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Breast

Oncoplastic Breast Reconstruction in Morbidly Obese Patients: An Acceptable Practice

Grey W. Fortenbery, MD*
Lauren Todd, MD†
Niaman Nazir, MD, MPH‡
Shreeya Dalla, BS†
Meredith Collins, MD, FACS*

Background: Breast cancer is the most common noncutaneous malignancy amongst women. Lumpectomy with adjuvant radiation is a mainstay of surgical treatment. Oncoplastic breast reconstruction reduces the resultant breast deformity. Obesity is a risk factor for the development of complications after breast reconstruction. This study's purpose was to determine if oncoplastic breast reconstruction is a safe procedure in obese patients.

Methods: A single institution retrospective chart review was performed on women undergoing oncoplastic breast reduction from 2009 to 2021. Patients were then divided into groups based on body mass index (BMI). A statistical analysis was performed comparing rates of complications and time to adjuvant therapy.

Results: An estimated 340 patients were identified with an average age of 56.2 years (140 with BMI <30 kg/m^2, 87 with BMI 30–34.9 kg/m^2, 62 with BMI 35–39.9 kg/m^2, and 51 with BMI >40 kg/m^2). There was a significant difference between the BMI greater than 40 kg per m^2 and BMI less than 30 kg per m^2 group in the number of returns to the operating room ($P = 0.0096$), major complications ($P = 0.0002$), and minor complications ($P = 0.0051$). Average time to adjuvant treatment was 47 days and there was no statistically significant difference between the groups ($P = 0.1691$).

Conclusions: There was a significant difference in major and minor complications between the BMI groups; however, there was no delay in the time to adjuvant therapy. Therefore, we conclude that with appropriate counseling on surgical risks, oncoplastic breast reduction is an acceptable option for breast cancer patients after lumpectomy, regardless of BMI. *(Plast Reconstr Surg Glob Open 2024; 12:e5601; doi: 10.1097/GOX.0000000000005601; Published online 12 February 2024.)*

INTRODUCTION

Affecting 12.5% of women, breast cancer predominates as the most common noncutaneous malignancy amongst women with 1.38 million new cases per year.[1] Currently, the standard of care for the surgical management of breast cancer is breast conservation therapy (BCT), including lumpectomy and radiation, versus mastectomy.[2] BCT has proven to be an equivocally effective and safe treatment when compared with mastectomy; however, it has been reported that up to 6.5% of patients undergoing BCT have poor aesthetic outcomes.[3] This has led to an increased interest and use of oncoplastic breast reconstruction (OBR), a method that incorporates both plastic and oncological surgical techniques to minimize the resultant breast deformity postlumpectomy.

In the United States, the prevalence of obesity has steadily increased over the last several decades and is currently approaching 40% of women.[4] Excess body weight has been shown to be a risk factor for development of breast cancer in postmenopausal women.[5] As such, one would expect the number of obese breast cancer patients to continue to climb as the obese population rises. In relation to breast cancer therapy, obesity is a well-described risk factor for postsurgical complications in the postoperative period.[6] Obese patients are also known to have increased surgical risks with implant and autologous based reconstruction methods.[7–9] Additionally, patients with a body mass index (BMI) greater than 32 kg per m^2 have been found to have higher rates of wound-related complications after nononcologic breast reduction surgery.[3,10]

*From the *Department of Plastic Surgery, University of Kansas Medical Center, Kansas City, Kans; †University of Kansas School of Medicine, Kansas City, Kans; and ‡Department of Population Health, University of Kansas Medical Center, Kansas City, Kans.*

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Time between procedure and adjuvant treatment is an important safety consideration in breast-conserving therapy, including oncoplastic reduction. Any postoperative complication could lead to a delay of adjuvant therapy, which can lead to a worse prognosis for patients.[11–16] As obesity has been described as a predominant risk factor for such complications in BCT, the question arises regarding the safety of OBRs in obese patients. OBR has been described as a safer option in regard to complications when compared with mastectomy with reconstruction in the obese patient population.[5,17] In contrast, OBR was found to have a higher complication rate than patients receiving BCT alone.[6,18] Our study aimed to evaluate OBR in the obese breast cancer population and determine if this is an acceptable practice for these patients and does not result in delays to adjuvant care.

Takeaways

Question: Is oncoplastic breast reconstruction (OBR) an acceptable practice in obese and morbidly obese patients?

Findings: There are higher rates of complications in class III obese patients compared with nonobese patients undergoing OBR. Despite the increased rate of complications, there was no statistically significant increase in the time to adjuvant therapy for these patients.

Meaning: OBR is an acceptable practice in patients regardless of their BMI; however, class III obese patients should be counseled about the increased risk for surgical complications.

METHODS

After approval from the institutional review board at the University of Kansas Medical Center, a single institution retrospective chart review was performed from the electronic medical records of women with breast cancer who underwent oncoplastic breast reduction from November 2009 to August 2021. Patients were stratified into four separate groups based on their BMI: BMI less than 30 kg per m^2, BMI 30–34.9 kg per m^2, BMI 35–40 kg per m^2, and BMI greater than 40 kg per m^2.

On review of medical records, patient characteristics (including BMI and relevant medical history, data on their perioperative complications, and time to initiation of adjuvant therapy) were collected. In this study, we examined commonly associated comorbidities, including hypertension, diabetes mellitus, chronic obstructive pulmonary disease, immune deficiency, cardiovascular disease history, and smoking status. A variety of standard OBR techniques, which included symmetry procedures on the noncancerous breast, were used by the multiple surgeons in our group performing the procedure. The type of pedicle used for the breast varied by tumor location and surgeon preference. Postoperative complications were divided into minor and major complications, with major complications requiring surgical intervention. Time to adjuvant treatment was determined from the date of surgery to the date that treatment was started.

Data management and statistical analyses were performed using SAS software (version 9.4) (SAS Institute Inc., Cary, N.C.). Categorical variables were summarized with percentages and continuous variables were summarized by means and medians. Bivariate analysis was conducted using chi square tests for categorical variables and ANOVA for continuous variables. For instances where 50% of the cells had expected counts of less than five, Fisher exact test was used to make global comparisons of categorical variables across BMI groups. Two-sided *P* values less than 0.05 were considered statistically significant.

RESULTS

In total, 340 patients were included in this retrospective review. The mean age of our population was 56.2 years (median 56.0, range 29.0–82.0) with an average BMI of 32.4 kg per m^2 (median 31.5 kg/m^2, range 18.6–60.8 kg/m^2). After stratification into the BMI groups, there were 141 patients with BMI less than 30 kg per m^2, 88 patients with BMI 30–34.9 kg per m^2, 61 patients with BMI 35–40 kg per m^2, and 50 patients with BMI greater than 40 kg per m^2 (Table 1). Between the BMI groups, age, smoking status, and demographics were statistically similar.

Patient Comorbidities

In terms of medical comorbidities among the groupings, there was a significant difference in prevalence of hypertension ($P = 0.005$) and diabetes ($P = 0.0003$) in those with a BMI more than 40 kg per m^2. With respect to the other comorbidities, a history of cardiovascular disease (coronary artery disease, heart failure), chronic obstructive pulmonary disease, immune deficiency, current tobacco use, and history of either preoperative radiation or neoadjuvant chemotherapy, there was no significant difference found amongst the groups (Table 2).

Pedicle and Skin Incision Type

The most common skin incision types used were Wise and vertical pattern, and the most common pedicle type was inferior. Of note, nine patients examined did not have the type of pedicle used described in the medical record (Table 3).

Complications and Return to Operating Room

Regarding returns to the operating room, we noted 21 of 340 patients required a return to surgery. When this is broken down into the different BMI groups, we found a marginal difference in the rates of return between the BMI less than 30 kg per m^2 and BMI greater than 40 kg per m^2 groups ($P = 0.05$) (Table 2).

When examining the rates of complications, there was a significant difference in the number of major

Table 1. BMI Groups

BMI (kg/m^2)	No. Patients	% of Total Participants
BMI <30	141	41.5
BMI 30–34.9	88	25.9
BMI 35–40	61	17.9
BMI >40 kg/m^2	50	14.7

Table 2. Patient Characteristics, Complications, and Time to Treatment by BMI Groups

	BMI <30 kg/m² N (%)	BMI 30–34.9 kg/m² N (%)	BMI 35–40 kg/m² N (%)	BMI > 40 kg/m² N (%)	*P*
Comorbidities					
Diabetes	7 (5)	7 (8)	9 (14.8)	13 (26)	0.0003*
Cardiovascular disease	12 (8.5)	7 (8)	2 (3.3)	4 (8)	0.61
COPD	0 (0)	1 (1.1)	1 (1.6)	1 (2)	0.27
Immune deficiency	0 (0)	0 (0)	1 (1.6)	1 (2)	0.11
Hypertension	42(29.8)	29 (33)	27 (44.3)	28 (56)	0.005*
Smoking	13 (9.3)	5 (5.7)	4 (6.6)	2 (4)	0.89
History of radiation	4 (2.8)	0 (0)	0 (0)	0 (0)	0.28
Neoadjuvant chemotherapy	37 (26.2)	15 (17.1)	17 (27.9)	13 (26)	0.35
Any Complications	35 (24.8)	33 (37.5)	22 (36.1)	24 (48)	0.02*
Return to Operating Room	4 (2.8)	5 (5.7)	6 (9.8)	6 (12)	0.05
Major Complications					
Infection	1 (0.7)	2 (2.3)	1 (1.6)	0 (0)	0.61
Dehiscence	0 (0)	1 (1.1)	3 (4.9)	3 (6)	0.008*
Skin necrosis	0 (0)	1 (1.1)	0 (0)	1 (2)	0.25
Hematoma	6 (4.3)	2 (2.3)	3 (4.9)	4 (8)	0.44
Contralateral breast	1 (0.7)	1 (1.1)	0 (0)	1 (2)	0.75
Any major complication	8 (5.7)	5 (5.7)	6 (9.8)	7 (14)	0.21
Minor Complications					
Infection	7 (5)	7 (8)	5 (8.2)	3 (6)	0.72
Dehiscence	7 (5)	14 (16)	5 (8.2)	9 (18)	0.01*
Delayed healing	2 (1.4)	8 (9.1)	5 (8.2)	11 (22)	<0.0001*
Skin necrosis	3 (2.1)	1 (1.1)	2 (3.3)	1 (2)	0.86
Fat necrosis	3 (3.1)	1 (1.1)	3 (4.9)	2 (4)	0.39
Hematoma	8 (5.7)	5 (5.7)	3 (4.9)	4 (8)	0.90
Contralateral breast	2 (1.4)	1 (1.1)	1 (1.6)	0 (0)	1.00
Any minor complication	29 (20.6)	29 (33)	19 (31.2)	22 (44)	0.01*
Mean Time to Adjuvant Treatment (d)	45.7	48.9	45.2	49.8	0.21

*Indicates a statistically significant difference found amongst the groups.

Table 3. Skin Incision and Pedicle Types

	BMI <30 kg/m² N (%)	BMI 30–34.9 kg/m² N (%)	BMI 35–40 kg/m² N (%)	BMI >40 kg/m² N (%)	Total N (%)
Skin Incision Type					
Wise pattern	98 (69.5)	76 (86.4)	48 (78.7)	46 (92)	268 (78.8)
Vertical	38(27)	10 (11.4)	13 (21.3)	2 (4)	63 (18.5)
Lateral	1 (0.7)	0 (0)	0 (0)	1 (2)	2 (0.6)
Periareolar	4 (2.8)	2 (2.3)	0 (0)	1 (2)	7 (2.1)
Pedicle Type					
Superior	35 (25.9)	7 (8.1)	12 (19.7)	1 (2.1)	55 (16.6)
Superomedial	17 (12.6)	15 (17.2)	14 (23)	11 (22.9)	57 (17.2)
Medial	2 (1.5)	1 (1.2)	1 (1.6)	0 (0)	4 (1.2)
Lateral	1 (0.7)	0 (0)	0 (0)	0 (0)	1 (0.3)
Inferior	79 (58.2)	58 (66.7)	33 (54.1)	30 (62.5)	200 (60.4)
Free nipple graft	1 (0.7)	6 (6.9)	1 (1.6)	6 (12.5)	14 (4.2)
Missing data	6	1	0	2	9

complications. Major complications were those that required a return to the operating room. Overall, there was no significant difference in the total number of major complications amongst the groups. When the types of complications were evaluated separately, we found a significant difference in the rate of wound dehiscence, which required operative intervention between the BMI less than 30 kg per m², BMI 30–34.9 kg per m², and BMI greater than 40 kg per m² groups ($P = 0.008$). There was no statistically significant difference found when comparing with the other group. We found no significant difference in the rates of hematoma, infection, skin necrosis, or complications with the contralateral breast requiring a return to the operating room (Table 2).

For the minor complications, we noted significant difference in the total number of minor complications between BMI less than 30 kg per m² and BMI greater than 40 kg per m² ($P = 0.005$). When separating out the different complications, there was a significant difference between the BMI less than 30 kg per m² and BMI greater than 40 kg per m² groups with respect to dehiscence ($P = 0.01$) and delayed wound healing

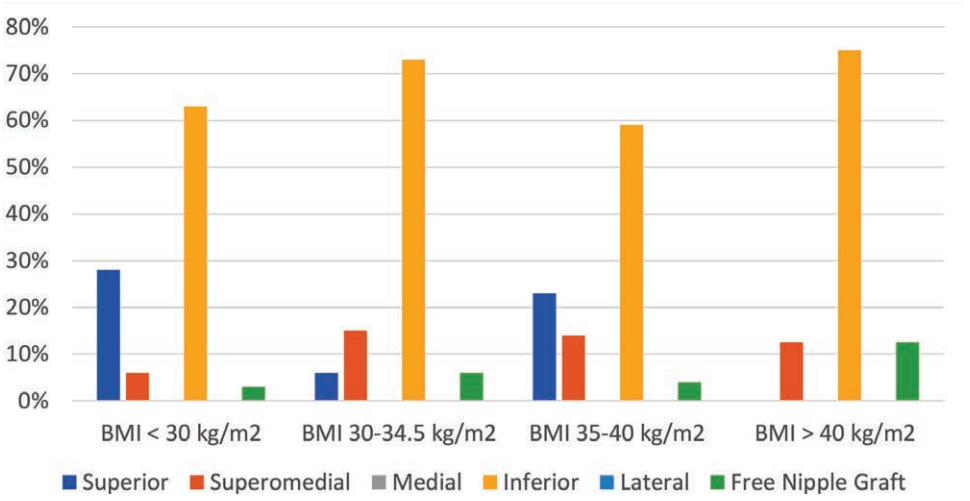

Fig. 1. Distribution of pedicle type among patients with any complication in each BMI group.

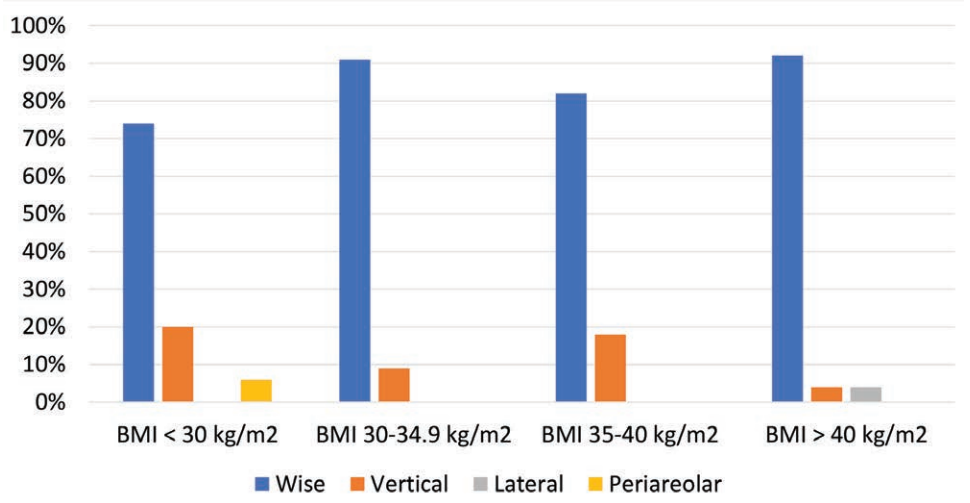

Fig. 2. Distribution of incision type among patients with any complication in each BMI group.

($P \leq 0.0001$). We defined dehiscence as wound separation and delayed wound healing as the incisions appearing not yet healed but not widely separated. There was no significant difference of other minor complications such as hematoma, infection, fat necrosis, skin necrosis, and complications with the contralateral breast (Table 2).

Additionally, the pedicle and incision type used for patients within each BMI group that experienced any complication was evaluated (Figs. 1 and 2). When the groups were assessed for the rate of any complication related to the pedicle type or skin incision type, there was no statistically significant difference noted.

Time to Adjuvant Therapy

Average time to adjuvant therapy across all groups was 47 days. When separated into respective BMI groups, there was no significant difference in the average time to adjuvant treatment ($P = 0.21$; Table 2).

DISCUSSION

Despite the growing prevalence of breast-conserving therapy and oncoplastic reconstructions, there has yet to be any study to date that has investigated the safety of oncoplastic reconstruction in class II and class III obese patients. With the prevalence of breast cancer and the growing rate of obesity in the United States, it is only expected that surgeons will be faced with the decision of whether to offer these patients reconstruction. Our study sought to evaluate oncoplastic reconstruction in morbidly obese patients, specifically in terms of complication risks and the effect on timing of adjuvant therapy.

Breast-conserving therapy is an important treatment modality for obese patients with breast cancer who are candidates for lumpectomy. Obese patients are known to have an increased general risk with anesthesia due to associated comorbidities.[19] BCT reduces the amount of anesthesia time when compared with mastectomy, making this a safer therapy option for certain patients.[20] In women with a lower

BMI, BCT with oncoplastic reconstruction has been shown to have a comparable complication rate, reduced reexcision rates, and higher patient satisfaction compared with BCT alone.[21–23] Furthermore, studies have shown that obese patients, particularly those with BMI greater than 30 kg per m^2, undergoing BCT alone are more likely to report more breast asymmetry and have a less favorable aesthetic result.[7–9] Therefore, it is of increasing importance to be able to offer oncoplastic reconstructions to the obese patient population. Although this study specifically evaluated rates of complications and time to adjuvant treatment in patients undergoing OBR according to their BMI groups, an additional valuable study would be comparison of obese patients undergoing BCT alone versus BCT with OBR.

As is evidenced in our results, there was a significant increase in number of minor complications between the BMI less than 30 kg per m^2 and BMI more than 40 kg per m^2 groups. Overall, the number of major complications were statistically similar amongst the groups; however, when individual complication types were examined, we found statistically significant differences with wound dehiscence requiring operative intervention between the BMI less than 30 kg per m^2, BMI 30–34.9 kg per m^2, and BMI greater than 40 kg per m^2 groups. This is consistent with what would be expected based on prior findings with higher complications rates in patients with a higher BMI undergoing other breast reconstruction procedures.[24,25] In a meta-analysis published by Panayi et al, they found that obese patients undergoing both autologous and implant-based breast reconstruction procedures were more likely to have surgical complications, medical complications, and a higher rate of reoperation.[24] Additionally, the most common complication type among obese patients in their study was wound dehiscence.[24] Schaverien et al also looked at the effects of obesity on the outcomes of free autologous breast reconstruction. In their study of complications in free flaps, breast reconstruction became prohibitive above a BMI of 40 kg per m^2.[25] Both of the aforementioned studies demonstrated results similar to those highlighted in this study with regard to complications and higher rates of occurrence in patients with class III obesity. Although no changes in procedure or technique were made for patients with higher BMI to reduce the risk of wound dehiscence, based on the results of this study, this may be a consideration going forward.

Of the patients included in this study, 78.8% had a Wise pattern incision and 60.4% had an inferior pedicle. When we evaluated those patients who experienced any complication within each BMI group according to their pedicle and incision type, no statistically significant difference was noted. Toplu et al demonstrated no significant correlation between rates of complications and breast reduction pedicle technique utilized.[27] A prior meta-analysis by Li et al showed that inverted T-incision pattern and vertical reduction mammaplasty were equally safe, although the inverted T-incision pattern had a higher rate of complications.[28] Although we did not see any statistically significant difference between the different BMI groups based on the pedicle or skin incision technique used, more patients who experienced complications had Wise pattern incisions and inferior pedicles. This is likely because these were the most frequently used techniques in the study.

Prior studies have demonstrated that an increased number of complications after oncoplastic reconstruction can lead to a prolonged time to adjuvant radiation.[26] In this study, our data shows higher complication rates in the class III obese patients. Despite the increased rate of complications in the BMI greater than 40 kg/m^2 group in our study, there was no statistically significant increase in the time to adjuvant therapy amongst the different BMI groups. This translates to no delay in adjuvant oncologic treatment due to the reconstruction. Numerous prior studies have shown that delays in adjuvant treatment can lead to worse prognoses for patients, especially if the cancer has an aggressive phenotype.[11–16] Given that there was no statistically significant delay in oncologic treatment following surgery, and despite a higher risk of complications in obese patients, oncoplastic reduction appears to be an acceptable practice regardless of patient BMI. Both patients and medical/surgical/radiation oncologists should be counseled about the increased risks in this patient population to properly set expectations for surgical outcomes.

The therapeutic benefit of OBR before radiation has also been well demonstrated in the literature, which further highlights the importance of this study. Many prior studies have shown that increased breast volume requires higher energy photons to adequately radiate deeper tissues, and a larger breast volume leads to more radiation dose inhomogeneity.[29–32] Furthermore, an increase in radiation dose inhomogeneity has been linked to higher toxicity and higher rates of postradiation complications.[29,30] It has also been shown that reducing breast volume with oncoplastic techniques makes radiotherapy easier and reduces the percentage of radiation related complications.[33] Optimizing radiation therapy through reduction of inhomogeneity of dosage improves the aesthetic and therapeutic outcomes.[32] Given the benefits of OBR in optimizing radiation therapy and reducing postradiation complications, and the findings in our study that it does not delay time to treatment, we believe that OBR should be considered for all patients regardless of BMI for these benefits.

The main strength of this study is the number of patients included in the analysis. Within our cohort, we identified 200 patients classified as obese who underwent oncoplastic reconstruction. Furthermore, 51 of these obese patients would be classified as class III obese with a BMI greater than 40 kg per m^2. One limitation of this study is that this was a retrospective chart review, which was reliant on the documentation in the medical record. Our study also did not examine the breast specimen weight or cancer staging in the data analysis.

CONCLUSIONS

Oncoplastic breast reduction seems to be an acceptable practice in the morbidly obese patient population. Although there is a higher rate of complications in the class III obese patients, there was no delay in their

adjuvant therapy. Therefore, we conclude that OBR can be offered to patients regardless of patient BMI and is an excellent option for obese and morbidly obese patients who are candidates for breast-conserving therapy; however, these patients and other members of the multidisciplinary breast cancer care team should be counseled on the increased risk for complications to properly set expectation for surgical outcomes. Future studies evaluating BCT alone versus BCT with OBR in obese patients would be beneficial.

Meredith Collins MD, FACS
University of Kansas Medical Center
Department of Plastic Surgery
4000 Cambridge St., Mailstop 3015
Kansas City, KS 66160
E-mail: mcollins7@kumc.edu

DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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