Oncoplastic Breast Surgery Using Latissimus Dorsi Miniflap

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Abstract

Background: Breast-conserving surgery plus radiotherapy is firmly established as a good and safe option for most women with early breast cancer. Cosmoses after Breast-conserving surgery depend on two main factors: the site of the lesion and the breast volume excised in relation to total breast volume. Latissimus dorsi miniflap is one of the various autologous tissue reconstructions that can replenish loss of more than 25% of breast volume. The aim of our study is to evaluate the aesthetic outcome and complications of breast reconstruction using latissimus dorsi miniflap augmentation after wide local excision of the tumor combined with axillary lymph node dissection.

Patients and Methods: The study involved twenty eight patients with breast cancer underwent conservative breast surgery in the form of wide local excision with safety margin with immediate reconstruction using Latissimus dorsi mini-flap either by muscle only or musculocutaneous flap. Neoadjuvant chemotherapy was given in some cases to reduce the tumor size and after surgery; all cases received eligible adjuvant therapy.

Results: Most of the patients (71.4%) were having T2 tumor, while (14.3%) of the patients had T1 tumor and (14.3%) had T3 tumor. Neoadjuvant chemotherapy was given for 14 patients with overall response rate about 76.7%. Wide local excision with safety margin with immediate reconstruction using latissimus dorsi mini-flap was done. Seventeen patients had reconstruction with muscle only, while 11 patients had reconstruction by musculocutaneous flap. A deeply satisfied cosmetic result was achieved in (82.1%) and none of them subsequently required mastectomy. After median follow-up of 28 month, the progression free survival was 92.9% and the over all survival was 96.4%. No local recurrence was recorded.

Conclusion: Breast augmentation with autologous tissue comes into play by reducing the resultant deformity when the breast volume excised is significant. The Latissimus dorsi flap is the mainstay of oncoplastic breast surgery after partial mastectomy and it has low donor site morbidity, deep patient satisfaction and low and temporary radiation effects.

Key Words: Breast conservative surgery – Breast cancer – Oncoplastic breast surgery – Latissimus dorsi.

Introduction

BREAST-Conserving Surgery (BCS) plus radiotherapy is firmly established as a good and safe option for most women with early breast cancer [1]. Resection of the primary cancer with microscopically free margins yields 20 year disease free and overall survival outcomes similar to mastectomy [2,3]. Cosmoses after BCS depends on two main factors: The site of the lesion and the Breast Volume Excised (BVE) in relation to total breast volume. Thus when BVE is more than 20%, cosmoses and patient satisfaction are adversely affected and it may be associated with poor psychological adjustment after breast cancer treatment [4,5]. Satisfactory cosmetic results can be achieved by developing plastic surgery techniques immediately after tumor excision with good guarantees for an appropriate oncologic resection [6,7]. Of the various autologous tissue reconstructions for post-excision defects in conserved breasts, the Latissimus Dorsi Miniflap (LDMF) is steadily gaining popularity among non-plastic breast surgeons. The LDMF replenishes loss of more than 25% of breast volume allowing conservation of most of the natural breast tissue that otherwise would have been impossible from an oncological standpoint [8,9]. The aim of our study was to evaluate the aesthetic outcome and complications of immediate (LDMF) breast reconstruction following a Wide Local Excision (WLE) of the tumor combined with axillary dissection.

Patients and Methods

From January 2008 till January 2010, 28 female patients with breast cancer were carefully selected.
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from out-patient clinic of Surgical Oncology Department, South Egypt Cancer Institute and underwent conservative breast surgery in the form of Wide Local Excision (WLE), axillary lymph node dissection and immediate reconstruction using Latissmus Dorsi Mini Flap (LDMF). The age of the patients ranged from 25 to 65 years with a follow-up period ranging from 24 to 48 months and a median of 28 months.

All patients were evaluated clinically and radiologically with exclusion of patients not eligible for conservative breast surgery and those patients with tumors in the inner half of the breast.

Approximate estimate of the breast volume was by bra-cup size + clinical size + size of tumor on mammogram/ultrasound. Depending upon the discernible size and location, those patients who were suitable for and who preferred WLE over mastectomy were informed about LDMF reconstructions and gave their informed consent after discussion of the (LDMF) reconstruction procedure and its potential complications and the possibility of secondary procedures.

Seventeen patients had reconstruction with muscle only, while 11 patients had reconstruction by musculocutaneous flap. LDMF was used to reconstruct central and lateral quadrant resection defects, replacing the volume excised with autogenous tissue.

The affected quadrant was accessed then the tumor was gripped digitally and a (WLE) with a minimum of 2cm away from the palpable margin of the tumor was carried out. The specimen thus included tumor with surrounding normal breast tissue, subcutaneous fat and pectoralis fascia. Axillary dissection was adequately performed through the superolateral end of the incision or through a separate incision. We used the transversely oriented incision for our patients and LDMF was raised with the patient in the lateral decubitus position with a 90º abducted shoulder. Preoperatively the bra strap area and the inframammary crease were marked out with the patient standing. When skin was needed, the transverse skin paddle was marked on the back by the pinch technique along the desired line. The incision went down to the subdermal layer. The plane of dissection then continued along the subcutaneous plane just above Scarpa's fascia leaving at least one cm-thick native skin flaps. The thoracodorsal vessels are kept intact during axillary dissection. Its anterior border was then separated carefully from the underlying serratus anterior muscle. The insertion of the muscle into the intertubercle groove on the humerus was either totally or in some cases subtotally divided to keep the pedicle protected and at the same time to minimizes the axillary bulk which would be caused if whole insertion were to be left. The thoracodorsal nerve was divided to avoid contraction of the muscle.

The miniflap was then fixed in place without tension and the wound closed over suction drains to the wound and axilla.

Tumors characteristics, breast specimen weight, postoperative sequelae and oncologic outcome were assessed. Quality of life measurements and objective assessments of aesthetic outcome were evaluated.

The aesthetic results were assessed independently by the patients and two surgeons. The assessment by surgeons was determined by evaluating the preoperative and postoperative photographs for breast shape and contour, definition of the inframammary fold and the anterior axillary line, the creation of inferior fullness, the degree of symmetry to the other breast and the quality of the scars. The patients' aesthetic evaluation was based on their subjective satisfaction with the shape of the new breast, the degree of symmetry to the contra lateral breast, its consistency and the quality of the scars. The aesthetic results have been ranked into three categories by the surgeons: Good, satisfactory and fair and satisfaction of patients has been classified into three levels: Deeply satisfied, satisfied and poorly satisfied.

Chemotherapy:

Eligible patients (14 patients) received adjuvant chemotherapy. Chemotherapy regime was six cycles of anthracycline based chemotherapy (FAC). FAC (5-fluorouracil 500mg/m², adriamycin 50 mg/m², and cyclophosphamide 500mg/m²) were given bolus intravenous every 3 weeks.

In cases of T3 tumor or clinically palpable axillary lymph nodes patients and those with positive axillary lymph node by axillary ultrasound examination (14 patients) had received (FAC) as a neoadjuvant chemotherapy. Chemotherapy was given until maximum response to be followed by surgery and then patients complete the remaining chemotherapy cycles after surgery. Tumors who did not respond received alternate chemotherapy regimen in the form of paxlitaxel 175mg/m² every 3 weeks.
Patients with hormonal receptor positive tumors received adjuvant hormonal treatment in the form of tamoxifen 20mg daily. All patients were under regular follow-up until the end of the study.

Radiotherapy:

Radiation target volume was the breast and supraclavicular region if indicated. The supraclavicular region extended from the level of cricothyroid groove to sternal angle. The superior border of the chest wall and breast matched with the lower border of the supraclavicular field. The lower field border was at 1 cm below the mammary fold. The medial border was set at midline, while the lateral border was set at mid-axillary line. Three dimensions planning were used for all patients.

Results

From January 2008 till January 2010, 28 female patients with breast cancer underwent conservative breast surgery in the form of WLE with safety margin with immediate reconstruction using LDMF. The age of the patients ranged from 25 to 65 years (mean 45yrs) with a follow-up period ranging from 24 to 48 months (median 28ms), body mass index range was 21-33kg/m² (mean 27), operative time was 2.5-3.5 hours (mean 3hrs) and hospital stay was 5-21 days (mean 13 days).

The site of the tumor was in the upper outer quadrant in 16 patients, lower outer quadrant in 8 patients and central in 4 patients. Twenty patients had the mass in the right breast while 8 patients had left breast mass. Most of patients had T2 tumor size (71.4%) and four patients (14.3%) had T3 tumor. Tumor diameter ranged from 23 to 55mm (median 31mm) with a safety margin ranged from 15 to 30mm (median 23mm). The weight of the resected specimens ranged from 85 to 305g (median 125g). Other tumors characteristics are shown in (Table 1).

Seventeen patients had reconstruction with muscle only while 11 patients had reconstruction by musculocutaneous flap. None of patients who underwent central resection performed secondary nipple and areola reconstruction.

Four patients had T3 tumor size and received neoadjuvant chemotherapy to down size the mass before the operation. Three out of 4 patients showed good response with decrease in the size of the mass, while one patient had no response, he received taxanes and the mass was stable in size even after paclitaxel. Ten patients with clinically palpable axillary lymph nodes received neoadjuvant chemotherapy; the lymph node became clinically impalpable in 7 patients, which was confirmed by axillary ultrasound in 6 patients. The over all response rate for neoadjuvant chemotherapy was 76.7%.

As regard the aesthetic outcome Figs. (1-6) of immediate (LDMF) breast reconstruction, the results scored by the patients and the surgeons is illustrated in (Table 2). Satisfactory cosmetic result was achieved in all and none of patients subsequently required mastectomy.

Regarding flap related complications, partial flap necrosis occurred in 2 patients (7.1%), while lymphorrhoea and wound breakdown each occurred in 3 patients (10.7%). Partial flap necrosis and wound breakdown were treated by debridement and secondary suturing. In the donor site, the most common complication was seroma which occurred in 5 patients (17.8%) and was treated by repeated aspiration in outpatient clinic. Five patients (17.8%) had temporary limitation of shoulder movements postoperatively but all recovered completely within few weeks.

Patients who received chemotherapy, non of them developed deterioration of cardiac function which necessitate treatment interruption or change of the planned regimen. No Grade III or IV non hematological toxicity has been encountered except for nausea and vomiting in (35%) of our patients and alopecia in 55% of our patients. Regarding hematological toxicity we encountered Grade II neutropenia in only one patient. No toxic deaths occurred in this study.

Postoperative radiotherapy was given, with minimal toxicity in the form of radiation pneumonitis, which necessitates treatment with steroid in 3.6% of our patients, while Grade II radiation dermatitis was 17.3%. Neither chemotherapy nor radiotherapy were compromised or delayed in any case. Chemotherapy and radiotherapy was given without significant toxicity.

After median follow-up of 28 month, the progression free survival was 92.9% and the over all survival was 96.4%. One patient 27yrs old with original stage T1 N1 M0 developed contralateral breast cancer, which was detected as T 1 N0 lesion after 21 months of follow-up. She was managed by subcutaneous mastectomy and immediate reconstruction with latissimus dorsi flap and silicon implant. Another patient with pretreatment stage T3 N1 M0 and G3, she developed pulmonary metastasis at the 19th month of follow-up. No local recurrence was recorded.
Table (1): Tumor characteristics.

<table>
<thead>
<tr>
<th>Tumor characteristics</th>
<th>Number of patients</th>
<th>Percentage (%)</th>
<th>Scoring by patients and surgeons</th>
<th>Number of patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tumor stage:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage T1</td>
<td>4/28</td>
<td>14.3</td>
<td>Patients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage T2</td>
<td>20/28</td>
<td>71.4</td>
<td>Deeply satisfied</td>
<td>23</td>
<td>82.1%</td>
</tr>
<tr>
<td>Stage T3</td>
<td>4/28</td>
<td>14.3</td>
<td>Satisfied</td>
<td>5</td>
<td>17.8%</td>
</tr>
<tr>
<td><strong>Lymph nodes:</strong></td>
<td></td>
<td></td>
<td>poorly satisfied</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Positive</td>
<td>24/28</td>
<td>85.7</td>
<td>Surgeons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>4/28</td>
<td>14.3</td>
<td>Good</td>
<td>21</td>
<td>75%</td>
</tr>
<tr>
<td><strong>Tumor grade:</strong></td>
<td></td>
<td></td>
<td>Satisfactory</td>
<td>5</td>
<td>17.9%</td>
</tr>
<tr>
<td>Grade 1,2</td>
<td>22/28</td>
<td>78.6</td>
<td>Fair</td>
<td>2</td>
<td>7.1%</td>
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<tr>
<td>Grade 3</td>
<td>6/28</td>
<td>21.4</td>
<td></td>
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</table>

Fig. (1): Left side breast cancer in the lower outer quadrant just lateral to the retroareolar area.

Fig. (2): Circum areolar incision through which the LDMF used for augmentation grasped by an artery forceps.

Fig. (3): Postoperative cosmetic outcome.

Fig. (4): Postoperative appearance after LDMF reconstruction of the left breast.

Fig. (5): Postoperative appearance of both breasts.

Fig. (6): Postoperative appearance of back scar.

Table (2): Aesthetic outcome of the studied cases.

<table>
<thead>
<tr>
<th>Patients</th>
<th>Number of patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deeply satisfied</td>
<td>23</td>
<td>82.1%</td>
</tr>
<tr>
<td>Satisfied</td>
<td>5</td>
<td>17.8%</td>
</tr>
<tr>
<td>poorly satisfied</td>
<td>0</td>
<td>0.0%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Surgeons</th>
<th>Number of patients</th>
<th>Percentage (%)</th>
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</thead>
<tbody>
<tr>
<td>Good</td>
<td>21</td>
<td>75%</td>
</tr>
<tr>
<td>Satisfactory</td>
<td>5</td>
<td>17.9%</td>
</tr>
<tr>
<td>Fair</td>
<td>2</td>
<td>7.1%</td>
</tr>
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</table>
Discussion

During the past 40 years breast-conserving surgery had been developed greatly and the breakthrough publications were two prospective randomized trials showing that resection of the primary cancer with microscopically free margins yields 20-year disease-free and overall survival outcomes similar to mastectomy [1-3]. The extent of excision and margin involvement are therefore strong predictors of local recurrence [10-12], thus in an attempt to reduce local recurrence in BCS, a significant volume (often more than 25%) of breast tissue can be lost. The subsequent cosmetic results of BCS can be worse than those of a mastectomy and this is yet an argument by many in favor of mastectomy [13-16]. Oncoplastic procedures combine the best principle of resection with the best principles of reconstruction, to achieve wide tumor free margins while optimizing the cosmetic outcome [17]. The use of a Latissimus Dorsi Muscular Flap (LDMF) to replace the volume loss after major breast sector resection is an option where the tumor to breast volume ratio is large [17-19].

In the current study we used LDMF to reconstruct defects in the lateral and central quadrants which are suitable sites for the arc of rotation of this miniflap. We used LDMF in two forms either muscular (60.7%) or musculocutaneous (39.2%) when there is a need to construct the skin as well, as in case of parenchmal lesion <2cm form the skin or secondary to badly design biopsy scar which we founded in 8 cases, all were performed outside the institute.

When skin was required to reform breast contour, the skin paddle was designed in a transverse direction along bra line and we were still able to harvest enough fat from the scapular and lumbar regions. It is to be noted that the choice of the skin design varies from one surgeon to another [20-22]. We founded the transverse scar to be less deforming and quite acceptable to patients as it can be hidden underneath the bra.

The overall patient satisfaction in our study was high as 23 patients (82.1%) were deeply satisfied and five (17.8) were only satisfied, and more also the quality of Life results showed high patient satisfaction. This favorable cosmetic result therefore, justifies the use of LDMF reconstruction in our practice for augmentation after WLE. The main advantage of such method is the creation of natural breast ptosis, this also mentioned by other studies [23-25].

On the other hand, the results were graded as being slightly less favorable by the surgeons due to their more critical look searching for mild asymmetry, existence of skin paddle or postoperative radiation morphologic changes on the flap. Although the tissue edema and fibrosis were more severe in the early post-irradiation period, the reconstructed breasts got softer with time and most patients were satisfied.

Patients in this study who had mild to moderate asymmetry were very reluctant to undergo simultaneous or delayed contralateral breast surgery. Similarly, Delay et al., reported that the majority of their patients did not agree on contralateral breast surgery [20]. It is well noted that completion of nipple/areolar reconstruction improves patient aesthetic satisfaction with their breast reconstructions [26]. On the other hand, a large number of patients may just be satisfied by the newly constructed breast mound and may refuse the option of nipple and areola reconstruction [27]. None of the patients whom underwent central resection in this study were willing to undergo nipple and areola reconstruction.

Nevertheless, dorsal flap necrosis is a potential problem and it has been variably reported by several authors. Chang et al., [15] reported 16% necrosis rates in 75 patients while Delay et al., [20] reported 3% incidence in 100 patients. In this study, no cases developed dorsal flap necrosis.

The most frequent complication was donor-site seroma, with a rate (17.8%) comparable to those published by Munhoz et al., [21] and Kat et al., [14], the seroma appeared after drain removal and required serial aspiration. This rate is not high if we take into account that all of the patients had undergone nodal dissection, this practice being a risk factor for seroma formation [28]. Aiming to decrease the incidence of seroma we tried to anchor the donor site flaps to underlying tissues by quilting stitches to decrease the dead space leaved after mobilization of the muscle as advocated by others [28]. Even so, this complication can be easily dealt with and does not require additional surgical procedures. Another potential problem following LDMF is the contour deficiency on one side of the back; however, it was minimal and acceptable. This deformity is slight and usually settles when the back becomes supple and lax with time, it is sometimes more obvious especially in obese patients. Only two patients presented a flap complications (minor partial skin necrosis), which was treated by debridement and secondary sutures.
without delay of adjuvant therapy and without compromising of the cosmetic outcome.

Overall response rate for neoadjuvant chemotherapy in our study was 76.7%. This was in agreement with Francisco Sapunar and Ian E Smith [29]. No Grade III or IV non hematological toxicity, except nausea and vomiting in (35%) patients and alopecia in 55% of our patients. We encountered Grade II neutropenia in only one patient. These toxicities was encountered in other studies [29,30].

Three dimensions planning for radiation therapy was done, based on a study done at South Egypt Cancer Institute during the period from February 2001 to October 2003. Its results was published in 2004, and demonstrated that there is significant dosimetric improvement with three dimensions planning [31], this improvement was marked in BCS cases and was manifested by decrease skin toxicity. Radiation pneumonitis, which necessitates treatment with steroid, between our patients was detected in 3.6% of patients, while Grade 2 radiation dermatitis was 17.3%. This result matches with Elsayed [31] and Giacalone [32]. Postoperative radiotherapy given did not affect aesthetic outcome of our patients. As regard recurrence in this study and due to the small number of cases and the short duration of follow-up, we couldn't perform statistical analysis for the factors affecting survival or recurrence; however the only notable factor in the 1st case was the young age, while large T stage and high grade were found in the 2nd case.

In conclusion, although mastectomy is still being performed in up to 40% of patients, it in turn is becoming a less chosen option owing to the advent of breast conservative surgery and oncoplastic breast surgery. Oncoplastic procedures combine the best principle of resection with the best principles of reconstruction, to achieve wide tumor free margins while optimizing the cosmetic outcome. Augmentation with autologous tissue comes into play by reducing the resultant deformity when the breast volume excised is significant. The latissimus dorsi myocutaneous miniflap is the mainstay of oncoplastic breast surgery after partial mastectomy and it has low donor site morbidity, deep patient satisfaction and low and temporary radiation effects.

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