



4-30-2024

Section: General Surgery

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How to Cite This Article

Deabes, Shawky Mohamed; Abdelatty, Walid Raafat; and Salah, Ragab El-Sayed Mahmoud (2024)
"Oncoplastic Surgical Techniques in Treatment of Central Breast Cancer," *Al-Azhar International Medical Journal*: Vol. 5: Iss. 4, Article 58.

DOI: <https://doi.org/10.58675/2682-339X.2402>

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Oncoplastic Surgical Techniques in Treatment of Central Breast Cancer

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Abstract

Background: Surgical management of central breast cancers presents a challenge to the physician, who must achieve the primary objectives of breast conservative surgery (BCS), precisely sufficient margins and aesthetically pleasing results.

Aim: To evaluate breast preservation in women with central breast cancer while providing these patients with both oncologic safety and acceptable cosmetic appearance.

Patients and methods: Fifty patients participated in this prospective investigation at Al-Azhar University Hospitals, Cairo, From January 2021 till January 2023. All were indicated and fit for conservative breast surgery due to central carcinoma. The patients gave their informed written consent. Each patient was given a code number and a review of the study's objectives.

Results: Regarding the oncoplastic techniques performed on the studied patients, 16 (32%) patients underwent the risotto technique, 12 (24%) patients underwent the melon slice technique, 14 (28%) patients underwent the round block technique, and 8 (16%) patients underwent batwing mastopexy technique. The average tumor size was 2.4 ± 0.47 cm, with a 1.6 to 3.2 cm range. The surgical safety margins had a mean of 1.5 ± 0.36 cm and varied from 0.9 to 2.1 cm.

Conclusion: After resection of CLBC, the center quadrant can be safely rebuilt using a variety of oncoplastic procedures with acceptable cosmetic results.

Keywords: Oncoplastic Surgical Techniques; Central Breast Cancer

1. Introduction

The combination of oncologic and plastic surgery principles, known as oncoplastic breast surgery (OBS), is increasingly being used as a standard treatment for early-stage breast cancer, particularly in Western nations.¹

There are two basically different approaches for treating breast abnormalities after oncoplastic breast surgery (OBS): Volume displacement procedures involve resection combined with different mammoplasty and rearranging the breast surrounding tissue, as well as reduction (using techniques such as inferior pedicle and Melon slice) & restructuring (using techniques such as round-block technique, Grisotti flaps,

etc.) approaches.²

Volume-replacement techniques, which use locoregional flaps to repair after resection.^{3,4} immediately

Improved symmetry in all situations can be paired with either contemporary or post-operative correction in the contralateral breast.⁵

Clough et al.^{6,7} then made sub-classifications of the volume-displacement processes, which were separated into two stages: reduction of breast volume by less than 20% without involving skin excision or mammography; and expected resection of 20–50% of the breast volume, extra skin must be removed to contour the breast using mammoplasty procedures.

Accepted 14 April 2024.
Available online 30 April 2024

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<https://doi.org/10.58675/2682-339X.2256>

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Even though only 20–50% of the breast volume is expected to be respected, volume-replacement methods can still be used on tiny or medium-sized breasts. The first cosmetically pleasing outcomes did not occur until after many researchers made every effort, including the latissimus dorsi (LD) myocutaneous flap by Nogushi et al. and countless other newly developed procedures.^{8,9}

Fifteen to twenty percent of patients have central breast neoplasms; for a long time, breast conservation surgery (BCS) was not an option for these patients, and mastectomy was the standard of care. A sufficient safety margin surrounding the tumor must be maintained in addition to the nipple and areolar excision due partly to the high incidence of nipple-areola-complex (NAC) involvement typically associated with these malignancies. The outcome is an unsatisfactory cosmetic one. To make matters worse, a lot of surgeons and patients were not happy with the cosmetic outcomes of the initial central quadrantectomy.^{10,11}

This study aimed mainly at evaluating breast preservation in women with central breast cancer while providing these patients with both oncologic safety and acceptable cosmetic appearance.

2. Patients and methods

This prospective study was carried out on 50 patients at Al-Azhar University Hospitals, Cairo, from January 2021 to January 2023. All were indicated and fit for conservative breast surgery due to central carcinoma. The patients gave their informed written consent. Each patient was given a code number and a review of the study's objectives.

Inclusion criteria: Patients indicated for oncoplastic breast surgery with central breast carcinoma either involving or not involving nipple-areola complex (stage I & II central breast cancer) and patients with duct carcinoma.

Exclusion criteria: Poor general condition, non-compliance to postoperative adjuvant therapy, refusing conservative surgery, co-morbidities interfering with postoperative adjuvant therapy, non-central breast cancer, and patient with a history of reduction mammoplasty. Breast carcinoma with either one of the following: stage III & IV breast cancer, recurrent breast cancer, lobular carcinoma, multifocal, and extensive size extending to other quadrants.

All studied cases were subjected to the following:

Detailed history taking, including:

Personal history: name, age, weight, height, BMI. **Parity,** menopausal status, abortion, and family history of breast cancer. **Past medical history:** diabetes mellitus, hypertension, Hyperlipidemia. **Past surgical history:** history of

any surgical procedures, blood transfusions, and history of trauma.

Total clinical examination: Physical examination, including temperature, respiration rate, capillary filling time, pulse, blood pressure, and capillary filling time.

Routine preoperative Laboratory investigations and anesthetic fitness evaluation: Complete blood count, Prothrombin time, Serum alanine transaminase (ALT) level, Random blood glucose level, and Serum creatinine level. Bilateral breast ultrasonography and mammography. Core biopsy was taken from the lesion before surgery to confirm the diagnosis; oncoplastic breast surgery involving reconstruction using a local skin-glandular flap and a central quadrantectomy.

Preoperative data: The malignant lesion data include the site, size, distance from the nipple-areola complex, skin changes, nipple changes, and the preoperative core biopsy result.

Operative data: Operative details.

Postoperative data: Early postoperative complications, including ischemic changes to the flap, Time of hospital discharge, Final pathological examination, safety margin, and involvement of nipple-areola complex, and late postoperative complications, including scar complications and early carcinoma recurrence.

Assessment of the nipple/areola complex (NAC)

NAC evaluation was a crucial component of the preoperative evaluation to determine whether or not NAC was engaged. If any of these characteristics were present, the NAC complex was removed: Clinical indicators indicate NAC involvement, such as nipple retraction, discharge, ulceration, or Paget disease, or radiological evidence that point to a malignant NAC involvement (distance from lesion to nipple less than 2 cm, as determined by MRI).¹²

Outline of oncoplastic surgical techniques

Individuals who needed contralateral breast reduction to achieve bilateral symmetry declined to have any contralateral surgery performed, and those who had NAC excision declined NAC reconstruction, depending on the size of the breast and degree of ptosis.¹³

Oncoplastic techniques

Grisotti mastopexy: utilizing a comma-shaped flap to mobilize and excise the central quadrant inferior, the skin island is rounded to fill the deficiency.¹⁴

The melon slice approach involves a horizontal elliptical excision followed by direct closure. This procedure involves removing the tumor and any necrotic areas along with a safety margin that extends down to the pectoral fascia.¹⁵

Round block technique: is made up of two circular skin markings; the outer circle was determined by the setting of the nipple, breast

ptosis, and tumor size, and the outer circle was produced on the areola's boundary. The tumor is excised with safety margins down to the pectoral fascia after the tissue between the two incisions has been de-epithelialized. A running technique was used to close skin wounds.¹⁶

Batwing mastopexy technique: On each side of the NAC, two semicircular incisions with angled "wings" were made. The two half-circles were placed such that, upon wound closure, they may re-approximate one another. When these skin wings were removed, the semicircles could be moved together without generating extra skin folds at closure.¹⁷

Management of the axilla

Longitudinal lymph node biopsy (SLNB) using methylene blue was performed on patients diagnosed with clear lymph nodes (N0). The injection techniques used were combined retro-areolar and peritumoral. ANLD, or axillary lymph node dissection, was unnecessary if SLNB was negative. However, all levels I and II dissection were carried out if the sentinel node tested positive. Initially, ALND was applied to patients who showed positive axilla.¹⁸

Surgical techniques

When a tumor developed at or infringed upon the retro-areolar region, a central quadrantectomy was performed, which included removing the NAC down to the pectoralis fascia. The surgeon sutured the breast specimen to maintain orientation after surgical excision. A sufficient one-centimeter gross safety margin was guaranteed. A local skin-glandular flap was used for breast restoration. Except for the skin disc at the top end, the flap was meticulously de-epithelialized. The flap's medial edge was cut down to the pectoral fascia. Then, to facilitate simple tissue mobilization, the flap, and the breast's medial and lateral pillars were undermined for 3–4 cm.

Two or three 0-PGA sutures were used to connect the skin-glandular flap's deep portion to the profound aspect of the breast defect after it was turned into the central quadrantectomy defect. Next, two layers of 4/0 PGA were applied to close the circular areolar defect surrounding the skin disc: a subcutaneous layer of interrupted 4/0 PGA and a continuous subcuticular layer of 4/0 PGA.

Pathological evaluation

the immunohistochemical analysis, which includes Ki-67, HER2/neu, PR, and ER. The margins were considered negative when a histological investigation revealed no cancer cells within 2 mm of the removed tissue surface.

Cosmetic outcome

Patients were asked to rate their level of satisfaction with the cosmetic outcome and how it compared to their preoperative breast using a

five-point scale: excellent (five), sound (four), fair (three), terrible (two), and bad (one). So.¹⁹

The cosmetic result was reviewed objectively by two surgeons and a seasoned nurse, who assigned a score between 1 (very poor) and 10 (excellent). When evaluating, five factors are taken into account: breast symmetry, areola and breast reconstruction, scar quality and retraction, glandular tissue deficits.

Oncologic outcome: Whole breast radiotherapy (WBRT), Adjuvant hormonal therapy, Adjuvant chemotherapy, Recurrence and metastasis of breast cancer. Seroma, hematoma, wound infection, and surgical site infection were evaluated.

Follow up

All cases were carefully observed during hospitalization, discharged after early complications were excluded, and followed up in the outpatient clinic and by active telephone calling if required.

Ethical considerations

The study was authorized by the Faculty of Medicine's Ethics Committee at Al-Azhar University Hospitals. To ensure the privacy of participants and the secrecy of their data, adequate protections are as follows: Patients were given the option to opt out of the trial if they so desired. In addition to recording each participant's name and address in a separate file, we also assign them a code. The patient's identity is kept secret when the research is being used. Aside from applying them scientifically, we did not do anything more with the study's findings.

Statistical analysis

IBM Inc., Armonk, NY, USA, used SPSS v26 for statistical analysis. The standard deviation (SD) and mean represent quantitative variables. Qualitative factors were displayed as percentages (%) and frequencies.

3. Results

Table 1. Demographic data of the studied patients
N=50

AGE (YEARS)	Mean ± SD	51.5 ± 7.29
	Range	40 - 64
WEIGHT (KG)	Mean ± SD	73.5 ± 10.05
	Range	60 - 89
HEIGHT (M)	Mean ± SD	1.6 ± 0.06
	Range	1.55 - 1.74
BMI (KG/M ²)	Mean ± SD	27.2 ± 4.43
	Range	20.28 - 35.25

BMI: Body mass index.

Age ranged from 40 to 64 years with a mean of 51.5 ± 7.29 years. Weight ranged from 60 to 89 kg with a mean of 73.5 ± 10.05 kg. Height ranged from 1.55 to 1.74 m with a mean of 1.6 ± 0.06 m. BMI ranged from 20.28 to 35.25 kg/m² with a mean of 27.2 ± 4.43 kg/m².

Table 2. Reproductive history of the studied patients.

		N=50
PARITY	Nullipara	20 (40%)
	Multipara	30 (60%)
MENOPAUSAL STATUS	Premenopausal	22 (44%)
	Postmenopausal	28 (56%)
ABORTION	Yes	16 (32%)
	No	34 (68%)
FAMILY HISTORY OF BREAST CANCER	Positive	19 (38%)
	Negative	31 (62%)

Regarding parity of the studied patients, 20 (40%) patients were nullipara, and 30 (60%) patients were multipara. Regarding menopausal status, 22 (44%) patients were premenopausal, and 28 (56%) patients were postmenopausal. Regarding abortion, 16 (32%) patients had abortion. Regarding family history of breast cancer, 19 (38%) patients had positive family history.

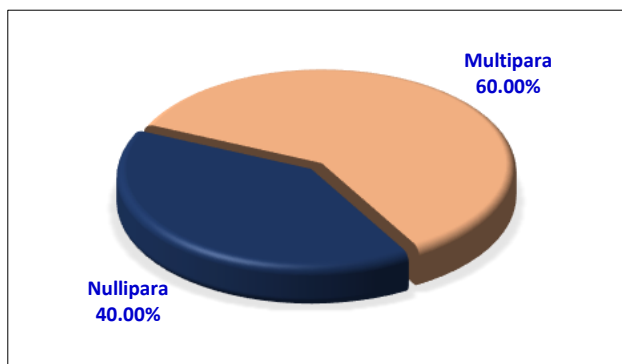


Figure 1. Parity of the studied patients.

Table 3. Co-morbidities of the studied patients.

		N=50
HTN	Yes	21 (42%)
	No	29 (58%)
DM	Yes	14 (28%)
	No	36 (72%)
HYPERLIPIDEMIA	Yes	9 (18%)
	No	41 (82%)

HTN: Hypertension, DM: Diabetes mellitus

Twenty one (42%) patients were hypertensive, 14 (28%) patients were diabetic, 9 (18%) patients had hyperlipidemia.

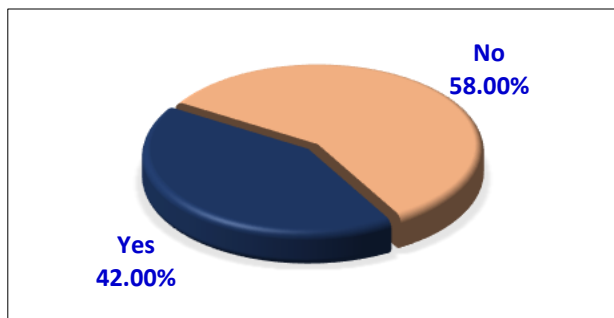


Figure 2. Incidence of hypertension in the studied patients.

Table 4. Blood picture of the studied patients.

		N=50
HB (G/DL)	Mean ± SD	11.9 ± 0.96
	Range	10.5 - 13.5
WBCS (X 10 ⁹)	Mean ± SD	12.2 ± 0.93
	Range	10.5 - 13.5
PLT (X 10 ⁹)	Mean ± SD	229.1 ± 40.39
	Range	165 - 299
CREATININE (MG/DL)	Mean ± SD	0.5 ± 0.2
	Range	0.3 - 0.8
UREA (MG/DL)	Mean ± SD	34 ± 8.97
	Range	20 - 48
ALT (U/L)	Mean ± SD	28.4 ± 5.02
	Range	18 - 36
AST (U/L)	Mean ± SD	28.2 ± 6.77
	Range	1 - 38
INR	Mean ± SD	1 ± 0.13
	Range	0.8 - 1.1

Hb: Hemoglobin, WBCs: White blood cells, PLT: Platelets, ALT: Alanine transaminase, AST: Aspartate Transaminase, INR: International Normalized Ratio.

Hemoglobin ranged from 10.5 to 13.5 g/dL with a mean of 11.9 ± 0.96 g/dL. WBCs ranged from 10.5 to 13.5 x 10⁹ with a mean of 12.2 ± 0.93 x 10⁹. PLT ranged from 165 to 299 x 10⁹ with a mean of 229.1 ± 40.39 x 10⁹. Creatinine ranged from 0.3 to 0.8 mg/dL with a mean of 0.5 ± 0.2 mg/dL. Urea ranged from 20 to 48 mg/dL with a mean of 34 ± 8.97 mg/dL. ALT ranged from 18 to 36 U/L with a mean of 28.4 ± 5.02 U/L. AST ranged from 1 to 38 U/L with a mean of 28.2 ± 6.77 U/L. INR ranged from 0.8 to 1.1 with a mean of 1 ± 0.13.

Table 5. Pathological assessment of breast cancer in the studied patients.

		N=50
POSITIVE AXILLARY LYMPH NODES	ANLD	34 (68%)
NEGATIVE AXILLARY LYMPH NODES	Positive SNLB (underwent ANLD)	13 (26%)
	Negative SNLB	3 (6%)

ALND: Axillary lymph node dissection, SLNB: Sentinel lymph node biopsy.

After appearing with positive axillary lymph nodes, 34 individuals (68%) had ANLD. While 13 (26%) of the 16 patients (32%) who presented with a clinically and/or radiologically negative axilla received ANLD, the remaining 16 patients (32%) had positive SNLB. The remaining 3 individuals (6%) on the other hand, exhibited negative SNLB.

4. Discussion

Of the patients in the study, 34 (68%) had ANLD when their axillary lymph nodes were positive for breast cancer based on the pathological examination of the disease. Comparatively, 13 (26%) of the 16 (32%) patients who presented with

a clinically and possibly radiologically negative axilla underwent ANLD, whereas the remaining 16 patients (32%) underwent SLNB. SNLB was negative in contrast for the remaining 3 cases (6%). Regarding the pathological types of breast cancer in the studied patients, 32 (64%) patients had IDC, 12 (24%) patients had PBD, 5 (10%) patients had DCIS, and 1 (2%) patient had ILC.

Farouk et al. (2015) revealed that the most frequent pathological diagnosis was invasive ductal carcinoma (24/30, 80%), with two patients each for Paget syndrome of the nipple and invasive lobular carcinoma. Stage II was the most prevalent tumor stage (19/30, 63%), with four individuals each for stages I and III.²⁰

Gardfjell et al. (2019) revealed that the specimen weight was 92 (14–345) grams, the median radiological tumor extents (containing malignant microcalcifications and DCIS) were 20 (5–60) mm while 22 (6–90) mm, respectively, and the EPBVE percentage was 15% (3–35%).²¹

The study participants' breast cancer stages were as follows: 17 (34%) had initial-stage breast cancer, 23 (46%) had Phase IIA breast cancer, and 10 (20%) had Phase IIB breast cancer. Of the patients under study, 18 (36%) had a N0 nodal stage, 28 (56%) a N1 nodal stage, and 4 (8%) a N2 nodal stage of breast cancer. In terms of the patients' breast cancer grades, 3 (6%) and 47 (94%) of the patients had level II breast cancer, respectively.

Gulcelik et al. (2022) discovered that the percentage of tumors in grades I, II, and III was 11.5%, 44.5%, and 44%, respectively. Of the patients, 266 (24.7%) were in the N1 stage, 64 (6%) were in the N2 stage, and 744 (69.2%) were in the pathological N0 stage.²²

Regarding the Hormone receptor status of breast cancer in the studied patients, 42 (84%) patients were ER-positive, 8 (16%) patients were ER-negative, 17 (34%) patients were HER2-positive, and 33 (66%) patients were HER2-negative. Of the patients, 39 (78%) had positive PR results, and 11 (22%) had negative PR results.

the oncoplastic techniques performed on the studied patients, 16 (32%) patients underwent the risotto technique, 12 (24%) patients underwent the melon slice technique, 14 (28%) patients underwent the round block technique, and 8 (16%) patients underwent the batwing mastopexy technique. The tumor size varied, with a mean of 2.4 ± 0.47 cm and a range of 1.6 to 3.2 cm. The surgical safety margins had a mean of 1.5 ± 0.36 cm and varied from 0.9 to 2.1 cm.

Gulcelik et al. (2022) emphasized that the most often used level II oncoplastic procedures were vertical mammoplasty in 140 patients (13%), inferior pedicle flap in 294 patients (27.3%), and upper outer quadrantectomy in racquet incision in 334 patients (31%).²²

Furthermore, the following techniques were employed: round block (donut) technique (5%), radial mammoplasty (5.5%), fusiform mammoplasty (6.7%), superior pedicle flap (6.8%), and batwing (4.5%).²²

Gardfjell et al. (2019) discovered that eight (26.7%) patients underwent Grisotti advancement rotational flap, twenty (66.7%) underwent SSM with latissimus dorsi pedicled flap, and two (6.7%) underwent SRM with latissimus dorsi pedicled flap. Individuals needing contralateral surgery to attain a conventional symmetry declined to have such procedures. Furthermore, individuals with SSM declined to have their areolas and nipples tattooed.²¹

The follow-up duration ranged from 6 to 24 months, with a mean of 16.6 ± 5.15 months. In terms of breast cancer recurrence and metastasis among the patients under study, none of the individuals had either of these events.

Thirty-one (62%) patients reported outstanding postoperative cosmetic results, fourteen (28%) good postoperative cosmetic results, four (8%) acceptable postoperative results, one (2%) poor postoperative results, and no patient reported a horrible postoperative cosmetic result. The surgeon assessed the patients' postoperative cosmetic results and found that 13 (26%) had 10 points, 7 (14%) had 9 points, 8 (26%) had 13 points, 5 (10%) had 7 points, 8 (16%) had 6 points, and 4 (8%) had 5 points.

Of the patients who had the Grisotti procedure, 7 (58.3%) had outstanding patient evaluations, and 5 (41.7%) had good patient evaluations. On the other hand, the Melon slice approach yielded good outcomes in 5 patients (62.5%), decent results in 3 patients (37.5%), and no significant results were found ($P = 0.013$). Surgeons evaluated 9 out of 3 patients (25%), 8 out of 4 patients (33.3%), 7 out of 1 patient (8.3%), and 6 out of 5 patients (41.7) with a mean of 7.19 ± 1.38 in the Grisotti technique; in the Melon slice technique, the mean was 5.480 ± 0.76 in 7 out of 1 patient (12.5%), 6 out of 3 patients (37.5%), and 5 out of 4 patients (50%).

Compared to patients with the Melon slice procedure, those who received the Grisotti approach exhibited better esthetic outcomes through the c-round block method than batwing macroscopy. Of the patients with the round block technique, 9 (81.8%) had outstanding patient evaluations, and 2 (18.2%) had good evaluations. On the other hand, there were no recorded fair results ($P < 0.274$) for the Batwing mastopexy procedure, which was good in 1 patient (11.1%) and significant in 8 patients (88.9%).

5. Conclusion

After the resection of CLBC, the center quadrant can be safely rebuilt using several oncoplastic procedures with acceptable cosmetic results. We advise these methods for patients with early-stage central breast cancer based on prior findings. Reconstructing the central defect in moderately sized breasts is connected with a superior cosmetic outcome when using the Grisotti approach. Round block and batwing mastopexy procedures can be employed to preserve the central tumors with an excellent esthetic result.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article

Funding

No Funds : Yes

Conflicts of interest

There are no conflicts of interest.

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