

Correlation of the Oncoplastic Excision Volumes with the Aesthetic Outcomes for the Upper Outer Quadrant Breast Cancer

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ABSTRACT

Background: Oncoplastic breast surgery (OBS) has emerged as more advanced surgical approaches which combine the principles of both the oncological and plastic surgeries to achieve those advanced results and to expand the tumour size indication in front of the conservative management.

Methods: From July 2016 to March 2019, 200 patients presented with UOQ primary breast cancer including multifocal and post neoadjuvant cases with predicted excision volume (PEV) less than 35% were operated and enrolled in this prospective study. Aesthetic outcomes were objectively evaluated 6 months after surgery by the semi-automated Breast Cancer Conservative Treatment (BCCT) core software.

Results: Total aesthetic results according to the objective BCCT core assessment were excellent in 41.5% (83 cases), good in 29.5% (59 cases), fair in 19.5% (39 cases), and poor in 9.5% (19 cases). More than 90% of the patients with EEV less than 10% have achieved excellent aesthetic results; EEV from 10 to 15% has achieved more than 60% good results; EEV from 15 to 20% has achieved around 50% fair results which have been approached the 70% in the 20 to 25% group; more than 40% poor results were noticed in the 25 to 30% EEV which were raised up to 75% in the 30 to 35% EEV.

Conclusion: Excision volume ratio has become one of the main determinants of the aesthetic results; its preoperative value can refer to the most suitable oncoplastic surgical technique for each patient, expect the forthcoming discrepancy and the necessity for contralateral symmetrization. Current study has revealed the necessity of discrepancy corrective surgery or performing volume replacement reconstruction with the EEV more than 20% in the UOQ and from 15 to 20% in the fair results according to the patients' preference.

Key Words: Aesthetic outcomes – Oncoplastic surgery – Excision volumes – Upper outer quadrant – Breast cancer.

INTRODUCTION

Breast conserving surgery (BCS) has become the main surgical approach combined with radiotherapy for management of early breast cancer; statistical results has confirmed the same survival and local recurrence rates as modified radical

mastectomy with an eminent advance in the aesthetic outcome, psychological impact and quality of life [1-4].

Although this fact has a wide assent making the BCS the standard surgical management for the early breast cancer with a wide consensus on the safety of the oncological outcomes, there is still a growing race in the modern breast surgery to achieve more advanced and natural aesthetic results; this race has motivated the appearance of the oncoplastic breast surgery (OBS) as more advanced surgical approaches which combine the principles of both the oncological and plastic surgeries [5-9].

OBS has rapidly expanded to include many different surgical techniques classified into the volume displacement and replacement; it has gained wide popularity in many countries around the world with noticed flared rate of the annual performed procedures [10-12].

Traditionally, classic BCS was reserved for patients with tumor size of 5cm or less to permit a safe oncological resection with an acceptable aesthetic outcome; however, the emergence of the more important item of the tumour size ratio relative to the breast size and the continual advances in the neo-adjuvant regimens have expanded tumour size indication in front of the conservative management [13-15].

Many studies have revealed that up to 25-30% of the classic BCS procedures may result in poor aesthetic outcomes and have regarded those unacceptable results to the excision of more than 10-20% of the breast volume depending on the site of the tumour [16,17]; OBS has enabled breast surgeons to excise larger volumes from the breast and expanded those excision ratios for larger tumours excision (small breast - tumour ratio) with preser-

vation of good aesthetic outcomes [10,18-20]; however, the question which has been raised is “what are the correlation of those expanded excision volumes with the aesthetic outcomes for each breast quadrant?”

As the upper outer quadrant (UOQ) of the breast has been statistically established as the most common site for the development of the breast cancer and possesses most of the distributed breast tissue [21,22]; we have decided to find an answer of the former question for this quadrant.

PATIENTS AND METHODS

From July 2016 to March 2019, 200 patients presented with UOQ primary breast cancer including multifocal and post neoadjuvant cases with predicted excision volume (PEV) less than 35% and fulfilling the other eligibility criteria of the breast conservative therapy; were evaluated, consented, operated and enrolled in this prospective study. Preoperative determination of the PEV was done for all the patients from this mathematical equation introduced by Cochrane et al. [23]:

$$PEV = \frac{4 (\text{Radius of Lesion} + 1\text{cm})^3}{(\text{Radius of Breast})^2 \times \text{Height of Breast}}$$

Breast volume (BV) was calculated as an elliptical cone based on the preoperative medio-lateral oblique (MLO) mammographic view using this formula [23,24]:

$$BV = 1/3 \pi \text{ breast radius}^2 \times \text{Breast height.}$$

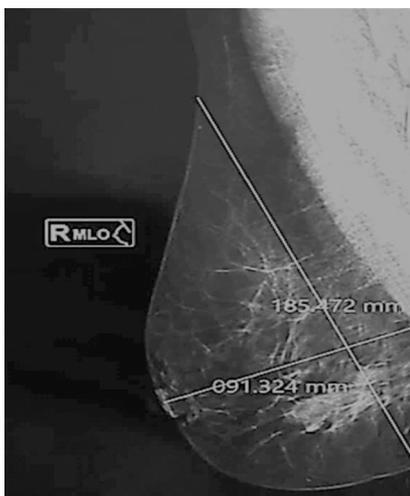


Fig. (1): MLO mammographic view showing the estimated breast radius and height.

Specimen volumes were measured after surgical excision by Archimedes (Water Displacement) method [25].

The estimated excision volume (EEV) was calculated by dividing the measured specimen volume (Archimedes method) by the calculated BV from the MLO mammographic view.

We have adopted two different volume displacement oncoplastic surgical techniques for our patients in this study including the round block technique for those who presented with small to medium sized breasts without major ptosis and have tumour within the 5cm periareolar area in the UOQ without nipple invasion and with no need for excision of the overlying skin. The other adopted technique was the racquet incision which was indicated for the patients presented with medium to large sized breasts without major ptosis and have tumour located outside the 5cm periareolar area in the UOQ, or in a need for excision of the overlying skin to achieve adequate safety margin. All tumours were excised with palpable safety margins of 1cm. Aesthetic outcomes were objectively evaluated 6 months after surgery and after adjuvant radiotherapy.

This evaluation was done by the semi-automated Breast Cancer Conservative Treatment (BCCT) core software presented by Cordoso et al. [26] using frontal two-dimensions digital photos that were taken by a single photographer using 12 megapixel digital camera; both flash use and asymmetric illumination were avoided using single light source standing at equal distances from both breasts with the use of a light coloured non-reflective background behind. Patients were stood at attention with their hands on their hips (standardized view). Our photographic framing was made to include the suprasternal notch above and the scale mark below (midline drawn point 25cm inferior to the suprasternal notch); this determined frame has controlled and standardized the distance between camera and patients, and maintained constant picture magnification.

Each photo was loaded on the BCCT. Core 3.0 software ® and the digital red dots were adjusted manually on the suprasternal notch, scale mark, nipples and axillae on both sides and the "Auto Adjust" button was pressed. Software automatically identifies the breast contour on both sides and adjusts the white digital dots over them and carries out automated measurements to calculate the overall aesthetic outcomes in the 4-point scale.

RESULTS

In this study, patients' age has ranged from 28 to 64 years old (mean 42.7±9.4 years), breast volume from 476 to 1170cc (mean 836.5±184.2cc),

specimen volume from 76 to 290cc (mean 150.3 ± 47.5 cc), PEV from 6 to 32.7% (mean 16.03 ± 3.72 %), and EEV from 7.5 to 34.5% (mean 18.29 ± 4.84 %); total aesthetic results according to the objective BCCT core assessment were excellent in 41.5% (83 cases), good in 29.5% (59 cases), fair in 19.5% (39 cases), and poor in 9.5% (19 cases).

Patients were divided into six groups according to the percentage of excision volume and the objective BCCT core aesthetic results were analyzed for each group (Table 1).

More than 90% of the patients with EEV less than 10% have achieved excellent aesthetic results;

EEV from 10 to 15% has achieved more than 60% good results; EEV from 15 to 20% has achieved around 50% fair results which have been approached the 70% in the 20 to 25% group; more than 40% poor results were noticed in the 25 to 30% EEV which were raised up to 75% in the 30 to 35% EEV.

Round block oncoplastic surgical technique was indicated for 123 patients and racquet incision for 77 patients. About 80% of the round block patients and 55% of the racquet incision patients have achieved acceptable (excellent and good) results.

Table (1): EEV groups and the BCCT core aesthetic results.

EEV	Excellent	Good	Fair	Poor	Total
Up to 10%	56 (92%)	5 (8%)	–	–	61 (30.5%)
10 to 15%	24 (37%)	41 (63%)	–	–	65 (32.5%)
15 to 20%	3 (10%)	11 (38%)	15 (52%)	–	29 (14.5%)
20 to 25%	–	2 (10.5%)	13 (68.5%)	4 (21%)	19 (9.5%)
25 to 30%	–	–	8 (57%)	6 (43%)	14 (7%)
30 to 35%	–	–	3 (25%)	9 (75%)	12 (6%)
Total	83 (41.5%)	59 (29.5%)	39 (19.5%)	19 (9.5%)	200

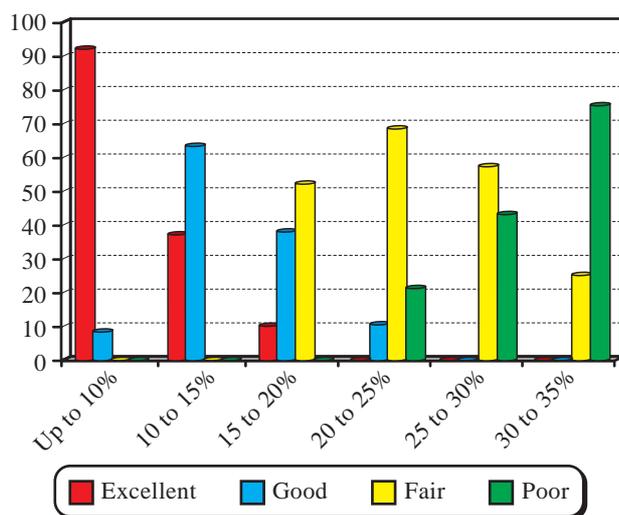


Chart (1): EEV groups and the BCCT core aesthetic results.

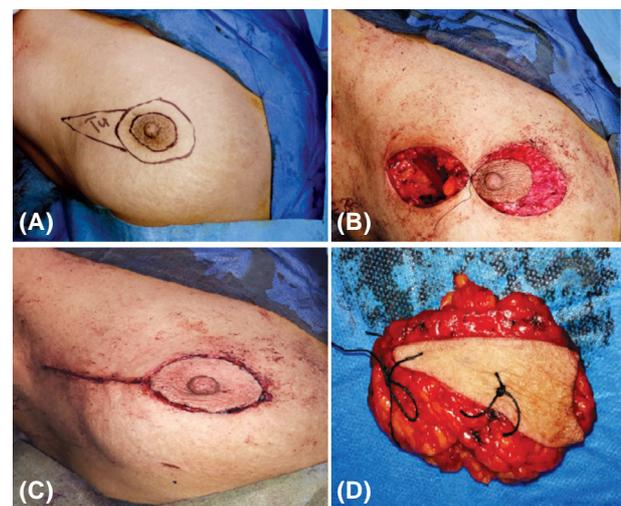


Fig. (2): On table photo (A): Tumour location, (B): After excision, (C): After reconstruction by round block technique, (D): Operative specimen.

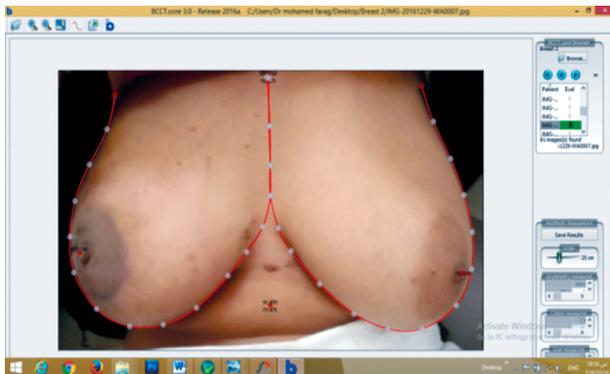


Fig. (3): Right side round block and excellent BCCT core result.

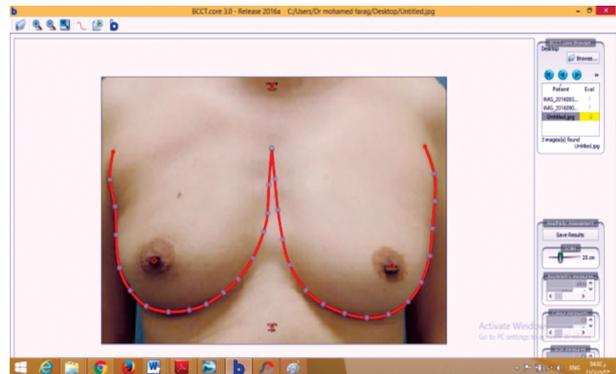


Fig. (4): Right side round block and good BCCT core result.

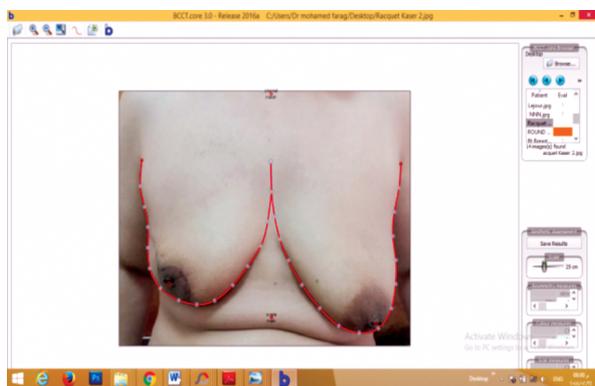


Fig. (5): Right side racquet incision and fair BCCT core result.

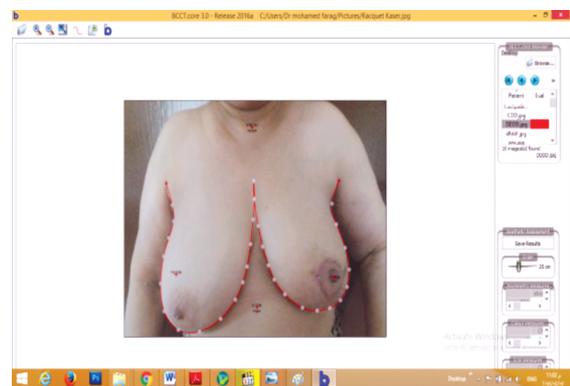


Fig. (6): Left side racquet incision and poor BCCT core result.

DISCUSSION

In the modern breast surgery, excision volume ratio has replaced the classic indication of the tumour size for breast conservation (5cm or less) and become one of the main determinants of the aesthetic outcome [27]; this ratio can be calculated prospectively to expect this outcome, determine the most suitable oncoplastic surgical technique for each patient and the need for contralateral symmetrization to augment the aesthetic results [23,28,29].

Our study has been designed to correlate the excision volumes of the volume displacement oncoplastic techniques for the UOQ breast cancer with the aesthetic outcomes before the contralateral symmetrization.

After review of the literature, Cochrane et al. [23] equation that have been proposed for calculating the PEV was adopted in this study, Archimedes' method [25] was adopted as a direct, easy and accurate method for evaluation of the specimens' volumes, and the proposed formulae that treats the breast as a cone depending on the dimensions

measured from the oblique mammographic film rather than the craniocaudal one was accepted as an accurate and readily available method for measurement of the breast volume [30].

Many different methods for the postoperative aesthetic assessment have been mentioned in literature; some depend on the patient's self-evaluation or the observer evaluation representing the subjective methods and others depend on the physical and the photographic measurements to represent the objective methods [31-35]; we have intended to depend on the objective method (BCCT core software) [26] to review our results excluding the possibility of subjective bias.

In the current study, total aesthetic results according to the objective BCCT core assessment were excellent in 41.5% (83 cases), good in 29.5% (59 cases), fair in 19.5% (39 cases), and poor in 9.5% (19 cases); those results were in close correspondence with the results of the systematic review (36) that has included 25 studies evaluating the aesthetic outcomes of the OBS for breast cancer patients (n=1,962) and revealed excellent, good,

fair and poor outcomes in 55.2%, 31.0%, 9.4% and 4.4% of the patients respectively.

According to the aesthetic results of the current study for each EEV group, EEV up to 10% from the UOQ of the breast gives 90% excellent results and those patients are not in a need for contralateral symmetrization as the produced discrepancy has a little effect on the aesthetic outcome.

EEV from 10 to 15% gives excellent and good results at rates of about 40% and 60% respectively and those results are also in no need for discrepancy correction.

EEV from 15 to 20% has given acceptable results (excellent in 10%, good in about 40%, and fair in about 50%); however, fair results in this group still can be improved by the discrepancy corrective procedures taking into consideration the patients' preference.

Most of the patients with EEV more than 20% have achieved unacceptable aesthetic results which should be improved by the contralateral symmetrization or by performing the surgical excision with replacement reconstruction instead of the displacement techniques.

Many previous studies [37-41] have suggested that excision of more than 20% of the breast volume has a clear risk of deformity, unacceptable aesthetic results, psychological morbidity, and contralateral symmetrization or volume replacement surgery should be considered for this excision ratio.

Conclusion:

Over the last two decades, the aesthetic deformities that have faced both patients and surgeons after standard BCS have motivated the appearance of OBS which has enabled breast surgeons to excise larger volumes and achieve advanced aesthetic outcomes. Excision volume ratio has become one of the main determinants of those aesthetic results; its preoperative value can refer to the most suitable oncoplastic surgical technique for each patient, expect the forthcoming discrepancy and the necessity for contralateral symmetrization to augment the aesthetic results. Current study has revealed the necessity of discrepancy corrective surgery or performing the surgical excision with volume replacement reconstruction instead of the displacement techniques with the EEV more than 20% in the UOQ and from 15 to 20% in the fair results according to the patients' preference.

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