

## Preserving the Nipple and Areola Complex in Surgical Intervention in Early Breast Cancer

Ahmed Nabil<sup>1</sup> and Rasha Abdelkader<sup>2</sup>

Departments of <sup>1</sup>General Surgery; <sup>2</sup>Plastic Surgery, Cairo University

### ABSTRACT

**Background:** There are two widely accepted procedures that are used to surgically treat cancer of the breast while preserving the nipple & areola complex (NAC); breast conservative therapy (BCT) using oncoplastic procedures (OPS) and nipple sparing mastectomy (NSM) with immediate reconstruction. Not many studies directly compare the two methods. It is especially important to compare these methods in studies specifically targeting the Egyptian population, due to different tumour biology, different radiotherapy technique, and different body habitus. The goals are to compare NSM with autologous reconstruction versus oncoplastic breast surgery regarding the aesthetic and oncologic results. **Patient and methods:** The present study was conducted on 30 patients with Stage I and II breast cancer as well as having tumors located within the breast tissue more than 2 cm away from the areola. The patients were subjected to either OPS techniques (local tissue rearrangement or reduction mammoplasty techniques) or NSM with autologous reconstruction (Latissimus Dorsi Flap). Long term assessment was carried on after 3 months including patient and doctor satisfaction. **Results:** Fifteen patients were surgically managed by OPS and fifteen by NSM. All 30 cases in the study showed an overall good acceptance of the surgery, however they were all concerned about the possibility of recurrence of the disease i.e. they are satisfied regarding the cosmetic effect but still worried about the oncological aspect of the disease. As a single breast its size, shape, contour, and NAC position and direction are satisfactory however due to patient refusal of contra-lateral symmetrization the overall cosmetic outcome may appear unsatisfactory to both, patients and plastic surgeons. **Conclusion:** Oncoplastic breast surgery (OPS) and Nipple sparing mastectomy (NSM) are both safe and aesthetically accepted, however with OPS patients have to receive breast radiotherapy with all its complications. In many cases, this will affect the aesthetic result. Patients are becoming increasingly worried about developing a cancer in their breasts amidst a rising general perception of increased breast cancer incidence. This in turn has led to an increased interest in prophylactic mastectomies. Through immediate reconstruction, NSM offers patients the possibility of maintaining an aesthetic breast while removing all the tissue liable to develop a malignancy in the breast. **Keywords:** Breast cancer, nipple sparing mastectomy & oncoplastic breast surgery, immediate breast reconstruction.

### INTRODUCTION

Despite much advancement in breast cancer management, there are varied views on the ideal method regarding aesthetic and oncologic outcome. The goal of every method is to attain total eradication of the cancer while permitting patients to have an aesthetic breast. Both autologous and implant based reconstruction can achieve an aesthetic breast mound, however reconstruction of the areola and nipple is less satisfactory in most cases<sup>[1]</sup>.

Therefore, there is an increasing challenge among surgeons in the medical community to try to preserve the nipple areola complex (NAC) whenever possible. The nipple and areola

complex is a significant component of the breast regarding its function and aesthetic appearance<sup>[2]</sup>.

There are two methods to treat breast cancer surgically while preserving the NAC. Which are nipple sparing mastectomy with immediate reconstruction as well as breast conservative therapy (BCT). Many patients who are candidates for BCT will achieve a better outcome by an oncoplastic procedure<sup>[3]</sup>.

Amidst a growing public perception of breast cancer incidence, many patients are extremely worried about developing a cancer in their breasts. Leading to a greater interest in prophylactic mastectomies. Nipple sparing mastectomy (NSM) with immediate reconstruction offers them the possibility of

having an aesthetic breast while removing all the breast tissue liable to develop a malignancy<sup>[2]</sup>.

Oncoplastic surgery has also been shown to be safe with good aesthetic result. Compared to NSM, it is time and cost efficient, avoids distal donor site morbidities and is well accepted by patients and surgeons. However, patients have to receive breast radiotherapy with all its complications. In many cases, this will affect the aesthetic result. Direct comparison between both methods where minimally addressed before<sup>[4]</sup>. This is especially important in the Egyptian population, due to different tumour biology, different radiotherapy technique, and different body habitus. The goals of this study are to compare NSM with autologous reconstruction versus oncoplastic breast surgery regarding the aesthetic and oncologic outcome.

## PATIENT AND METHODS

The present study was carried at Kasr Al Ainy hospital and other hospitals during the period from June 2012 to November 2014. The study included a total sample of 30 patients consisting of those with Stage I and II breast cancers as well as having tumor located within the breast tissue more than 2 cm away from the areola. They were candidates for either NSM with autologous reconstruction or oncoplastic procedures. Recurrent cases, nipple pathology or patient refusing the procedure were excluded from the study.

All the patients received the routine workup of breast cancer patient including:

- Full history taking, thorough physical examination [most importantly sites of donor tissue flaps],
- routine laboratory investigations [Complete Blood Count (CBC), Coagulation profile, Liver function test, Liver enzymes including Alkaline Phosphatase, renal function tests as well as Blood Sugar],
- routine radiological investigations [breast ultrasonography and mammography, abdominal ultrasound and chest x-ray] and bone scan for selected cases with elevated alkaline phosphatase.
- Electrocardiography (ECG) was also performed for patients older than 40 years old or those with a history of cardiac disease.

Tissue diagnosis was assured by preoperative needle biopsy.

All patients were counseled and consented for the procedure, related risks and possible complications, revisional surgery or the possible need for immediate or delayed modified radical mastectomy.

Preoperative marking of the breast was performed the same day of surgery. The patient was marked in the standing position using waterproof skin marker.

In addition, the following data was recorded;

- The position of the NAC from the suprasternal notch (SSN) and midline,
- The distance between the mass and the nipple
- The distance between the mass and the edge of the areola.

Preoperative digital photography was taken in the standing position. This is helpful in planning the procedure and for documenting the results of surgery.

The patients were subjected to either OPS techniques (local tissue rearrangement or reduction mammoplasty techniques) or NSM with autologous reconstruction. All cases were subjected to axillary clearance at the same setting either from the same incision or from a separate axillary incision. Intraoperative pathological assessment was conducted through frozen section examination of the mass and examination of the surgical margins in cases of OPS. Frozen section for the nipple tissue core was done in cases of NSM. Suction drains were inserted at the end of the procedures at the site of the reconstructed breast and at the donor site of the flaps used for autologous reconstruction as well as the axilla. Skin wounds are sutured subcuticular using polyglycolic acid 3/0.

For OPS techniques the patient were lightly dressed with little compression over the breast to help support it and to help keep the alignment of the reconstruction done.

For NSM techniques the patient were lightly dressed with no compression over the breast to avoid nipple ischemia due to compression with a window for flap monitoring.

The donor site of autologous reconstruction (i.e latissimus dorsi flap) were dressed and compressed well to avoid seroma formation.

The skin of the breast and the NAC was observed starting at 6 hours post operatively, then every 12 hours for the first 48 hours, then once

every day. All patients received third generation Cephalosporins with induction of anesthesia for 7 days post operative.

Assessment of the cosmetic outcome was noted and classified as short term after one week and long term after 3 months. The results were sent to three senior plastic surgeons to evaluate the aesthetic outcome using both pre and postoperative digital photographs. Cosmetic results were assessed by an objective grading system in accordance with the method described by Strasser<sup>[5]</sup>, using a scale that measures 5 key items:

- Malposition
- Distortion
- Asymmetry
- Contour deformity
- Scar

Each category flaw received a value for the severity level: 0 points for perfect; 1 point for noticeable; 5 point for obvious and 5 points for obvious and deforming. The total score was then calculated as a the sum of all point under each category. A total score of 0 was considered a perfect result; from 1 to 4 a good result from 5 to 14 mediocre and 15 or more poor. This grading system was beneficial as regards the easy identification of deficiencies & outcome result, for plan implementation & exclude future flaw. However there was an increase in surgeon critical observation awareness. It aids the evaluation of the procedure and relates to the final outcome. This further aids the outcome & betters the communication within physicians in an understandable way<sup>[5]</sup>.

## RESULTS

The present study included 30 female patients presenting with stage I & II breast cancer. The patients' ages ranged between 29 and 53 years old with a mean age 44.5 year old. Six cases given positive family history. All patients had no systemic diseases (eg. diabetes or uremia or anemia) nor had they undergone any previous operations in their breasts.

All of the cases presented with a painless mass in the breast. Clinical examination revealed only one case to have a palpable solitary axillary lymph node, while the other cases showed no palpable nodes in their axillae. Tumor sizes ranged between 1 and 3.5 cm. All of which

proved to be invasive duct carcinoma in the preoperative biopsy as well as the postoperative one. Fifteen patients were surgically managed by OPS and fifteen by NSM. Oncoplastic techniques included reduction mammoplasty techniques and local tissue rearrangement (batwing mastopexy and V-mammoplasty).

All cases underwent axillary evacuation either through a separate incision in 6 cases of local tissue rearrangement (batwing mastopexy and V-mammoplasty procedures) and through the same incision in the other 24 cases.

All cases passed uneventful in the postoperative period with one case of mild wound infection in the scar line, which responded well to systemic antibiotic, and another case later showed a hypertrophic scar which got minimized after irradiation. There were no cases showing necrosis of the nipple and areola in the present study.

Long-term assessment was carried on after 3 months including patient and doctor satisfaction.

Regarding patient satisfaction:

- NSM (15 cases) showed good satisfaction regarding size and shape of the breast as well as nipple projection and color.
- OPS (15 cases): twelve cases showed good satisfaction regarding size and shape of the breast as well as nipple projection and color. Two cases were poorly satisfied regarding the shape and size, as the postoperative residual breast was too small in comparison to the contralateral big healthy breast. And one case was dissatisfied regarding the direction of nipple projection in comparison to the projected healthy nipple.

**Table (1):** Patient Satisfaction Comparison – NSM vs. OPS

	NSM	OPS
Satisfaction % (#)	100% (15)	80% (12)
Dissatisfaction % (#)	-	20% (3)

In all cases there was no precise touch sensation. All cases showed variable minimum widening of the areola. All 30 cases of the study showed a general good acceptance of the surgery however they were all worried about the possibility of recurrence of the disease i.e. they are satisfied regarding the cosmetic effect but still worried about the oncological aspect of the disease.



**Fig. 1:** Patient presenting with a mass in the upper outer quadrant of the left breast. The mass is away from the edge of the areola by 3cm. a-c reduction mammoplasty technique (medial pedicle = Hall Findlay mammoplasty); a) preoperative marking, b) 1 week postoperative and c) post radiation therapy.



**Fig. 2:** Patient presenting with a mass in the upper outer quadrant of the right breast. The mass is away from the edge of the areola by 4.5 cm. NSM with a latissimus dorsi flap was done. a) intraoperative bed after mastectomy and axillary evacuation and b) 1 month postoperative.

Doctor satisfaction was assessed by an objective grading system as per the method described by Strasser<sup>(5)</sup> detailed earlier. As a single breast its size, shape, contour, and NAC position and direction are satisfactory however due to patient refusal of contralateral symmetrization the overall cosmetic outcome may appear unsatisfactory to plastic surgeons.

## DISCUSSION

Surgery is still the main method of treatment for cancer of the breast despite recent and continuing advances in other forms of non surgical medical treatments. BCS along with postoperative radiotherapy is now an established surgical modality, as studies demonstrated equivalent survival for BCS in comparison with modified radical mastectomy in addition to the improved body image & life style<sup>(6)</sup>.

Breast conservative surgery allows for complete removal of cancer with adequate safety margins, however the amount of tissue removed is not only in terms of absolute volume but also in relation to tumor location & relative size of breast, that's why some lesions are likely to result in an unsatisfactory aesthetic outcome<sup>(4)</sup>.

The development of oncoplastic breast surgery (OPS) aimed at safely removing all malignant breast tissue while achieving the best possible aesthetic outcome. This is based upon the incorporation of plastic surgery techniques for immediate reshaping of the breast after wide excision for breast cancer. OPS offer tools for breast conservation in patients otherwise destined for mastectomy or procedures with poor aesthetic outcome<sup>(7)</sup>.

OPS techniques may improve the cosmetic result without jeopardizing the oncological outcome. A range of such techniques has been described in the literature including breast reshaping by local glandular tissue or the use of reduction mammoplasty techniques<sup>(8)</sup>.

The term oncoplastic surgery is thus coined to describe an evolving domain of breast surgery that applies the combined principles of surgical oncology and those of plastic & reconstructive surgery to the management of breast cancer. So OPS does not describe a particular surgical procedure; it is a comprehensive approach to surgical planning aimed at achieving widened surgical margins, reduced local recurrence risk,

and optimized cosmetic outcome and breast reduction volume when patients with macromastia develop breast cancer. Multiple elements have been combined to allow surgeons to use innovative surgical solutions to improve both surgical cosmeses and oncologic outcome simultaneously<sup>(7)</sup>.

Nipple-sparing mastectomy (NSM) is being increasingly recognized as an alternative to the more traditional mastectomy approaches. Such technique is based on the concept that preservation of the NAC and the skin envelop of the excised breast would achieve the best aesthetic appearance. So NSM combines skin sparing mastectomy with preservation of the NAC, intraoperative assessment of the nipple tissue core and immediate reconstruction of the breast<sup>(9)</sup>.

NSM raises serious oncologic concerns about the risk of an occult or a newly formed primary tumor resulting from parenchyma left behind in the nipple and retro-areolar area, therefore the procedure is not generally considered to be an alternative to standard mastectomy. However the procedure can be safe with the proper patient selection criteria<sup>(10)</sup>.

In an effort to eradicate the possibility of leaving residual tumor tissue in the nipple areola complex, a subareolar frozen biopsy can effectively identify NAC that may harbor cancerous cells. In other words, neoplastic involvement of the NAC can be predicted prior to operation and assessed during the surgery. Postoperative viability of NAC is sustained likely with appropriate surgical technique. However candidates for OPS who most often have peripherally located tumor in which wide local excision is performed with preservation of the NAC may not need to routinely undergo sampling from the nipple tissue core<sup>(9)</sup>.

There have been controversies involving possible higher risk of local relapse using the NSM approach. Recent studies have shown that the procedure is safe for selected patients especially those who under run nipple tissue core biopsy intra-operatively. Other studies stated that the rate of local recurrence with NSM is comparable to that of conventional total mastectomy<sup>(11)</sup>.

Incidence of local recurrence ranged between 2% - 5.4%. Slavin Sumner<sup>(11)</sup> supported after his study that the technique of SSM as an

oncologically safe one based on an absence of ductal epithelium at the margins of the native skin flaps and a local recurrence rate of 2% after 45 months of follow up. Such finding may consider NSM as an alternative treatment to breast conservation for patients with ductal carcinoma insitu and early stage invasive duct breast cancer<sup>[12]</sup>.

Results of surgery can be assessed through many methods including patient reported satisfaction to body image and health related quality of life, clinical examination, photography and applanation tonometry (to assess texture).

Mosahebi et al. evaluated 61 patients with mean follow up of 48 months with an aim of establishing the effect of different reconstruction types (implant only, pedicled LD flap with implant, DIEP flap). They found that all three reconstruction techniques achieve good outcome scores although this assessment was helpful in illustrating that good aesthetic outcomes are attained with NSM. However in patients that underwent postoperative radiotherapy, objective tonometry showed that the breast remained softer in DIEP flap reconstruction<sup>[13]</sup>.

One of the appeals to NSM is that there is no removal of the breast skin and the nipple so it is similar to breast conservation, offering women with a more natural look and feel when compared to other forms of mastectomy. There is a dramatic difference better off, in terms of self-esteem and sense of self-confidence. The psychological stability achieved supersedes the concern of time and money needed for such surgery, especially the perception of the concept of plastic and reconstructive surgery with the preservation of the NAC a fact which reflects positively on the psychology of the patient and the progress of the cure.

It would be expected that many preserved nipples would be insensate as their nerve supply from the anterior division of the 4<sup>th</sup> lateral intercostals nerve is injured and removed while traveling through the breast parenchyma; however, there is some evidence that nipple sensation may be regained.

Petit et al. used a score from zero to ten according to sensation felt when the areola is touched with a piece of paper, they found that the mean score was only 2, however, after one year 15% of patients had some sensitivity. Reported light touch sensation in 6 out of 14 preserved

NAC, but with altered quality more like that of the surrounding skin<sup>[5]</sup>.

Patients should also be advised that although some erectile ability and nipple sensation may remain postoperative, it is more likely those characteristic will be permanently lost and that NSM should therefore be viewed as a procedure to conserve cosmeses rather than sensation and function. It is found that if erectile function and sensation cannot be preserved, the benefit of conserved cosmeses overrides this restrictive point of view among patients in different studies.

Due to the sample number of cases done in the present study, its results in comparison to the results of the international ones in the literature are not applicable. However, such practicing enabled a wider understanding and a clinical approach to gain the practical feeling of the international experiences and the different opinions.

## CONCLUSION

Nipple sparing mastectomy has been shown to be oncologically safe. Compared to oncoplastic surgery, it offers several advantages; mainly avoiding radiotherapy in many cases, and elimination of the risk of secondary tumours. Several patients, especially with increasing public perception of the incidence of breast cancer, are extremely worried about developing a cancer in their breasts. This has led to a great interest in prophylactic mastectomies. NSM with immediate reconstruction offers them the possibility of having an aesthetic breast while removing all the breast tissue liable to develop a malignancy.

Oncoplastic surgery has also been shown to be safe with good aesthetic result. Compared to NSM, it is time and cost efficient, avoids distal donor site morbidities and is well accepted by patients and surgeons. However, patients have to receive breast radiotherapy with all its complications. In many cases, this will affect the aesthetic result.

## REFERENCES

1. Broer N et al., A novel technique for nipple-sparing mastectomy and immediate reconstruction in patients with macromastia. *PlastReconstr Surg*, 2014. 126(2): p. 89e-92e

2. Spear SL et al., Nipple-sparing mastectomy. *PlastReconstrSurg*, 2009. 123(6): p. 1665-73
  3. Vlajcic, Z., R. Zic, and Z. Stanec, Has the time come to change the breast-conserving treatment for skin and nipple-areola complex-sparing mastectomy? *Plast Reconstr Surg*, 2010. 125(3): p.1043-4; author reply 1044-5
  4. Clough KB, Kaufman GJ, Nos C, Buccimazza I, Sarfati IM. Improving breast cancer surgery: a classification and quadrant per quadrant atlas for oncoplastic surgery. *Ann SurgOncol*. 2010 May;17(5):1375-91
  5. Strasser EJ. An objective grading system for the evaluation of cosmetic surgical results. *Plast Reconstr Surg*. 1999 Dec;104(7):2282-5
  6. Benson JR, della Rovere GQ. Ipsilateral breast cancer recurrence. *Breast*. 2008 Feb; 17(1):12-18. doi: 10.1016/j.breast.2007.06.006. Epub 2008 Feb 4
  7. Meretoja TJ, Svarvar C, Jahkola TA, Outcome of oncoplastic breast surgery in 90 prospective patients. *Am J Surg*. 2010 Aug;200(2):224-228
  8. McCulley SJ, Durani P, Macmillan RD. Therapeutic mammoplasty for centrally located breast tumors. *PlastReconstr Surg*. 2006 Feb; 117(2):366-73
  9. Crowe JP Jr, Kim JA, Yetman R, Banbury J, Patrick RJ, Baynes D. Nipple-sparing mastectomy: technique and results of 54 procedures. *Arch Surg*. 2004 Feb; 139(2):148-50
  10. Mátrai Z, Gulyás G, Tóth L, Sávolt A, Kunos C, Pesthy P, Bartal A, Kásler M. [Role of nipple sparing mastectomy in modern breast surgery]. *OrvHetil*. 2011 Jul 31; 152(31): 1233-49
  11. Spear SL, Willey SC, Feldman ED, Cocilovo C, Sidawy M, Al-Attar A, Hannan C, Seiboth L, Nahabedian MY. Nipple-sparing mastectomy for prophylactic and therapeutic indications. *PlastReconstr Surg*. 2011 Nov; 128(5):1005-14
  12. Slavin SA, Schnitt SJ, Duda RB, Houlihan MJ, Koufman CN, Morris DJ, Troyan SL, Goldwyn RM. Skin-sparing mastectomy and immediate reconstruction: oncologic risks and aesthetic results in patients with early-stage breast cancer. *PlastReconstr Surg*. 1998 Jul; 102(1):49-62
  13. Mosahebi A, Ramakrishnan V, Gittos M, Collier J. Aesthetic outcome of different techniques of reconstruction following nipple-areola-preserving envelope mastectomy with immediate reconstruction. *Plast Reconstr Surg*. 2007 Mar; 119(3):796-803
  14. Petit JY, Rietjens M, Garusi C, et al. Integration of plastic surgery in the course of breast-conserving surgery for cancer to improve cosmetic results and radicality of tumor excision. *Recent Results Cancer Res*. 1998;152:202-211
-