Evaluation of different oncoplastic procedures in the management of breast cancer from an aesthetic point of view

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Background
Breast cancer, according to the National Cancer Institute, is the most common cancer in women in Egypt as it accounts for ~38.8% of the total malignancies among Egyptian women.
For many women with early-stage breast cancer, a combination of partial mastectomy and radiation therapy referred to as breast-conserving therapy is preferable to total mastectomy.
Objective
To evaluate the different oncoplastic techniques for the management of breast cancer from an esthetic point of view.
Patients and methods
This was a prospective, analytical study that included 30 patients aiming to clinically assess the oncoplastic surgical techniques used for the management of early-stage breast cancer. This study was conducted at the Bahya Specialized Breast Cancer Hospital and Ain Shams University Hospitals.
Results
In our study, none of the patients had any malignant recurrence as confirmed by the pathologist in our multidisciplinary team proving that we had performed a safe oncoplastic technique from the oncological point of view. The follow-up of the malignant recurrence was for the first 6 months as this was the time limitation of our study. In our study, we were able to conduct an excellent cosmetic outcome for relatively large tumor excisions with 90% of the cases falling in excellent and very good score groups with a mean cosmetic outcome score of 4.53. The remaining 10% fall in the good and fair score groups as those patients noticed asymmetry of the two breasts in front of the mirror as they refused bilateral breast reduction mastopexy. None of our cases have had a poor or an ugly score.
Conclusion
The choice of the oncoplastic technique is mainly based on the location of the tumor, size of the breast, and distance of the tumor from the nipple–areola complex.

Keywords:
modified radical mastectomy, oncoplastic surgery

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Introduction

The breast is the true symbol of femininity, and it remains in the mind of every one of us as the heart of womanhood, with its role as nourisher and comforter. These roles evoke the idea of the importance and the affection of this delicate organ has in the minds of women [1].

Breast cancer is the most common cancer in women worldwide, with nearly 1.7 million new cases diagnosed in 2012 (the second most common cancer overall). This represents about 12% of all new cancer cases and 25% of all cancers in women [2].

Breast cancer, according to the National Cancer Institute, is the most common site of cancer in women in Egypt as it accounts for about 38.8% of total malignancies among Egyptian women; it is an important cause of mortality among women [3].

The diagnosis of breast cancer is a life-changing experience. Not only does it bring the woman face to face with her mortality, but also the surgical treatment of breast cancer is accompanied by physical changes to the breast and body that may significantly, and often permanently, alter her perception of her physical, emotional, and sexual wholeness [4].

The history of breast surgery has evolved over the past several decades, since Halsted's radical mastectomy was first presented in 1882 as the best radical solution for those with breast cancer [5].

Modified radical mastectomy was developed and gained acceptance for providing the same effectiveness as radical mastectomy with less side effects. However, the severe disfigurement that those surgeries pose to the female body has raised the demand to a newer technique that reduces disfigurement without altering the safety or the overall prognosis [5].

Surgical management of breast cancer has evolved significantly over the years, trending away from radical procedures, and moving toward those with complete resection of tumor while preserving the normal parenchyma tissue thereby decreasing patient morbidity. This shift has allowed for improved esthetic outcomes and quality of life for patients, while maintaining equivalent oncologic safety [6].

Since the Early Breast Cancer Trialists' Collaborative Group established the equivalency of mastectomy and breast-conserving therapy in 1985, breast-conserving surgery (BCS) has remained the optimal surgical treatment for breast cancer patients [7].

The goals of BCS are the removal of breast cancer with an adequate surgical margin and maintenance of a breast that is cosmetically acceptable to the patient [7].

Mastectomy with or without breast reconstruction is the treatment of choice when tumor resection with cosmetic preservation is unattainable. Given the understandable desire to preserve a sense of wholeness, it is not surprising that many women consider mastectomy to be an unacceptable cosmetic alternative to BCS [7].

BCS is established as a safe option for most women with early-stage breast cancer [8].

In an attempt to resolve the conflict between oncologic safety and cosmetic satisfaction, a novel approach named 'oncoplastic surgery' has emerged and gained wide acceptance all over the world [9].

Oncoplastic surgery refers to describe techniques that combine the principles of surgical oncology with those of plastic surgery in an attempt to achieve a desirable esthetic result while maintaining a low cancer recurrence rate. The use of oncoplastic techniques has been driven by the fact that up to 30% of women undergoing BCS will have a residual deformity that might require surgical intervention. Deformities are generally seen in BCS when more than 20% of the breast volume has been resected as well as in tumors that are located medially, superiorly, or in the retroareolar region [10].

The oncologic outcome of the BCS is equivalent to mastectomy, when free margins are achieved and adjuvant radiotherapy of the operated breast is applied. Oncoplastic breast-conserving techniques combine two aspects: oncological safety with a resection of the tumor with free margins and optimal esthetic aspects. Breast-conserving oncoplastic techniques divide into volume displacement and volume replacement techniques: the first are constituted by rotational mammoplasty techniques (glandular rotation mammoplasty, dermoglandular rotation mammoplasty, and tumor-adapted mastopexy), the latter by latissimus dorsi flap and lateral thoracic advancement flap [11].

Oncoplastic breast reconstruction at the time of partial mastectomy, either through local tissue rearrangement or mastopexy/reduction mammoplasty technique, is an extremely valuable tool in comprehensive oncologic treatment. These techniques leave the patients with minimal breast deformities following proper treatment, without compromising the oncologic safety. These are procedures that all reconstructive breast surgeons should be familiar with and offer their patients at the time of BCS for breast cancer [6].

Aim of the work

To evaluate the different oncoplastic techniques for the management of breast cancer from an esthetic point of view.

Patients and methods

Type of study

This was a prospective, analytical study that included 30 patients aiming to clinically assess the oncoplastic surgical techniques used for the management of breast cancer regarding breast esthetics, patient satisfaction, and quality of life.

Study settings

This study was conducted at Bahya Specialized Breast Cancer Hospital and Ain Shams University Hospitals. Approval of the Ethics Committee and written informed consent from all participants were

obtained. An oncoplastic surgical technique was proposed for patients in whom breast conservative treatment is possible on oncologic grounds, but where a standard resection without reconstruction would lead to a poor cosmetic outcome. Diagnosis and staging examinations were carried out according to the standard protocol being conducted at the Bahya Specialized Breast Cancer Hospital and Ain Shams University Hospitals. Regarding the stage of the disease, eight patients were of stage I (T1N0M0) and 15 patients of stage II (T1N1M0), while T2N1M0 in seven patients. The size of the tumor was less than 2 cm in 23 patients while in only seven patients the tumor was more than 2 cm but less than 5 cm. Regarding the status of the axilla in our study there was suspicious unilateral axillary LNs by ultrasound in all the patients; there was no contralateral lymph node (LN) affection; sentinel LN biopsy was not done that is why we do total axillary clearance in all the patients (eight patients with N0 and 22 patients with N1). In-patient postoperative recovery time ranged from 24 h to a maximum of 2 days. All patients were discharged with a set of instruction and follow-up schedule. Our patients were all followed up for both oncologic and cosmetic grading and were referred to receive suitable adjuvant chemoradiotherapy and/or radiotherapy according to the final pathology reported after conventional pathological evaluation. Patient selection was achieved through a number of inclusion and exclusion criteria.

Inclusion criteria

Female patients ranged from the age of 18–60 years. Imaging studies confirmed pathoanatomic features corresponding to clinical symptoms. Histopathological diagnosis confirmed the clinical features and manifestations.

Exclusion criteria

Female patients under the age of 18 years and over 60 years, multicentric lesions, patients with extensive in-situ component (>25%), recurrent malignancy following conservative breast surgery, inflammatory breast cancer with extensive skin involvement, previous breast irradiation, distant metastasis, noncompliant patients including patients demanding mastectomy for fear of local recurrence, patients not convinced with proposed procedure after adequate explanation, and patients refusing postoperative adjuvant radiotherapy.

All patients were submitted to history taking including full personal history, complaint, analysis of their disease along with thorough medical and family history with its relevance to the condition, and complete clinical examination in the outpatient clinic.

Preoperative investigation were performed that included laboratory tests: including complete blood count, liver profile, kidney profile, coagulation profile, and blood sugar. Radiological examination: including bilateral digital mammography in at least two views (cranio-caudal and mediolateral oblique). Computed tomography chest, computed tomography pelvi-abdomen with contrast as part of our metastatic workup protocol, and bone scan as indicated and upon the patient's complaint from bony ache. ECG and echocardiography were performed on request by the anesthesiologist when indicated. Tissue biopsy using true-cut needle core biopsy in all patients was indicated.

Multidisciplinary team

Multidisciplinary team at the Breast Unit at the General Surgery Department of Bahya Specialized Breast cancer Hospital and Ain Shams University Hospital reviewed every single case independently. The multi-disciplinary team (MDT) included: breast surgery consultant, pathology consultant, plastic surgery consultant, and radiology consultant. Discussion was made up on every case including her history, examination, and investigations until the decision is tailored for every case.

Patient counseling and consent

After admission and completion of history and examination, each patient received a detailed explanation of her condition regarding the disease itself, the type of surgery, and expected postoperative adjuvant therapy.

Operative details of the selected technique for each patient were explained using pictures of similar cases to help visualization of the outcome, risks, and benefits of the suggested procedure along with its possible intraoperative and postoperative complications.

Possible complications were also clearly stated and explained individually for each procedure including wound infection, fat necrosis, failure of flap, nipple–areola complex (NAC) sloughing, asymmetry or failure of adequate cosmetic outcome, and incidence of local recurrence.

Also, the change of the strategy of the postoperative oncological management and the need for postoperative radiation dose to the remaining tissue

of the breast and the resultant effect of this dose on the skin and cosmetic outcome were evaluated.

All patients were evaluated by our surgical team prior to surgery, full photography of the breast was taken from multiple views.

A formal consent was written and explained to the patient. The consent was signed 1 day prior to the surgery and any inquiries, concerns, or doubts were discussed with the patient and a first-degree relative (upon the patient's request).

Medical photography

The need for medical photography was also discussed and explained: How will the photograph be taken, and who is going to photograph her. Also, the reason of the photography was discussed, explained, and consented.

Medical photographs were taken and kept in the patient's records as agreed upon. At least two views were taken: front and side views. Pictures were taken to the patients along with their follow-up visits to keep record and document progress.

Preoperative marking

Mark up and design of the planned incision were done on the morning of the surgery in the holding area of the operating theater in the presence of a breast nurse and the surgical team.

Measurements were taken and kept with the patient standing in an upright position prior to receiving preanesthetic drugs. Drawings were made using waterproof skin markers.

A preoperative photography session is made now again for documenting the breast measurements and incision sites to help auditing the final cosmetic outcome according to each patient and each breast size.

Operating room setup and surgical equipment

Surgery was performed in the operating rooms of Bahya Specialized Breast Cancer Hospital and at Ain Shams University hospitals.

Applied oncoplastic techniques

All the 30 patients underwent oncoplastic breast surgery which implied two major technical steps: (a) excision of the tumor with a wide safety margin through a predesigned incision with frozen section examination for margins along with formal axillary dissection. (b) This was followed by immediate reconstruction using the following oncoplastic techniques: superior medial pedicle mammoplasty, inferior pedicle mammoplasty, round block mammoplasty, and rotation flap (Grisotti technique). Subcutaneous mastectomy was followed by immediate reconstruction using the latissimus dorsi muscle flap.

Postoperative management

Broad-spectrum prophylactic antibiotic which was a third-generation cephalosporins (1 g) was administrated to all patients upon induction and during the whole period of hospital stay. Postoperative pain and discomfort were encountered and the patients were given routine postoperative analgesia in the form of pethidine 50 mg after recovery from anesthesia followed by NSAIDs fixed dose every 8 h in the first 24 h and when needed after that. The patients were discharged on the postoperative second day if everything is fine. They were discharged on antibiotics, analgesics, and anti-edema agents and were advised to wear well-fitting sport bra following all reconstruction procedures. Drains were removed in follow-up visits when the daily volume is less than 40–50 ml. The patients were instructed to undergo arm and shoulder mobilization and a set of exercises to avoid stiffness of the shoulder joint and decrease arm edema after axillary surgery. Dressing once daily with betadine was done for all patients.

Follow-up

The patients were given a follow-up schedule on discharge from the hospital on the following first week every 3 days for dressing and monitoring the drains and then the following 2 weeks every 4 days until removal of the drains and stitches. After the final pathology report is available, the patients were referred to the Oncology Department to start their adjuvant therapy according to our standard protocol that ranged from 3 to 8 weeks. All patients were given the contact information of the surgeon in case of any complication arises and were asked to pass by the clinic at least once a month during the course of their adjuvant therapy. After completion of the adjuvant therapy, the patients were asked to follow up in the surgical department clinic once every 3 months for the 6 months for clinical examination, breast ultrasound, tumor markers, bilateral mammography, and routine investigations as required.

Assessment of cosmetic outcomes

Cosmetic outcome was evaluated during the early postoperative period and on follow-up. Evaluation was done by means of a scoring system, graded from one to five, one indicating poor results and five indicating excellent results. Regarding our outcomes:

12 patients had undergone superior pedicle flap mammoplasty (eight patients were excellent, two patients were very good, and two patients were good). Four patients underwent inferior pedicle flap (three patients were excellent and only one patient was good). Eight patients underwent round block technique (six patients were excellent and two patients were very good). Four patients underwent Grisotti technique (two patients were excellent and other two patients were very good in outcome). Two patients underwent latissmus dorsi flap (one of them as excellent and one of them was very good).

Cosmetic outcome was evaluated by the surgeon, the patient, and the breast MDT by postoperative photographs, then at 2 weeks and 1 month. Regarding the patient many factors affect the outcomes mainly by order complication, scars, size, and symmetry with the shape of the nipple, while regarding the surgeon the factors affecting the outcomes by order are the size and symmetry, shape of the nipple, scars, and complications.

Pictures were taken before and after surgery for comparison in terms of breast contour, breast size and shape, degree of ptosis, NAC deviation and degree of asymmetry. Regarding symmetrization, there was discrepancy in breast size and NAC. After patient counseling, three patients refused contralateral symmetrization.

Comparison of preoperative and postoperative breast measurements was taken in terms of NAC position to the mid-humeral level, distance from the sternal border, and inframammary sulcus.

Reevaluation was done after completion of adjuvant chemotherapy and radiotherapy during the follow-up. Documentation of radionecrosis, breast edema, and inflammation was done and managed according to its severity for the first 6 months after the surgery.

The cosmetic outcome score was based on multiple items that made up a checklist to be evaluated by our team and the MDT of the breast for every single case. This checklist includes the overall shape of the breast, the symmetry of both breasts, the site and direction of the nipple, the volume of the breast, and the skin incision shape.

Assessment of patient satisfaction and quality of life

Patient satisfaction and quality of life were evaluated during the early postoperative period and on follow-up. Evaluation was done by BREAST-Q.

Quality of life domains

(1) Psychosocial well-being: this scale measures the psychosocial well-being with items that ask about body image (e.g. accepting of body; attractive) and a woman's confidence in social settings. Other items cover emotional health and self-esteem.
(2) Sexual well-being: this scale measures sexual well-being and body-image issues with items that ask about feelings of sexual attractiveness when clothed and unclothed and sexual confidence as it relates to one's breasts, as well as how comfortable or at ease a woman feels during sexual activity.
(3) Physical well-being, chest, and upper body: this scale captures the physical problems caused by breast size including pain (e.g. breast, shoulder, back, neck), energy levels, rashes, and sleeping problems. There are also questions asking about activity limitations and balance.

Satisfaction domains

(1) Satisfaction with breasts: this scale measures body image in terms of a woman's satisfaction with her breasts. Items cover breast appearance (e.g. size, symmetry, softness, cleavage), and satisfaction with breasts in relation to how a bra fits and how the breasts look when clothed or unclothed. There are also postoperative only items (e.g. location and appearance of scars).
(2) Satisfaction with nipples: this scale measures satisfaction with the appearance of the NAC. Items cover their location on the breast, symmetry, shape, and nipple sensation.
(3) Satisfaction with the outcome: this scale measures a woman's overall appraisal of the outcome of her breast surgery. Items cover whether the woman's expectations were met with respect to the esthetic outcome and the impact surgery has had upon her life as well as satisfaction with the decision to have surgery (e.g. 'I would do it again').
(4) Satisfaction with care information: this scale measures satisfaction with information provided about the breast reduction surgery from the surgeon. Items cover complications and risks (e.g. loss of nipple sensation), implications for future breast cancer screening and breast-feeding, healing, and recovery time, how the surgery would be done, and breast appearance (e.g. breast size, scars). Surgeon: this scale measures satisfaction with the surgeon. Items

ask about the surgeon's manner (e.g. professional, reassuring, thorough, sensitive) and communication skills (e.g. easy to talk to). Items also cover the extent to which the patient was involved in the decision-making and understood the process. Medical team: this scale measures satisfaction with members of the medical team (other than the surgeon). Items ask whether the staff were professional, knowledgeable, and friendly, as well as how comfortable the woman was made to feel and whether she felt she was treated in a respectful manner.

(5) Office staff: this scale measures satisfaction with interactions with members of the office staff. Items ask whether staff were professional, knowledgeable, and friendly, as well as how comfortable the woman was made to feel and whether she felt she was treated in a respectful manner.

Results

Figs 1-6 Showed different of oncolplastic technique.

Age

The age of the patients varied from 21 and 59 years old. The mean age for our study was 44.7 (Table 1).

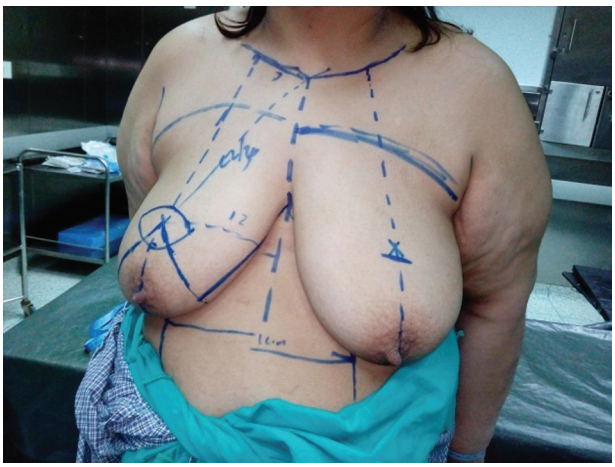
Comorbidities

On pre-operative patient preparation, Full history taking and full labs are done, 8 patients among the 30 patients were found to have medical comorbidities. 6 patients have hypertension and 2 patients have diabetes mellitus (Table 2).

Tumor size

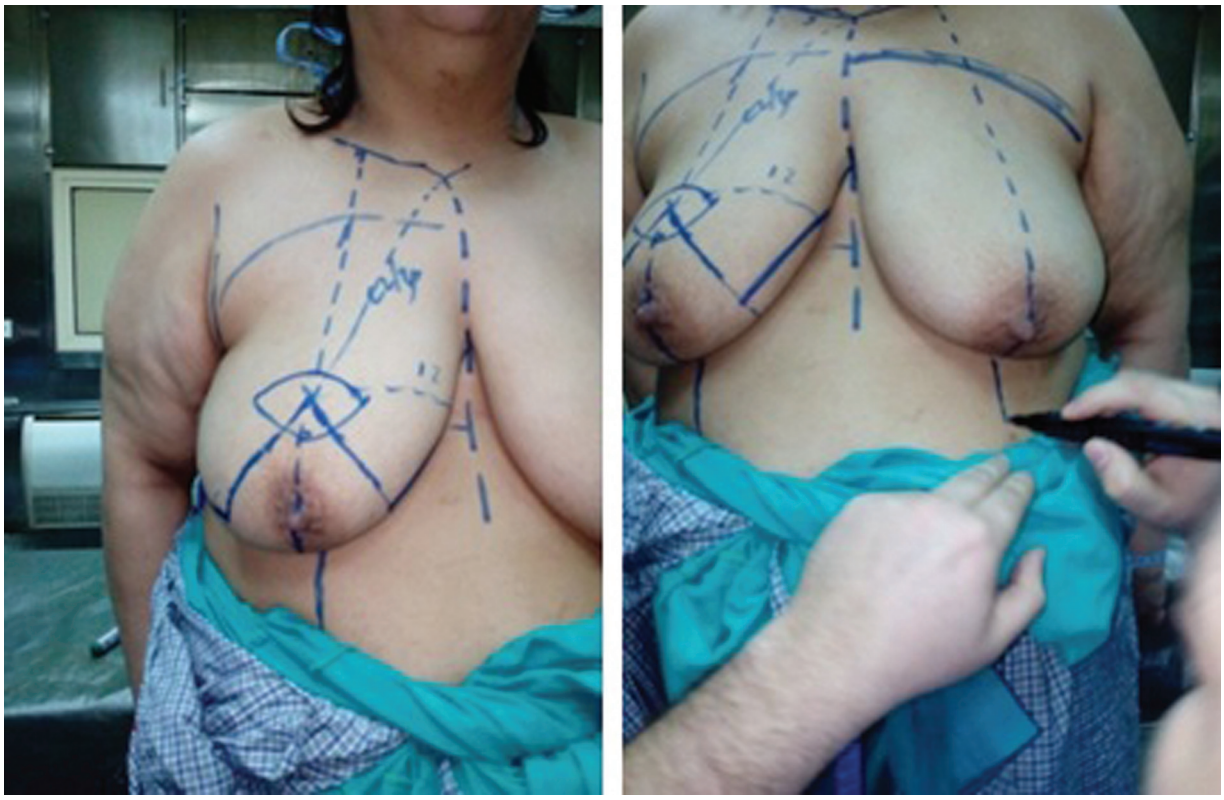
The tumor size was evaluated by ultrasound done for all cases before operation as an integral step of the triple

Figure 2



Picture after completion of preoperative drawing.

Figure 1



Preoperative drawing while the patient standing.

Figure 3

Preoperative drawing while the patient is lying down on a table.

Figure 4

Round block mammoplasty.

Figure 6

Number of cases included in the study.

Table 1 Mean age of the study

	Mean±SD	Minimum	Maximum
Age	44.72±9.12	21	59

Table 2 Number and percent of comorbidities

Comorbidity [n (%)]	
No	22 (73)
Yes	8 (27)
Type of comorbidity [*n* (%)]	
None	22 (73)
HTN	6 (20)
DM	2 (7)

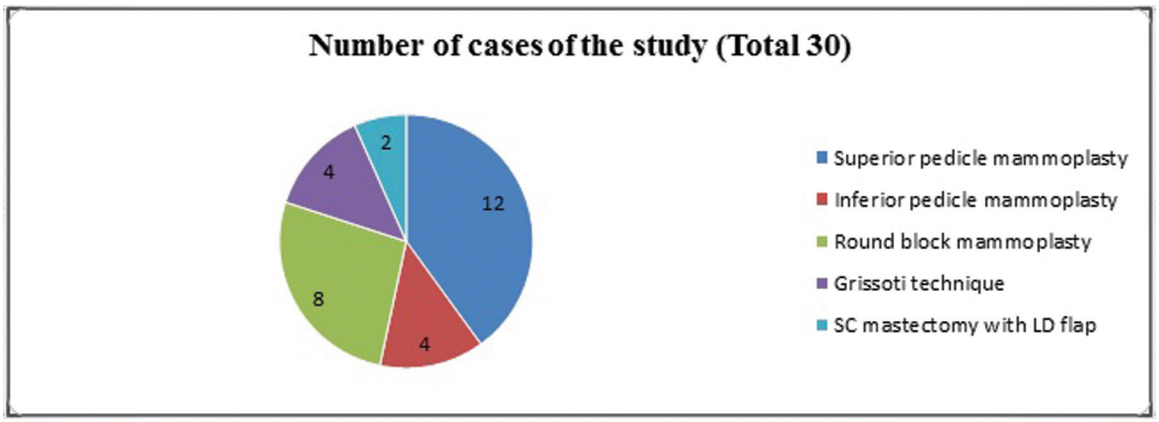
DM, diabetes mellitus; HTN, hypertension.

Table 3 Mean tumor size in the study

	Mean±SD	Minimum	Maximum
US size	1.97±0.69	1	3

US, ultrasound.

Figure 5



Superior pedicle mammoplasty.

assessment. The tumor size is evaluated along the longest diameter of the tumor mass. The smallest tumor size was 1 cm, the largest one was 3 cm and the mean tumor size was 1.97 cm (Table 3).

The mean breast cup size for the whole study was 3.33 inches which stand for C, (Table 4). The minimum breast cup size was A, the maximum was G.

Distance from NAC

The distance from the nipple areola complex was variable among the cases of the study, the nearest tumor was 1.5 cm from NAC, the farthest was 8 cm from NAC with mean distance 2.99 cm (Table 5).

Tumor location

Table 6

Operative evaluation

Operation time

Our mean operation time was 121 minutes (Table 7), the shortest procedure finished in 90 minutes while the longest took 205 minutes.

1st day drain amount

All 30 patients have had a drain left inside the wound with two separate limbs, one in the breast wound and the other in the axilla. The amount of blood lost in the 1st 24 hours was estimated by the amount of blood in the drain in the 1st day post-operative. The mean amount of blood collected in the drain in the 1st day was 83.83 ml. The maximum amount in the drain was 125 ml while the minimum amount was 50 ml (Table 8).

Postoperative hospital stay

All patients were admitted to the hospital one day before surgery for pre-operative anesthesia consultation and to fulfill all their lab work up, then discharged one to two days post-operative once they are able to move and proceed to normal daily activities.

Any patient who complains from post-operative pain or delay in movement is allowed to stay until they are able to leave. Most of the patients were discharged at the morning of the second day post-operative (i.e. 24 hours post-operative).

The mean post-operative stay period was 30 hours. (Table 9), however the longest post-operative stay period was 3 days.

Postoperative complications

Patients were given a follow up schedule upon discharge from the hospital as the following in the form of 3 visits in the first week for dressing, monitoring the drains and any complications. The following two weeks every four days until removal of the drains and stitches.

During the follow up period complications occurred only in 5 cases in the form of: 3 cases of infection and 2 cases of ulcer formation (Table 10).

Postoperative pathological outcome

Postoperative results provided by our pathologist showed that 25 of our patients had (IDC), 4 of our

Table 4 Mean breast cup size for the study

	Mean±SD	Minimum	Maximum
Mean breast size	3.33±1.56	1	7

Table 5 Mean distance of the tumor from nipple–areola complex among the patient population

	Mean±SD	Minimum	Maximum
Distance from NAC	2.89±1.47	1.5	8

NAC, nipple–areola complex.

Table 6 Location of the tumor among the patient population

Tumor location	Number of patient (%)
Upper outer quadrant	14 (47)
Lower outer quadrant	10 (33)
Upper inner quadrant	4 (14)
Lower inner quadrant	2 (6)

Table 7 Mean operation time for our study

	Mean±SD	Minimum	Maximum
Operative time	121.8±37.8	90	205

Table 8 Mean first day postoperative drain amount

	Mean±SD	Minimum	Maximum
1st day drain	83.83±22.12	50.00	125.00

Table 9 Mean postoperative stay of our study

	Mean±SD	Minimum	Maximum
Postoperative hospital stay	30±8.77	24	72

Table 10 Number and percent of complications among the patient population

Complications	*n* (%)
Ulcer	
Negative	28 (93.3)
Positive	2 (6.7)
Infection	
Negative	27 (90)
Positive	3 (10)

patients had (ILC) and one of them had mucinous carcinoma. (Table 11)

Evaluation of cosmetic outcome

Cosmetic outcome was evaluated using a scoring system which was made up by the three independent grading parties (Surgeon, Patient and MDT of the breast) based on the level of satisfaction to give an overall score for cosmetic outcome.

The cosmetic outcome score was based on multiple items that made up a checklist to be evaluated by our team and the MDT of the breast for every single case. This checklist includes the overall shape of the breast, the symmetry of both breasts, the site and direction of the nipple, the volume of the breast and the skin incision shape

These elements were discussed for every single case and analyzed to give a scoring system graded from 1 to 5 as the following: (Table 12)

The overall mean score of our study was 4.53 which falls between very good and excellent (Table 13).

Table 11 Postoperative pathological type of tumor among the patient population

Postoperative pathological type of tumor	*n* (%)
IDC	25 (83.3)
ILC	4 (13.3)
Mucinous carcinoma	1 (3.3)

IDC, invasive ductal carcinoma; ILC, invasive lobular carcinoma.

Table 12 Postoperative cosmetic scoring system

5	Excellent
4	Very good
3	Good
2	Fair
1	Poor
0	Ugly

Table 13 Mean cosmetic outcome of our study

	Mean±SD	Minimum	Maximum
Cosmetic outcome	4.53±0.77	2	5

Table 14 Number of cases for every score of cosmetic outcome

Cosmetic outcome	*n* (%)
Score 5	20 (66.6)
Score 4	7 (23.3)
Score 3	2 (6.6)
Score 2	1 (3.3)
Score 1	0 (0)
Score 0	0 (0)

The following is the number of cases for each Grade of the scoring system for the whole study. (Table 14)

Superior medial pedicle mammoplasty (Table 15)

Inferior pedicle mammoplasty (Table 16)

Round block mammoplasty (Table 17)

Round block mammoplasty (Table 18)

Grissoti technique (Table 19)

Satisfaction with breasts

The highest score was 100 while the lowest score was 59. The mean score was 91.72. The highest scores were for superior medial pedicle mammoplasty, inferior pedicle mammoplasty, round block mammoplasty, grissoti technique and subcutaneous mastectomy followed by immediate reconstruction using

Table 15 Mean cosmetic outcome for superior medial pedicle mammoplasty procedure

Score	Excellent	Very good	Good	Fair	Poor	Ugly	Mean score
Number of cases	8	2	2	0	0	0	4.5

Table 16 Mean cosmetic outcome for inferior pedicle mammoplasty procedure

Score	Excellent	Very good	Good	Fair	Poor	Ugly	Mean score
Number of cases	3	0	0	1	0	0	4.25

Table 17 Mean cosmetic outcome for round block mammoplasty procedure

Score	Excellent	Very good	Good	Fair	Poor	Ugly	Mean score
Number of cases	6	2	0	0	0	0	4.75

Table 18 Mean cosmetic outcome of the Grisotti technique

Score	Excellent	Very good	Good	Fair	Poor	Ugly	Mean score
Number of cases	2	2	0	0	0	0	4.5

Table 19 Mean cosmetic outcome of subcutaneous mastectomy with latissimus dorsi muscle flap

Score	Excellent	Very good	Good	Fair	Poor	Ugly	Mean score
Number of cases	1	1	0	0	0	0	4.5

latissimus dorsi muscle flap. The lowest score was for subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap (Table 20).

Satisfaction with nipples

The highest score was 20 while the lowest score was 14. The mean score was 19.13. The highest scores were for superior medial pedicle mammoplasty, inferior pedicle mammoplasty, round block mammoplasty, grissoti technique and subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap. The lowest score was for inferior pedicle mammoplasty. (Table 21).

Satisfaction with outcome

The highest score was 100 while the lowest score was 39. The mean score was 91.16. The highest scores were for superior medial pedicle mammoplasty, inferior pedicle mammoplasty, round block mammoplasty, grissoti technique and subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap. The lowest score was for subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap. (Table 22).

Satisfaction with information

The highest score was 100 while the lowest score was 57. The mean score was 92.03.The highest scores were for superior medial pedicle mammoplasty, inferior pedicle mammoplasty, round block mammoplasty and grissoti technique. The lowest score was for round block mammoplasty. (Table 23).

Satisfaction with surgeon

The highest score was 100 while the lowest score was 58. The mean score was 95.26. The highest scores were for superior medial pedicle mammoplasty, inferior pedicle mammoplasty, round block mammoplasty, grissoti technique and subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap. The lowest score was for subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap. (Table 24).

Satisfaction with medical team

The highest score was 100 while the lowest score was 65. The mean score was 94.6. The highest scores were for superior medial pedicle mammoplasty, inferior pedicle mammoplasty, round block mammoplasty, grissoti technique and subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap. The lowest scores were for superior medial pedicle mammoplasty and round block mammoplasty. (Table 25).

Satisfaction with office staff

The highest score was 100 while the lowest score was 58. The mean score was 91.58. The highest scores were for superior medial pedicle mammoplasty, inferior pedicle mammoplasty, round block mammoplasty, grissoti technique and subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap. The lowest scores were for superior medial pedicle mammoplasty, round block mammoplasty and subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap. (Table 26).

Table 20 Mean score of satisfaction with breasts for our study

	Mean±SD	Highest	Lowest
Satisfaction with breasts	91.72±15.23	100	59

Table 21 Mean score of satisfaction with nipples for our study

	Mean±SD	Highest	Lowest
Satisfaction with nipples	19.13±1.75	20	14

Table 22 Mean score of satisfaction with outcome for our study

	Mean±SD	Highest	Lowest
Satisfaction with outcome	91.16±17.48	100	39

Table 23 Mean score of satisfaction with information for our study

	Mean±SD	Highest	Lowest
Satisfaction with information	92.03±14.39	100	57

Table 24 Mean score of satisfaction with surgeon for our study

	Mean±SD	Highest	Lowest
Satisfaction with surgeon	95.26±8.42	100	58

Table 25 Mean score of satisfaction with the medical team for our study

	Mean±SD	Highest	Lowest
Satisfaction with the medical team	94.6±9.41	100	65

Table 26 Mean score of satisfaction with office staff for our study

	Mean±SD	Highest	Lowest
Satisfaction with office staff	91.58±14.83	100	58

Table 27 Mean score of psychosocial well-being for our study

	Mean±SD	Highest	Lowest
Psychosocial well-being	92.6±11.71	100	66

Table 28 Mean score of sexual well-being of our study

	Mean±SD	Highest	Lowest
Sexual well-being	91.76±13.46	100	65

Table 29 Mean score of physical well-being of our study

	Mean±SD	Highest	Lowest
Physical well-being	91.03±15.13	100	34

Psychosocial well-being

The highest score was 100 while the lowest score was 66. The mean score was 92.6. The highest scores were for superior medial pedicle mammoplasty, inferior pedicle mammoplasty, round block mammoplasty, grissoti technique and subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap. The lowest scores were for round block mammoplasty and subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap. (Table 27).

Sexual well-being

The highest score was 100 while the lowest score was 65. The mean score was 91.76. The highest scores were for superior medial pedicle mammoplasty, inferior pedicle mammoplasty, round block mammoplasty and grissoti technique. The lowest scores were for superior medial pedicle mammoplasty, round block mammoplasty and subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap. (Table 28).

Physical well-being

The highest score was 100 while the lowest score was 34. The mean score was 91.03. The highest scores were for superior medial pedicle mammoplasty, inferior pedicle mammoplasty, round block mammoplasty, grissoti technique and subcutaneous mastectomy followed by immediate reconstruction using latissimus dorsi muscle flap. The lowest score was for round block mammoplasty. (Table 29).

Discussion

Breast cancer is the most common site-specific cancer in women and is the leading cause of death from cancer for women aged 20–59 years. It accounts for 26% of all newly diagnosed cancers in women and is responsible for 15% of the cancer-related deaths in women [12].

Oncoplastic breast surgery is based on three basic principles: ideal breast cancer surgery with wider excisions, immediate breast reconstruction, and immediate symmetry of the other breast whenever necessary. This is achieved through several techniques based on tumor location, characteristics of the breast, volume of mammary resection, and clinical evaluation of the patient. Oncoplastic techniques are divided into volume displacement and volume replacement procedures. The volume displacement techniques use the remaining breast tissue, while the second, the volume replacement techniques use other autologous tissue to supplement the insufficient breast tissue [13].

Planning for oncoplastic breast surgery includes selecting the most effective techniques for parenchymal excision and placing accurate preoperative markings on the skin. The breast size and the patients' age, general status, and personal potentials are also taken into consideration [14].

In our study, 16 patients underwent superior medial pedicle mammoplasty and inferior pedicle mammoplasty owing to a large breast size. Excision of the tumor with adequate safety margin along with reduction mammoplasty was done lowering the dose of postoperative radiotherapy. This is similar to what was published by Urban and Rietjens [1], Fitzal [15], and Bertozzi *et al.* [16], who stated that the breast size is usually smaller after oncoplastic breast surgery (OBS); thus, it has a positive impact on radiotherapy planning by reducing the dosage required. Contralateral symmetrization was done in 12 patients. Four patients refused reduction mammoplasty on the opposite side.

Eight patients underwent round block mammoplasty owing to small to moderate breast size in addition to tumor distance from NAC being less than 4 cm. This technique minimally affects breast size and contralateral symmetrization is usually not required. This is similar to the retrospective study made by Lin *et al.* [17] published in 2016 who preferred the round block technique to approach breast cancer in a small breast size.

Grisotti technique was performed in patients with central tumors. The esthetic results were excellent similar to the study made by Betal *et al.* [18] published in 2011 who used the Grisotti flap reconstruction technique for central retroareolar breast cancers.

Patients with large tumors, high tumor/breast volume ratio, and small breasts underwent subcutaneous mastectomy followed by immediate reconstruction using the latissimus dorsi muscle flap. This is similar to what was published by Bertozzi *et al.* [16], who claimed that those patients are often associated with defects that are difficult to reconstruct with volume displacement techniques. Indeed, in such cases the residual breast tissue is usually insufficient for proper rearrangement after a partial mastectomy, and the patient may require reconstruction using autologous local or distant flaps. Thus, volume replacement techniques are used for the reconstruction of relatively small breasts with a large resection volume. Furthermore, with the volume replacement technique, remodeling of the contralateral breast is usually not required to achieve symmetry.

The mean age of our study was 44.7 years, 50% of the cases fall between 42 and 57 years, which is consistent with the demographic data published by National Cancer Institute in 2013 by Zeeneldin *et al.* [19], who claimed the peak incidence of breast cancer is between 40 and 59 years old.

Surgeons embarking on outpatient clinic (OPC) should be aware of the risk of complications and the factors that increase this risk. Glandular necrosis is the most challenging complication. Aggressive undermining of both the skin envelope and the gland from the pectoralis muscle can lead to glandular necrosis if the breast is fatty. Areas of fat necrosis can become infected and cause wound dehiscence resulting in postoperative treatment delay [20].

In our study, only five (17%) cases have had complications, three cases got wound infection, two of them were diabetics reflecting the immunocompromisation with diabetes mellitus (DM). Statistically DM has increased the risk of postoperative wound infection thrice, which is similar to what was published by Urban and Rietjens [1] showing the complication of DM in oncoplastic surgery.

Those who had wound infection were treated with admission, parenteral antibiotics, and frequent daily dressing with saline and topical antibiotics. The infection was eradicated within 2–3 days in two of the three patients and the patients were discharged on oral antibiotics with a more frequent follow-up schedule, the third patient needed secondary suturing after treatment of the infection.

We reported lower results of surgical site infection (10%) than reported by Vilar-Compte *et al.* [21] (18.9%) and higher than reported by Olsen *et al.* [22] (4.7%).

Another two cases in our study had wound ulcer with an incidence rate of 7%; it was discovered in the 2nd week postoperatively. None of them had any other complications. For both patients the ulcer was a result of the heavy weight of the breast exerted on the skin of the breast even after reduction as both patients had a breast cup size G, both patients were treated with topical antibiotics, topical reepithelialization ointments, and daily dressing until full recovery.

None of the previously stated complications resulted in delay of postoperative adjuvant therapy and all patients were sent to receive their appropriate therapy according to the schedule.

The majority of our patients had the tumor in the upper outer and lower outer quadrants except six (20%) patients.

The operative duration of our study was variable. The longest operation was subcutaneous mastectomy followed by immediate reconstruction using the latissimus dorsi muscle flap which took about 205 min as it includes two operative sites. The shortest operation was round block mammoplasty which took about 90 min.

Regarding postoperative hospital stay, the majority of our patients were discharged 24 h postoperatively; however, patients who underwent subcutaneous mastectomy followed by immediate reconstruction using the latissimus dorsi muscle flap required longer postoperative hospital stay as there was a delay in their ability to move and to perform normal daily activities in addition to their complaint of postoperative pain.

Regarding postoperative pathological outcome, postoperative results provided by our pathologist showed that 25 (83%) of our patients had invasive duct carcinoma, four (13%) of our patients had invasive lobular carcinoma, and one (3%) of them had mucinous carcinoma which match with the recent statistics by breastcancer.org [23], which claims that about 80% of all breast cancers are invasive ductal carcinomas.

In our study, none of the patients had any malignant recurrence as confirmed by the pathologist in our multidisciplinary team proving that we had performed a safe oncoplastic technique from the oncological point of view. The follow-up of the

malignant recurrence was for the first 6 months as this was the time limitation of our study. The follow-up of the malignant recurrence was for the first 6 months as this was the time limitation of our study; a longer follow-up for the patient will be much better but we found our results in the first 6 months.

Annual recurrence curves indicated that the relapse peak after mastectomy emerged in the first 2 years; however, recurrence after conservative breast surgery increased annually with the highest peak being close to 5 years as shown by most of the studies [20].

In our study, we were able to conduct an excellent cosmetic outcome for relatively large tumor excisions with 90% of the cases (27 patients) falling in excellent and very good score groups with a mean cosmetic outcome score of 4.53. The remaining 10% (three cases) which fall in good and fair score groups as those patients noticed asymmetry of the two breasts in front of the mirror as they refused bilateral breast reduction mastopexy. None of our cases have had a poor or an ugly score.

The round block mammoplasty had the highest mean cosmetic outcome score of 4.75, which approaches the excellent score. Six out of eight cases of round block mammoplasty scored excellent with 75%. The wound being obscured around the NAC at the transitional zone between the NAC and skin played an integral role in improving the cosmetic outcome, patient satisfaction, and acceptance in both early postoperative period and late follow-up period. None of the cases have been given less than very good score. This is similar to what was published by Bertozzi *et al.* [16], who reported that the round block technique can be easily performed on tumors in any location; however, it is most suitable for tumors that are close to the areola giving an excellent esthetic outcome.

Superior medial pedicle mammoplasty, the Grisotti technique, and subcutaneous mastectomy followed by immediate reconstruction using the latissimus dorsi muscle flap had a mean cosmetic outcome of 4.5 which falls between very good and excellent.

Inferior pedicle mammoplasty had a mean cosmetic outcome of 4.25 which falls between excellent and very good. Three out of four patients scored excellent with 75%. One patient scored fair as she noticed asymmetry of the two breasts in front of the mirror and she refused bilateral breast reduction mastopexy, in addition she experienced postoperative wound infection owing to her medical history of being diabetic.

Regarding patient satisfaction and quality of life, our patients reported high scores of more than 90 in all domains which reflect the excellent outcome of the applied oncoplastic techniques in our study. Losken [24] reported that the esthetic results were good at 1 year (97.7%) and at 5 years (90.3%) in a series of 540 consecutive cases of patients with high tumor/breast volume ratios. Age, BMI, size, and location of the tumor; breast size; and the adjuvant treatment applied can affect the final cosmetic outcome. The esthetic results in the reported study were analyzed by means of patients' self-evaluated questionnaires or subjective scales completed by specialists. It emerged that young patients at high social and economic levels have lower satisfaction rates. Moreover, it appears that patients' evaluations are usually better than those of the specialists.Patients are more worried about deformities than a mismatch in the size of their breasts or scar length. Therefore, the aim of OBS is to reshape the remaining breast gland while maintaining an esthetically pleasant shape and contours. Indeed, contralateral surgeries are often performed to achieve symmetry. OBS can also prevent NAC displacement by anticipating possible NAC deviation and repositioning it at the center of the breast mound. Future studies need to further validate the oncological safety of OBS and provide surgeons with adequate preoperative tools to plan better the resection and reconstructive steps. Although OBS is more complicated and time consuming than the conventional breast conservative surgery (BCT) approach and has better oncological outcomes and satisfaction rates, breast surgeons should be also trained in plastic surgery or should at least collaborate with plastic surgeons when performing OBS [16].

Conclusion

A combination of plastic surgery techniques with breast oncology surgery gives the surgeon a new tool for the treatment of breast cancer. This approach has enabled us to increase the number and extend the indications of BCS with wider margins offering safer oncologic control with more satisfactory cosmetic outcome.

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Conflicts of interest

None declared.

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