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ORIGINAL ARTICLE

Clinical outcomes and patient-reported outcomes after oncoplastic breast surgery in breast cancer patients: A matched cohort study

Hsuan-Yu Chou[a,b], Ling-Ming Tseng[c,d,e], Hsu Ma[b,e,f], Cherng-Kang Perng[a,e], Chi-Cheng Huang[c,d], Yi-Fang Tsai[c,d,e], Yen-Shu Lin[c,d], Pei-Ju Lien[c,d], Chin-Jung Feng[a,c,e,g,*]

[a]Division of Plastic and Reconstructive Surgery, Department of Surgery, Taipei Veterans General Hospital, Taipei, Taiwan, ROC; [b]Department of Plastic and Reconstructive Surgery, Chang Gung Memorial Hospital Keelung Branch, Keelung, Taiwan, ROC; [c]Comprehensive Breast Health Center & Division of General Surgery, Department of Surgery, Taipei Veterans General Hospital, Taipei, Taiwan, ROC; [d]Division of General Surgery, Department of Surgery, Taipei Veterans General Hospital, Taipei, Taiwan, ROC; [e]School of Medicine, National Yang Ming Chiao Tung University, Taipei, Taiwan, ROC; [f]Department of Surgery, National Defense Medical Center, Taipei, Taiwan, ROC; [g]Institute of Clinical Medicine, National Yang Ming Chiao Tung University, Taipei, Taiwan, ROC

Abstract

Background: Surgery is the recommended treatment for breast cancer, the most common cancer in women in Taiwan and the leading cause of cancer-related deaths. Although breast-conserving surgery (BCS) has good prognosis, in some cases, BCS may cause more significant deformities and interfere with the patient's psychosocial well-being. Oncoplastic breast surgery (OBS) is the treatment option in these cases. This study aimed to determine the outcomes of OBS and BCS regardless of clinical and patient-reported esthetic outcomes.

Methods: Between 2015 and 2020, 50 patients who underwent OBS at our hospital after complete treatment were enrolled. With 1:2 matched ratios, 100 patients were enrolled in the BCS control group. Clinical outcomes were analyzed. The BREAST-Q questionnaire was then assessed 6 months after the completion of treatment for subjective patient-reported outcomes.

Results: Due to the matching process, no difference was noted between the two groups in terms of demographic data such as age, comorbidities, or tumor characteristics. There were no significant differences in the local recurrence rate, disease-free survival, overall survival, positive margin rate, rewide excision rate, conversion to mastectomy rate, or complication rate (major or minor) between both groups. However, the OBS group showed higher satisfaction with breasts in the BREAST-Q questionnaire ($p < 0.001$). The mean follow-up time was 38.77 ± 14.70 months in the BCS group and 29.59 ± 14.06 months in the OBS group.

Conclusion: OBS seems to be a safe and feasible surgery in breast cancer patients because clinical outcomes are compatible with BCS. Moreover, the OBS group had better patient-reported outcomes in terms of satisfaction.

Keywords: Breast-conserving surgery; Control group; Hospital; Mastectomy; Patient-reported outcome

1. INTRODUCTION

Breast cancer is the main cause of malignancy in women and cancer-related deaths worldwide in the modern era.[1] With advances in medical treatment, such as chemotherapy, radiation therapy (RT), hormone therapy, and target therapy, the overall survival rate has improved significantly. In early breast cancer, the 5-year survival rate can be up to 99.3% based on Surveillance, Epidemiology, and End Results (SEER) Research Datasets.[2]

Surgical intervention with mastectomy remains the first choice of treatment in patients with breast cancer, if indicated. In the past, patients who needed breast surgery may undergo simple mastectomy or modified radical mastectomy depending on their lymph node involvement. However, with the development of RT, patients may now have another choice of treatment, partial mastectomy, also known as breast-conserving surgery (BCS). Only patients with multicentric lesions, diffuse microcalcification, or contraindications to RT (eg, previous exposure, pregnancy) are contraindicated for BCS. Large and long-term follow-up studies have shown that patients receiving BCS with adequate adjuvant RT can have similar prognosis and survival rates to those undergoing conventional mastectomy.[3,4] In BCS, patients have a greater chance of preserving their breast contour, physical function of lactation, and psychosocial health and well-being. Nevertheless, conventional BCS may lead to more problems such as postoperative deformity, asymmetry, or nipple-areolar complex (NAC) distortion when the tumor-to-breast ratio is high or the tumor is located over the critical anatomical area (upper medial or inferior breast), which influence patients' self-esteem.[5,6]

* Address correspondence. Dr. Chin-Jung Feng, Division of Plastic and Reconstructive Surgery, Department of Surgery, Taipei Veterans General Hospital, 201, Section 2, Shi-Pai Road, Taipei 112, Taiwan, ROC. E-mail address: cjf0205@gmail.com (C.-J. Feng).

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Therefore, a new concept of BCS was advocated, termed oncoplastic breast surgery (OBS). OBS was first described in the 1990s.[7] OBS is composed of partial mastectomy with oncoplastic methods (volume displacement [VD] or volume replacement [VR]) to decrease possible deformity or distortion of the NAC after surgery and adjuvant RT.[8] During the past decades, several classifications of OBS have been published,[9,10] but there is still no consensus on the use of oncoplastic surgery in different situations (based on the patient's breast volume and tumor size).

In recent decades, people have started to focus on the patient's satisfaction and quality of life after breast surgery for the improvement of survival. Patient-reported outcomes became the mainstream evaluation, in which the BREAST-Q questionnaire, first published by Sloan Kettering Cancer Center in 2009 is the most widely used questionnaire with strong reliability and validity.[11] It now has five major modules (augmentation, reduction/mastopexy, mastectomy, reconstruction, and breast-conserving therapy), composed of questions about quality of life, satisfaction with breast, and satisfaction with medical faculties.[12,13]

By retrospectively reviewing the breast cancer patients at Taipei Veteran General Hospital, the aim of this study was to compare the clinical and patient-reported outcomes between conventional BCS and OBS. In addition, we propose our OBS algorithm in breast cancer treatment in this study.

2. METHODS

This retrospective study was approved by the Institutional Review Board of Taipei Veteran General Hospital, a tertiary academic medical center in Taipei City, Taiwan (TPEVGH IRB No.: 2019-05-004AC). All patients in this study were women and diagnosed with primary ductal carcinoma in situ (DCIS) or breast cancer. Patients who were older than 18 years, received BCS or OBS at our hospital, and completed the treatment course according to the Veterans General Hospital guidelines were enrolled in the study between 2015 and 2020. Exclusion criteria included previous contralateral mastectomy (no normal breast for esthetic comparison), recurrent cases, incomplete medical records or questionnaires, or follow-up time <6 months after complete treatment. The timing of the questionnaire collection was at least 6 months after completing cancer-related treatment (adjuvant chemotherapy and RT).

The matched control group was selected from the breast center database of our hospital. Matched variables included histological type, tumor size (pT stage), pathological primary tumor regional lymph node distant metastasis (TNM) stage, and demographic data (eg, age, body mass index [BMI], hypertension, diabetes, and cardiovascular disease). The matched group was under a 1:2 matched ratio for enrollment.

In the OBS group, preoperative markings were performed with the patient in the standing position. Based on the excision volume and tumor location, the appropriate oncoplastic technique was applied, either VD or VR, according to a previously published atlas.[9,10] Women with smaller breasts and women who have skin removed from the tumor are often reconstructed with locoregional flaps (VR). Women with larger or ptotic breasts are candidates for oncoplastic reduction techniques (VD). When the resection volume resulted in a noticeable asymmetry in size between the two breasts, immediate contralateral breast reduction was performed. Tumor resection was a large full-thickness glandular excision from the skin to the pectoralis fascia. No systematic shavings of the cavity were performed, but a specimen mammography was always recorded perioperatively. Specimens were immediately marked by sutures to ensure orientation after partial mastectomy. TridentTM Specimen Radiography System (Hologic, Inc., Bedford, MA, USA) was used to take images that were reviewed by surgeons intraoperatively. If necessary, a selective margin shaving was performed. Not only specimen mammography but also the surgeon's clinical decision after gross inspect might lead to margin shavings. All specimens were sent to pathologists. A clear margin was defined as no cancer cell detected. Clips were systematically placed into the defect for radiotherapy planning. Multidisciplinary tumor boards at our institute would assist clinical decision-making regarding optimal patient selection.

Demographic data collected in this study included age, BMI, active smoking status, comorbidities (hypertension, diabetes, cardiovascular disease), and tumor characteristics (pathological T, N, and TNM stages). The primary endpoints of the study were local recurrence rate, mortality rate, disease-free survial, overall survival, positive margin rate, wide excision rate, conversion to mastectomy rate, and postoperative complication rates. The definition of major and minor complications was determined if further admission or surgery was performed. The secondary endpoints focused on patient-reported outcomes of satisfaction with breasts, adverse effects of radiation, and psychosocial, physical, and sexual well-being. Because it was a retrospective chart review and prospective questionnaire study, the timing of the BREAST-Q questionnaire with breast-conserving therapy module was assessed at least 6 months after the patients completed the treatment, such as adjuvant chemotherapy and RT.

Continuous data were presented as mean and SD, while categorical data were presented as frequency and percentage. Comparisons were performed using the chi-squared test and independent *t* test for categorical and continuous variables, respectively. Survival analysis was based on the Kaplan-Meier method, log-rank test and cox proportional hazards model. All analyses were performed using SPSS software, version 20 (IBM SPSS Version 25.0; IBM Corp., Armonk, NY). All *p* values were two-sided, and values <0.05, were considered statistically significant.

3. RESULTS

A total of 95 patients were identified in the OBS group at our hospital during the past 5 years, of which 45 patients were diagnosed with benign lesions. Therefore, 50 patients were eventually recruited in the OBS group. After the matching process, 100 patients were recruited in the BCS control group. First-stage clinical outcome analysis was carried out based on these 150 patients for safety evaluation. Second-stage patient-reported outcome analysis was performed after administering the BREAST-Q questionnaire. The response rate was 68.0% in the OBS group and 51.0% in the BCS group (34 of 50 patients and 51 of 100 patients) (Fig. 1).

Due to the matching process, no difference was noted between the two groups in terms of demographic data or tumor characteristics (Table 1). Regardless of the cancer-related therapy, such as neoadjuvant chemotherapy (9.0% and 4.0%, $p = 0.338$), adjuvant chemotherapy (42.0% and 26.0%, $p = 0.072$), adjuvant RT (95.0% and 90.0%, $p = 0.302$), or adjuvant hormone therapy (83.0% and 74.0%, $p = 0.202$), all showed no significant difference between the two groups. The clinical outcomes of the two groups are presented in Table 2. In our study, 50 patients underwent OBS, of whom 4 (8%) received VR (all were lateral intercostal artery perforator flap [LICAP]) and 46 (92%) received VD. Among those patients receiving VD, 31 patients just received glandular approximation, 11 patients received round block incision, 4 patients received vertical incision and 1 patient received inverted-T incision. Similar clinical outcomes including positive margin rate (1% and 2%, $p = 1.000$), rewide excision rate (1% and 2%, $p = 1.000$), surgical overall/major/minor complication rate (13.0/6.0/7.0% and 10.0/4.0/6.0%, $p = 0.846$), local recurrence rate (3% and 0%, $p = 0.551$), and mortality rate (1% and 0%, $p = 1.000$), disease-free survival (Hazard ratio (HR)

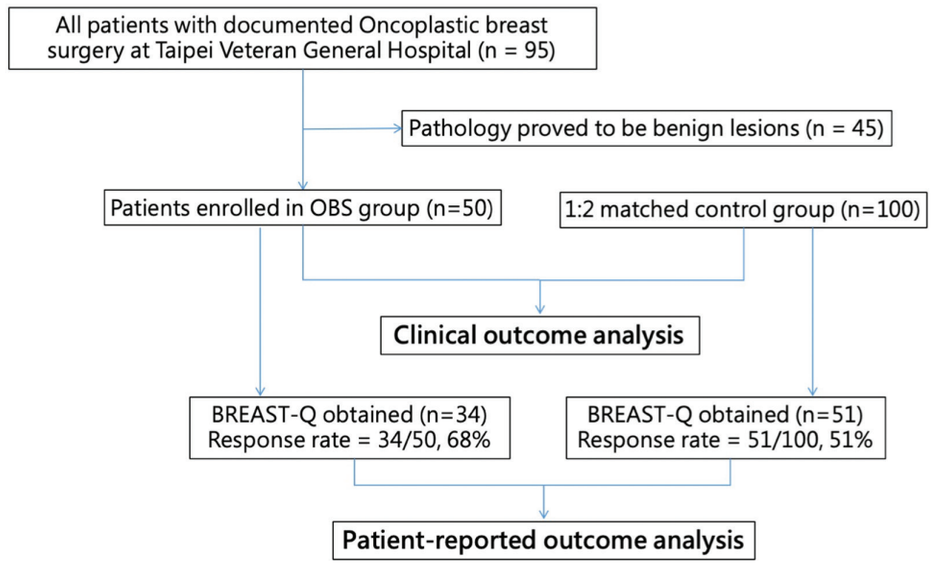


Fig. 1 Study flow diagram. OBS = oncoplastic breast surgery.

Table 1

Demographic data and tumor characteristics

Characteristics	BCS (n = 100)	OBS (n = 50)	*p*
Age	54.98 ± 10.181	56.24 ± 9.518	0.467
BMI	23.96 ± 4.097	23.71 ± 3.702	0.723
Smoking	0 (0)	1 (2.0)	0.333
Hypertension	20 (20.0)	8 (16.0)	0.659
Diabetes mellitus	11 (11.0)	7 (14.0)	0.602
Cardiovascular disease	3 (3.0)	2 (4.0)	1.000
Histological type (invasive)	76 (76.0)	40 (80.0)	0.681
pT stage			0.516
Tis	24 (24.0)	12 (24.0)	
1a	10 (10.0)	5 (10.0)	
1b	18 (18.0)	9 (18.0)	
1c	25 (25.0)	12 (24.0)	
2	23 (23.0)	12 (24.0)	
pN stage			0.516
0	76 (76.0)	42 (84.0)	
1	19 (19.0)	6 (12.0)	
2	5 (5.0)	2 (4.0)	
pTMN stage			0.990
0	24 (24.0)	12 (24.0)	
1A	42 (42.0)	23 (46.0)	
2A	18 (18.0)	8 (16.0)	
2B	11 (11.0)	5 (10.0)	
3A	5 (5.0)	2 (4.0)	

BCS = breast-conserving surgery; BMI = body mass index; OBS = oncoplastic breast surgery; pTMN = primary tumor distant metastasis regional lymph node.

Table 2

Clinical outcomes

	BCS (n = 100)	OBS (n = 50)	*p*
OP complication			0.846
Overall	13 (13.0)	5 (10.0)	0.791
Major	6 (6.0)	2 (4.0)	0.719
Minor	7 (7.0)	3 (6.0)	1.000
Positive resection margin	1 (1.0)	1 (2.0)	1.000
Rewide excision	1 (1.0)	1 (2.0)	1.000
Convert to mastectomy	0 (0)	0 (0)	-
Local recurrence	3 (3.0)	0 (0)	0.551
Mortality	1 (1.0)	0 (0)	1.000
Follow-up time, mo	38.77 ± 14.698	29.60 ± 14.059	<0.001

BCS = breast-conserving surgery; OBS = oncoplastic breast surgery; - = N/A.

= 0.03, 95% CI, 0.000-945488, p = 0.351) and overall survival (HR = 0.03, 95% CI, 0.000-6928291, p = 0.493) were observed between the OBS and BCS groups (Table 2 and Fig. 2). In this cohort, no patient needed mastectomy after the initial surgery or rewide excision. The mean follow-up time was 38.77 ± 14.70 months in the BCS group and 29.59 ± 14.06 months in the OBS group.

The BREAST-Q questionnaire was administered prospectively at 6 months after the patients completed the treatment during regular follow-up at our outpatient department. The response rates in the two groups were 34 patients (68.0%) in the OBS group and 51 patients (51.0%) in the BCS group. Demographic data, tumor characteristics, cancer-related therapy, and complication rates in BREAST-Q responders of both groups were analyzed, where most variables remained compatible between the two groups except for patients' age. BREAST-Q responders in the OBS group were older than those in the BCS group (57.41 ± 9.25 and 51.33 ± 7.99, p = 0.002) in our study (Table 3). Furthermore, the tumor-to-breast ratio was calculated to justify the patient-reported outcome. The breast volume was estimated from the latest mammography before surgery, using the formula of volume estimation = 1/3 × π × r_{cc} × r_{mlo} × h_{mlo} (Fig. 3).[14] The r_{cc} reflected the half width of the breast base in the craniocaudal view of mammography. The r_{mlo} reflected the half width of the breast base, while h_{mlo} reflected the vertical distance between the pectoralis major muscle and nipple in the medial-lateral-oblique view of mammography. The results showed no significant difference in breast volume (607.94 ± 256.47 and 659.55 ± 383.24 cm^3, p = 0.522) and tumor-to-breast ratio (1.06 ± 3.04% and 1.06 ± 1.98%, p = 0.989) in the two groups (Table 3). In BREAST-Q responders of both groups, the adjuvant radiation rate was 100% (51/51) in the BCS group and 91.2%

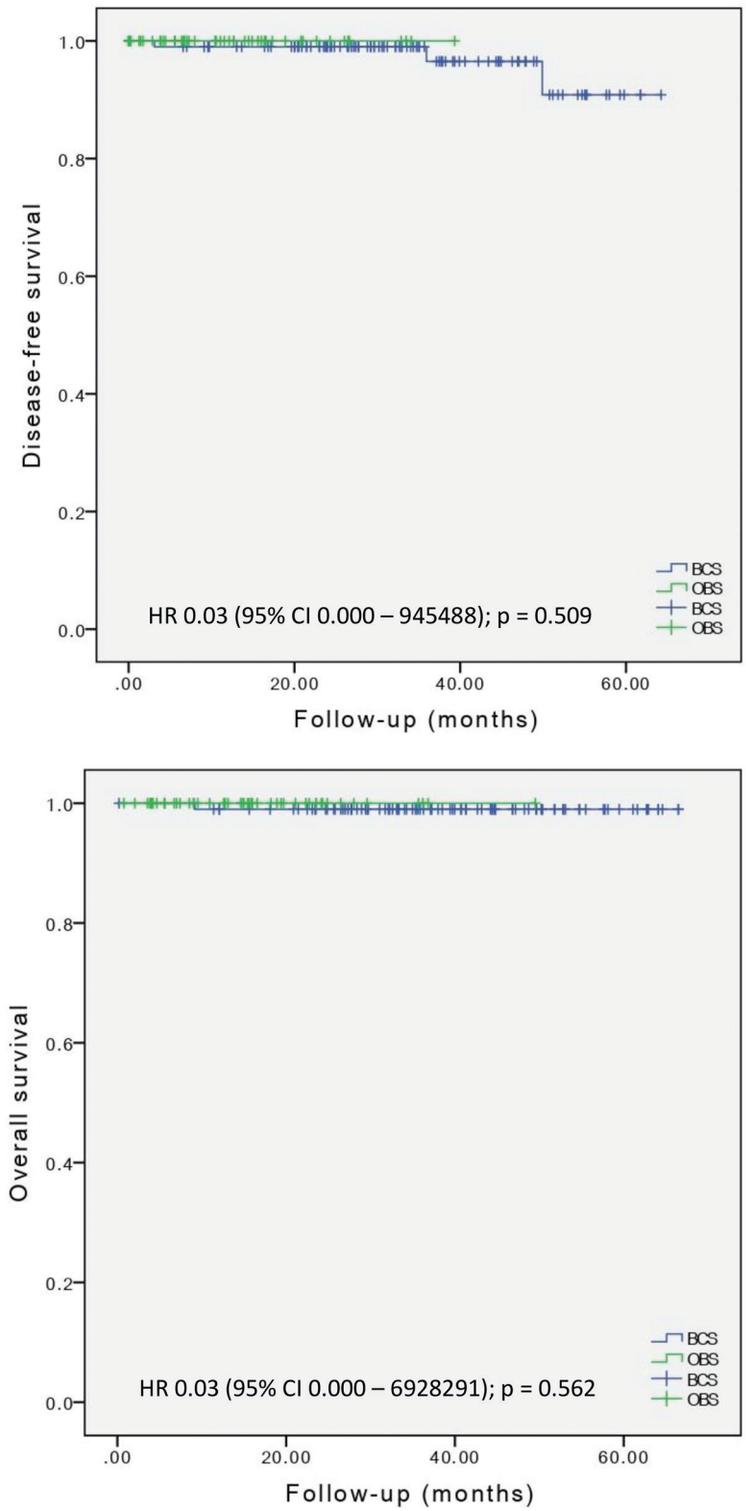


Fig. 2 Disease-free survival/overall survival analysis. BCS = breast-conserving surgery; HR = Hazard ratio; OBS = oncoplastic breast surgery.

(31/34) in the OBS group, respectively (p = 0.061). Among those three patients who didn't receive RT, one patient was low-risk DCIS with old age and the other two patients were low-risk Hormone-receptor-positive early breast cancer with old age. The patient-reported outcome based on BREAST-Q questionnaire (Table 4) was carried out with five domains in satisfaction with breasts (57.65 ± 18.75 and 76.56 ± 17.37, p < 0.001), adverse effects of radiation (78.55 ± 21.21

Table 3

Demographic data and tumor characteristics of BREAST-Q responders

Characteristics	BCS (n = 51)	OBS (n = 34)	*p*
Age	51.33 ± 7.999	57.41 ± 9.245	0.002
BMI	24.18 ± 4.189	24.06 ± 3.325	0.894
Smoking	0 (0)	1 (2.9)	0.400
Hypertension	8 (15.7)	6 (17.6)	1.000
Diabetes mellitus	5 (9.8)	5 (14.7)	0.512
Cardiovascular disease	2 (3.9)	2 (5.9)	1.000
pT stage			0.918
Tis	18 (35.3)	9 (26.5)	
1a	4 (7.8)	3 (8.8)	
1b	7 (13.7)	6 (17.6)	
1c	11 (21.6)	9 (26.5)	
2	11 (21.6)	7 (20.6)	
pN stage			0.364
0	37 (72.5)	29 (85.3)	
1	10 (19.6)	4 (11.8)	
2	4 (7.8)	1 (2.9)	
pTMN stage			0.291
0	18 (35.3)	9 (26.5)	
1A	14 (27.5)	17 (50.0)	
2A	10 (19.6)	4 (11.8)	
2B	5 (9.8)	3 (8.8)	
3A	4 (7.8)	1 (2.9)	
Neo-chemo	5 (9.8)	0 (0)	0.080
Adj-chemo	20 (39.2)	9 (26.5)	0.252
Neo-radiation	0 (0)	0 (0)	-
Adj-radiation	51 (100)	31 (91.2)	0.061
Hormone	46 (90.2)	26 (76.5)	0.124
OP complication			1.000
Major	5 (9.8)	2 (5.9)	
Minor	1 (2.0)	2 (5.9)	
Breast volume, cm^3	607.94 ± 256.47	659.55 ± 383.24	0.522
Tumor-to-breast ratio	1.069% ± 3.04%	1.060% ± 1.98%	0.989

BCS = breast-conserving surgery; OBS = oncoplastic breast surgery; OP = operative; pTMN = primary tumor distant metastasis regional lymph node; - = N/A.

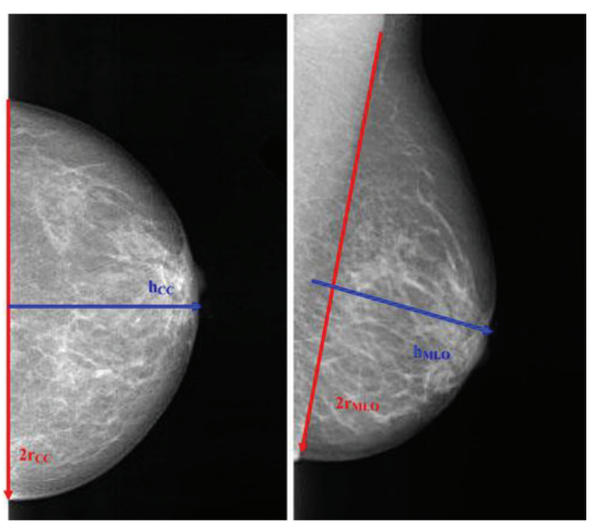


Fig. 3 Measurement on craniocaudal view and medial-lateral-oblique view mammograms. 2rCC = width of breast base in craniocaudal view mammogram; 2rMLO = width of breast base in medial-lateral-oblique view mammogram; hCC = height of breast in craniocaudal view mammogram; hMLO = height of breast in medial-lateral-oblique view mammogram.

and 71.29 ± 17.62, p = 0.103), psychosocial well-being (67.20 ± 19.92 and 68.71 ± 17.06, p = 0.718), physical well-being: chest (74.75 ± 24.76 and 73.62 ± 19.99, p = 0.825), and sexual well-being (58.92 ± 27.41 and 60.53 ± 30.25, p = 0.801). Patients in the OBS group were significantly more satisfied with postoperative breast appearance than those in the conventional BCS group. However, there were no differences in psychosocial, physical, and sexual well-being.

We present two cases in the OBS group. First case is a 43-year-old woman with diagnosis of invasive ductal carcinoma (lesion diameter = 2.3 cm) of the right breast over 9 o'clock, 3 cm from the nipple. She received OBS with VD via round block incision. Postoperation photographs were taken during follow-up (8 months after radiotherapy). Second case (Fig. 4B) is a 51-year-old woman with diagnosis of invasive ductal carcinoma (lesion diameter = 2.3 cm) of the right breast over 3 o'clock, 4 cm from the nipple. She received OBS with VD via round block incision. Postoperation photographs were taken during follow-up (6 months after radiotherapy). No complications were reported in both cases and they were both satisfied with postoperative results.

4. DISCUSSION

During the past decades, OBS has shown robust advances with improved techniques. A recent large systematic review published by Losken et al[15] disclosed similar safety and prognosis to conventional BCS between positive margin rate, completion mastectomy rate, and local recurrence rate. Nevertheless, the complication rate dropped between 10% and 20%, which was higher than that of the usual technique. However, Crown et al[16] suggested that OBS may have lower complication rates (infection and seroma) when performed by breast surgeons instead of general surgeons. The earlier literature review by De La Cruz et al[17] also supports OBS with lower complication rates, margin positive rate, and rates of reexcision or conversion to mastectomy. A possible reason for associating OBS with higher complication rates compared to BCS may be that the surgical technique not only excised the tumor lesion completely with the design for further reassignment, but also added the VD or replacement procedures to achieve the ideal breast appearance.[18] In our study, the positive margin rate was 2% with a surgical complication rate of 10%, which was lower than the reported data. On reviewing the three operative complication cases, two underwent wound debridement due to wound edge dehiscence, while the rest showed suspected wound cellulitis under antibiotic treatment. No conversion to mastectomy, local recurrence, or mortality was found in our oncoplastic group, which agrees with previous studies as a reliable surgery.

Recently, different classifications and algorithms have been advocated for better preoperation planning. Clough et al[9] reported their own classification, which divided OBS into two levels according to the percentage of breast volume resected. In level 1 OBS (resected volume <20%), patients may achieve

Table 4

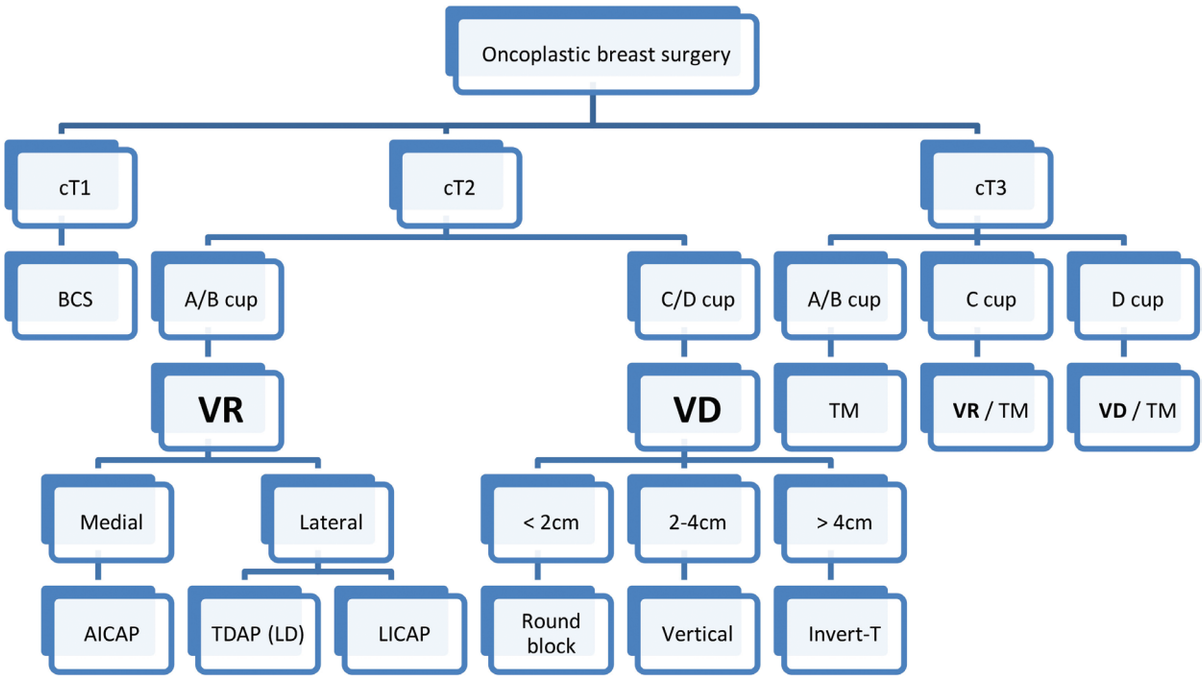
Patient-reported outcomes in BREAST-Q response group

	BCS (n = 51)	OBS (n = 34)	*p*
Satisfaction with breasts	57.65 ± 18.758	76.56 ± 17.373	<0.001
Adverse effects of radiation	78.55 ± 21.212	71.29 ± 17.623	0.103
Psychosocial well-being	67.20 ± 19.924	68.71 ± 17.057	0.718
Physical well-being: chest	74.75 ± 24.755	73.62 ± 19.994	0.825
Sexual well-being	58.92 ± 27.409	60.53 ± 30.250	0.801

BCS = breast-conserving surgery; OBS = oncoplastic breast surgery.

Fig. 4 Case presentations. A, A 43-year-old woman with invasive ductal carcinoma (2.3cm) of the right breast over 9 o'clock, 3 cm from the nipple (above), status-post right level 2 oncoplastic breast surgery, follow-up 8 months after radiotherapy (excellent esthetic outcome postoperatively, below). B, A 51-year-old woman with invasive ductal carcinoma (2.3cm) of the right breast over 3 o'clock, 4 cm from the nipple (above), status-post right level 2 oncoplastic breast surgery, follow-up 6 months after radiotherapy (good esthetic outcome postoperatively, below).

satisfactory outcomes by glandular approximation alone, while level 2 OBS (resected volume between 20% and 50%) needed further VD with reduction mammoplasty technique to reach optimal outcome.[9] Munhoz et al[10], on the other hand, divided patients into different categories based on each patient's bra cup size and distortion degree (mild/moderate/severe) after BCS. In his classification, in patients with relatively small bra cup size (A/B) and moderate distortion or medium bra cup size (C) and severe breast distortion after surgery, VR with local perforator or myocutaneous flap was indicated for local reconstruction, while in patients with larger bra cup size (D) and moderate breast distortion after surgery, VD may achieve better esthetic outcomes. However, the lack of a consistent definition of oncoplastic surgery causes confusion among surgical trainees, practicing surgeons, oncoplastic educators, and patients seeking breast cancer treatment. Therefore, based on the previous classification, we proposed our own algorithm to offer different reconstruction methods to achieve better esthetic outcomes based on the tumor-to-breast ratio. First, we divided patients into groups based on clinical tumor stage (mostly based on sonography findings). Second, we further classified patients into two subgroups based on their bra cup size: A and B cups as small, and C and D cups as large breast volume. If patients had a large tumor size and small bra cup size, VR with a local flap should be considered for reconstruction. In this situation, the key point of surgical design should be the tumor location; for example, the thoracodorsal



VR, volume replacement

TDAP, thoracodorsal artery perforator

MICAP, medial intercostal artery perforator

LICAP, lateral intercostal artery perforator

AICAP, anterior intercostal artery perforator

VD, volume displacement

LTAP, lateral thoracic artery perforator

TM, total mastectomy

Fig. 5 Algorithm for oncoplastic breast surgery based on tumor size, bra cup size, tumor location, and the degree of ptosis.

artery perforator flap (TDAP) or LICAP is suitable for lateral tumor and anterior intercostal artery perforator flap (AICAP) for medial tumors. When patients have a small tumor size and large bra cup size, VD instead of replacement could achieve better esthetic outcomes. In that situation, the key aim of the surgical design is not tumor location but the distance of NAC elevation. When patients need small adjustments (elevation <2 cm), a round block incision should be considered; a vertical incision for intermediate adjustment (elevation = 2-4 cm), and inverted-T incision for large adjustment (NAC elevation >4 cm). Our study is the first to provide a simple algorithm to choose the appropriate oncoplastic technique based on the tumor-to-breast ratio, tumor location, and degree of breast ptosis (Fig. 5).

The BREAST-Q questionnaire was proposed approximately a decade ago with two modifications. Currently, six different modules have been designed for patient-reported outcome evaluations after different breast surgeries. All modules are composed of preoperation and postoperation parts with four to six domains, respectively. Recently, Rose et al[19] claimed that patients with OBS had better outcomes in postoperative psychosocial well-being but similar outcomes in physical well-being and satisfaction with breast. However, Gardfjell et al[20] reported that satisfaction with breasts was better for OBS. In a systemic review by Liu et al[21], patients receiving OBS (based on flap reconstruction) also showed better quality of life and satisfaction. The demographic data and tumor characteristics of the patients may interfere with patient-reported outcomes. In our study, the demographic data and tumor characteristics of both groups were similar during the matching process, and the timing of BREAST-Q questionnaire was also administered similarly at 6 months after the patients completed the RT. Consequently, satisfaction with breasts was significantly better in the OBS group ($p < 0.001$), although no significant differences in physiological, psychosocial, and sexual well-being were found.

Although OBS has been performed for decades, an increasing number of modifications and classifications have been published recently. In our study, we not only compared the clinical outcomes between OBS and conventional BCS, but also proposed an innovative algorithm for surgical planning, which is the most important part of OBS. Moreover, subjective quality of life and satisfaction were assessed using the BREAST-Q questionnaire with a breast-conserving therapy module. This study

was comprehensive in evaluating the outcomes of OBS in Asian populations by means of different analyses.

However, there are still some limitations to this study. First, selection bias might exist in a single institute study. Second, the analysis of objective esthetic outcomes was lacked in this study. The objective esthetic outcome of the ideal breast varied between different observers, and it usually needed two to three observers to review all the preoperative and postoperative images or data to perform the database analysis under different scale assistance (eg, Likert scale, Harvard scale).[22,23] Third, this preliminary study included a relatively small number of patients. Further, it was a retrospective study; although the matched control group might have reduced the effects of selection bias, further prospective studies including oncological outcomes, long-term follow-up, and preoperation questionnaires should be conducted to complete the study with stronger evidence.

In conclusion, based on our study, OBS might show no obvious difference in oncological outcomes compared with BCS, regardless of complication rates, reexcision rate, local recurrence rate, and survival rate. Furthermore, OBS could achieve better satisfaction with postoperative breasts, which may improve the patient's confidence, esthetics, and self-esteem. According to the above findings, OBS seems to be a safe and feasible surgical technique for breast cancer patients with adequate preoperative planning, which could provide better patient satisfaction and esthetic results.

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