Evaluation of donut mammoplasty in early breast cancer near to nipple–areola complex

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Background
Breast cancer, according to 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 females; it is an important cause of mortality among women.
Objective
To focus on donut mammoplasty for management of early breast cancer near to nipple–areola complex (NAC) to assess the technique clinically regarding cosmetic outcome, operative complication, and oncological safety.
Patients and methods
It was a prospective analytical study that included 25 patients focus on donut mammoplasty for management of early breast cancer near to NAC to assess the technique clinically regarding cosmetic outcome, operative complication, and oncological safety. This study was conducted at Ain Shams University Hospitals and Bahya specialized breast cancer hospitals. Approval of the Ethical Committee and written informed consent from all participants was obtained.
Results
In our study we addressed donut mammoplasty technique in a prospective study conducted 25 patients that aimed to demonstrate the safety of those techniques and the comparable outcomes as regard preoperative and postoperative prospective. During our follow up period the overall incidence of complications was 12% which is quite similar to the other comparable studies.
Conclusion
Donut mammoplasty has excellent cosmetic outcome of about 84% of cases of the study, the overall cosmetic outcome of our study was more satisfactory which was reflected on the patient psychological health and self-well-being. It was best applied to small more than large-sized breast with possibly distant tumor from the NAC with the donut mammoplasty technique as it will yield less satisfactory cosmetic outcome. Donut mammoplasty shows low percentage of complications were simple in dealing with no risk in patient's life. None of the stated complications resulted in delay of postoperative adjuvant therapy.

Keywords:
multiple drug resistance, nipple and areola complex

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Introduction

Breast is a uniquely important part of the female body and as such embodies in itself anatomical, physiological, and esthetic role. A proportionately developed breast is an important feminine feature, a sign for fertility and sexuality. Breasts are extremely important for women's self-confidence especially when their role in society has expanded immensely [1].

Breast cancer is the most common cancer in women worldwide, with nearly 1.7 million new cases diagnosed in 2012 (second most common cancer overall). The risk of developing breast cancer throughout life is 12% [2], according to National Cancer Institute, breast cancer is the most common site of cancer in women in Egypt as it accounts for about 38.8% of total malignancies among Egyptian females; 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 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 first surgical treatment with a scientific basis was carried out in 1882, when Halsted designed an intervention called radical mastectomy. This surgery was performed throughout the 20th century, with a cure rate of 40% for those patients with a mechanical

extension from the tumor to the lymph nodes, then to the blood and finally metastasis. This technique consisted of removing all the skin around the breast, fat, breast tissue, lymph channels, and pectoral muscles, leaving only the rib cage and causing a large defect, which today is seen as a very aggressive surgery [5].

Since then, resections have become increasingly smaller and more efficient. In the 1970s, Veronesi showed that conservative surgery (removing the tumor with free margins while preserving the breast) plus radiotherapy gave the same survival results as more aggressive surgeries [4].

The goals of breast-conserving surgery are the removal of breast cancer with an adequate surgical margin and maintenance of a breast that is cosmetically acceptable to the patient [6].

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 [7].

Plastic surgery techniques were transposed into breast-conserving therapy to avoid late unsatisfactory esthetic results in 1980s in France by Jean-Yves Petit (Institute Goustave-Roussy), Jean-Yves Bobin (Centre Léon-Bérard), and Michel Abbes (Centre Lacassagne) [4]. However, Audretsch [8], considered by some as the father of oncoplastic surgery, described the technique of reconstructing a partial mastectomy defect in 1998 as a further refinement of breast conservation avoiding mastectomy, coining the term oncoplastic [9].

Munhoz *et al.* [10] describes the modern oncoplastic breast surgery as a combination of oncologic and plastic surgery techniques to obtain oncologically sound and esthetically pleasing results. Thus, by means of customized techniques the surgeon ensures that oncologic principles are not jeopardized while meeting the needs of the patient from an esthetic point of view [11].

Oncoplastic techniques can be classified in two large groups: volume displacement procedures and volume replacement procedures.

Volume displacement procedures combine tumor resection with immediate reconstruction of the mammary defect caused by the resection. They are indicated when a resection of less than 30% of mammary volume is preview. These include techniques of glandular rearrangement (advancement, rotation, or transposition glandular flaps) and reduction mammoplasty.

Volume replacement procedures use autologous tissue flaps to replace the excised breast volume. The most used is the latissimus dorsi flap with or without skin. It allows the restoring of the shape and size of the breast symmetry, achieving excellent cosmetic results without the need to act on the contralateral breast. These techniques are usually reserved for patients requiring extensive local resections, those that present medium or large tumors, and those who do not wish volume loss or surgery in the healthy [12].

Round block

All patients with a tumor in the breast may be eligible for round-block technique. This simple technique may be used to avoid scars on the breast. Perimamillary scars only are then visible. This technique has no further comorbidities as compared with breast-conserving therapy and is easily acquired. The nipple–areola complex (NAC) may or may not be moved higher with this technique, depending on the distance of the outer incision from the new areola incision. Thus, this technique may be used in patients who do not want to change the position of the nipple or in those with mild ptosis [13].

This technique is more suitable for patients with symmetric, small-sized to medium-sized breasts and without major ptosis which may not require contralateral breast surgery for symmetrization. There are only a few contraindications that depend on breast size and tumor location; very large breasts and peripheral tumor location, centrally located breast tumors, tumor size more than 70% of one quadrant or multicentric or large multifocal disease in which cases real quadrantectomy or even biquadrantectomy may be indicated [13].

Round block is performed first by de-epithelializing a rim of skin around the areola. The tumor was then accessed via an incision through the de-epithelialized skin, leaving the NAC vascularized on the dermal pedicle. The breast tissue was then dissected as much as possible to allow complete resection of the tumor and remodeling to cover the tumor defect [14].

Although many studies compared the round-block technique to standard wide local excisions, no evidence of increased surgical complications was reported. A lower re-excision rate and better cosmoses were observed in the round-block patients suggesting that the round-block technique is not only

comparable in general, but may have advantages to standard wide local excisions in selected cases [15].

Aim of the work

Is to focus on donut mammoplasty as an oncoplastic procedure for management of early breast cancer near to NAC to assess the technique clinically regarding cosmetic outcome, operative complication, and oncological safety.

Patients and methods

Type of the study

It was a prospective analytical study that included 25 patients aiming to focus on donut mammoplasty as an oncological procedure for management of early breast cancer near to NAC to assess the technique clinically regarding cosmetic outcome, operative complication, and oncological safety.

Study settings

This study was conducted at Ain Shams University Hospitals and Bahya Breast Specialized Hospital for breast cancer. Approval of the Ethical Committee and written informed consent from all participants was obtained. Donut mammoplasty 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 and Bahya Breast Specialized Hospital for breast cancer. 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 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.

Inclusion criteria

Female patients ranging from age of 20 to 60 years old. Early breast cancer stages I and II. Tumors near NAC within 2–6 cm.

Exclusion criteria

Tumors away from NAC more than 6 cm. Advanced breast cancer T3 and T4. IBC and lobulated carcinoma. Multicentric or multifocal carcinoma.

All patients were submitted 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, 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, blood sugar. Radiological examination: including bilateral digital mammography in at least two views (craniocaudal and mediolateral oblique). Computed tomography chest, computed tomography pelvic-abdomen with contrast as part of our metastatic work up protocol, bone scan as indicated and upon the patients' complaint from bony ache. ECG and echocardiography were performed upon requested 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 General Surgery Department of Ain Shams University and Bahya Breast Specialized Hospital for breast cancer 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 upon 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 was explained using pictures of similar cases to help visualization of the outcome, risks and benefits of the suggested procedure along with it's possible intraoperative and postoperative possible complications were also clearly stated and explained individually for each procedure. Which included wound infection, fat necrosis, failure of flap, 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. All patients were evaluated by our surgical team prior to surgery, full photography of the breast were taken from multiple views.

A formal consent was written and explained to the patient. The consent was signed 1 day prior to 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 whom is going to photograph her. Also the reason of the photography was discussed, explained, and consented. Medical photos were taken and kept in the patient's records as agreed upon. At least two vies were taken; front and side views. Pictures were taken to the patients along their follow-up visits to keep record and document progress.

Preoperative marking

Mark up and design of planned incision were done on the morning of the surgery in the holding area of the operating theater in the presence of the 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 water proof skin markers. Outer and inner incision lines marked with arrows, area in-between to be de-epithelialized (dots), 1–2 cm distance between inner and outer incision line depending on tumor size, location, and nipple position. The more breast volume to be excised, the more ptosis to be corrected, the larger the distance between inner and outer incision line. In small tumors and breasts with similar nipple positions, the distance between the inner and outer incision line should be as close as possible. The diameter of the inner circle (neoareola) should be 4 cm [13].

A preoperation 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 set up and surgical equipment

Surgery was performed in the operating rooms of the Ain Shams University Hospitals and Bahya Breast 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

The patient is operated in the supine position with both arms elevated at 90°. Preoperative biopsy improves the operation planning, however, is not necessary for this type of surgery (unlike other larger reduction techniques). In cases of preoperatively histologically verified breast cancer, it is preferable to start with sentinel node biopsy in order not to disturb the lymphatic drainage. It is preferable to de-epithelialize straight away and to dissect the breast parenchyma from the skin before removing the lump with the tumor. This strategy warrants a large operating field and better control of the resection margins which are substantial in breast cancer surgery. We always use intraoperative frozen section analyses to reduce the necessity of a second operation. The tumor bed is marked with six titan clips at all margins for radiotherapy orientation to reduce radiation scattering.

De-epithelialization between outer (lateral borders→ and inner neoareola) incision lines. The NAC is supplied by dermal vessels from all sides. Do not cut through the dermis.

Resection

Cut through the dermis at the side of tumor location. Lift and undermine the skin in order to free the breast parenchyma from the skin above the tumor and at least 5 cm laterally and medially from the tumor and up to the upper end of the breast to have a good exposure. The nipple is still supplied by dermal vessels.

Reconstruction

After dissecting the breast parenchyma and the lump with the tumor from the skin, the lump is lifted up with the pectoralis fascia and elevated outside the skin envelope to optimize palpable control during lumpectomy.

Closure

After resection of the tumor, the defect (■) can be closed by approaching the lateral parenchyma (↔) either with sutures or just by mobilization and simple positioning. Mobilize the lateral breast tissue by undermining above the pectoralis fascia and between the skin and breast parenchyma. Mark the breast borders with titan clips.

Close the dermis with interrupted single stitches using absorbable 4/0 and the epidermis with running absorbable 5/0.

Postoperative management

Prophylactic broad spectrum antibiotic which was third-generation cephalosporins 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 at the second day postoperative if everything is fine. Patients were discharged on antibiotics, analgesics, and anti-edema 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 shoulder joint and decrease arm edema after axillary surgery. Dressing once daily with betadine was done for all patients.

Follow up

Patients were given a follow up schedule upon discharge from the hospital as the following first week every 3 days for dressing and monitoring the drains 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 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, 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 one to five, one indicating poor results and five indicating excellent results. Cosmetic outcome was evaluated by the surgeon, the patient and the breast MDT by postoperative photographs, then 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 radio-necrosis, breast edema, and inflammation was done and managed according to its severity for the first 6 months after the surgery.

Results

Figures 1–5.

Age

The age of the patients varied from 20 and 60 years old. The mean age for our study was 45.7. (Table 1).

Comorbidities

On pre-operative patient evaluation, 3 patients among the 25 patients were found to have medical comorbidities. 1patient had diabetes mellitus, 1 patient had hypertension and 1 patient had ischemic heart disease (Table 2).

Tumor size

The tumor size was evaluated by ultrasound along the longest diameter of the tumor mass. The smallest tumor size was 1 cm. The largest one was 3.6cms. The mean tumor size was 1.8 cms (Table 3).

Distance from nipple areola complex

The distance from the nipple areola complex was variable among the cases of the study. The mean distance was 2.9 cms ranging from 2-6cm from NAC (Table 4).

3-Breast size

The mean breast cup size for the whole study was C. The minimum breast cup size was A, while the maximum was G (Table 5).

The following table represents the number of cases for each breast cup size (Table 6).

Operation time

Operative time was evaluated in all of the 25 surgical procedures, from the beginning of the operation timed by skin incision until the end of the procedure marked by the end of skin closure.Our mean operation time was 107 minutes (1 hour and 45 minutes). The fastest procedure finished in 85 minutes, while the longest one took 145 minutes (Table 7).

Intra-operative Blood loss

Intra-operative blood loss was estimated by the amount of blood in the suction machine and number of gauzes soaked with blood during the operation.

The mean amount of blood loss for the whole study was 85.6ml, The minimum amount was 50 ml while the maximum amount was 200 ml (Table 8).

Figure 1

(a–d) Round-block technique: preoperative drawing.

1st day drain amount

All 25 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 mean amount of blood in the drain in the 1st day post-operative was 83.83 ml. The maximum amount in the drain was 125 ml while the minimum amount was 50 ml. (Table 9).

Post-operative hospital stay

The post-operative stay period was recorded for all patients. 60%of patients (21 patients) was discharged 24 hours post-operative 12% of the patients (3patients) was discharged 36 hours post-operative 8%of the patients (1patient) was discharged 48 hours post-operative. The mean post-operative stay period for the study was 30 hours. However the longest post-operative stay period was 48 days (Table 10).

Post-operative complications

During the follow up period complications occurred only in 3 cases (16%), in the form of:

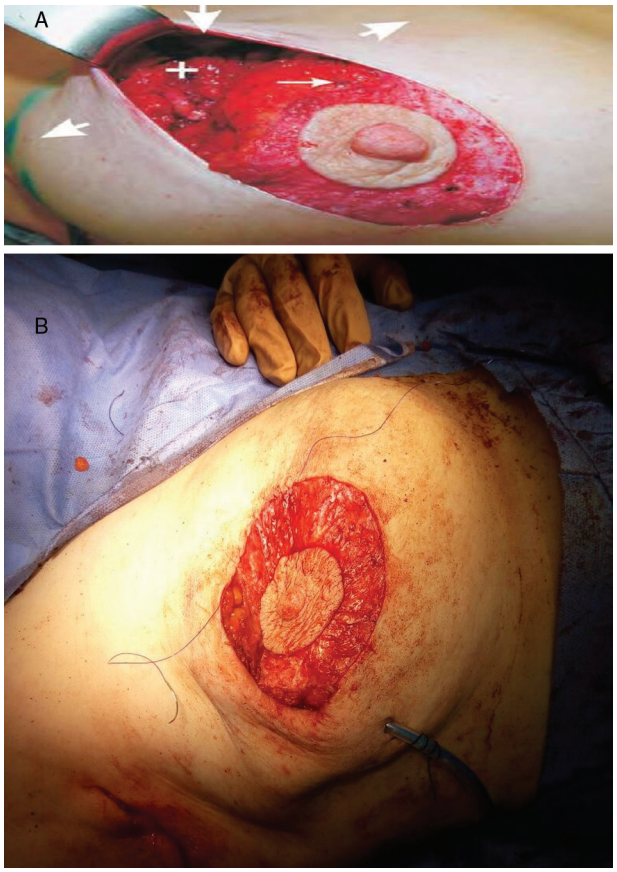
2 cases of infection
1 cases of hematoma formation (Table 11)

The overall mean score of our study was 4.5 which falls between very good and excellent (Table 12).

Figure 2

(a and b) De-epithelialization of incision line. De-epithelialization and neoareola.

Figure 3



(a and b) Exposure of the tumor. Dermis, the tumor, lateral, medial, and the upper end of the breast.

The following is the number of cases for each Grade of the scoring system for the whole study (Table 13).

Discussion

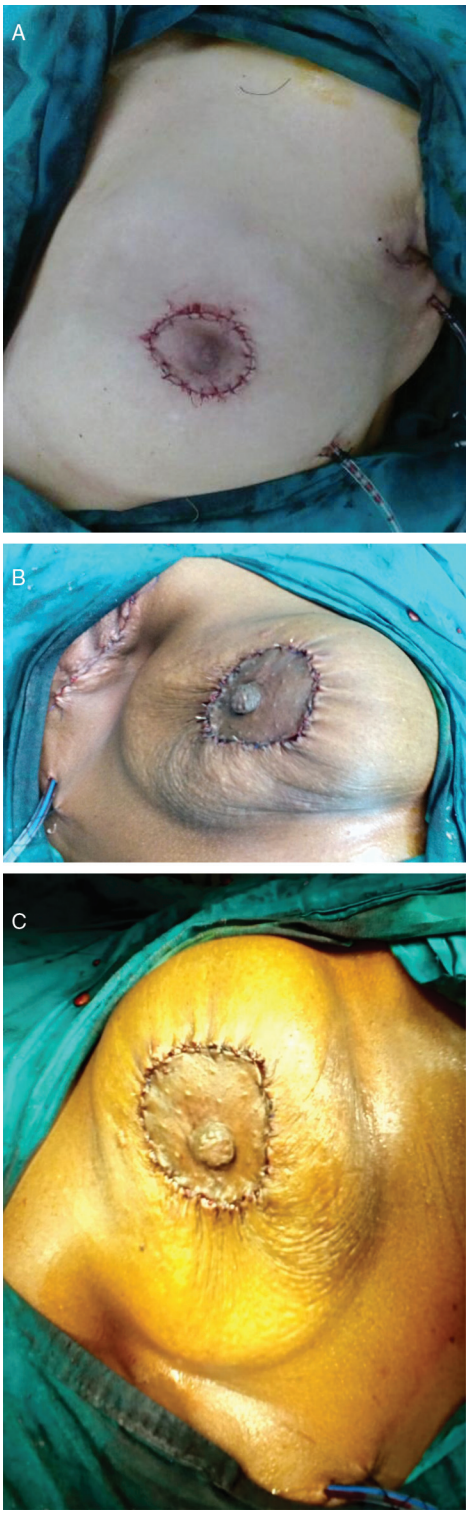
Breast cancer is the most common site-specific cancer in women and is the leading cause of death from cancer for women aged 20–59 years. It accounts for 26% of all newly diagnosed cancers in females and is responsible for 15% of the cancer-related deaths in women [16].

Outcomes for breast cancer vary depending on the cancer type, extent of disease, and person's age. Survival rates in the developed world are high, with between 80 and 90% of those in England and the United States alive for at least 5 years. In developing countries survival rates are poorer. Worldwide, breast cancer is the leading type of cancer in women, accounting for 25% of all cases. In 2012 it resulted in 1.68 million new cases and 522 000 deaths. It is more common in developed countries and is more than 100 times more common in women than in men [16].

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 into volume displacement and volume replacement procedures. The volume displacement techniques uses the remaining breast tissue, while the second, the volume replacement technique, uses other autologous tissue to supplement the insufficient breast tissue [17].

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 in consideration.

Figure 4



(a–c) Closure of the defect after resection of the tumor.

The mean age of our study was 45.7 years, 50% of the cases fall between 45 to 55 years which is consistent with the demographic data published by National Cancer Institute at 2013 by Zeeneldin *et al.* [18] who claimed the peak incidence of breast cancer between 40 and 59 years old.

In our study only three (12%) cases have had complications, two cases got wound infection, and one of them was diabetic reflecting the immune compromisation with diabetes mellitus. Statistically diabetes mellitus has increased the risk of postoperative wound infection thrice, this similar to what was published by Urban and Rietjens [1] showing the complication of diabetes mellitus 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 one patient and the patient was discharged on oral antibiotics with a more frequent follow up schedule, the second patient needed secondary suturing after treatment of the infection.

We reported lower results of surgical site infection (8%) than reported by Vilar-Compte *et al.* [19] (18.9%) and higher than reported by Olsen *et al.* [20] (4.7%).

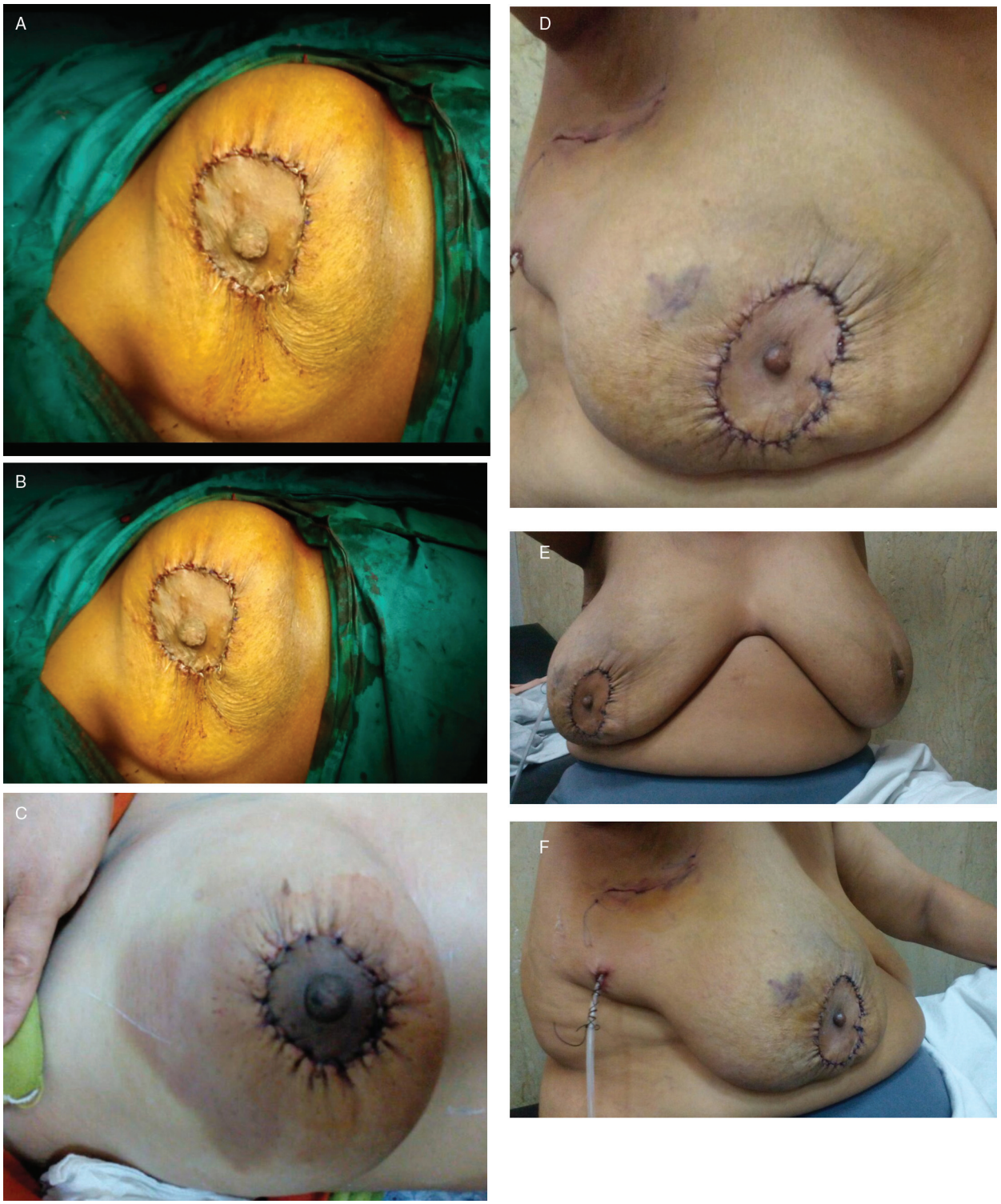
Another case in our study had wound hematoma with an incidence rate 4%, it was discovered in the second day postoperative. This case has no other complications. For this patient the hematoma resolved and she completed the postoperative period uneventful.

This case who suffered from hematoma has tumor distance from the NAC more than 4 cm. So we recommend that tumors that are far from the NAC with more than 4 cm distance is better approached by other oncoplastic techniques like radial segmentectomy or lateral mammoplasty rather than donut mammoplasty. This is the similar to the results published by Humayun and Ardeshir [21] who developed geometrical calculation method to be an easily reproducible technique for intraoperative evaluation of site of the NAC and the tumor and determining the best oncoplastic technique for the tumor distance. They claimed that tumors that are far away from the nipple cannot be handled by donut mammoplasty and better to be handled by lateral mammoplasty.

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 mean operative time of our study was 107.6 min and this acceptable compared to the results published

Figure 5



(a–f) Round-block mammoplasty postoperative.

by Lim *et al.* [15] 122 min. The operative duration of our study was long at first (145 min) but with progression of our study and as we build up more experience the operating time was reduced to (50 min).

One of our last cases had long operative duration as the patient had breast cup size F which required large volume dissection.

Table 1 Mean age of the study

	Mean±SD	Minimum	Maximum
Age	45.70±12.27	20	60

In our study none of the patients had any malignant recurrence as confirmed by the pathologist in our multidisciplinary team proving that we had

Table 2 Number and percent of complications

Comorbidity [*n* (%)]	
No	22 (88)
Yes	3 (12)
Type of comorbidity [*n* (%)]	
None	22 (88)
DM	1 (4)
HTN	1 (4)
IHD	1 (4)

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

Table 3 Mean tumor size in the study

	Mean±SD	Minimum	Maximum
U/S size	1.8±0.43	1.00	3.6

Table 4 Mean distance of the tumor from nipple–areola complex in the study

	Mean±SD	Minimum	Maximum
Distance from NAC	2.9±0.93	2.00	6.00

NAC, nipple–areola complex.

Table 5 The mean breast cup size for the study

	Mean±SD	Minimum	Maximum
Mean breasts size	C±1.4	A	F

Table 6 Number and percent cases for every breast cup size in the study

	Cup size	*n* (%)
Breast size	A	3 (12)
	B	5 (20)
	C	13 (52)
	D	2 (8)
	E	1 (4)
	F	1 (4)
	G	0 (0)

Table 7 Mean operation time for our study

	Mean±SD	Minimum	Maximum
Operative time	107.60±14.50	85.00	145.00

Table 8 Mean intraoperative blood loss for the study

	Mean±SD	Minimum	Maximum
Intraoperative blood loss	85.6±29.4	50	200

performed donut mammoplasty technique safely from oncological point of view, and this similar to the results published [15].

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.

Table 9 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 10 Postoperative hospital stay

	Mean±SD	Minimum	Maximum
Postoperative stay	30.00±8.77	24.00	48.00

Table 11 Number and percent of complications in our study

Complications	*n* (%)
Hematoma	
Negative	24 (96)
Positive	1 (4)
Infection	
Negative	23 (92)
Positive	2 (8)

Table 12 Mean cosmetic outcome for our study

	Mean±SD	Minimum	Maximum
Cosmetic outcome	4.5±.86	2.00	5.00

Table 13 Number of cases for every score of cosmetic outcome

Cosmetic outcome	*n* (%)
Score 5 (excellent)	13 (52)
Score 4 (very good)	8 (32)
Score 3 (good)	3 (12)
Score 2 (fair)	1 (4)
Score 1 (poor)	0 (0)
Score 0 (ugly)	0 (0)

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 near 5 years as shown by most of the studies [22].

In our study mainly a small to medium-sized breast (cup A, B, and C) was approached by donut mammoplasty. The mean breast cup size for the study was C. Larger breast size can be handled by other techniques. The large excision made by donut mammoplasty would disfigure the breast and may compromise safety due to possibly less excision volume and consequently smaller safety margin. This is similar to the retrospective study made by Lin *et al.* [23] published at who preferred donut technique to approach breast cancer in a small

breast size. The overall cosmetic outcome was excellent.

Our study shows that donut mammoplasty fits tumors that are very close to the NAC with distance about 3 cm or more, however a far tumor more than 5 cm would be difficult to approach by this technique which might yield less satisfactory cosmetic outcome. The mean distance of the tumor from NAC in our study was 2.9 cm.The simplicity of the surgical technique of donut mammoplasty was not only reflected on the operation time but also on the overall intraoperative blood loss small amount of blood loss was detected. The mean blood loss was 85.6 ml. In the early postoperative follow up period, first day drain amount was estimated in all of the cases. It is quite similar, the mean first day drain amount was 83.8 ml [24].

The whole operative evaluation proved for donut mammoplasty to be very simple and safe procedure with relatively average operation time in comparison for the other oncoplastic techniques, yet it has the least intraoperative and postoperative blood loss and the least need for analgesia and the fastest recovery and discharge.

In our study we were able to conduct an excellent cosmetic outcome for a relatively large tumor excisions with 84% which is higher than the results published by of the cases (21 patients) falling in excellent and very good score groups with mean cosmetic outcome score 4.23. Another 16% (four cases) which fall in good and fair score groups. None of our cases have had a poor or an ugly score [25].

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.

The donut mammoplasty has high mean cosmetic outcome score 4.5 which approaches the excellent score the wound being obscured around the NAC at the transitional zone between NAC and skin played an integral role in improving cosmetic outcome, patient satisfaction, and acceptance in both early postoperative period and late follow up period.

Conclusion

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

The choice of the oncoplastic technique is mainly based upon the location of the tumor, size of the breast, and distance of the tumor from the NAC. So all cases should be adequately reviewed in order to tailor the decisions for every single case.

Our study was focused on donut mammoplasty technique as an oncoplastic procedure for management of early breast cancer near to NAC to assess the technique clinically regarding cosmetic outcome, operative complication, and oncological safety.

Donut mammoplasty shows 100% off oncological safety with no recoded cases of local recurrence, 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 donut mammoplasty technique safely from oncological point of view.

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Conflicts of interest
There are no conflicts of interest.

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