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Original Article

Comparative study of surgical and oncological outcomes in oncoplastic versus non oncoplastic breast-conserving surgery for breast cancer treatment ☆

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ABSTRACT

Background: Oncoplastic surgery has been increasingly used in breast cancer treatment and allows the performance of breast-conserving surgery in cases of larger tumors with unfavorable location or tumor-breast disproportion. Purpose: To compare surgical and oncological outcomes of patients undergoing oncoplastic and nononcoplastic breast-conserving surgery. Methods: Retrospective cohort study with convenience sampling of 866 patients who consecutively underwent breast-conserving surgery from 2011 to 2015. Results: The mean follow-up was 50.4 months. Nononcoplastic breast conservation surgery was performed on 768 (88.7%) patients and oncoplastic surgery on 98 (11.3%) patients. Patients

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in the oncoplastic group were younger ($p<0.0001$) and most were premenopausal ($p<0.0001$). Comorbidities such as diabetes ($p=0.003$) and hypertension ($p=0.0001$) were less frequent in this population. Invasive carcinoma >2 cm ($p<0.0001$), multifocality ($p=0.004$), ductal in situ carcinoma ($p=0.0007$), clinically positive axilla ($p=0.004$), and greater weight of surgical specimens ($p<0.0001$) were more frequent in the oncoplastic group. A second surgery for margin re-excision was more frequently performed in the nononcoplastic group ($p=0.027$). There was more scar dehiscence in the oncoplastic group ($p<0.001$), but there was no difference in early major complications ($p=0.854$), conversion to mastectomy ($p=0.92$), or local recurrence ($p=0.889$). Conclusion: Although used for the treatment of larger and multifocal tumors, surgical re-excisions were performed less often in the oncoplastic group, and there was no increase in conversion to mastectomy or local recurrence. In spite of the higher rate of overall complications in the oncoplastic group, major complications were similar in both groups.

Introduction

Oncoplastic surgery has been used to a great extent in breast cancer treatment.[1] The application of plastic surgery techniques in cancer treatment allows the performance of breast conservation surgery in cases of larger tumors with unfavorable location or tumor-breast disproportion.[2-5] Compared to nononcoplastic breast-conserving surgery, it enables the resection of tumors with wider margins, reducing the need for re-excision procedures.[6-8] Moreover, it can provide better esthetic results as it allows extensive glandular mobilization and skin resection, promoting in many cases the correction of breast ptosis and symmetrization of the contralateral breast,[9] improving self-esteem, sexuality, and quality of life.[10, 11]

Despite the benefits associated with oncoplastic surgery, some studies have identified a higher frequency of postoperative complications as wound dehiscence and flap necrosis than that of nononcoplastic breast conservation surgery.[12] However, most of these studies assessed heterogeneous populations as patients were not stratified in accordance with the type of oncoplastic surgery performed, and the classification of postoperative complications was not standardized.[13]

Therefore, this study aimed to compare groups of patients who underwent nononcoplastic and oncoplastic breast-conserving surgery according to the characteristics of the patients, tumors, and postoperative complications. Risk factors of early major complications, positive margins, and local recurrence were also assessed. Identification of those risk factors in these specific groups should help to stratify patients who would be more suitable for oncoplastic surgery.

Methods

This retrospective single-center cohort study was based on convenience sampling and identified 972 patients who consecutively underwent breast-conserving surgery for breast cancer treatment at the Woman's Hospital Prof. Dr. José Aristodemo Pinotti (CAISM), State University of Campinas (UNICAMP) from 2011 to 2015. Surgeries with medical records that had at least one of the following keywords were classified as oncoplastic surgeries: reconstruction, mammaplasty, mastoplasty, and symmetrization. Bilateral surgery was performed when symmetrization of the contralateral breast was demanded. Surgeries with only the "quadrantectomy" keyword were considered as nononcoplastic

breast-conserving surgeries. A total of 106 patients were excluded because of incomplete surgical records (65), benign pathological disease (10), bilateral (24) or metastatic (3) breast cancer, and no visits after the surgical procedure (4). Thus, the study included 866 patients.

Oncoplastic surgeries were defined as procedures with resections that represented more than about 20% of breast volume, which included reduction mammaplasties and locoregional flaps.[14] Glandular flaps were not considered for oncoplastic surgery as they are routinely used in traditional breast-conserving surgery at our institution. The techniques used in oncoplastic surgeries were: Wise-pattern, periareolar mammaplasty, and locoregional flaps. All the oncoplastic techniques were applied immediately after tumor resection.

Postoperative complications were stratified in accordance with their severity and relationship to adjuvant treatment and both index and symmetrized breasts were considered in the analysis. Complications requiring surgical intervention or systemic antibiotic therapy were considered as major surgical complications due to the risk of delaying adjuvant therapy. Complications developed before or during adjuvant treatment were classified as early complications, and those developed after the adjuvant treatment were classified as late complications.

Surgical margins were considered to be tumor-free in invasive disease when the invasive tumor did not extend to the ink (no ink on tumor)[15] and, for in situ tumors, when there was a tumor-margin distance of at least 2 mm.[16] Patients with compromised margins in the surgical specimen (evaluated by H&E hematoxylin-eosin) were submitted to reoperation. Positive or multiple narrow margins for ductal in situ carcinoma (DCIS) in patients treated for invasive carcinoma and multiple close margins were analyzed to undergo a second surgery by a multidisciplinary team discussion or the surgeon's personal decision. Simple margin re-excision or mastectomy was a decision of each surgical team and was discussed with the patients.

Follow-up was conducted every 6 months for the first 5 years and then once every year. The indication of neoadjuvant and adjuvant chemotherapy followed the institution's guideline, and radiotherapy was performed after the completion of adjuvant chemotherapy (if needed) and followed the same plan for both nononcoplastic and oncoplastic surgeries. Local recurrences were confirmed by core biopsy.

The medical records were reviewed, and data were collected and managed in Research Electronic Data Capture (REDCap®)[17] and Excel®. The analyses used the Student's t-test or Mann-Whitney test for continuous variables and the chi-square or Fisher's exact test for categorical variables, and the results were expressed as p-values. Univariate and multivariate regression models were also used, and the results were expressed as odds ratio with a 95% confidence interval and p value. The Research Ethics Committee of the institution approved the study.

Results

Of 866 patients, 768 (88.7%) underwent nononcoplastic breast-conserving surgery and 98 (11.3%) underwent oncoplastic breast-conserving surgery. Mammaplasty was performed on 88 (89.8%) patients and locoregional flap on ten (10.2%) patients. Most mammaplasties used Wise-pattern based on superior (41%) and inferior (31%) pedicles. Symmetrization of the contralateral breast was performed on 81 (92%) patients who underwent mammaplasty and in 75% of the symmetrized breasts the same technique was applied as was used in the index breast. Mean follow-up was 50.4 months, and characteristics of the patients included in both groups are shown in Table 1. Patients in the oncoplastic group were younger ($p<0.0001$) and most were premenopausal ($p<0.0001$). Comorbidities such as diabetes ($p=0.003$) and hypertension ($p=0.0001$) were less frequent in this population.

Characteristics of the tumors are described in Table 2. Invasive carcinoma >2 cm ($p<0.0001$), multifocality ($p=0.004$), DCIS ($p=0.0007$), and clinically positive axilla (p0.004) were increasingly frequent in the oncoplastic group. The mean weight of the resected glandular tissue was significantly greater in this group (222.4g x 78.6g and $p<0.0001$) and many patients underwent neoadjuvant chemotherapy ($p=0.0001$). Adjuvant treatment was performed on 851 (98.3%) patients, and there was no difference in the regimen used in both groups with regard to systemic treatment ($p=0.152$) and locoregional radiotherapy ($p=0.171$) (data not shown).

Table 1
Patient characteristics for oncoplastic and nononcoplastic groups

	Oncoplastic (n=98)	Nononcoplastic (n=768)	Total (n=866)	OR (95%CI); *p* value
Age at surgery (y)				
≥ 50	44 (44.9%)	555 (72.3%)	599 (69.2%)	Reference
< 50	54 (55.1%)	213 (27.7%)	267 (30.8%)	3.19 (2.08-4.90); p<0.0001
BMI (kg/m²)				
BMI < 25	19 (19.3%)	186 (24.2%)	205 (23.7%)	Reference
BMI ≥ 25	79 (80.7%)	582 (75.8%)	661 (76.3%)	1.32 (0.78-2.25); p=0.289
Menopause				
Yes	42 (42.9%)	510 (66.4%)	552 (63.7%)	Reference
No	56 (57.1%)	258 (33.6%)	314 (36.3%)	2.63 (1.71-4.04); p<0.0001
Diabetes				
No	92 (93.9%)	¨631 (82.2%)	723 (83.5%)	Reference
Yes	6 (6.1%)	137 (17.8%)	143 (16.5%)	0.30 (0.13-0.70); p=0.003
Hypertension				
No	70 (71.4%)	392 (51%)	462 (53.3%)	Reference
Yes	28 (28.6%)	376 (49%)	404 (46.7%)	0.41 (0.26-0.66); p=0.0001
Smoking				
Yes	9 (9.2%)	113 (14.7%)	122 (14.1%)	Reference
No	89 (90.8%)	655 (85.3%)	744 (85.9%)	1.70 (0.83-3.48); p=0.13

BMI: Body Mass Index

Table 2
Tumor characteristics for oncoplastic and nononcoplastic groups

	Oncoplastic (n=98)	Non-oncoplastic (n=768)	Total (n=866)	OR (95% IC); *p* value
Histology[a] DCI	77 (78.6%)	643 (83.7%)	720 (83.1%)	Reference
DCIS	13 (13.3%)	60 (7.8%)	73 (8.4%)	1.80 (0.94-3.44);
LCI	5 (5.1%)	22 (2.9%)	27 (3.1%)	p=0.067
				1.89 (0.69-5.15);
				p=0.201
Subtype[b] Luminal	56 (70%)	478 (62.2%)	534 (69.2%)	Reference
HER/Luminal HER	14 (17.5%)	125 (16.3%)	139 (18%)	0.95 (0.51-1.77);
Triple negative	10 (12.5%)	87 (11.3%)	97 (12.6%)	p=0.886
				0.98 (0.48-1.99);
				p=0.095
cT[c] cTis cT1	13 (13.3%)	62 (8.1%)	75 (8.7%)	3.15 (1.56-6.35);
cT2/T3/T4	31 (31.6%)	467 (60.8%)	498 (57.5%)	p=0.0007
	54 (55.1%)	239 (30.8%)	293 (33.8%)	Reference
				3.40 (2.13-5.43);
				p<0.0001
cN N0	72 (73.5%)	652 (84.9%)	724 (83.6%)	Reference
N1/2/3	26 (26.5%)	116 (15.1%)	142 (16.4%)	2.03 (1.24-3.31);
				p=0.004
pT pTis pT1 pT2	10 (10.2%)	4 (5.7%)	54 (6.2%)	3.30 (1.51-7.20);
pT3/T4	30 (30.6%)	436 (56.8%)	466 (53.8%)	p<0.0001
	48 (49%)	250 (32.6%)	298 (34.4%)	Reference
	3 (3.1%)	10 (1.2%)	13(1.5%)	2.79 (1.71-4.51);
				p<0.0001
				4.26 (1.13-16.6);
				p=0.053
Multifocal tumor[d]	69 (76.7%)	650 (87.7%)	719 (86.4%)	Reference
No	21 (23.3%)	92 (12.3%)	113 (13.6%)	2.15 (1.26-3.67);
Yes				p=0.004
Neoadjuvant	76 (77.6%)	693 (90.2%)	769 (88.8%)	Reference
chemotherapy No	22 (22.4%)	75 (9.8%)	97 (11.2%)	2.67 (1.57-4.54);
Yes				p=0.0001
Excised tissue weight (g)	222.4	78.6	150.5	p<0.0001

DCI, ductal carcinoma invasive; *DCIS,* ductal carcinoma in situ; and *LCI,* lobular carcinoma invasive.
[a,b,c,d]Histology, Subtype, pT, and multifocal tumor were considered when complete information was available

Table 3
Early major and early minor surgical complications for oncoplastic and nononcoplastic groups (n = 224)

	Oncoplastic (n=98)	Nononcoplastic (n=768)	Total (n=866)	OR (95%CI); *p* value
Early Major Complications (n=84)				
Infection	6 (6.1%)	62 (8%)	68 (7.8%)	0.74 (0.31-1.76); p=0.499
Hematoma with reoperation	0	8 (1%)	8 (0.9%)	-
Dehiscence with reoperation	2 (2%)	9 (1.1%)	11 (1.3%)	1.75 (0.37-8.25); p=0.358
Necrosis with reoperation	2 (2%)	0	2 (0.2%)	-
Total[a]	9 (9.2%)	75 (9.8%)	84 (9.7%)	0.93 (0.45-1.93); p=0.854
Early Minor Complications (n=106)				
Seroma	7 (7.1%)	73 (9.5%)	80 (9.2%)	0.73 (0.32-1.63); p=0.428
Hematoma without reoperation	0	6 (0.8%)	6 (0.7%)	-
Dehiscence without reoperation	13 (13.3%)	24 (3.1%)	37 (4.3%)	4.74 (2.32-9.65); p<0.001
Necrosis without reoperation	1 (1%)	1 (0.1%)	2 (0.2%)	-
Total[b]	18 (21.4%)	88 (13.5%)	106 (14.5%)	1.74 (1.00-3.03); p=0.049

[a] One patient with early major complication (infection) only in the symmetrized breast
[b] Two patients with early minor complication (dehiscence without reoperation) only in the symmetrized breasts

We identified 801 (92.5%) patients who underwent radiation therapy with complete data collected. Radiotherapy was the only adjuvant therapy indicated for 297 (37.1%) patients, and in 504 (62.9%) patients, it was associated with chemotherapy. The mean time to radiation in the 297 patients who underwent only radiotherapy was 19.6 weeks (3.6 - 49 weeks) without a difference between oncoplastic (18.4 weeks and SD 5.47) and nononcoplastic groups (19.8 weeks and ?————————wrong space?—

SD 6.04) (p=0.188). In 22 (7.7%) patients, radiation therapy started before ten weeks, in 146 patients (41.4%) between 10 and 20 weeks, and in 151 (50.8%) patients after 20 weeks.

Postoperative surgical complications occurred in 224 (25.9%) patients and were more frequent in the oncoplastic group (35.6% x 24.6% and p=0.018) (data not shown). In this group, more patients evolved with surgical wound dehiscence without the need for reoperation (13.3% x 3.1% and p<0.001), which was the only complication with significant difference. There was no significant difference between the groups with regard to the frequency of early major complications: 9.2% in the oncoplastic group and 9.8% in the nononcoplastic group (p=0.854). The most common early major complication in both groups was infection (7.8%), followed by dehiscence (1.3%), hematoma (0.9%), and necrosis (0.2%); and all off them required unplanned surgery. One patient developed an early major complication (infection) only in the symmetrized breast (Table 3). Risk factors for early major complications identified in the total population were diabetes (p = 0.019), the presence of any comorbidity (p=0.0009), and smoking (p=0.014) in the multivariate analysis (Table 4).

Risk factors for positive margins are presented in Table 5. Of the 856 samples analyzed, 772 (90.2%) had tumor-free margins and 84 (9.8%) had compromised margins. There was no significant difference in the status of margins between the groups (p=0.118), but the rate of surgical re-excision was higher in the nononcoplastic group (5.1% x 12.7% and p=0.027). There was no difference in the conversion rate to mastectomy between the groups (4.1% x 4.3% and p=0.92) (Table 6).

Local recurrence occurred in 36 (4.2%) patients and was not different between the two groups (p=0.424) with six cases (6.1%) in the oncoplastic group and 30 (3.9%) in the nononcoplastic group. Risk factors for locoregional recurrence in the multivariate analysis were pN+ (p=0.004) and triple negative subtype (p=0.031) (Table 7).

Discussion

Oncoplastic surgery comprehends a variety of techniques allowing large tumor resections, without compromising the esthetical and oncological results,[12] and many debates were raised regarding the tolerable rate of complications.[18,19] Our single institution study with more than 860 patients showed that 11.3% underwent oncoplastic surgery, and this technique was more commonly used in younger patients with less comorbidities such as diabetes and hypertension. They also had many in situ, invasive tumors >2 cm and multifocal tumors, with many cases of clinically positive axilla and more frequently underwent neoadjuvant chemotherapy. In the oncoplastic group, surgical re-excisions were

Table 4
Risk factors for early major surgical complications (n = 84)

	Complication(n=84)	No complication(n=782)	OR (95%CI); *p* valueMultivariate
Age at surgery (y)			
≥ 50	63 (75%)	536 (68.5%)	Reference
< 50	21 (25%)	246 (31.5%)	1.71 (0.63-4.61); p=0.288
BMI (kg/m²)			
BMI<25	18 (21.4%)	187 (24%)	Reference
BMI≥25	66 (78.6%)	595 (76%)	1.02 (0.57-1.81); p=0.941
Diabetes			
No	60 (71.4%)	663 (84.8%)	Reference
Yes	24 (28.6%)	119 (15.2%)	1.94 (1.11-3.40); p=0.019
Hypertension			
No	40 (47.6%)	422 (54%)	Reference
Yes	44 (52.4%)	360 (46%)	0.63 (0.37-1.07); p=0.091
Any comorbidities			
No	8 (9.5%)	210 (26.9%)	Reference
Yes	76 (90.5%)	572 (73.1%)	4.04 (1.77-9.21); p=0.0009
Smoking			
Yes	66 (78.6%)	678 (86.7%)	Reference
No	18 (21.4%)	104 (13.3%)	2.15 (1.19-3.87); p=0.014
Nononcoplastic	75 (89.3%)	693 (88.6%)	Reference
Oncoplastic	9 (10.7%)	89 (11.4%)	1.05 (0.49-2.26); p=0.889

BMI: Body Mass Index

performed less often, and there was no increase in major complications, conversion rates to mastectomy, or local recurrence.

As in this study, other authors found that patients who underwent oncoplastic surgery had many multifocal and larger tumors and were increasingly associated with positive axilla and more frequently treated with neoadjuvant chemotherapy.[20] In an English study, the authors compared the characteristics of the tumors of 980 patients who underwent three types of breast surgery: extensive local excision (n = 558), mastectomy (n = 318), and oncoplastic surgery (n = 104). In comparison with the groups, they observed that the presence of tumors >2 cm, grade 3, with lymph node involvement, and negative hormone receptors were similar between the mastectomy and the oncoplastic surgery groups.[21]

Therefore, the characteristics of the tumors most frequently treated with oncoplastic surgery show that this technique is an important tool to be used in patients who would frequently be candidates for mastectomy or nononcoplastic breast-conserving surgery with unfavorable esthetic results.[22,23] Young patients have greater esthetic requirements and less comorbidity, such as diabetes and hypertension, which are factors that support the use of oncoplastic surgery in this group within our study.[24]

All patients in the oncoplastic group underwent mammaplasties or locoregional flaps. There were no cases of myocutaneous flaps, such as the latissimus dorsi miniflap,[25] because in our institution we reserve this option for late reconstructions, surgery failures, or local recurrence.

The more detailed systematization in our study increases our knowledge of the complications. The analysis showed that the oncoplastic group had a higher frequency of any complication. However, this finding only refers to early minor complications due to the higher frequency of postoperative wound dehiscence, without the need of reoperation, which is caused by the use of broader incision as compared to traditional breast-conserving surgery.[20,22] Moreover, the mean weight of the resections in the oncoplastic group was three times greater, which leads to more tissue mobilization that can cause more seroma and small necrosis.[20,26]

Studies on esthetic reduction mammaplasties have shown that the rate of complications can reach up to 52%.[27] Therefore, analyzing separately, only early minor complications are more frequent in the oncoplastic group with no significant difference between the groups regarding early major complications.

Postoperative complications are difficult to analyze in most studies because of the lack of standardization in the classification. Nevertheless, most studies show no significant difference in general com-

Table 5
Risk factors for positive margins (n = 856)

	Positive margin (n=84)	Negative margin (n=772)	OR (95%CI); *p* value Multivariate[b]	OR (95%CI); *p* value Multivariate[c]
Age at surgery (y)	54 (64.3%)	539 (69.8%)	Reference	Reference
≥ 50	30 (35.7%)	233 (30.2%)	1.31 (0.77-2.24); p=0.316	1.43 (0.88-2.33); p=0.144
< 50	73 (9.6%)	686 (90.4%)	Reference	-
Neoadjuvant chemotherapy No	11 (11.3%)	86 (88.6%)	1.80 (0.82-3.94); p=0.138	
Yes	78 (10.3%)	681 (89.7%)	Reference	Reference
Nononcoplastic	6 (6.2%)	91 (93.8%)	0.55 (0.20-1.52); p=0.252	0.49 (0.20-1.19); p=0.118
Oncoplastic	71 (9.4%)	705 (90.6%)	-	Reference
Histology Invasive	12 (25%)	42 (75%)		2.75 (1.14-6.61); p=0.023
In situ	35 (57.1%)	430 (61%)	Reference	-
pT (invasive)	23 (26.2%)	176 (25%)	1.76 (1.00-3.10); p=0.049	
≤ 2cm	13 (12.7%)	99 (14%)	1.97 (0.96-4.02); p=0.06	
2-3cm				
>3cm				
Multifocal tumor[a] No	66 (9.2%)	653 (90.8%)	Reference	Reference
Yes	18 (15.9%)	95 (84%)	1.59 (0.71-3.56); p=0.252	1.21 (0.57-2.56); p=0.617

In 10 patients, tumors were not identified in the surgical specimens
[a] Only complete data were shown
[b] Multivariate analysis only for invasive carcinoma
[c] Multivariate analysis for in situ and invasive carcinoma. Excluded neoadjuvant chemotherapy and pT.

Table 6
Re-excision and conversion to mastectomy rates for oncoplastic and nononcoplastic groups (n = 140)

Oncoplastic (n=98)		Nononcoplastic (n=768)	OR (95%CI); *p* value
Re-excision	5 (5.1%)	98 (12.7%)	2.72 (1.07-6.85); p=0.027
Without neoplasia	5 (100%)	67 (68.4%)	-
LCIS	0	3 (3.1%)	-
DCIS	0	15 (15.3%)	-
DCI/LCI	0	13 (13.3%)	-
Conversion to mastectomy	4 (4.1%)	33 (4.3%)	1.05 (0.36-3.04); p=0.92
Without neoplasia	0	8 (25%)	-
LCIS	0	1 (3.1%)	-
DCIS	2 (50%)	8 (25%)	-
DCI/LCI/Especial	2 (25%)	16 (37.5%)	-
Total	9 (9.2%)	131 (17.1%)	0.49 (0.24-1.00); p=0.046

LCIS, Lobular Carcinoma In Situ; *DCIS*, Ductal Carcinoma In Situ; *DC*I, Ductal Carcinoma Invasive; *and LCI*, Lobular Carcinoma Invasive

plications between the oncoplastic and the nononcoplastic groups.[19,28,29] However, as in our study, De Lorenzi et al.[22] and Losken et al.[26] found a higher frequency of complications in the oncoplastic group and the most common complications were wound dehiscence (9.6%) and infection (5.4%).

In our study, there was no difference in time to adjuvant therapy, which compared the groups, but we identified a longer interval between surgery and adjuvant radiotherapy than that recommended by the literature. Unfortunately, in the Brazilian public healthcare assistance, we have observed a considerable delay to start radiotherapy because the number of patients and available radiotherapy equipment are disproportionate.[30] Some authors found delays in the commencement of adjuvant treatment in 1.9% and 4.6% of patients who underwent oncoplastic surgery.[12,31] Known factors such as diabetes, smoking, and the presence of comorbidities were significantly associated with the occurrence of early

Table 7
Risk factors for local recurrence of breast cancer (n = 36)

	Local recurrence		OR (95%IC); *p* valueMultivariate
	Yes (n=36)	No (n=830)	
Age at surgery (y)			
≥ 50	19 (3.2%)	580 (70%)	Reference
< 50	17 (6.4%)	250 (30%)	1.78 (0.83-3.80); p=0.133
BMI (kg/m²) BMI < 25			
BMI ≥ 25	11 (6.9%)	194 (23.4%)	Reference
	25 (3.8%)	636 (76.6%)	0.44 (0.20-0.94); p=0.035
Nononcoplastic			
Oncoplastic	30 (3.9%)	738 (96.1%)	Reference
	6 (6.1%)	92 (93.9%)	1.50 (0.55-4.07); p=0.424
pT > 2cm No			
Yes	17 (3.1%)	528 (96.9%)	Reference
	19 (6.1%)	292 (93.9%)	1.40 (0.60-3.26); p=0.426
pN+			
No Yes	13 (2%)	528 (97.6%)	Reference
	21 (7.1%)	274 (92.9%)	3.18 (1.42-7.12); p=0.004
Multifocal tumor No			
Yes	30 (4.2%)	689 (95.8%)	Reference
	6 (5.3%)	107 (94.7%)	1.44 (0.46-4.48); p=0.523
Positive margins No			
Yes	33 (4.3%)	739 (95.7%)	Reference
	3 (3.6%)	81 (96.4%)	1.00 (0.28-3.51); p=0.996
Subtype Luminal			
HER/Luminal HER	16 (3%)	518 (97%)	Reference
Triple negative	9 (6.5%)	130 (93.5%)	1.78 (0.74-4.31); p=0.196
	9 (9.3%)	88 (90.7%)	2.87 (1.09-7.52); p=0.031

BMI, Body Mass Index; *pN+* positive axillary lymph node

major complications, as demonstrated in previous studies, which shows that adequate patient selection is the first step to prevent major complications.[2]

The surgical margin is a determinant prognostic factor in the local control of the disease.[15,16,32,33] According to the literature, positive margins were identified in 15% - 47% of nononcoplastic breast-conserving surgeries and 2% - 22% of oncoplastic breast-conserving surgeries.[12,19,21] In this study, the tissue samples of the oncoplastic group had greater weight, but this was not related to more tumor-free margins. Low rates of positive margins in both groups suggest that our institution has correctly selected the patients and safely performed both breast-conserving surgery techniques that result in lower morbidity rate and better esthetic results.[19,28]

Risk factors associated with positive margins were in situ tumors, tumors >2 cm, and multifocal tumors. Although all these characteristics were more frequent in the tumors in the oncoplastic group, positive margins were not frequently found in this group, suggesting that the technique can be used even in tumors with unfavorable characteristics for breast-conserving surgery.

Although we currently use the criteria defined in the margin assessment of the Society of Surgical Oncology Consensus Guidelines,[15,16] we know that the concept of free margins has changed overtime. In this retrospective study, we identified that in specific cases some surgeons decided to perform re-excision, even with free margins in the final anatomopathological result. Such cases were invasive tumors with positive or narrow margins for in situ carcinoma, multiple margins <1 mm from invasive tumor, and multiple narrow margins for in situ tumors. For this reason, there were more cases of re-excision than with positive margins and they were considered negative margins in the present guideline. The nononcoplastic group more frequently underwent margin re-excision. The literature supports this finding and shows that one of the main factors in selecting this technique is the possibility of having wider margins followed by esthetic benefits.[29,34,35] Changes in opinion over the years with regard to margins and the use of different references in the studies impair the critical evaluation of this data in literature.[13,19,36]

In our study, there were no significant increases in the conversion rate to mastectomy in the oncoplastic group, a controversial topic in the literature. A study published in 2015 by Crown et al.[37] showed data that were similar to our findings. The authors compared 425 patients who underwent traditional breast conservation surgery with 387 patients who underwent oncoplastic breast surgery and found a significant reduction in the conversion rate to mastectomy from 34% to 15%, even though there were larger tumors in the oncoplastic group.

In contrast, Losken et al.[4] and Mansell et al.[38] showed that oncoplastic surgery increased the mastectomy rates from 3.8% to 6.5% and from 5.5% to 11.8%, respectively and revealed that the mobilization of the breast tissue in oncoplastic surgeries impairs the identification of the tumor bed. However, as this type of surgery involves the transfer of new tissue to the tumor bed, we consider that the enlarged area can be identified intraoperatively. The use of a metal clip in the tumor bed can assist in the identification of the area to be re-excised.[36,37,39]

Local recurrence is an important and multifactorial oncological outcome. At a mean follow-up duration of 50.4 months, the recurrence rate of 6.1% in the oncoplastic group was within the range found in the literature from 2.2% to 6.8%.[1] Although the univariate analysis showed that younger patient and tumor size >2 cm were factors associated with increased risk of local recurrence, the multivariate analysis showed that only compromised axilla and triple negative tumors remain as risk factors for this outcome. Therefore, local recurrence was not an outcome influenced by the surgical technique employed but by tumor biology.[28,40]

Although our study includes a large number of patients and results show similar outcomes in the oncoplastic and nononcoplastic groups, it is limited to a retrospective review of a single institution with convenience sampling and short follow-up. Moreover, there were significantly fewer patients in the oncoplastic group, which could create some biases in the analysis. To better evaluate oncoplastic surgery, prospective studies with more patients and detailed standardization of the type of oncoplastic surgery and outcomes are required.

Conclusion

Oncoplastic surgery can be proposed for patients with tumors with unfavorable characteristics for traditional breast conservation surgery. Although used for the treatment of larger and multifocal tumors, surgical re-excisions were performed less often and was not related to higher rates of conversion to mastectomy or increased risk of local recurrence. In spite of the fact that overall complications were higher in the oncoplastic group, the incidence of major complications was similar in both groups. It should be considered a safe tool to expand the indications of breast conservation surgeries.

Declaration of Competing Interest

None.

Ethical approval

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