

# Single Center Oncoplastic Experience and Patient Satisfaction Reported via Patient Reported Outcomes

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**Background:** Oncoplastic breast surgery (OPS) is gaining in popularity compared with traditional breast conserving surgery due to wider resections and better satisfaction with cosmetic outcomes. This study analyzed OPS versus traditional breast conserving surgery outcomes: wound complications, reoperations for margins or fat necrosis, and ipsilateral recurrence.

**Methods:** This retrospective review compared 191 OPS and traditional breast conserving surgery patients on patient-related factors, primary outcomes, and patient reported outcome measures results. A propensity score method analysis using 1:1 to nearest neighbor was also performed.

**Results:** OPS patients were younger, less likely to be smokers, more likely to be ER+ and PR+, and had larger specimen volumes than did traditional breast conserving surgery patients ( $P < 0.05$ ). There were also differences in distribution of invasive ductal carcinoma and noninvasive disease ( $P < 0.05$ ). After the propensity score method, the differences observed between the cohorts disappeared. No differences were observed between groups for wound complication, reoperation for positive margins or fat necrosis, or ipsilateral recurrence. Results of patient reported outcome measures showed greater satisfaction with breast surgery in OPS patients ( $P < 0.01$ ).

**Conclusions:** We showed that OPS is a noninferior technique that should be discussed with appropriate patients. Operative planning should involve patient preferences in optimizing long-term cosmetic outcomes. (*Plast Reconstr Surg Glob Open* 2022;10:e4336; doi: [10.1097/GOX.0000000000004336](https://doi.org/10.1097/GOX.0000000000004336); Published online 20 May 2022.)

## INTRODUCTION

Traditional breast conserving surgery (TBCS) has gained popularity as an alternative to mastectomy because several large, randomized studies have demonstrated equivalent survival.<sup>1,2</sup> TBCS tries to preserve the natural shape and symmetry of the breast, yet up to 40% of patients report dissatisfaction with the cosmetic outcome.<sup>3</sup> Removing more than 20% of breast volume greatly increases the risk of deformity, and therefore patients with large breast tumors may not achieve an aesthetically satisfactory result with TBCS.<sup>4-6</sup> Despite the shift toward breast conservation,

an increasing number of TBCS-eligible patients are electing to undergo mastectomy.<sup>7,8</sup> This change may be due to a variety of reasons, including the desire to avoid radiotherapy, fear of recurrence, or to achieve better symmetry with implant-based reconstruction.<sup>9</sup>

An alternative to TBCS and mastectomy is oncoplastic surgery (OPS), which involves removal of diseased breast parenchyma with simultaneous reconstruction (ie, augmentation, mastopexy, reconstruction, etc.). The goal of OPS is to improve the appearance of the breasts, while upholding oncologic principles. The benefits of OPS have been shown to extend beyond aesthetics. OPS enables removal of large volumes of tissues. A 2014 meta-analysis demonstrated a reduction in positive margins and decreased rates of reoperation with the use of oncoplastic techniques.<sup>10</sup> Outcomes data (including disease-free survival and overall survival) are encouraging thus far; however, long-term follow-up is required to determine if oncoplastic resection results in improved regional

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control.<sup>11</sup> Based on treatment statistics published by the National Cancer Institute, a higher percentage of breast cancer patients would opt for TBCS in 2021 than ever before.<sup>12</sup> Additionally, an increasing number of surgeons are interested in utilizing oncoplastic techniques.<sup>13</sup> But the question remains: Are patients ultimately more satisfied with OPS outcomes?

Patient reported outcome measures (PROMs) are an integral part of modern breast cancer management, and numerous tools have been developed to better understand patients' perspectives. Currently, there is weak evidence to suggest that OPS is associated with higher patient satisfaction. In a Brazilian observational study, OPS patients had higher aesthetic scores (as measured by surgeons and software) than TBCS patients, but there were no differences in patient reported aesthetic outcomes.<sup>14</sup> BREAST-Q, European Organization for Research and Treatment of Cancer (EORTC) QLQ-BR23, and EROTC QLQ-BRC30 are tools developed to assess PROMs.<sup>15-17</sup> These questionnaires assess health-related quality of life (HRQoL) in two domains: (i) quality of life and (ii) satisfaction. By quantifying these metrics, PROMs could help advocate and guide care for breast cancer patients. Furthermore, it provides insight into how patient satisfaction varies between different surgical techniques and practices.

Our study aimed to compare the outcomes between TBCS and OPS in breast cancer patients. Metrics include wound complications (infections, dehiscence, hematomas/seromas necessitating evacuation) within 3 months of surgery. Rates of reoperation for positive margins or fat necrosis, and ipsilateral recurrence. Additionally, we compared the level II (significant tissue rearrangement with nipple repositioning/plastic surgery assistance) OPS experience versus TBCS in relation to HRQoL and patient satisfaction. We identified markers for psychosocial and physical well-being as well as satisfaction with breast surgery and surgeons. We evaluated the differences in patient satisfaction between OPS and TBCS.

## METHODS

A total of 191 patients underwent breast conservation surgery at a tertiary medical center from 2015 to 2020. Level II OPS was offered at this institution starting in 2015. Based on case log current procedural terminology codes, TBCS and OPS cases were identified. Patients who had excisional biopsies or benign indications were excluded. Patient characteristics such as age, body mass index, smoking status, diabetes, tumor markers [estrogen receptor, progesterone receptor, and human epidermal growth factor receptor (HER2)], tumor size, specimen volume, histology, pathology, neoadjuvant therapy, and adjuvant therapy status were included for analysis. Primary outcomes included wound complications, reoperation for margins or fat necrosis, and ipsilateral recurrence.

PROM surveys were completed by patients via phone as a one-time assessment postoperatively. Our PROM survey was adopted from concepts evaluated in BREAST-Q and EORTC QLQ-BRECON-23. The four sections assessed were psychosocial well-being, physical well-being, satisfaction with breast surgery, and satisfaction with surgeons

## Takeaways

**Questions:** Is oncoplastic surgery a non-inferior technique compared to traditional breast conservation surgery? Are patients satisfied with their experience and results?

**Findings:** No differences in complications and outcomes are seen between oncoplastic and traditional breast surgery. Patients are overall more satisfied with oncoplastic surgery, but a validated survey is needed to further answer this question.

**Meaning:** Oncoplastic surgery should be discussed with all patients, and potentially could be adopted for patients to achieve better patient satisfaction.

(Table 5). The first three sections of the PROM survey were evaluated as dissatisfied, neutral, or satisfied, and the answers were translated to a numerical scale of 1–3. The section on satisfaction with breast surgeons was binomial. Scores per section were tallied. Our institution employed three plastic surgeons and two breast surgeons. All phone surveys were conducted by three interviewers who followed a standardized script. (See survey, Supplemental Digital Content 1, which displays the patient reported outcomes measures questionnaire. <http://links.lww.com/PRSGO/C40>.)

Patient characteristics were compared using Student's *t*-test for continuous variables and chi-square test for categorical variables. Two-sided test of significance was used with a cutoff of a *P* value less than 0.05. Propensity score matched (PSM) analysis was used to further adjust for potential confounding. Propensity scores for each patient were generated from a multivariable logistic regression model adjusting for age, ER status, PR status, histology, specimen volume, and pathology. OPS patients were then 1:1 propensity matched to TBCS patients using the "nearest neighbor" method. Variables included in our models were chosen a priori as those thought to be determinates of clinical outcome. Outcomes of interest for the matched cohorts were then compared using the student's *t*-test or chi squared test where appropriate. Statistical analyses were performed with R on RStudio Team (2015) and XLSTAT (2022).

## RESULTS

Compared with TBCS, OPS patients were younger (57 versus 62,  $P < 0.01$ ), less likely to be smokers (5% versus 15%,  $P = 0.05$ ), and more likely to be ER+ (86% versus 70%,  $P = 0.02$ ) and PR+ (79% versus 56%,  $P < 0.01$ ). Larger volumes of breast tissue were removed in OPS patients than in TBCS patients (209 cm<sup>3</sup> versus 101 cm<sup>3</sup>,  $P < 0.01$ ). Fewer patients with invasive ductal carcinoma (81% versus 87%,  $P < 0.01$ ) and noninvasive disease (Tis) (14% versus 30%,  $P = 0.03$ ) underwent OPS than TBCS (Table 1). There was no statistical difference between cohorts for wound complications, reoperation for positive margins, reoperation for fat necrosis, or ipsilateral recurrence (Table 2).

Analysis of the PSM matched cohort of the OPS (n = 56) and TBCS (n = 56) showed that the previously

**Table 1. Patient Demographic, Tumor Characteristic, and Pathology**

	OPS (97)		TBCS (94)		P
	N	%	N	%	
Age (mean)	57		62		<b>&lt;0.01</b>
Body mass index (mean)	30.7		30.2		0.59
Smoking	5	5%	14	15%	0.05
Diabetes	14	14%	18	19%	0.50
ER+	83	86%	66	70%	<b>0.02</b>
PR+	77	79%	53	56%	<b>&lt;0.01</b>
HER2-	24	25%	15	16%	0.18
Sentinel node bx	87	90%	87	93%	0.66
Tumor size (cm), median	1.2		1.3		0.98
Specimen vol (cm <sup>3</sup> ) median	209		101		<b>&lt;0.01</b>
Neoadj chemotherapy	17	18%	18	19%	0.33
Previous endocrine Tx	4	4%	2	2%	0.99
Neoadj radiation	0	0%	1	1%	0.99
Intraoperative radiation	3	3%	6	6%	0.71
Adjuvant chemotherapy	20	21%	27	29%	0.16
Adjuvant radiation	76	78%	68	72%	0.48
Adjuvant hormone	63	65%	54	57%	0.28
Histology					<b>0.01</b>
Ductal carcinoma in-situ	17	20%	7	7%	0.06
Invasive ductal carcinoma	67	81%	82	87%	<b>&lt;0.01</b>
Invasive lobular carcinoma	13	16%	5	5%	0.10
Pathology					0.11
Tis	14	14%	28	30%	<b>0.03</b>
I	45	46%	54	57%	0.19
II	22	23%	25	27%	0.77
III	2	2%	1	1%	1.00

Values in bold are statistically significant with  $p < 0.05$ .

**Table 2. Primary Outcomes**

	OPS (97)		TBCS (94)		P
	N	%	N	%	
Wound complications	15	15%	8	9%	0.21
Reoperation—positive margins	4	4%	2	2%	0.71
Reoperation—fat necrosis	5	5%	0	0%	0.08
Ipsilateral recurrence	3	3%	4	4%	0.97

observed differences among age, ER status, PR status, histology, and pathology disappeared (Table 3). Furthermore, no statistical differences between cohorts were observed for the end points of interests (Table 4).

Results of the PROM survey showed no significant differences between OPS and TBCS patients in psychosocial well-being, physical well-being, and surgeon satisfaction. OPS patients had higher satisfaction with breast surgery outcomes than TBCS patients ( $P < 0.01$ ). Mean time elapsed from surgery to timing of the surgery is 3.3 years (Table 5).

## DISCUSSION

Although TBCS is the standard of care, OPS is gaining popularity in the treatment of breast cancer. The primary goal of OPS is to improve cosmetic outcomes postoperatively, while maintaining appropriate tumor-free resection margins.<sup>18</sup> Our study showed that there are no significant differences in wound complications, reoperations, and ipsilateral recurrence between patients who underwent TBCS versus OPS. Moreover, a PROM questionnaire comparing postoperative patient satisfaction showed that OPS patients were more satisfied with the outcomes of their breast surgery than TBCS patients. The survey results are reflective of the reconstructive options with OPS

**Table 3. PSM—Patient Demographic, Tumor Characteristic, and Pathology**

	OPS (56)		TBCS (56)		P
	N	%	N	%	
Age (mean)	59		59		0.98
Body mass index (mean)	29.5		30		0.50
Smoking	2	4%	10	18%	0.05
Diabetes	7	13%	10	18%	0.60
ER+	44	79%	48	86%	0.46
PR+	40	71%	42	75%	0.83
HER2-	13	23%	7	13%	0.22
Sentinel node bx	54	96%	52	93%	0.67
Tumor size, cm (median)	1.1		1.2		0.58
Specimen vol, cm <sup>3</sup> (median)	173		111		0.58
Neoadj chemotherapy	11	20%	12	21%	1.00
Previous endocrine Tx	1	2%	4	7%	0.36
Neoadj radiation	0	0%	1	2%	1.00
Intraoperative radiation	4	7%	4	7%	1.00
Adjuvant chemotherapy	12	21%	16	29%	0.51
Adjuvant radiation	52	93%	46	82%	0.15
Adjuvant hormone	40	71%	45	80%	0.38
Histology					0.67
DCIS	6	11%	6	11%	1.00
Invasive ductal carcinoma	42	75%	45	80%	0.65
ILC	8	14%	5	9%	0.56
Pathology					0.81
Tis	12	21%	10	18%	0.81
I	30	54%	35	63%	0.44
II	13	23%	10	18%	0.65
III	1	2%	1	1%	1.00

**Table 4. PSM—Primary Outcomes**

	OPS (56)		TBCS (56)		P
	N	%	N	%	
Wound complications	9	16%	4	7%	0.24
Reoperation—positive margins	4	7%	1	2%	0.36
Reoperation—fat necrosis	4	7%	0	0%	0.13
Ipsilateral recurrence	1	2%	2	4%	1.00

depending on tumor location. Central or inferior tumors may leave a larger defect, resulting in poor cosmesis after TBCS.<sup>19</sup> OPS patients included in this study underwent a level II volume displacement involving tissue rearrangement with nipple repositioning with plastic surgery assistance, and contralateral mastoplasty when desired. These techniques allow for better breast symmetry and enhance the appearance of the affected breast.

OPS is gaining adoption amongst breast surgeons and is accepted as an oncologically safe technique. In a comprehensive review for T1-T2 breast cancers, de la Cruz showed that over an average of 50.5 months; OPS rates of overall survival (95%) and disease-free survival (90%) were high.<sup>20</sup> However, local recurrence (3.2%) and distant recurrence (8.7%) rates were low. This is expected as OPS enables for larger volumes of tissues to be excised.

**Table 5. PROM Questionnaire Results**

	OPS (56)	TBCS (56)	P
Psychosocial well-being	14.1	15.0	0.15
Physical well-being	2.72	2.89	0.41
Breast surgery satisfaction	15.3	13.2	<b>&lt;0.01</b>
Surgeon satisfaction	1.98	2.00	0.32

Values in bold are statistically significant with  $p < 0.05$ .

Moreover, a meta-analysis across 18 studies also showed no statistical difference in disease recurrence when comparing OPS with TBCS or mastectomy.<sup>19</sup>

There is no clear difference in complication rates between OPS and TBCS. Reported positive margin rate, re-excision rate, and conversion to mastectomy rate were 10.8%, 6%, and 6.2%, respectively.<sup>20</sup> Complications from OPS (ie, fat necrosis) were also low. Our reoperation and wound complication rates were consistent with those reported in the literature.<sup>20–22</sup> Notably, we differentiated between reoperation for fat necrosis and oncological revision. Only six patients (four OPS and two TBCS) underwent re-excision for positive margins. Our rate of wound complications was higher in the OPS group, but not statistically significant. It is possible that in the OPS group, patients are at a higher risk of wound complications due to risk of complications with the contralateral mastopexy. Our data do not provide such granularity. This is an important point because OPS offers patients aesthetic benefits of symmetry with the contralateral mastopexy, but not without risks. The potential complications to the noncancer breast should be discussed with patients preoperatively. More importantly, any wound complication or return to the operating room is a potential for delay in adjuvant radiation therapy.<sup>23</sup> Tenofsky et al showed that despite higher incidences of nonhealing wounds and fat necrosis, OPS is not associated with clinically meaningful delay to adjuvant radiation.<sup>24</sup>

Our PROM addressed patient satisfaction with postoperative cosmesis. Common barriers to PROM studies include long surveys that are tedious to complete and incomplete data. To ease the administration and to increase response rate, we elected to do a short phone survey. Our questions were derived from different established PROMs and focused on patient's satisfaction with their appearance and breast surgery. When asked to elaborate on their negative surgical experiences, most patients reported prolonged postoperative pain. The design of the PROM and its administration are limitations. BREAST-Q varied in three, four, and five-point scales depending on the section. Our PROM was scored on a three-point scale, whereas a five-point scale could have been more informative and discriminative.<sup>25</sup> The applicability of results to other cohorts is limited. BREAST-Q has become a standardized method to evaluate patient reported outcomes in breast surgery, especially reconstructive breast surgery.<sup>26–29</sup> Ng et al tested the validity of BREAST-Q IS, a modified five question PROM, and showed that it is a feasible tool to use to assess for satisfaction associated with breast implants.<sup>30</sup> A more user-friendly and oncologic-focused BREAST-Q could be adopted for future studies.

Our study is also limited by the sample size. Level II OPS was offered at our institution starting in 2015, and all patients were included in our analyses. However, a larger sample size would further increase the power of the analysis. A prospective study with pre- and postsurgical surveys would further strengthen the validity of the survey results and enable for continuous assessment over time. Finally, our PROM survey was done as a one-time evaluation of postoperative satisfaction, and patients were surveyed

regardless of their recovery time from surgery. This variability in timing could confound the answers as patients may feel differently about their well-being depending on their recovery and treatment stage. Some psychosocial factors such as anxiety and depression also evolve, as patients undergo their treatment journey with radiation and chemotherapy. Saiga et al is conducting a multicentered trial on BREAST-Q versus other PROM evaluations at 1, 3, 6, 12, and 36 months postoperatively to show time-dependent changes in patient satisfaction.<sup>31</sup>

Long-term impact of radiation on OPS cosmesis should also be examined in future studies. Currently, the limited data suggest that there is favorable physician rating of OPS postradiation cosmesis, but patient satisfaction declines after 6 months.<sup>32</sup> It is possible that patients' perceived cosmesis changes due to radiation fibrosis and skin changes. A more objective metric for breast cosmesis, including evaluation of breast tissue perfusion, and a validated OPS specific PROM would be critical.

## CONCLUSIONS

Our study showed that noninferior OPS outcomes are coupled with overall good patient satisfaction. These patients should be followed internally for long-term oncological assessment for future studies. To widely employ OPS in practice would require collaboration with plastic surgery colleagues as well as acceptance and understanding from medical and radiation oncology teams. Although time to adjuvant therapy is important to consider, the results are currently mixed and the consensus is that OPS should not be excluded due to concern for delay of therapy.<sup>23,33,34</sup> As such, OPS should be routinely offered and discussed with patients during their surgical evaluation to optimize cosmetic and patient satisfaction outcomes.

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*This project was reviewed and deemed exempt by the institutional review board.*

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