

Outcomes of Margin Reexcision after Oncoplastic Breast Reduction

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Introduction: Tissue rearrangement after an oncoplastic breast reduction may complicate identification of margins during reexcision. Little is known about outcomes of reoperation in this setting.

Methods: This is a single-institution, retrospective analysis of outcomes of margin reexcisions after lumpectomy with concurrent oncoplastic Wise-pattern reduction from 2015 to 2020. Outcomes assessed were the rate of successful breast conservation, in-breast recurrence, wound issues or complications, effect on cosmesis, and delay to onset of adjuvant therapy.

Results: From 2015 to 2020, 649 patients underwent lumpectomy with oncoplastic Wise-pattern reduction. Forty-seven patients (7.2%) had greater than or equal to one positive margin(s); of these, 28 went directly to mastectomy, and 19 underwent margin reexcision. Residual disease was found in seven of 19 patients (37%) at reexcision. The rate of successful breast-conserving therapy was 95% with a mean follow-up of 31 months. There was one (5%) in-breast recurrence (invasive ductal carcinoma [IDC] occurring 30 months after the original operation); this patient had a mastectomy for treatment of her recurrence. The overall complication rate was 37%. Radiation was administered to 18 patients (95%), and two patients (11%) had delay of radiation past 6 weeks due to wound complications. Of the 14 patients with photographs available, 12 of 14 patients (86%) were blindly assessed to have equivalent or better cosmesis after margin reexcision (versus initial lumpectomy).

Conclusion: Margin reexcision after oncoplastic breast reduction with Wise-pattern is feasible and effective, and can be done without compromising the initial cosmetic results. (*Plast Reconstr Surg Glob Open* 2022;10:e4509; doi: 10.1097/GOX.0000000000004509; Published online 23 September 2022.)

INTRODUCTION

Oncoplastic breast surgery combines facets of reconstructive plastic surgery with traditional resection techniques, allowing resection of larger tumors with larger margins, with a decrease in positive margin rate and improved cosmesis compared with partial mastectomy alone.¹ Depending on tumor size, location, and patient

preference, there are several different oncoplastic techniques available to the surgeon. Oncoplastic breast surgery is broadly classified as level I or level II. Level I oncoplastic techniques involve more limited tissue rearrangement and are appropriate when less than 20% of breast tissue is removed. When more than 20% of breast parenchyma is removed, level II techniques are typically used and involve more complex tissue rearrangement and skin excision.¹⁻⁴ Studies evaluating the oncologic safety of oncoplastic surgery have shown no difference in local recurrence-free survival compared with conventional breast-conserving surgery (BCS).^{1,5}

Oncoplastic breast reduction and/or mastopexy, typically with a Wise-pattern incision, is a common level II oncoplastic technique. Bilateral reduction mammoplasty is a frequently selected approach, because it allows for improved breast symmetry and can improve symptoms of macromastia such as back, neck, and/or shoulder pain, shoulder grooving, and intertrigo. Patients report a high degree of satisfaction with cosmetic and functional results.^{6,7} The Wise-pattern breast reduction allows for

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improved access and enables the breast surgeon to resect a wider margin than they would in a standard BCS.

The positive margin rate for BCS ranges from 17% to 40%.^{3,8,9} Oncoplastic techniques have been shown to lower the positive margin rate, with reported positive margin rates ranging from 1.7% and up to 18.6%.^{8,10} However, when a positive margin does occur after oncoplastic breast reduction, it can be more challenging to manage. The breast surgeon may be concerned about whether he/she can accurately locate the tumor bed after oncoplastic breast surgery. Residual tumor in the reexcised margin can be reassuring that the tumor bed was identified, but residual disease is only found in 30%–70% of specimens at reexcision.^{10,11} A positive resection margin is a risk factor for recurrence; therefore, long-term follow-up is needed to assess outcomes. While there are increasing data on reexcision rates in oncoplastic breast surgery, there is little published on the outcomes of margin reexcision, as a large percentage of these patients have historically gone straight to mastectomy. The purpose of this study was to evaluate outcomes of margin reexcision in the setting of oncoplastic lumpectomy.

MATERIALS AND METHODS

This is an IRB-approved, single-institution, retrospective analysis of outcomes of margin reexcisions after lumpectomy with oncoplastic Wise-pattern reduction from 2015 to 2020. All patients with oncoplastic Wise-pattern reductions were included. Patients with multifocal tumors were excluded. Outcomes assessed were the rate of successful margin reexcision while maintaining breast conservation therapy, in-breast recurrence, wound complications, effects on cosmesis, and delay to adjuvant treatment. Demographic, clinical, pathologic, and recurrence information were collected from the electronic medical record. All partial mastectomy and reexcision of margin procedures were performed by a fellowship-trained breast surgical oncologist in conjunction with a board-certified plastic surgeon.

All partial mastectomy specimens were marked consistently among surgeons with different length sutures delineating the superior and lateral aspect. The pathologist examined margins on the main specimen as well as any additional shave margins that were submitted, which varied among surgeons in this study.

To assess maintenance of cosmesis, three blinded breast cancer providers (a surgeon, physician’s assistant, and a nurse practitioner), without knowledge of the study aims or photograph sequence, reviewed photograph pairs from after oncoplastic reduction and after reexcision, and compared cosmesis between the two images. Criteria for maintenance of cosmesis were preserving the overall appearance, size, and symmetry between the breasts. The pictures were arranged in random order, and the reviewers evaluated the second picture as the same, better, or worse than the first picture. Informed consent was obtained for research and publications, and all photographs are unidentifiable. The confidence intervals (CIs) were calculated using the Wilson score interval with a correction for continuity.

Takeaways

Question: What are the outcomes of margin reexcision after oncoplastic breast reduction?

Findings: This retrospective analysis of 19 patients had a mean follow-up of 31 months. The rate of successful breast-conserving therapy was 95%. There was one patient who had recurrence. The overall complication rate was 37%, including small wounds at the triple point. Most patients (86%) had equivalent or better cosmesis after margin reexcision.

Meaning: Margin reexcision after oncoplastic breast reduction is effective in selected patients and can be done without compromising the initial cosmetic results.

RESULTS

From 2015 to 2020, 649 patients underwent lumpectomy with oncoplastic Wise-pattern reduction at our institution. Forty-seven patients (7.2%; 95% CI, 5.4–9.6) had greater than or equal to one positive margin(s). Of the positive margin group, 28 patients went directly to mastectomy (60%), and 19 underwent margin reexcision (40%). The patients who underwent margin reexcision form the study cohort.

All of the oncoplastic reductions were done with Wise-pattern (inverted T) incisions and were performed concurrent to partial mastectomy. The contralateral symmetry procedure was performed at the index operation, and the breast with cancer was left slightly larger in anticipation for radiation. The reoperation for margin reexcision occurred a mean of 21 days after the original operation, and in all cases, the reexcision was performed through the prior Wise-pattern incision. In 14 of 19 cases, the plastic surgeon was present on the takeback based on breast or plastic surgeon clinical judgment. None of the patients required a revision on the contralateral breast.

Patient information, tumor details, and pathology findings are displayed in Tables 1–3. The majority of the tumors were invasive ductal (68%), and all invasive carcinomas had a ductal carcinoma in situ (DCIS) component. T category distribution was as follows: 21% Tis (n = 4), 63% T1 (n = 12), and 16% T2 (n = 3). Four patients (21%) received neoadjuvant chemotherapy: three for Her2neu positive tumors greater than 2 cm and one for triple negative tumor (T1c). Only one margin was positive in the

Table 1. Patient Information

Patient Information	Average ± SD	N
Age	56 ± 10	
BMI	31 ± 6.0	
Sternal notch to nipple distance	30 ± 4	
Bra size		
C		6
D		1
DD		8
DDD		1
F		1
Days between lumpectomy and reexcision	21 ± 13	
	5–55 (range)	
Follow-up from initial surgery (mo)	31 ± 15	
	8–64 (range)	

Table 2. Tumor Details

Tumor Details	N = 19 (%)
ER positive tumors	18 (95)
Her2Neu+ tumors	5 (26)
Multifocal tumors	7 (37)
No. radiology placed wire localizations	
0	3 (16)
1	11 (58)
2	5 (26)
Quadrant of disease	
UIQ	8 (42)
UOQ	9 (47)
LIQ	2 (11)
LOQ	0
Received neoadjuvant chemotherapy	4 (21)

ER, estrogen receptor; LIQ, lower inner quadrant; LOQ, lower outer quadrant; UIQ, upper inner quadrant; UOQ, upper outer quadrant.

majority of patients (63%). Residual disease was found in seven patients (37%) at reexcision. One patient required a second margin reexcision for persistently positive margin involved with DCIS and did achieve clear margins on the third operation (second reexcision). None of the 19 patients went on to mastectomy during management of the initial diagnosis. Ninety-five percent of patients in this cohort were nondiabetic and nonsmokers.

Overall, 12 patients (63%) healed without any complications after the original and margin reexcision surgery. Fat necrosis was not encountered in any of the patients during follow-up. Seven patients (37%) developed wound dehiscence. Four patients (21%) had minor incisional dehiscence, either at the triple point or along the inframammary incision, less than 2 cm in size, which healed with conservative wound care measures. Three patients (16%) had dehiscence greater than 2 cm, and two of these patients had delay of radiation past 6 weeks, although both healed without surgical reintervention. One of these had no contributing comorbidities; she was able to start

Table 3. Pathology Findings

Pathology Data	N = 19 (%)	Average ± SD
Noninvasive tumor size on pathology (mm)		33±23
Invasive tumor size on pathology (mm)		15±7
Weight of initial partial mastectomy specimen and any margin(s) (grams)		84±72
Weight of additional reduction specimen(s) (grams)		226±199
Weight of margin reexcision specimen(s) (grams)		10±7
Tumor type on final path		
Pure DCIS	4 (21)	
IDC	13 (68)	
ILC	1 (5)	
Mucinous	1 (5)	
No. margins positive		
1	12 (63)	
2	5 (26)	
3	2 (11)	
Tumor type on positive margin		
DCIS	16 (84)	
DCIS and invasive (IDC)	1 (5)	
Invasive (IDC and ILC)	2 (11)	
Residual disease found on reexcision	7/20 (37)	
DCIS	6 (30)	
Mucinous	1 (5)	

DCIS, ductal carcinoma in situ; IDC, invasive ductal carcinoma; ILC, invasive lobular carcinoma.

radiation at 12 weeks postoperatively. The other patient with delay to radiation had diabetes and end-stage renal disease; her initial partial mastectomy was complicated by takeback for bleeding. After reexcision, she developed an infection and partial wound dehiscence. Her radiation started at 5 months postoperatively.

Radiation was administered to 18 patients (95%), and boost doses were administered to four patients (21%). One patient declined radiation; she had 12 mm of intermediate grade DCIS and did comply with endocrine therapy.

Of the 14 patients with sufficient photographs available to review, blinded reviewers assessed that the cosmesis was worse after margin reexcision in two (14%), better in four (28%), and equivalent in eight (57%). Eighty-five percent of patients had the same or better aesthetic outcome (Fig. 1A–F).

Oncologic outcomes were assessed over a median of 27 months postoperatively (range, 8–64). Patients were followed up with a clinical examination every 6–12 months and a yearly diagnostic mammogram. There was one in-breast recurrence of invasive ductal carcinoma (IDC) diagnosed 30 months after the original operation, for a recurrence rate of 5% (1/19; 95% CI, 3–28). This patient’s index cancer was a 1.4 cm IDC grade 3, estrogen receptor (ER) 10%, progesterone receptor (PR) 15%, and human epidermal growth factor receptor 2 (HER2) negative, with 8 cm of DCIS. She had two positive margins after her initial operation. Her reexcision pathology did have residual DCIS, but her final margins were negative by 3.5 mm. After the index operation, she was treated with radiation and endocrine therapy. Chemotherapy was recommended but due to the patient’s poor health, it was not done. This patient experienced a 5-month delay to radiation due to a nonhealing wound, as discussed above. She had an in-breast recurrence at 2.5 years, which was treated with mastectomy.

DISCUSSION

At our institution, lumpectomy with breast reduction has a positive margin rate of 7.2%. Review of the literature reveals that factors associated with higher incidence of positive margins after oncoplastic surgery and/or reduction are resection over 1000 g, invasive lobular histology, larger tumor size/higher T stage, and higher grade.^{6,10} In many cases, patients with positive margins after lumpectomy with reduction will proceed to mastectomy.¹⁰ Mastectomy may be recommended because an extensive tissue rearrangement may create uncertainty for the breast surgeon about reidentification of a margin for reexcision. Also, the surgeon may feel that positive margins after a large oncoplastic lumpectomy indicate a high tumor burden, making successful breast conservation unlikely.

Only two patients in this study had three positive margins, and no patients had more than three positive margins. Diffusely positive margins after an oncoplastic reduction will likely prompt the need for a mastectomy as the tumor is more extensive than recognized on imaging or examination. For diffusely positive margins, Clough et al¹⁰ advocates a redo unilateral mammoplasty with the



Fig. 1. Preoperative, postoncoplastic surgery and postmargin reexcision photographs for two patients. In the second picture for each patient (B) and (E), please note the hashmarks that facilitate reopening and aesthetically reclosing the Wise-pattern. C, The photograph is postradiation. F, The photograph is preradiation. A–C, Blinded reviewers deemed the final result cosmetically superior to the initial oncoplastic result. D–F, Reviewers deemed the oncoplastic and post reexcision results to be aesthetically equivalent.

same technique if the remaining breast tissue volume allows it. If the remaining breast is too small to allow for further volume reduction via margin reexcision, a mastectomy should be considered. If mastectomy is required after an oncoplastic reduction, a nipple-sparing mastectomy often can be a safe and cosmetically excellent option as the patient's ptosis and/or macromastia has been corrected, assuming the positive margin does not involve the nipple-areola complex. Patients may also opt for mastectomy if that would enable them to avoid radiation.

Cosmesis is another important factor to consider when deciding about possible reexcision, and a lack of adequate breast volume remaining or concern about symmetry is other indications for mastectomy.³ However, the average amount of tissue removed on the takeback for reexcision in this study was only 10 grams, and this is unlikely to make

a significant difference in size or symmetry between the breasts. There is very little published on cosmesis and patient satisfaction after margin reexcision. In our series, the cosmetic outcome of 12 of 14 (85%) patients who had pictures taken before and after reexcision was reviewed and found to have the same or better cosmetic outcome after the second operation (Fig. 1A–F). The pictures were limited due to the retrospective nature of this study, and most of them were taken shortly after surgery, before radiation. Radiation changes are a different issue. If a large volume needs to be reexcised, the contralateral breast can be revised for symmetry if needed.

There are a few helpful strategies to facilitate margin reexcision in the circumstance it is needed. At our institution, surgeons typically place clips and/or a three-dimensional tissue marker at the lumpectomy site. Although

intended for use in targeting a radiation boost, these can also help the surgeon if margin reexcision is required. We recommend that surgeons document in the operative report where the tumor bed lies in relation to the pedicle and flaps of the reduction procedure. How the plastic surgeon labels and marks his/her specimens can also help communicate that additional tissue/margin was taken around the tumor bed in the case of an unexpected positive margin. It is helpful if the breast surgeon stays for a portion of the oncoplastic reduction with the plastic surgeon to ink and send additional specimens if they are taken from around the tumor cavity. Alternatively, if an appropriately trained breast surgeon performs both lumpectomy and oncoplastic rearrangement, this can contribute to surgeon ability to reidentify and excise a positive margin.

Returning to the operating room for the reexcision as a team with the plastic surgeon can enable identifying the lumpectomy bed and ensure appropriate access to the area of concern while preserving the pedicle. In addition, the plastic surgeon can optimize the aesthetic result and assess the need for symmetry procedure on the opposite breast. The operating surgeon should mark the breast at the time of the takeback with hash marks so the incision is reapproximated correctly at the end of the surgery (Fig. 1).

Timely takeback for margin reexcision is imperative, as waiting too long can obliterate planes. One study recommended the reexcision at 1 month to allow some consolidation of the seroma cavity, while other experts in the field recommend going back within 2 weeks.¹² The longest time between the original surgery and the reexcision for margins in this study was 55 days. We strive to take the patient back within 1 month.

In a pooled analysis, oncoplastic reduction for partial mastectomy reconstruction had equivalent complication rates compared with bilateral reduction performed for symptomatic relief from macromastia, which ranges from 17% to 34%.^{1,13,14} The most common complication after an oncoplastic reduction was wound dehiscence or delayed wound healing (4.6%).¹ There was no literature on the complication rate after margin reexcision in this setting, but in our study, the total complication rate was 37% (7/19 patients; 95% CI, 17–61), which is slightly higher than the range mentioned in the literature after an oncoplastic reduction surgery. We would anticipate the rate of complications in the reoperative group to be higher given a degree of tissue trauma/stress from having to undergo the second operation. Most of these complications were small wounds at the triple point, which is the area under the most tension and the most at risk for breakdown. Delays in adjuvant treatment due to wound healing may compromise oncologic outcomes, and this risk should be considered when undertaking an oncoplastic approach in patients with high-risk tumors or comorbidities that put them at higher risk for such complications.

A meta-analysis on the safety of oncoplastic breast surgery was recently published by Kosasih et al.¹ The authors found that there was no significant difference in recurrence between oncoplastic breast surgery and

standard BCS or mastectomy, with a range of follow-up of 1.5–9.2 years. There was one (5%) recurrence in our study with a mean study follow-up of 31 months (range, 8–64). This patient did have aggressive tumor histology and chemotherapy was recommended but was not given. This is a single-center, retrospective study, which limits the translation of our findings and a larger study with longer follow-up will be important to confirm the oncologic safety of reexcision of margins after oncoplastic reduction.

CONCLUSIONS

Ninety-five percent of patients in this cohort were successfully managed with margin reexcision while maintaining breast-conserving therapy. There was one recurrence, which led to a mastectomy. Longer follow-up is needed to verify the oncologic safety of this approach. Mastectomy is not always necessary when managing a positive margin after lumpectomy with oncoplastic breast reduction, and lumpectomy reexcision may be offered to carefully selected patients when the breast surgeon feels that the positive margin(s) can be reidentified.

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