Comparison between Quadrantectomy and Modified Radical Mastectomy in Early Breast Cancer

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ABSTRACT

Background: Breast cancer (BC) has been the most frequent cancer among women worldwide, and it is the leading cause of cancer-related death. Nowadays, numerous surgical treatments are extensively employed in the management of BC, including full surgical resection of the breast (mastectomy) and breast conserving operations (quadrantectomy), which may or may not be accompanied by radiation.

Aim of the work: To analyze the optimal surgical management for early breast cancer through the comparison between quadrantectomy and modified radical mastectomy.

Patients and methods: A total of 60 women suffering from early breast cancer were diagnosed using precise criteria and were gathered from January 2021 to January 2022. In this study, we classified 2 groups: Group A: 30 patients prepared for quadrantectomy and Group B: 30 patients prepared for modified radical mastectomy.

Results: there is no significant difference between the two groups regarding age and BMI, tumor size and site, mass site in the breast, histopathology findings, grade and stage, complications and recurrence. When compared to the quadrantectomy group, the mastectomy group had significantly higher surgical time, loss of blood, and hospital stay. Disease free survival after 12 months in group A was 82.5% and in group B it was 94.2%, with a log rank test of 0.861.

Conclusion: When compared to modified radical mastectomy, quadrantectomy was more efficacious in the management of early-stage breast cancer, involving less surgery time and intraoperative blood and a reduced hospital length of stay.

Keywords: Breast Cancer; Early Stage; Optimum Operation; Quadrantectomy; Radical Mastectomy.

INTRODUCTION

Breast cancer represents the most frequent type of cancer worldwide and is the major cause of cancer mortality in women. In the year 2021, nearly 2 million new instances of breast cancer will be diagnosed. 1 In the United States, breast cancer represents the most frequent cancer among women, with ever-changing treatment guidelines. Breast cancer treatment often involves surgery, including breast conserving surgery or mastectomy. 2

As reported by the US Centers for Disease Control (CDC), breast cancer has been one of the most common causes of mortality among women worldwide. Estimates suggest that over one million women are diagnosed with breast cancer each year and that over 400,000 deaths have been attributed to this disease, which accounts for 14% of all breast cancer deaths in women. The unfavorable negative impacts of breast cancer therapy are one of the most motivating factors in the search for alternative methods. 3

The purpose of breast cancer management is to maintain one's quality of life while also extending one's average lifespan. The main forms of cancer treatment in men are surgery, radiotherapy and chemotherapy. 4 Medicines may frequently offer temporary symptomatic alleviation, prolong life, and sometimes treat illness. Targeted treatments, hormone therapy, radiotherapy, and surgery are all options for breast cancer treatment currently. Types of breast cancer surgery vary, depending on how much tissue is removed along with the tumor. It is based on the characteristics of the cancer, its spread, and the specific feelings of the patient. 5

A lumpectomy, also known as a partial mastectomy, is a surgical technique that involves removing a portion of the breast containing a malignant tumor, as well as some healthy tissue and lymph nodes, while
leaving most of the breast intact, as per the American Cancer Society.\(^7\) Early diagnosis and comprehensive treatment of CS are important for a good prognosis. However, the aesthetics of the breasts are seriously affected, although the MRM retains the large and small pectoral muscles.\(^8\)

Many types of surgery are currently being performed in British Columbia, including: B. Surgical excision of the entire breast (mastectomy) as well as breast-conserving procedures (quadrupletectomy), accompanied by radiotherapy or other means. The involves the removal of 2 x 3 cm of healthy tissues surrounding the tumor, as well as sufficient overlying skin and underlying fascia.\(^7\)

Breast reconstruction is usually performed during or following an operation to reduce the patient's psychological stress. Surgical techniques are usually associated with changes in appearance and surgical scars on the chest. Common conditions that may occur after BC surgery/chemotherapy include shoulder weakness, syndrome of post-mastectomy, axillary chordoma, chemotherapy-induced peripheral neuropathy, lymphedema, and postural disturbances.\(^8\)

Mastectomy is the most effective way to treat a case of already metastatic breast cancer where lumpectomy was inconclusive. Reports support that breast-conserving therapy is an acceptable treatment modality, and breast-conserving therapy has been recommended as the therapeutic choice for stage I and II breast cancer.\(^8\) Quadrantectomy with axillary node dissection associated with radiotherapy is the most commonly used method of conservative breast treatment.\(^9\)

The study aimed to reach optimal surgical management for early breast cancer through the comparison between quadrantectomy and modified radical mastectomy.

**PATIENTS AND METHODS**

**Study Population**

After receiving approval from the research and ethical committee, this study was carried out in the general surgery departments of Al-Ahzar University Hospitals and Al-Ahrar Teaching Hospital. The study runs from January 2021 to January 2022. Population of the study included Woman presented by early breast cancer aged from 20 to 60 Years. All patients participate in this study was given an informed written consent.

**Study Design and Study Interventions**

The sample size was 60 patients, divided into 2 equal groups. The study included patients with specific inclusion criteria: early breast cancer in female patients aged 20 to 60 years (stages I and II). While, the excluded criteria: Patients aged less than 20 years or more than 60 years. Advanced breast cancer stages III and IV. Recurrent breast cancer. Small breasts. Sixty patients are subdivided into 2 groups: Group A: 30 patients, prepared for quadrantectomy and Group B: 30 patients, prepared for modified radical mastectomy. The following will be done to each patient who participates in the study: A complete history is taken, and a clinical examination is performed, which includes a physical examination and specific investigations: Noninvasive Laboratory Exam: Complete Blood Count (CBC), Blood Grouping, Prothrombin time and International Normalized Ratio (INR), kidney and liver functions, blood glucose level, viral markers (HCV, HBV, and tumor markers). Radiological Examination: Breast ultrasound and mammography, MRI in selected cases and Metastatic work up. Invasive investigation: cutting needle biopsy, fine needle aspiration cytology, incisional or excisional biopsy, and hormonal receptors. Pre-operative preparation and informed consent, General anesthesia, Supine position, Group A quadrantectomy or wide local excision with axillary clearance and Group B modified radical mastectomy with axillary clearance. Closure with drain. Post-operative follows up: Post-operative complications as bleeding or wound infection, Duration of hospital stay and Histopathological Study to correlation. Follow-up: Mammograms at 6 and 12 months, Magnetic resonance imaging (MRI) 6 months after surgery and Tumor marker (CEA- CA15-3- CA27.29- CA 125) every 3 months.

**Statistical Analysis**

SPSS 22.0 for Windows (SPSS Inc., Chicago, IL, USA) and MedCalc 13 for Windows (MedCalc Software bvba, Ostend, Belgium) were used to collect, tabulate, and statistically analyze all the data. The Shapiro-Walk test has been performed to determine if the data has a normal distribution. Frequencies and relative percentages have been employed to represent qualitative data. The difference between qualitative variables has been calculated using the Chi square test (\(\chi^2\)) as well as Fisher exact as specified. For parametric data, mean ± SD (standard deviation) has been employed, and for non-parametric data, median and range have been used. For parametric as well as non-parametric parameters, the Independent T test and Mann Whitney test have been employed to determine the difference across quantitative variables in two groups. The Kaplan-Meier approach was employed for estimating event-free survival, and the log rank test was performed to compare survival curves (P values of ≤ 0.05 levels were deemed significant). All statistical comparisons have been two-tailed, with a P-value of < 0.001 indicating a highly significant difference, P ≤ 0.05 indicating a significant difference, and P > 0.05 indicating a non-significant difference.

**RESULTS**

**Comparison between Age and BMI**

After analysis, there were no significant differences in age and BMI among the two groups included in the study, with P values of 0.810 and 0.357, respectively (Table 1).
Table 1: Demographic data between the two studied groups

Comparison between tumor size and site

Our findings revealed that tumor size among Group A and Group B were significantly no differences between both groups with P value 0.237. Tumor Site group A the right 17 (56.7%) and the left 13 (43.3%), while in Group B 14 (46.7%) and 16 (53.3%) with no significant differences P value 0.438 (Table 2).

Table 2: Breast tumor size and site between both groups

Distribution among Quadrantectomy and Mastectomy

Our findings revealed that the distribution between quadrantectomy and mastectomy through upper and lower outer, upper and lower inner quadrant and subareolar with no significant differences P value 0.203 (Table 3 and Figure 1).

Table 3: Site distribution between the two studied groups

Histopathological Findings among Quadrantectomy and Mastectomy

All patient subjected to histopathological findings; through invasive and non-invasive, infiltrating duct carcinoma and papillary carcinoma with no significant difference P value (0.295) (Table 4 and Figure 2).
Table 4: Histopathology findings between the two studied groups

<table>
<thead>
<tr>
<th></th>
<th>Quadrantectomy (N=30)</th>
<th>Mastectomy (N=30)</th>
<th>χ²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-invasive duct carcinoma</td>
<td>6 (20%)</td>
<td>3 (10%)</td>
<td>3.71</td>
<td>.295</td>
</tr>
<tr>
<td>Invasive duct carcinoma</td>
<td>10 (33.3%)</td>
<td>14 (46.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infiltrating duct carcinoma</td>
<td>12 (40%)</td>
<td>13 (43.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Papillary carcinoma</td>
<td>2 (6.7%)</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Tumor grade and stage of the two studied groups

Fig. 2: Histopathology findings Site distribution between the mastectomy and quadrantectomy techniques

Fig. 3: Tumor grades between the mastectomy and quadrantectomy techniques

Figure (4) – N stage percentage between quadrantectomy and mastectomy techniques
Comparison between Operative time, Blood loss and Hospital stay
When comparing both groups; significant differences were observed in operative time (minutes), loss of blood (ml) and hospital stay (day) with a P value of (0.000) (Table 6).

<table>
<thead>
<tr>
<th>Operative time (min)</th>
<th>Quadrantectomy (N=30)</th>
<th>Mastectomy (N=30)</th>
<th>Test</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ±SD</td>
<td>53.81 ± 12.76</td>
<td>94.13 ± 14.35</td>
<td>11.5</td>
<td>.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blood loss (ml)</th>
<th>Quadrantectomy (N=30)</th>
<th>Mastectomy (N=30)</th>
<th>Test</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ±SD</td>
<td>40.71 ± 12.5</td>
<td>81.57 ± 14.7</td>
<td>11.6</td>
<td>.000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hospital stay (day)</th>
<th>Quadrantectomy (N=30)</th>
<th>Mastectomy (N=30)</th>
<th>Test</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ±SD</td>
<td>11.92 ± 2.39</td>
<td>14.79 ± 3.41</td>
<td>3.77</td>
<td>.000</td>
</tr>
</tbody>
</table>

Table 6: Operative data between both groups
Comparison between Postoperative complications
Our results observed that, site infection represents the highest percentages among both groups; group A 4 (13.3 %) and Group B (6.7%) non significance with p value (0.389). While, Seroma represents 3 (10 %) in group A and 1 (3.3%) in Group B non significant with P value (0.302), hematoma were 1 (3.3%) in group A and 2 (6.7%) in Group B non significance with P value (0.554) (Table 7).

<table>
<thead>
<tr>
<th>Seroma (N=30)</th>
<th>Quadrantectomy</th>
<th>Mastectomy</th>
<th>x2</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 (10%)</td>
<td>1 (3.3%)</td>
<td>1.07</td>
<td>.302</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Site infection (N=30)</th>
<th>Quadrantectomy</th>
<th>Mastectomy</th>
<th>x2</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 (13.3%)</td>
<td>2 (6.7%)</td>
<td>.741</td>
<td>.389</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hematoma (N=30)</th>
<th>Quadrantectomy</th>
<th>Mastectomy</th>
<th>x2</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (3.3%)</td>
<td>2 (6.7%)</td>
<td>.351</td>
<td>.554</td>
<td></td>
</tr>
</tbody>
</table>

Table 7: Postoperative complications between both groups
Recurrence among Quadrantectomy and Mastectomy
When comparing both group for the determination of recurrence after the surgical management among both operative techniques; there were non significant differences detected with p value (0.554) (Table 8).

<table>
<thead>
<tr>
<th>Recurrence</th>
<th>Quadrantectomy (N=30)</th>
<th>Mastectomy (N=30)</th>
<th>x2</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>2 (6.7%)</td>
<td>1 (3.3%)</td>
<td>.351</td>
<td>.554</td>
</tr>
</tbody>
</table>

Table 8: Recurrence between both groups
Disease Free Survival – Survival Analysis
On the basis of patient; the mean disease free survival were 12 months for quadrantectomy and mastectomy with survival rate (94.5%) and (82.5%). Patients who treated with quadrantectomy has significantly difference better than who treated with mastectomy RT (0.861) on survival analysis; Mean Group A (5.902) and Group B (3.724), Standard deviation (2.132) group A and (1.145) group B, 95% confidence interval [CI] 3.599 - 7.619 group A, 2.833 - 4.615 Group B with cum survival (0.100) for group A.

<table>
<thead>
<tr>
<th>Mean</th>
<th>SD</th>
<th>95% CI</th>
<th>Log Rank test</th>
<th>Survival at 12-months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>5.902</td>
<td>2.132</td>
<td>3.599 - 7.619</td>
<td>0.861</td>
</tr>
<tr>
<td>Group B</td>
<td>3.724</td>
<td>1.145</td>
<td>2.833 - 4.615</td>
<td></td>
</tr>
</tbody>
</table>

Table 9: Recurrence-Free Survival

Figure (5) - Breast cancer patients' Kaplan-Meier survival curve depicting recurrence-free survival.
Breast cancer (BC) represents the most frequent cancer in women and one of the main reasons for cancer-related death in developed countries. The study included 30 patients with early breast cancer who experienced conservative surgical procedures and 30 patients whose roots were damaged. The study was supported by a previous study that aimed at comparing the outcomes of breast cancer surgery. The current study was consistent with previous research that aimed to compare the outcomes of breast cancer surgery. The study included 30 patients with early breast cancer who were treated with quadrantectomy and mastectomy. A patient treated with a quadrantectomy showed no progression of breast cancer. Several reasons can explain this improvement in both mastectomy and quadrantectomy. Mastectomy has a low incidence in women with early breast cancer. According to the pathological examination, all breast lesions were considered primary precancerous lesions. The pathology of the lesions and pathological examination were important for BC management. In order to achieve optimal management for early breast cancer, further randomized controlled studies with greater sample sizes should be performed to improve the current understanding of the prognosis.

In terms of demographics between the two groups, the current study was able to compare the outcomes of breast cancer surgery. Regarding postoperative complications, the current research found no statistically significant differences across the two groups. The current study was performed on 60 women who were diagnosed with stage I breast cancer between the ages of 20 and 60. In the quadrantectomy group, 8 patients were treated with a quadrantectomy and 22 patients were treated with mastectomy. Regarding the main characteristics of breast cancer in women, the groups were matched for age, BMI, and anatomical stage. Regarding postoperative complications, we found no significant differences across the two groups. Regarding the main characteristics of breast cancer in women and one of the main reasons for cancer-related death in developed countries, the study included 30 patients with early breast cancer who experienced conservative surgical procedures and 30 patients whose roots were damaged. The study was supported by a previous study that aimed at comparing the outcomes of breast cancer surgery. The current study was consistent with previous research that aimed to compare the outcomes of breast cancer surgery. The study included 30 patients with early breast cancer who were treated with quadrantectomy and mastectomy. A patient treated with a quadrantectomy showed no progression of breast cancer. Several reasons can explain this improvement in both mastectomy and quadrantectomy. Mastectomy has a low incidence in women with early breast cancer. According to the pathological examination, all breast lesions were considered primary precancerous lesions. The pathology of the lesions and pathological examination were important for BC management. In order to achieve optimal management for early breast cancer, further randomized controlled studies with greater sample sizes should be performed to improve the current understanding of the prognosis.


