Evaluation of superior lateral pedicle extension technique for oncoplastic resection of medial breast tumors

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Introduction
Oncoplastic techniques expanded the spectrum of breast conservative surgery for the management of early breast cancer. Planning for resection of medial breast tumors is difficult. The scars are apparent and deformity is eminent. Mammaplasty techniques do not leave scars in the medial area and reshaping can avoid deformity.
Aim
The study was carried out to evaluate the use of superior lateral pedicle and its inferior extension to fill the medial defects that occur after resection of medial breast tumors exploring the technical issues and results in terms of resection volume, adequacy of resection, deformity, complications, and esthetic results.
Patients and methods
Thirty consecutive patients with early breast cancer and medial tumors underwent wide excision to negative margins followed by reconstruction of defects using the extended superior lateral pedicle technique.
Results
All cases had negative resection margins. The weight of the specimen ranged from 65 to 565 g with an average weight of 262.47±165.31 g. Complications occurred in eight patients. No major complications or nipple loss occurred. Esthetic results were considered very good to excellent by both surgeons and patients.
Conclusion
Oncoplastic techniques for medial breast quadrants enabled wide resection, achieved adequate resection to negative margins with minimal complication rates and favorable esthetic results.

Keywords:
breast cancer, medial quadrants, oncoplastic, superior lateral pedicle

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Introduction

Breast cancer is the most common cancer in women in Egypt. The annual incidence is about 12%. It accounts for about 32% of all cancer cases among women. It remains to cause substantial morbidity and mortality [1].

Breast conservative therapy is the gold standard therapy for early breast cancer. The safety of the procedure is equivalent to mastectomy with superior cosmetic outcomes. The procedure is most suitable for small, single tumors. Free resection margins are essential for adequate local control [2–9].

Several studies point to the inferior cosmetic results for breast conservative surgery for medial breast tumors. The cause of that is probably due to the appearance of the scar in the 'decollate' area. Another cause is the paucity of breast volume in the medial half, so even small volume resection can result in major deformity [10–15].

Oncoplastic techniques are novel surgeries that aim to combine the principles of oncological resection and plastic surgery at the same time. So, wide excisions to the point of safety can be achieved without the risk of deformity [16].

Therapeutic mammaplasty has gained popularity using several pedicles for nipple–areola complex (NAC). The surgery can be tailored to the tumor situation. The most common pedicles are the superior and inferior pedicles for inferior and superior tumors, respectively [17].

Scars of mammaplasty are hidden around the areola, vertically below the areola, and at the inframammary line. So no scars are present in the medial half. But both superior and inferior pedicles might not be enough for medial tumors because only central breast parts that are compensated and medial under filling is likely.

The use of a lateral breast pedicle with extension below the nipple can replace medial defects by rotation.

Aim

The aim of this study was to evaluate superior lateral pedicle extension for immediate reconstruction of defects following resection of tumors of the medial half of the breast; exploring technical aspects, feasibility of resection, and outcome in terms of resection volume, margin involvement, complications, esthetical results, and patient's satisfaction.

Patients and methods

Thirty female patients with early breast cancer (stages I, II according to AJCC/TNM classification 2012); submitted to oncoplastic surgery for breast cancer in the Medical Research Institute Hospital of Alexandria University between 2015 and 2016, who had tumors located in the medial half of the breast, with criteria compatible with conservative breast surgery were presented. Ethical committee approved and informed consent taken from every patient underwent surgery.

Patients who prefered mastectomy, or with tumor mass larger than 5 cm, metastatic disease, inflammatory breast carcinoma, and multiple tumors were excluded.

Preoperative markings

These markings were made before surgery with the patient in the upright standing position by the use of a permanent marker (Fig. 1).

(1) The breast meridian: a vertical line was drawn from the mid-clavicular line to the upper edge of the NAC and continuing inferiorly across the inframammary line.
(2) The new nipple position was marked along the breast meridian and was located 21–23 cm from the sternal notch. It corresponded to the projection of the inframammary line onto the breast meridian.
(3) The midline, inframammary line, and lateral breast margin were also marked.
(4) Using a tape, a mark was made in the shape of a short arc on the surface of the breast that measures just over one-half the length of the inframammary fold (e.g. for a 22-cm fold, the distance would be 12–13 cm).
(5) Diverging lines were drawn from the nipple point; they passed as tangents to either side of the dilated areola and meet the arc line drawn from the ends of the inframammary fold.
(6) A wire keyhole pattern was then adjusted to a similar angle of divergence and superimposed on the lines, indicating the proper size and location of the new areola window.
(7) A distance of 5–6 cm was measured from the window to establish the length of the limbs of the keyhole pattern.
(8) From these extremities, lines were directed medially and laterally to intersect the inframammary fold.

The extended lateral pedicle technique

The areola was circumscribed at a diameter of 42 mm.

The lateral pedicle was outlined

(1) The entire pedicle, except the reduced nipple–areola, was de-epithelialized.
(2) The pedicle was then incised along its superior and inferior margins to the fascia of the underlying musculature; the extension of the breast volume inferior to the nipple is preserved till the inframammary line. Medial and lateral dermoglandular wedges were resected.
(3) A window of breast tissue was removed from the upper portion of the pedicle flap, from the level of the nipple to the height of the keyhole pattern. This resection did not extend above the upper limit of the areola window in order to avoid loss of superior breast volume.

Figure 1

Marking for mammaplasty.

(4) Wide tumor excision of medially located mass was adequately achieved as part of the reduction mammaplasty specimen.
(5) The pedicle flap was rotated superiorly on itself, bringing the areola into position within the keyhole pattern.
(6) The medial and lateral flaps were brought together over the pedicle, and closure was begun, working from the extremities toward the center.

Wide local excision with a safety margin of at least 1 cm all around the palpable edge of the tumor was included in resection. Surgical clips [(ADD) titanium clips to avoid interference with MRI postoperatively] were placed at the margins of the defect to facilitate the original tumor localization. Following surgical excision, the breast specimen was orientated and marked for the pathologist by stitches. The specimen weight was recorded. Surgical margins were determined by histological examination of frozen sections of the breast specimens in the operating room.

In situations, where frozen section analysis confirmed margin(s) involvement by tumor cells the margin(s) in question was (were) re-excised [18]. In situations in which the tumor was located closely to the skin, the skin over the tumor was resected.

Sentinel lymph node biopsy (methylene blue 1%) or axillary dissection for levels I and II axillary lymph nodes was performed through the same incision that was used for mammaplasty or through a separate incision according to circumstances.

All patients were followed closely in the postoperative period by the oncological surgeon and oncologist. All patients underwent postoperative radiation therapy. Adjuvant chemotherapy was given as appropriate for the stage of disease. Adjuvant hormonal therapy was given guided by hormone receptors' state. All patients were followed after surgery to record the changes in esthetical results especially after radiotherapy. The patients were followed by physical examination and mammography which was performed 6 months after surgery.

The shape, appearance, and positions of the NAC and symmetry of the two breasts were evaluated. The esthetical evaluation of these categories was performed by the patient, as well as the surgeon. Each category (shape, NAC position, and symmetry) was classified as good or very good, satisfactory, and poor. A four-point scale, wherein the overall result was defined and rated from 4 to 1 (4 very good, 3 good, 2 satisfactory, and 1 poor) was used.

Results was considered very good when the parameter evaluated (NAC, shape, or symmetry) had a perfect shape and normal appearance. A good result indicated that the parameter evaluated had an almost perfect shape. A satisfactory result indicated that the parameter evaluated was imperfect but is reasonably normal within normal limits. Results were rated as poor when there was considerable breast asymmetry and unacceptable shape. The average result of each item was used as a final result.

An acquired-informal questionnaire was used to grade the patient's level of satisfaction with the esthetical results. The patients classified their level of satisfaction as very satisfied, satisfied, and disappointed or regretted their decision.

Results

All cases had eventually free margins. Definitive pathology confirmed free margins in all cases. The weight ranged from 65 to 565 g with the average weight of 262.47±165.31 g.

Tables 1 and 2 are descriptive for oncological information, preoperative assessment, and surgical techniques.

Complications occurred in eight (26.6%) patients. Seroma occurred in two patients but eventually subsided after repeated office aspirations. Minor skin dehiscence occurred in two patients mainly at the lower T junction of reduction mammaplasty. One patient had wound infection; which resolved after 2 weeks of antibiotic treatment. Fat necrosis complicated three cases before the commencement of radiotherapy. These cases underwent operative re-excision.

Table 1 The study sample presented according to oncological information (*N*=30)

	n (%)
Multifocality	3 (10)
IDC	30 (100)
Tumor grade	
I	1 (3.3)
II	20 (66.7)
III	9 (30.0)
Vascular invasion	20 (66.7)
In-situ component	13 (43.3)
Axillary involvement	14 (46.7)
Boost radiotherapy	24 (80.0)
Chemotherapy	25 (83.3)
Hormonal therapy	23 (76.7)

Follow up period ranged from 4 to 34 months (mean, 17 months). Local recurrence in the same breast occurred in two patients at 6 and 8 months after index operation. The recurrence developed the medial half in both cases. Both cases had multifocality in the definitive pathology report that was not detected preoperatively. Both had metastasis work up which was free. Both underwent mastectomy. The second younger case had chest wall recurrence 4 months after mastectomy and died 6 months later. Another case developed spine metastasis. She is now on radiotherapy. No breast recurrence occurred.

Some results are shown in Figs. 2–4.

Table 2 The study sample presented according to breast size, ptosis, asymmetry, and breast density (*N*=30)

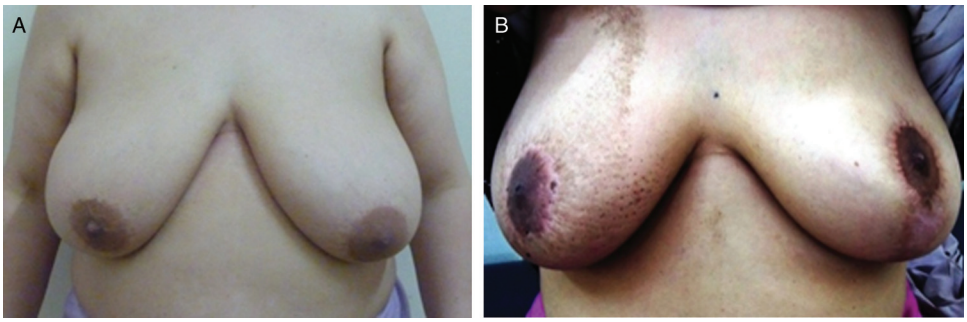
	n (%)
Breast size	
Moderate	1 (3.3)
Large	12 (40.0)
Larger	17 (56.7)
Ptosis	
No	1 (3.3)
Moderate	11 (36.7)
Severe	18 (60.0)
Asymmetry	9 (30.0)
Breast density	
Fatty	17 (56.7)
Dense	2 (6.7)
Mixed	11 (36.7)

Discussion

Since 2015 we tried to select patients for this novel approach. The motivation for breast conservation was the priority element after inclusion criteria were fulfilled. Thirty consecutive patients with medial tumors were treated by lateral pedicle oncoplastic technique. The age ranged from 29 to 64 years. We noticed that younger patients were more disparate for keeping their breasts than older groups. They also accepted contralateral procedures more frequently. Unfortunately, they had more unfavorable tumor characteristics (frequent in-situ cancer) and higher stages of the disease. We tried to insure wider resections, boost radiotherapy, and hormonal therapy in younger age group (29–40 years).

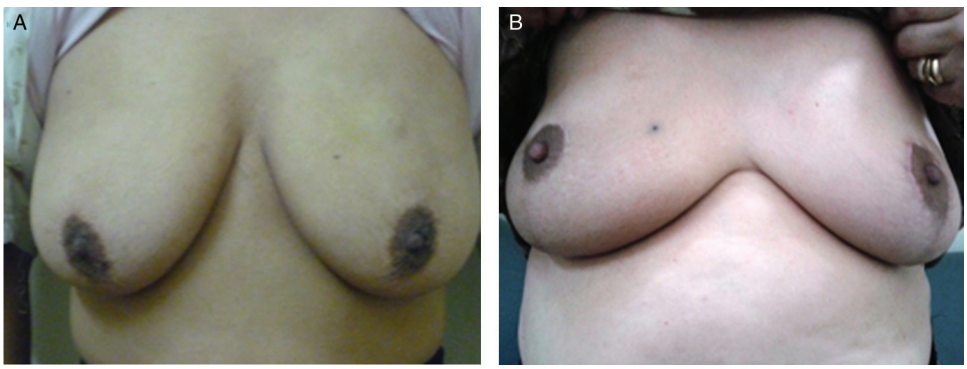
The majority of our patients had extensive resection. That is because we tried to attain a resection that is

Figure 2



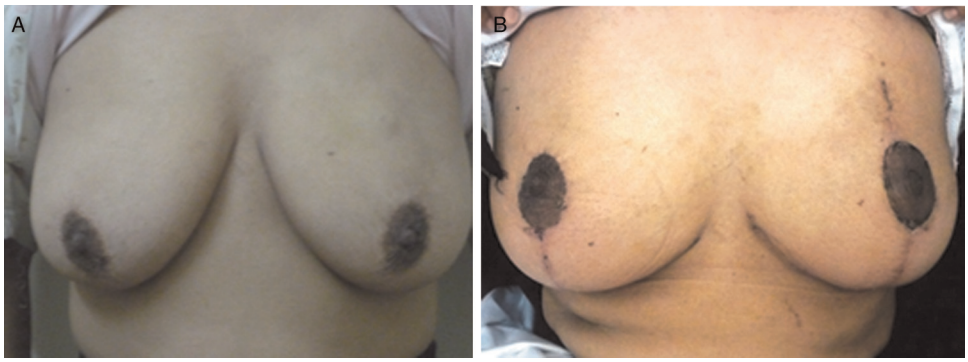
Fifty-one-year old housewife with 3×2 cm mass at the right upper inner quadrant. (a) Preoperative, (b) right lateral pedicle mammaplasty and contralateral le jour mammaplasty for symmetry after 18 months.

Figure 3



Fifty-seven-year old housewife with upper inner quadrant 2×1 cm. (a) Preoperative, (b) 17 months postoperative.

Figure 4



Thirty-year-old housewife with upper medial quadrant tumor 2×1 cm with skin tethering. (a) Preoperative, (b) 16 months postoperative after wise pattern reduction mammaplasty.

wide enough to make the surgeon satisfied irrespective of the esthetic consequences. The real test for the technique was to let the oncological surgeon do whatever he (she) wants before the plastic surgeon tried to solve.

Quadrentectomy is shown in a great number of studies to be correlated with inferior cosmetic outcomes [10–15]. Thus, a majority of our patients would have had deformities. Even the cases that underwent lumpectomy, they were all in the upper medial quadrant. It is well known that small resection in this area of the breast is prone to deformity as well [19]. Partial mastectomy would not ever be possible without correction; because the resultant deformity would not be accepted.

Wider resection insured adequate excision of the tumor. Negative initial margins are an indication of successful oncological control from the first attempt. Most of the cases of re-excision were due to the presence of atypical cells or in-situ cancer rather than invasive carcinoma. The average specimen weight in our study (262.47 g) is a further indication of extensive resection that would definitely have caused serious deformities.

A sum of eight minor complications occurred in our study, and was all managed conservatively except three revisions for fat necrosis before radiotherapy. Complications did not cause a delay in adjuvant therapy. Seroma accompanied extensive dermoglandular dissection and defect under filling. Minor skin dehiscence occurred in two patients mainly at the lower T junction of reduction mammaplasty. They were all treated by secondary closure at office or left to heal. We tried to preserve a triangular piece of skin at the center of inframammary line at the site of T closure to decrease tension and guard against dehiscence. Subsequent cases with this modification did not experience that complication.

Many reports showed a multitude of objective methods for esthetic evaluations. They were not very much different from panel and patient scorings. But for the sake of simplicity, we utilized the method presented by Munhoz *et al.* [18]; as we thought that it was feasible.

Contour irregularities occurred when defects were under filled. When the local tissue resources did not close the defect adequately, skin dimpling was visible after seroma subsided. Nevertheless, partial filling of the defect is better tolerated than leaving it.

The shape of the NAC is the most important determinant of overall results. Unfortunately surgeons make adjustments to the final areola shape at the end of the operation when they become exhausted and may forego adjustments altogether. Most frequently they regretted this postoperatively. The key element is perfectly round periareolar window. We suggest checking the roundness of periareolar window, by multidiameter circular template, just before closure. Finally, double layer areola closure gives accepted rate of areola stretching.Symmetry parameter had the lowest score (2.93 out of four) among all; due to radiotherapy changes that affected the diseased side. This factor did not affect the overall patient satisfaction rate. Patients who had lower symmetry scores had similar satisfaction rate to those who had high symmetry scores.

Patients consistently gave better scores than surgeons, physicians, nurses, and other independent observers. This is identical in many studies [10–15]. Our patients gave an average satisfaction score of 3.6 out of four.

Total average evaluation was 3.14 out of four. At the end, it is patients' opinion that all matters.

Conclusion and recommendation

Oncoplastic resection was feasible. Larger margins could be obtained without serious deformity. Cosmetic results were well accepted by patients and surgeons. Learning curve rises while rate of complications falls. Longer follow up is needed to assess oncological safety.

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Conflicts of interest

There are no conflicts of interest.

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