

The Role of Breast Conserving Procedures in Breast Cancer Surgery

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Abstract

Objective: Breast cancer treatment, especially surgery, has significantly changed in the last 30-40 years. In this study, we aimed to discuss all the possible options ranging from radical mastectomy to breast-conserving surgery (BCS), and to utilize the conclusion in our daily practice.

Methods: The study was retrospectively performed, and hospital records were used for quantitative data. The cases were classified into three groups. The cases having breast surgery in 1997 were included in Group A; in 2007, Group B; and in 2017, Group C. Surgical methods, BCS and mastectomy, in these cases were compared with rates according to groups and cancer stage.

Results: There were 515 cases in Group A, 519 in Group B, and 538 in Group C; and BCS was performed in 141, 238, and 372 cases, respectively (30%, 42%, 60.2%). Between Group A and C, a significant increase in the number of BCSs was observed. In the groups A, B, and C, BCS ratios according to stage (S) were as follows: S I: 57%, 73%, and 86%; S II: 49%, 75%, and 82%; and S III: 14%, 20%, and 48%. Subgroup analysis showed no BCS in S IV tumors in groups A and B. In Group, 18 patients (25%) who received neoadjuvant chemotherapy were performed with BCS.

Conclusion: Breast-conserving therapy is the standard approach in early-stage breast cancer. Compared to 20 years ago, the total number of patients undergoing BCS has increased >100%. Usually when the tumor is diagnosed, we make the treatment plan for breast cancer in the multidisciplinary tumor board. This increases the feasibility of BCS in all stages.

Keywords: Breast cancer, breast-conserving surgery, breast-conserving treatment, mastectomy

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INTRODUCTION

Surgery and the limitations of the surgeons in treatment of breast cancer have shown rapid and significant changes in the last 30-40 years. In the 1960s, radical and modified radical mastectomy (MRM) was performed to treat patients with breast cancer (1). Over the time, diagnostic methods as well as treatment options have changed. Radical surgeries have been replaced by breast-tissue-conserving procedure, namely, breast-conserving surgery (BCS). The breast-conserving surgery (BCS) concept, which was considered with caution in the 1990s, is now a priority in our day-to-day work in patients with early-stage breast cancer. Skin-sparing mastectomy and prosthesis use have also become popular because of their contribution to this field. Nevertheless, BCS stands out as the gold-standard approach with the impact of possible financial and medical costs.

When applied together, BCS and radiotherapy (RT) have equivalent results as those of mastectomy, which is also known as breast-conserving therapy (BCT). With the development of RT technique in this field as well as widespread use of chemotherapy, local recurrence has decreased. With the widespread use of scanning, the number of cancer cases detected in the early stages has also increased, and thus BCT applications have increased. The role of the surgeon has also become differentiated and specialized.

In this study, we aimed to discuss the all the possible treatment options ranging from radical mastectomy to BCS, and to utilize the conclusion in our daily practice.

METHODS

The research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects", (amend-

Table 1. BCS/mastectomy rates according to groups in 1997 (A), 2007 (B), 2017 (C)

Tumor stage (S)	S I	S II	S III	S IV	Medium total (%)
A	39/68	74/154	28/195	0/98	30
B	112/153	94/124	32/154	0/88	42
C	144/168	156/189	54/111	18/70	60.2

BCS: breast-conserving surgery

Table 2. BCS Rates according to stage (S): overall average in all groups

Group	S I	S II	S III	S IV
A- BCS (%)	57	49	14	0
B-BCS (%)	73	75	20	0
C- BCS (%)	86	82	48	25
Medium (%)	72	68	27	8.3

BCS: breast-conserving surgery

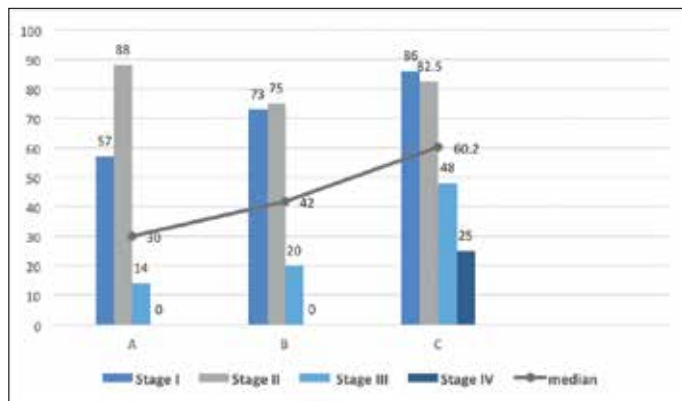


Figure 1. Breast-conserving surgery /total cases ratio by groups at each stage (%)

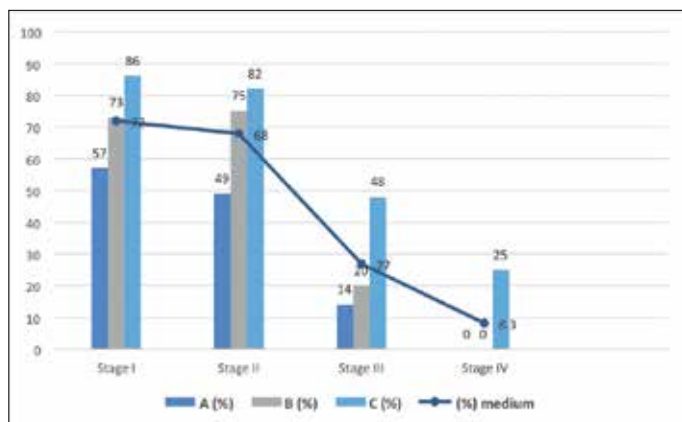


Figure 2. Breast-conserving surgery rates by stage in groups

ed in October 2013) and was retrospectively performed, hospital records were used for quantitative data. Ethical committee approval was not required because we did not use any organism or private data in our work.

To see the reflection of this change in our daily practice, three separate time frames separated by 10 years were selected. Cases who underwent surgery in 1997 were assigned to Group A, cases who underwent surgery in 2007 were assigned to Group B, and those who underwent surgery in 2017 were assigned to Group C. The method of surgical intervention (BCS and mastectomy) was compared according to the groups and the tumor stage. Changes in the breast cancer surgery in the light of the literature were reviewed.

RESULTS

In our hospital, 515 cases in Group A, including 68 Stage I, 151 Stage II, 195 Stage III, and 98 Stage IV cases, were operated for breast cancer in 1997. BCS was performed in 39 cases in Stage I, 74 cases in Stage II, 28 cases in Stage III; and mastectomy were performed in 29 cases in Stage I, 77 cases in Stage II, and 167 cases in Stage III. A total of 519 patients were in Group B, 153 were Stage I, 112 underwent BCS, and 41 underwent mastectomy; out of the 124 Stage II cases, 94 underwent BCS, and 30 underwent mastectomy; and out of the 154 Stage III cases, 34 underwent BCS, and 120 underwent mastectomy. A total of 98 Stage IV cases in Group A, and 88 Stage IV cases in Group B did not undergo BCS. According to the data of 2017, there were 538 cases. It was recorded that out of the 168 Stage I cases, 144 underwent BCS; out of the 189 Stage II cases, 156 underwent BCS; out of the 111 Stage III cases, 54 underwent BCS; and out of the 70 Stage IV cases, 18 underwent BCS. Also, 24 Stage I, 57 Stage II, and 57 Stage III cases underwent mastectomy (Table 1). The total BCS cases were 30% in Group A, 42% in Group B, and 60% in Group C (Figure 1). According to this information, the application rate of BCS increased by 100% between Group A and C after 20 years. BCS and mastectomy rates applied to all groups were also found to change over the time. In the subgroup analysis, the rates of BCT according to disease stage in groups A, B, and C were 57%, 73%, 86% for Stage I; 49%, 75%, 82% for Stage II; 14%, 20%, 48% for Stage III. In Stage IV, only Group C had BCS, and the rate was 25% (Table 2 and Figure 2).

DISCUSSION

The current status of breast cancer surgery is the result of a radical change. A multidisciplinary approach is essential for proper treatment of breast cancer. The surgeon is the physician to see the case for the first time, so he/she has a prognostic determinant effect; however, surgical treatment for breast cancer should be done by experienced surgeons using current knowledge and techniques with planning according to correct timing and the tailoring approach.

Breast cancer should be treated according to the biological behavior of the tumor. Although it has long been seen as a local disease, and has been treated with radical surgical applications with severe morbidities, organ-protective procedures have taken their place in terms of both women's physical and mental integrity.

The first person to advocate in the second century that breast cancer was a systemic disease, not a locoregional disease was Galen (1). However, he could not find many supporters, and

breast tissue was treated using local applications either with surgery or with cauterization. In the eighteenth century, Halsted (2) claimed that the disease occurred locally, that the lymph glands formed an early barrier, and therefore, he argued that the treatment was extensive surgery. Halsted (2) performed the first radical mastectomy operation in 1882, and published his work in 1894.

Since the experienced surgeons who could perform radical surgeries described by Halsted were fighting during the Second World War, breast cancer surgeries became the practice of inexperienced surgeons who could only perform simple mastectomy. After a long time, it was realized that these patients were alive and as healthy as those who had radical mastectomy. After this development, Halsted's hypothesis became open to debate (3).

Fisher et al. (4) study of tumor cells in 1963 showed that unlike healthy individuals, tumor cells led to distant metastases in the patients with cancer. This study was followed by the NSABP-B04 study. These were the first studies to demonstrate that the prognosis of breast cancer depends on the biology of the tumor. When the first five-year results of NSABP-04 were obtained, it was seen that N0-treated breast tissue might be equivalent to mastectomy when RT was added to preventive surgery, and the B06 study was planned (5). This study has been a milestone in the treatment of breast cancer with BCS + RT; that is, BCT has the same results as mastectomy has (5, 6).

On the other hand, since 1970, Veronesi has begun to work on this issue, and is considered the first to apply breast surgery in the form of quadrantectomy and axilla dissections (6). With the publication of this work, the BCT approach was accepted in many centers. A total of 701 patients with tumors smaller than 2 cm in size were randomized; one group had radical mastectomy (n=349), and the other had BCT (n=352); that is, complete axillary dissection (7, 8). Twenty years after these cases, the local recurrence rate in BCT was higher in the first years. In the radical mastectomy group, 8.8%-2.3% of the results were obtained ($p < 0.001$), and the difference was significant (7-9). However, the overall mortality rate was 41.7 versus 41.2 ($p = 1.0$), and breast-cancer-specific mortality rate was 26.1 versus 24.3 ($p = 0.8$), which was favoring BCT but was almost similar (9).

The NSABP-B06 study included 1851 cases with early-stage breast cancer with tumors smaller than 4 cm in size. These cases were divided into three groups: one group was randomized to mastectomy (n=589), one group was randomized to only lumpectomy (n=634), and one group was randomized to lumpectomy and additionally RT (n=628). In this study, level I-II axillary dissection was performed in each case. At the end of the study, the rate of local recurrence in patients with lumpectomy and RT were lower favoring lumpectomy (14.3% vs. 39.2%). The difference between lumpectomy+RT versus lumpectomy alone ($p < 0.001$) was significant, and accepted as a milestone showing the superiority of BCT. In this study, the rates of local disease-free ($p = 0.26$), distant disease-free ($p = 0.34$), and overall survival ($p = 0.57$) were similar among the three groups (10).

Over time, the indications in BCS and surgical margin concept in breast cancer treatment have undergone serious changes. During the first few years of BCS, the indications and contraindications were different. Segmental mastectomy for a single-foc-

cused T1 and T2 tumor with a favorable breast tumor ratio was accepted. The presence of in situ focus near the primary tumor, tumor located in the breast central, >3cm and/or multifocal tumor, definite Paget's disease, the surgical margin being <1 cm, the age of the patient, the patient's and the physician's preference, nodal involvement, and technical conditions of the hospital were considered as relative contraindications (4).

In our study, BCS was also given to the group with a 3-cm, single-centered tumor with no in situ component and a minimum surgical margin of 5 mm, preferably 1 cm.

In our study, Group A cases were selected from cases with unifocal, <3 cm, non-retroareolar-located tumors without in situ component, and where performed lumpectomy at least 5 mm, preferably 1 cm surgical margin. For that reason, in Group A, almost all of the cases in Stage I and II (57% and 49%) and in Stage III, only 14% had BCS.

In the EORTC 10801 trial, which was accepted as a case study between 1980 and 1986, <5 cm nodal involvement, MRM (n=442) and BCT cases (n=448) were compared. In the study that reported the results of 22.1 years of both groups, local control results of BCT group in the first few years were worse than those of MRM group; however, both groups had similar results in terms of total survival and distant metastasis (11). EORTC 10801 study and concurrently published Holland's study showed that local recurrence was more frequent in the tumor bed, especially around 2 cm, and Boost RT began to be added to BCT+all breast RT (11, 12). In a study comparing Boost and non-Boost cases, it was shown that together with the tumor's molecular structure, Boost RT was the most crucial factor for recurrence (13). After several studies showing that the additional dose of Boost RT in the tumor bed significantly reduced the likelihood of local recurrence, BCT was accepted as the standard practice for early-stage breast cancer as BCS + Whole Breast radiotherapy (WBRT)+ Boost RT (Intra-Operative Boost RT or external beam or brachytherapy) (14, 15).

The routine Boost RT treatment in our hospital and diagnosing breast cancer cases not only by one surgeon but together with the understanding of a multidisciplinary approach increased the number of surgeons who performed BCS in our clinic, and reached an average of 42% of the BCS in a series of Group B. In Group B, the BCS ratio increased by approximately 40% compared to Group A in all patients with breast cancer. This rate is lower than the rate in the world, which is over 60% (12, 13). In our opinion, the reason for the lower number of cases treated with BCS compared to the literature is the presence of our colleagues who claim that mastectomy is still the primary choice in tumors larger than 3 cm as well as the belief of our patients that they will be completely tumor free after mastectomy. Non-homogeneity of the surgeons who perform breast surgery may also be a reason. Cosmetic result is directly related to BCS's success, and the problems in this area can be overcome with oncoplastic surgery techniques.

Overall and disease-free survival in breast cancer is not only proportional to the surgeon's control, but it has been shown that BCS can be applied even in multifocal breast cancer in the case of systemic chemotherapy prior to surgery with a treatment program made at the stage of diagnosis (15). Based on the results of the randomized trials, the overall and disease-free survival rates

of patients with BCS in breast cancer are equivalent and/or better compared to mastectomy (15). Christiansen et al. (16) reported that overall and disease-free survival and the quality of life of BCS cases are superior to those of mastectomy cases based on the results of 10-year follow-up of a total of 58.331 patients diagnosed with breast cancer who had surgery in Denmark between 1995 and 2012 (27.143 mastectomies, 26.958 BCS, and 4230 BCS plus mastectomy cases). In this study, the mean relative risk of BCS was 1.08 (95% CI: 1.01-1.15) and 1.20 (95% CI: 1.15-1.25) after mastectomy (16).

With developments and the spread of screening programs in radiology, more cases can be diagnosed in early stage. Suggestions and information about the surgical procedure have changed significantly, that is, at the tumor border. New information on the concept of surgical margins for invasive cancer is: no ink on tumor. Thanks to this concept, today BCS can be performed without the need for extensive excision (15, 17). This has made it possible to perform conservative surgery for breast tissue in more cases, and contributed to achieving better cosmetic results. In our series, the number of BCS cases in Group C compared to Group B has increased by 42.8%. When Group A and Group C were compared, BCS rate was 30% was in the former, whereas in the latter, this rate was 60.2%. This represents an increase of 100.6%.

We are aware that the outcome of breast cancer treatment is not dependent on surgery, RT, or systemic treatment alone. The correct decision is only possible with the treatment planning according to the molecular structure of each tumor which is specific to the case. Sorting priority in the treatment plan may vary according to the case; initial treatment may be surgery or systemic treatment. Neoadjuvant chemotherapy (NAC) is most beneficial in hormone receptors (estrogen and progesterone) and human epidermal growth factor receptor 2 (HER2) negative (called "triple negative") and HER 2 (+++/+++) cases. In addition, NAC can also be applied to make it possible for BCS. To excise the correct area in case of full response and tumor regression in cases, who is receiving NAC, it is marked radiologically at the initiation of treatment, and the chance of performing BCS is preserved at the end of treatment in cases with full or partial response (18).

In our clinic, following histopathologic diagnosis, the treatment was planned keeping all options in mind, for Group C (partially in Group B) in a multidisciplinary breast council. Treatment for patient with breast cancer is initiated after the tumors are radiologically marked as cases of NAC due to the molecular structure or tumor size. For this reason, although BCS is not possible at the beginning, it may be re-staged after CT, and then the same patient can be well matched to BCS. This method was used in all of the cases of Stage III and IV that had surgery following NAC in 2017, and 25% in BCS could be performed.

The results of the studies on breast cancer have changed at an incredible pace in recent years. This type of cancer, which is considered a systemic disease, is dependent on the biological behavior of the tumor, and has a higher chance of treatment compared to that of others. Patients with breast cancer can live a long life.

Regardless of tumor size and stage, BCS and of course BCT is performed in more patients. The developments and studies on

BCT make it possible. More surgery does not mean being better. The prognostic significance of the surgeon is crucial because it is the first physician to see the patient in the case of breast cancer. This makes us responsible for the quality of life for patients and also effective as a surgeon. The most widely accepted guide, breast-cancer-related NCCN data, is updated every 3 months (19). Therefore, it is essential and necessary to update yourself as a breast surgeon. Breast cancer surgery should be performed by surgeons experienced in this area.

CONCLUSION

Breast conserving therapy (BCT) is the standard approach in the treatment of early-stage breast cancer. The total number of patients undergoing BCS increased >100% compared to 20 years ago. Usually when the tumor is diagnosed, we make the treatment plan for breast cancer in the multidisciplinary tumor board. This increases the feasibility of BCS in all stages.

Ethics Committee Approval: Author declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects", (amended in October 2013).

Informed Consent: Informed consent documents, obtained before treatment from each patient are available in patient files.

Peer-review: Externally peer-reviewed.

Conflict of Interest: The author has no conflicts of interest to declare.

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