Comparative study between breast conservative surgery and modified radical mastectomy in early stage of breast carcinoma in a tertiary care hospital

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Abstract

Aim: This study aimed to compare breast-conserving surgery (BCS) and modified radical mastectomy (MRM) in patients with early-stage breast carcinoma.

Background: Breast cancer is a significant global health concern, being the most common cancer among women, with approximately two million new cases and over 500,000 deaths reported annually. Surgical intervention is a cornerstone of breast cancer treatment, with breast-conserving surgery (BCS) and modified radical mastectomy (MRM) being the two main surgical options. This study aimed to compare the outcomes of BCS and MRM in patients with early-stage breast cancer.

Material & Method: A prospective observational study was conducted involving 74 patients, with a minimum follow-up period of 18 months. The study took place in the Department of Surgery at VIMSAR, BURLA between July 2018 and July 2021. Participants were divided into two groups: Group A (n=37) underwent BCS, and Group B (n=37) underwent MRM for early-stage breast cancer.

Results: The mean age of patients was 47.65 years in the BCS group and 48.19 years in the MRM group. The average operative time for BCS was 1.04±0.25 hours, while it was 3.20±0.48 hours for MRM. The MRM group experienced a statistically significant higher volume of postoperative drainage compared to the BCS group ($p<0.001$). The BCS group demonstrated a significantly higher rate of excellent aesthetic outcomes ($p<0.0001$) and reported a better quality of life than the MRM group.

Conclusions: Both BCS and MRM are oncologically sound treatment options for early-stage breast cancer when implemented with a multidisciplinary approach. BCS is associated with less trauma, fewer infections, shorter hospital stays, improved aesthetic outcomes, and a better quality of life compared to MRM. These findings suggest that BCS should be more widely promoted as a preferred clinical approach for treating early-stage breast cancer.

Key Words: Breast cancer, Breast-conserving surgery, Modified radical mastectomy (MRM)

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Introduction: Breast cancer remains the most common cancer among women worldwide, accounting for two million new diagnoses and over half a million deaths annually [1]. Early-stage breast cancer, defined as disease that has not spread beyond the breast tissue or local lymph nodes, is often treated surgically. The two primary surgical options for early-stage disease are breast-conserving surgery (BCS) and modified radical mastectomy (MRM).[2,3] These procedures differ in complication rates, hospital stay duration, recovery time, patient-reported symptoms, body image, and overall quality of life. While MRM, initially proposed in 1894, was historically the standard surgical treatment, MRM has evolved to minimize morbidity without sacrificing survival rates.[4-9] BCS has emerged as a recognized alternative to mastectomy for early-stage breast cancer following studies in the 1980s demonstrating equivalent survival outcomes between the two approaches.[10,11] However, some studies suggest similar survival outcomes between MRM and BCS, while others favour BCS, raising questions about the reasons for these potential differences.[12-15] Factors such as socioeconomic status, associated with multimorbidity, later stage at presentation, and lower rates of adjuvant chemotherapy, can influence survival outcomes.[16-22] Furthermore, research from high-income countries (HICs) indicates that BCS is associated with better body image-related quality of life compared to MRM, likely due to the more extensive nature of mastectomy and its potential negative impact on QOL.[23,24]

Material & Methods – This study aimed to compare breast-conserving surgery (BCS) and modified radical mastectomy (MRM) in patients with early-stage breast carcinoma. This prospective observational study was conducted at the Surgery departments of VIMSAR, BURLA. The study included patients aged 20-70 years with early-stage breast cancer who were eligible for surgery. Patients with metastatic or locally advanced breast cancer, prior chest wall irradiation, breast skin involvement, recurrent breast cancer, or pregnancy were excluded. Patients who declined participation were also excluded. Data was collected from July 2018 through July 2021, with a minimum follow-up period of 18 months. A total of 74 patients were enrolled and divided into two groups: Group A (n=37), underwent BCS, and Group B (n=37), underwent MRM. The selection criteria for BCS included small tumor size, favorable breast-to-tumor ratio, unifocal tumors, and no contraindications to radiation therapy. Patients selected for MRM typically presented with small breasts relative to tumor size, multifocal tumors, centrally located tumors, lymph node involvement, or expressed a preference for MRM. Diagnosis was established through a triple assessment approach: a comprehensive medical history, a thorough clinical breast examination, and appropriate imaging modalities. Patients over 35 years of age underwent mammography, while those under 35 underwent ultrasonography. Fine needle aspiration cytology (FNAC) was performed on patients with inconclusive mammogram or ultrasound findings to confirm the diagnosis. Magnetic resonance imaging (MRI) was utilized in cases of lobular carcinoma and when mammography results were unclear. Staging was performed using CT scans and distant metastasis was ruled out by PET-CT scans. Pre-operative baseline investigations, including complete blood count, random blood sugar, serum creatinine, chest X-ray, ECG, and blood typing (including Rh factor), were conducted for all patients. Post-operative adjuvant therapy, consisting of endocrine therapy, chemotherapy, and conformal radiotherapy, was administered to eligible patients based on the St. Gallen Breast Cancer Consensus

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guidelines. Premenopausal patients with oestrogen receptor (ER) and progesterone receptor (PR) positive tumors received tamoxifen twice daily for five years. Postmenopausal patients with ER and PR positive tumors received letrozole 2.5 mg once daily for five years. Patients with human epidermal growth factor receptor-2 (HER2) positive tumors received herceptin (initial dose of 8 mg/kg intravenously over 90 minutes, followed by 6 mg/kg weekly for 12 months). Neoadjuvant chemotherapy was administered using standard regimens as clinically indicated. Breast conformal radiation was administered one-month post-surgery at a dose of 45-50 Gy to the whole breast, with a 10 Gy boost to the tumor bed. Post-operative follow-up was conducted via a multidisciplinary approach every six months for 18 months in an outpatient department (OPD) setting. Follow-up evaluations included breast examination, clinical examination, ultrasonography, and tumor marker assessment. Quality of life (QoL) was assessed using a standardized questionnaire at one and two years post-operatively, focusing on social functioning, body image, and sexual function. Aesthetic outcomes were evaluated one-year post-surgery using Harris's 4-staged subjective evaluation method. Statistical analysis was performed using SPSS version 20.0 (SPSS Inc., Chicago, Illinois, USA). The Shapiro-Wilk test was used to assess the normality of continuous variables. Continuous variables are presented as mean ± standard deviation. Categorical variables are presented as numbers and percentages. Independent sample t-tests were used to compare continuous variables between the two groups. Categorical variables were analyzed using the Pearson Chi-square test. A p-value of <0.05 was considered statistically significant

Results- Demographic and Clinical Characteristics: The average age of patients in the breast-conserving surgery (BCS) group was 47.65 ± 11.25 years, while the modified radical mastectomy (MRM) group had an average age of 48.19 ± 11.96 years. The mean tumor size in the BCS group was 1.21 ± 0.78 cm, compared to 2.22 ± 0.93 cm in the MRM group. No statistically significant differences were found between the two groups regarding age, menopausal status, time of onset, or tumor size ($p = 0.842$, 0.871, 0.632, and 0.431, respectively). In the BCS group, the upper outer quadrant (UOQ) was the most common location of the lesion (23 patients), while 21 patients in the MRM group had lesions in the UOQ. The difference in lesion site between the groups was not statistically significant ($p = 0.816$) (Table 1).

Table 1: Demographic and clinical characteristic of the study patients.

VARIABLE	BCS GROUP	MRM GROUP	P VALUE
AGE(YRS) MEAN+/-SD	47+/-11.25	48.19+/-11.96	0.842
MENOPAUSE	14(37.8%)	17(45.9%)	0.871
ONSET TIME(MONTH)	10.13+/-4.12	11.32+/-4.41	0.632
TUMOUR SIZE(CM)	1.21+/-0.78	2.22+/-0.93	0.431
LESION SITE			
UOQ	23	21	
LOQ	4	3	0.816
UIQ	8	6	
LIQ	4	5	

Immunohistochemistry and Disease Stage: Oestrogen receptor positivity (ER+) was observed in 20 patients in the BCS group and 22 patients in the MRM group. Progesterone receptor positivity (PR+) was present in 20 cases in the BCS group and

22 cases in the MRM group. HER2 positivity (HER2+) was found in 2 cases in the BCS group and 3 cases in the MRM group. Immunohistochemical marker expression did not differ significantly between the two groups. The majority of patients in both groups had stage T2N0 tumors (12 in the BCS group and 13 in the MRM group). Stage T1N2 tumors were found in 11 cases in the BCS group and 14 in the MRM group. No significant difference was observed in disease stage between the groups (p = 0.730) (Table 2).

Table 2: Immunohistochemistry & Disease stage of the study groups.

IMMUNOHISTOCHEMISTRY & DISEASE STAGE	BCS GROUP	MRM GROUP	P VALUE
ER(+)	20	22	0.67
PR(+)	20	22	0.98
HER-2(+)	2	3	0.730
T1N0	7	6	
T2N0	12	13	
T1N1	7	4	O.730
T1N2	11	14	
TOTAL	37	37	

Histopathological Types: Infiltrating ductal carcinoma was the most common histopathological type in both groups, with 32 cases in the BCS group and 31 cases in the MRM group.
Intraoperative and Post-operative Findings: The average operative time was significantly shorter in the BCS group (1.04 ± 0.25 hours) compared to the MRM group (3.20 ± 0.48 hours) (p < 0.001). Postoperative drainage volume was also significantly lower in the BCS group (82.08 ± 29.20 ml) compared to the MRM group (200.08 ± 49.20 ml) (p < 0.001). Similarly, postoperative hospital stay was significantly shorter for patients undergoing BCS compared to MRM (p < 0.001) (Table 3).

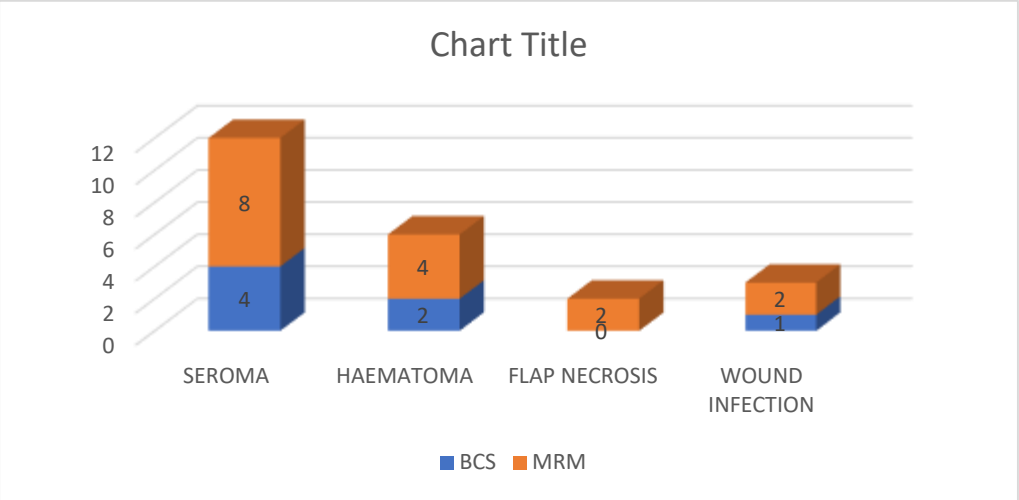
Table 3: Intraoperative and post-operative finding of the study group.

VARIABLES	SURGERY	MEAN+/-SD
OPERATIVE TIME (HRS)	**BCS**	**1.04+/-0.25**
	MRM	**3.02+/-0.48**
DRAINAGE VOLUME(ML)	**BCS**	**82.08+/-29.2**
	MRM	**200.08+/-49.2**
HOSPITAL STAY(DAYS)	**BCS**	**9+/-1.39**
	MRM	**13+/-2.72**

Postoperative Complications: Immediate postoperative wound complications assessed included seroma formation, hematoma, flap necrosis, and wound infections. Seroma formation occurred in 12 patients (8 in the MRM group and 4 in the BCS group). Hematoma affected 2 patients in the BCS group and 4 in the MRM group. Flap necrosis was observed in 2 patients in the MRM group but not in the BCS group. Wound infection occurred in 1patient in the BCS group and 2 patients in the MRM

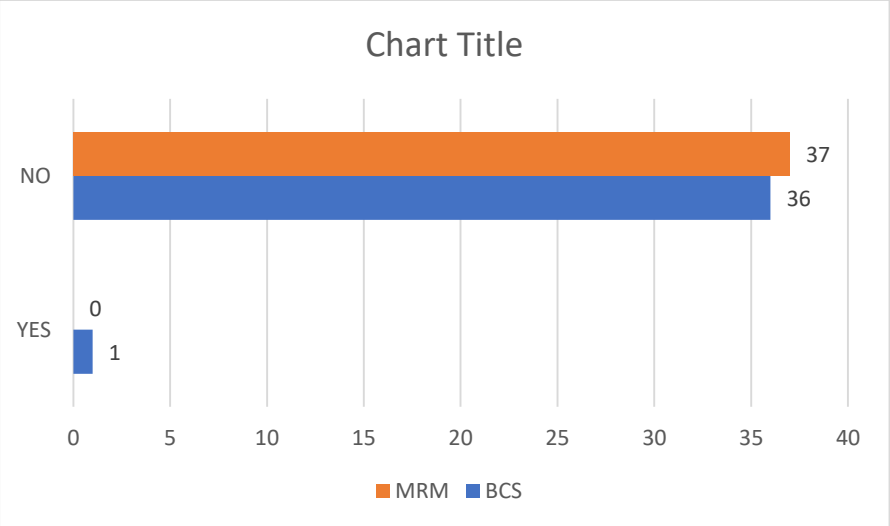
group. The overall difference in postoperative complications between the groups was not statistically significant (p = 0.747) (GRAPH 1).

GRAPH 1: Short term postoperative complications results.



Recurrence Rate Analysis: Patients were routinely monitored postoperatively for up to 18 months. Local recurrence occurred in only one patient in the BCS group, 18 months after the initial surgery. No recurrences were observed in the MRM group. The difference in recurrence rates between the two groups was not statistically significant (p = 0.512) (GRAPH 2).

GRAPH 2: Recurrence rate of the study groups.



Aesthetic outcome comparison: Regarding aesthetic outcomes, the excellent and good rates in the BCS Group were much higher than those in the MRM Group (91.90% vs. 0.0%, p<0.0001) .
Post-operative quality of life assessment :At one- and two-year post-operative follow

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up, the status of social functioning, Body image and Sexual function were much better and favourable in BCS group than MRM group (p value<0.001, <0.0001 and <0.05 respectively) .Comparison of postoperative QoL at one and two years postoperatively, social functioning: Compared with the MRM group, p<0.001, Body image: Compared with the MRM group, p<0.0001; Sexual functioning: Compared with the MRM group, p<0.05.

Discussion: Breast cancer remains the most common cancer among women and, despite advancements, continues to be a significant cause of cancer-related deaths in females. While progress has been made in surgery, diagnosis, and screening, further improvements are crucial.[25] Landmark trials have established that breast-conserving surgery (BCS) and modified radical mastectomy (MRM) offer comparable survival rates in early-stage breast cancer, making them equivalent therapeutic options. Recent advancements in surgical approaches to breast cancer have prioritized patient recovery, oncological safety, and optimal cosmetic outcomes.[26] This study aimed to compare the effectiveness of MRM and BCS in managing early-stage breast cancer by dividing the study population into two groups. The mean ages of the patients undergoing BCS (47.65 years) and MRM (48.19 years) were not statistically different in our study. These ages were notably younger than the average age of 53 reported in the Mansell et al.[27] investigation and even more so compared to studies like Tenofsky et al., which reported a mean age of 60.9 years. Similarly, Gennaro et al. reported an average patient age of 53.3 years in their 2011 study of mastopexy patients [28,29]. Our study demonstrated statistically significant differences between the two groups in surgical time, hospital stay, postoperative drainage volume, postoperative complications, and cosmetic success as perceived by both patients and surgeons. These findings are consistent with other studies. Specifically, the average operative time for MRM in our study was 3.20 hours, compared to 1.04 hours for BCS. Lambert and Mokbel reported a mean operating duration of 3 hours for MRM in their study of 18 patients (range: 188-191 minutes). Wang et al. found an average operating duration of 2.5 hours (80-190 minutes) for MRM in their study of 82 patients. [30,31] It's important to note that operation times tend to be shorter in specialized, high-volume centres and are influenced by the surgeon's expertise. The average hospital stay in our study was 9.0 days for BCS and 13.0 days for MRM. Regarding postoperative complications, Wang et al. reported that 10.2% (10/82) of patients undergoing MRM experienced complications, including wound infection (2 patients), flap necrosis (1 patient), seroma (3 patients), and wound dehiscence (4 patients). In Rezai's study, 3.3% (4/118) of BCS patients experienced wound infections, while 22.8% (27/118) developed seroma.[32] Complications encountered in our study population included seroma (4 patients), hematoma (2 patients), and wound infection (1 patient) in the BCS group, with no incidence of flap necrosis. In the MRM group, 8 patients developed seroma, 4 experienced hematoma, 2 had wound infections, and 2 suffered flap necrosis. There was one instance of recurrence in our study, resulting in a recurrence rate of only 1.35%. Lhenaff et al. reported a recurrence rate of 1.04% following MRM with a median follow-up of 192 months.[33] Lim et al. observed a local recurrence rate of 2% post-BCS with a median follow-up of 30 months.

Limitations: This study encountered several limitations. First, the sample size was relatively modest. Second, the post-operative follow-up period was brief. Additionally, the quality of life (QoL) was evaluated only through a questionnaire survey conducted after the surgery.[34]

Conclusion: In summary, both Breast-Conserving Surgery (BCS) and Modified Radical Mastectomy (MRM) represent oncologically safe treatment options for early-stage breast cancer when implemented with a multidisciplinary approach. BCS results in reduced trauma, fewer infections, shorter hospital stays, superior aesthetic outcomes, and enhanced quality of life compared to MRM. As a result, BCS is more worthy of clinical promotion for managing early-stage breast cancer.

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