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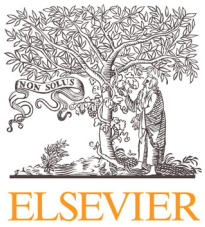

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An analysis of complication rates and the influence on patient satisfaction and cosmetic outcomes following oncoplastic breast surgery

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Summary *Introduction:* This study aimed to evaluate complication rates, patient satisfaction, and cosmetic outcomes after oncoplastic breast-conserving surgery (OPS). Furthermore, outcome differences between volume displacement and volume replacement techniques and the effect of postoperative complications on outcomes were evaluated.
Methods: This was a prospective single-center study addressing patients who underwent OPS from 2017 to 2020. The BREAST-Q was used to measure patient satisfaction, and cosmetic outcomes were assessed by patient self-evaluation and panel evaluation based on medical photographs.
Results: A total of 75 patients were included. The overall complication rate was 18.7%, of which 4% required invasive interventions. Median BREAST-Q scores ranged from 56 to 100 and cosmetic outcomes were scored good to excellent in 60–86%. No differences in complications were observed between volume replacement and volume displacement techniques. Following volume displacement techniques, patients-reported higher BREAST-Q scores for the domain "physical well-being of the chest" and lower cosmetic outcomes scores for "mammary symme-

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try." Patients with complications scored significantly lower on several domains of the BREAST-Q and in various cosmetic outcome categories.
Conclusion: In this cohort, an overall complication rate of 18.7% was observed. Patients were generally satisfied, and most cosmetic outcomes were good to excellent. Volume displacement or replacement techniques were performed for different indications and generally showed comparable results. Expected differences in physical discomfort and symmetry between both techniques were observed. In addition, the occurrence of complications resulted in lower patient satisfaction and cosmetic outcomes. These findings emphasize the importance of thorough preoperative counselling.

Introduction

While breast cancer surgery has evolved over the years, the goals have remained the same: complete removal of the tumor acquiring negative margins, with the least degree of breast deformity. The cosmetic results after breast cancer surgery have become increasingly important, partly because of the current favorable life expectancy after breast cancer treatment.[1] Therefore, oncoplastic breast-conserving surgery (OPS) has rapidly gained popularity over the last decade. It optimizes oncological safety and cosmetic outcomes, combining the best principles of surgical oncology with the possibility of larger resection margins with plastic reconstructive surgery.[2] As a result, OPS might be associated with less conversions to mastectomy and lower re-excision rates compared to breast-conserving surgery alone.[3] In addition, breast-conserving surgery plus radiotherapy might even result in improved survival compared to mastectomy in early breast cancer.[4] By combining OPS with neoadjuvant chemotherapy, leading to preoperative tumor reduction, more patients are eligible for this technique. This implies that OPS can be a cosmetically acceptable alternative to breast-conserving surgery or mastectomy without compromising local oncological safety, even in tumors that are relatively large compared to the breast size.[5,6]

OPS can be categorized in two different approaches, based on tumor location and excised volume, in combination with the volume and ptosis of the patient's breast.[7] Volume replacement is a technique using tissue adjacent to the breast and to fill up the gap that is left behind after tumor removal. Volume displacement is a technique that uses the remaining breast tissue to fill up the defect.[8] Volume replacement techniques are required in patients with small and non-ptotic breasts. Most suitable techniques are islanded or pedicled chest wall fasciocutaneous perforator flaps like the lateral or anterior intercostal artery perforator flap (LICAP or AICAP)[9] or the thoracodorsal artery perforator (TDAP) flap.[10] For volume displacement, only possible in patients with some degree of ptosis, the Wise pattern mammoplasty using different nipple-areola complex pedicles is the most common approach.[11]

The objectives of this study were to assess complication rates, patient satisfaction, and cosmetic outcomes after OPS, investigate the influence of complications on patient satisfaction and cosmetic outcomes, and compare these results between volume replacement and volume displacement techniques.

Methods

Study design

This study was designed as a prospective single-center study, including all patients who underwent OPS (volume replacement or volume displacement) for breast cancer between January 2017 and December 2020 at the Alrijne Hospital in the Netherlands.

Ethical considerations

The study protocol was approved by the local institutional ethical review board (N21.053), and informed consent was obtained from all participants. The study was conducted in accordance with the Declaration of Helsinki and reported according to the strengthening the reporting of observational studies in epidemiology (STROBE) statement.[12,13]

Surgical technique

All patients were operated by four plastic surgeons. For volume displacement, the Wise or Grisotti technique was used.[11,14] For volume replacement, the TDAP flap or bilobed swing flap was used.[10,15]

Complications and definitions

All complications were collected in a prospective manner. Postoperative complications (seroma, hematoma, surgical site infection (SSI), wound dehiscence, and necrosis) were graded according to Clavien–Dindo (CD) classification.[16] In this study, for grade 1 complications, the normal postoperative course has not deviated, and no interventions were necessary. Grade 2 complications required pharmacological treatment with antibiotics. Grade 3 complications required surgical drainage. Clinically relevant postoperative complications were defined as complications with a CD score of 2 or more.

BREAST-Q

Patient-reported quality of life and satisfaction was measured with the BREAST-Q breast-conserving therapy (BCT) module, which was sent online to all participating patients (Castor EDC). The BREAST-Q is a validated, disease-specific patient-reported outcome measure and patient-reported experience measure to assess patient satisfaction and health-related quality of life.[17] Responses from each scale were summed and transformed into Q-scores ranging from 0 to 100, with higher numbers representing greater satisfaction or quality of life.

Patient-reported cosmetic outcomes

Patients received an online questionnaire for self-assessment of cosmetic outcomes. Participants were asked to provide a score, from 1 to 4 (1: poor, 2: fair, 3: good, 4: excellent), for each of the following four categories: mammary symmetry, scarring, areola-nipple symmetry, and global judgment. The score and cosmetic categories were derived from previous research.[18] In case the patient underwent a contralateral symmetrization, patients were asked to fill in these questions according to the situation before the symmetrizing surgery. Patients in whom the nipple was excised, the nipple-areolar symmetry was not scored.

Panel-reported cosmetic outcomes

In accordance with the standard postoperative protocol after breast reconstruction, five-point view medical photographs were made at a minimum of three months after the surgery and uploaded in the patient files. In case these photographs were not present in the patient files, patients were invited for an appointment with the medical photographer. Based on these photographs, cosmetic outcomes were evaluated by a panel consisting of two independent plastic surgeons and two laymen. The members of the panel scored cosmetic outcomes independently and were blinded for any clinical information. All members of the panel were invited to evaluate the breasts in the previously mentioned four categories with a score from 1 to 4. Patients, who underwent a contralateral symmetrization without available photographs before this procedure, were excluded from the analysis. The nipple-areolar symmetry was not scored if the nipple was excised during OPS.

Statistical analysis

Continuous variables are presented as median values with interquartile ranges (IQRs), and frequency percentages were calculated for categorical variables. Differences in baseline characteristics between groups were tested with Mann–Whitney U tests, chi-square tests, or Fisher's exact tests. Comparisons between volume displacement and volume replacement techniques were performed using the chi-square test for postoperative complications and Mann-Whitney *U* test for BREAST-Q and cosmetic outcomes. The same tests were performed for comparisons between patients with and without complications. Patients with missing data on (domains of) the BREAST-Q or cosmetic outcomes were excluded from this specific part of the analysis. The level of inter-observer agreement between the two laymen and the two specialists was derived from Cohen's kappa values and defined as follows: 0–0.20 slight agreement, 0.21–0.40 fair agreement, 0.41–0.60 moderate agreement, 0.61–0.80 substantial agreement, and 0.81–1 excellent agreement. A two-sided P-value of <0.05 was considered statistically significant. IBM SPSS statistics (version 26) was used for standard statistical analysis.

Results

Patient selection

Between January 2017 and December 2020, a total of 75 patients underwent OPS. Five patients were lost to follow-up, and the remaining 70 patients were invited to participate in the BREAST-Q, self-assessment of cosmetic outcomes, and panel evaluation of cosmetic outcomes. The BREAST-Q was completed by 52 patients (response rate 74.3%), self-assessment of cosmetic outcomes by 50 patients (response rate 71.4%), and panel evaluation was performed in 40 patients (57.1%).

Study population

The total study population consisted of 75 women with a median age of 61 years (IQR: 52–67 years) and a median BMI of 27 kg/m^2 (IQR: 24.0–30.1 kg/m^2). Volume displacement techniques were used in 74.7% of the patients, involving the Wise pattern ($n = 54$, 96.4%) and the Grisotti technique ($n = 2$, 3.6%). Volume replacement techniques were used in 25.3% of patients, involving the TDAP flap ($n = 18$, 94.7%) and a bilobed swing ($n = 1$, 5.3%). Follow-up time varied from one to four years.

Baseline characteristics were compared between patients who underwent OPS with volume replacement versus volume displacement. A significant difference ($P < 0.001$) between the groups was found in the tumor location, with 17 out of 19 tumors (90%) located in the cranio-lateral quadrant in the volume replacement group while the tumors were more equally distributed in the volume displacement group. Furthermore, 20 patients (35.7%) in the volume displacement group versus only one patient (5.3%) in the volume replacement group underwent a contralateral symmetrization ($P < 0.01$). In all patients, tumor and surgical characteristics are depicted in Table 1.

Postoperative complications

Overall, an 18.7% clinically relevant complication rate was found, of which 14.7% had a CD score of 2, and 4% had a CD score of 3. Hematoma and wound dehiscence were reported in one patient (1.3%). Necrosis occurred in two patients (2.7%). An SSI was found in ten patients (13.3%) and led to a CD score of 3 in three patients (4%). No other complications led to a CD score of 3. The presence of seroma never resulted in a CD score of 2 or more.

Table 1 Preoperative and surgical characteristics of the total group, volume displacement, and volume replacement.

Preoperative characteristics	Total ($n = 75$)	Volume displacement ($n = 56$)	Volume replacement ($n = 19$)	*P*-value
Age, years	61.0 (52.0-67.0)	59.5 (52.0-67.0)	62.0 (51.5-68.0)	0.985
BMI, kg/m^2	27.0 (24.0-30.1)	27.1 (24.1-30.1)	26.1 (23.8-30.3)	0.950
Cup size				0.339
A,B,C	32 (42.7)	23 (41.1)	9 (47.4)	
D,E,H,F	33 (44.0)	27 (48.2)	6 (31.6)	
Missing	10 (13.3)	6 (10.7)	4 (21.1)	
ASA score				0.492
1	6 (8.0)	5 (8.9)	1 (5.3)	
2	62 (82.7)	47 (83.9)	15 (78.9)	
3	7 (9.3)	4 (7.1)	3 (15.8)	
Comorbidity	57 (76.0)	41 (73.2)	16 (84)	0.535
Current smoker	6 (8.0)	3 (5.4)	3 (15.8)	0.166
Tumor focality				1.000
Unifocal	62 (82.7)	46 (82.1)	16 (84.2)	
Multifocal	13 (17.3)	10 (17.9)	3 (15.8)	
Tumor size combined, mm	25 (20.5-35.0)	24.5 (19.5-34.0)	25.0 (23.0-33.5)	0.609
Location tumor 1				*<0.001*
Cranial	5 (6.7)	5 (9)	0 (0)	
Craniomedial	8 (11)	8 (15)	0 (0)	
Craniolateral	29 (39)	12 (22)	17 (90)	
Caudal	4 (5)	4 (7)	0 (0)	
Caudolateral	9 (12)	8 (15)	1 (5)	
Caudomedial	11 (15)	11 (20)	0 (0)	
Retro-areolar	1 (1)	1 (20)	0 (0)	
Medial	7 (10)	6 (11)	1 (5)	
Location tumor 2				0.118
Craniomedial	2 (15.4)	2 (20)	0 (0)	
Craniolateral	4 (30.8)	1 (10)	3 (100)	
Caudal	1 (7.7)	1 (10)	0 (0)	
Caudolateral	1 (7.7)	1 (10)	0 (0)	
Caudomedial	1 (7.7)	1 (10)	0 (0)	
Medial	4 (30.8)	4 (40)	0 (0)	
Neoadjuvant chemotherapy	18 (24.0)	12 (21.4)	6 (31.6)	0.370
Neoadjuvant hormone therapy	3 (4.0)	3 (5.4)	0 (0.0)	0.567
Contralateral symmetrization	21 (28.0)	20 (35.7)	1 (5.3)	*0.011*

Surgical characteristics	Total ($n = 75$)	Volume displacement ($n = 56$)	Volume replacement ($n = 19$)	*P*-value
Operative time, min	108 (90-129)	105 (89-126)	117 (103-136)	0.061
Weight resected specimen, gram	84 (46-102)	80 (45-94)	98 (46-135)	0.469
Reduction weight, gram	-	147 (45-305)	-	
Sentinel node	67 (89.3)	51 (91)	16 (84)	0.360
Adjuvant radiotherapy	70 (93.3)	52 (95)	18 (95)	1.000
Adjuvant chemotherapy	20 (26.7)	17 (30)	3 (16)	0.249
Adjuvant hormone therapy	40 (53.3)	30 (54)	10 (53)	1.000

Note: Data are n (%) or median (IQR). Significant P-values are denoted in italic. ASA indicates American Association of Anesthesiologists; BMI, body mass index; DCIS, ductal carcinoma in situ.

There was no significant difference in complications between the volume replacement and volume displacement groups. Re-excision rates after OPS were similar in both groups: 5.4% in the volume displacement group and 5.3% in the volume replacement group.

BREAST-Q questionnaire

Fifty-two patients completed the BREAST-Q questionnaire. Of these patients, only 34 (65.4%) filled out the domain "sexual well-being." The domains "satisfaction with breasts," "satisfaction with information about the surgery," and "satisfaction with plastic surgeon" were filled out by 51 patients (98.1%). All other domains were fully completed. The median time from surgery until the completion of the BREAST-Q was 28 months (IQR: 16–39 months).

The BREAST-Q scale scores were compared between OPS with volume replacement and volume displacement. Women who underwent volume displacement techniques reported significantly higher scores for "physical well-being of the chest," than patients who underwent volume replace-

Table 2 Q scores BREAST-Q BCT domains for total cohort and stratified for volume replacement and volume displacement.

Domain	Total	Volume replacement	Volume displacement	*P*-value
Psychosocial well-being	63 (51-71)	64 (49-73)	56 (53-66)	0.453
Sexual well-being	56 (46-66)	58 (45-68)	56 (50-66)	0.838
Satisfaction with breasts	65 (55-74)	63 (55-70)	65 (54-83)	0.410
Physical well-being: chest	56 (38-66)	63 (45-71)	38 (20-53)	*0.003*
Satisfaction with information surgery	71 (59-91)	76 (64-96)	64 (49-76)	0.074
Satisfaction with plastic surgeon	100 (82-100)	100 (86-100)	87 (75-100)	0.173

Note: Data are depicted in median and IQR. Significant P-values are denoted in italic.

Table 3 Individual global esthetic judgment scores, categorized as poor, fair, good, and excellent, by patients and panel.

	Patient ($n = 50$)	Plastic surgeon 1 ($n = 40$)	Plastic surgeon 2 ($n = 40$)	Layman 1 ($n = 40$)	Layman 2 ($n = 40$)
Poor	2 (4.0)	3 (7.5)	2 (5.0)	5 (12.5)	10 (25.0)
Fair	5 (10.0)	6 (15.0)	7 (17.5)	11 (27.5)	5 (12.5)
Good	18 (36.0)	21 (52.5)	19 (47.5)	17 (42.5)	14 (35.0)
Excellent	25 (50.0)	10 (25.0)	12 (30.0)	7 (17.5)	11 (27.5)

Note: Data are n (%).

ment techniques (median 63 vs. 38, $P = 0.003$). Scores in all other domains were comparable. All the results for the BREAST-Q questionnaires are shown in Table 2. BREAST-Q scores of patients with and without complications were compared. Patients without complications had significantly higher scores in the domain "satisfaction with the breast" and "satisfaction with information about the surgery," compared to patients with complications (median 65 (IQR: 56-78) vs. 56 (IQR: 43-53), $P = 0.007$, and median 71 (IQR: 64-100) vs. 55 (IQR: 46-78), $P = 0.026$, respectively). In the other domains, no significant differences were seen.

Patient self-assessment of cosmetic outcomes

Fifty patients completed the self-assessment questionnaires for cosmetic outcomes. The individual global aesthetic judgment scores are presented in Table 3. A poor score was reported by two patients (4%), fair by five patients (10%), good by 18 patients (36%), and an excellent score by 25 patients (50%). This resulted in a median global aesthetic judgment score of 3.5. Scarring and areola-nipple symmetry scored 3.0, and breast symmetry scored 2.5.

No significant difference was found between patients who underwent OPS with volume replacement versus volume displacement techniques (Table 4). Self-assessment scores in patients with and without complications were compared, showing a significantly higher score for symmetry in patients without complications (median 3.0 (IQR: 2.0-4.0) vs. 1.0 (IQR: 1.0-2.0), $P = 0.001$). In the other categories, no significant differences were observed.

Panel evaluation of cosmetic outcomes

In 40 patients, medical photographs could be obtained that were amenable for panel evaluation, with a median postoperative time of 16 months (IQR: 8-43). Medical photographs were taken within the first postoperative year in 13 out of 30 patients (43%) and in three out of ten patients (30%) in the displacement and replacement group, respectively ($P = 0.456$). Global aesthetic judgment scores distributed in the categories as poor, fair, good, and excellent are summarized in Table 3. The median scores by the specialists and laymen for global aesthetic judgment, symmetry of the breast, scarring, and areola-nipple symmetry are presented in Table 4.

The inter-observer agreement between laymen was fair to moderate, with a significant kappa value of 0.288, 0.478, and 0.372 for global aesthetic judgment, symmetry of the breast, and scarring, respectively. The agreement between specialists was also fair to moderate, with a kappa of 0.497, 0.236, and 0.357 for global aesthetic judgment, symmetry of the breast, and scarring, respectively. No significant agreement for areola-nipple symmetry was observed.

Subgroup analysis between patients who underwent OPS with volume replacement versus volume displacement is presented in Table 4, showing a significantly higher symmetry score in the volume replacement group, according to the specialist and the laymen (median 3.0 vs. 2.5 ($P = 0.020$) and median 3.0 vs. 1.75 ($P = 0.031$), respectively). Cosmetic outcomes scored by the panel in patients with and without complications were compared. The laymen provided a significantly higher score for global aesthetic judgment in patients without complications (median 3 (IQR: 2.0-3.5) vs. 2 (IQR: 1.0-3.0), $P = 0.046$). The specialists provided a significantly higher score for symmetry in patients without complications (median 2.5 (IQR: 2.0-3.0) vs. 2.5 (IQR: 1.5-2.0), $P = 0.002$). In the other categories, no significant differences were observed.

Discussion

In this study, postoperative complication rates, patient-reported outcomes, and cosmetic outcomes were evaluated

Table 4 Cosmetic outcomes for patients, plastic surgeons, and layman in the four categories.

	Total	Volume replacement	Volume displacement	*P*-value
Patient	$N = 50$	$N = 12$	$N = 38$	
Global aesthetic	3.50 (3.00-4.00)	3.00 (3.00-4.00)	4.00 (3.00-4.00)	0.500
judgment	2.50 (1.00-4.00)	3.00 (2.00-4.00)	2.00 (1.00-3.00)	0.246
Symmetry	3.00 (3.00-4.00)	3.00 (2.00-4.00)	4.00 (3.00-4.00)	0.120
Scar	3.00 (2.50-4.00)	4.00 (2.50-4.00)	3.00 (2.00-4.00)	0.379
Areola-nipple symmetry*				
Specialist	$N = 40$	$N = 10$	$N = 30$	
Global esthetic	3.00 (2.50-3.50)	3.00 (2.50-3.50)	3.00 (2.50-3.50)	1.000
judgment	2.50 (2.00-3.00)	3.00 (2.50-3.50)	2.50 (2.00-3.00)	*0.020*
Symmetry	3.00 (3.00-3.50)	3.00 (3.00-4.00)	3.00 (3.00-3.50)	0.939
Scar	3.00 (2.50-3.50)	3.50 (3.00-4.00)	3.00 (2.50-3.50)	0.053
Areola-nipple symmetry**				
Layman	$N = 40$	$N = 10$	$N = 30$	
Global aesthetic	2.75 (2.00-3.50)	2.75 (2.00-3.50)	2.75 (2.00-3.50)	0.866
judgment	2.50 (1.00-3.00)	3.00 (2.50-3.50)	1.75 (1.00-3.00)	*0.031*
Symmetry	3.00 (2.00-3.50)	2.25 (1.50-3.00)	3.00 (2.00-3.50)	0.221
Scar	2.75 (2.00-3.50)	3.00 (2.50-3.50)	2.50 (2.00-3.50)	0.241
Areola-nipple symmetry**				

Note: Numbers are median (IQR). For areola-nipple symmetry, numbers are lower than mentioned in the "total" column because of exclusion criteria.

* 47 patients, 12 volume replacements, 35 volume displacements.

** 36 patients, 10 volume replacements, and 26 volume displacements. Significant P-values are depicted in italic.

after OPS with volume displacement or volume replacement techniques, as well as the influence of the occurrence of complications on these outcomes. An overall clinically relevant complication rate of 18.7% was found in this study. Overall, patients were satisfied after their surgery. Cosmetic outcomes were scored as good to excellent by both patients and the panel in 60–86%. These results emphasize that OPS should be considered in eligible patients planned for oncological breast surgery.

The occurrence of complications following breast surgery has a major impact on the patient's life[19,20] and oncological treatment, as it might delay the start of adjuvant chemo or radiotherapy.[21,22] The current literature shows several studies about complication rates after OPS. However, these studies used various or no complication scoring systems, and studies about the influence of complications on patient satisfaction are limited. Mattingly et al. reported a total complication rate of 33.9% of which is 20.3% an intervention was required,[23] in contrast to the substantially lower percentage of 4%, found in this current study. The study of Kronowitz et al. reported a complication rate of 24% after immediate reconstructions; however, the severity of complications was not specified.[24]

Patient satisfaction is considered an important outcome measure following OPS, which was evaluated with the BREAST-Q BCT module in this study. In all domains, scores were above average. The lowest scores were found in the domains "sexual well-being" and "physical well-being of the chest," both with a median score of 56, with "sexual well-being" having a lower response rate (65.4%). This is similar to the findings in the study by Rose et al.,[25] where they compare BREAST-Q outcomes after OPS and breast-conserving surgery. Overall, patients were satisfied with their breasts and with psychosocial well-being, with a median score of 65 and 63 in these domains, respectively. However, other studies on this topic showed better outcomes as compared to this present study.[26,27] Yet, there are notable differences compared to our study: patients were either younger, various types of reconstructions were included, or small breasts (cup B or smaller) were excluded.

When evaluating global aesthetic judgment, patients were satisfied with a score from fair to excellent in 96%, which was 75–95% by panel evaluation. This was in line with a study by Clough et al.,[28] in which a panel used a similar grading system to evaluate cosmetic outcomes of 101 breast cancer patients who underwent OPS with volume displacement, at two and five years follow-up 88% and 82% scored fair to excellent.

The baseline comparison between volume replacement and volume displacement showed significant differences in the location of the tumor and in contralateral symmetrizations. This was expected as the volume replacement technique is most often used in patients with smaller breasts and laterally located tumors, where adjacent tissue is used to fill the defect, leading to little asymmetry without the need for contralateral symmetrizations. No differences in complications were found between the groups. After volume replacement, a lower score in the BREAST-Q domain "physical well-being of the chest" (median score 38 vs. 63) was reported, which is probably due to the more ex-

tensive surgery and the donor site morbidity, compared to the displacement group. As expected, subgroup analysis showed a significant higher score of mammary symmetry in the volume replacement group (median 2.8 vs. 2.2, $P = 0.048$).

Outcomes of patients with and without clinically relevant complications were compared. BREAST-Q results showed that patients with complications were less satisfied with the breast and with the information about the surgery. The need for adequate preoperative information was emphasized in previous research in which patients after failed breast reconstructions were interviewed.[29] As for cosmetic outcomes, patients with complications had lower mammary symmetry scores, reported by the patients and specialists, and lower global aesthetic judgment scores, reported by the layman. Presented results imply that complications have a negative impact on patient satisfaction and on the cosmetic outcomes after OPS. This is in line with recent research, including 1871 breast cancer patients after various procedures in which the EQ-5D questionnaire was used to value the effect of surgical complications. This study showed that complications resulted in poorer health-related quality of life.[30] Furthermore, complications leading to inferior cosmetic outcomes were expected, as they may lead to skin retractions contributing to asymmetry or a lower global aesthetic judgment, even though the expected influence on scarring was not found.

There are several limitations of this study. First of all, the data were obtained in one study center and may not be generalizable to the oncoplastic reconstructive population at large. Second, patients completed the BREAST-Q at variable time points after surgery, which could lead to recall bias, especially for the patient-reported experience measures. Furthermore, no preoperative BREAST-Q was available for comparison. Third, patient-reported cosmetic outcomes and the cosmetic panel evaluation were assessed at different time points, and no explanation of the given score was obtained. Fourth, the general quality of life, next to the breast-related quality of life, was not assessed in this study. Finally, the small sample size and limited number of available postoperative photographs (57.1%) resulted in the inability to accurately assess for confounding, such as patient characteristics, surgical characteristics, and adjuvant therapies. Future studies, preferably with a larger sample size and multicenter design, should implement both BREAST-Q and medical photographs in a standard protocol, involving more frequent and fixed time points.

In conclusion, postoperative complications were observed in 18.7% of patients after OPS, which required (surgical) intervention in only in 4%. No differences in complication rates were observed between techniques. Furthermore, 60–86% of cosmetic outcomes were scored good to excellent, in which patients given the highest score followed by the plastic surgeons and laymen. Volume displacement or replacement was performed for different indications and generally showed comparable results. Expected differences in physical discomfort and symmetry between both techniques were observed. The occurrence of complications resulted in lower BREAST-Q scores and cosmetic outcome scores. Ultimately, these insights could be used to thoroughly counsel patients by using information from patient, specialist, and layman experience.

Financial support

None.

Ethical approval

The study protocol was approved by the local institutional ethical review board (N21.053) and informed consent was obtained from all participants.

Declaration of Competing Interest

None.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.bjps.2022.06.088.

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