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Early outcome of breast conserving surgery and modified radical mastectomy in early breast cancer

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Abstract

Among different surgical methods, there has been limited investigation into the comparative effectiveness of Breast Conserving Surgery (BCS) versus Modified Radical Mastectomy (MRM). Consequently, this study was designed to compare these two treatment approaches for patients with primary breast carcinoma receiving care at a tertiary hospital. The study was a hospital-based prospective comparative study and was conducted at the Department of Surgery in Sir Salimullah Medical College & Mitford Hospital, from April 2019 to April 2021. Patients with diagnosed breast cancer disease in stages I & II (diameter up to 5 cm, N0 or N1, M0) were approached for inclusion in the study by purposive sampling. Written informed consent was taken from the subject and ethical issues were ensured properly. Moreover, the study participants were subdivided into two groups: Group A and Group B. Group A consisted of the patients who had undergone BCS and Group B consisted of the patients who had undergone MRM. A total of 30 patients in each group were included and interviewed. The researcher conducted the interview and data collection was done by using a structured questionnaire. Collected data was analyzed by the SPSS 20. The mean age of the study populations was 44.12 ± 8.75 SD (years). Sociodemographic profiles are similar across the group ($p > 0.05$). Most of the study patients had T₂N₁ stage of breast carcinoma (31.67%) followed by T₁N₀ (28.33%), T₂N₀ (20%), and T₁N₁ (20%) with no statistical difference between the two groups (p-value 0.990). There was a significantly longer duration of surgery (88.73 ± 11.76 min) in patients who had undergone MRM compared to BCS (60 ± 7.61 min) ($p < 0.05$). Length of postoperative hospital stay was also higher among MRM patients compared to BCS (13.67 ± 2.99 vs 8.80 ± 1.22 , p-value < 0.001). Four patients (13.33%) from group B had developed postoperative complications (two superficial wound site infections, one flap necrosis, and one seroma formation) whereas no patients from group A had developed any post-operative complication without any statistical significance (p-value 0.612). No patients from any group had developed local recurrence within two years of follow-up. BCS is superior to MRM in primary breast carcinoma patients in terms of postoperative outcomes and complications. However, a further clinical trial is recommended.

Keywords: Breast-conserving surgery, modified radical mastectomy, early breast cancer

Introduction

Breast cancer is characterized by the presence of cancerous cells in the breast tissue, typically originating from either the ducts or lobules. These malignant cells have the potential to proliferate within the breast tissue and may metastasize to other organs in the body.

It ranks as the second most common cause of death among women presently. Breast Cancer is the second leading cause of death in women today. The incidence of breast cancer has been increasing at a rate of 2%~3% year by year [1]. In Bangladesh, the incidence rate of breast cancer was about 22.5 per 1,00,000 in females and the highest prevalence rate among women between 15 and 44 years of age when compared to other types of cancer [2]. It reported that approximately 2,30,480 new cases of invasive breast cancer and 39,520 breast cancer deaths occurred among US women [3].

At present, the cause of breast cancer is still unclear, and it is mainly believed that secretion disorders of estrone and estradiol have a close correlation with breast cancer. Family history is another well-known risk factor. Women with inherited breast cancer due to mutations of such genes as BRCA1 and BRCA2 have an extremely high (approximately 80%) lifetime risk of developing breast cancer. This genetically transmitted form of the disease is uncommon, accounting for only 10% to 15% of breast cancer cases [4].

The primary indication of breast cancer often manifests as a fresh lump or mass. A painless, hard mass that has irregular edges is more likely to be cancer, but breast cancers can be tender, soft, or rounded [5]. First clinical examination should be done for assessment of the disease. There are some other modalities to diagnose breast cancer such as Mammograms, Ultrasound Scans, and Magnetic Resonance Imaging. To confirm breast cancer, a biopsy will have to be performed in which cells or a piece of tissue is removed for examination under a microscope.

Treatment methods for patients with breast cancer depend both on the patient's and the disease's characteristics. The staging of breast cancer is an important factor in making decisions about treatment methods. Local treatment methods include surgery and radiation therapy and systemic treatment methods, like chemotherapy, hormone therapy, targeted therapy, and bone-directed therapy, use drugs that can kill cancer cells anywhere in the body. Most women with breast cancer in stage I, and II are treated with surgery often followed by radiation therapy. Surgical procedures include breast-conserving surgery (BCS) (sometimes called lumpectomy or partial mastectomy), total or simple mastectomy, modified radical mastectomy, radical mastectomy, skin-sparing mastectomy, nipple-sparing (subcutaneous) mastectomy, Among them breast-conserving surgery (BCS) and modified radical mastectomy (MRM) are commonly performed procedure.

BCS refers to the removal of the primary breast tumor mass, along with 1 cm normal tissue from surrounding the edge of the lump, and sentinel axillary lymph nodes biopsy through the same incision or another separate incision. MRM refers to the excision of the involved whole breast along with the axillary dissection of the lymph node through the same incision. The most obvious advantage of breast-conserving surgery is a better cosmetic outcome and sexuality may be less affected. However, it has a few potential disadvantages such as the need for radiation therapy for residual breast tissue of the same breast, a higher risk of developing a local recurrence of cancer, and may need to have one or more additional surgeries after the initial lumpectomy [6].

On the other hand modified radical mastectomy consists of the removal of the whole breast and many lymph nodes under the arm thus reducing the risk of cancer recurrence. The Potential disadvantage is that cannot replace the natural breast and higher complication rate. Due to limited data, the effectiveness of the two procedures is still controversial [7]. Considering the ground, this study was planned to compare the two surgical procedures.

Methodology

This was a prospective observational comparative study carried out in the department of surgery, Sir Salimullah Medical College Mitford Hospital, Dhaka during the period of April 2019 to April 2021. A total of 60 participants with diagnosed breast cancer disease in stages I & II (diameter up to 5 cm, N0 or N1, M0) were included in this study according to inclusion and exclusion criteria by purposive sampling. All patients were subdivided into two groups: Group A and Group B. Group A consisted of the patients who underwent BCS and Group B consisted of the patients who underwent MRM. An informed consent was taken for the surgical procedure. Before surgery, all the patients were resuscitated with correction of fluid and electrolyte balance. In the BCS group excision of the tumour with a 1 cm healthy margin and sentinel axillary lymph node biopsy by methylene blue dye followed by histopathological

examination was done. The BCS group received radiotherapy to the breast in all cases. In the MRM group, simple mastectomy with ipsilateral axillary dissection up to level ii followed by histopathological examination was done. All patients were assessed intraoperative and post-operatively. All cases were watched for variables such as age, stage of disease, socioeconomic status, position of lumps, presence of lymph nodes, tissue diagnosis, duration of surgery, intra-operative blood loss, postoperative blood loss, hospital stay, and development of complications. The patients of both groups were evaluated in 4th week and then 6 monthly at the outpatient clinic, and the following criteria were assessed: time of postoperative pain relief, time of hospital stay, the postoperative time needed for healing, and assessment for local recurrence of carcinoma. All data were recorded in a separate case record form. Differences in baseline characteristics were compared using both the student t-test and the Pearson chi-square test. SPSS 20 was used for statistical significance where the value was set as less than 0.05.

Results

The average age was of the study participants 44.12 ± 8.75 years (range 24-63 years). The majority of the patients belonged to the age group 30-49 years (68.33%). There was no significant difference in mean age and age group distribution between the two groups ($p \geq 0.05$).

Most of the study patients had T₂N₁ stage of breast carcinoma (31.67%) followed by T₁N₀ (28.33%), T₂N₀ (20%), and T₁N₁ (20%) with no statistical difference between the two groups (p-value 0.990).

Most of the patients had ductal carcinoma of the breast (90%) with lymph node involvement (51.67%). The mean diameter of the involved tumor was 2.31 ± 1.03 cm and the left breast was affected most (55%). There was no statistical difference between the two groups regarding tumor characteristics as p-value >0.05 (Table 1).

There was a significantly longer duration of surgery (88.73 ± 11.76 min) in patients who undergone MRM compared to BCS (60 ± 7.61 min) (p-value <0.001). Besides, intra-operative and postoperative blood was higher among MRM patients (141.23 ± 6.85 mL and 57.18 ± 18.49 mL respectively) than BCS (98.83 ± 6.45 mL and 41.30 ± 8.77 mL respectively) which was statistically highly significant (p-value <0.001). Length of postoperative hospital stay was also higher among MRM patients compared to BCS (13.67 ± 2.99 vs 8.80 ± 1.22 , p-value <0.001) (Table 2).

Four patients (13.33%) from MRM patients had developed postoperative complications (two superficial wound site infections, one flap necrosis, and one seroma formation) whereas no patients from the BCS group had developed any post-operative complication without any statistical significance (p-value 0.612).

Table 1: Tumor characteristics of patients (n=60)

Variable		BCS (N = 30) n (%)	MRM (N = 30) n (%)
Tumor site	Left	16 (53.33%)	17 (56.67%)
	Right	14 (46.67%)	13 (43.33%)
Tumor diameter (cm)		2.20 ± 1.03	2.42 ± 1.04
Tumor type	Ductal carcinoma	27 (90%)	27 (90%)
	Lobular carcinoma	3 (10%)	3 (10%)

Table 2: Outcome of patients

Variable	BCS (N = 30)	MRM (N = 30)	P value
Duration of surgery (min)	60±7.61	88.73±11.76	<0.001
Intra-operative blood loss (mL)	98.83±6.45	141.23±6.85	<0.001
Post-operative blood loss (mL)	41.30±8.77	73.07±9.85	<0.001
Post-operative hospital stay (day)	8.80±1.22	13.67±2.99	<0.001

Table 3: Outcome of patients (Post-operative complications)

Post-operative complications	BCS n (%)	MRM n (%)
Superficial wound site infection	0	2 (6.67%)
Flap necrosis	0	1 (3.33%)
Seroma formation	0	1 (3.33%)

Discussion

In this study, the mean age of all patients was 44.12±8.75 years (range: 24-63 years) with the majority (68.33%) belonging to the age group 30-49 years (p-value 0.969). According to an NICRH report, 5255 breast cancer cases were diagnosed during the period 2005-2010; the mean age of the breast cancer patients was 41.8 years (age range 15-94 years) and over 56% of the cases were women of reproductive age (15-44 years) [7].

A greater part of the study patients had stage II breast carcinoma (51.67%) and the rest had stage I (48.33%). Sreelesh *et al* also found most of the patients had stage II breast carcinoma [9]. According to TNM classification, the maximum study patients had T₂N₁ stage of breast carcinoma (31.67%) followed by T₁N₀ (28.33%), T₂N₀ (20%), and T₁N₁ (20%). Sreelesh *et al* also found most of the patients present with the T₂N₁ stage [9]. Most of the patients had ductal carcinoma of the breast (90%) with lymph node involvement (51.67%). In another study, Kaushal *et al* found most of the patients had ductal carcinoma (90%) [10].

In this study, the mean diameter of the involved tumor was 2.31±1.03 cm and the left breast was affected most (55%). But Chen *et al*. discovered that the average diameter of the affected tumor was 1.88±0.51 cm and 1.87±0.48 cm in breast-conserving surgery (BCS) and modified radical mastectomy (MRM), respectively, which was smaller compared to the findings of this study [12]. There was no statistical difference between the two groups regarding any characteristics of the tumor as p-value >0.05 like the following discussed studies comparing BCS and MRM outcome [1, 10-13].

In this study, there was a significantly longer duration of surgery (88.73±11.76 min) in patients who undergone MRM compared to BCS (60±7.61 min) (p-value <0.001). Like this study, many other studies also found a lesser duration of surgery among BCS patients compared to the MRM group [1, 12, 13]. Thus, BCS is faster to perform than MRM as per these observations. The increased duration of MRM may be due to the complexity of the procedure. Furthermore, intra-operative and post-operative blood loss was higher among MRM patients (141.23±6.85 mL and 57.18±18.49 mL respectively) than BCS (98.83±6.45 mL and 41.30±8.77 mL respectively) which was statistically highly significant (p-value <0.001). Chen *et al* included 219 early breast cancer cases, 107 subjects received the breast-conserving operation, and other 112 cases received the modified radical mastectomy, found the operation time, intraoperative blood loss, and length of hospital stay were significantly smaller (56.7±14.6) min, (39.2±10.1) ml, (12.1±2.1) day in the breast-conserving group compared to (95.6±13.5) min, (79.5±13.6) ml, (14.8±3.2) day in the modified radical mastectomy group respectively [12]. Cui *et al* also found conserving surgery group had significantly better surgery time (114.57±18.72 vs 173.54±24.47 min), hospital stay (9.47±1.94 vs 15.26±3.21 days) and intraoperative bleeding (98.04±9.85 vs 140.93±12.69

mL) than those of the radical group (p<0.05) [1]. Qui *et al* revealed that intraoperative bleeding volume, incision length, and hospitalization duration were better in the BCS group than in the MRM group [13].

No patients from any group in this study had developed local recurrence within two years of follow-up. Similarly, for the 1-year follow-ups after the operation, Qiu *et al* and Veronesi *et al* found no significant differences in local recurrence rate, distant metastasis rate, and survival rate between BCS vs MRM (p>0.05) [13, 14]. In another study by Lize Wang *et al*, the 6-year local recurrence-free survival (LRFS) rates were 98.2% in the BCT group and 98.7% in the MRM group (P=0.182), respectively [11]. Thus, we can say that these 2 kinds of surgery have similar curative efficacy, and both can reduce the relapse rate [14]. Furthermore, breast-conserving surgery can not only effectively remove the lesions of breast cancer, but also preserve the integrity of the breast to the maximum, meeting the requirement of patients to maintain a beautiful appearance and quality of life [1, 15].

However, from this study's findings, it is obvious that amount of blood loss, operation time, hospital stay, and postoperative complications, modified radical surgery patients were not better than conserving breast cancer resection patients. Therefore, it is advisable to provide every woman diagnosed with operable breast cancer the choice of breast-conserving treatment, unless there are specific contraindications, along with an explanation of how radiation therapy plays a role in such cases.

Conclusion

In this study, it was found that patients undergoing breast-conserving surgery (BCS) experienced significantly shorter duration of surgery, lower duration of hospital stay, and a lower incidence of complications compared to those undergoing modified radical mastectomy (MRM) for primary breast carcinoma. Additionally, no patients from either group developed local recurrence during short-term follow-up. These findings suggest that BCS may be superior to MRM in terms of post-operative outcomes and complications for primary breast carcinoma patients. Further research with longer follow-up periods and larger sample sizes is warranted to validate these findings and explore their long-term implications.

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