonhealing wounds in the oncoplastic group. There was a higher reported rate of breast pain complaints in the 6- to 12-month interval in our nononcoplastic group, but this was most likely a sample size limitation for both our study and most of the other oncoplastic lumpectomy studies.

### Conclusions

An overall benefit of oncoplastic lumpectomy is that it provides certain patients with more choices for the management of their breast cancer. It offers these patients options that are not only aesthetically more pleasing, but may provide oncological benefit as well. Through this analysis, it has been shown that only minor differences exist between the immediate and long-term complications of the 2 groups; therefore, oncoplastic lumpectomy should be considered a safe alternative for selected breast cancer patients. Thus, oncoplastic lumpectomy will continue to be an important and desirable option for certain breast cancer patients.

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## Discussion

**Stephen F. Sener** (Los Angeles, CA): I applaud this movement towards more oncoplastic operations across America. When I moved from Chicago to LA, I basically stopped doing non-oncoplastic surgery and started doing oncoplastic repairs of defects, mainly because I was working with Mel Silverstein in the home of oncoplastic surgery, some would say. How did you learn how to do this? What were your selection criteria? Could you describe for us the non-oncoplastic operation? In my opinion, one of the criteria for safety in breast conserving surgery is the margins; rates of reexcision, the criteria for reexcision. So the debate about reexcision, I think, has pretty much been settled in many parts of the country. Patient satisfaction, you mentioned your perception of satisfaction, but I wonder whether you would be interested in applying something like BREAST-Q or formal patient satisfaction survey in the future.

**Tenofsky:** For selection criteria, I offer any women who has a D cup size breast or larger reduction mammoplasty. And most choose it, but some do not choose it. The person who does not choose to have a reduction mammoplasty would go into the non-oncoplastic category. As for donut mastopexies, I don't do those procedures very often, but it would be a smaller breasted woman who has their cancer close to the nipple areolar complex. Adjacent tissue transfers, for the purpose of this study, were patients that I actually freed the skin and the muscle from the breast parenchyma and re-approximated the tissue. I do not do oncoplastic procedures on all patients. If it is a very small cancer and medium

to large sized breasts, and I don't feel like the cavity will be significant, I will not bring the tissue back together.

As for reexcision, my criteria at the time of this study was 2 millimeters or larger except for the skin and muscle for which I would want no cancer at the marked edge. At the time of this study, I did reexcise for 2 millimeters or larger margins, but I do not necessarily do that now in my current practice. We have a tumor conference where we present these cases and discuss margin status.

I do have a patient satisfaction survey, but it is not blinded. The patients are seen in follow up every 6 months. The mean follow up in this study was approximately 3 years. There certainly may be a bias if the patient is concerned I might be upset if she says she's unhappy with her cosmetic result. A blinded survey would be better.

As for adjuvant therapy, we did not specifically look at how many patients had neoadjuvant chemo in our actual paper. And I do work with 2 plastic surgeons in our group. All reduction mammoplasties, are with them. I have not done these procedures by myself. I had the plastic surgeons help me with the first few donut mastopexies until I felt comfortable with the procedure and I don't bring them in for the adjacent tissue transfers, just reduction mammoplasties.

**Lynne M. Jalovec** (Peoria, IL): What do you do when you have done a reduction mammoplasty and your margin is positive and now you're dealing with a completely altered breast and you've got to go back in and do a reexcision? We're having some difficulty getting simultaneous reduction mammoplasties covered financially from the insurance companies. I wondered how you're handling that.

**Tenofsky:** Fortunately, very seldom do you get a positive margin on the reduction mammoplasties. I like to have a plan in place in case that happens and discuss it with the patient. If we have a positive margin with a reduction lumpectomy, the plan is to do a mastectomy. The plastic surgeons sometimes feel we can go back and obtain larger margins if it is soon after surgery and we know exactly where to take the tissue. It is difficult, however, when the tissue is completely rearranged to know where to take more. I, therefore, prefer to go to a mastectomy if we have positive margins. This is discussed in detail with the patient and at our tumor conference before proceeding back for further surgery.

The insurance question is a bit of a concern. I have yet to have any denials on oncoplastic procedures, as long as they are coded correctly. There has been some memos coming from insurance companies such as Blue Cross/Blue Shield of Kansas that have said that reconstruction of any type with lumpectomies may no longer be covered.

**Jalovec:** We are having the same problem. So our plastic surgeons are doing it delayed. They are doing the reduction mammoplasties after I have already done the excision.

**Tenofsky:** That is certainly a good option and would allow more tissue to be taken, before the reduction mammoplasty, in someone with a positive margin. It would also make scheduling easier with the two surgeons. The patient would require two anesthetics, however.