



Modified Radical Mastectomy vs Breast-Conserving Surgery: Current Clinical Practice in Women with Early Stage Breast Cancer at a Corporate Tertiary Cancer Center in India

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Abstract

Breast cancer is the most common cancer in women in urban India and surgery has one of the definitive roles in treating this cancer. Over the decades, multiple studies have been published and they have shown that BCS followed by radiotherapy has equivalent disease-free survival (DFS) and overall survival (OS) as compared with MRM. The surgeon has the main role in explaining the treatment options to the patient. It is a prospective study conducted at Vedant Cancer and Multispeciality Hospital in a metropolitan city, Thane, India. Patients with stage I or II breast cancer with tumor size less than 5 cm were included in the study. Patients with locally advanced and metastatic breast cancer were excluded from the study. The study population was early breast cancer patients registered and waiting for surgery ($n = 86$) at Vedant Cancer and Multispeciality Hospital from November 2019 to end of April 2020. The total number of females enrolled in the study were 86 and out of this, 79.1% ($n = 68$) females opted for MRM and 20.9% ($n = 18$) females opted for BCS in which 8 patients had changed their decision after re-counseling in the ward from MRM to BCS. The most common reasons selected by patients to undergo MRM were fear of cancer recurrence (30.2%, $n = 26$), avoidance of side effects of radiation therapy (25.5%, $n = 22$) and fear of radiation therapy (23.2%, $n = 20$). Surgeon had decided the surgical option in 79.1% ($n = 68$) cases. The study shows that the treating surgeon and patient's husband are the principal persons who decide the surgical option and active participation of women during counseling is an important factor.

Keywords MRM · BCS · Early breast cancer · Patient participation · Counseling

Background

The incidence of breast cancer worldwide is 11.6% (2.089 million) with ranking at 2nd position after lung cancer and it accounts for 6.6% of all cancer deaths worldwide (<https://www.uicc.org/news/new-global-cancer-data-globocan-2018>). In India, it ranks at 1st position with an incidence of 14% and mortality around 11.1% in 2018 (<https://gco.iarc.fr/today/data/factsheets/populations/356-india-fact-sheets.pdf>). It is the most common cancer in women in urban India and surgery has one of the definitive roles in treating this cancer. Surgical options are modified radical mastectomy (MRM) and breast-conserving surgery (BCS). Over the decades, multiple studies have been published, and they have shown that BCS followed by radiotherapy has equivalent disease-free survival (DFS) and overall survival (OS) as compared with MRM [1]. All these results influence the treatment decision while selecting a surgical

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procedure [2]. There is significantly a better social, emotional, and physical adjustment after BCS in contrast to MRM patients. The postoperative morbidity and return to normal function are also better for the BCS group [3]. BCS has the advantage of fewer surgical site complications and desirable cosmetic outcomes as compared to MRM [4]. In the USA, about 60% of women with early stage breast cancer undergo BCS [5]. Still, in India, it is not followed and only about 10% of women with early stage breast cancer undergo BCS [6]. The reasons for preferring MRM in India may be due to lack of awareness of equivalent results of MRM and BCS, fear of radiation therapy, fear of recurrence and lack of involvement of the patient in decision-making [7]. Instead of BCS, if MRM is preferred for an early stage breast cancer, then it is considered as overtreatment [8]. Post-MRM, most of the women have psychological trauma, depression, anxiety and their body image also gets disturbed [9]. The surgeon has the main role in explaining the treatment options to the patient. Finally, the patient, her family and her husband have to decide and select an option. In some of the states of the USA, the law has been implemented and it has been made mandatory for surgeons to explain the treatment options to the patient and her family member [10].

How the surgical decision is planned in India is still unclear, and there is a scarcity of literature on this. Patient's perception is the most important factor in decision-making. We have studied these factors which affect the decision while selecting the surgery at the corporate tertiary cancer center in Thane city, where most of the population is literate and economically self-supporting.

Materials and Methods

It is an Institutional Review Board–approved prospective study conducted at Vedant Cancer and Multispeciality Hospital in the metropolitan city, Thane. This is the tertiary cancer care center serving at Thane city. Thane is located on the north-western side of the state of Maharashtra, India. The city is an immediate neighbor of Mumbai city and a part of the Mumbai Metropolitan region. It is the largest district in Maharashtra state which has seven talukas and it is the 15th most populated city in India, according to the 2011 census. The draining areas of patients to this hospital are from Mumbai, Pune, Raigad, Gujarat state, Uttar Pradesh state, Bihar state and from all talukas of Thane districts. A total of 86 patients were enrolled in this prospective study and the duration of the study was 6 months, with the start of November 2019 to the end of April 2020. Vedant hospital provides all facilities for advanced cancer care and an average of about 2200 cancer surgeries are performed yearly.

Objectives of the Study

- 1) To know the most preferred surgical option.
- 2) To find out the reasons behind selecting the type of surgical option.
- 3) To evaluate the changing options during varying phases of counseling.

Inclusion Criteria

Patients with stage I or II breast cancer with tumor size less than 5 cm.

Exclusion Criteria

Locally advanced and metastatic breast cancer.

Study Population

Diagnosed and completely evaluated early breast cancer patients registered and waiting for surgery ($n=86$) at Vedant Cancer and Multispeciality Hospital, Thane, Maharashtra, India from November 2019 to the end of April 2020.

Data Collection

Demographic details of the patient which include information regarding age, marital status, education, income, obstetric history, menstrual history, past history, personal history and clinical findings were recorded from the patient's case file and also from the proforma for the study which is separately prepared for each registered patient. A self-designed questionnaire was given to patients to assess various factors responsible for decision-making regarding the type of surgery which was broadly divided into patient-related factors, tumor-related factors and factors based on the interaction between surgeon and patient. Patient-related factors were age (<40 years/ >40 years), place (rural/urban), marital status (married/unmarried), literacy status (literate/illiterate), educational status (school/high school/graduate/post-graduate), economic status (self-supporting/non-earning dependent/earning dependent/other), knowledge of BSE (breast self-examination), the person who took the decision for the treatment (self/husband/self + husband/other relative) and any contact with friend/family who knows about MRM/BCS. Surgeon and patient-related factors include the reason for opting MRM (fear of radiation therapy/to avoid side effects of radiation therapy/fear of cancer returning/to avoid another surgery in the future/inconvenience of radiation therapy), the reason for opting BCS (no difference between the surgeries/possibility of breast reconstruction/how my partner would

feel if complete breast is removed/feel about losing a breast) and did they clearly understand the treatment options and any change made in the final surgical option after admission in the ward. Tumor-related factors were the stage of the disease, size of the tumor and involved quadrant. However, we found that there was no correlation between tumor factors and choice of surgery. Counseling for the type of surgical option with merits and demerits of each surgery was done by cancer surgeons who were specially trained in breast cancer surgery with experience of about more than 15 years. Each case was discussed in our Institutional Multidisciplinary Tumor Board, followed by counseling. Counseling was conducted at the outward patient department (OPD) section of the hospital and the patients were followed by the same surgeon's team in the ward after admission till the final plan of surgery. The same team did the re-counseling in the ward. Data was analyzed after collecting all self-designed questionnaires. Consent was taken from each participant for enrolment in this study and they have been provided with a patient information sheet narrating the burden of breast cancer in India, explaining the purpose of this study and confidentiality of their personal information. All patients were evaluated with FNAC (fine needle aspiration cytology) from the lesion, chest X ray, ultrasound of abdomen with the pelvis, ultrasound of both breasts if age < 40 years and bilateral mammogram if age > 40 years.

Statistical Methods and Analyses

Study data was tabulated in the Excel spreadsheet. Analysis was performed using Statistical Package for Social Sciences (IBM SPSS Statistics for Windows, Version 25.0; IBM Corp., Armonk, NY). Data across surgery type preferred were presented in absolute numbers as well as the percentage of rows. Chi-square test of significance and Fisher's exact test were used for study between surgery group differences. An independent sample *t*-test was used to compare the mean age of study participants. A *P*-value below 0.05 is considered statistically significant.

Results

The total number of females enrolled in the study were 86 and out of this, 79.1% (*n* = 68) females opted for MRM and 20.9% (*n* = 18) females opted for BCS in which 8 patients had changed their decision after re-counseling in the ward from MRM to BCS. Only 8 females were unmarried and the rest of 78 were married. The age group difference includes 30.2% (*n* = 26) females below 40 years of age and 69.8% (*n* = 60) were above 40 years of age. Out of 86 females, 15.11% (*n* = 13) had comorbidities like hypertension (HTN),

diabetes mellitus (DM), both (HTN + DM) and asthma. All females were literate and number of females with their level of education status were as follows: school, high school, graduate, post-graduate: 30.2% (*n* = 26), 25.5% (*n* = 22), 23.2% (*n* = 20), 20.9% (*n* = 18), respectively, with *p* < 0.001. Urban females were 44.2% (*n* = 38) and rural females were 55.8% (*n* = 48) with *p* < 0.001. The different economic status levels of study population were as follows: non-earning dependant, 55.8% (*n* = 48); earning dependant, 23.2% (*n* = 20) and self-supporting 20.9% (*n* = 18). Family history of breast cancer was found in 8.13% (*n* = 7) of patients. The most common reason selected by patients to undergo MRM was fear of cancer recurrence (30.2%, *n* = 26). The second reason was to avoid side effects of radiation therapy (25.5%, *n* = 22) and the third reason selected was fear of radiation therapy (23.2%, *n* = 20). While selecting an option of BCS, the most common reason selected was feeling of losing a breast (20.93%, *n* = 18). Surgeon had decided the surgical option in 79.1% (*n* = 68) cases, followed by the other deciding persons are surgeon with husband (11.6%, *n* = 10) and patient with husband (9.3%, *n* = 8).

Discussion

The complete workup of patients with early stage breast cancer was followed according to the guidelines of the National Comprehensive Cancer Network (NCCN) [11]. After a complete evaluation, each case was discussed in our institutional multidisciplinary tumor board with the finalization of the treatment plan, followed by counseling for the surgical options. Tissue diagnosis was obtained with FNAC. Our institutional policy is to evaluate early breast cancer patients with FNAC as in the majority of early breast cancer patients; neoadjuvant chemotherapy or hormonal therapy is not required. Hormonal receptor status can be traced out with the final histopathology specimen with the planning of adjuvant treatment. We are advising core needle biopsy only in locally advanced breast cancer patients, metastatic breast cancer patients and in patients where tumor size is > 5 cm (T3) where neoadjuvant treatment approach is possible and which were all our exclusion criteria. Most of the studies reported that age is one of the factors which significantly affects the surgical choice between MRM and BCS [12]. Elderly patients usually pay less attention to cosmetic parts and their main concern is the effects of radiation therapy on the body. This is the reason for the change in their preference for MRM instead of BCS. Teh et al. [13] reported that patients in Asia with an age of more than 60 years were more willing to undergo mastectomy instead of breast conservation. The present study found that there is no age difference in both groups of patients. The mean age + standard deviation for patients

Table 1 Mean age comparison across the study group

Age group	MRM	BCS	<i>t</i> -test	<i>P</i> -value
<i>N</i>	68	18		
Mean + SD	49.5 + 11.6	47.3 + 10.0	0.727	0.469

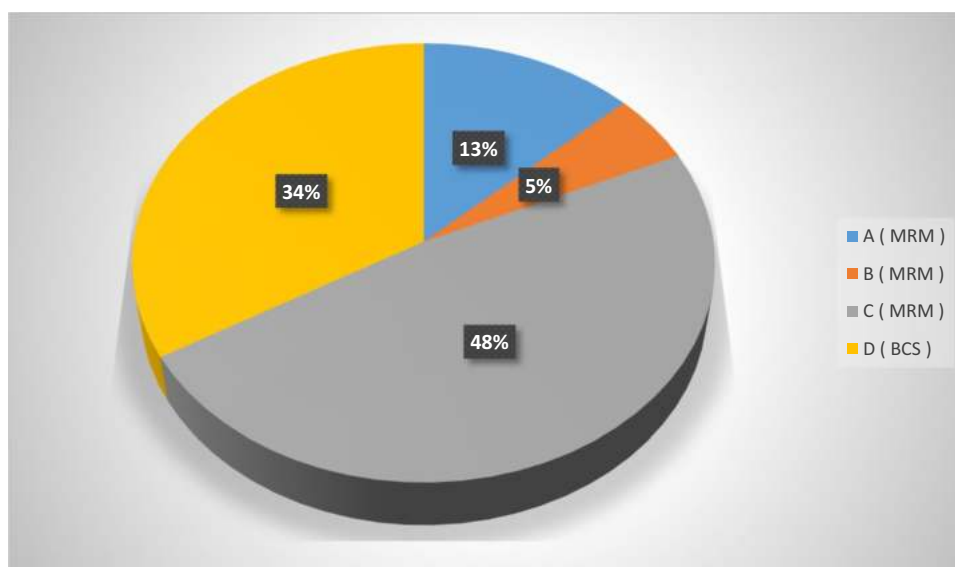
undergone MRM was 49.5 + 11.6 and that for BCS was 47.3 + 10.0 (Table 1). Kotwall et al. [14] suggested that a low level of health insurance may be related to a patient choosing mastectomy and less likely breast conservation. Hershman et al. [15] used the US 2000 census to generate an aggregate SES (socioeconomic status) score for each zip code based on income, poverty and education data, and they found that patients who underwent mastectomy usually had lower SES. Patients without health insurance have to pay themselves for the surgery. The procedure of BCS with postoperative radiotherapy is costly. One of the reasons for the diversion of decision from MRM to BCS is the complications associated with radiation therapy and the patient has to travel daily for radiation which consumes her extra routine time. It is difficult for patients with a lower level of education to accept information based on new research. Some patients still believe that mastectomy is the only reliable choice for breast cancer surgery, believing a bigger operation would provide more effective treatment [16]. Jeffrey Gu et al. [17] studied these decision-making factors through 7 database research articles. They found that higher socioeconomic status is associated with higher breast conservation surgery rates and rural locations with increasing distance from radiation treatment facilities are associated with lower rates of BCS.

The present study shows that the contribution of the surgeon has a main role in selecting the option of MRM or BCS. In 79.1% ($n=68$) of cases, the surgeon's recommendation was followed for choosing an option of MRM. Only 20.9% ($n=18$) of cases had selected an option of BCS. In developed countries, about 41% of females had contributed independently to the decision-making process [8]. The present study has a lower percentage of active participation of females because of their lower level of education status, low economic status and rural background. About 55% of females studied up to school and high school level, and they had opted for MRM; however, the preference of post-graduate females was BCS. It proves that education has a definite role in decision-making. The lower education level is because of their rural background (55.8%) which makes their economic status a non-earning-dependant (55.8%) status. All these factors are responsible for the low level of self-confidence which ultimately leads to poor concentration or interaction with the surgeon during counseling, resulting in a poor understanding of the merits and demerits of BCS or MRM.

During counseling at OPD, the surgeon's role was to explain each and everything about equality of DFS, OS between MRM and BCS, according to available best literature [18]. Corradini et al. [19] studied the results of BCS in one of the largest cohorts of 7565 patients with early stage breast cancer in real-life clinical practice. They found that BCS followed by RT had improved outcomes in clinical practice regarding local control, distant control and overall survival as compared to mastectomy alone. BCS maintains the body image cosmesis and which has been supported by the literature [20]. In the index study, the authority was given to surgeons by patients for selecting the surgical procedure due to lack of confidence in their decision-making process and surgeon had given them the best possible option as per their economic status. Thus, the surgeon has a vital part in the present study. In only 12 cases, tumor:breast ratio was found higher and the surgeon had given them an option of breast reconstruction. Out of this, only 3 cases turned out to undergo BCS with reconstruction and the remaining 9 cases underwent MRM. Our hospital does not have free-of-cost surgery; the patient has to pay for it and the cost of BCS is more as compared to MRM in view of intraoperative-frozen section control procedure and reconstructive procedure. The cost of MRM is less and postoperative hospital stay is only 2 days if the postoperative course is uneventful. Patients with a lower level of education, non-earning-dependent status, rural background and absence of health insurance policy make the surgeon as the sole deciding person ($p < 0.001$). In this scenario, the surgeon had recommended them to undergo MRM. Patients who had undergone BCS accounts for 20.9% ($n=18$), in which 11.6% ($n=10$) had opted for BCS where the surgeon and husband are the principal persons in the decision-making process. The rest 9.3% ($n=8$) patients had selected MRM, but they changed their decision to BCS after admission in the ward after re-counseling and decision-making persons were patient and husband. The reason for the change in decision from MRM to BCS was the feeling of losing a breast, similar to the reason selected by other females whose primary decision was to undergo BCS. Out of 20.9% ($n=18$) females who selected BCS, 3 females underwent wide local excision with reconstruction and the rest 15 females underwent only wide local excision of the lesion. A total of 7 females (8%) had knowledge of BSE (breast self-examination) and all of these females underwent BCS. BCS had been preferred by most of the post-graduate qualified females (20.9%). Hence, the present study indicates that females with a higher qualification, self-supporting economic status, knowledge of BSE and urban background prefer breast conservation.

The most common reason for selecting mastectomy was fear of cancer recurrence (30.2%, $n=26$); next to this was avoidance of side effects of radiation therapy (25.5%, $n=22$) and fear of radiation therapy (23.2%,

Fig. 1 Distribution of surgical choices based on primary reasons. A means fear of radiation therapy; B means to avoid side effects of radiation therapy; C means fear of cancer recurrence; D means the feeling of losing a breast. *MRM*, modified radical mastectomy; *BCS*, breast-conserving surgery



$n = 20$) (Fig. 1). Ohsumi et al. [21] reported a study of the influence of non-doctoral factors while selecting surgical choice in Chinese patients eligible for breast-conserving surgery. They found that patients with younger age, higher income and education, shorter admission to surgery interval and shorter confirmed diagnosis to surgery interval were more likely to choose BCS than mastectomy. In our study, females with a lower level of education, non-earning-dependent economic status and rural background preferred MRM ($p < 0.001$). Previous studies have identified that patients feel safer after mastectomy and that the fear of recurrence is the primary motivator for choosing a mastectomy over BCS [16]. The fear of recurrence remains an issue in the long term, which is a challenge [22]. In the present study, surgeon (79.1%), surgeon + husband (11.9%), and patient + husband (9.6%) are the decision-making persons for surgical choices. Patients with positive family history (8.1%, $n = 7$) had opted for MRM because of fear of cancer recurrence as they had a bad experience of recurrence with their family members. Females in rural places are having a lower level of education with non-earning-dependency status. It proves that still in India which is considered a male-dominated country where illnesses of females are always gotten less importance at rural places. Due to this, they have a lower level of confidence and difficulty in expressing their feelings which ultimately results in inactive participation during decision-making counseling. In our self-designed questionnaire, there is an option where we had asked for a clear understanding of the procedure after counseling. All patients who had opted for MRM responded positively to this question but may be because of poor understanding of cancer biology and insufficient fund for BCS diverted them to undergo MRM (Table 2).

Limitations

The study place is a tertiary cancer center where all facilities of breast reconstruction are available with 24 h availability of plastic and reconstructive surgeons; still, the type of surgery is decided by the specific group of patients which can be divided as affordable or non-affordable. Our study sample size is low. In India, there is a requirement for such prospective multicentric studies. Uniformity should be there in the counseling process at all centers. This study has limitations in non-affordable patients as in spite of a strong desire to undergo BCS, they cannot go ahead with it and land up in selecting MRM. Though the counseling process has the involvement of experienced surgeons, it needs improvisation in the future with a video demonstration of both procedures to avoid any surgeon-related bias and we are working on it. We have not analyzed follow-up data of all patients with their post-surgery experience till the completion of the whole treatment, but we are in the process of following this. We are looking to overcome all these limitations in the future with a prospective database.

Conclusion

The study shows that the deciding factors for selecting the surgical options are the treating surgeon and patient's husband and the active participation of women during counseling process carries a highly important role in decision-making. The most common reason which diverts women from BCS to MRM is the fear of cancer recurrence.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s13193-021-01457-8>.

Table 2 Comparison of surgery group across the study group

Narration	MRM	BCS	Total	Chi-square	P-value
Age group					
< =40 years	21 (80.8)	5 (19.2)	26 (30.2)	0.1	0.80
> 40 years	47 (78.3)	13 (21.7)	60 (69.8)		
Marital status					
Married	61 (78.2)	17 (21.8)	78 (90.7)	0.4	0.54
Unmarried	7 (87.5)	1 (12.5)	8 (9.3)		
Comorbid conditions					
No comorbidity	56 (76.7)	17 (23.3)	73 (84.9)	1.6	0.20
Either DM/HTN or both	12 (92.3)	1 (7.7)	13 (15.1)		
Educational status					
School	26 (100)	0 (0)	26 (30.2)	86.0	<0.001
High school	22 (100)	0 (0)	22 (25.6)		
Graduation	20 (100)	0 (0)	20 (23.3)		
Post-graduation	0 (0)	18 (100)	18 (20.9)		
Economic status					
Non-earning dependent	48 (100)	0 (0)	48 (55.8)	86.0	<0.001
Earning dependent	20 (100)	0 (0)	20 (23.3)		
Self-supporting	0 (0)	18 (100)	18 (20.9)		
Locality					
Urban	20 (52.6)	18 (47.4)	38 (44.2)	28.8	<0.001
Rural	48 (100)	0 (0)	48 (55.8)		
Family history of CA breast					
No	63 (79.7)	16 (20.3)	79 (91.9)	1.7	0.44
Yes	3 (60)	2 (40)	5 (5.8)		
	2 (100)	0 (0)	2 (2.3)		
Husband status					
Not applicable (unmarried females)	7 (87.5)	1 (12.5)	8 (9.3)	0.4	0.54
Good	61 (78.2)	17 (21.8)	78 (90.7)		
Reason for procedure (MRM/BCS)					
A (MRM)	20 (100)	0 (0)	20 (23.3)	86.0	0.00
B (MRM)	22 (100)	0 (0)	22 (25.6)		
C (MRM)	26 (100)	0 (0)	26 (30.2)		
D (BCS)	0 (0)	18 (100)	18 (20.9)		
Decision change or not					
No	60 (76.9)	18 (23.1)	78 (90.7)	2.3	0.13
Yes	8 (100)	0 (0)	8 (9.3)		
Decision taken by					
Surgeon	68 (100)	0 (0)	68 (79.1)	86.0	<0.001
Surgeon + husband	0 (0)	10 (11.6)	18 (20.9)		
Patient + husband	0 (0)	8 (9.3)			

A means fear of radiation therapy; B means to avoid side effects of radiation therapy; C means fear of cancer recurrence; D means the feeling of losing a breast

DM, diabetes mellitus; HTN, hypertension; MRM, modified radical mastectomy; BCS, breast-conserving surgery;

Author Contribution All authors contributed to data analysis, drafting, and revising the article, gave final approval of the version to be published, and agreed to be accountable for all aspects of the work.

Data Availability Data analyzed during this study are included in this published article, and the remaining data cannot be shared due to patient confidentiality.

Declarations

Ethics Approval Approved from the Institutional Review Board.

Consent for Publication Informed consent to publish this research study was obtained from the participants.

Human Subject Informed and printed consent was obtained from the patients for being included in the study.

Payment/Services Info All authors have declared that no financial support was received from any organization for the submitted work.

Financial Relationships All authors have declared that they have no financial relationships at present or within the previous 3 years with any organizations that might have an interest in the submitted work.

Other Relationships All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Conflicts of Interest The authors declare no competing interests.

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