

# Cosmetic Outcome and Level of Patient Satisfaction after Oncoplastic Breast Surgery in Breast Cancer Survivors: A Cross-sectional Study from Tertiary Care Centre in Kerala, India

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## ABSTRACT

**Introduction:** Oncoplastic Breast Surgery (OBS) has revolutionised breast cancer treatment by combining oncological surgery with plastic surgery techniques, thereby allowing for both cancer control and aesthetic preservation. Evaluating the cosmetic outcomes and levels of patient satisfaction post-OBS is critical for understanding its impact in the Indian context, where cultural, socio-economic and healthcare factors play important roles in shaping patients' postoperative experiences. Patient satisfaction is influenced by factors such as overall outcomes and specific breast features, including size, shape and symmetry.

**Aim:** To assess the cosmetic outcomes and levels of patient satisfaction after OBS in breast cancer survivors, using the Kyungpook National University Hospital (KNUH) Breast Q rates. The study also compares responses among patient groups who underwent different techniques of OBS and examines the association of these outcomes with various qualitative variables, such as age, co-morbidities, stage of disease and adjuvant treatments, among others.

**Materials and Methods:** This cross-sectional study included 40 breast cancer patients who underwent Breast Conservation Surgery (BCS) with volume displacement and replacement techniques in the Department of Surgical Oncology at Sree Gokulam medical college and Research Foundation, Trivandrum,

Kerala, India. Each patient was given the modified KNUH Breast-Q questionnaire during follow-up visits to the department. Based on their responses, cosmetic outcomes and satisfaction levels were measured using the Breast-Q score. The Chi-square test and Fisher's exact test were utilised to determine the association between categorical variables.

**Results:** In this study, of 40 patients following OBS, 100% of patients reported a positive response of either excellent or good/fair satisfaction. Considering the association of patient responses to various surgical techniques, 100% of patients who underwent reduction mammoplasty, including superomedial and inferomedial pedicle reduction mammoplasty, gave an excellent response. Among the most commonly performed techniques, the round block (n=13) received an excellent response from 61.5% of patients, while 38.5% reported fair/good satisfaction. The p-value was found to be 0.044, indicating a statistically significant association. No significant association was found between satisfaction levels and age or stage of disease (p-value >0.05).

**Conclusion:** The cosmetic outcomes and patient satisfaction, based on breast Q scores, indicated either excellent or good/fair responses in 100% of the study patients who underwent OBS. OBS can be a viable option in breast cancer surgery, achieving patient satisfaction in the Indian population while maintaining oncological safety.

**Keywords:** Breast reconstruction, Indian population, Psychological satisfaction

## INTRODUCTION

The concept of OBS was first introduced in the 1990s by Prof. Warner Audrestch when he described the technique of partial reconstruction of the breast using plastic surgical techniques [1]. By facilitating tumour excision with a broad margin of resection and immediately reconstructing the defect (partial breast reconstruction), Oncoplastic BCS (OBCS), with or without neoadjuvant therapy, preserves a woman's natural breast shape and improves cosmetic results [2]. The management of breast cancer, including breast surgery, has undergone significant change since the origin of the Halstedian concept of total mastectomy [3]. In the recent past, the aesthetics of breast surgery have received more emphasis, as increasing evidence indicates that a poor cosmetic result can translate to significant depression and a worse quality of life [4].

OBS is still contemporary in developing countries. Beyond economic considerations, the difference from the West is due to a shortage of surgeons who are sufficiently skilled in oncoplastic surgeries. As

a result, there is little information available from low- and middle-income countries regarding the effectiveness of OBS in treating breast cancer [5-7].

In India, where breast cancer is the most common malignancy among females [8,9], the adoption of OBS is steadily increasing due to benefits such as oncological safety alongside improvements in aesthetics and quality of life. OBS is practised in many centres in large cities and metropolitan areas in India, but it has yet to attain mainstream status nationwide. Taken together, OBS procedures have revealed the economic feasibility and cost-effectiveness of this novel surgical option in low-resource settings such as India, and they are becoming popular in the centres delivering OBS [6].

Evaluating the cosmetic outcomes and levels of patient satisfaction post-OBS is critical in understanding its impact in the Indian context, where cultural, socio-economic and healthcare factors play an important role in shaping patients' postoperative experience. Patient satisfaction is influenced by factors such as overall outcome and

specific breast features like size, shape and symmetry. Additionally, factors other than the procedure itself, including personal traits, appearance, investment, pain, scars, loss of a nipple and recovery time, may cause dissatisfaction [10,11]. The worst aesthetic outcomes and asymmetry of the breasts have been shown to be linked to decreased quality of life and symptoms of depression and stigmatisation [12,13].

In a study by Mathapati SN et al., 90% of patients achieved overall good to excellent cosmetic outcomes on the Harvard scale after OBS in breast cancer patients [14]. A study by Koppiker C et al., indicates that in India, a country where women often present with large and locally advanced tumours, the safety of therapeutic mammoplasty expands the indications for BCS for patients with macromastia. These techniques not only focus on cancer but also improve self-image and reduce associated physical discomfort, often overlooked by women in the Indian context [15].

Considering that OBS is still evolving in India, there is a lack of substantial evidence regarding the use and application of oncoplastic procedures and their clinical outcomes. Thus, this study aimed to analyse the cosmetic outcomes and levels of patient satisfaction after OBS in breast cancer survivors at a tertiary care centre in Kerala, India. Additionally, it sought to compare the cosmetic outcomes and levels of satisfaction among different patient groups who underwent various techniques of OBS, as well as to explore the association with some qualitative variables. The KNUH Breast Q rates were utilised to study the cosmetic outcomes and levels of patient satisfaction. The KNUH-Breast Q is a modification of the breast-Q developed by Kyungpook National University Hospital [16].

## MATERIALS AND METHODS

This study was a hospital-based cross-sectional study in which breast carcinoma patients who underwent BCS were given a questionnaire once while attending a review at the Department of Surgical Oncology at Sree Gokulam Medical College and Research Foundation in Trivandrum, Kerala, India. Ethical approval was obtained from the hospital's ethical committee for the study (SGMC IEC/52/679/05/2023/F). Each patient received a questionnaire during a three-month period from December 2023 to February 2024 when they presented for review. The total study period lasted six months, from December 2023 to May 2024. Informed written consent was obtained from patients, and the study was conducted in accordance with the Helsinki Declaration.

**Inclusion criteria:** All patients with Early Breast Cancer (EBC) and Locally Advanced Breast Carcinoma (LABC) of any pathological type who underwent OBS and provided consent for the study in this department were enrolled included in the study.

**Exclusion criteria:** Patients with bilateral or metastatic breast carcinoma who were not willing to provide consent were excluded from the study.

**Sample size calculation:** The sample size was calculated using the formula:

$$n = z^2 * P * (1-P) / d^2$$

(z=z score for 95% confidence, d=relative precision, P=proportion of cases with excellent and good performance [17]. Considering excellent, good performance as outcome of interest (P) P≈82% (from reference study [16] 46% for excellent, 36% for good. Hence, P=46+36 or (27/33)% =81.81). Thus, the minimum number of sample size calculated was 38. Accordingly, 57 such patients were approached, of whom 40 were selected, fulfilling the inclusion criteria.

Details related to the patients' age, co-morbidities, mode of technique, hormonal status and adjuvant treatment was collected from hospital medical records to support the analysis. Using the modified Breast-Q questionnaire, responses were measured using a Likert scale [18-20] ranging from 1 to 5, where '5' indicates very satisfied and '1' indicates very unsatisfied. Considering 11 responses from 11 questions of a single questionnaire, the Breast-Q score for

each patient was calculated by taking the mean value  $[(q1+q2+\dots+q11)/11]$ . The scores were then categorised into excellent (>4 and ≤5), good (>3 and ≤4), fair (>2 and ≤3), and poor (≤2) [16]. When presenting the results, the response category 'poor' was recorded as nil. For statistical ease, the responses for 'good' and 'fair' were combined and tabulated.

Cosmetic outcomes and the level of patient satisfaction based on these responses were classified according to different surgical techniques (Batwing, Crescent, Round Block, Reduction Mammoplasty, Perforator Flaps), tumour types {1) DCIS; 2) DCIS+IDC or IDC; 3) IDC+ILC; 4) ILC or ILC+DCIS} (DCIS: Ductal Carcinoma In Situ; IDC: Invasive Ductal Carcinoma; ILC: Invasive Lobular Carcinoma), different American Joint Committee on Cancer (AJCC) stages [21] of breast cancer (stage 0 to IIIC), and different quadrants (Left Inner Quadrant LIQ, Left Outer Quadrant LOQ, Upper Inner Quadrant UIQ, Upper Outer Quadrant UOQ, Retroareolar) before being evaluated and compared. Patients were categorised according to selected clinical variables, and associations among these groups were examined. The classification was based on age (<50 vs. >50 years), co-morbidity status (with vs. without co-morbidities), disease stage (early: stages 0, I, II vs. late: stage III), and whether they received chemotherapy or radiotherapy. To eliminate any bias related to the surgical technique, the entire surgery with reconstruction was performed by the same surgeon.

## STATISTICAL ANALYSIS

Categorical and quantitative variables were expressed as frequency (percentage) and mean±SD, respectively. The Chi-square test and Fisher's exact test were used to determine the association between categorical variables. For all statistical interpretations, p-value <0.05 was considered the threshold for statistical significance. Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 20.0.

## RESULTS

Out of the 40 patients who were enrolled in the study, the mean age was  $53.1 \pm 12$  years, and all were women under various AJCC stages of breast carcinoma. Eighteen patients had various co-morbidities such as diabetes mellitus, hypertension, dyslipidaemia, thyroid diseases, and others [Table/Fig-1]. Regarding hormonal status, 11

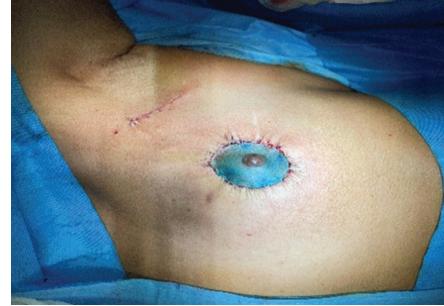
Co-morbidities	n (%)
Nil	22 (55.0)
Diabetes mellitus	5 (12.5)
Hypertension	7 (17.5)
Dyslipidaemia	7 (17.5)
Hypothyroidism	6 (15.0)
Bronchial asthma	4 (10.0)
Allergic bronchitis	1 (2.5)
Anxiety	1 (2.5)
Cholelithiasis	1 (2.5)
COVID	1 (2.5)
Parkinsonism	1 (2.5)
Rheumatic heart disease	1 (2.5)
Hormonal treatment for menorrhagia	1 (2.5)
Thyroid carcinoma	1 (2.5)
<b>Chemotherapy</b>	
No	12 (30)
Neo adj chemo	2 (5)
Adj chemo	26 (65)
<b>Radiotherapy</b>	
Yes	38 (95)
No	2 (5)

**[Table/Fig-1]:** Percentage distribution of the sample according to co-morbidities.

out of the 40 patients (27.5%) were triple negative; the remaining 29 patients included 21 patients (52.5%) who were either Oestrogen Receptor (ER) or Progesterone Receptor (PR) hormone positive with HER2/neu negative status, while eight patients (20%) were HER2/neu positive/rich. The percentage distribution of the sample according to those who underwent radiotherapy and chemotherapy is tabulated in [Table/Fig-1].

Patients underwent different OBS techniques, including Batwing mastopexy (n=5), Crescent mastopexy (n=9), Round block

mammoplasty (n=13), and superomedial or inferomedial pedicle reduction mammoplasty (n=3). Some OBS procedures were performed with adjacent flaps as well (n=10). Various flaps included Lateral Intercostal Artery Perforator (LICAP), LICAP+Lateral Thoracic Artery Perforator (LTAP) and Modified LICAP with V-Y advancement flaps [Table/Fig-2]. The majority of tumours were located in the Upper Inner Quadrant (n=19, UIQ) (47.5%) and Upper Outer Quadrant (n=12, UOQ) (30%). Tumours in the Lower Outer Quadrant (LOQ), retroareolar region, and Lower Inner Quadrant (LIQ)

	Preoperative	Intra/postoperative	
Crescent mastopexy			
Batwing mastopexy			
Oncoplastic techniques LICAP			
Round block mammoplasty			
Reduction mammoplasty			

[Table/Fig-2]: Oncoplastic techniques.

LICAP: Lateral intercostal artery perforator

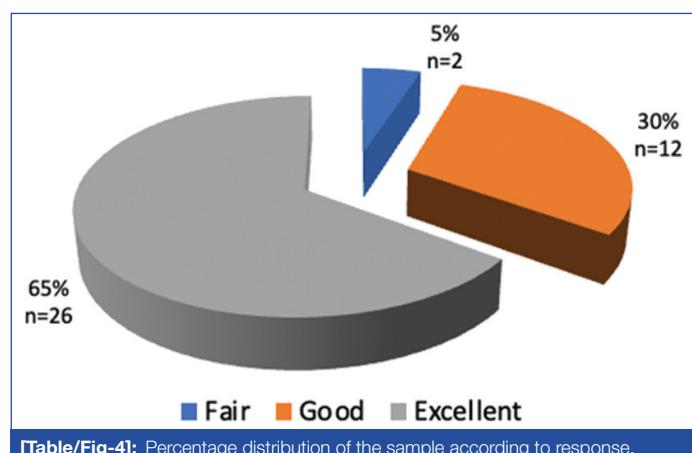
were less common. The predominant tumour type was IDC or IDC with DCIS (n=30, 75%), while ILC or its variants accounted for 12.5%. IDC with ILC made up 10%, and pure DCIS was rare (2.5%). Half of the patients (50%) presented with Stage IIA disease [Table/Fig-3].

		n (%)
Oncoplastic technique	Batwing	5 (12.5)
	Crescent	9 (22.5)
	Round block	13 (32.5)
	Reduction mammoplasty	3 (7.5)
	Perforator flap	10 (25.0)
Quadrant	LIQ	2 (5.0)
	UIQ	19 (47.5)
	LOQ	4 (10.0)
	UOQ	12 (30.0)
	Retroareolar	3 (7.5)
Tumour type	DCIS	1 (2.5)
	IDC or IDC+DCIS	30 (75.0)
	IDC+ILC	4 (10.0)
	ILC or ILC+DCIS	5 (12.5)
Stage	0	1 (2.5)
	I A	11 (27.5)
	II A	20 (50.0)
	II B	5 (12.5)
	III A	2 (5.0)
	III C	1 (2.5)

**[Table/Fig-3]:** Percentage distribution of the sample according to oncoplastic technique, quadrant, tumour type, and stage.

DCIS: Ductal carcinoma in situ; IDC: Invasive ductal carcinoma; ILC: Invasive lobular carcinoma; LIQ: Lower inner quadrant; UIQ: Upper inner quadrant; LOQ: Lower outer quadrant; UOQ: Upper outer quadrant

Twenty-six patients (65%) rated the cosmetic outcome as excellent, 12 (30%) rated it as good, and only 2 (5%) rated it as fair [Table/Fig-4]. The comparison of the patients' responses regarding cosmetic outcome and level of satisfaction according to tumour type, stage and quadrant is shown in [Table/Fig-5]. A significant association was observed between the oncoplastic technique and cosmetic outcome and satisfaction level (p-value=0.044) [Table/Fig-6]. However, there was no significant association between cosmetic outcome and satisfaction with age at diagnosis, stage of disease, chemotherapy, and adjuvant radiotherapy (p-value >0.05) [Table/Fig-7].



**[Table/Fig-4]:** Percentage distribution of the sample according to response.

## DISCUSSION

The OBS is based on the fundamental principle that the breast is not only a functional organ but also an aesthetic one. OBS results from incorporating the principles and practices of conventional breast oncosurgery with those of plastic surgery. An oncoplastic procedure aims to minimise cosmetic detriment to the breast by

		Fair/Good	Excellent
		n (%)	n (%)
Tumour type	DCIS	0	1 (100.0)
	IDC or IDC+DCIS	13 (43.3)	17 (56.7)
	IDC+ILC	0	4 (100.0)
	ILC or ILC+DCIS	1 (20.0)	4 (80.0)
Stage	0	0	1 (100.0)
	I A	3 (27.3)	8 (72.7)
	II A	8 (40.0)	12 (60.0)
	II B	1 (20.0)	4 (80.0)
	III A	1 (50.0)	1 (50.0)
	III C	1 (100.0)	0
Quadrant	LIQ	1 (50.0)	1 (50.0)
	UIQ	5 (26.3)	14 (73.7)
	LOQ	2 (50.0)	2 (50.0)
	UOQ	6 (50.0)	6 (50.0)
	Retroareolar	0	3 (100.0)

**[Table/Fig-5]:** Distribution and comparison of cosmetic outcome and level of patient satisfaction with selected variables of breast cancer patients who underwent oncoplastic breast surgery.

\*\*DCIS: Ductal carcinoma in situ; IDC: Invasive ductal carcinoma; ILC: Invasive lobular carcinoma; LIQ: Lower inner quadrant; UIQ: Upper inner quadrant; LOQ: Lower outer quadrant; UOQ: Upper outer quadrant

Oncoplastic technique	Fair/Good	Excellent	$\chi^2$	p-value
	n (%)	n (%)		
Batwing	1 (20.0)	4 (80.0)		
Crescent	1 (11.1)	8 (88.9)		
Round block	5 (38.5)	8 (61.5)	9.82*	0.044
Reduction mammoplasty	0	3 (100.0)		
Perforator flap	7 (70.0)	3 (30.0)		

**[Table/Fig-6]:** Association of cosmetic outcome and level of patient satisfaction with the oncoplastic technique of breast cancer patients who underwent Oncoplastic Breast Surgery (OBS).

\*: Significant at 0.05 level

	Fair/Good	Excellent	$\chi^2$	p-value
	n (%)	n (%)		
Age at diagnosis (years)	4 (22.2)	14 (77.8)	2.35	0.125
	10 (45.5)	12 (54.5)		
Co-morbidities	5 (27.8)	13 (72.2)	0.75	0.386
	9 (40.9)	13 (59.1)		
Stage of disease	12 (32.4)	25 (67.6)	1.43	0.232
	2 (66.7)	1 (33.3)		
Chemotherapy	4 (33.3)	8 (66.7)	1.23	0.541
	0	2 (100.0)		
	10 (38.5)	16 (61.5)		
Adjuvant radiotherapy	14 (36.8)	24 (63.2)	--	0.417*
	0	2 (100.0)		

**[Table/Fig-7]:** Association of cosmetic outcome and level of patient satisfaction with selected variables of breast cancer patients who underwent Oncoplastic Breast Surgery (OBS).

\*Fisher's exact test

eliminating surgical cavities that would otherwise create distortion; hence, the terms "parenchymal redistribution" or "parenchymal replacement" have been used [22]. Breast cosmesis took priority in the necessary endpoints while maintaining oncological safety as a prerequisite. Quality of life has gained a new meaning in breast oncological surgery, with patient-reported outcomes serving as the qualitative measure of success [23].

In this study, all the patients (100%) were cosmetically satisfied with OBS, with responses classified as excellent (65%), good (30%), or fair (5%). None provided a poor response. This aligns with previous

studies, one of which reported by Johansen J et al., indicated that 73% of patients rated their outcomes as excellent or good, while Taylor ME et al., found that 87% reported excellent or good outcomes [24,25]. Similar findings were reported in an Indian study by Shanmugham S et al., where responses depicted a high level of satisfaction, with 36% and 60% categorising themselves as highly satisfied and extremely satisfied, respectively [26]. These findings are also consistent with a study by Kim JB et al., which examined Thoracodorsal Artery Perforator (TDAP)-based partial breast reconstruction after BCS in Korean women; in this study, 46% (n=16) and 36% (n=12) of the 33 subjects rated their satisfaction as excellent and good, respectively [16].

There was no significant association between the age of the patients and the level of patient satisfaction. However, younger patients ( $\leq 50$  years) exhibited a higher proportion of excellent responses (77.8%) compared to good/fair responses (22.2%). In contrast, patients over 50 years reported excellent and fair/good results with minimal variation (54.5% and 45.5%, respectively). This finding suggests that the older age group emphasises oncological safety and may not prioritise body image or its impact on their sexual life, although the p-value was not significant for this observation. A study by Cetintas SK et al., indicated that age over 50 years may be a risk factor for poor aesthetic outcomes as evaluated by the panellists of that study, whereas the patients themselves remained satisfied [27].

Considering the association of patients' responses to various surgical techniques, 100% of patients who underwent reduction mammoplasty, such as superomedial or inferomedial pedicle reduction mammoplasty, reported an excellent outcome. Among the most frequently performed techniques, the round block procedure (n=13) received an excellent response from 61.5% of patients, while 38.5% reported fair or good outcomes. The p-value found was 0.044, indicating that the association was statistically significant. Among those who underwent flap reconstruction, the majority reported fair or good responses, with only a small percentage achieving excellent outcomes. Pain from the donor site and scar-related issues were reported by fewer flap-reconstructed patients (n=10) than by those who did not undergo flap surgery.

In the association of patients' responses to various surgical techniques, all patients who underwent reduction mammoplasty, including superomedial and inferomedial pedicle reduction mammoplasty, provided excellent feedback. However, according to the study by Aristokleous I et al., no association was found between the extent of dissection and postoperative satisfaction [28]. This discrepancy may be due to heterogeneity in the methodologies of oncoplastic breast surgical techniques or the inclusion of confounding factors such as axillary dissection.

When comparing the responses of patients across different AJCC stages, those in more advanced stages (stage IIIA and IIIC) showed that only one out of three patients gave an excellent response. In contrast, when comparing the responses between early stages (stage 0-II) and stage III, we observe a sharply divergent outcome: 67.6% of patients in the early stages received excellent responses, while only 33.3% did so in stage III. The advanced stage patients had larger lesions and the tumour-to-breast ratio was higher compared to those with lower stage tumours, leading to larger surgical defects and consequently more extensive mobilisation of flaps or adjacent tissue. This has adversely affected patient satisfaction levels and cosmetic outcomes. Dahlbäck C et al., showed no influence of tumour size on outcomes [29].

Considering adjuvant radiation therapy for 38 patients, 63.2% (n=24) reported excellent responses, while 36.8% (n=14) reported fair or good outcomes. Only two patients did not receive adjuvant radiation (one had DCIS, and the other was of advanced age with multiple co-morbidities, including Parkinsonism). Both of these patients reported excellent outcomes and satisfaction. Irrespective of therapy, patients' responses were categorised as excellent or

fair/good, with no negative impact noted, consistent with findings from another study [26].

Although, in the general population, most patients have upper outer quadrant lesions, this study noted a greater number of upper inner quadrant lesions. This discrepancy may be attributed to referral bias, as this was a tertiary care hospital where the majority of complex cases have been referred from peripheral centres.

## Limitation(s)

Long-term effects were not studied post-treatment, and a much larger sample size is required to analyse the association among different tumour types and quadrants. The significance could not be assessed here due to the lack of adequate samples in the various types and quadrants.

## CONCLUSION(S)

The OBS in breast cancer patients succeeded in maintaining excellent, good and fair cosmetic outcomes and confidence, taking into account satisfaction among the Indian female population while prioritising oncological safety. More research is needed in this field, incorporating a larger sample size and a postoperative follow-up study.

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