

Early Physical Quality of Life Following Breast-Conserving Surgery Versus Modified Radical Mastectomy in Early and Large Operable Breast Cancer: A Prospective Comparative Study

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Abstract: Background: Breast-conserving surgery (BCS) has emerged as the preferred surgical approach for appropriately selected women with early breast cancer because it provides oncological outcomes comparable to modified radical mastectomy (MRM) while preserving the breast. Although long-term oncological equivalence has been well established, evidence regarding early postoperative physical quality of life in Indian women remains limited. This study compared early postoperative physical quality of life, perioperative outcomes, postoperative morbidity, and patient-reported satisfaction following BCS and MRM in women with early and large operable breast carcinoma. Methods: A prospective comparative observational study was conducted in the Department of General Surgery, Ganesh Shankar Vidyarthi Memorial Medical College and Lala Lajpat Rai Hospital, Kanpur, India, between October 2024 and October 2025, with follow-up completed in January 2026. A total of 140 women with early and large operable breast carcinoma underwent either breast-conserving surgery (n = 70) or modified radical mastectomy (n = 70) according to standard oncological indications. Physical quality of life was assessed using the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30) and the EORTC Breast Cancer Module (QLQ-BR42) at one and three months after surgery. Secondary outcomes included postoperative pain, duration of hospital stay, postoperative complications, cosmetic satisfaction, and confidence in performing daily activities. Between-group comparisons were performed using appropriate parametric or non-parametric statistical tests according to data distribution, and multivariable linear regression was used to identify independent predictors of functional recovery. Results: The two groups were comparable with respect to baseline age (47.91 ± 9.71 vs. 47.96 ± 10.45 years; $p = 0.947$). Compared with MRM, patients undergoing BCS had a significantly shorter hospital stay (3.46 ± 1.05 vs. 6.99 ± 3.87 days; $p < 0.001$) and lower postoperative pain scores (3.39 ± 1.07 vs. 6.57 ± 1.11 ; $p < 0.001$). Functional quality-of-life scores were significantly higher after BCS at both one month (78.00 ± 7.57 vs. 59.11 ± 9.93 ; $p < 0.001$) and three months (86.11 ± 8.20 vs. 70.04 ± 8.43 ; $p < 0.001$), while symptom scores were significantly lower at both follow-up assessments (all $p < 0.001$). Cosmetic satisfaction was significantly greater following BCS (100% vs. 61.4%; $p < 0.001$). Both groups demonstrated significant improvements in functional recovery and symptom burden between one and three months; however, BCS remained an independent predictor of superior functional recovery in multivariable analysis. No significant between-group differences were observed in global quality-of-life scores. Conclusions: Breast-conserving surgery was associated with superior early functional recovery, lower postoperative symptom burden, reduced postoperative pain, shorter hospitalization, and greater cosmetic satisfaction compared with modified radical mastectomy. Although overall global quality-of-life scores were comparable during the early postoperative period, breast-conserving surgery independently predicted improved functional recovery after adjustment for relevant clinical variables. These findings support the integration of patient-reported quality-of-life outcomes into surgical decision-making for women with early and large operable breast cancer. Further multicenter studies with longer follow-up are warranted to evaluate long-term functional and oncological outcomes.

Keywords: Breast-conserving surgery; Modified radical mastectomy; Breast cancer; Quality of life; EORTC QLQ-C30; EORTC QLQ-BR42; Patient-reported outcome measures; Prospective comparative study.

1. Introduction

Breast cancer is the most frequently diagnosed malignancy among women worldwide and remains the leading cause of cancer-related mortality in females. According to the Global Cancer Observatory (GLOBOCAN) 2022 estimates, approximately 2.3 million new cases of breast cancer were diagnosed globally, accounting for nearly one in four cancers

among women. Despite substantial advances in screening, multidisciplinary treatment, and systemic therapies, breast cancer continues to impose a considerable physical, psychological, and socioeconomic burden on patients and healthcare systems.^{1,2} In India, the incidence of breast cancer has risen steadily over the past two decades, with an increasing proportion of women presenting at a younger age compared with Western populations. Improvements in awareness, imaging, pathology, and multimodal treatment

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have resulted in better survival, shifting the focus of breast cancer management beyond disease control toward optimization of postoperative quality of life.^{3,4}

Surgical management remains the cornerstone of treatment for early and large operable breast cancer. Historically, **modified radical mastectomy (MRM)** was considered the standard operative procedure because it provided excellent local disease control while allowing comprehensive axillary staging. However, landmark randomized controlled trials conducted by **Fisher and colleagues** and **Veronesi and colleagues** demonstrated equivalent long-term overall survival and local disease control between **breast-conserving surgery (BCS) followed by adjuvant radiotherapy** and mastectomy in appropriately selected patients.^{5,6} These findings transformed the surgical management of breast cancer and established BCS as the preferred treatment for eligible patients whenever oncologically feasible. Contemporary recommendations from the **National Comprehensive Cancer Network (NCCN)**, the **European Society for Medical Oncology (ESMO)**, and the **Society of Surgical Oncology (SSO)** support breast conservation whenever adequate surgical margins can be achieved with acceptable cosmetic outcomes.⁷⁻⁹

Although survival outcomes after BCS and MRM are comparable, the two procedures differ substantially in their impact on postoperative recovery, body image, physical functioning, psychosocial well-being, and overall quality of life. Increasing emphasis on patient-centered care has highlighted the importance of **patient-reported outcome measures (PROMs)**^{10,11,16} in evaluating the success of breast cancer treatment. The **European Organisation for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire-Core 30 (QLQ-C30)** and the **EORTC Breast Cancer Module (QLQ-BR42)** are internationally validated instruments that comprehensively assess functional status, symptom burden, and breast cancer-specific quality-of-life domains.^{10,11} These instruments provide standardized measures that complement conventional oncological endpoints and facilitate comparisons across different treatment strategies.

Several studies have reported superior cosmetic outcomes and improved body image following BCS, whereas others have demonstrated lower postoperative pain, earlier return to normal activities, and higher patient satisfaction compared with mastectomy.¹²⁻¹⁵ Nevertheless, published evidence remains heterogeneous because of variations in study design, patient selection, follow-up duration, cultural factors, and the quality-of-life instruments used. Furthermore, most available data originate from Western populations, and relatively few prospective studies have evaluated early postoperative quality of life among Indian women undergoing contemporary breast cancer surgery. Differences in sociocultural perceptions, healthcare access, family support, and expectations regarding breast preservation may influence postoperative recovery and patient satisfaction, highlighting the need for region-specific evidence.

In addition to quality of life, perioperative outcomes such as postoperative pain, duration of hospital stay, surgical complications, and cosmetic satisfaction are important

determinants of patient recovery and healthcare utilization. Understanding these outcomes is essential for shared decision-making between surgeons and patients, particularly when both breast conservation and mastectomy are oncologically appropriate options. High-quality prospective comparative data can assist clinicians in counselling patients regarding the expected functional recovery and patient-reported outcomes associated with each surgical approach.

The present prospective comparative study was undertaken to evaluate **early physical quality of life** following **breast-conserving surgery** and **modified radical mastectomy** in women with early and large operable breast carcinoma treated at a tertiary care teaching hospital in northern India. We hypothesized that breast-conserving surgery would be associated with superior early functional recovery, lower postoperative symptom burden, improved cosmetic satisfaction, and shorter hospitalization without compromising early postoperative outcomes. By incorporating validated patient-reported outcome measures together with perioperative and postoperative clinical variables, this study aims to provide contemporary evidence to support individualized surgical decision-making in breast cancer care.

2. Materials and Methods

Study Design and Setting

This prospective comparative observational study was conducted in the Department of General Surgery, Ganesh Shankar Vidyarthi Memorial (GSVM) Medical College and Lala Lajpat Rai Hospital, Kanpur, Uttar Pradesh, India. Patients were prospectively enrolled between **October 2024 and October 2025**, and postoperative follow-up was completed in **January 2026**. The study was designed to compare early postoperative physical quality of life, perioperative outcomes, postoperative complications, and patient-reported satisfaction among women undergoing **breast-conserving surgery (BCS)** or **modified radical mastectomy (MRM)** for early-stage and large operable breast cancer.

The study was conducted in accordance with the ethical principles outlined in the **Declaration of Helsinki**¹⁸ and is reported in accordance with the **Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)**¹⁷ guidelines for observational studies.

Ethical Approval

The study protocol was reviewed and approved by the **Institutional Ethics Committee, GSVM Medical College, Kanpur** (Approval No. **EC/400/Sept./2024**). Written informed consent was obtained from all participants before enrolment. Patient confidentiality was maintained throughout the study by anonymizing all identifiable information before statistical analysis.¹⁸

Study Population

Women with **histopathologically confirmed early-stage and large operable breast carcinoma** presenting to the Department of General Surgery during the study period were consecutively screened for eligibility. Patients fulfilling the

predefined inclusion criteria were prospectively enrolled after providing written informed consent.

A total of **140 patients** were included in the final analysis. Of these, **70 patients underwent breast-conserving surgery (BCS)** and **70 underwent modified radical mastectomy (MRM)**. The choice of surgical procedure was determined by tumour characteristics, breast-to-tumour ratio, anticipated cosmetic outcome, patient preference, and multidisciplinary team recommendations in accordance with contemporary oncological guidelines.⁷⁻⁹

Eligibility Criteria

Inclusion Criteria

Patients fulfilling all of the following criteria were included:

- Female patients aged **18 years or older**.
- Histopathologically confirmed invasive breast carcinoma.
- Clinical stage **T1–T3, N0–N1, M0** according to the **American Joint Committee on Cancer (AJCC) 8th Edition TNM staging system**.¹⁹
- Early-stage or large operable breast cancer considered suitable for definitive surgical management.
- Planned treatment with either breast-conserving surgery or modified radical mastectomy.
- Ability to understand and complete quality-of-life questionnaires.
- Provision of written informed consent.

Exclusion Criteria

Patients were excluded if they had:

- Metastatic (Stage IV) breast cancer.
- Locally advanced unresectable breast cancer.
- Recurrent breast carcinoma.
- Previous ipsilateral breast surgery or breast irradiation.
- Bilateral breast malignancy.
- Severe psychiatric or cognitive illness interfering with questionnaire completion.
- Incomplete follow-up during the study period.
- Refusal to participate.

Surgical Procedures

The choice between breast-conserving surgery and modified radical mastectomy was individualized following multidisciplinary discussion, considering tumour size, tumour location, breast volume, oncological safety, expected cosmetic outcome, and patient preference.

Breast-Conserving Surgery

Breast-conserving surgery consisted of wide local excision with the objective of achieving histologically negative surgical margins while preserving breast contour. Sentinel lymph node biopsy or axillary lymph node dissection was performed according to clinical nodal status and institutional protocols. Surgical margins were considered adequate according to the **Society of Surgical Oncology–American Society for Radiation Oncology (SSO–ASTRO) consensus guideline**, and all patients subsequently received adjuvant whole-breast radiotherapy as indicated.⁹

Modified Radical Mastectomy

Modified radical mastectomy consisted of complete removal of the breast tissue with preservation of the pectoralis major

and pectoralis minor muscles, together with Level I and Level II axillary lymph node dissection. Closed suction drainage was routinely employed following mastectomy and managed according to standardized institutional postoperative protocols. Perioperative antibiotic prophylaxis, postoperative analgesia, drain management, wound care, and postoperative follow-up protocols were standardized across both treatment groups to minimize treatment-related variability.

Outcome Measures

Primary Outcome

The primary outcome was **early postoperative physical quality of life**, assessed at **1 month** and **3 months** following surgery using the following validated patient-reported outcome measures:

- European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30)¹⁰
- European Organisation for Research and Treatment of Cancer Breast Cancer Module (EORTC QLQ-BR42)¹¹

Secondary Outcomes

Secondary outcome measures included:

- Duration of hospital stay
- Postoperative pain assessed using the **Visual Analogue Scale (VAS)**
- Surgical site infection
- Seroma formation
- Hematoma
- Readmission
- Early recurrence
- Cosmetic satisfaction
- Confidence in performing routine daily activities
- Patient preference regarding surgical treatment

Quality-of-Life Assessment

Quality of life was evaluated using validated EORTC questionnaires administered by trained investigators during scheduled outpatient follow-up visits.

The **EORTC QLQ-C30** evaluates global health status, functional domains (physical, role, emotional, cognitive, and social functioning), and symptom burden. The **EORTC QLQ-BR42** is a breast cancer-specific module assessing body image, breast symptoms, arm symptoms, treatment-related adverse effects, endocrine therapy symptoms, sexual well-being, and future perspective.^{10,11}

Raw questionnaire responses were transformed into standardized scores ranging from **0 to 100** according to the **EORTC QLQ-C30 Scoring Manual**. Higher functional scores indicate better functioning, whereas higher symptom scores represent greater symptom burden.²²

Follow-up

Patients were prospectively followed at **1 month** and **3 months** after surgery. During each follow-up visit, the following parameters were recorded:

- EORTC QLQ-C30 and QLQ-BR42 scores
- Visual Analogue Scale pain score
- Wound status
- Seroma formation

- Surgical site infection
- Readmission
- Cosmetic satisfaction
- Confidence in daily activities
- Evidence of disease recurrence

Statistical Analysis

Data were entered into **Microsoft Excel 2021 (Microsoft Corporation, Redmond, WA, USA)** and analyzed using **IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA)**.

Continuous variables were assessed for completeness, outliers, and normality using the **Shapiro–Wilk test**. Normally distributed variables are presented as **mean ± standard deviation (SD)**, whereas non-normally distributed variables are expressed as **median (interquartile range [IQR])**. Between-group comparisons were performed using the **independent-samples Student's *t*-test** or the **Mann–Whitney *U* test**, as appropriate.

Categorical variables are presented as frequencies and percentages and were compared using the **Chi-square test** or **Fisher's exact test**, where appropriate.

Changes in quality-of-life scores between **1 month** and **3 months** within each surgical group were analyzed using the **paired Student's *t*-test** or the **Wilcoxon signed-rank test**, depending on data distribution.

Effect sizes for continuous outcomes were calculated using **Cohen's *d*** and interpreted as **small (0.2), moderate (0.5), or large (≥ 0.8)**. Mean differences are reported with **95% confidence intervals (95% CI)** wherever appropriate.

To identify independent predictors of postoperative functional recovery at three months, **multivariable linear regression analysis** was performed. Variables demonstrating clinical relevance or a univariable **p-value <0.10** were entered into the final model using the enter method. Regression assumptions, including linearity, homoscedasticity, normality of residuals, independence of observations, and multicollinearity, were assessed before model construction.

All statistical tests were **two-tailed**, and a **p-value <0.05** was considered statistically significant.

3. Results

Patient Characteristics

During the study period, **140 women** with early-stage and large operable breast cancer fulfilling the eligibility criteria were prospectively enrolled. Of these, **70 patients underwent breast-conserving surgery (BCS)** and **70 underwent modified radical mastectomy (MRM)**. All enrolled patients completed the scheduled postoperative follow-up at **1 month** and **3 months**, and no patient was excluded from the final analysis (Figure 1).

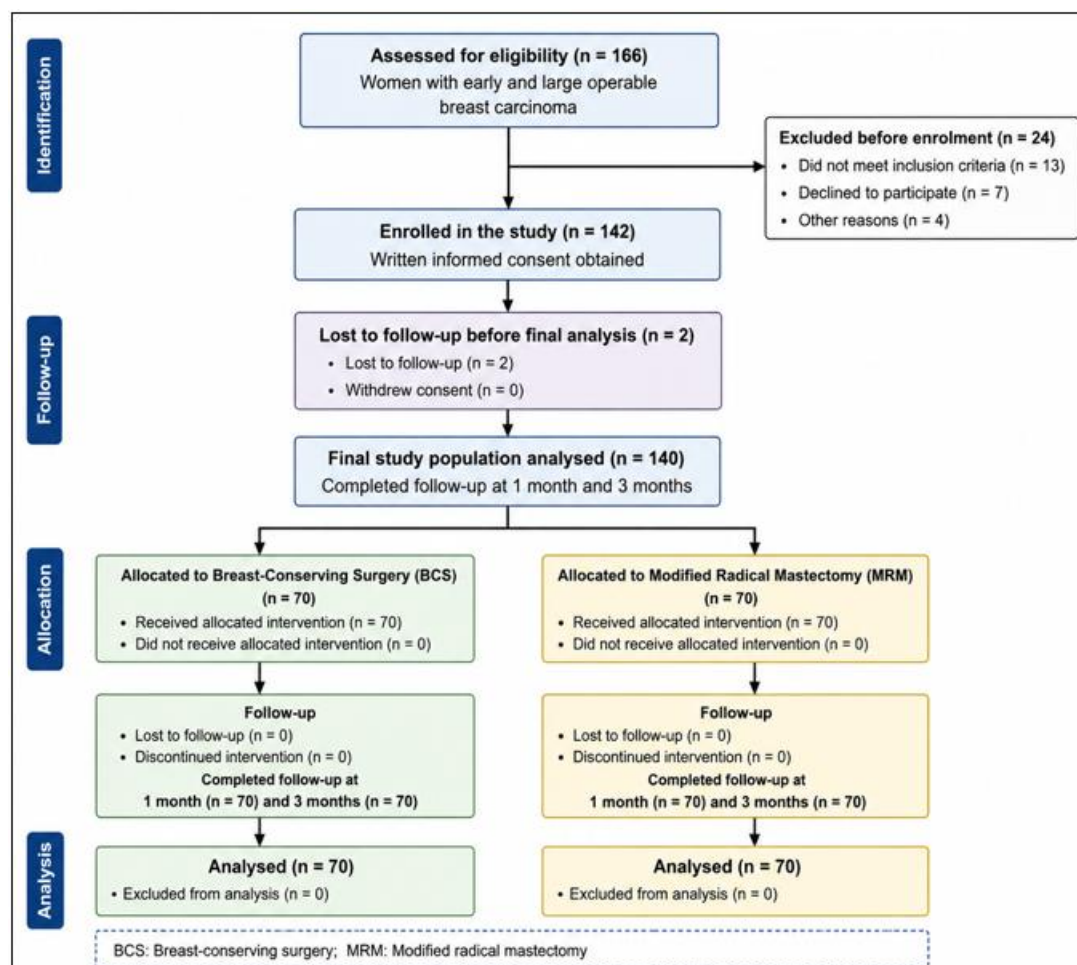


Figure 1: STROBE Flow Diagram of the Study

The baseline demographic characteristics of the two groups were comparable. The mean age of patients undergoing BCS was 47.91 ± 9.71 years, while that of patients undergoing

MRM was 47.96 ± 10.45 years, with no statistically significant difference between the groups ($p = 0.947$). (Table 1).

Table 1: Baseline Demographic and Clinicopathological Characteristics of the Study Population

Characteristic	Overall (n=140)	BCS (n=70)	MRM (n=70)	P value
Age (years), mean $\pm$ SD	47.93 $\pm$ 10.06	47.91 $\pm$ 9.71	47.96 $\pm$ 10.45	0.98
Age group, n (%)				0.826
30–39	39 (27.9)	20 (28.6)	19 (27.1)	
40–49	48 (34.3)	22 (31.4)	26 (37.1)	
≥ 50	53 (37.9)	28 (40.0)	25 (35.7)	
Clinical T stage, n (%)				0.452
T1	32 (22.9)	19 (27.1)	13 (18.6)	
T2	55 (39.3)	29 (41.4)	26 (37.1)	
T3	53 (37.9)	22 (31.4)	31 (44.3)	
Clinical N stage, n (%)				0.059
N0	21 (15.0)	15 (21.4)	6 (8.6)	
N1	119 (85.0)	55 (78.6)	64 (91.4)	
AJCC Anatomical Stage, n (%)				0.003
Stage II	18 (12.9)	15 (21.4)	3 (4.3)	
Stage III	122 (87.1)	55 (78.6)	67 (95.7)	

Values are presented as **mean $\pm$ standard deviation or number (percentage)**. Abbreviations: **BCS** – Breast-conserving surgery, **MRM** – Modified radical mastectomy

Perioperative Outcomes

Patients undergoing breast-conserving surgery demonstrated significantly better early perioperative outcomes than those undergoing modified radical mastectomy (Table 2).

The mean duration of postoperative hospital stay was significantly shorter in the BCS group (3.46 ± 1.05 days) compared with the MRM group (6.99 ± 3.87 days, $p < 0.001$). The corresponding effect size was large (Cohen's $d = 1.25$).

Similarly, postoperative pain scores assessed using the Visual Analogue Scale were significantly lower following BCS (3.39 ± 1.07) than after MRM (6.57 ± 1.11 , $p < 0.001$), with a Cohen's $d = 2.92$.

Routine postoperative drain placement was required in all patients undergoing MRM, whereas only a minority of patients undergoing BCS required drainage.

Table 2: Perioperative Outcomes

Variable	BCS (n = 70)	MRM (n = 70)	P value
Hospital stay (days), mean $\pm$ SD	3.46 $\pm$ 1.05	6.99 $\pm$ 3.87	<0.001
Pain score (VAS), mean $\pm$ SD	3.39 $\pm$ 1.07	6.57 $\pm$ 1.11	<0.001
Drain used, n (%)	24 (34.3)	70 (100.0)	<0.001

Early Postoperative Quality of Life

One-Month Assessment

At 1 month, patients who underwent breast-conserving surgery demonstrated significantly superior functional recovery compared with those treated with modified radical mastectomy (Table 3).

The mean functional score was significantly higher in the BCS group (78.00 ± 7.57) than in the MRM group (59.11 ± 9.93 ; $p < 0.001$). Likewise, postoperative symptom burden

was significantly lower following BCS, with mean symptom scores of 25.10 ± 6.37 compared with 44.33 ± 9.85 in the MRM group ($p < 0.001$).

No statistically significant difference was observed in the global quality-of-life score between the two surgical groups at one month (61.97 ± 26.37 vs. 59.06 ± 23.37 ; $p = 0.490$).

Table 3: Early Postoperative Quality of Life at 1 Month

Outcome	BCS (Mean $\pm$ SD)	MRM (Mean $\pm$ SD)	P value
Functional score	78.00 $\pm$ 7.57	59.11 $\pm$ 9.93	<0.001
Symptom score	25.10 $\pm$ 6.37	44.33 $\pm$ 9.85	<0.001
Global score	61.97 $\pm$ 26.37	59.06 $\pm$ 23.37	0.49

Three-Month Assessment

At 3 months, the superiority of breast-conserving surgery in functional recovery persisted (Table 4).

The mean functional score increased to 86.11 ± 8.20 in the BCS group compared with 70.04 ± 8.43 in the MRM group ($p < 0.001$). Symptom scores remained significantly lower following BCS (15.53 ± 6.76) than after MRM (34.04 ± 9.32 , $p < 0.001$).

Although the global quality-of-life score remained numerically higher in the MRM group, the difference between the two groups did not reach statistical significance (53.83 ± 28.39 vs. 60.69 ± 25.33 , $p = 0.134$).

Table 4: Early Postoperative Quality of Life at 3 Months

Outcome	BCS (Mean $\pm$ SD)	MRM (Mean $\pm$ SD)	P value
Functional score	86.11 $\pm$ 8.20	70.04 $\pm$ 8.43	<0.001
Symptom score	15.53 $\pm$ 6.76	34.04 $\pm$ 9.32	<0.001
Global score	53.83 $\pm$ 28.39	60.69 $\pm$ 25.33	0.134

Changes in Quality of Life During Follow-up

Within-group analysis demonstrated significant improvement in postoperative recovery between the first and third postoperative months (Table 5).

Among patients undergoing breast-conserving surgery, functional scores increased significantly from 78.00 ± 7.57 to 86.11 ± 8.20 ($p < 0.001$), while symptom scores improved significantly from 25.10 ± 6.37 to 15.53 ± 6.76 ($p < 0.001$). However, no statistically significant change was observed in global quality-of-life scores ($p = 0.095$).

Similarly, patients undergoing modified radical mastectomy demonstrated significant improvement in functional recovery (59.11 ± 9.93 to 70.04 ± 8.43 , $p < 0.001$) together with a significant reduction in symptom burden (44.33 ± 9.85 to 34.04 ± 9.32 , $p < 0.001$). Global quality-of-life scores remained unchanged during follow-up ($p = 0.560$).

Table 5: Within-Group Changes in Quality of Life

Group	Outcome	1 Month (Mean $\pm$ SD)	3 Months (Mean $\pm$ SD)	P value
BCS	Functional score	78.00 ± 7.57	86.11 ± 8.20	<0.001
	Symptom score	25.10 ± 6.37	15.53 ± 6.76	<0.001
	Global score	61.97 ± 26.37	53.83 ± 28.39	0.095
MRM	Functional score	59.11 ± 9.93	70.04 ± 8.43	<0.001
	Symptom score	44.33 ± 9.85	34.04 ± 9.32	<0.001
	Global score	59.06 ± 23.37	60.69 ± 25.33	0.56

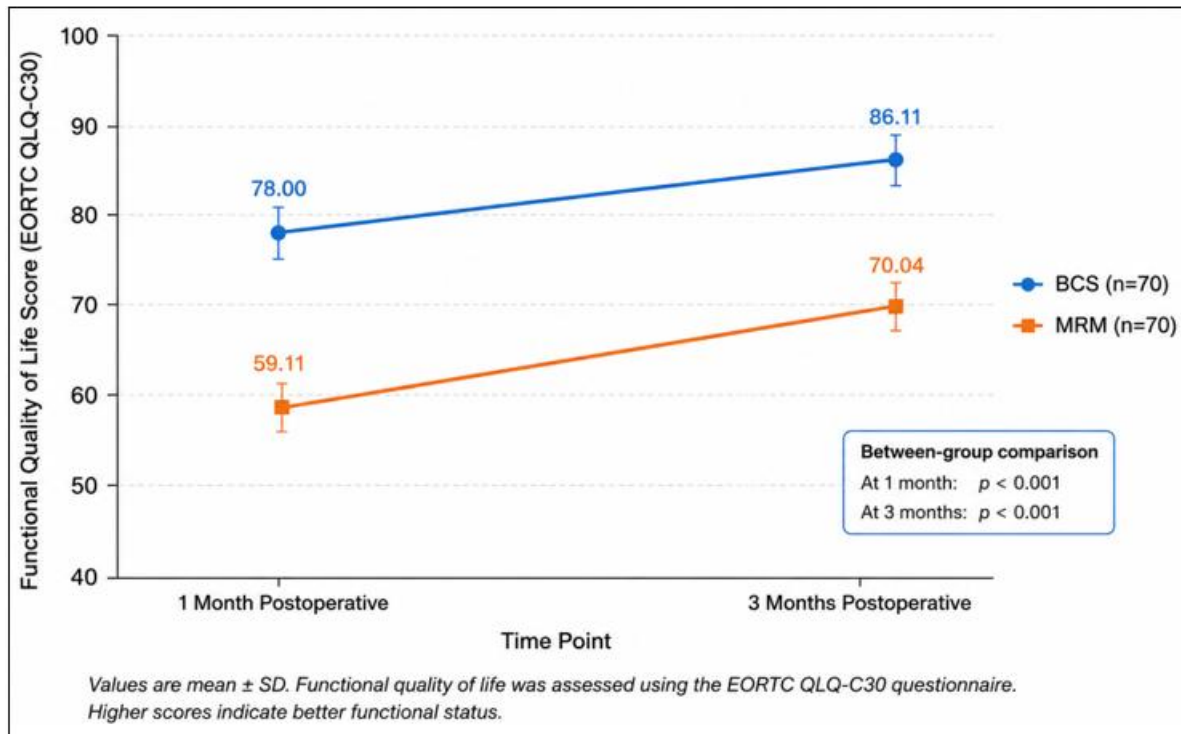


Figure 2: Change in Functional Quality of Life Score Over Time

Postoperative Complications

Postoperative complications are summarized in Table 6.

Seroma formation occurred in 16 patients (22.9%) undergoing breast-conserving surgery and 25 patients (35.7%) undergoing modified radical mastectomy. Although the incidence was lower following BCS, the difference did not achieve statistical significance ($p = 0.137$).

Four patients (5.7%) in the MRM group required hospital readmission, whereas none of the patients undergoing BCS required readmission ($p = 0.120$).

Only one patient developed disease recurrence during the study period, precluding meaningful comparative analysis.

Table 6: Postoperative Complications

Variable	BCS (n = 70)	MRM (n = 70)	P value
Seroma, n (%)	16 (22.9)	25 (35.7)	0.137
Readmission, n (%)	0 (0.0)	4 (5.7)	0.12
Recurrence, n (%)	0	1 (1.4)	—

Patient-Reported Outcomes

Patient-reported outcomes are presented in Table 7.

Cosmetic satisfaction was significantly greater among patients undergoing breast-conserving surgery. All patients in the BCS group (100%) reported satisfaction with the cosmetic outcome compared with 61.4% of patients in the MRM group ($p < 0.001$).

Confidence in performing routine daily activities was high in both groups, with no statistically significant difference between BCS (98.6%) and MRM (94.3%, $p = 0.366$).

Table 7: Patient-Reported Outcomes

Variable	BCS (n = 70)	MRM (n = 70)	P value
Cosmetic satisfaction, n (%)	70 (100)	43 (61.4)	<0.001
Confident in daily activities, n (%)	69 (98.6)	66 (94.3)	0.366

Multivariable Analysis

A multivariable linear regression model was constructed to identify independent predictors of functional recovery at 3 months (Table 8).

After adjustment for age, postoperative pain score, and duration of hospital stay, **breast-conserving surgery remained an independent predictor of superior postoperative functional recovery ($\beta = 9.17$, 95% CI 4.17–14.18; $p < 0.001$).**

Higher postoperative pain scores were independently associated with poorer functional recovery ($\beta = -1.92$, 95% CI -3.20 to -0.65 ; $p = 0.003$). Age and duration of hospital stay were not independent predictors in the final model.

The final regression model demonstrated good explanatory performance (**adjusted $R^2 = 0.509$, overall model $p < 0.001$**).

Table 8: Multivariable Linear Regression Analysis
Identifying Independent Predictors of Functional Recovery
at Three Months

Variable	β Coefficient	Standardized β	95% CI	P value
Breast-conserving surgery	9.17	0.49	4.17–14.18	<0.001
Postoperative pain score	-1.92	-0.28	-3.20 to -0.65	0.003
Hospital stay	-0.61	-0.09	-1.49 to 0.28	0.179
Age	-0.04	-0.03	-0.18 to 0.11	0.618

Adjusted $R^2 = 0.509$; Overall model $p < 0.001$, Dependent variable: **Functional QoL score at 3 months**, Variables entered: Surgery, Age, Pain score, Hospital stay

4. Discussion

The present prospective comparative study evaluated early postoperative physical quality of life, perioperative outcomes, postoperative morbidity, and patient-reported satisfaction among women undergoing breast-conserving surgery (BCS) or modified radical mastectomy (MRM) for early-stage and large operable breast cancer. The principal findings of this study demonstrate that patients undergoing BCS experienced significantly shorter hospital stays, lower postoperative pain, superior functional recovery, lower symptom burden, and **significantly higher cosmetic satisfaction** than those undergoing MRM. Although both groups showed progressive improvement in quality-of-life measures during follow-up, breast-conserving surgery remained independently associated with superior early functional recovery. Interestingly, no significant difference was observed in global quality-of-life scores between the two surgical groups during the early postoperative period.

The evolution of breast cancer surgery over the past four decades has shifted the emphasis from radical extirpative procedures toward oncologically safe breast preservation whenever feasible. Landmark randomized trials conducted by Fisher et al. and Veronesi et al. established that breast-conserving surgery followed by radiotherapy provides long-term survival and local control equivalent to mastectomy for appropriately selected patients.^{5,6} Consequently, contemporary international guidelines recommend breast conservation as the preferred surgical option whenever negative surgical margins can be achieved without compromising oncological safety.⁷⁻⁹ While these trials primarily focused on survival and recurrence, modern breast cancer management increasingly recognizes patient-reported

outcomes as equally important determinants of treatment success.¹⁶

One of the most important observations in the present study was the significantly better functional recovery among patients undergoing BCS at both one and three months after surgery. These findings are consistent with previous reports demonstrating earlier restoration of physical function following breast preservation. Hopwood et al. observed superior physical functioning and body image among women treated with breast-conserving surgery compared with mastectomy, particularly during the early postoperative period.¹³ Similarly, Arndt et al. reported that patients treated with breast-conserving surgery experienced better long-term physical functioning and social reintegration than women undergoing mastectomy.¹⁴ The improved functional outcomes observed in our study are likely attributable to reduced surgical trauma, preservation of the breast envelope, less extensive tissue dissection, and decreased impairment of shoulder mobility following breast conservation.

Symptom burden was also significantly lower among patients undergoing BCS at both postoperative assessments. Patients undergoing modified radical mastectomy experienced higher postoperative pain scores, more postoperative discomfort, and a greater incidence of seroma formation, all of which may contribute to delayed functional recovery. Previous studies have similarly demonstrated lower postoperative pain and faster rehabilitation following breast-conserving surgery.^{12,20,21} The significantly shorter duration of hospitalization observed in our study further supports these findings and reflects the less invasive nature of breast-conserving surgery. Reduced hospital stay has important implications not only for patient recovery but also for healthcare resource utilization and cost-effectiveness.

An important finding of the present study was the significantly higher cosmetic satisfaction among patients undergoing breast-conserving surgery. Preservation of the native breast has consistently been associated with improved body image, self-esteem, and psychosocial well-being. Al-Ghazal et al. demonstrated significantly greater patient satisfaction and psychological adjustment among women undergoing breast-conserving surgery compared with mastectomy.¹⁵ Similar observations have been reported in systematic reviews evaluating patient-reported outcomes following breast cancer surgery.²² Cosmetic satisfaction is increasingly recognized as an important component of survivorship because it influences self-confidence, social interactions, and overall treatment satisfaction.

Interestingly, despite significant differences in functional and symptom scores, the global quality-of-life score did not differ significantly between the two groups. This finding should not be interpreted as contradictory. Global quality of life reflects multiple physical, emotional, social, and psychological domains that extend beyond surgical recovery alone. Patients undergoing mastectomy may adapt psychologically during the early postoperative period despite experiencing greater physical impairment, whereas women undergoing breast-conserving surgery may continue to experience anxiety related to adjuvant radiotherapy, fear of recurrence, or ongoing treatment. Consequently, improvements in physical

functioning do not necessarily translate into measurable differences in overall global quality of life during short-term follow-up. Similar observations have been reported in previous prospective studies evaluating postoperative quality of life after breast cancer surgery.^{13,14}

A notable strength of the present study is the demonstration that breast-conserving surgery remained an independent predictor of improved functional recovery after multivariable adjustment. This suggests that the observed benefits are not solely explained by differences in postoperative pain or duration of hospitalization. However, interpretation of these findings should consider the baseline clinicopathological differences between the groups. Patients undergoing modified radical mastectomy had a significantly higher proportion of Stage III disease, reflecting routine clinical decision-making in which more advanced tumors are more likely to require mastectomy. Although this may have contributed to differences in postoperative recovery, multivariable analysis was undertaken to reduce potential confounding. Nevertheless, residual confounding inherent to non-randomized observational studies cannot be completely excluded.

The strengths of the present study include its prospective design, balanced sample size, standardized perioperative management, complete follow-up, and use of validated patient-reported outcome measures, including the EORTC QLQ-C30 and EORTC QLQ-BR42 questionnaires.^{10,11} In addition to quality-of-life assessment, the study incorporated clinically relevant perioperative outcomes, postoperative complications, and patient satisfaction measures, providing a comprehensive evaluation of early recovery following breast cancer surgery.

Several limitations should also be acknowledged. First, this was a single-center observational study, which may limit the generalizability of the findings. Second, allocation to breast-conserving surgery or modified radical mastectomy was based on clinical indications rather than randomization, introducing the possibility of selection bias. Third, the higher proportion of Stage III disease in the MRM group may have influenced postoperative recovery despite statistical adjustment. Finally, the follow-up period was limited to three months and therefore does not permit evaluation of long-term quality of life, local recurrence, disease-free survival, or overall survival.

Despite these limitations, the present study provides important prospective evidence from an Indian tertiary care center demonstrating that breast-conserving surgery offers clinically meaningful advantages in early postoperative recovery. The observed improvements in functional status, symptom burden, cosmetic satisfaction, and duration of hospitalization reinforce the value of breast conservation whenever oncologically appropriate. Incorporation of patient-reported outcome measures into routine surgical decision-making may facilitate more individualized treatment planning and improve patient-centered breast cancer care.

5. Conclusion

Breast-conserving surgery was associated with superior early postoperative functional recovery, lower symptom burden, reduced postoperative pain, shorter hospitalization, and greater cosmetic satisfaction compared with modified radical mastectomy in women with early-stage and large operable breast cancer. Although overall global quality-of-life scores were comparable between the two surgical groups during the early postoperative period, patients undergoing breast-conserving surgery experienced clinically meaningful advantages in physical recovery and patient-reported outcomes. These findings reinforce the importance of considering quality-of-life measures alongside traditional oncological outcomes when selecting the optimal surgical approach. While modified radical mastectomy remains an essential treatment option for patients in whom breast conservation is not oncologically feasible, breast-conserving surgery should be offered whenever appropriate, with shared decision-making incorporating tumour characteristics, patient preference, and anticipated functional outcomes. Further multicentre studies with longer follow-up are warranted to evaluate the durability of these benefits and their impact on long-term survivorship, oncological safety, and health-related quality of life.

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