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ORIGINAL ARTICLE

Breast-Conserving Surgery for Breast Cancer

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Abstract

Introduction: Breast cancer is notably significant as it is the most common cancer in women. Recent findings indicate that breast-conserving surgery (lumpectomy and axillary dissection) in early-stage breast cancer offers a long disease-free period and comparable overall survival to those undergoing mastectomy. This highlights the potential preference for breast-conserving surgery in early-stage breast cancers.

Methods: This study included 26 patients diagnosed with breast cancer at the SSK Izmir Training and Research Hospital General Surgery Service between 20/02/2001 and 11/11/2004. Factors such as medical considerations, cosmetic results, patient age, patient preference, mammographic findings, tumor size and number, condition of axillary lymph nodes, and histopathological findings were considered. Breast-conserving surgery was performed, followed by a retrospective analysis of these patients.

Results: This study analyzed local control and survival outcomes in 26 patients diagnosed with early-stage (Stage 1-11) breast cancer, with a median follow-up of 3.9 years between 20/02/2001 and 11/11/2004. The median follow-up period for the patients was 45 months. Quadrantectomy+axillary dissection was performed in 20 patients, and Lumpectomy+axillary dissection in 6 patients. All 26 patients received radiotherapy with a dose of 46-50 Gy (2 Gy/day).

Discussion and Conclusion: Reviewing the article with current publications, Lancet in December 2019 supports whole breast irradiation after breast-conserving surgery for early-stage breast cancer. A 2011 randomized controlled trial reported excellent long-term outcomes for invasive ipsilateral breast tumor recurrences following lumpectomy, particularly after radiation therapy and tamoxifen-sparing surgery. These findings strongly suggest that breast-conserving surgery combined with radiotherapy is equivalent to mastectomy.

Keywords: Breast cancer; breast-conserving surgery; radiation therapy.

Breast cancer is indeed a significant global health challenge. It is the most commonly diagnosed cancer worldwide, with an estimated 2.26 million cases recorded in 2020, and it is the leading cause of cancer mortality among females[1,2]. Therefore, examination for early diagnosis, advancements in screening methods, and determining the most appropriate treatment after diagnosis are central to current research. With the advent of new technologies, breast-conserving surgery (lumpectomy and axillary dissection) in early breast cancers can now be evaluated for its effectiveness over the long disease period and overall outcomes, similar to those of mastectomy[3]. This shifts the focus towards breast-conserving surgeries in early-stage breast cancers. In stage 1-11 lesions, mastectomy remains a valid and widely utilized treatment, along with breast-conserving treatment (BCT). While breast-conserving surgery (BCS) preserves cosmetically sufficient breast tissue, it also yields comparable results to mastectomy in terms of local control and survival.

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In our study, we investigated the outcomes of patients who presented at our hospital with various breast complaints, were diagnosed with early-stage breast cancer, and underwent breast-conserving surgery.

Materials and Methods

This study encompasses the outcomes of 26 patients who presented at the SSK Izmir Training and Research Hospital General Surgery Clinic between 2001 and 2004 for an early diagnosis of breast cancer and underwent their first breast-conserving surgical treatment. A retrospective study was conducted, considering factors such as medical reasons, cosmetic results, patient's age, patient preference, mammographic findings, tumor size and number, status of axillary lymph nodes, histopathological findings, and breast-conserving surgery.

Detailed anamneses, physical examinations, breast ultrasonography, and bilateral mammography scans were performed for patients who visited the I. General Surgery Department outpatient clinic with various breast complaints. Incisional and excisional biopsies were conducted for cases with suspicious lesions. Six patients were diagnosed with microcalcifications in mammography. Excisional biopsies were performed on areas marked by guide wires under mammographic guidance, confirming malignancy diagnoses.

Routine hematologic tests (hemogram, APTZ, PTZ, etc.), routine biochemistry, and detailed radiological examinations (PA chest X-ray, whole abdomen USG, bone scintigraphy, thorax and whole abdomen CT in suspicious cases, spot bone radiographs) were conducted for patients diagnosed with breast cancer and hospitalized. It was determined that none of the patients in the study had distant metastases.

Quadrantectomy + axillary dissection was performed on 20 patients, and Lumpectomy+axillary dissection on 6 patients; postoperative complications were evaluated. Systemic chemoradiotherapy and hormone therapy treatment protocols were determined and applied by our hospital's council in the postoperative period, and all patients were followed up in the 1st General Surgery Chemotherapy Unit post-treatment. Patients were scheduled for routine controls every 3 months for the first 2 years and every 6 months thereafter. During routine controls, hematological, biochemical tests, CEA, Ca 15-3, and metastasis screenings with PA chest X-ray and Whole Abdominal USG were conducted. All patients were annually followed up with mammography for other breast and breast cancer surveillance.

Bone scintigraphy followed by spot X-rays were performed for patients reporting bone pain. Contrast-Enhanced Abdominal CT was conducted for all patients with suspicious lesions identified by USG.

In this study, local control and disease-free survival outcomes of breast-conserving surgery in breast cancers were calculated. The results were grouped, calculating mean disease-free survival times and rates. The Mann-Whitney U test, a parametric test for "significance of the difference between two averages," was used for statistical calculation of mean disease-free survival time. The error probability was set at 0.05 ($p<0.05$ significant). Disease-free statistical analysis was performed using Fisher's Exact Chi Square test ($p<0.05$).

Results

In this study, the local control and survival outcomes of 26 patients diagnosed with early-stage (Stage 1-11) breast cancer between 20/02/2001 and 11/11/2004 were assessed, with a median follow-up period of 3.9 years. Univariate analysis of categorical parameters affecting disease-free survival was performed using the Mann-Whitney-U test. For cosmetic evaluation, 10 patients (0/0 39) with at least 3 years of follow-up were examined using both qualitative and quantitative methods. The median follow-up duration was 45 months (min: 6.1; max: 48.13 months). The mean age of the patients was 46.5±11.8 years, ranging from 33 to 62 years old (Table 1). Seventeen (65.6%) patients were pre- or perimenopausal, while 9 (34.4%) were postmenopausal. Quadrantectomy+axillary dissection was performed on 20 (76.9%) patients, and Lumpectomy+axillary dissection on 6 patients. The mean number of lymph node dissections is presented in Table 2.

Table 1. Age Distribution

Age Range	Number (n)	Percent (%)
33-39 years old	6	23
40-49 years old	11	43
50-59 years old	6	23
Over 60 years old	3	11

Table 2. Mean LAP Number of Patients Distributed by Menopausal Status

Menopausal Status	Patient (n)	Average of Total LAP Detected (n)
Postmenopausal	9	25.45
Pre-Perimenopausal	17	22.70
Total	26	24.25

ER and PR receptors of the 26 patients were evaluated according to their menopausal status. At a mean follow-up of 45 months, it was found that ER and PR status were not significant prognostic factors individually, but patients with ER(+) PR(+) had a statistically significant and independent disease-free survival rate (Table 3).

Eleven patients (43.2%) were in T1 stage and 15 (56.6%) in T2 stage. According to the MCC staging, 7 (27%) patients were Stage I, 13 (50%) Stage IIa, and 6 (23%) Stage IIb (Table 4). The distribution of masses according to localization is provided in Table 5.

Histopathologically, 22 patients (85%) were diagnosed with invasive ductal carcinoma, 2 (7.8%) with invasive lobular carcinoma, and 2 (7.8%) with combined (invasive ductal + lobular) type carcinoma (Table 6).

Table 3. Surgery and Receptor Status of the Patients

Surgery Type	Number of Patients (n)
Lumpectomy + Axillary Dissection	6
Quadrantectomy + Axillary Dissection	20
Receptor Status	
ER Receptor Positivity	18
PR Receptor Positivity	14

Table 4. Patient Groups by Stage

Stage	Patient (n)	%
Phase I	7	27
Phase IIa	13	50
Phase IIb	6	23

Table 5. Distribution of Masses by Localization

Localization	Number of Patients (n)
Upper Outer Quadrant	20 (77%)
Upper Inner Quadrant	3 (11.5%)
Lower Outer Quadrant	3 (11.5%)

All 26 patients received a dose of 46-50 Gy (2 Gy/day) radiotherapy. The overall survival rates at the end of the study were 88.4% at 3 years and 84.6% at 3.9 years. The local control rates were 92.3% for 3 years and 89.2% for 3.9 years. After a median follow-up of 3.9 years, the isolated intramammary recurrence rate was 6.3%, and the rate of simultaneous breast and distant recurrence was 7.7%. Factors negatively affecting local control in univariate analysis included being under 50 years of age (p=0.029), pre/perimenopausal status (p=0.034), tumor diameter over 2 cm (p=0.014), pathological diagnosis of invasive ductal carcinoma (p=0.016), dose below 50 Gy to the whole breast (p=0.050) and to the tumor bed (p=0.006), administration of radiotherapy post-chemotherapy (p=0.039), and hormone therapy post-radiotherapy (p=0.014). In multivariate analysis, age (p=0.0529) and histopathological diagnosis (p=0.0019) were significant.

Qualitative cosmetic results were excellent-good in 78.9% of cases, with a high correlation between qualitative and quantitative cosmetic evaluation methods. Factors negatively affecting qualitative cosmetic results in univariate analysis included non-specialized center operations (p=0.046), excision size greater than 200 cm^3 (p=0.040), tumor diameter over 2 cm (p=0.020), and Stage IIb (p=0.028). Quantitative cosmetic results were negatively affected by excision size over 200 cm^3 (p=0.001), use of the en bloc axillary incision method (p=0.034), large tumor diameter (p=0.006), N positive status (p=0.029), and Stage IIb (p=0.006). In multivariate analysis, excision size over 200 cm^3 (p=0.025) and tumor diameter over 4 cm (p=0.006) remained significant (Table 7).

Local recurrence occurred in 3 (10.8%) cases and distant metastasis in 3 (9%) cases, with an overall survival rate of 84.6%. The mean disease-free survival time was 32.8 months. No distant metastases were detected in cases with local recurrence during the follow-up period. Two patients died due to uncontrollable distant metastases. In our study, with a short follow-up period, we achieved 89.2% local control and 84.6% survival (Table 8).

Table 6. Number of Patients by Histological Types, Disease-Free Survival Rates and Mean Disease-Free Survival Times

Histological Type	Number of Patients	Local Control Rate (%)	Disease-Free Survival Rate (%)	Median Follow-up Time (Months)
Invasive Ductal Carcinoma	22	95.4	91.6	45
Invasive Lobular Carcinoma	2	50	50	45
Invasive Ductal + Invasive Lobular Carcinoma	2	50	50	45

Table 7. Tumor Size and Disease-Free Survival Time and Mean

Tumor Size (cm)	Number of Patients	Disease-Free Survival Rate (%)	Disease-Free Mean Survival Time (Months)
< 2 cm	20	83.3	44.4
2-5 cm	6	79.3	42.3

Table 8. Mean Disease-Free Survival and Disease-Free Survival Rates in Patients

Number of Patients	Disease-Free Survival Rate (%)	Local Control Rates (%)	Intramammary Recurrence Rate (%)	Breast and Distant Recurrence Rate (%)	Median Follow-up Time (Months)
26	84.6	89.2	6.3	7.7	45

Discussion

In our study, which had a short follow-up period and a small patient cohort, we found local control and survival rates of 89.2% and 84.6%, respectively. These figures are close to those reported in current studies[4,5]. Although not definitive, breast-conserving surgery followed by radiotherapy in Stage I and II breast cancers is increasingly being recognized as a viable combined treatment method. Unless specific circumstances necessitate mastectomy, the choice between mastectomy and breast-conserving surgery (BCS) is largely determined by the patient's condition and personal preference. The evidence that BCS and radiotherapy can provide similar survival rates as mastectomy has shifted the discussion towards other considerations in choosing between these two methods[6]. The advantage of BCS lies in its ability to preserve the aesthetic appearance of the breast[7]. However, its disadvantages include the time-consuming, expensive, and often challenging nature of radiotherapy, particularly if the patient resides far from the treatment center. Additionally, radiotherapy can lead to side effects such as swelling, pain, skin pigmentation, and fibrosis in the breast tissue[8,9].

In patients who are estrogen receptor (ER) positive, tamoxifen has been shown to produce similar reductions in local recurrence rates. Considering these findings, it can be inferred that lumpectomy and radiotherapy, along with the increased use of adjuvant therapy, can provide long-term local control. However, local recurrence of breast cancer necessitates a psychologically stressful second, often larger, excision or even mastectomy. To circumvent this possibility, surgeons should carefully consider the option of mastectomy as the initial treatment choice, which is also stressful for the patient. Ultimately, the decision is typically based on the personal preferences of both the patient and the doctor. Nevertheless, certain conditions, such as the presence of malignant calcification clusters on mammography, multiple primary tumors, or the inability to achieve tumor-free margins in excised tissue, necessitate the preference for mastectomy[10,11].

Wider excision or mastectomy is often necessary as significant involvement of surgical margins increases the risk of local recurrence. Ongoing studies are attempting to ascertain the risk of recurrence when there is only microscopic involvement in limited areas. It has been posited that the risk of recurrence after breast-conserving surgery (BCS) is correlated with tumor diameter[12]. Reports indicate that certain microscopic features of the tumor, such as poor nuclear grade or a diffuse intraductal component, elevate the likelihood of local recurrence, suggesting mastectomy as the preferable choice for tumors with these characteristics.

The fact that quadrantectomy, a method intermediate between total mastectomy and lumpectomy, provides better local control compared to lumpectomy, suggests that wider local excision increases the likelihood of achieving clean surgical margins. Therefore, if the excision is complete and a clean surgical margin is obtained, the aforementioned histopathological risk factors should not influence the choice of surgery. If there are no definitive contraindications, radiotherapy should be added to BCS. Patients should be informed that the risk of local recurrence increases without radiotherapy and that this risk can be mitigated only by mastectomy[13]. The cosmetic outcome of BCS depends on the ratio of the removed tissue to the total breast volume, not just the amount of tissue removed. In some cases, a tumor in a small breast may be too large for BCS to yield an acceptable cosmetic result. In such scenarios, recommending a mastectomy may be necessary.

Our study, in line with existing publications, supports the findings of the Lancet, which in December 2019 published long-term primary outcomes of accelerated partial breast irradiation after breast-conserving surgery for early-stage

breast cancer[14]. The long-term outcomes of invasive ipsilateral breast tumor recurrences after lumpectomy, as reported in a 2011 Randomized Controlled Trial by the J National Cancer Institute, indicate that while ipsilateral breast tumor recurrence increases the risk of death from breast cancer, radiation therapy and tamoxifen reduce ipsilateral breast tumor recurrence (I-IBTR) and are associated with breast-preserving effects for DCIS. These results suggest that the long-term prognosis post-surgery remains favorable[15]. In a study by Vispute et al.,[16] the use of intraoperative ultrasound was reported to reduce the rate of margin positivity compared to the traditional palpation-guided method.

Breast cancer constitutes one-third of all cancer cases in women[1]. From a young age, many women are taught to view the breast as a hidden and mysterious part of their body, often shrouded in social taboos against open discussion, visibility, and touch. Upon reaching puberty, this perspective typically evolves, and the breast becomes emblematic of femininity, acquiring sexual significance.

There have been significant advancements in the treatment of breast cancer. Thanks to early detection in a majority of patients and developments in radiotherapy and chemotherapy, extensive surgeries historically performed have been supplanted by less invasive techniques like skin-sparing and breast-conserving surgeries[3].

In treating breast cancer, as with all cancers, the primary goal is to eradicate the tumor tissue and save the patient's life. However, the challenges faced by breast cancer patients extend beyond those posed by the cancer diagnosis itself. The psychological impact of a mastectomy can be profound, often leading to a range of psycho-social issues such as depression and other affective disorders, loss of sexual desire, altered body image, fears of diminished femininity, anxiety about disease recurrence, difficulties in finding suitable clothing, and issues related to external breast prostheses[17,18].

The objective of breast-conserving surgery (BCS) is to remove the cancerous tissue in line with oncological principles while also achieving satisfactory aesthetic results[19]. The critical factor here is that these oncological principles are upheld. Achieving both goals without compromise requires a blend of oncological expertise and surgical proficiency.

Ultimately, the decision between mastectomy and breast-conserving surgery hinges on various factors: patient preference, surgical feasibility, and the patient's ability to undergo postoperative radiotherapy. Multifocal involvement, the inability to secure clean surgical margins, a large tumor-to-breast ratio, other factors that may result in poor cosmetic outcomes, and connective tissue diseases are among the contraindications for breast-conserving surgery.

Conclusion

The data, corroborated by researchers, strongly suggest that breast-conserving surgery combined with radiotherapy offers survival rates equivalent to those of mastectomy. In light of these findings, it is anticipated that, in line with the evolving global value system, physicians will focus not only on treating breast cancer but also on preserving and enhancing the quality of life of their patients. This holistic approach to care reflects a deeper understanding of the multifaceted impacts of breast cancer treatment, underscoring the importance of considering both physical and psychological outcomes. The growing emphasis on patient-centered care in oncology highlights the significance of this shift towards treatments that support not just longevity but also the overall well-being of individuals facing breast cancer.

Ethics Committee Approval: Before the beginning of the study, necessary permissions were obtained from SSK Izmir Training and Research Hospital. Ethical approval was obtained in accordance with the Declaration of Helsinki.

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