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Full Length Article

Skin sparing mastectomy: Technique and suggested methods of reconstruction



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KEYWORDS

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Abstract *Aim:* To demonstrate the feasibility and accessibility of performing adequate mastectomy to extirpate the breast tissue, along with en-block formal axillary dissection performed from within the same incision. We also compared different methods of immediate breast reconstruction used to fill the skin envelope to achieve the best aesthetic results.

Methods: 38 patients with breast cancer underwent skin-sparing mastectomy with formal axillary clearance, through a circum-areolar incision. Immediate breast reconstruction was performed using different techniques to fill in the skin envelope. Two reconstruction groups were assigned; group 1: Autologous tissue transfer only ($n = 24$), and group 2: implant augmentation ($n = 14$).

Autologous tissue transfer: The techniques used included filling in the skin envelope using Extended Latissimus Dorsi flap (18 patients) and Pedicled TRAM flap (6 patients).

Augmentation with implants: Subpectoral implants (4 patients), a rounded implant placed under the pectoralis major muscle to augment an LD reconstructed breast. LD pocket (10 patients), an anatomical implant placed over the pectoralis major muscle within a pocket created by the LD flap. No contra-lateral procedure was performed in any of the cases to achieve symmetry.

Results: All cases underwent adequate excision of the breast tissue along with en-block complete axillary clearance (when indicated), without the need for an additional axillary incision.

Eighteen patients underwent reconstruction using extended LD flaps only, six had TRAM flaps, four had augmentation using implants placed below the pectoralis muscle along with LD flaps, and ten had implants placed within the LD pocket. Breast shape, volume and contour were successfully restored in all patients. Adequate degree of ptosis was achieved, to ensure maximal symmetry.

Conclusions: Skin Sparing mastectomy through a circum-areolar incision has proven to be a safe and feasible option for the management of breast cancer in Egyptian women, offering them adequate oncologic control and optimum cosmetic outcome through preservation of the skin envelope of the breast when ever indicated. Our patients can benefit from safe surgery and have good cosmetic outcome by applying different reconstructive techniques.

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Introduction

In 1991 Toth and Lappert first described the term skin-sparing mastectomy (SSM) [1,2], which is a technique used to extirpate the breast tissue with preservation of as much skin as possible, leaving behind an adequate skin envelope along with the infra-mammary fold for optimum immediate breast reconstruction [3].

In this study we demonstrate the feasibility and safety of type I skin sparing mastectomy in patients with breast cancer. We utilize and compare between various methods of immediate breast reconstruction, without the need for a contra-lateral symmetrizing procedure.

Aim

The aim is to demonstrate the feasibility and accessibility of performing adequate mastectomy to extirpate the breast tissue, along with en-block formal axillary dissection performed from within the same incision and to demonstrate the feasibility of this type of mastectomy in all breast sizes with no limitation as regards access for adequate resection. We also compared different methods of immediate breast reconstruction used to fill the skin envelope to achieve the best esthetic results restoring the breast shape, volume and contour in all breast sizes.

Methods

Thirty-eight patients with breast cancer underwent skin-sparing mastectomy with formal axillary clearance, through a circum-areolar incision. Inclusion criteria included young patients (from 20 to 50 years of age) with breast cancer that were contraindicated for conservative breast surgery desiring breast reconstruction, patients with central retro-areolar tumors, and patients with no skin involvement. Pre-operative mark-up was done in the morning of the surgery after patient counseling and consent, care was taken to select the most suitable procedure to fit each patient individually taking into consideration post-operative adjuvant treatment and medical comorbidities and body built. Medical photography was performed pre- and post-operatively and a scoring system for subjective assessment of the final cosmetic outcome was used.

Drawings included a circum-areolar incision line, and the footprint of the breast was also outlined (the breast “foot-print” is the outline that the breast makes on the chest wall) along with the infra-mammary fold (Figs. 1 and 2). Establish-



Figure 1 Pre-operative mark up of the circumareolar incision and the footprint of the breast.



Figure 2 Pre-operative mark up of the circumareolar incision and the footprint of the breast.

ing an appropriate footprint is the first step in reconstructing the breast [4]. The footprint of the breast varies according to the body built of each patient with respect to certain anatomical boundaries which the breast will never grow beyond, including the mid-axillary line, the infra-mammary fold, the midline and beyond the clavicle [4]. A skin ellipse was designed over the donor site (on the back for the LD and lower abdomen for the TRAM flaps), and a disk was drawn corresponding to the diameter of the areola, and was centered on the flap to replace the skin of the NAC (Fig. 3). The incision was carried out after induction of general anesthesia with the patient placed supine on the operating table. Removal of the NAC along with the breast tissue was carried out through elevation of the skin flaps in the same planes as the NSSM. Care was taken during traction so as not to devitalize the native skin envelope and traction on the skin of the NAC was done to manipulate the specimen for adequate exposure. Dissection of the lower flap was not carried out beyond the infra-mammary fold, so as not to go beyond the breast footprint. After circumferential elevation of the skin flaps, shaving off the pectoral fascia was done, and the specimen was delivered out of the skin pocket to facilitate the exposure of the axilla with minimal traction on the skin envelope. Level I and II axillary clearance was performed routinely, however dissection was extended to include all three levels whenever indicated. Axillary clearance was carried out through the same incision without the need to extend the original circum-areolar incision (Figs. 4 and 5). The specimen was removed en-block and sent for histo-pathological examination (Fig. 6).

Immediate breast reconstruction was performed using different techniques to fill in the skin envelope (Fig. 7). Two reconstruction groups were assigned; group 1: autologous tissue transfer only ($n = 24$), and group 2: implant augmentation



Figure 3 A disc corresponding to the diameter of the areola in the center of the flap.

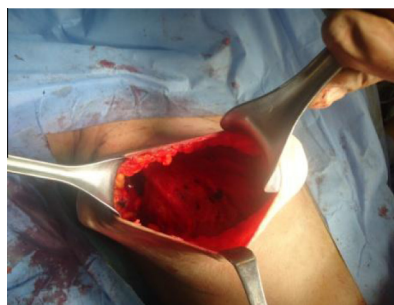


Figure 4 Adequate exposure for complete mastectomy and axillary clearance.



Figure 5 Axillary dissection through the circumareolar incision.



Figure 6 Specimen removed enblock.



Figure 7 Skin envelope after resection.

($n = 14$). Autologous tissue transfer: the techniques used included filling in the skin envelope using Extended Latissimus Dorsi flap (18 patients) and Pedicled TRAM flap (6 patients). Augmentation with implants: subpectoral implants (4 patients), a rounded implant placed under the pectoralis major muscle to augment an LD reconstructed breast. LD pocket (10 patients), an anatomical implant placed over the pectoralis major muscle within a pocket created by the LD flap. No contra-lateral procedure was performed in any of the cases to achieve symmetry.

Operative time and blood loss were recorded from time of induction till the end of the surgical procedure.

All patients were followed up for a median period of 18 months for oncologic purpose and cosmetic grading.

Patients were referred to receive suitable adjuvant chemo and/or radiotherapy according to the final pathology reported.

Results

All cases underwent adequate excision of the breast tissue along with en-block complete axillary clearance (when indicated), without the need for an additional axillary incision.

Eighteen patients underwent reconstruction using extended LD flaps only, six had TRAM flaps, four had augmentation using implants placed below the pectoralis muscle along with LD flaps, and ten had implants placed within the LD pocket.

Breast shape, volume and contour were successfully restored in all patients.

Adequate degree of ptosis was achieved, to ensure maximal symmetry.

Operative time

A mean operative time was one and half hours for the resection and depending on the breast size the operative time may differ, resection was done in less than 1 h for small breasts and could reach up to 2 h for large and ptotic breasts. The harvesting phase depended on the type of flap to be utilized. The mean time of raising the LD flap was an hour and 20 min while the TRAM flap used up more time up to two and half hours both including closure of the donor site. Insetting of the flap using autologous tissue was remarkably shorter (30 min to an hour) than when augmentation with implant was needed as more time was needed to create the pocket (an hour and half to 2 h).



Figure 8 Paget's disease of the left breast.

Pathology results

Four patients had Paget's disease (Fig. 8), seven patients had wide spread micro-calcifications (pathologically proven as DCIS), eight patients had retro-areolar central tumors and fifteen patients had early invasive breast cancer (invasive duct carcinoma in eleven patients and invasive lobular carcinoma in four patients). Multi-centricity was observed in four patients. Mean tumor size was 3.5 cm, and the lymph node dissection specimens contained on average 15–32 lymph nodes. The axillary nodal status ranged from 0 to 12 positive nodes. Margins of excision ranged from 1.2 to 7 cm. All patients had negative margins.

Oncologic results

None of the patients developed local recurrence or systemic disease over the period of the study (median 18 months).

Cosmetic results

Based on a subjective method of assessment using a scoring system from 1 to 5, assigned by a referee surgeon, a breast nurse and the patient.

Result	Excellent (5) (%)	Very good (4) (%)	Good (3) (%)	Fair (2) (%)	Poor (1) (%)
Shape	84.3	10.5	2.6	2.6	
Volume	79	15.8	2.6	2.6	
Ptosis	76.3	15.8	5.3	2.6	
Symmetry	65.8	21.1	10.5		2.6

Complications

Superficial sloughing of the distal part of the skin envelope was reported in 2 patients (Fig. 9), seroma in the donor site (back) in 3 patients and hematoma reported under the flap in 1 patient and in the back in 1 patient.

Overall level of satisfaction (as described by the patients)

The final cosmetic outcome exceeded expectation in 35% of the cases, met with expectations in 60% and 5% below expectations.



Figure 9 Superficial sloughing of the distal part of the skin envelope.

Discussion

The introduction of skin-sparing mastectomy in 1991 allowed preoperative planning of mastectomy incisions in order to maximize skin preservation and to facilitate breast reconstruction. Preserving the native skin envelope and the infra-mammary fold remarkably enhanced the final cosmetic outcome of the reconstructed breast with minimal need for a contra-lateral symmetrizing procedure.

Classification of skin sparing mastectomy was described through the work published by Carlson et al. [5]. This classification was based according to the type of skin incision used and the amount of skin removed into four types. Type I: only nipple and areola removed. Type II: nipple–areola, skin overlying superficial tumors and previous biopsy incisions removed in continuity with the nipple and areola. Type III: nipple–areola, skin overlying superficial tumors and previous biopsy incisions removed without intervening skin. Type IV: nipple–areola removed with an inverted or reduction pattern skin incision [5]. In our work we demonstrated the feasibility of type I skin-sparing mastectomy performed through a circum-areolar incision, that entailed removal of the nipple–areola complex without the need to extend the incision line in order to achieve adequate exposure for formal axillary clearance. This type of resection has proven to be safe even for large and ptotic breasts with minimal complications in the form of superficial sloughing of the distal part of the skin envelope, reported in only two patients (5.3%) with complete recovery within 3 weeks.

Immediate reconstruction of the breast represented a challenge. To achieve the same degree of ptosis and thus adequate symmetry to the contra-lateral breast with such large skin pockets different techniques were used. Extended LD flap (Figs. 10–15) reconstruction proved to be the most effective and efficient method of reconstruction. The extended LD flaps alone gave us adequate volume and shape in 18 (47.4%) of our patients in spite of the large skin pockets. It carried the least morbidity and the flap proved to be reproducible and safe. Donor site morbidity occurred in 10.5% in the form of seroma, which responded with postoperative aspiration. Functional defect was observed in one patient working as a teacher. The extended LD flap alone gave us very good esthetic result and symmetry with the least operative time. This was followed by reconstruction using an extended LD flap augmented by an implant placed within the LD pocket over the pectoralis muscle (Figs. 16 and 17), used in 10 (26.3%) of our patients. This technique leads to an excellent cosmetic outcome

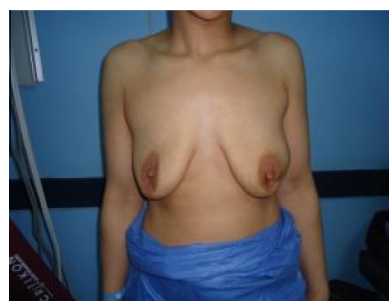


Figure 10 Preoperative picture of a patient with left breast cancer.



Figure 11 Post operative picture of the patient after reconstruction using extended LD flap.

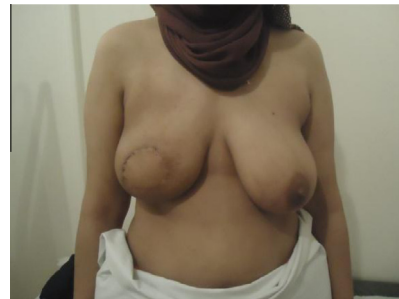


Figure 15 Post operative picture after reconstruction using extended LD flap.



Figure 12 Post operative picture after reconstruction of her nipple.



Figure 16 Preoperative picture of a patient with Paget's disease of the right breast.



Figure 13 Post operative picture after tattooing the areola.



Figure 17 Post operative picture after reconstruction using extended LD flap augmented by an anatomical implant placed within the LD pocket over the pectoralis muscle.



Figure 14 Preoperative picture of a patient with right breast cancer.

but with greater operative time and was used in patients that were not scheduled to receive post operative radiation therapy. Placing the implant in the sub-pectoral pocket (Figs. 18 and 19), was done in 4 (10.5%) of our patients that needed post-

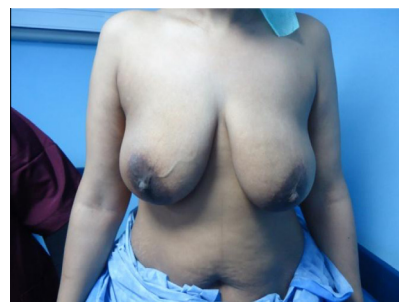


Figure 18 Preoperative picture of a patient with right breast cancer.



Figure 19 Post operative picture after reconstruction using a rounded implant in the Subpectoral pocket along with an LD flap.



Figure 20 Preoperative picture of a patient with left breast cancer.



Figure 21 Post operative picture after reconstruction using a pedicled TRAM flap.

operative radiotherapy. This technique resulted in adequate volume, but did not achieve appropriate degree of ptosis and thus resulted in a less than optimal final cosmetic result or the need for a contra-lateral symmetrizing procedure. Reconstruction using pedicled TRAM flaps (Figs. 20 and 21) done in 6 (15.8%) of our patients, had the advantage of giving adequate volume, very good shape and symmetry and minimal morbidity as regards abdominal wall integrity due to a relative higher incidence of divaricated rectus muscles commonly encountered in Egyptian women. But this came at the cost of longer operative time, in addition to the TRAM flap being less reliable and reproducible than the LD flap in terms of availability for use and viability after harvesting.

The use of alloderm and stratus to create pockets for the implants is yet to be studied as there were indications for their application but with limitations as regards availability and very high cost at the time of the study.

Minor complications were observed that did not require surgical intervention or resulted in delaying adjuvant therapy.

Similar results were concluded by the publication by Cunnick and Mokbel [6], which stated a similar rate of complication as regards superficial sloughing of the native skin envelope despite different skin incisions. The effect of post-operative radiation therapy on the final cosmetic outcome is yet to be evaluated.

Skin sparing mastectomy through a key hole circum-areolar incision proved to be both feasible and safe in terms of resection for invasive tumors smaller than 5 cm, multicentric tumors and DCIS [7,8]. It had the advantage of facilitating immediate reconstruction with the advantage of better final esthetic result through preservation of the native skin envelope and the infra-mammary fold [9]. Several acceptable reconstructive techniques are available [10,11].

Conclusions

Skin sparing mastectomy through a circum-areolar incision has proven to be a safe and feasible option for the management of breast cancer in Egyptian women, offering them adequate oncologic control and optimum cosmetic outcome through preservation of the skin envelope of the breast whenever indicated. Our patients can benefit from safe surgery and have good cosmetic outcome by applying different reconstructive techniques.

Conflict of interest

There was no conflict of interest in this study.

Funding

There was no external funding for this study.

This study was approved by the ethics committee of the National Cancer Institute, Cairo University.

References

- [1] Toth BA, Lappert P. Modified skin incisions for mastectomy: the need for plastic surgical input in preoperative planning. *Plast Reconstr Surg* 1991;87(6):1048–53.
- [2] Toth BA, Forley BG, Calabria R. Retrospective study of the skin-sparing mastectomy in breast reconstruction. *Plast Reconstr Surg* 1999;104:84–8.
- [3] Hudson DA, Skoll PJ. Single-stage, autologous breast restoration. *Plast Reconstr Surg* 2001; 108: 1161–71; discussion, 1172–73.
- [4] Phillip N, Blondeel, John Hijjawi, Herman Depypere, Nathalie Roche, Koenraad Van Landuyt. Shaping the breast in aesthetic and reconstructive breast surgery: an easy three-step principle. *Plast Reconstr Surg* 2009; 123: 455.
- [5] Carlson GW, Bostwick 3rd J, Styblo TM, et al. Skin-sparing mastectomy: oncologic and reconstructive considerations. *Ann Surg* 1997;225:570–8.
- [6] Cunnick GH, Mokbel K. Oncological considerations of skin-sparing mastectomy. *Int Semin Surg Oncol* 2006; 3: 14.
- [7] Simmons RM, Adamovich TL. Skin-sparing mastectomy. *Surg Clin North Am* 2003;83:885–99. [http://dx.doi.org/10.1016/S0039-6109\(03\)00035-5](http://dx.doi.org/10.1016/S0039-6109(03)00035-5).
- [8] Shrotria S. The peri-areolar incision – gateway to the breast! *Eur J Surg Oncol* 2001;27:601–3. <http://dx.doi.org/10.1053/ejs.2001.1051>.

- [9] Singletary SE, Robb GL. Oncologic safety of skin-sparing mastectomy. *Ann Surg Oncol* 2003;10:95–7. <http://dx.doi.org/10.1245/ASO.2003.01.910>.
- [10] Kronowitz SJ, Robb GL. Breast reconstruction with postmastectomy radiation therapy: current issues. *Plast Reconstr Surg* 2004;114:950–60. <http://dx.doi.org/10.1097/01.PRS.0000133200.99826.7F>.
- [11] Cordeiro PG, Pusic AL, Disa JJ, McCormick B, Van Zee K. Irradiation after immediate tissue expander/implant breast reconstruction: outcomes, complications, aesthetic results, and satisfaction among 156 patients. *Plast Reconstr Surg* 2004;113:877–81. <http://dx.doi.org/10.1097/01.PRS.0000105689.84930.E5>.