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Comparison of Outcome and Quality of life between Breast Conserving Surgery and Modified Radical Mastectomy for Breast Cancer

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ABSTRACT

Objectives: To compare the clinical outcomes, recurrence rates, post-operative complications, and quality of life between patients undergoing BCS and MRM for early-stage breast cancer.

Study Design and Setting: This was a prospective cohort study (comparative) conducted at DHQ Teaching hospital Narowal

Methodology: This one-year study (January 2023–January 2024) included 93 early-stage breast cancer patients, with 46 undergoing MRM and 47 BCS. Demographics, tumor traits, recurrence rates, complications, and quality-of-life outcomes were analyzed. Statistical tests, including chi-square were performed using SPSS version 20.

Results: Complications occurred in 18.1% (17 out of 93) patients in which 7 (14.9%) were from the BCS group, and 10 (21.7%) were from the MRM group. Recurrence rate was 10.9% in MRM group and 4.3% for the BCS group (P<.05). Wound infection was more common in the MRM group (6.5%) compared to the BCS group (4.3%), though this difference was not statistically significant (p = 0.41). Tests of quality of life at the end of a year revealed that BCS patients have far better body image and mental health findings than MRM patients.

Conclusion: Although BCS offers higher quality-of- life results, both BCS and MRM are appropriate surgical choices for early-stage breast cancer. These findings make BCS appear like a reasonable choice compared to MRM, More research is advised using larger samples.

Keywords: Breast-conserving surgery, modified radical mastectomy, post-operative complications, Recurrence rate

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INTRODUCTION

Breast cancer, the most often occurring cancer in women worldwide, it results in a lot of morbidity and mortality. Improvements in early detection techniques, public health expertise, and treatment strategies over the past few years have fundamentally altered the management of this illness.[1]One of the most crucial methods to treat breast cancer remains surgery even with these developments.[2, 3] Dramatic operations like the Halsted radical mastectomy were the most often used approach of treating breast cancer in the past. These procedures concentrated on eliminating all the surrounding breast tissue and structures to lower the recurrence risk but the physical and psychological issues accompanying it spurred the hunt for less intrusive techniques such as breast-conserving surgery (BCS).[4]

Multiple randomized controlled trials as well as cohort studies performed at scale have validated that combining BCS with radiotherapy provides an effective treatment method compared to MRM for early-stage breast cancer. The NSABP B-06 trial together with various meta-analyses prove BCS achieves the same survival prognosis as MRM and maintains both physical appearance and mental health.[5] The choice of breast cancer surgery is shaped by both patient health conditions and tumor characteristics and healthcare

delivery systems. Some resource-deprived regions choose MRM over other options because they lack radiotherapy resources even though MRM is not necessary for oncological care. Knowledge of these elements enables better optimization of individualized treatment approaches for patients.[6]

The choice of surgical procedure depends equally on surgical safety and treatment-related quality of life as well as patient preference. Research indicates breast cancer surgery patients demonstrate superior satisfaction together with better adjustment to their social environment and enhanced sexual outcomes when receiving BCS instead of MRM.[7] Healthcare providers face challenges because radiotherapy for BCS breast cancer patients creates longer treatment times and raises financial stress. People with breast cancer anxieties about potential recurrence generally want thorough surgical interventions beyond Breast Conserving Surgery even though appropriate selection demonstrates these surgeries can be safe.[8]

Certain early-stage breast cancer patients might not require a modified radical mastectomy (MRM). Rather, patients can undergo lumpectomy along with further radiation treatment as part of breast-conserving surgery. Studies on general life and survival free from disease have revealed that BCS produces cancer outcomes akin to those of MRM. Apart from maintaining the looks of the breasts, BCS has psychological and social consequences that improve the quality of life of patients.[9] Still the best choice for those whose cancer has progressed locally or to other places is MRM, which entails removing the whole breast and lymph nodes in the armpit.[10] It is also advised in areas where radiation is difficult to access since BCS requires further treatment for the optimum effects.

Among the several factors influencing the choice between BCS and MRM are tumor size and stage, patient wishes, and the availability of healthcare resources. There are advantages and disadvantages in both approaches of accomplishing things. BCS demands rigorous follow-up and commitment to extra therapy to reduce the possibility of recurrence, even if it may make surgery less physically and psychologically taxing.[11, 12]

Though much research has been done to evaluate BCS and MRM, there is still gap, particularly in areas where good diagnostics and radiation facilities are rare. Furthermore lacking is a lot of localized data examining these surgical technique in a spectrum of healthcare environments and socioeconomic levels. Examining the outcomes of modified radical mastectomy and breast-conserving surgery in terms of patient satisfaction, quality of life, and safety in the battle against cancer helps this study to close in the evidence gaps.

METHODOLOGY

This study was conducted after obtaining ethical approval from the Institutional Review Board (IRB) of the Narowal medical college college/DHQ teaching hospital Narowal under ERC number 237/NMCN dated 25.01.2023. Written informed consent was obtained from all participants, and the study adhered to the ethical guidelines outlined in the Declaration of Helsinki. The research was a prospective cohort study carried out in the Department of Surgery at teaching hospital Narowal. The aim was to compare the clinical outcomes of breast-conserving surgery (BCS) and modified radical mastectomy (MRM) in patients diagnosed with early-stage breast cancer. The study spanned one year, from 13-Jan-2023 to 13-January-2024, allowing for a comprehensive assessment of post-surgical outcomes and follow-up data for one year till December 2024.

A consecutive sampling method was employed to recruit eligible participants. The sample size was calculated using the formula for comparative studies :

$n = 2(Z\alpha/2 + Z\beta)2 \cdot p(1-p)/(p1-p2)$. Here $z \propto /2 = 1.96$ for a 95% confidence level and z β=0.84 for 80% power. Proportions (p1 and p2) of recurrence rates for BCS and MRM were extracted from previously published studies[13]. Assuming an expected difference of 10% and adjusting for potential attrition, the sample size was finalized at 93 patients. Eligible participants were women aged 30–70 years with histologically confirmed early-stage breast cancer (Stage I or II) who were suitable for either BCS or MRM based on clinical and radiological evaluations. Patients with metastatic or recurrent breast cancer, bilateral breast cancer, a history of breast surgery or radiotherapy, or contraindications to surgery or radiotherapy were excluded. Patients were divided into two groups randomly after explaining all the details of procedure and outcome of treatment and then informed consent was taken on the preformed Performa.

No experimental drugs or specialized apparatus were required. Standard surgical instruments and diagnostic tools available at DHQ teaching hospital were utilized. Surgery was performed by qualified surgeons with post fellowship experience of more than five years to minimize complications and best possible outcomes. Radiotherapy for patients undergoing BCS was administered using a cobalt-60 unit, commonly available in most oncology centers in Pakistan and this was done in diagnostic center Narowal (DCN) established in hospital by atomic energy commission. Patients received a total dose of 50 Gy in 25 fractions over five weeks. Patients of both groups were followed postoperatively on weekly basis for first month and then on monthly basis for next eleven months to see the complications by history and clinical examination of patients. Beside history of any mass in axilla, clinical examination of BCS patients, their ultrasound of axilla was also done on follow up to assess the lymph nodes and if positive then by axillary lymph node biopsy for twelve months to see any involvement by tumor.

SPSS software version 20 was used to conduct the statistical analysis. While categorical data like lymph node involvement and post-operative problems were displayed as frequencies

and percentages, continuous variables like age and tumor size were summarized as means and standard deviations. Continuous variables were compared between the BCS and MRM groups using independent sample t-tests. For categorical data, chi-square tests were utilized, and when the number of cells was less than five, Fisher's exact test was applied. Standard methods were used to manually perform Kaplan-Meier survival analysis, and survival curves were compared using the log-rank test. P-values below 0.05 were regarded as statistically significant.

RESULTS:

46 patients underwent a modified radical mastectomy (MRM) and 47 underwent breast-conserving surgery (BCS). The study involved 93 participants in all. The two groups' ages, tumor sizes, lymph node involvement, and molecular characteristics at first were somewhat similar. Whereas those in the MRM group had a mean age of 52.7 ± 7.9 years, the patients in the BCS group had 51.2 ± 8.3 years (p = 0.37). With 2.6 ± 0.5 cm, the tumors in the BCS group were roughly 2.4 ± 0.6 cm smaller than those in the MRM group; nonetheless, this difference was not statistically significant (p = 0.09). P = 0.35; it was found in 32.6% of patients in the MRM group and 23.4% of patients in the BCS group. Based on the histology, both groups developed comparable kinds of breast cancer. The most of the patients turned out to be invasive ductal carcinoma (IDC). Table 1 presents the demographic and clinical details about the start participants of the trial. A total of 18.1% of patients (17/93) experienced post-operative complications. Figure 1 shows the post-operative complications for both surgical groups. The complications included wound infections, seroma, hematomas, and delayed wound healing. There was no flap necrosis or nerve injury in any patient so that were not assessed. Among the 17 patients who experienced complications, 7 (14.9%) were from the BCS group, and 10 (21.7%) were from the MRM group. Wound infection was more common in the MRM group (6.5%) compared to the BCS group (4.3%), though this difference was not statistically significant (p = 0.41).

Table 1: Baseline Demographic and Clinical Characteristics

Characteristic	BCS (n=47)	MRM (n = 46)	p-value
Age (years)			
Mean ± SD	51.2 ± 8.3	52.7 ± 7.9	0.37
Age Range	32–67	33–68	
Tumor Size (cm)			
Mean ± SD	2.4 ± 0.6	2.6 ± 0.5	0.09
Tumor Size Range	1.2–3.8	1.1–3.9	
Lymph Node Involvement (%)			
Positive Nodes	11 (23.4%)	15 (32.6%)	0.35
Histological Type			
Invasive Ductal Carcinoma	43 (91.5%)	42 (91.3%)	0.58
Invasive Lobular Carcinoma	4 (8.5%)	4 (8.7%)	

In both groups, 26 patients (28.0%) had lymph node involvement. Table 1 displays the distribution of lymph node involvement. The BCS and MRM groups' lymph node positivity did not differ significantly. Although the MRM group had a slightly greater rate of lymph node involvement (32.6%) than the BCS group (23.4%), the difference was not statistically significant ($x^2 = 0.86$, p = 0.35).

The quality of life (QoL) scores were recorded at baseline and at 12 months post-surgery. Table 3 presents the QoL scores for both groups at baseline and at 12 months. The baseline QoL scores were similar between the two groups (BCS: 70.3 ± 8.5, MRM: 69.7 ± 9.1, p = 0.71). However, at 12 months, the QoL improved significantly in both groups. The BCS group showed a greater improvement (mean score of 82.4 ± 7.9) compared to the MRM group (mean score of 78.9 ± 8.4), with the difference being statistically significant (p = 0.03). During the follow-up period, 7 patients (7.5%) experienced a breast cancer recurrence. The recurrence rates by surgery group are summarized in Figure 2. The emergence of fresh tumor growth in the same breast or nearby lymph nodes was referred to as recurrence. Overall, recurrences occurred in 5 patients (10.9%) in the MRM group and 2 individuals (4.3%) in the BCS group. Despite having a decreased recurrence rate, the BCS group did not experience a statistically significant difference (p = 0.26, Fisher's exact test). Kaplan-Meier survival analysis was conducted to compare recurrence-free survival between the two groups. The median follow-up time was 11.3 months (range: 10–12 months). The recurrence-free survival rates at 12 months were 95.7% for the BCS group and 89.1% for the MRM group. The log-rank test indicated no significant difference in recurrence-free survival between the two groups ($x^2 = 1.20$, p = 0.27).

The statistical analysis showed no significant differences in age (t = 0.90, p = 0.37) and tumor size (t = 1.70, p = 0.09) between the two groups. However, quality of life (QoL) at 12 months was significantly better in the BCS group (t = 2.20, p = 0.03). Post-operative complications were similar in both groups (p = 0.41), and lymph node involvement also showed no significant difference ($x^2 = 0.86$, p = 0.35). Recurrence rates (p = 0.26) and recurrence-free survival ($x^2 = 1.20$, p = 0.27) were comparable between BCS and MRM, indicating similar long-term outcomes for both surgical approaches.

Figure 1: Post-Operative Complications by Surgical Group

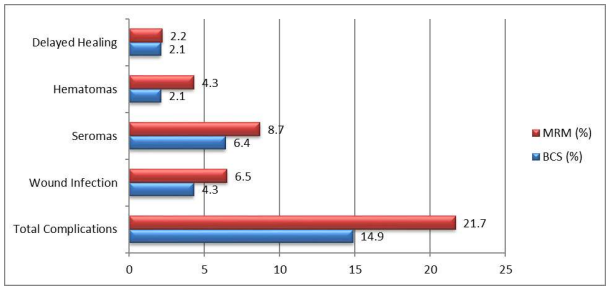
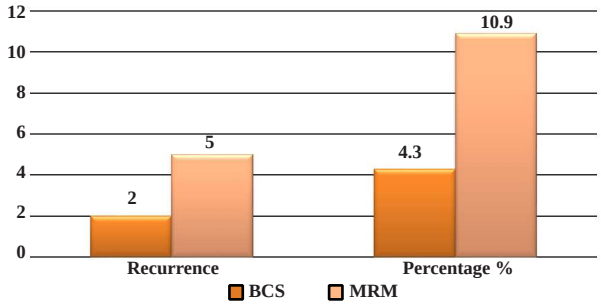


Table 2: Quality of Life (QoL) Scores

Surgical Group	Baseline QoL Score	12-Month QoL Score	p-value
BCS	70.3 ± 8.5	82.4 ± 7.9	0.03
MRM	69.7 ± 9.1	78.9 ± 8.4	

Figure 2: Recurrence Rates by Surgical Group



DISCUSSION

The study sought to evaluate, clinically and in terms of quality-of- life, the outcomes of MRM and BCS. According to the findings, BCS and MRM are connected to rather similar rates of recurrence and difficulties following surgery. At twelve months following surgery, BCS patients did, however, have greater quality of life. Although both surgeries are effective in treating breast cancer, BCS is a suitable option for many since it may enable patients recuperate and feel better psychologically following surgery.

With regard to age, tumor size, and histological characteristics, our investigation revealed no appreciable variations between the BCS and MRM groups. This is consistent with findings of other investigations.[13] usually depending on the sort of tumor they have and their desired outcome, both medications are prescribed to patients not in consideration of their age or other demographic background. The BCS group had a somewhat smaller average tumor size; however this difference was not statistically significant according to our findings. This result aligns with past studies indicating, depending on factors including tumor location and patient general health, both BCS and MRM can be employed for tumors of various diameters.[14] As long as the margins are clear, BCS has been demonstrated to be safe and helpful for tumors up to 5 cm in size.

The incidence of lymph node involvement in both groups in our study was similar to other studies, which have shown that lymph node positivity does not significantly influence the choice between BCS and MRM.[15] Although lymph node involvement is an important factor for staging and treatment decisions, both procedures have been found to offer comparable outcomes in patients with positive lymph nodes when adjuvant therapies such as chemotherapy are used. The incidence of post-operative complications in our study was 18.1%, with a slightly higher rate in the MRM group. This is consistent with existing studies that report a higher rate of complications in MRM patients, primarily due to the more extensive nature of the surgery, which may involve longer recovery times, greater risk of wound infection, and a higher likelihood of post-operative pain.[16] On the other hand, BCS, being a less invasive surgery, typically results in fewer complications and faster recovery. Although both procedures involve some risk of complications, the lower complication rates in the BCS group are consistent with literature that advocates for BCS in suitable candidates due to its lower risk of morbidity.[17]

Quality-of-life assessments revealed that BCS patients experienced a significantly greater improvement in their QoL scores at 12 months, compared to those who underwent MRM. This finding is in agreement with studies that have emphasized the psychological and emotional benefits of breast conservation, particularly in terms of body image, self-esteem, and overall satisfaction with the surgical outcome.[18] Patients undergoing MRM often experience a more significant emotional and psychological impact due to the loss of the entire breast, which can lead to increased anxiety and depression. In contrast, BCS allows for the preservation of the breast, leading to improved body image and a less traumatic recovery period.

The recurrence rates in our study were 4.3% in the BCS group and 10.9% in the MRM group. While these findings did not reach statistical significance, they align with the broader body of research that suggests recurrence rates in breast cancer are similar for both BCS and MRM, provided that proper adjuvant therapy is used.[19] It has been shown that recurrence rates between the two procedures are not significantly different, as long as the surgical margins are clear and follow-up care is adequately provided. It is important to note that both treatments are effective in preventing recurrence in patients with early-stage breast cancer.

Regarding the number of years of recurrence-free survival, our study similarly revealed no appreciable variation between the two groups. This is consistent with recent research revealing comparable survival rates between BCS and MRM.[20] Combined with other therapies, these surgeries have roughly the same survival rate. Usually, more crucial than the patient's chance of life are the location of the tumor, their preferences, and the surgeon's capacity to obtain clean surgical margins.

Ultimately, our research supports the theory that, given no significant variations in the rates of recurrence or problems following surgery, BCS and MRM are reasonable surgical options for treating breast cancer. Regarding quality of life, BCS does, however, have a clear advantage. After getting it, patients claim their mental health and physical condition improve. These findings highlight the need of considering both physical and psychological factors in selecting the most

appropriate surgical approach for breast cancer sufferers. To validate these findings and provide additional knowledge regarding the long-term performance of both treatments, future studies including larger groups of people and longer follow-up timeframes is required.[21]

Limitations and Future Suggestions: This study has several limitations should be considered. With only 93 instances, the sample size is somewhat small, thus the findings might not be relevant to a larger population. If the sample size was larger, the variations between BCS and MRM would be more easily apparent. Furthermore, the 12-month follow-up period might not be sufficient to completely investigate rates of long-term survival and recurrence. Future research should employ longer follow-up times to observe long-term effectiveness of both approaches. Furthermore, even if our study concentrated on clinical outcomes, other elements such as genetic profiles, patient preferences, and socioeconomic background could also be quite crucial in determining the optimal operation. Future research should examine these aspects so that we may better understand the decisions taken in breast cancer treatment.

CONCLUSION

With nearly the same rates of recurrence and complications following surgery, this study reveals that both modified radical mastectomy and breast-conserving surgery are good approaches to treat breast cancer surgically. Regarding quality of life, however, BCS clearly benefits mainly in terms of body image and mental health. These findings highlight the need of considering clinical outcomes as well as patient perspectives in deciding on the optimum surgical technique. More study with larger sample counts and longer follow-up times will help us to ascertain the long-term impacts and advantages of both operations.

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Muhammad Zafar Mengal: Article Writing
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Zain Mukhtar Chaudhary: Study Review
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