Full Length Article

Outcome of different oncoplastic surgical (OPs) techniques for centrally located breast cancer (CLBC)

A. Moustafa, I. Fakhr *

Surgical Oncology Department, National Cancer Institute (NCI), Cairo University, Egypt

Received 21 September 2014; revised 7 October 2014; accepted 22 October 2014
Available online 15 November 2014

Abstract Background: Oncoplastic breast surgery is a standard treatment of early breast cancer, offering a balance between good cosmetic outcome and limited risk of locoregional recurrence, by enabling proper resection margins.

Aim of study: To present multiple techniques of partial breast reconstruction following the resection of centrally located breast cancer (CLBC) resection.

Patients and methods: From January 2011 to August 2014, 21 patients underwent central quadrantectomy for carcinoma of the central region of the breast. Excisions included the nipple/areola complex, in most of the cases, down to the pectoralis fascia with a wide safety margin, and proper axillary management. Oncoplastic approaches included latissimus dorsi flap, inferior pedicle flap, Melon slice, Grisotti and round block techniques.

Results: Mean age of patients was 49.5 ± 10.61 years. Tumor size ranged from 1.5 to 4.5 cm. Postoperative pathology revealed a tumor mean safety margin of 2.5 ± 0.83 cm, with positive axillary lymph nodes in 15 (75.0%) patients. Nineteen (95.0%) patients received postoperative breast radiotherapy, while 9/20 (45.0%) and 3/20 (15.0%) received adjuvant chemotherapy or hormonal therapy, respectively, and only 8/20 (40.0%) patients received both therapies. During a median follow-up period of 14.89 months, neither local nor distant metastasis, were detected. The postoperative cosmetic result evaluated by the patients was excellent in 6/20 patients (30.0%), good in 11/20 patients (55.0%), fair in 3/20 (15.0%) with neither poor nor bad results, with an overall mean of 4.0 ± 0.5 equivalent to 80% satisfaction.

Conclusion: Multiple oncoplastic breast surgery techniques can be used for the resection of CLBC with satisfying cosmetic outcomes.

© 2014 Production and hosting by Elsevier B.V. on behalf of National Cancer Institute, Cairo University.

Introduction

Oncoplastic breast surgery (OBS), which combines the concepts of oncologic and plastic surgery, is becoming a...
norm-of-practice treatment of early breast cancer, especially in Western countries [1–6].

There are two fundamentally different approaches for breast defect management in OBS: (1) volume-displacement procedures, which combine resection with a variety of different breast adjacent tissue rearrangements and mammoplasty techniques, reduction (inferior pedicle, and Melon slice techniques) and reshaping (round-block technique, Grisotti flap, etc.) techniques [7,8], and (2) volume-replacement procedures, which combine resection with immediate reconstruction by using loco-regional flaps [9,10]. In all cases, this can be combined with simultaneous or delayed correction in the contralateral breast to achieve better symmetry [11].

The volume-displacement procedures were then sub-classified by Clough et al. [12,13] into two levels: (I) Including excision of less than 20% of breast volume, without either skin excision nor mammoplasty; (II) Including anticipated resection of 20–50% breast volume, with excision of excess skin required to reshape the breast based on mammoplasty techniques.

However, volume-replacement procedures are still possible to use, in small or medium size breasts, even if only 20–50% of the breast volume is anticipated to be resected [14].

Nevertheless, patients with centrally located breast tumors (CLBT), who account for 5–20% of breast cancer cases, have been routinely denied, and for a long time, the opportunity for breast conservation [15], strikingly, the NSABBP (B06) undertaken by Fisher and his colleagues [16] and including 1843 patients did not report one single case of central tumor as candidate for conservative therapy. Moreover, in their retrospective analysis of the NSABBP, Fisher et al. [17] reported 11.1% incidence of pathological infiltration of the nipple. It is not until later, when other authors addressed the relation of pathological NAC involvement to local and distant failures and most of them reported no effect on local recurrence, disease free or overall survival rates, whether mastectomy or breast conservation therapy were carried out [18,19].

Furthermore, when central quadrantectomy was first applied, cosmetic results were not very satisfactory to many authors [20–23]. It was not before numerous researchers tried their best that the first cosmetically satisfactory results began to appear, to mention the latissimus dorsi (LD) myocutaneous flap by Nogushi et al. [24], Calderoli [25], Calderoli and Piat [26], and the Grisotti [27] flap, followed by many other emerging techniques, among which, we have chosen a variety to explore in this study.

Patients and methods

During the period from January 2011 to July 2014, twenty-one patients with central breast carcinoma were treated with oncoplastic surgery.

Preoperatively all patients underwent physical examination of both breasts and axillae as well as bilateral mammograms and ultrasonography of both breasts. Histopathological diagnosis of cancer was made prior to surgery using ultrasound guided core needle biopsy. The planned procedure was discussed with patients, and their approval was documented.

Surgical techniques

Tumors present at the retro-areolar region, or encroaching on it, underwent central quadrantectomy including excision of the nipple/areola complex (NAC) down to the pectoralis fascia (Fig. 1). Following surgical excision, the breast specimen was marked with sutures by the surgeon to retain orientation. Surgical margins were determined by macroscopic and histologic examination of frozen sections of the breast specimens in the operating room. An adequate safety margin of 1 cm was always insured.

Breast reconstruction was done using one of the following techniques

A. Volume-displacement procedures

– Inferior pedicle technique [27] which consists of a key-hole excision, including the NAC, followed by an inferior advancement pedicle carrying skin from the inferior pole of the breast on the upper half of the pedicle. It was applied in patients with relatively large sagging breasts, (size C or D) and was accompanied with contralateral inferior pedicle reduction mammoplasty, if patient wished.

– Grisotti mastopexy technique [28] which consists of central quadrantectomy with mobilization of an inferior based comma-shaped flap, with rounded skin island to fill the gap. This technique was kept for patient with relatively smaller lesions in moderate size breasts (B).

– Melon slice [10,27] which consists of a central horizontal elliptical excision, including NAC, with direct closure. It is a safe, simple, and quick technique, which was used whenever the central tumor was located in a more superior or lateral position, in patient with ptotic moderate to large size breasts (size B or C), convenient for use in co-morbid patient.

– Round block technique (or Donut Mastopexy Resection) [11] which consists of the excision of a circumareolar rim of skin around the NAC, wider at the tumor location, with direct closure. It was used for smaller lesions, possibly within the areolar/peri-areolar zones, which are at least 25 mm deep to the NAC, in almost all breast sizes. This technique, although initially used for lesions in the upper half of the breast, enabled the excision of a wide subareolar resection margin for all peri-areolar lesions.

B. Volume-replacement procedures:

– Latissimus dorsi (LD) myocutaneous flap was used to reconstruct the elliptical horizontal defect of a central quadrantectomy, in patients with relatively large tumors in small-medium (size A or B) sized breasts and minimal ptosis, who cannot afford to lose the volume associated with volume displacement techniques, or who wish to avoid mastectomy.

C. All patients who underwent nipple-areola complex (NAC) resection were offered, 6–12 months following radiation therapy, areola and nipple reconstruction by means of tattooing followed by central de-epithelialized local flap, respectively.

Patients presenting with radiologically confirmed clinical axilla, had sentinel lymph node biopsy (SLNB), using patent blue and/or radiolabelled colloid. Combined intradermal peri-areolar and peri-tumoral injection techniques was used. Patients with positive SLNB or radiologically detected lymph nodes in the axillae received level I and II dissection. Axillary
lymph node dissection (ALND) was completed in whenever positive one or both axillary lymph nodes levels were accoutered.

All patients with expected remarkable discrepancy between the two breasts post excision, were offered the option of, simultaneous or delayed reduction mammoplasty of the contralateral breast for better symmetry.

Pathological evaluation

All specimens were oriented and subjected to histopathology and immunohistochemical examination including ER, PR, Her-2-neu and ki-67. Margins were regarded as negative when permanent histological examination found no cancer cells within a distance of 2 mm from excised tissue surface.

Postoperative follow-up

Postoperative clinical follow-up was done at three months intervals and included palpation of the breast and axilla. Tumor marker (CA 15-3), mammograms, and ultrasonography were done according to the standard protocol. MRI was done when needed.

Cosmetic outcome

The postoperative esthetic result was evaluated asking the patients to rate the postoperative cosmetic result and their degree of satisfaction compared to the preoperative breast using a five-point scale (excellent, 5; good, 4; fair, 3; poor, 2; bad, 1) [29]. Objective assessment of the cosmetic result was done by two surgeons and a trained nurse, rated on a visual analog scale from 1 (unacceptable result) to 10 (excellent result). Evaluation was based on 5 criteria, namely: breast symmetry, glandular tissue defects, nipple and areola reconstruction, scar quality and/or retraction, and the resultant breast shape.

Results

Mean age of patients was 49.5 ± 10.61 years, and the median was 48 years (range from 32 to 70 years). The different procedures are presented in Table 1. One of the patients from the latissimus dorsi group had a small contralateral breast lesion, for which she underwent a breast conserving resection type I (Fig. 1). Only one patient, who underwent resection using inferior pedicle flap, requested a contralateral inferior pedicle reduction mammoplasty (Fig. 2). All 19 patients who underwent NAC resection were reluctant to undergo the tattooing process, 6–12 months following the end to chemo-radiotherapy, as previously planned.

Surgical complications

There were 5/20 (25.0%) postoperative complications. Three (60.0%) patients with LD reconstruction had back seroma at the donor site, which was treated by aspiration, while a fourth (20.0%) patient had partial flap loss. One (20.0%) patient with inferior pedicle reconstruction had a partial skin dehiscence, which required secondary sutures. However, only the last 2 (10%) of our patients had a delay in their adjuvant treatment for four and two weeks, respectively.

Pathological results

Pathological evaluation revealed a mean tumor size of 2.9 ± 0.95 cm, with a median of 3 cm (range from 1.5 to 4.5 cm). Tumors were staged as pT1 in 4 (20.0%) and as pT2 in 16 (80.0%) patients. All surgical safety margins were negative with a mean of 2.5 ± 0.83 cm and a median of 2.4 cm (range from 0.8 to 4.0 cm). Surgical margins of 2–4 cm were almost always the deep ones, since pectoralis fascia was reached in all resections. Only one patient revealed positive margin with ductal carcinoma in situ (DCIS), on paraffin section, although it was negative on frozen section, and had to be completed to modified radical mastectomy, with immediate reconstruction using extended LD flap, consequently, patient was excluded from the study. Eighteen tumors were invasive duct carcinoma (IDC) (90.0%), while 2 (10.0%) were invasive lobular carcinoma (ILC), and all, were moderately differentiated (95.0%), except one which was undifferentiated Table 1.

Thirteen (65.0%) patients had positive axillary lymph nodes, all staged as pN1; while the other 7 (35.0%) where staged as pN0. Among the last, only one patient presented with a clinically negative axilla, SLND was done using combined technique, and proved to be negative, and the ALND was abandoned.
Fig. 2  Retro-areolar breast cancer of the left breast treated by central quadrantectomy and inferior pedicle flap reconstruction on left side, with contralateral inferior pedicle reduction for symmetrization: (A) preoperative mapping, (B) intra-operative view of de-epithelialization of the flap, and (C) one month postoperative view. The result was assessed by the patient as 3/5 (good result) and objectively by 7/10 (good result).

Fig. 3  Retro-areolar breast cancer of the right breast treated by central quadrantectomy and Grisotti technique for reconstruction: (A) preoperative mapping, (B) intraoperative, and (C) immediate postoperative view (from another patient). The result was assessed by the patient as 4/5 (good result) and objectively by 6/10 (good result).

Fig. 4  Retro-areolar breast cancer of the right breast treated by central quadrantectomy and Melon slice technique for reconstruction: (A) preoperative mapping (B) immediate postoperative (C) 12 months postoperative views. The result was assessed by the patient as 4/5 (good result) and objectively by 6/10 (average result).

Fig. 5  Retro-areolar breast cancer of the right breast treated by central quadrantectomy and round block technique for reconstruction: (A) preoperative mapping with injected patent blue traces for SLND, with two weeks lateral (B) and coronal (C) postoperative views. The result was assessed by the patient as 5/5 (excellent result) and objectively by 10/10 (excellent result).
Outcome of different OPs techniques for CLBC

## Oncological outcome

All patients completed their treatment and follow-up plans. Nineteen (95.0%) patients received postoperative breast radiotherapy, while 9/20 (45.0%) and 3/20 (15.0%) received adjuvant chemotherapy or hormonal therapy, respectively, and only 8/20 (40.0%) patients received both therapies. During a median follow-up period of 14.89 months, neither local nor distant metastasis, were detected. We report no deaths among our patients.

## Cosmetic outcome

The postoperative cosmetic result evaluated by the patients was excellent in 6/20 patients (30.0%), good in 11/20 patients (55.0%), fair in 3/20 (15.0%) with neither poor nor bad results, with an overall mean of 4.0 ± 0.5 equivalent to 80% satisfaction.

The postoperative cosmetic result as evaluated by 3 professional investigators on a 10 point scale was marked 10 in 1/20 patients (5.0%), 9 in 1/20 patients (5.0%), 8 in 7/20 patients (35.0%), 7 in 5/20 (25.0%), 6 in 4/20 (20.0%), and 5 in 1/20 (5.0%), and 4 in 1/20 (5.0%), with a mean of 7.2 ± 1.35 equivalent to 72% satisfaction. Patient dissatisfaction was explained by scar presence, keloid scar, minimal breast shape asymmetry and NAC absence or asymmetry. Objective was dissatisfaction based by absence of NAC, keloid scar, minimal breast shape asymmetry, and scar retraction.

## Discussion

Patients with centrally located breast cancer (CLBC) account for 5–20% of breast cancer cases and, for a long time, they have been denied breast conservation surgery (BCS) and instead been conventionally treated with mastectomy [15]. The high incidence of NAC involvement associated with these tumors necessitates, usually, NAC resection together with an adequate safety margin around the tumor, which has yielded non-satisfactory cosmetic results [30]. In cases where NAC was not involved, Flierl and Hanker [31] reported satisfactory results using central segmental mastectomy with preservation of NAC and volume displacement, however, they also noticed that NAC distortion was a very common cosmetic deformity.

The mean tumor diameter in this study was 2.9 ± 0.95 cm, conferring with the reported Egyptian patients being 2.9 cm [32]. The incidence of ILC was 10% comparable to the reported incidence in Egypt as 6–7% [32]. The incidence of positive axillary nodes was 65.0%, which is almost equal to the reported incidence with breast cancer in Egypt 63% [33].

In this study we report 25% complicated cases, this is more than other authors who reported 5–26% [13,34,12,35]. However, since most of these were just seroma, only 2 (10%) of our patients had a delay in their adjuvant treatment for two and four weeks, respectively.

In this study we reported one case of involved margin, this is lower than other authors who reported up to 13.1%, which can be explained by our large safety margin with a mean of 2.5 ± 0.83 cm which was insured in this study, and the better histology that we encountered, with only one case of DCIS, a major cause for involved margins [13]. Nevertheless, we have chosen to re-operate our single patient with immediate total reconstruction rather than adopting a conservative pathway as did other authors [13].

In this study, we did not report any cases of local recurrences or distant metastasis, as usually reported by other authors [13], this can be explained by the small number dictated by the relative rarity of the CLBC, not exceeding 9% of breast cancer cases [36]. Another cause might be the short time of follow up, which actually was not one of the main intentions of this effort. However, it worth mentioning in this context that, other authors reported in extended series of 298 patients treated with OBS, 5-year recurrence-free and overall survival rates of 93.7% and 94.6%, respectively [12].

Despite the resultant smaller volume following OBS, the shape and the form of the breast is preserved. Most patients do not request, or require, further surgery for cosmesis. The techniques used mainly involve direct incisions. These scars are rarely conspicuous because they become less visible after radiotherapy; however, they are much longer than usual lump-ecotomy scars, and patients should be warned of this drawback [13].

Only one of our patients agreed to undergo contra-lateral mammoplasty for symmetrization, this was true whether this option was offered synchronously with tumor ablation, for fear of bilateral scarring and disfigurement, or even when it was offered as a delayed procedure, most probably because of the patients being tired from previous surgery and long exhausting radiotherapy and chemotherapy being reluctant to go through an additional “disputable” surgical intervention, this is similar to what has been reported by other Egyptian colleagues [37].

Moreover, all patients were reluctant to undergo a NAC reconstruction, though it is a much simpler procedure if compared to contralateral symmetrization, this was also reported by other not only Egyptian colleagues, but also Italian authors [38], which insinuates that simple preservation of the breast mound for a feminine body contour is the most essential requirement for women, especially in relatively conservative societies.

In this study, the cosmetic result was evaluated by patients as excellent in 6/20 (30.0%) patients, good in 11/20 (55.0%) patients, with an overall mean of 4.0 ± 0.5 equivalent to

### Table 1 Different surgical procedures.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oncoplastic procedure (n = 21*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latissimus dorsi flap</td>
<td>6</td>
<td>28.6</td>
</tr>
<tr>
<td>Inferior pedicle flap</td>
<td>8</td>
<td>38.1</td>
</tr>
<tr>
<td>Grisotti procedure</td>
<td>3</td>
<td>14.3</td>
</tr>
<tr>
<td>Melon slice technique</td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td>Round block technique</td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td>Nipple resection</td>
<td>19</td>
<td>90.5</td>
</tr>
<tr>
<td>Axillary management (n = 21*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SLND</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>ALND</td>
<td>20</td>
<td>95.2</td>
</tr>
</tbody>
</table>

SLND: sentinel lymph node detection; ALND: axillary lymph node dissection.

a One case of inferior pedicle flap was completed to modified radical mastectomy due to DCIS.

b Fig. 3.

c Fig. 4.

d Fig. 5.
80% satisfaction. This is worse than the results reported by other authors who reported excellent up to 80%, and good up to 20% [39,40]. This can be explained by the fact that all patients, although they were reluctant to undergo a NAC reconstruction, considered its absence as a defect in the overall cosmetic outcome. On the contrary, the objective evaluation had a mean of 7.2 ± 1.35 equivalent to 72% satisfaction, which was even slightly lower than the cosmetic result, when graded by independent observers. This relative higher satisfaction rate by patients, than professionals, was commonly reported by other authors, and may not necessarily be based on objective criteria but due to the fact that breast cancer patients have an initial fear of losing their breast, hence their satisfaction by its simple preservation. [41].

Conclusion

Multiple oncoplastic breast surgery techniques can be used for the resection of CLBC with satisfying cosmetic outcomes, however, these techniques need tedious training, and good matching with both, the tumor location, and the size of the breast.

Disclosure statement & conflict of interest

The author denies any actual or potential conflict of interest; financial or otherwise.

References


