Inferior pedicle technique with immediate nipple–areola reconstruction as an oncoplastic procedure for early central breast cancer

Mahmoud A. Mahmoud[a], Mohamed A.A. Saleh[b]

Departments of [a]General Surgery, [b]Plastic Surgery, Faculty of Medicine, Ain Shams University, Cairo, Egypt

Correspondence to Mahmoud A. Mahmoud, MD, Department of General Surgery, Faculty of Medicine, Ain Shams University, Cairo, Egypt. Tel: +20 101 183 2904; e-mail: mahmoudhamza2222@gmail.com

Received 15 March 2019
Accepted 14 April 2019

The Egyptian Journal of Surgery 2019, 38:497–510

Introduction
Requirements and indications for usage of an inferior pedicle oncoplastic reduction are cases having breast cancer wishing to preserve their breasts with moderate-sized to large breasts and ptosis. A decreased breast volume tolerates radiation therapy better than a large-volume breast, and aesthetic outcomes have been revealed and displayed to be superior.

Aim
To evaluate inferior pedicle technique as an oncoplastic procedure for management of central breast cancer.

Patients and methods
A prospective analytical research study that recruited 15 cases was conducted at Ain Shams University Hospitals and Bahya Specialized Hospital for breast cancer. Approval of the Ethical Committee and written informed consent from all participants were obtained.

Results
The number of cases given excellent score (score 5) was 9, the number of cases given very good score (score 4) was 4, the number of cases given good score (score 3) was 1, the number of cases given fair score (score 2) was 1, the number of cases given poor score (score 1) was 0, and the number of cases given ugly score (score 0) was 0. All of our patients had clear margins in frozen sections taken during the operations and the postoperative paraffin section results provided by our pathologist, and none of them had recurrence during postoperative follow-up period of 6-month duration.

Conclusion
Inferior pedicle oncoplastic reduction is a very reliable and adaptable technique for reconstructing the partial mastectomy defects in women with macromastia or ptosis.

Keywords:
early central breast cancer, inferior pedicle technique, nipple–areola reconstruction

Egyptian J Surgery 38:497–510

1110-1121

Introduction

The breast is a cornerstone image of femininity, and the heart of womanhood, 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. Breast, according to national cancer institute, is the chief site of cancer in women in Egypt, representing ~38.8% of total malignancies among Egyptian women; it is a crucial cause of mortality among women [1,2,3].

Oncoplastic breast-conserving surgery is a modern surgical protocol that manages oncology and reconstruction issues avoiding cosmetic sequelae. It is a varied surgery composing of many different techniques. Breast reconstruction is becoming increasingly important owing to changes in patients' expectations and demand. There is growing recognition that immediate reconstruction in appropriately selected women can combine an oncological and aesthetic procedure in one operation with excellent results. As most breast surgery cases are conducted by general surgeons, most reconstructive procedures are delayed by plastic surgeons. Progressively more, breast surgery cases are conducted by specialized breast surgeons trained in oncoplastic techniques offering immediate reconstructive approaches with both therapeutic and economic option [4,5,6].

Surgical management of malignant diseases is a multidisciplinary management protocol. The integration of management involves primary surgical

treatment, radiation therapy, and chemotherapy, which requires careful harmony and coordination of these modes with the novel techniques of reconstructive breast cancer surgery [7,8,9].

For better aesthetic outcomes and minimal low complications, it is essential to put in consideration the basic aspects of oncoplastic surgical technique. Basically, the incision design relies on the presence or absence of previous scars, breast volume, and ptosis [10,11,12].

Patients with central breast neoplasms represent 5–20% of breast cancer cases, and for a long time, they have been denied breast conservation surgery and conventionally managed with mastectomy. The high incidence of nipple–areola Complex involvement is frequently linked with those tumors, obliging nipple and areolar resection together with sufficient surgical safety margin around the resected tumor, which produces an unacceptable cosmetic outcome. With the help of oncoplastic surgical techniques, breast conservative surgeries could be offered to those cases [13,14,15].

The inferior pedicle surgical technique could consistently preserve the nipple–areola complex zone well perfused in a breast of almost any size and shape. It is a procedure that is simple to pick up and apply in practice. Even though it necessitates some flap undermining and the wise pattern in most surgical case scenarios, it could be performed in ~2–3 h. Some surgeons consider that the inferior pedicle approach has lower rates of complications as the inferior location eliminates dead space within the dependent region of the breast [16,17].

The indications for an inferior pedicle oncoplastic reduction are cases having breast cancer wishing to preserve their breasts with moderate-sized to large breasts and ptosis. A decreased breast volume tolerates radiation therapy better than a large-volume breast, and aesthetic outcomes have been revealed and displayed to be superior [18].

Grisotti flap or B flap is indicated if the tumor is positioned close to the nipple areola complex, and it is essential to reconstruct the central breast in a female with adequate breast volume or moderate breast ptosis. Central oncoplastic techniques involve central lumpectomy, donut mastopexy lumpectomy, and variations of reduction mastopexy lumpectomy that have been innovated to manage this issue. By conjugating large-volume tumor removal with breast-flap advancements, the oncoplastic techniques permit wider margins of resection and better breast shape and contour preservation [19].

The round block technique can be implemented in cases with small- and moderate-sized breasts without ptosis and for tumors situated near the nipple–areola complex though not invading the nipple. In this technique, care must be taken to prevent injury to the dermis to preserve the blood supply of the nipple–areola complex. After the surgery, the cosmetic results are satisfactory because there are only perimamillary scars without any additional scars, and in the case of a large nipple–areola complex, a smaller neo-areola could be created [4,7,9].

Aim

The aim was to assess and evaluate inferior pedicle technique as an oncoplastic procedure for management of central breast cancer with immediate nipple–areola reconstruction regarding oncological safety, surgical outcomes, and patient satisfaction.

Patients and methods

It is a prospective analytical research study that recruited 15 cases aiming to clinically assess the inferior pedicle oncoplastic technique for central breast cancer with immediate nipple/areola reconstruction regarding oncological safety and patient satisfaction, conducted at Ain Shams University Hospitals and Bahya Specialized Hospital for breast cancer. Approval of the Ethical Committee and written informed consent from all participants were obtained.

Inferior pedicle 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 Ain Shams University Hospitals.

Inpatient 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 chemotherapy 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.

Inclusive research criteria involved female patients with retroareolar invasive breast cancer, all age groups (18–75 years), all tumor size but with large-breast size, node positive or negative patients (T1, T2, and T3, i.e. T1N0M0, T1N1M0, T2N0M0, T2N1M0, and T3).

Exclusive research criteria involved distant metastasis, tumors away from nipple and areola complex, and history of previously treated ipsilateral breast cancer.

Inflammatory tumors, T4 breast cancer, diffuse microcalcification, multicentric breast cancer in more than one quadrant, patients demanding mastectomy for fear of local recurrence, patients with previously irradiated breast or having an absolute contraindication for adjuvant radiotherapy, and positive margins after frozen section examination of the specimen were also excluded.

All patients were subjected to history taking including full personal history, compliant, 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 investigations were performed including laboratory tests, such as complete blood count, liver profile, kidney profile, coagulation profile, and blood sugar, and radiological examination such as bilateral digital mammography in at least two views (cranio-caudal and medio-lateral 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 bone ache. ECG and echocardiography were performed upon requested by an 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 General Surgery Department of Ain Shams University and Bahya Specialized Hospital for breast cancer reviewed every single case independently. The MDT included breast surgery consultant, pathology consultant, plastic surgery consultant, and radiology consultant. Discussion was held on every case, including their 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 possible complications, which were also clearly stated and explained individually for each procedure. These included wound infection, fat necrosis, failure of flap, asymmetry or failure of adequate cosmetic outcome, and incidence of local recurrence.

Moreover, 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 also explained.

All patients were evaluated by our surgical team before surgery, and full photographs of the breast were taken from multiple views. The breast cup size was estimated for every single case, and a score was given for each cup size as in Table 1. The ideal breast size varies the most with differing personal and social preferences. It is important to balance a woman's breast size with the rest of her figure. Breast size was estimated by cup size which represents the difference between two measures. The first is the chest circumference just below the breast at the inframammary fold, and the second is the bust circumference representing the circumference at the most projecting part of the breasts usually at the level of the nipples.

All patients were offered contralateral breast symmetrization at the same setting.

Table 1 Breast cup size score given for the cases in the study

Breast cup size	Given score
A	1
B	2
C	3
E	4
D	5
F	6
G	7

In patients with a mild to severe ptosis, even with smaller breasts, oncoplastic techniques by using breast-lifting methods may be of advantage for the general cosmesis by lifting the nipple in the right place and keeping the scar around the areola. Although simple lumpectomy in patients with macromastia (cup-D size or larger) may reach good cosmetic results, breast reduction of both sides improves symptoms such as back and shoulder pain and may thus improve the quality of life. Moreover, the homogeneity of radiation dose distribution may be altered in large breasts, thus breast reduction may improve adjuvant radiotherapy effects.

A formal consent form was written and explained to the patient. The consent was signed 1 day before 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 photography be taken, and who is going to photograph her. Moreover, 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 of the patients in their follow-up visits to keep record and document progress.

Preoperative marking

Markup and design of planned incision were done on the morning of the surgery in the holding area of the operating theatre in the presence of the breast nurse and the surgical team. Measurements were taken and kept with the patient standing in an upright position before receiving preanesthetic drugs. Drawings were made using waterproof skin markers.

A preoperation photography session is done again for documenting the breast measurements and incision sites to help audit 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 the Ain Shams University Hospitals and Bahya Specialized Hospital for breast cancer.

Surgical technique

The patient is placed in the supine position with the arms abducted for axillary access, with the possibility to seat the patient on the operative table to control the symmetry.

Incision

Through a circumareolar incision, we remove the NAC with the retroareolar tumor in the pattern of central quadrantectomy.

Resection

The excision is usually extended down to the pectoralis fascia. Applications of four clips are along the margins of the tumor bed to facilitate subsequent adjuvant radiotherapy. The reconstructive flap, in this case, can be executed while awaiting the result of frozen section analysis.

De-epithelialization of the dermoglandular flap with a skin island is preserved for reconstruction of the areola.

The medial and inferior margins of the flap are incised down to the fascia and the flap is advanced to fill the central quadrantectomy defect, with the new areola lying adjacent to the native structure. The new areola will have slightly smaller dimensions than the original one, owing to excision behind medial and lateral pillars of the inferior pedicle.

Reconstruction

The goals are to fill the dead space, and reconstruct or reshape the breast mound. Additional tissue should not be resected until it has been determined that the dead space can be filled with the inferior pedicle, surrounding breast tissue, or breast flaps. The final part of the breast reconstruction is the reconstruction of the new areola. Local flap reconstruction (multiple designs) and tattooing were used for the new nipple reconstruction using the skin island made by the surgeon.

Closure

Recentralization of the future areola is performed to recreate a harmonious breast size and shape. The medial and lateral breast flaps are undermined and sutured together to fill the excision defect, leaving a typical inverted-T scar. For patients with macromastia, consistent positioning of the breast for radiotherapy may be difficult, resulting in dosing inhomogeneity and suboptimal treatment. These patients can benefit from reduction mastopexy lumpectomy using a unilateral or bilateral approach.

Postoperative management

Prophylactic broad-spectrum antibiotic, which was third generation cephalosporin 1 g, was administrated to all patients upon induction and during the whole period of hospital stay. Postoperative pain and discomfort was encountered

and 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. Patients were discharged on the second day postoperatively if everything is fine. Patients were discharged on antibiotics, analgesics, and antiedema agents. They were advised to wear well-fitting sport bra following all reconstruction procedures. Drains were removed in follow-up visits when daily volume is less than 40–50 ml. Patients were instructed to undergo arm and shoulder mobilization and a set of exercises to avoid stiffness of the should joint and decrease arm edema after axillary surgery; dressing once daily with betadine was done for all patients.

The cases were given a follow-up schedule upon discharge from the hospital as the following: in the first week, every 3 days for dressing and monitoring the drains, and in the following 2 weeks, every 4 days until removal of the drains and stitches. After the final pathology report is available, patients were referred to the oncology department to start their adjuvant therapy according to our standard protocol, which ranged from 3 to 8 weeks. All patients were given the contact information of the surgeon in case 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, patients were asked to follow-up in the surgical department clinic once every 3 months for the 6 months for clinical examination, breast ultrasound and tumor markers, bilateral mammography, and routine investigations as required.

Assessment of cosmetic outcome

Cosmetic outcome was evaluated during the early postoperative period and on follow-up. Evaluation was done by means of scoring system, graded from 1 to 5, where 1 indicates poor results and 5 indicates excellent results. Cosmetic outcome was evaluated by the surgeon, the patient, and the breast MDT by postoperative photographs and then at 2 weeks and 1 month. Pictures were taken before and after surgery for comparison in terms of breast contour, degree of ptosis, new areola deviation and degree of asymmetry, the volume of the breast, and the skin incision shape. Comparison of preoperative and postoperative breast measurements were taken in terms of NAC position to the mid humeral level, distance from the sternal border and inframammary sulcus.

Re-evaluation was done after completion of adjuvant chemotherapy and radiotherapy during 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 (Table 2).

Results

A prospective research study was conducted that involved 15 female patients diagnosed with breast cancer, being suitable candidates for breast oncoplastic surgery.

Type of surgery

All the 15 cases underwent oncoplastic breast surgery, which implied two major technical steps: excision of the tumor with a wide safety margin via a pre-designed incision with frozen section examination for surgical margins along with formal axillary dissection, followed by immediate reconstruction by usage the inferior pedicle technique.

Patient characteristics

Age

The age of the patients ranged from 28 to 60 years old. The mean age for our study was 42.6 years (Table 3).

Comorbidities

On preoperative patient evaluation, full history taking and full laboratory investigations were performed. Overall, five patients among the 15 patients had medical comorbidities: three cases had diabetic mellitus (DM), one case had hypertension, and one case had ischemic heart disease (Table 4).

Table 2 Postoperative cosmetic scoring system

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

Table 3 Mean age of the study

	Mean	±SD	Minimum	Maximum
Age	42.60	8.37	28	60

Table 4 Number and percent of complications

Comorbidity		
No	10	66
Yes	5	33
Type of comorbidity		
None	10	66
DM	3	30
HTN	1	1.5
IHD	1	1.5

DM, diabetic mellitus; HTN, hypertension; IHD, ischemic heart disease.

Before the operation, the five patients were consulted to internal medicine and cardiology departments consecutively, and their recommendations were fulfilled (Figs 1–27).

Description of tumor characteristics of the study cases:

Tumor size

The tumor size was evaluated by ultrasound done for all cases before operation as an integral step of the triple 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 3.2 cm, and the mean tumor size was 2 cm (Table 5).

The mean breast cup size for the whole study was 3.33, which stand for C (Table 5).

The minimum breast cup size was A, and the maximum was G (Table 6).

Operative evaluation

Operation time

Our mean operation time was 165 min (2 h and 45 min) (Table 7). The fastest procedure finished in 120 min and longest took 240 min.

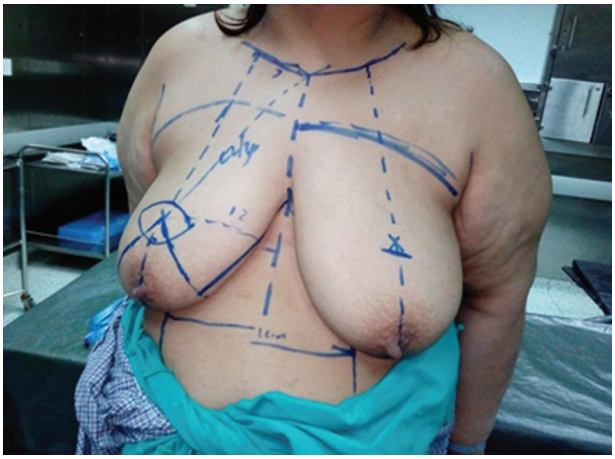
Intraoperative blood loss

No patient required blood transfusion either intraoperatively or postoperatively.

First day drain amount

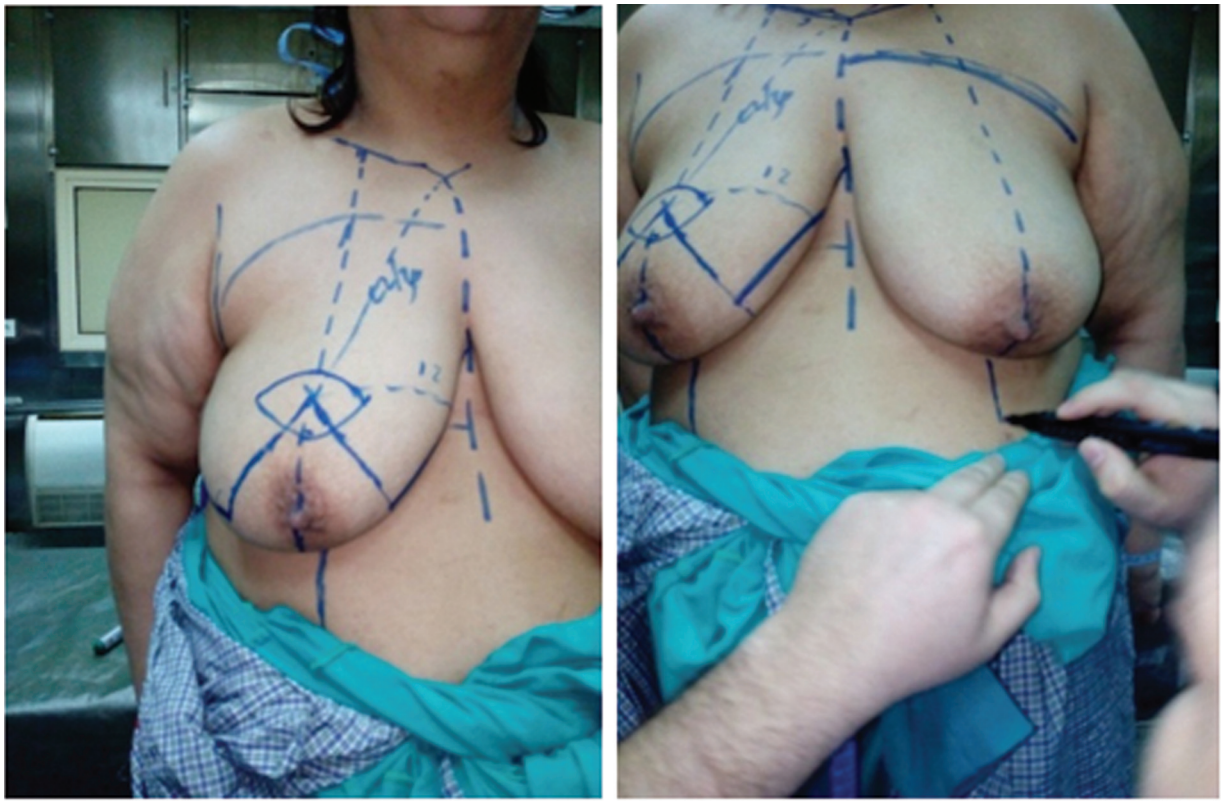
All 15 patients have had a drain left inside the wound with two separate limbs, one in the breast wound exiting from lateral side of IMF and the other in the axilla. The amount of blood lost in the first 24 h was estimated by the amount of blood in the drain in the

Figure 2



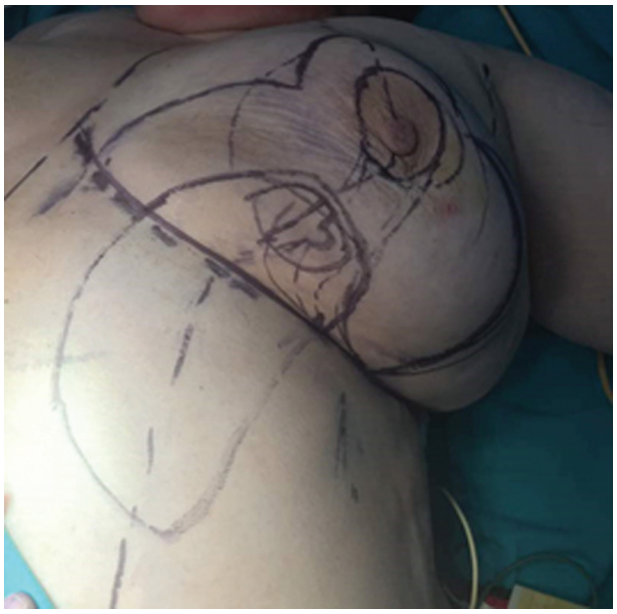
Picture after completion of preoperative drawing.

Figure 1



Preoperative drawings while the patient is standing.

Figure 3



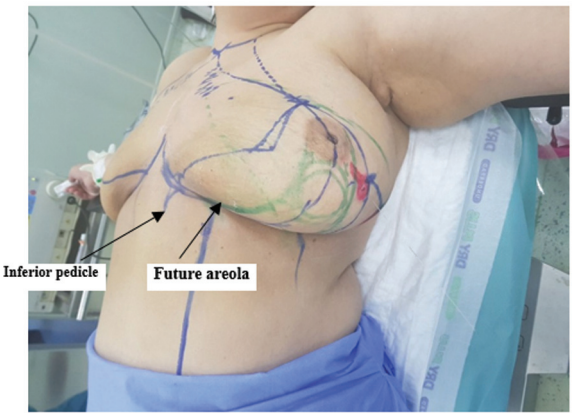
Preoperative drawing while the patient is lying down on the table.

Figure 4

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

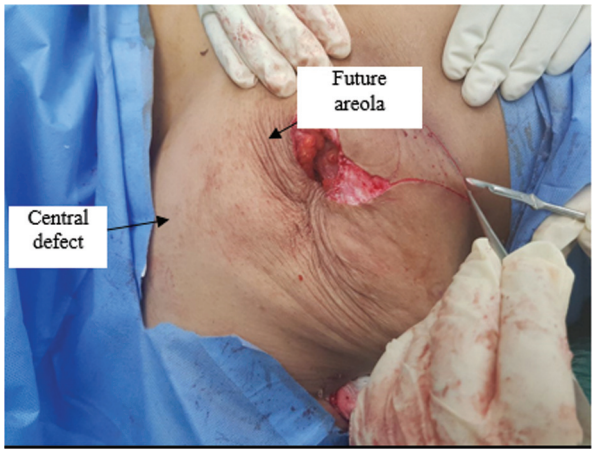
first day postoperative. The mean amount of blood collected in the drain in the first day was 83.83 ml. The maximum amount in the drain was 125 ml, whereas the minimum amount was 50 ml (Table 8).

Figure 5



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

Figure 6



Incision with central defect and future areola.

Postoperative hospital stay

All patients were admitted to the hospital 1 day before surgery for preoperative anesthesia consultation and to fulfill all their laboratory workup. They were then discharged 1–2 days postoperatively once they are able to move and proceed to normal daily activities.

Any the patients who complained of postoperative pain or had delay in movement were allowed to stay until they are able to leave. Most of the patients were discharged in the morning of the second day postoperatively (i.e. 24 h postoperatively).

The mean postoperative stay period was 30 h (Table 9); however, the longest postoperative stay period was 3 days.

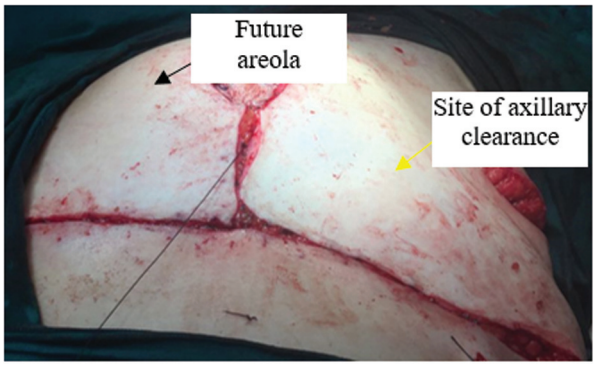
Postoperative complications

Patients were given a follow-up schedule upon discharge from the hospital as the following: three visits in the first week for dressing and monitoring the drains and any complications, and the following 2

Figure 7

Resection of retroareolar tumor with nipple and areola.

Figure 8



Postoperative wound closure.

Figure 9

Postoperative results.

Figure 10

Postoperative results.

weeks every 4 days until removal of the drains and stitches.

During the follow-up period, complications occurred only in five cases, in the form of three cases of infection and two cases of ulcer formation (Table 10).

It is worth noting that among the three patients who have had wound infection, two of them were diabetics. This reflects the effect of DM on immune system compromization. The three patients received oral antibiotics and were instructed to have the wound daily dressed twice until the infection was eradicated. One of the three patients required wound opening to allow adequate drainage, which was later secondarily sutured. None of them have had any other problem.

Figure 11

Postoperative results.

Figure 12

Postoperative results.

Postoperative pathological outcome

Postoperative results provided by our pathologist showed that nine of our patients had intra ductal carcinoma (IDC), one of our patients had intra lobular carcinoma (ILC), and five of them had Paget's disease (Table 11).

Cosmetic outcome

Cosmetic outcome was estimated using a scoring system which was made up from 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, which was made up of a check list to be evaluated by our team and the MDT of the breast for every single case. This check list included the overall shape of the breast, the symmetry of both breasts, the site and of the areola, the volume of the breast, and the skin incision shape. These elements was discussed for every single case and analyzed to give a scoring system graded from 1 to 5 as follows:

Figure 13

Postoperative results.

Figure 14

Postoperative results.

The overall mean score of our study was 4.23, which falls between very good and excellent (Tables 12–14).

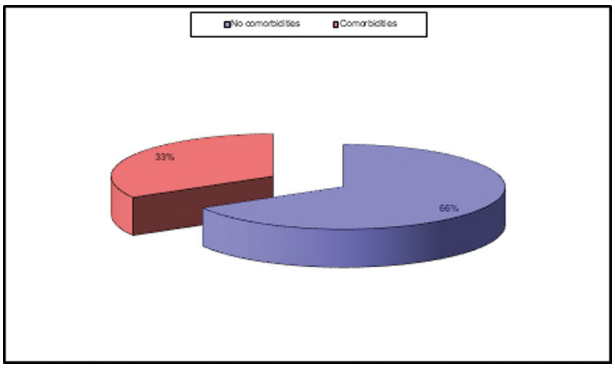
The following is the number of cases for each grade of the scoring system for the whole study.

The number of cases given excellent score (score 5) was 9, the number of cases given very good score (score 4) was 4, the number of cases given good score (score 3)

Figure 15

Postoperative results.

Figure 16

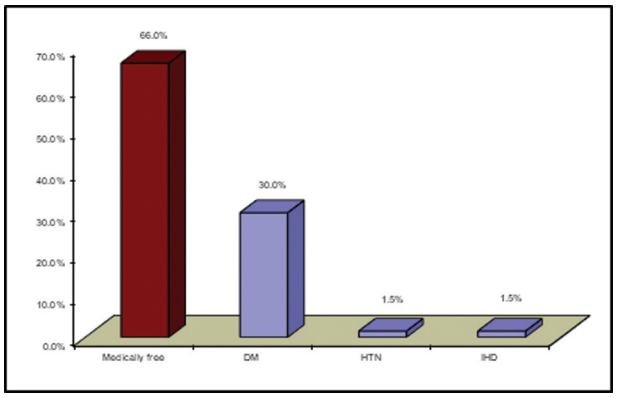


Percentage of comorbidities among patient population.

was 1, the number of cases given fair score (score 2) was 1, the number of cases given poor score (score 1) was 0, and the number of cases given ugly score (score 0) was 0. Contralateral breast inferior pedicle mammoplasty, along with immediate reconstruction and symmetrization was done in the same setting giving the previous cosmetic outcomes.

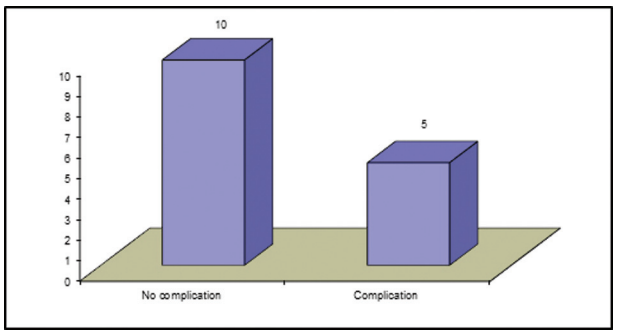
Regarding the oncological safety, all of our patients had clear margins in frozen sections taken during the operations and postoperative paraffin section results provided by our pathologist, and none of them had

Figure 17



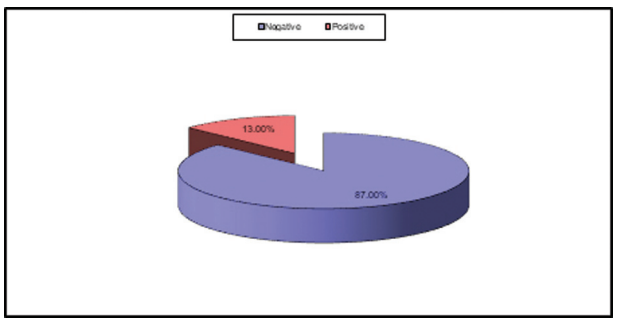
Type of comorbidities among patient population.

Figure 18



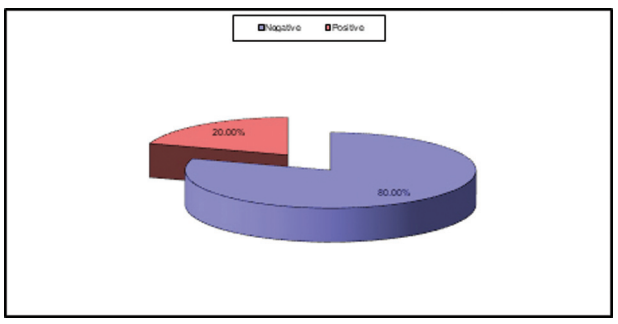
Number of complicated cases among patient population.

Figure 19



Postoperative of ulcer formation among patient population.

Figure 20



Percentage of postoperative infection among patient population.

Figure 21

Postoperative infection.

Figure 22

Postoperative ulcer formation.

Figure 23

Postoperative ulcer formation.

Figure 24

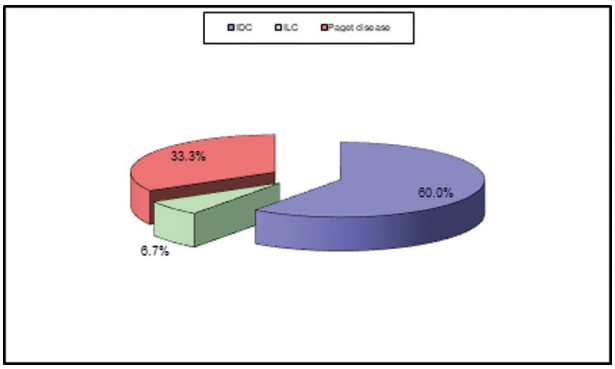
Postoperative wound infection.

recurrence during postoperative follow-up period of 6-month duration.

Surgical and clinical outcomes for breast cancer differ and rely on the cancer type, disease extent, and age of the case. Survival rates in the developed nations and communities are high. Approximately 80 and 90% of cases in areas of Europe and the USA stay alive for a period of at least 5 years. On the contrary, in developing nations, survival rates are poorer. Globally, breast cancer is the chief cancer type in females, representing ~25% of all cases. In 2012, it resulted in 1.68 million new cases and 522 000 mortalities. It is more common in developed countries and is more than 100 times more common in females than in males [2,3,8].

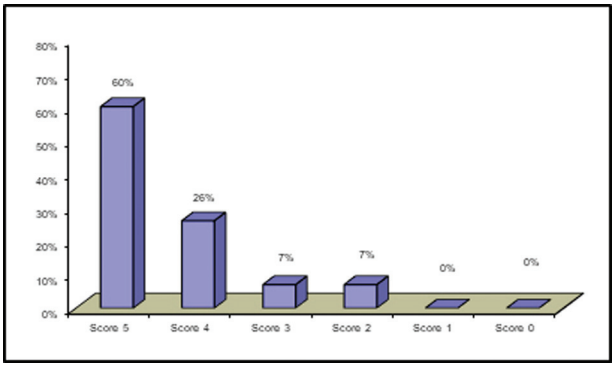
Breast cancer, like other cancers, exists owing to an interplay between an environmental (external) factor and a genetically susceptible host. Cells normally divide

Figure 25



Postoperative pathological type of tumor among patient population.

Figure 26



Postoperative cosmetic outcome.

Figure 27

Postoperative cosmetic outcome with contralateral symmetrization.

as much as functionally required and stop. They adhere to neighboring other cells and stay in place within tissues. Cells become cancerous as they lose their capability to stop division, to adhere to other cells, to stay where they belong, and to undergo apoptosis at the proper time [4,7,10].

Table 5 Mean tumor size in the study

	Mean	±SD	Minimum	Maximum
US size	2.00	0.47	1.00	3.2

US, ultrasound.

Table 6 The mean breast cup size for the study

	Mean	±SD	Minimum	Maximum
Mean breasts size	3.33	1.56	1.00	7.00

Table 7 Mean operation time for our study.

	Mean	±SD	Minimum	Maximum
Operative time	107.60	14.50	120	240

Table 8 Mean first day postoperative drain amount for the study

	Mean	±SD	Minimum	Maximum
First day drain	83.83	22.12	50.00	125.00

Table 9 The mean postoperative stay for our study

	Mean	±SD	Minimum	Maximum
Postoperative stay	30.00	8.77	24.00	72.00

Table 10 Number and percent of complications among patient population

Complications	*n* (%)
Ulcer	
Negative	13 (87.0)
Positive	2 (13.0)
Infection	
Negative	12 (80.0)
Positive	3 (20.0)

Table 11 Postoperative pathological type of tumor among patient population

Postoperative pathological type of tumor	*n* (%)
IDC	9 (60)
ILC	1 (6.7)
Paget's disease	5 (33.3)

IDC, intra ductal carcinoma; ILC, intra 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 for our study

	Mean	±SD	Minimum	Maximum
Cosmetic outcome	4.23	0.86	2.00	5.00

Table 14 Number of cases for every score of cosmetic outcome

Cosmetic outcome	*n* (%)
Score 5	9 (60)
Score 4	4 (26)
Score 3	1 (7)
Score 2	1 (7)
Score 1	0
Score 0	0

Oncoplastic breast surgery relies on three basic ideas: perfect breast cancer surgery having wider excisions, speedy breast reconstruction, and performing symmetry for the other breast if required. This is performed via various techniques according to tumor location, breast characteristics, mammary resection volume, and clinical assessment of the patient into volume displacement and volume replacement procedures. The volume displacement techniques use the residual breast tissue, whereas the second, the volume replacement technique, uses other autologous tissue for enhancement of the inadequate breast tissue [11,13,19].

Oncoplastic surgery with the inferior pedicle breast reduction technique for central breast lesions is a new option for tumor removal other than the traditional used techniques, with patient satisfaction up to 86%. Obtaining clear margins (the larger, the better) is an essential step in the procedure to reduce the cancer recurrence rate. The recurrence rates are influenced by the tumor size, the tumor type, vascular invasion, multicentric disease, and the age of the patient [12,15].

With good consideration of risk factors for recurrence biologically and anatomically, inferior pedicle technique is a good option for selected patients with node-positive breast cancer. The mean age in this research study has been 42.6 years, and 50% of the cases fall between 42 and 57 years, which is consistent with the demographic data published by National Cancer Institute at 2013 in which it was mentioned that the peak incidence of breast cancer was between 40 and 59 years old, and another research study in 2010 claimed that the peak incidence is 51 years old [14,17].

In this research study, all of our patients had retroareolar tumors. In this study, only five (33%) cases had complications: three cases got wound infection and two of them were diabetics reflecting the immune compromization with diabetes mellitus. Statistically, DM has increased the risk of postoperative wound infection by three times. These findings are in harmony with similar previous research studies revealing the complication of diabetes mellitus regarding oncoplastic surgery [1,12,16].

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, and the third patient needed secondary suturing after treatment of the infection.

This research study team observed and displayed lower results of surgical site infection (15%) than reported by (18.9%) and greater than mentioned by (4.7%) and Degnim and colleagues (8.7%) [2,7,14,19].

Another two cases in this research study had wound ulcer, with an incidence rate of 12%, which is higher than reported by other investigators in prior similar studies (3.7%). Wound ulcer was discovered in the second 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 patient had breast cup size G. Both patients were treated with topical antibiotics, topical re-epithelialization 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 schedule. The operative duration of our study was long at first (240 min), but with progression of our study and as we build up more experience, the operating time was reduced to 120 min. One of our last cases had long operative duration as the patient had breast cup size G, which required large-volume dissection. 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 inferior pedicle technique safely from 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, where the main focus of our study was assessment of cosmetic outcome and we will continue monitoring of the patients for recurrence assessment.

Annually recorded recurrence curves denote that the peak of recurrence after mastectomy arises within the first 2 years; however, recurrence after conservative

breast surgery increased annually with the highest peak near 5 years, as revealed and displayed by various research studies [2,14].

In this research study, we were capable of achieving an excellent cosmetic clinical outcome for relatively large tumor excisions, with 86% of the cases (13 patients) falling in excellent and very good score groups. As four of them asked for contralateral symmetrization, mean cosmetic outcome score was 4.23. Another 14% (two cases) fell in good and fair score groups. None of our cases have had a poor or an ugly score.

High cosmetic outcome was obtained, as the patients were satisfied with presence and shape of their breasts relatively to the cosmetic outcome of the patients who underwent modified radical mastectomy.

Conclusion

The choice of the oncoplastic surgical technique is chiefly based upon the tumor location, breast size, and distance of the tumor from the nipple–areola complex. Accordingly all cases must be adequately reviewed to tailor to the decisions for every single case.

Inferior pedicle oncoplastic reduction is a very reliable and adaptable technique for reconstructing the partial mastectomy defects in females with macromastia or ptosis. Inferior pedicle breast reduction technique for central breast lesions is a new option for retroareolar tumor removal other than the traditional used techniques example modified radical mastectomy (MRM), with patient satisfaction up to 86%. Obtaining clear margins (the larger, the better) is an essential step in the procedure to reduce the cancer recurrence rate.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1 Urban C, Rietjens M. Oncoplastic and reconstructive breast surgery. 1st edition. Italia: Springer-Verlag Italia; 2013. pp. 13–20.

2 Khafagy M, Fakhr I, Hamed A, Youssef O. Pedicled dermoglandular flap reconstruction following breast conserving surgery. J Egypt Natl Canc Inst 2012; 24:91–96. ?

3 Skandalakis J, Skandalakis E. Surgical Anatomy and Technique: A Pocket Manual, DOI 10.1007/978-1-4614-8563-6_3, © Springer Science+ Business Media New York; 2014.

4 Munhoz AM, Montag E, Gemperli C. Current aspects of therapeutic reduction mammoplasty for immediate early breast cancer management: an update. World J Clin Oncol 2014; 10:1–18.

5 Roughton MC, Shenaq D, Jaskowiak N, Park JE, Song DH. Optimizing delivery of breast conservation therapy: a multidisciplinary approach to oncoplastic surgery. Ann Plast Surg 2012; 69:250–255.

6 Sanidas EE. Batwing lumpectomy with skin resection. In: Fitzal F, Schrenk P, editors. Oncoplastic breast surgery. 2nd edition. Springer: Vienna; 2015. pp. 21–23.

7 Ibrahim AS, Khaled HM, Mikhail NNH, Baraka H, Kamel H. Cancer Incidence in Egypt: Results ofthe National Population-Based Cancer Registry Program. J Cancer Epidemiol 2014; 437971. 10.1155/2014/437971.

8 González E, Rancati A. Latest approach to breast cancer treatment and reconstruction – Skin-sparing mastectomy. J Gland Surg 2015; 4:541–553.

9 D'Souza N, Darmanin G, Fedorowicz Z. Immediateversus delayed reconstruction following surgery for breast cancer. Cochrane Database Syst Rev 2011.

10 Gieni M, Avram R, Dickson L, Farrokhyar F, Lovrics P, Faidi S, Sne N. Local breast cancer recurrence after mastectomy and immediate breast reconstruction for invasive cancer: A metaanalysis. Breast 2012; 21:230–236.

11 Hau E, Browne L, Capp A, Delaney GP, Fox C, Kearsley JH, *et al.* The impact of breast cosmetic and functional outcomes on quality of life: long-term results from the St. George and Wollongong randomized breast boost trial. Breast Cancer Res Treat 2013; 139:115–123.

12 Ades F, Tryfonidis K, Zardavas D. The past and future of breast cancer treatment-from the papyrus to individualized treatment approaches. Ecancermedicalscience 2017; 11:746.

13 Hultman C, Daiza S. Skin-sparing mastectomy flap complications after breast reconstruction: review of incidence, management and outcome. Ann Plast Surg 2011; 50:249–255.

14 Zeeneldin AA, Ramadan M, Gaber AA, Taha FM. Clinico-pathological features of breast carcinoma in elderly Egyptian patients: a comparison with the non-elderly using population-based data. J Egypt Natl Canc Inst 2013; 25:5–11.

15 Dabbs DJ, Schnitt SJ, Geyer FC, Weigelt B, Baehner FL, Decker T, Palacios J. Lobular neoplasia of the breast revisited with emphasis on the role of E-cadherin immunohistochemistry. Am J Surg Pathol 2013; 37:1–11.

16 Degnim AC, Throckmorton AD, Boostrom SY, Boughey JC, Holifield A, Baddour LM, Hoskin TL. Surgical Site Infection (SSI) After Breast Surgery: Impact of 2010 CDC Reporting Guidelines. Ann Surg Oncol 2012; 19:4099–4103.

17 Farahat A. Oncoplastic reconstruction following breast conserving surgery: Oncologic and cosmetic results. 2012.

18 Farquharson M, Hollingshead J, Brendan M. Farquharson's, textbook of operative general surgery. 10th edition. 2014. pp. 32–40.

19 19.Clough KB, Ihrai T, Oden S, Kaufman G, Massey E, Nos C. Oncoplastic surgery for breast cancer based on tumour location and a quadrant-per-quadrant atlas. Br J Surg 2012; 99:1389–1395.