

Comparative Study of the Surgical Margins between Oncoplastic Breast Surgery and Quadrantectomy in Breast Conserving Surgery

Ali Abuseini MD FRCS, Nabeh Al-Kaisi MD***

ABSTRACT

Objective: To evaluate the oncological safety of oncoplastic procedures by studying the status of the surgical margins of the excised tumor specimen in comparison with standard quadrantectomies.

Method: This is a study that was conducted at Queen Alia Military Hospital (QAMH), Amman, Jordan, between January 2009 until August 2011. Fifteen consecutive breast cancer patients who underwent oncoplastic surgery (group 1) and 15 patients who underwent standard quadrantectomy (group 2) were studied with regard to the stage of breast cancer, the surgical procedures performed, the volume of breast tissue excised, and the histopathology of the tumor specimen, with specific details on surgical margins.

Results: Patients who underwent oncoplastic surgery (group 1) were younger (mean age 48.73 years) than patients who had a classic quadrantectomy (group 2; mean age 55.76 years). The mean volume of the excised specimen in group 1 was 188.2 cm³, compared with 101.6 cm³ in group 2. Surgical margins were negative in all 15 cases in group 1 and 14 out of 15 in group 2. The average width of the surgical margin was 9.2 mm in group 1 and 6.3 mm in group 2.

Conclusion: Oncoplastic breast cancer therapy achieved clear margin superior to standard quadrantectomy. This suggests that local disease control in oncoplastic breast surgery will be comparable with standard breast cancer therapy.

Key words: Breast cancer, Oncoplastic surgery, Quadrantectomy.

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Introduction

Oncoplastic breast surgery is a novel concept that combines a plastic surgical procedure with breast-conserving treatment to improve the final cosmetic results and adequate safety margin in breast cancer patients.

The dual goals of oncoplastic breast surgery are to increase the accuracy of local disease control and to maintain the breast shape and

appearance.^(1,2) Achieving both goals in the same operation may be a considerable challenge, depending on the tumor location and relative size in the breast. The primary aim of the breast cancer surgeon must always remain effective clearance of the breast cancer.

Oncoplastic surgery, which combines a plastic surgical procedure with Breast Cancer Therapy (BCT) is a new surgical approach that can allow

From the Departments of:

*General Surgery, Queen Alia Military Hospital, (QAMH), Amman-Jordan

**Pathology, Princess Iman Research and Laboratory Sciences Center, King Hussein Medical Center (KHMC), Amman-Jordan

Correspondence should be addressed to Dr. A. Abuseini, (QAMH), E-mail: dralifrcs@yahoo.com

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wide excisions but prevent breast deformities by immediate reconstruction of large resection defects. The procedures are mostly useful for resection of 20% to 40% of the breast in a group of patients normally treated by mastectomy.⁽³⁻⁵⁾ More importantly, multiple published reports have highlighted the oncologic safety of this approach.⁽⁶⁾ Theoretically, there are oncologic advantages to this procedure since this method has been shown to result in larger resective specimens than with partial mastectomy alone.⁽⁷⁾

Four features are integral to oncoplastic breast surgery: Appropriate surgery for cancer excision, partial reconstruction to correct wide excision defects, immediate reconstruction with the full range of available techniques, correction of volume and shape asymmetries relative to the contra-lateral healthy breast.^(8,9)

These are two fundamentally different approaches: (i) volume-replacement procedures, which combine resection with immediate reconstruction by using local flaps (glandular, fasciocutaneous, and latissimus dorsi mini-flaps) and (ii) volume-displacement procedures, which combine resection with a variety of different breast reduction and reshaping techniques, according to the location of the tumor.⁽¹⁰⁻¹⁵⁾

Several recent reports have demonstrated that oncoplastic techniques allow extensive resections for BCT and result in favorable oncological and aesthetic outcomes.^(4,5)

Pathologic margin status is one of the most important risks factors associated with ipsilateral breast tumor recurrences.⁽¹⁶⁻¹⁸⁾ Patients with focally positive margin show a relative risk of developing local breast cancer recurrence of almost 15 times compared with patients with negative margins.⁽¹⁹⁾ Residual breast carcinoma at the resection margins may also be a source of systemic spread and, ultimately, disease specific mortality.^(20,21)

To evaluate the oncological safety of oncoplastic surgical procedures, we performed a comparative descriptive study to analyze the histopathologic characteristics and, especially, the surgical margins in breast cancer specimens at the time of oncoplastic surgery by comparing them with specimens excised during standard quadrantectomy. We also compared the volume of the specimens excised during the two procedures.

Methods

This comparative descriptive study was conducted on 30 consecutive patients who underwent either a quadrantectomy or an oncoplastic operation at the surgical department in Queen Alia Military Hospital (QAMH) between January 2009 until August 2011.

These patients were divided into two groups: group 1, 15 patients who underwent oncoplastic procedures, and group 2, another 15 patients who received a standard quadrantectomy, and the following variables were recorded: age, tumor size, stage of breast cancer axillary lymph node status, surgical procedure, volume of breast tissue excised, and histopathology of the excised specimens, especially regarding the status of the surgical margins.

Patients were assessed as suitable for standard quadrantectomy (group2) if the tumor volume to breast volume ratio was estimated to be less than 20% in the upper outer quadrants of the breast, or less than 10% for lower medial quadrants tumors. Patients were selected for oncoplastic surgery (group 1) when the cosmetic outcome of the breast was likely to be poor if the expected breast volume excised was more than 20% and 10% at upper outer quadrants and lower medial quadrants of the breast respectively. Preoperatively mammography was reviewed with a qualified breast radiologist as shown in Fig. 1.

All patients in both groups were operated on by a breast surgeon; and all patients of both groups had complete axillary dissections that were accomplished by the same operating surgeon. In group 1, preoperative markings were made by the operating surgeon the day before surgery with the patient in standing position as shown in Fig. 2. Markings were drawn according to classic reduction mammoplasty techniques in 9 patients (both superior and inferior pedicle reductions) and lateral and medial mammoplasty in six patients. Tumor excision was performed with the aim of including the tumor with at least 2cm of healthy tissue far from the macroscopic margins as shown in Fig. 3, 4 and 5.

During breast reshaping, the glandular tissue was mobilized over the pectoralis major muscle and the resectional defect was filled up by opposing two glandular columns. Nipple/areola transposition was performed when necessary to

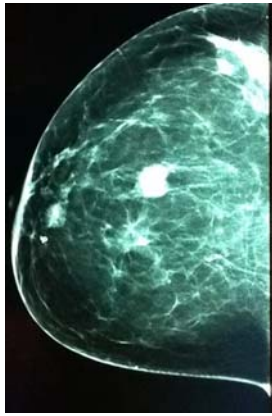


Fig. 1: Mammography for 51 year old female patient showing two speculated masses at the inferior quadrant of right breast



Fig. 2: Preoperative marking of the right breast



Fig. 3: Excised lower quadrant about 12 cm in diameter



Fig. 4: Peri-areolar de-epithelization excised



Fig. 5: The weight of the excised specimen is 586gm



Fig. 6: The breast shape immediately after surgery.

create an aesthetically acceptable breast as shown in Fig. 6.

Although, the contralateral reduction procedure on the healthy breast is an important procedure in oncoplastic breast surgery, none of our patients accepted the idea of this procedure.

Pathological Analysis

All specimens were inked by the pathologist before cutting. Formalin fixed and paraffin-embedded sections were stained with hematoxylin and eosin for routine examination.

We used a 2mm surgical margin as the cut off point for negative margins for the purpose of analysis in this study.⁽¹⁹⁾ Positive margins are defined as having tumor cells directly at the cut

edge of the specimen. Close margins are defined as having tumor cells between the cut edge of the specimen and the boundary defined as negative (<2mm). The volume of each specimen was calculated by multiplying measurement of the length, height, and width in cm³.

Results

The average age of patients in group 2 was 54.6 years (range 33-75 years) and in group 1 48.4 years (range 30-65 years). Patients undergoing oncoplastic surgery were considerably younger.

QSE superior external quadrant; QSI superior internal quadrant; QC central quadrant; QIE inferior external quadrant; QII inferior internal quadrant.

Table I: Location of the tumors in group 1 (oncoplastic surgery) and group 2 (quadrantectomy).

Variable	Group 1	Group 2
QSE	6	10
QSI	2	2
QC	2	1
QIE	3	2
QII	2	0

Table II: Tumor size in group 1 and group 2

Variable	Group 1	Group 2
pT1	8	6
pT2	7	9

Table III: Histology of Tumors in group 1 and group 2

Variable	Group 1	Group 2
Invasive ductal carcinoma	11	9
Invasive ductal carcinoma with extensive DCIS	2	3
Ductal carcinoma in situ DCIS	1	1
Invasive lobular carcinoma	1	2
Total	15	15

Table I shows the different tumor locations in the two groups. The commonest site of breast cancer is superior external quadrant in both groups (40% in group 1, 67% in group 2). Oncoplastic surgery was performed more often in patients with tumors located in the lower internal, lower external, central and superior inner quadrants (9 patients (60%) in group 1 compared to 5 patients (33%) in group 2).

The average tumor size determined pathologically for pT1 tumors was 1.6cm (range 1-2 cm) for group 1, and 1.4 cm (range 1-2cm) for group 2. The average tumor size for pT2 was 3.2cm (range 2.3-5 cm) in group 1 and 3.5cm (range 2.1-4.7cm) in group 2. Thus, both groups were similar in term of tumor size for pT1 and pT2 (Table II).

Specimen Volume and Margins

The mean volume of the specimen was 188.2 cm³ (range 55-560 cm³) in group 1 and 101.6 cm³ (range, 28-220 cm³) in group 2. Therefore, there was a larger volume of breast tissue excised in the oncoplastic surgery group.

In group 1, margins were negative in all 15 patients with close margin in one patient (6.8%), the average length of the surgical margin was 9.2 mm. In group 2, 14 patients had negative margins (93.2%) with close margins in two patients (13%), and one patient had (6.8%) positive

margin (DCIS) case. The average length of the surgical margin was 6.3 mm (Table III).

Discussion

Local recurrence following BCT has been shown to be impacted by multiple factors related to the patient and tumor characteristics, including patient age, tumor size, tumor grade, and presence of multifocal or multicentric disease.⁽²¹⁻²³⁾ However, the strongest predictor of local recurrence remains that of surgical margin status.⁽²⁴⁾ The Milan trial required quadrantectomy, which included 2-3 cm of normal tissue around the tumor plus the removal of overlying skin and underlying fascia.⁽²⁵⁾ However, no uniform agreement exists as to which patients require additional surgical excision for close surgical margins prior to adjuvant radiation therapy.⁽²⁶⁾

A Cochrane review found that an aesthetically acceptable limit for BCT was approximately 10% volume excision.⁽²²⁾ Tumor location is also important thus the relative tissue paucity medially allows up to 5% whereas the more voluminous lateral pole allows comfortable 15% reductions. Whilst there remain absolute indications for mastectomy, including widespread DCIS, multifocal tumors and recurrence, a significant proportion of breast cancers fall between these extremes, these necessitated an invention of a new technique to provide an adequate tumor extirpation and to preserve breast cosmesis, which stimulated the development of oncoplastic breast surgery. Oncoplastic breast surgery provides techniques to achieve good aesthetic results and symmetry while also providing possibility for wide excision margins. It is very well accepted by the younger female patients; this can explain the younger age of patients undergoing oncoplastic breast surgery in our study (a mean age 48.4 years) compared to patients undergoing quadrantectomy (a mean age 54.6 years).

In our study, oncoplastic breast surgery techniques were performed in patients with tumors in all locations. A similar distribution of tumors location was present in both groups. The amount of breast tissue excised during oncoplastic surgery was more than that excised during BCT in our study and in the literature,^(27,28) the average volume of specimens

after oncoplastic breast surgery group was 188.2 cm³ compared to 101.6 cm³ in quadrantectomy group.

We clearly demonstrated wider surgical margins in oncoplastic surgery group (a mean 9.2mm) in comparison to quadrantectomy group (a mean 6.3mm) which potentially enhances the oncological safety of the oncoplastic breast surgery. Our results are comparable with similar studies that were conducted by Kaur *et al.*⁽²⁹⁾ who reported a higher volume of tissue excised during oncoplastic procedure (200.2cm³ versus 117.5cm³, p=0.16). Furthermore, Giacalone *et al.* reported similar findings for volume excised, reporting mean specimen volume 190cm³ for oncoplastic procedures and 99cm³ for quadrantectomy.⁽³⁰⁾

None of our patients in this study had received neoadjuvant chemotherapy, since BCS after neoadjuvant chemotherapy needs special attention.⁽³¹⁾

In our study, we demonstrated oncoplastic breast surgery with wide surgical margins, however, our study consisted of 15 consecutive patients who underwent oncoplastic breast surgery in comparison to the similar number of consecutive patients who underwent quadrantectomy surgery: thus the total number of patients are small, and the follow-up was short, so to talk about the local recurrence is without any meaning. However, in the literature, the local recurrence in studies dealing with oncoplastic breast surgery with a mean follow-up up to years to 5 years by Raja *et al.* reported recurrence 3%,⁽¹¹⁾ Clough *et al.* reported a five year local recurrence of 9.4%, and five year survival rate of 95.7% for breast cancer treated with oncoplastic surgery,⁽⁵⁾ Reijnders *et al.* reported local recurrence rate of 3% and distant recurrence rate of 13%, with an overall survival rate of 92.5% over a median follow up of 74 months.⁽³²⁾

Conclusion

This study has shown that oncoplastic breast surgery can achieve clear margins superior to standard quadrantectomy in breast conserving surgery, suggesting that in selected patients oncoplastic BCT is a safe alternative to standard quadrantectomy. Further studies with larger number of patients and longer time of follow up are recommended.

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