Original Article

Expanded indications for breast-conserving surgery with oncoplastic approaches compared to conventional approaches: a single-center retrospective comparative cohort study

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Background: Oncoplastic breast-conserving surgery (OPBS) is the evolution of conventional breast-conserving surgery (CBCS); however, data from studies comparing patients who received two surgical procedures are limited. A comparison of differences in terms of the patient characteristics, tumor-nipple distance, volume of resected breast tissue, tumor volume and postoperative breast appearance between patients undergoing OPBS and CBCS was carried out in this study, enhancing the evidence base for OPBS by widening indications and improving patient satisfaction.

Methods: From January 2020 to April 2022, the Breast Center of West China Hospital conducted a retrospective comparative study involving 106 patients. Preoperative characteristics of patients were recorded, and the tumor-nipple distance, the volume of resected breast tissue, tumor volume and patient-reported esthetic outcomes measured by the Harris cosmetic scale were compared between patients who underwent OPBS and CBCS.

Results: Each group had a median follow-up time of 2 months, ranging from 1 week to 6 months. The tumor-nipple distance was significantly shorter in patients receiving OPBS than in those receiving CBCS (2.98±1.42 *vs.* 3.85±1.78 cm, P=0.006). The rate of positive margin evaluated by intraoperative frozen section biopsy was significantly lower in OPBS group than in CBCS group (2/43, 4.65% *vs.* 11/63, 17.46%; P=0.048). The maximum diameter of resected tissue (7.80±2.29 *vs.* 6.75±1.87 cm, P=0.011) and volume of resected tissue (74.20±42.77 *vs.* 45.52±30.99 cm^3, P<0.001) were significantly larger with OPBS. The tumor size, tumor volume (either clinically measured by ultrasound or pathologically measured), tumor location, and reoperation rate due to positive margins did not differ significantly between groups. Moreover, insignificant differences existed regarding patient satisfaction between two groups (87.30% *vs.* 81.40%).

Conclusions: The OPBS strategy allowed extensive resections and expanded indications with equivalent cosmetic satisfaction and favorable oncological safety.

Keywords: Oncoplastic breast-conserving surgery (OPBS); breast cancer; indication; aesthetics; patient satisfaction

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Introduction

As the most common cancer, data in the past three years suggest that breast cancer endangers women's health worldwide (1). Breast-conserving surgery (BCS) followed by adjuvant radiotherapy is a safe treatment modality for patients with early breast cancer without any detriment to long-term oncological outcomes, with acceptable local and regional recurrence rates (2), and during the last few decades, BCS has replaced mastectomy to a large degree. Volume displacement and volume replacement surgical techniques are the essentials of oncoplastic breast-conserving surgery (OPBS), which is the evolution of conventional BCS (CBCS) (3,4). The development of OPBS in the UK points that the longstanding support and commitment of breast and plastic surgeons enable the service to thrive (5). The available studies have discussed the surgical techniques (6), indications (7), postoperative complications (8), onco-safety (9), and aesthetic outcomes (10-13) of OPBS. Notably, methods to evaluate the aesthetic results for breast cancer patients who received BCS include the Harris score (10), the BREAST-Q (11), the Late Effects Normal Tissue/Subjective Objective Management Analytic (LENT/SOMA) scales (12), the software tool Breast Cancer Conservative Treatment (BCCT score) (13) and others.

OPBS techniques allow wider resections with favoured esthetic and oncological outcomes than CBCS. A systematic review and meta-analysis of 31 studies clearly demonstrated superior or at least equivalent outcomes when comparing OPBS with CBCS: the benefits of OPBS in dealing with larger tumors, wider surgical margins and better aesthetic results for patients (14). OPBS also optimizes the breast radiation therapy (RT) of patients with macromastia (15), even correct deformities after BCS in patients treated with radiotherapy (16). With respect to the indication for OPBS or post mastectomy breast reconstruction in older patients, it should not be based in chronological age alone but in a comprehensive evaluation including geriatric assessment, life expectancy calculation and patient preference (17). Generally when adequate onco-safety and cosmetic outcomes are guaranteed, OPBS is indicated for patients with macromastia; patients with high excision volume of the breast (>20%); patients with unfavorable tumor locations, including medial, superomedial, central or inferior parts of the breast; patients who need re-operation after conservative surgery, either before and after RT; patients with extensive ductal carcinoma in situ (DCIS)/invasive lobular carcinoma; or patients with poor response to neoadjuvant chemotherapy (18).

However, there are limitations and knowledge gaps that can't be ignored in the current studies about OPBS. Firstly, most retrospective studies can't provide high-level evidence as large and well-structured prospective randomized controlled trials do. Secondly, the majority of the studies are mainly based in the United States and the United Kingdom with covering a small population of Asian patients. Thirdly, single-center studies are most common, few are large international/national database review; fourthly, some studies do not differentiate these methods and combine the techniques as OPBS, therefore the combination of volume replacement and volume displacement has a certain impact on the reliability of the conclusions when classifying and discussing. Fifthly, most studies still lack survival results of long-term follow-up to verify the safety of OPBS (19).

This study investigated and compared the tumor-nipple distance, volume of resected breast tissue, the rate of positive margin evaluated by intraoperative frozen section biopsy, tumor volume and postoperative appearance assessed by the Harris cosmetic scale (20) between patients in OPBS and CBCS groups. In this study, we only included OPBS cases performed by the volume displacement technique. The clinical significances of this research are two aspects: expanding indications for OPBS with shorter tumor-nipple distance and allowing wider resections for OPBS compared with CBCS. Our study shed a light on the unsolved clinical conundrum with regard to the benefits of OPBS with the absence of significant difference in patient-

Highlight box

Key findings

- Oncoplastic breast-conserving surgery (OPBS) allowed extensive resections and expanded indications.

What is known and what is new?

- The current indications and favorable outcomes of OPBS.
- OPBS is indicated for shorter tumor-nipple distance with lower rate of positive margin evaluated by intraoperative frozen section biopsy.

What is the implication, and what should change now?

- More objective decision-making tools are emerging that promise the ability to identify those patients who will gain the most benefit from OPBS and to avoid mastectomy by extending the availability of OPBS.
- Core outcome dataset is strongly recommended to provide high quality, mature data to inform patient choice.
- Cost-containment and close collaboration between breast and plastic surgeons are vital.

reported aesthetic outcomes and oncological safety observed in both groups. We present this article in accordance with the STROBE reporting checklist (available at https://gs.amegroups.com/article/view/10.21037/gs-23-371/rc).

Methods

Patients

A total of 106 patients were included in this single-center retrospective comparative study that was conducted ethically in accordance with the Declaration of Helsinki (as revised in 2013) and approved by the institutional research ethics committee of Chengdu Shang Jin Nan Fu Hospital (No. 2023012021). Informed consent for this retrospective analysis was waived.

Patients pathologically diagnosed with stage I–II breast cancer who received BCS were included in Chengdu Shang Jin Nan Fu Hospital from January 2020 to April 2022. Included patients meet the following eligibility criteria: patients who have macromastia accompanied by moderate to severe ptosis, those who have unfavorable tumor locations referring to medial, superomedial, central or inferior parts of the breast, or patients with the breast volume excised over 20% of the overall breast tissue as there is a high probability of deformity, asymmetry and poor cosmetic results. The exclusion criteria are as follows: multifocal or multicentric breast cancer, inflammatory breast cancer, distant metastasis, and comorbidities that were contraindications to radiation therapy. Forty-three patients underwent OPBS, and 63 patients undergoing CBCS during the same period were enrolled as controls. The two groups were similar with respect to demographic and clinical characteristics.

All patients underwent a full preoperative workup according to the decisions made by the multidisciplinary team, including appropriate imaging, biopsy, and image-guided marker placement. All the preoperative markings and operations were mainly conducted by a single qualified breast surgeon and all patients had tumor localization by palpation, intraoperative ultrasound, or wire localization techniques. Specimen were removed by the operating surgeon at the time of resection, and an intraoperative frozen section biopsy and the postoperative paraffin resection biopsy were performed to confirm the presence of the cancer as well as to assess margins. Intraoperative extended resections were subsequently followed based on the pathological evaluation of margins using frozen section biopsy. The process of intraoperative frozen section biopsy, intraoperative extended resection and postoperative paraffin resection biopsy was similar for both groups.

Demographic and clinical data were derived from electronical medical records, including age, menopausal status, smoking, N stage, histological type, histological grade, axillary surgery, molecular subtype, Ki-67 and chemotherapy. The characteristics of the tumor and resected tissue were obtained from pathology reports: tumor site, tumor location, reoperation due to positive margin and the rate of positive margin evaluated by intraoperative frozen section biopsy were observed; tumor size, tumor-nipple distance and maximum diameter of resected tissue were measured; tumor volume measured by preoperative ultrasound, volume of resected breast tissue and postoperative-measured tumor volume were calculated (volume formula: $\pi/6 \times$ length $\times$ width $\times$ height).

No patients were lost to follow-up during which we uniformly scheduled the frequency and timing of breast examinations. Follow up for OPBS is the same as for CBCS. Each group had a median follow-up time of 2 months, ranging from 1 week to 6 months. Clinical breast examination was arranged at 1 week, 1 month, 3 months, and 6 months after BCS. Ultrasonography combined with magnetic resonance imaging (MRI) can identify cancer recurrence. Postoperative photographs were planned and the Harris cosmetic scale was used to evaluate the cosmetic results.

Aesthetic outcomes

Two categories of postoperative complications were identified. The minor complications were acute infection treated with antibiotics, hematoma, seroma, and partial skin/nipple-areola complex (NAC) necrosis that healed spontaneously. Moreover, the major complications defined as complications requiring surgical interventions included chronic infection, hematoma, seroma (lasting for more than 2 weeks following the removal of the surgical drain), fat necrosis, and partial skin/NAC necrosis (33).

The cosmetic result after BCS subjectively evaluated by the Harris cosmetic scale was divided into four grades: excellent (the reconstructed breast was the same as the contralateral breast in shape and size), good (the reconstructed breast differed less than 1/4 in shape from the contralateral breast), intermediate (the reconstructed breast differed 1/4 or 1/2 in shape from the contralateral breast), and poor (the reconstructed breast differed more than

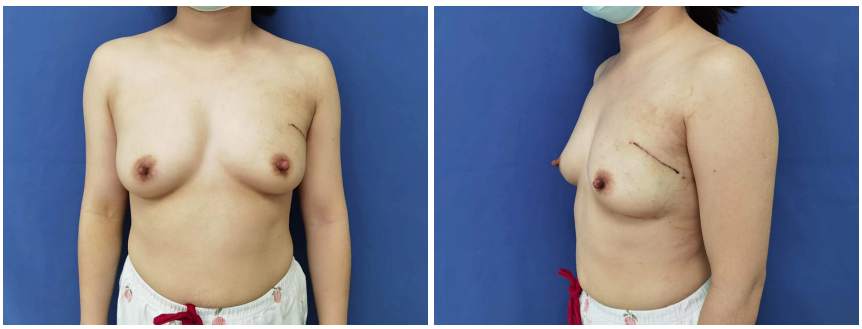

Figure 1 Left breast cancer in the upper outer quadrant near the axilla 1 month after surgery. Conventional breast-conserving surgery with one incision for both lumpectomy and sentinel lymph node biopsy.

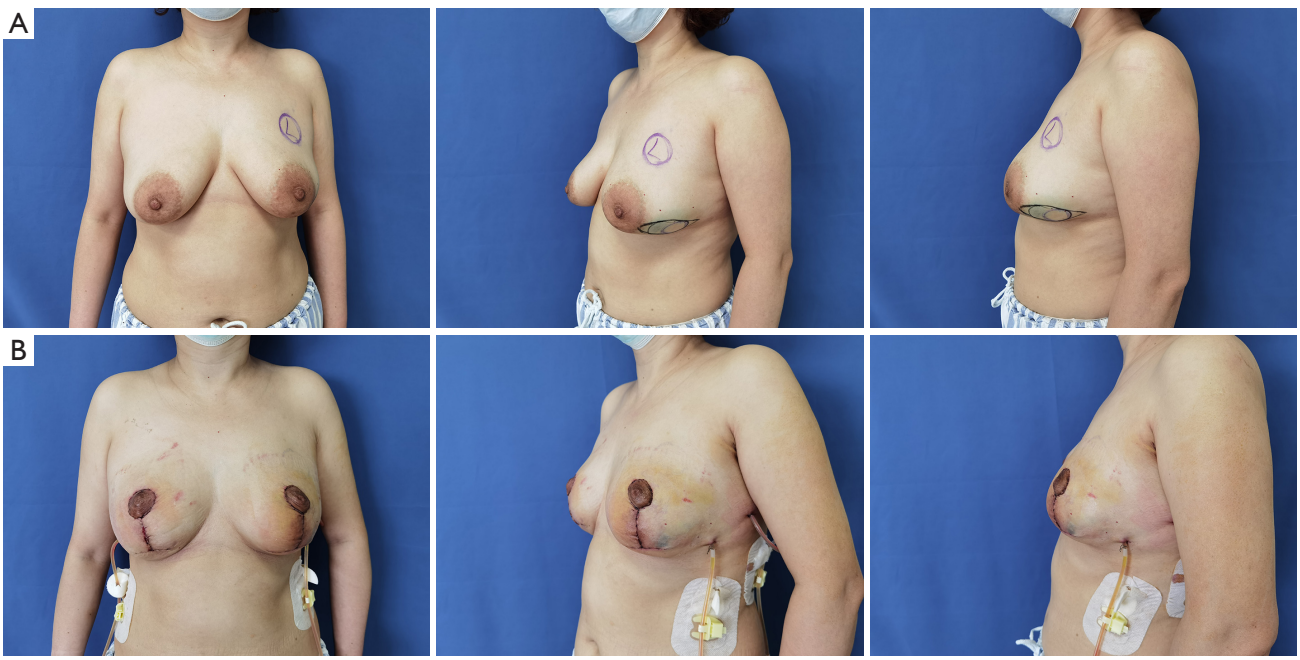

Figure 2 Breast cancer of the lower outer quadrant of the left breast with grade II ptosis. Vertical pattern of both breasts. (A) Patient before surgery; (B) 1 week after surgery.

1/2 in shape from the contralateral breast). In general, an excellent or good grade at 6 months after BCS was defined as high patient satisfaction.

Surgical techniques

In CBCS, incisions could be radial, fusiform or arcuate (along Langer's lines) for extended tumor resection (*Figure 1*). Residual gland was sutured to preserve a natural breast appearance. The choice of technique in OPBS largely depends on the location and size of the tumor, the size of the breast, and the extent of ptosis. A concealed incision was made at the inframammary fold close to the tumors. In terms of tumors at the lower pole, vertical pattern mammoplasty was tailored for small- to moderate-sized breasts without ptosis or with only moderate ptosis (*Figure 2*). Superior-pedicle (*Figure 3*) or inferior-pedicle (*Figure 4*) inverted T reduction mammoplasty (also called the Wise pattern) should be considered for lower pole or upper pole breast cancers with grade III mastoptosis or hypertrophy. For those with tumors in the lower outer quadrant, J-shaped or Lejour pattern mammoplasty was performed (*Figure 5*).

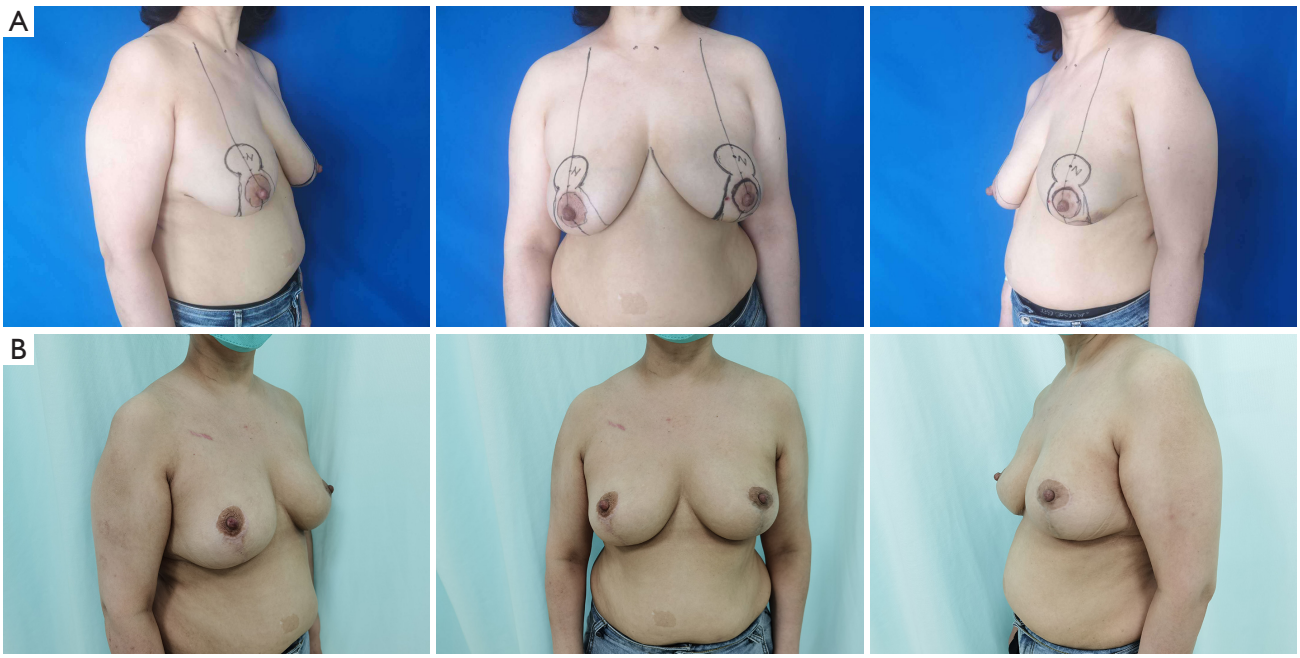

Figure 3 Breast cancer of left lower quadrant. Wise pattern (inverted T) reduction with superiorly based pedicle. (A) Patient before surgery; (B) 3 months after surgery.

The Tennis racket method (*Figure 6*) or round block technique (*Figure 7*) was chosen when the tumor was close to the NAC. Reshaping of the contralateral breast using the same technique may be necessary to maintain symmetry. For both OPBS and CBCS surgeries, intraoperative frozen sections were obtained from the upper, lower, inner, outer, and base of the tumor margins. Margins were marked with titanium clips to locate the tumor bed. Mastectomy with or without reconstruction was considered an alternative when a repeatedly positive margin was present.

Statistical analysis

Analysis of the collected data was conducted by SPSS 20.0 software. The independent samples *t*-test was adopted for measurement data ($\bar{x}$±s) comparison between groups, while the χ^2 test was made available for qualitative data (%) comparison between groups. There were statistically significant differences when two-sided P values were <0.05.

Results

Patient characteristics

Among a total of 106 patients, 63 received CBCS, while 43 received OPBS. A contralateral symmetric procedure was performed in 10/43, and was done simultaneous with the ipsilateral surgery. Patient characteristics are listed in *Table 1*. Age, menopausal status, smoking, N stage, histological type, histological grade, axillary surgery, molecular subtype, Ki-67 and chemotherapy were comparable between the two groups. After a follow-up of 6 months, no complications or recurrence were observed in either group.

Tumor characteristics were documented and compared between patients receiving OPBS and CBCS. The tumor-nipple distance in patients receiving CBCS ranged from 1–8 cm, while it ranged from 0.5–6 cm in patients receiving OPBS. The tumor-nipple distance was significantly shorter in OPBS group than in CBCS group (2.98±1.42 *vs.* 3.85±1.78 cm, P=0.006). The rate of positive margin evaluated by intraoperative frozen section biopsy was significantly lower in OPBS group than in CBCS group (2/43, 4.65% *vs.* 11/63, 17.46%; P=0.048). However, the rates of reoperation due to a positive margin in two groups were not significantly different. Among 63 patients receiving CBCS, one patient (1.59%) was reported to have mastectomy due to a positive margin, and one subject (2.33%) of OPBS group accepted reoperation as a result of positive margin.

Between the two groups, no significant differences

Figure 4 Breast cancer of the upper outer quadrant of the right breast after neoadjuvant chemotherapy (with grade III ptosis). Wise pattern (inverted T) reduction with inferiorly based pedicle. (A) Patient before surgery; (B) 3 months after surgery.

existed in terms of tumor size, tumor volume (either clinically measured by ultrasound or pathologically measured), tumor site, or tumor location (*Table 2*).

The volume of resected tissue was also evaluated. The OPBS group had a significantly larger maximum diameter of resected tissue (7.80±2.29 *vs.* 6.75±1.87 cm, P=0.011) and higher volume of resected tissue (74.20±42.77 *vs.* 45.52±30.99 cm^3, P<0.001) than the CBCS group (*Table 2*).

Patient satisfaction with esthetic outcomes

Patient satisfaction with esthetic outcomes did not differ

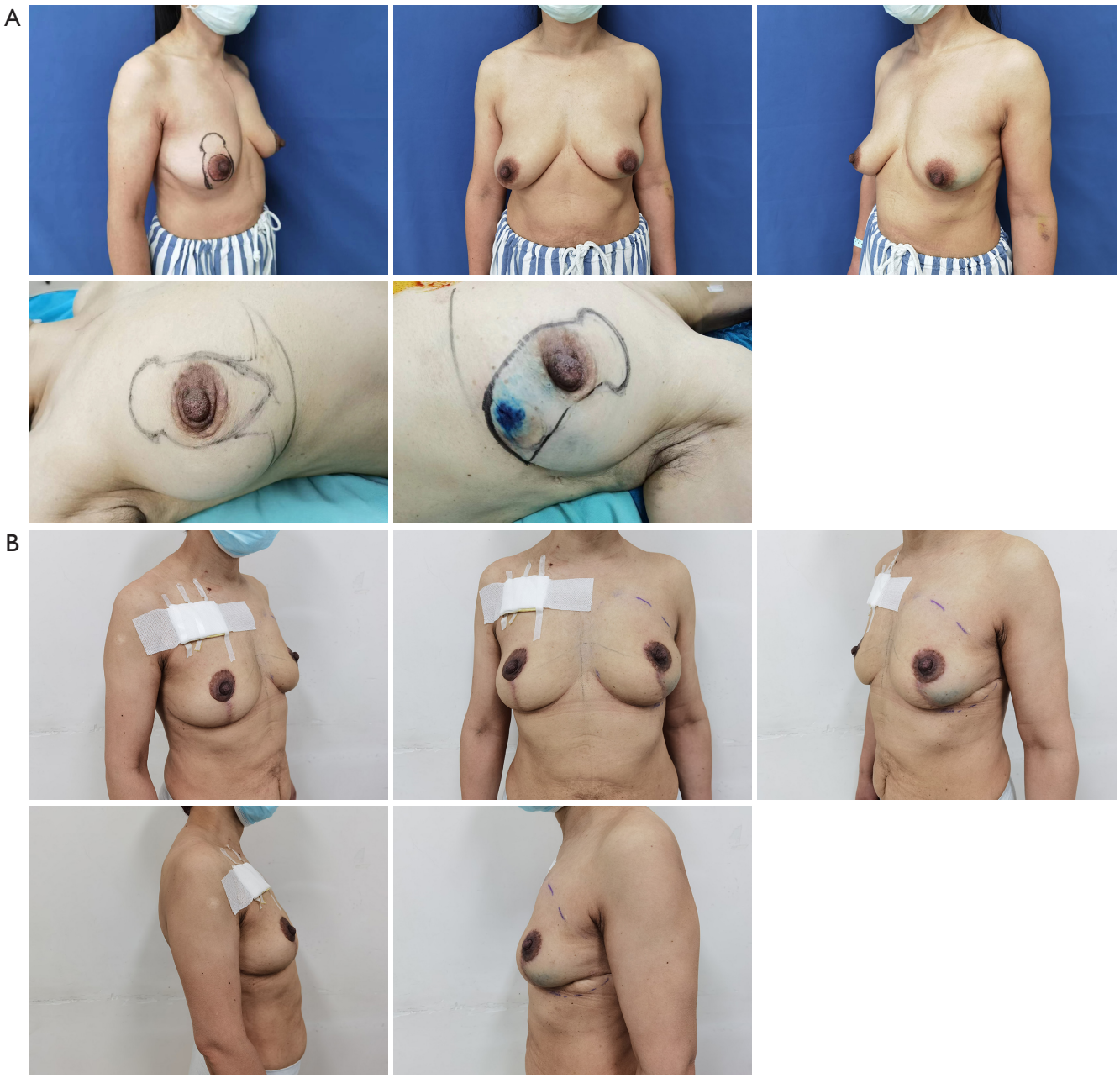

Figure 5 Breast cancer of the lower outer quadrant of the left breast and grade III ptosis of the right breast. L pattern mammoplasty for the left breast and wise pattern mastopexy for the right breast. (A) Patient before surgery; (B) 3 months after surgery.

between the two groups. The rates of excellent results in the OPBS group and the CBCS group were 81.40% and 87.30%, respectively. The rate of high satisfaction was 95.35% in the OPBS group and 96.83% in the CBCS group (P=0.673) (*Table 3*, *Figures 1-5*).

Correlation between patient satisfaction after OPBS and the characteristics of patients and the tumor

Correlation factors that might affect patient satisfaction after OPBS were explored. The results suggested that

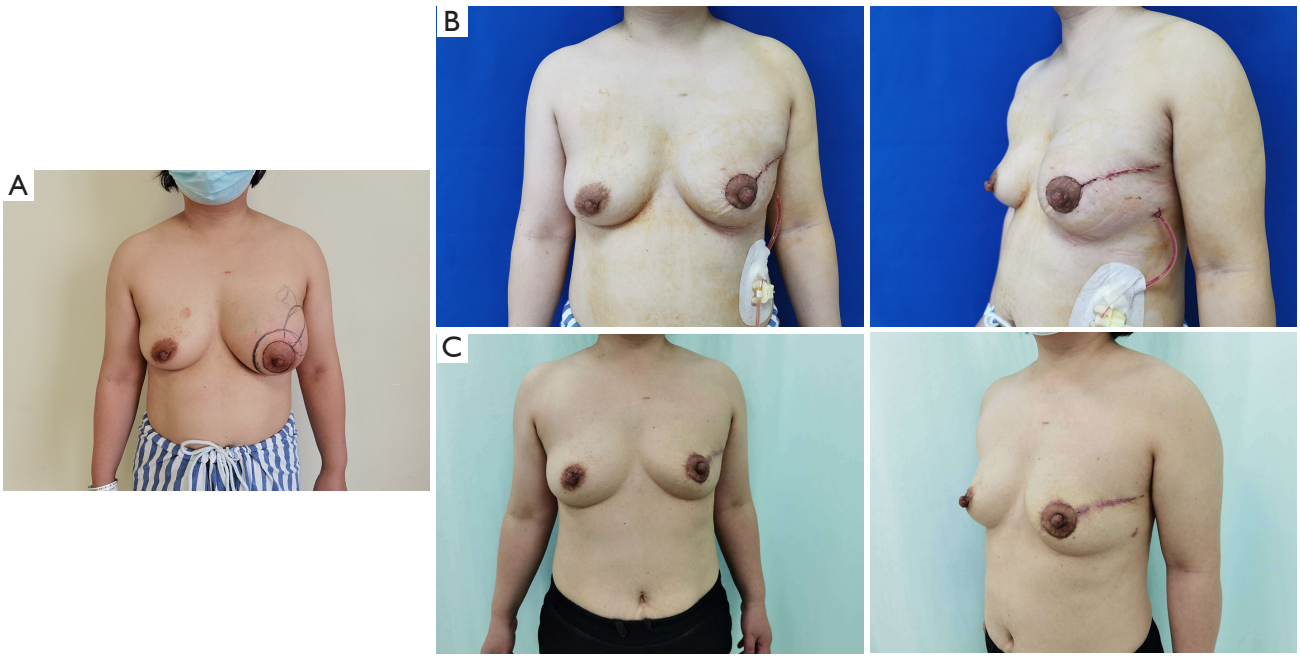

Figure 6 Breast cancer in the upper outer quadrant of the left breast with asymmetry. Tennis racket method of left breast. (A) Patient before surgery; (B) 1 week after surgery; (C) 3 months after surgery.

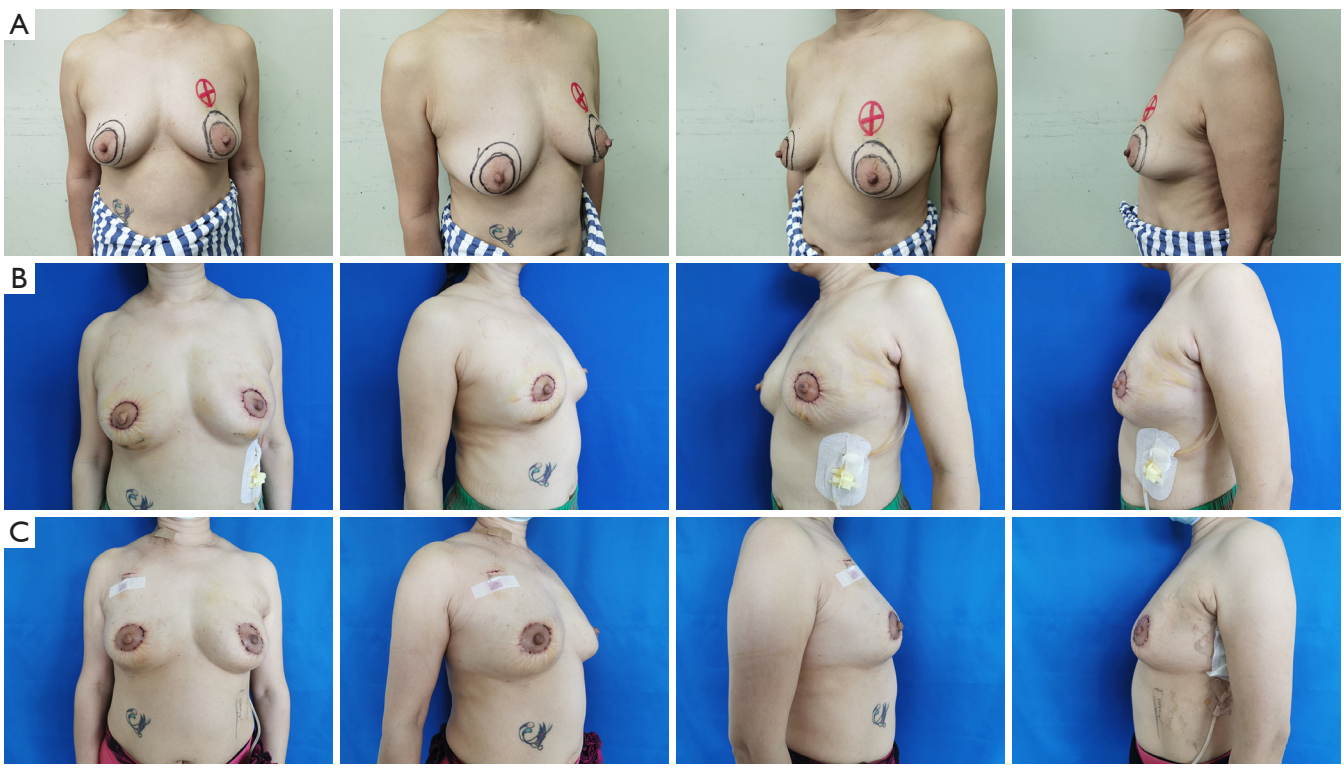

Figure 7 Breast cancer in the upper inner quadrant of the left breast with slight mastoptosis. Bilateral round block technique. (A) Patient before surgery; (B) 1 week after surgery; (C) 3 months after surgery.

Table 1 Comparison of patient characteristics between OPBS and CBCS groups

Variable	CBCS (n=63)	OPBS (n=43)	P value
Age (years), mean ± SD	45.19±10.34	47.42±9.24	0.258
Menopausal status, n (%)			0.317
Premenopausal	44 (69.84)	26 (60.47)	
Postmenopausal	19 (30.16)	17 (39.53)	
Smoking, n (%)			>0.99
Yes	7 (11.11)	4 (9.30)	
No	56 (88.89)	39 (90.70)	
N stage, n (%)			0.066
N0	46 (73.02)	24 (55.81)	
N+	17 (26.98)	19 (44.19)	
Histological type, n (%)			0.392
DCIS	3 (4.76)	0 (0.00)	
Invasive breast cancer	60 (95.24)	43 (100.00)	
Histological grade, n (%)			0.312
1	2 (3.18)	4 (9.4)	
2	28 (44.44)	15 (34.88)	
3	33 (52.38)	24 (55.81)	
Axillary surgery, n (%)			0.735
ALND	18 (28.57)	11 (25.58)	
SLNB	45 (71.43)	32 (74.42)	
Molecular subtype, n (%)			0.226
$HR^+/HER2^-$	11 (17.46)	3 (6.98)	
$HR^+/HER2^+$	29 (46.04)	27 (62.79)	
$HR^-/HER2^-$	17 (26.98)	8 (18.6)	
$HR^-/HER2^+$	6 (9.52)	5 (11.63)	
Ki-67, n (%)			0.504
≥30%	32 (50.79)	19 (44.19)	
<30%	31 (49.21)	24 (55.81)	
Chemo, n (%)			0.801
Neoadjuvant	4 (6.34)	2 (4.65)	
Adjuvant	46 (73.02)	30 (69.77)	
None	13 (20.64)	11 (25.58)	

OPBS, oncoplastic breast-conserving surgery; CBCS, conventional breast-conserving surgery; SD, standard deviation; DCIS, ductal carcinoma in situ; ALND, axillary lymph node dissection; SLNB, sentinel lymph node biopsy; HR, hormone receptor; HER2, human epidermal growth factor receptor 2.

Table 2 Comparison of characteristics of tumor and resected tissue between OPBS and CBCS groups

Variable	CBCS (n=63)	OPBS (n=43)	P value
Tumor size (cm), mean ± SD	1.91±0.88	2.16±0.83	0.145
Tumor-nipple distance (cm), mean ± SD	3.85±1.78	2.98±1.42	0.006
Tumor volume measured by ultrasound (cm^3), mean ± SD	2.28±2.26	3.43±3.95	0.088
Tumor volume measured pathologically (cm^3), mean ± SD	2.75±3.56	3.63±3.69	0.223
Tumor site, n (%)			0.952
Left	37 (58.73)	25 (58.14)	
Right	26 (41.27)	18 (41.86)	
Tumor location, n (%)			0.236
Upper inner quadrant	8 (12.70)	6 (13.95)	
Lower inner quadrant	1 (1.59)	2 (4.65)	
Upper outer quadrant	47 (74.60)	25 (58.14)	
Lower outer quadrant	7 (11.11)	10 (23.26)	
Maximum diameter of resected tissue (cm), mean ± SD	6.75±1.87	7.80±2.29	0.011
Volume of resected tissue (cm^3), mean ± SD	45.52±30.99	74.20±42.77	<0.001
Rate of positive margin evaluated by intraoperative frozen section biopsy	11 (17.46)	2 (4.65)	0.048
Reoperation due to positive margin, n (%)			>0.99
Yes	1 (1.59)	1 (2.33)	
No	62 (98.41)	42 (97.67)	

OPBS, oncoplastic breast-conserving surgery; CBCS, conventional breast-conserving surgery; SD, standard deviation.

Table 3 Comparison of patient satisfaction with esthetic outcomes between OPBS and CBCS groups

Patient satisfaction	CBCS (n=63)	OPBS (n=43)	P value
Excellent	55 (87.30%)	35 (81.40%)	0.706
Good	6 (9.52%)	6 (13.95%)	
Intermediate	2 (3.17%)	2 (4.65%)	
Poor	0 (0.00%)	0 (0.00%)	
Rate of high patient satisfaction	96.83%	95.35%	0.673

OPBS, oncoplastic breast-conserving surgery; CBCS, conventional breast-conserving surgery.

patient satisfaction was similar between patients with different tumor-nipple distances (≤2 *vs.* >2 cm, 94.4% *vs.* 96.0%, P>0.99), different maximum diameters of resected tissue (<8 *vs.* ≥8 cm, 100.0% *vs.* 89.5%, P=0.369), and different volumes of resected tissue (≤75 *vs.* >75 cm^3, 96.3% *vs.* 93.8%, P>0.99). Furthermore, differences in patient satisfaction were not found between patients who underwent reoperation and those who did not (100.0% *vs.* 95.2%, P>0.99) (*Table 4*).

Discussion

Radical surgery used to be a traditional technique for early breast cancer, but it has been gradually withdrawn from clinical practice due to large incisions, heavy complications, and slow recovery. Compared with radical surgery, BCS, both removing tumors and preserving breasts, has developed as the initial surgery for early breast cancer with regard to similar curative effects and fewer above mentioned problems. However, in clinical practice, CBCS inevitably affects the cosmetic outcomes of patients' breasts as a result of routine wider excision when compared with OPBS. This study compared the clinical, oncological, and esthetic outcomes between patients who underwent CBCS and OPBS.

In this study, the average distance between the removed tumor and the nipple in the OPBS group was

Table 4 Patient satisfaction in the OPBS group in terms of patient characteristics and characteristics of tumor and resected tissue

Variable	Excellent & good	Intermediate & poor	Rate of high patient satisfaction (%)	P value
Age				>0.99
>40 years	10	0	100.0	
≤40 years	31	2	93.9	
Menopausal status				>0.99
Premenopausal	26	1	96.3	
Postmenopausal	15	1	93.8	
Smoking				>0.99
Yes	3	0	100.0	
No	38	2	95.0	
N stage				>0.99
N0	23	1	95.8	
N+	18	1	94.7	
Histological grade				0.141
1	4	0	100.0	
2	13	2	86.7	
3	24	0	100.0	
Axillary surgery				0.952
ALND	9	1	90.0	
SLNB	32	1	97.0	
Molecular subtype				0.0637
$HR^+/HER2^-$	22	1	95.7	
$HR^+/HER2^+$	7	0	100.0	
$HR^-/HER2^-$	7	1	87.5	
$HR^-/HER2^+$	5	0	100.0	
Ki-67				0.869
≥30%	28	2	93.35	
<30%	13	0	100.0	
Chemo				0.703
Neoadjuvant	2	0	100.0	
Adjuvant	29	1	96.7	
None	10	1	90.9	
T stage				0.667
Tis-1	24	2	92.3	
2	17	0	100.0	

Table 4 (*continued*)

Table 4 (*continued*)

Variable	Excellent & good	Intermediate & poor	Rate of high patient satisfaction (%)	P value
Tumor-nipple distance				>0.99
≤2 cm	17	1	94.4	
>2 cm	24	1	96.0	
Tumor volume measured by ultrasound				>0.99
≤2 cm^3	21	1	95.5	
>2 cm^3	20	1	95.2	
Pathological tumor volume				0.427
≤2 cm^3	19	2	90.4	
>2 cm^3	22	0	100.0	
Tumor site				0.621
Left	23	2	92.0	
Right	18	0	100.0	
Tumor location				0.787
Upper inner quadrant	6	0	100.0	
Lower inner quadrant	2	0	100.0	
Upper outer quadrant	24	1	96.0	
Lower outer quadrant	9	1	90.0	
Maximum diameter of resected tissue				0.369
<8 cm	24	0	100.0	
≥8 cm	17	2	89.5	
Volume of resected tissue				>0.99
≤75 cm^3	26	1	96.3	
>75 cm^3	15	1	93.8	
Reoperation				>0.99
Yes	1	0	100.0	
No	40	2	95.2	

OPBS, oncoplastic breast-conserving surgery; ALND, axillary lymph node dissection; SLNB, sentinel lymph node biopsy; HR, hormone receptor; HER2, human epidermal growth factor receptor 2.

significantly shorter than that in the CBCS group. To obviate confounders resulting from tumor size variations, the distance was measured radially from the nipple to the epicenter rather than the edge of the tumor with patients receiving breast-conserving surgery lying down (21). For nipple-sparing mastectomy, a tumor-nipple distance measured by sonography or MRI that was ≤1 cm should not be regarded as a contraindication, while a tumor-nipple distance that was ≥1 cm likely predicted negative nipple pathology and represented a safe cutoff value for locoregional recurrence (22-24). Furthermore, tumor-nipple distance can be adopted to validly predict axillary lymph node involvement and better overall survival in old patients (21,25). In general, the shorter the distance between the tumor and the nipple, the worse the prognosis. Commonly, patients with appropriate breast size and ptosis

should be eligible for breast conservation and considered appropriate candidates for oncoplastic surgery (26). The main indications for OPBS were large lesions, extensive DCIS, invasive lobular carcinoma, and partial or poor responses to neoadjuvant treatment (3). Meanwhile, panels of conferences held a view that oncoplastic surgery as an alternative to mastectomy was due to broadened indications for BCS toward larger or multifocal tumors (27-30). Clough *et al.* found that OPBS not only extended the indications but also allowed surgeons to conduct wider resections with favorable cosmesis and good oncologic control (31).

Significant differences in patient satisfaction between the two groups were not observed in our study. The overall esthetic outcomes involving patient satisfaction were statistically higher in the oncoplastic group than in the CBCS group (90% *vs.* 80%) according to Losken *et al.*'s findings (32). A single-center retrospective study including 700 surgery cases suggested that all the median scores of the esthetic outcomes were significantly higher in the OPBS group than in the CBCS group (33). A recent study including 31 studies clearly demonstrated superior esthetic results for patients when comparing OPBS with conventional BCS (14). However, there were no differences in cosmetic satisfaction between groups according to Sherwell-Cabello *et al.*'s study (34). Rose *et al.* found that OPBS allowed similar cosmetic results to CBCS for the domains "Satisfaction with Breast" (35). In a prospective, cross-sectional study, statistically significant differences were not found for the cosmetic results although oncoplastic surgery was performed in more demanding patients and patients with worse tumor conditions (36). Furthermore, oncoplastic resection appeared worse in almost every Breast Cancer Treatment Outcome Scale (BCSOS) esthetic category (37). Patient satisfaction after lumpectomy assessed by Hennigs *et al.* decreased with follow-up, and its risk factors were related to postoperative seroma and a high body mass index (38). In addition to obesity, some studies have shown that re-excision increases the risk of patients being dissatisfied with symmetry (39,40). Previous studies stressed that radiotherapy had a negative influence on esthetic results (41), while others illustrated that both sequential (42) and concomitant (41) chemotherapy may also have a negative impact. Most studies have shown a correlation between a high percentage of breast volume excision (PBVE) and worse esthetic results (40,43,44). In addition, patients experiencing extreme oncoplasty showed greater contentment partially because they imagined the occurrence of a mastectomy before surgery; thus, much attention has been given to the esthetic results of breast conservation (45). In our study, the equal satisfaction after both OPBS and CBCS was probably due to limited sample size, the high esthetic satisfaction in both CBCS and OPBS groups, and short follow-up time after radiotherapy.

Efforts have been made to improve the appearance after surgeries for breast cancer. In clinical practice, the Clough bilevel classification was put into use for indication, planning, and performing oncoplastic surgery (27). As a quadrant-per-quadrant approach to oncoplastic techniques for breast cancer, the Clough system tailored the mammoplasty for each tumor location (3). According to a study, the periareolar approach involving volume resection major or minor by 20% effectively restored patients' small- to big-sized breast shapes, leaving only a periareolar scar in selected cases but producing a natural appearance and requiring little modification of the breast (46). With the help of glandular reshaping or reduction techniques, volume displacement surgical techniques according to a Korean study utilized residual breast tissue after BCS for small- to medium-size breasts to achieve better cosmetic outcomes (47). For Chinese patients with lower inner quadrant tumors, Zhuo's oncoplastic technique, a valid and flexible surgical approach, provided good esthetic results based on the premise of low recurrence risk (48). In this study, oncoplastic techniques, including the tennis racket method and wise pattern (inverted T) reduction, were used and achieved a high rate of patient satisfaction.

The limitations of the study were as follows. First, the inherent limitation of a single-center, retrospective study existed. Second, some significant differences were masked by limited sample size, particularly the small number of patients in the OPBS group, and selection bias favoring the CBCS group. Furthermore, several oncoplastic techniques were used, and the sample size was insufficient to allow comparison between specific techniques. Third, the short-term follow-up did not allow for long-term esthetic satisfaction evaluation. No tumor progression occurred during follow-up; thus, survival could not be calculated and compared, but the rate of positive margin evaluated by intraoperative frozen section biopsy seemed to reflect favorable oncological safety. Fourth, the impact of radiotherapy on the results was not objectively measured in this study; therefore, some significant associations may have remained undetected.

Conclusions

We can conclude, however, from current publications and the data collected and calculated in this study, that OPBS expands indications for patients with primary breast cancer, accompanied by wider resections, equivalent esthetic outcomes and acceptable oncological safety.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at https://gs.amegroups.com/article/view/10.21037/gs-23-371/rc

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. This study was conducted ethically in accordance with the Declaration of Helsinki (as revised in 2013) and approved by the institutional research ethics committee of Chengdu Shang Jin Nan Fu Hospital (No. 2023012021). Informed consent for this retrospective analysis was waived.

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