Comparison between conventional and oncoplastic breast surgeries regarding resection margins and local recurrences in breast cancer: Retrospective study

Ahmed A. Abdelkader, Tarek El-Fayoumi, Ahmed Roushdy, Mohamed Farouk Asal

Surgical Oncology Unit, Faculty of Medicine, Alexandria University, Egypt

Correspondence to Ahmed Roushdy, Surgical Oncology Unit, Faculty of Medicine, Alexandria University, Egypt.
Tel: 01092277267;
e-mail: roushdii.50005@gmail.com

Received: 17 August 2023
Revised: 1 September 2023
Accepted: 1 September 2023
Published: 7 December 2023

The Egyptian Journal of Surgery 2023, 42:938–947

Background
Breast cancer is the most common cancer in women and the second-leading cause of cancer-related fatalities globally. Breast-conserving surgery (BCS) is the primary surgical treatment for early-stage breast cancer, with oncoplastic BCS techniques expanding its possibilities. BCS offers a higher quality of life compared to mastectomy. However, it has two absolute contraindications: the inability to produce negative margins without deforming the breast and inflammatory breast cancer. Oncoplastic displacement and replacement BCS allow resections of up to 50% of breast volume without creating deformity. Positive surgical margins often require a second procedure, which can increase pain, complications, and medical expenses.

Patient and methods
This retrospective cohort study analyzed 310 patients with primary invasive breast cancer or DCIS who underwent conventional or oncoplastic breast cancer surgery. Most patients underwent lateral and therapeutic reduction mammoplasties. Other techniques included LD flap, TDAP flap, mini-LD muscle flap, ICAP flap, grisotti flap, LICAP flap, and modified round block technique. Oncoplastic techniques were tailored based on breast cup size, tumor size, tumor location, and patient preference. Wide local excision of the tumor with free margins was confirmed through intraoperative frozen sections.

Result
The mean weight of the specimen was 55.89 gm in the conventional group and 101.55 gm in the oncoplastic group. The mean operative time was 65.9 min in the conventional group, while the oncoplastic group had 72.58 min Complications included seroma, hematoma, wound infection, wound dehiscence, lymphedema, and partial nipple necrosis. The aesthetic outcome was excellent, with 132 patients satisfied with their results in the oncoplastic group compared to 90 in the conventional group.

Conclusion
Oncoplastic breast surgeries are safe, feasible and became the standard of care in breast cancer. Oncoplastic breast surgeries are of choice in cases of multifocal cancer. People who performed oncoplastic breast surgeries had wider free margins, much more aesthetic outcome, better psychological status, less redo surgery, less late deformities, more time consuming, more wound complications improved with frequent dressing, and did not causea delay in the adjuvant therapy, more requirement for contralateral symmetrizing surgery.

Keywords:
breast cancer, oncoplastic, conventional, free margins, local recurrence

Egyptian J Surgery 42:938–947

1110-1121

Introduction

Breast cancer, which makes up around 26% of all incident malignancies, is the most frequent cancer in women. Breast cancer is the second-leading cause of cancer-related fatalities globally, following lung cancer, with 40,000 women dying from it every year [1]. Breast-conserving surgery or mastectomy is the primary form of surgical treatment for breast cancer [2]. For the treatment of early-stage breast cancer, breast-conserving surgery (BCS), rather than mastectomy, has long held its position as the gold standard of surgical care. The possibilities of BCS in the management of larger and multifocal tumours as well as extensive ductal carcinoma in situ (DCIS), central tumours, and 6 o'clock lesions have been

further expanded by oncoplastic BCS techniques, which include excision of breast cancer mass with safety margins [3].

When compared to mastectomy, breast conservation results in a higher quality of life; therefore, if it is technically feasible and the patient requests it and there are no contraindications, breast conservation should be carried out [4].

Breast-conserving surgery has just two absolute contraindications: inability to produce negative margins without deforming the breast and inflammatory breast cancer [4]. According to the tumour site, size, breast size, and glandular tissue density, which fluctuate significantly regarding the amount of resected tissue, oncoplastic displacement and replacement BCS allow resections of up to 50% of breast volume without creating deformity utilising a variety of various procedures [3]. Surgical margins that are adequate have a key role in lowering the incidence of local recurrence (LR) [5]. The recommended surgical margins for invasive cancer were changed from 1 cm to 5 mm microscopical histological margins required for invasive cancer and 10 mm for DCIS. A consensus symposium in 2010 recommended that no ink on the tumour is adequate for invasive cancer and 2 mm for DCIS with or without concomitant invasive tumour [6]. Positive surgical margins are typically assumed to require a second procedure, either a mastectomy or a re-excision [7]. A second procedure may put the patient through pain and stress, increase their chance of surgical complications and poor cosmetic results, postpone adjuvant therapy, and raise their medical expenses [8,9]. Additionally, compared to patients who only had one procedure, those who have a re-excision may be at a higher risk of experiencing local recurrence [7].

Patient and methods

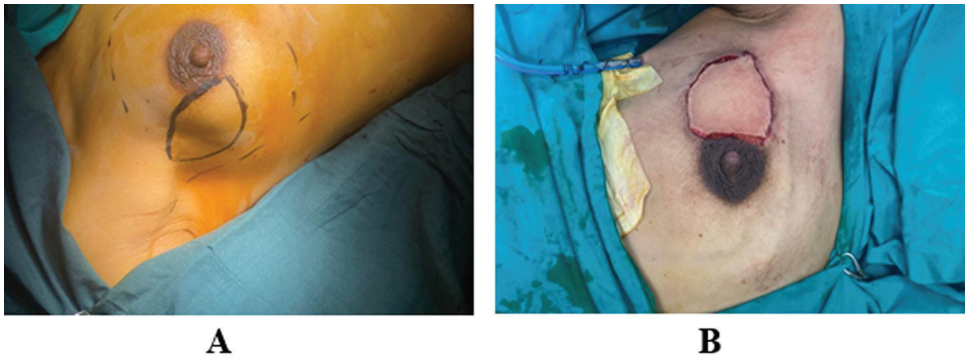
In this retrospective cohort study, we include 310 consecutive patients with primary invasive breast cancer or DCIS who underwent conventional (Fig. 1) or oncoplastic BCS (Figs 2–8) at the surgical oncology unit of Alexandria Main University Hospital between the January 1st, 2017, and December 31st, 2021. All the studied cases are equally distributed to both conventional (155 cases) and oncoplastic (155 cases) groups.

According to the surgical techniques used in the oncoplastic group in this study: Most of our patients performed lateral and therapeutic reduction mammoplasties as 36 patients (23.2%) performed lateral mammoplasty (Fig. 5) and 35 patients (22.6%) performed therapeutic reduction mammoplasty (Fig. 8). Other techniques used as volume replacement, 18 patients performed LD flap (Fig. 2), 12 patients performed TDAP flap (Fig. 3), 12 patients did mini-LD muscle flap (Fig. 6), 10 patients did ICAP flap, and 9 patients did grisotti flap and 8 patients did LICAP flap (Fig. 4). Other techniques were used as 9 patients performed round block technique (Fig. 7) to avoid lateralization of the nipple and 6 patients did modified round block technique.

Informed consent was obtained in all patients. All patients had a prophylactic antibiotic at the time of anaesthesia induction. A prober marking was done while standing.

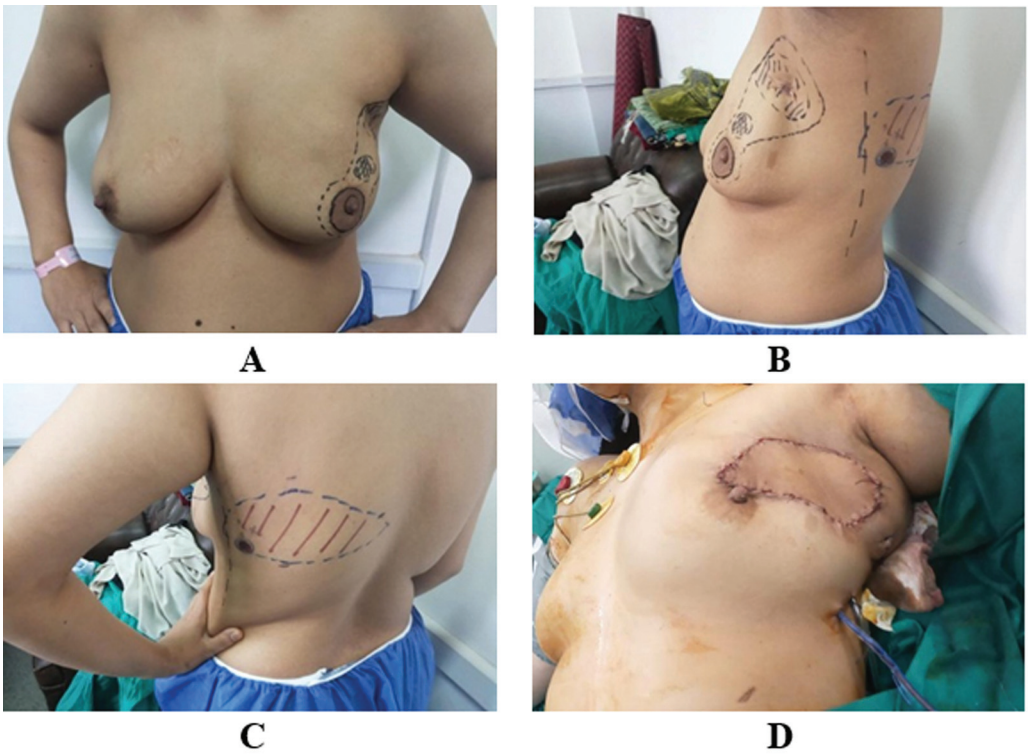
The choice of the oncoplastic technique is tailored according to breast cup size, tumor size, tumor location, and patient preference after a proper explanation of all the pros and cons. Peri areolar injection of the patent blue if the patient planned for SLN biopsy, and combination of the blue dye technique with the gamma prob technique (dual

Figure 1



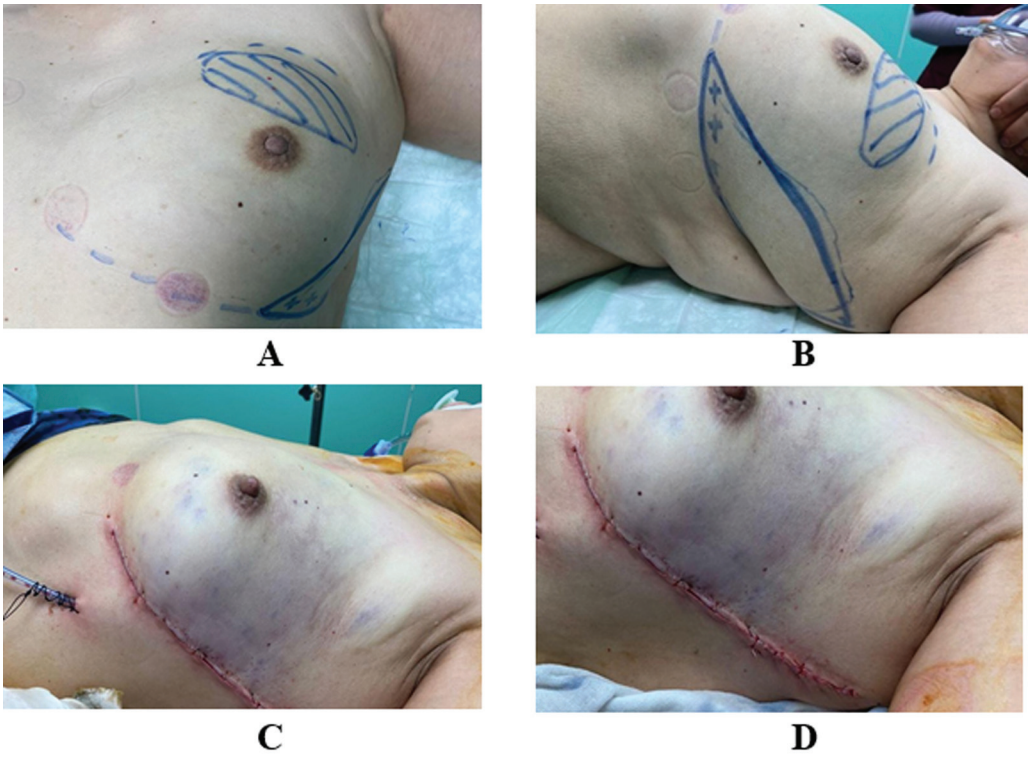
(A-C): A case from conventional group.

Figure 2



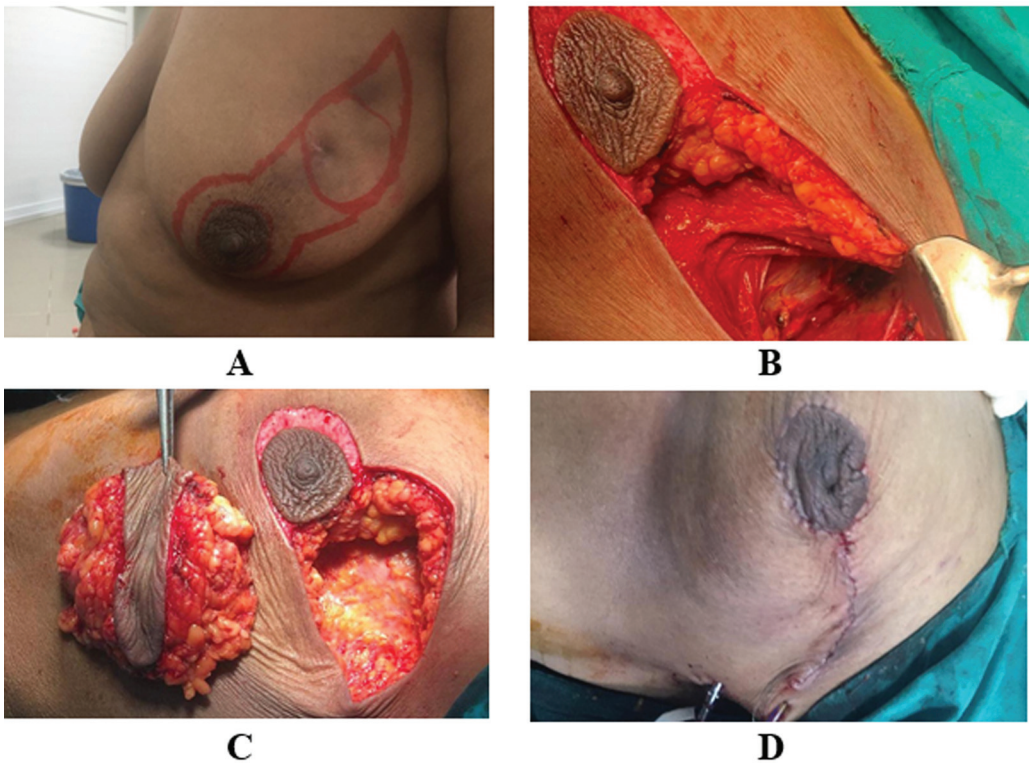
(A-B): A case from oncoplastic group who underwent volume replacement with LD Myocutaneous Flap.

Figure 3



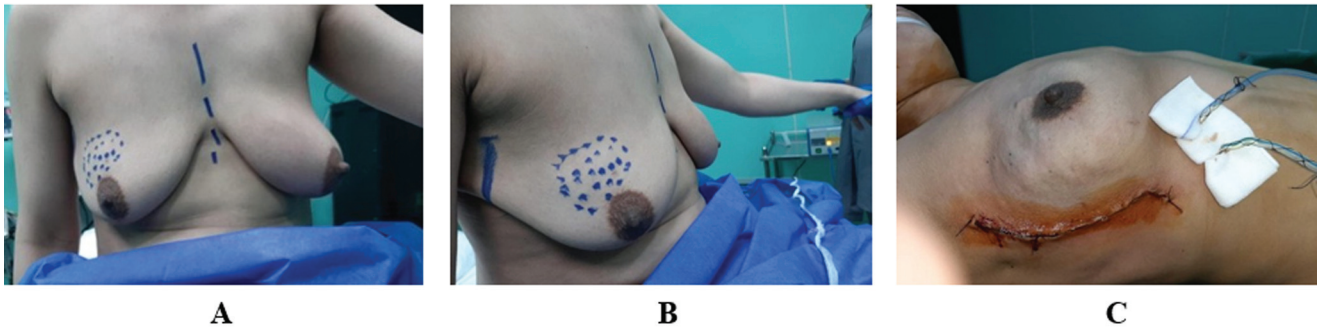
(A-D): A case from oncoplastic group who underwent volume replacement with TDAP.

Figure 4



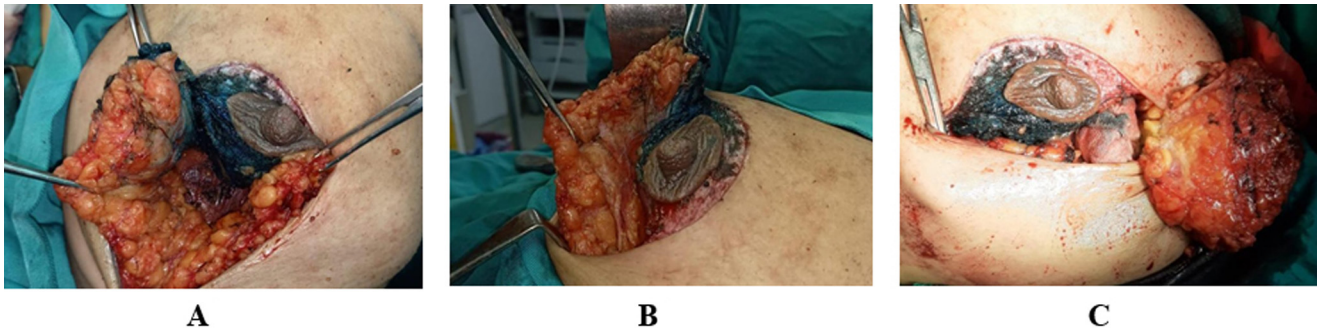
(A-D): A case from oncoplastic group who underwent volume replacement with LICAP.

Figure 5



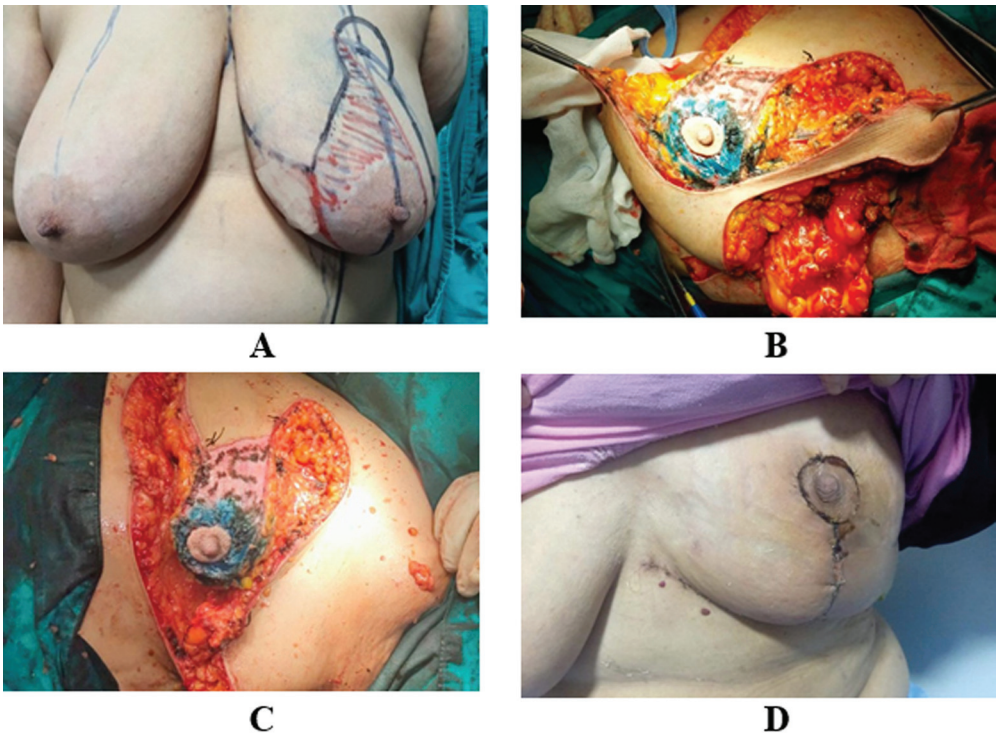
(A-D): A case from oncoplastic group who underwent Lateral mammoplasty.

Figure 6



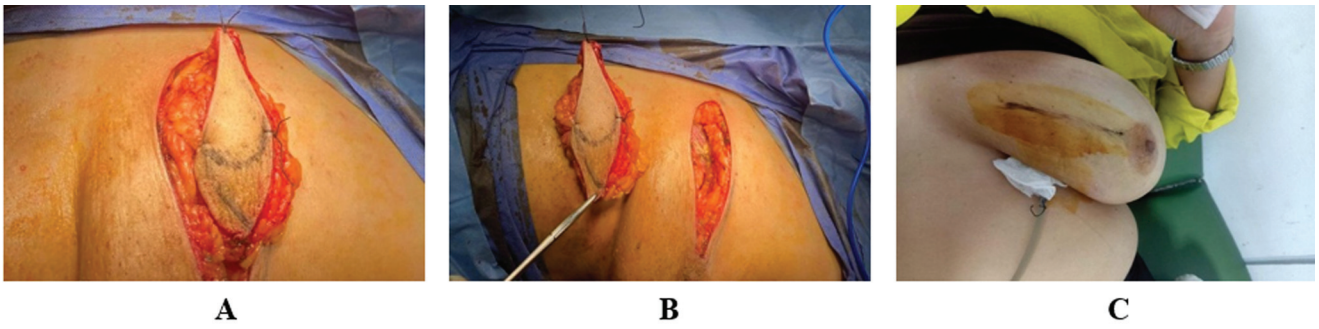
(A-C): A case from oncoplastic group who underwent volume replacement with Mini LD.

Figure 7



(A-C): A case from oncoplastic group who underwent round block mammoplasty.

Figure 8



(A-D): A case from oncoplastic group who underwent superior pedicle therapeutic reduction mammoplasty.

technique) if a SLN is done after a neoadjuvant chemotherapeutic regimen.

Wide local excision of the tumor with free margins is proven by intraoperative frozen section in all cases.

The marking of the tumor bed by metallic clips in all cases is our routine practice.

Results

All our cases, 310 patients (100%) did Sono-mammography for both breasts and axilla. Only 24 patients (7.7%) required further evaluation by MRI to confirm feasibility of breast conservation. The mean tumor size was 2.12 cm in the conventional group and 3.2 cm in the oncoplastic group, with a significant statistical difference. 83 patients (26.8%) had multifocal breast cancer. Most of them, 71 patients were in the Oncoplastic group compared to only 12 patients in the Conventional group. The tumor mean distance from the skin was 2.65 cm ranging from 1 to 5 cm. The tumor mean distance from NAC was 4.25 cm ranging from 1 to 7 cm. Most of our cases, 178 patients (57.4%) had positive axilla either clinical or radiological. Only 77 patients were in the

Table 1 Comparison between the two studied groups according to pre-operative data

Pre-operative data	Total (*n*=310) Number (%)	Conventional (*n*=155) Number (%)	Oncoplastic (*n*=155) Number (%)	Test of sig.	*P*
Radiology					
U / S and mammography and MRI	24 (7.7)	6 (3.9)	18 (11.6)	$\chi 2=6.503^*$	0.011*
U / S and mammography	286 (92.3)	149 (96.1)	137 (88.4)		
Tumor size (Max.) (cm)					
Min. – Max.	1.0–5.50	1.0–3.50	1.0–5.50	U=3874.50*	<0.001*
Mean±SD.	2.64±0.90	2.12±0.55	3.2±0.88		
Multi – focality	83 (26.8)	12 (7.7)	71 (45.8)	$\chi 2=57.275^*$	<0.001*
Distance from skin (cm)					
Min. – Max.	1.0–5.0	2.0–5.0	1.0–5.0	U=11368.5	0.369
Mean±SD.	2.65±0.78	2.70±0.69	2.61±0.86		
Distance from NAC (cm)					
Min. – Max.	1.0–7.0	2.0–6.0	1.0–7.0	U=9023.0*	<0.001*
Mean±SD.	4.25±1.33	4.04±0.85	4.46±1.65		
Axillary LNS					
Clinical	148 (47.7)	65 (41.9)	83 (53.5)	$\chi 2=4.189^*$	0.041*
Radiological	178 (57.4)	77 (49.7)	101 (65.2)	$\chi 2=7.600^*$	0.006*

Conventional group, while 101 patients were in the Oncoplastic group (Table 1).

The method of biopsy in all our cases was U/S guided True Cut Needle Biopsy with predominant histopathology IDC in 256 patients (82.6%), while 30 patients (9.7%) were IDC and DCIS, 18 patients (5.8%) were ILC and only 6 patients (1.9%) were DCIS in histopathology. Regarding the hormonal profile, 164 patients (52.9%) were luminal a, 69 patients (22.3%) were luminal b, 47 patients (15.2%) were triple negative and only 30 patients (9.7%) were Her2 enriched.

The majority of the patients who received neoadjuvant chemotherapy (84 patients) underwent conventional breast conservative surgery because of the toxic effects of the chemotherapy, like anemia, which guided the surgeon to go for the simplest and most straightforward way to excise the tumor. On the other hand, the smaller size of the tumor, or a complete clinical response, makes the volume of the resected breast tissue much smaller, making the decision for breast conventional surgery much easier (Table 2).

The mean weight of specimen was 55.89 gm in the conventional group and 101.55 gm in the oncoplastic group with statical significant difference. Only 12 patients (7.7%) required further extra margin in the Oncoplastic group compared to 30 patients (19.4%) in the conventional group required reshaving.

In concern to management of the axilla, SLN biopsy were obtained in 160 patients (51.6%) divided to 132 patients were clinically and radiologically free axilla from the start and 28 patients who had a complete

Table 2 Comparison between the two studied groups according to pre-operative data

Pre-operative data	Total (*n*=310) Number (%)	Conventional (*n*=155) Number (%)	Oncoplastic (*n*=155) Number (%)	Test of sig.	*P*
TCN Biopsy					
IDC	256 (82.6)	141 (91.0)	115 (74.2)	$c^2=36.892^*$	$^{MC}p<0.00^*$
ILC	18 (5.8)	0 (0.0)	18 (11.6)		
DCIS	6 (1.9)	6 (3.9)	0 (0.0)		
IDC, DCIS	30 (9.7)	8 (5.2)	22 (14.2)		
Hormonal status					
Luminal a	164 (52.9)	89 (57.4)	75 (48.4)	$c^2=10.201^*$	0.017*
Luminal b	69 (22.3)	25 (16.1)	44 (28.4)		
Triple negative	47 (15.2)	29 (18.7)	18 (11.6)		
Her2 +	30 (9.7)	12 (7.7)	18 (11.6)		
Neoadjuvant	84 (27.1)	41 (26.5)	43 (27.7)	$c^2=0.065$	0.798
Complete response	28 (9.0)	15 (9.7)	13 (8.4)	$c^2=0.157$	0.692

Table 3 Comparison between the two studied groups according to operative data

Operative data	Total (*n*=310) Number (%)	Conventional (*n*=155) Number (%)	Oncoplastic (*n*=155) Number (%)	Test of sig.	*P*
Weight of specimen					
Min. – Max.	40.0–130.0	40.0–70.0	70.0–130.0	t=28.789*	<0.001*
Mean±SD.	78.72±26.78	55.89±8.87	101.55±17.64		
Re shaving	42 (13.5)	30 (19.4)	12 (7.7)	c^2=8.923*	0.003*
Axilla					
SLN Biopsy	160 (51.6)	93 (60.0)	67 (43.2)	c^2=8.732*	0.003*
+ SLN Biopsy	42 (13.5)	35 (22.6)	7 (4.5)	c^2=21.592*	<0.001*
Axillary clearance	192 (61.9)	97 (62.6)	95 (61.3)	c^2=0.055	0.815
Operative time (min)					
Min. – Max.	45.0–120.0	55.0–85.0	45.0–120.0	U=1050.0	0.052
Mean±SD.	69.24±17.38	65.90±7.08	72.58±23.09		
Free margins in (cm)					
Min.–Max.	0.50–3.0	0.50–1.50	0.50–3.0	U=6105.0*	<0.001*
Mean±SD.	0.98±0.58	0.73±0.29	1.24±0.67		

response to the neoadjuvant chemotherapy. Only 42 patients (26.3%) were positive SLN biopsy and needed further axillary clearance.

192 patients (61.9%) did axillary clearance divided to 150 patients were clinically and radiologically positive axilla from the start and 42 patients did axillary clearance after positive SLN biopsy.

The mean operative time was 65.9 min in the conventional group, while the mean operative time in the oncoplastic group was 72.58 min which was longer but with no statical significant difference.

The free resection margins were a statically significant difference in the oncoplastic group with mean 1.24 cm compared to the mean in the conventional group which was 0.73 cm (Table 3).

Regarding complications, they were in the form of Seroma in 7 patients in the Conventional group and 10 patients in the Oncoplastic group, hematoma in 3 patients in the Conventional group and 4 patients in the Oncoplastic group, wound infection in 3 patients in the Conventional group and 5 patients in the Oncoplastic group, wound dehiscence in 10 patients in the Conventional group and 15 patients in the Oncoplastic group, lymphedema in 7 patients in the Conventional group and 10 patients in the Oncoplastic group and partial nipple necrosis in 2 patients in the Conventional group and 5 patients in the Oncoplastic group. All these complications were treated by

Table 4 Comparison between the two studied groups according to postoperative data

Postoperative data	Total (*n*=310) Number (%)	Conventional (*n*=155) Number (%)	Oncoplastic (*n*=155) Number (%)	Test of sig.	*P*
Complications					
Seroma after RV removal	17 (5.5)	7 (4.5)	10 (6.5)	c^2=0.560	0.454
Hematoma	7 (2.3)	3 (1.9)	4 (2.6)	c^2=0.146	^{FE}p=1.000
Infection	8 (2.6)	3 (1.9)	5 (3.2)	c^2=0.513	^{FE}p=0.723
Wound dehiscence	25 (8.1)	10 (6.5)	15 (9.7)	c^2=1.088	0.297
Lymphedema	17 (5.5)	7 (4.5)	10 (6.5)	c^2=0.560	0.454
Partial nipple necrosis	7 (2.3)	2 (1.3)	5 (3.2)	c^2=1.315	^{FE}p=0.448
Cosmetic result Surgeon assessment					
Poor	6 (1.9)	6 (3.9)	0 (0.0)	c^2=21.045*	$^{MC}_{p<0.001}$*
Fair	82 (26.5)	53 (34.2)	29 (18.7)		
Good	108 (34.8)	54 (34.8)	54 (34.8)		
Excellent	114 (36.8)	42 (27.1)	72 (46.5)		
Cosmetic result Patient satisfaction					
Not satisfied	88 (28.4)	65 (41.9)	23 (14.8)	c^2=27.991*	<0.001*
Satisfied	222 (71.6)	90 (58.1)	132 (85.2)		
Local recurrences	12 (3.9)	7 (4.5)	5 (3.2)	c^2=0.347	0.556
Distant mets	8 (2.6)	5 (3.2)	3 (1.9)	c^2=0.513	^{FE}p=0.723

conservative management and didn't delay the adjuvant treatment start time (Table 4).

The aesthetic outcome illustrated according to surgeon assessment and patient satisfaction.

As regard to surgeon aesthetic assessment, during the follow up period, patients showed excellent results were 42 patients in the Conventional group and 72 patients in the Oncoplastic group, good results were 54 patients in the Conventional group and 54 patients in the Oncoplastic group, fair results were 53 patients in the Conventional group and 29 patients in the Oncoplastic group and only 6 patients showed poor results all were in the Conventional group.

As regard to patient satisfaction, 132 patients were satisfied with their results in the Oncoplastic group compared to 90 patients in the Conventional group and only 23 patients were not satisfied with their results in the Oncoplastic group compared to 65 patients in the Conventional group.

During the follow up period, only 12 patients (3.9%) of our cases showed local recurrences with no statical significant difference between both oncoplastic and conventional groups.

Only 8 patients (2.6%) of our cases showed later on distant metastasis with no statical significant difference between both oncoplastic and conventional groups.

Discussion

Our study was performed retrospectively at The Surgical Oncology Unit of Alexandria Main University Hospital between January 1st, 2017 and December 31st, 2021, and our main drawback is the absence of randomization. However, we found that oncoplastic breast-conserving surgery is a safe alternative to Conventional breast-conserving surgery, particularly in cases with larger tumour sizes and multiple ipsilateral tumours, and especially in those frustrated by a worse histochemical subtype. In our study, we used various techniques, either oncoplastic volume replacement or oncoplastic volume displacement, according to the breast cup size, tumour size, tumour location in the breast, anticipated resection volume, age of the patient, and the patient's desire.

Considering the **oncoplastic surgical techniques** employed in the oncoplastic group of our study, the majority of our patients underwent lateral and therapeutic reduction mammoplasties; 36 patients (23.2%) underwent lateral mammoplasty, and 35 patients (22.6%) underwent therapeutic reduction mammoplasty. Contrary to Niinikoski *et al.*'s study [10], where they primarily employed the round block technique on their patients, The most popular mammoplasty procedures were lateral and therapeutic reduction mammoplasties because Egyptian women typically had larger breast cup sizes.

When it comes to the **specimen weight, reshaving, and resection margins**, The free resection margins in our study were higher in the oncoplastic group, and there was a statistically significant difference between the two groups, with a mean of 1.24 cm in the oncoplastic group compared to a mean of 0.73 cm in the conventional group. The type of surgical technique was related to the oncoplastic group's wider free margins. Only 12 patients (7.7%) in the oncoplastic group needed additional margin, compared to 30 patients (19.4%) in the conventional group. The pathologist used the frozen section technique intraoperatively to confirm the extra margin requirement. Numerous factors, most notably the larger size of the specimen in the oncoplastic group, contributed to the lessening of the reshaving in the oncoplastic group. None of our oncoplastic patients required a completion mastectomy. The positive margin rate in our study contrasted with rates previously reported in oncoplastic BCS studies. In comparison to our study, Losken *et al.* [11] (12.3%), De La Cruz *et al.* [12] (10.8%), Clough *et al.* [13] (12.6%), and Niinikoski *et al.* [10] (9.2%) all reported higher rates of positive margin. A lower positive margin rate of 5.4% was reported by Rietjens *et al.* [14]. There was a statistically significant difference between the two groups in the mean weight of the specimen, with the oncoplastic group having a higher mean weight. The conventional group's specimen weight range was 40 g to 70 g, while the oncoplastic group's range was 70 g to 130 g.

In our Conventional series, the mean specimen weight was 55.89 g, while in the oncoplastic group, it was 101.55 g. It should come as no surprise that it was highest in patients who had reduction mammoplasty methods. In comparison to our study, Niinikoski *et al.*'s oncoplastic group had a mean specimen weight of 77 g. The mean specimen weight in the other prior studies ranged from 168 to 241 [11–14] and was higher than in our study.

Concerning **time consuming**, The operative time was slightly longer in the oncoplastic group, but there was

no statistically significant difference between the two groups. The conventional group's average operating time was 65.9 min, whereas the oncoplastic group's average operating time was 72.58 min Due to the additional steps needed in the plastic portion of the surgery to produce a better aesthetic result, the oncoplastic group's procedure took longer than that of the conventional group.

In regards to **wound complications**, there were 10 patients in the conventional group and 15 patients in the oncoplastic group who experienced wound dehiscence, compared to 3 patients in the conventional group and 5 patients in the oncoplastic group who experienced wound infection. None of these complications delayed the adjuvant therapy because they were all conservatively managed with frequent dressings. In comparison with Crown *et al.*, who noted in their study that there are numerous surgical wound complications, particularly with oncoplastic techniques, including surgical site infection, ecchymosis, wound dehiscence, seroma, hematoma, partial flap loss, and complete flap loss [15], we have a lower rate of wound complications.

Considering the **aesthetic outcome and psychological state**, The oncoplastic group was superior to the conventional group in terms of aesthetic results during the observation period. To be more precise, 42 patients in the conventional group and 72 patients in the oncoplastic group had excellent outcomes; 54 patients in the conventional group and 54 patients in the oncoplastic group had good outcomes; 53 patients in the conventional group and 29 patients in the oncoplastic group had fair outcomes; and only 6 patients—all in the conventional group—had poor outcomes.The psychological condition of the patient and their level of satisfaction were both affected by this difference in the aesthetic result. Therefore, the oncoplastic group had a better psychological status for the patient, and the oncoplastic group also had a higher satisfaction rate. To be more precise, 132 patients in the Oncoplastic group were pleased with their outcomes compared to 90 patients in the Conventional group, and only 23 patients in the Oncoplastic group were dissatisfied with their outcomes compared to 65 patients in the Conventional group. Nonetheless, 85.2 percent of our patients who underwent OBS were cosmetically satisfied, compared to 72 percent of patients who underwent oncoplastic surgery in a previous study by Losken *et al.* [16].

In terms of **local recurrences and reoperations**, there was no statistically significant difference between the oncoplastic and conventional groups, and only 12 patients (3.9%) of our cases had local recurrences. The ipsilateral breast had all of the recurrences. There were five patients in the oncoplastic group and seven in the conventional group. Regional lymph node recurrences and contralateral breast cancer recurrences were uncommon in our series. To achieve radicality, reoperation was necessary for all 12 patients (3.9%), as opposed to 8.4% in Niinikoski *et al.* [10].

Conclusion

Oncoplastic breast surgeries are safe, feasible and became standard of care in breast cancer. Oncoplastic breast surgeries are of choice in cases of multifocal cancer. People who performed oncoplastic breast surgeries had wider free margins, much more aesthetic outcome, better psychological status, less redo surgery, less late deformities, more time consuming, more wound complications improved with frequent dressing and didn't cause delay in the adjuvant therapy, more requirement for contralateral symmetrizing surgery.

Acknowledgements

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1 Asal MF, Barakat KE, Korayem IM, Fayed H, Abdelkader AA. Hydrodissection technique versus electrocautery technique in nipple-sparing mastectomy: a comparative study. Egypt J Surg 2023; 42:125–135.

2 Fourquet A, Campana F, Zafrani B, Mosseri V, Vielh P, Durand JC, *et al.* Prognostic factors of breast recurrence in the conservative management of early breast cancer: a 25-year follow-up. Int J Radiat Oncol Biol Phys 1989; 17:719–725.

3 Clough KB, Kaufman GJ, Nos C, *et al.* Improving breast cancer surgery: a classification and quadrant per quadrant atlas for oncoplastic surgery. Ann Surg Oncol 2010; 17:1375e91.

4 Siponen ET, Vaalavirta L, Joensuu H, Vironen J, Heikkilä P, Leidenius MH. Lpsilateral breast recurrence after breast conserving surgery in patients with small (≤ 2cm) breast cancer treated with modern adjuvant therapies. Eur J Surg Oncol 2011; 37:25–31. doi: 10.1016/j.ejso.2010.11.003. Epub 2010 Nov 26

5 Behm EC, Beckmann KR, Dahlstrom JE, *et al.* Surgical margins and risk of locoregional recurrence in invasive breast cancer: an analysis of 10-year data from the Breast Cancer Treatment Quality Assurance Project. Breast 2013; 22:839e44.

6 Kaufmann M, Morrow M, von Minckwitz G, *et al.* Locoregional treatment of primary breast cancer: consensus recommendations from an International Expert Panel. Cancer 2010; 116:1184e91.

7 Hennings A, Fuchs V, Sinn HP, *et al.* Do patients after reexcision due to involved or close margins have the same risk of local recurrence as those after one-step breast-conserving surgery? Ann Surg Oncol 2016; 23:1831e7.

8 Yu KD, Huang S, Zhang JX, *et al.* Association between delayed initiation of adjuvant CMF or anthracycline-based chemotherapy and survival in breast cancer: a systematic review and meta-analysis. BMC Cancer 2013; 13:240.

9 Moran MS, Schnitt SJ, Giuliano AE, *et al.* Society of Surgical Oncology-American Society for Radiation Oncology consensus guideline on margins for breast conserving surgery with whole-breast irradiation in stages I and II invasive breast cancer. Int J Radiat Oncol Biol Phys 2014; 88:553e64.

10 Niinikoski L, Leidenius MHK, Vaara P, Voynov A, Heikkilä P, Mattson J, Meretoja TJ. Resection margins and local recurrences in breast cancer: Comparison between conventional and oncoplastic breast conserving surgery. Eur J Surg Oncol 2019; 45:976–982. doi: 10.1016/j.ejso.2019.02.010. Epub 2019 Feb 11. PMID: 30795953

11 Losken A, Dugal CS, Styblo TM, Carlson GW. A meta-analysis comparing breast conservation therapy alone to the oncoplastic technique. Ann Plast Surg 2014; 72:145–149. doi: 10.1097/SAP.0b013e3182605598. PMID: 23503430

12 De La Cruz L, Blankenship SA, Chatterjee A, Geha R, Nocera N, Czerniecki BJ, *et al.* Outcomes After Oncoplastic Breast-Conserving Surgery in Breast Cancer Patients: A Systematic Literature Review. Ann Surg Oncol 2016; 23:3247–3258. doi: 10.1245/s10434-016-5313-1. Epub 2016 Jun 29. PMID: 27357177

13 Clough KB, van la Parra RFD, Thygesen HH, Levy E, Russ E, Halabi NM, *et al.* Long-term results after oncoplastic surgery for breast cancer: a 10-year follow-up. Ann Surg 2018; 268:165–171. doi: 10.1097/SLA.0000000000002255. PMID: 28448389

14 Rietjens M, Urban CA, Rey PC, Mazzarol G, Maisonneuve P, Garusi C, *et al.* Long-term oncological results of breast conservative treatment with oncoplastic surgery. Breast 2007; 16:387–395. doi: 10.1016/j.breast.2007.01.008. Epub 2007 Mar 26. PMID: 17376687

15 Crown A, Scovel LG, Rocha FG, Scott EJ, Wechter DG, Grumley JW. Oncoplastic breast conserving surgery is associated with a lower rate of surgical site complications compared to standard breast conserving surgery. Am J Surg 2019; 217:138–141. doi: 10.1016/j.amjsurg.2018.06.014. Epub 2018 Jun 19. PMID: 30049436

16 Losken A, Hart AM, Broecker JS, Styblo TM, Carlson GW. Oncoplastic breast reduction technique and outcomes: an evolution over 20 years. Plast Reconstr Surg 2017; 139:824e–833e. doi: 10.1097/PRS.0000000000003226. PMID: 28350649