

Single Incision Lateral Mammoplasty as an Oncoplastic Technique in Laterally Located Breast Cancer; a Prospective Controlled Study

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Background: More than half of breast cancer lesions occur in the outer quadrant, mostly diagnosed in early stages. Cases with late stages are usually directed to total mastectomy and/or axillary clearance. With the recent interest in oncoplastic surgeries for such cases, we introduce the single incision lateral mammoplasty (SILM) for early as well as certain late stages

Patients and methods: 20 female patients diagnosed with invasive breast cancer in the outer breast quadrant, at different stages, were recruited for single incision lateral mammoplasty (SILM). Oncological safety and aesthetic outcomes were assessed.

Results: Complete resection of the tumor was possible in all cases, with one patient having wound infection and two having seroma. Excellent or good cosmetic results were reported in 95% of cases.

Conclusion: Single incision lateral mammoplasty (SILM) is feasible for outer quadrant breast cancer lesions at different stages, especially in cases where aesthetic outcomes are of concern.

Key words: Single-incision lateral mammoplasty, oncoplastic techniques, outer quadrant breast cancer.

Introduction

For the last few decades, Breast-conserving therapy (BCT), involving wide local excision followed by radiation therapy, had become the standardized treatment for patients with invasive breast cancers.¹⁻⁴ Conventional BCT, however, produces poor cosmetic outcomes ranging between 20 to 30% of patients,⁵⁻⁷ that risk is directly proportional to the volume of the excised specimen.⁸ Oncoplastic breast surgery (OBS) combines the principles of plastic surgery approaches to oncological excision to avoid poor aesthetic results.^{9,10} OBS is now employed widely.¹¹ The majority (60 percent) of breast cancers are situated in the lateral breast quadrants, and many oncoplastic techniques were developed for laterally located breast cancers, however, most of these techniques include scars in the breast itself in proximity to the nipple-areolar complex (NAC) which significantly decrease the aesthetic outcome.^{12,13} Resection of larger tumors usually leads to the deformity and deviation of nipple-areolar complex (NAC), superiorly and laterally. This deformity is occasionally exaggerated by postoperative radiation therapy and is related to an increase in patient dissatisfaction.^{14,15} We introduce our experience with single-incision lateral mammoplasty (SILM) enabling us to prevent such deformity and provide free resection margins in laterally located tumors.

Patients and methods

Having received the approval of the ethical committee of the general surgery department, faculty of medicine, Ain Shams university, 20 patients with invasive breast carcinoma in the

lateral quadrant, were recruited for our study. Our inclusion criteria were patients with large tumor-to-breast volume ratios irrespective of the breast size (I.e., tumor breast ratio one-third to one-half) provided they were fit for anesthesia i.e., ASA I and II. In such patients, BCT was either expected to be inappropriate or when a poor cosmetic result was anticipated such that mastectomy was assumed as the only option. The recruited patient should be fit for radiotherapy. Patients with T4 breast cancer (Candidates for mastectomy regardless of the response to neoadjuvant treatment), as well as patients with prior ipsilateral breast surgeries (Poor aesthetic outcomes), were excluded. Tumors with close proximity to the nipple-areolar complex (NAC) less than one centimeter were excluded (Candidates for central quadrantectomy) as well as patients with lobular carcinoma (Usually young age, with bilateral lesions and are candidates for a total mastectomy with implant reconstruction). Informed written consent was taken from all the participants. Patient demographics and tumor characteristics were analyzed. The distance of the tumor from the nipple-areolar complex (NAC) was recorded and patients were segregated in two groups: those having the tumor less than 5 cm, more than or equals 5 cm from the NAC. Patients were discussed in the multidisciplinary team meeting. Patients assigned for preoperative chemotherapy were reassessed after completion of their treatment course and those showing complete resolution of their lesions were excluded and replaced by other patients. It is worth mentioning that preoperative radiotherapy is not a protocol in our institution except for T4b and higher lesions and cases with metastatic lesions (already excluded from the study). Cosmetic results were

assessed after completing the course of adjuvant radiotherapy (4 to 6 months postoperatively according to the course of radiotherapy) using a grading system from 1 (Excellent) to 5 (poor), evaluating five main parameters: volume symmetry, the shape of breast contour, symmetry of NAC position, ipsilateral scars and post-irradiation consequences.^{16,17} The assessment was done by three assessors (Two specialized surgeons and the patient herself). The follow-up schedule for all patients was weekly during the first month after discharge, then every three months for the first year, and every six months for the next two years. Bilateral sono-mammography was requested every year for early detection of recurrence.

Surgical procedure

Under general anesthesia, the position of the tumor was marked with a surrounding 1 cm safety margin. Then, an imaginary line was drawn along the lateral extremity of the breast beginning from the inframammary fold upwards to the outer edge of the pectoralis major muscle on which the 7-10 cm incision was deeply marked facing the tumor position (**Figures 1,2**). The operation was done in three stages.



Fig 1: Incision marking.

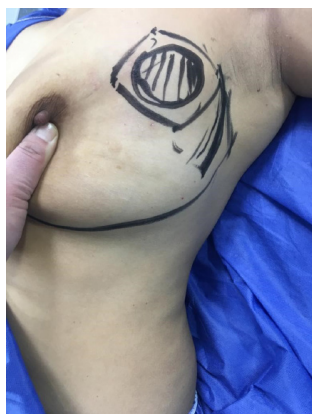


Fig 2: Tumor marking.

The first stage was tumor excision. The incision was opened and deepened down to the level of the glandular tissue. The upper breast skin flap was created, and dissection continued overlying the whole tumor and the surrounding safety margin (**Figure 3**). The tumor was then, excised down to the pectoral fascia in a wedge-shaped manner, with its base facing the areola and apex towards the lateral extremity of the breast with at least 1-cm safety margin from all directions (**Figure 4**). The tumor bed was marked by clips. The margins of the specimen were marked by threads and sent to frozen section for histopathological examination for marginal assessment (**Figure 5**). In the case of certain margin infiltration, a wider re-excision was performed. Having infiltrated margins for the third time i.e., after two frozen section positive results, was determined by surgeons to be an indication for total mastectomy and exclusion of the patient from the study.



Fig 3: Upper flap elevation.



Fig 4: Tumor excision till pectoralis major muscle.



Fig 5: The final specimen.

The second stage was axillary surgery. The lower margin of the incision was deepened down till reaching the clavi-pectoral fascia, which was exposed and opened to enter the axillary space (**Figure 6**). Sentinel lymph node biopsy or axillary dissection was done according to the preoperative decision for each patient. In case of positive sentinel lymph node biopsy, axillary dissection is performed (**Figure 7**).

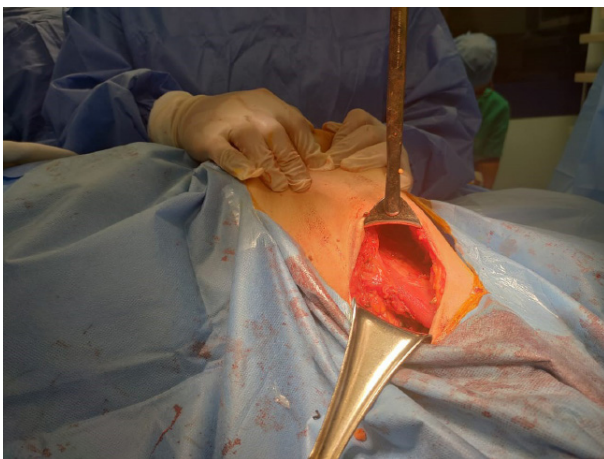


Fig 6: Entering the axilla from the same incision.

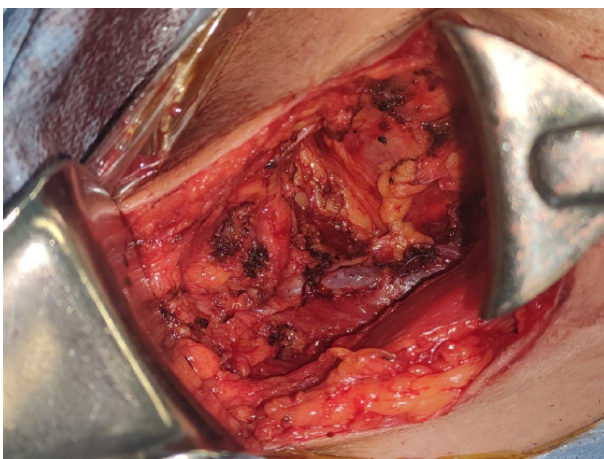


Fig 7: Complete axillary clearance.

The third stage is closure. The upper and lower dermoglandular flaps surrounding the tumor bed are freed downwards from the underlying pectoral fascia and upwards from the overlying skin flaps at a distance of 4 cm around. The dermoglandular flaps are approximated in two layers with 2/0 polyglycolic acid. The skin and subcutaneous tissue were closed as usual. Drains were not used unless axillary clearance was done (**Figure 8**). The volume of the excised specimen was measured using the formula described by Hashem et al. 18 i.e., $4\pi/3 (Abc)$, where $a = \text{length}/2$, $b = \text{height}/2$, and $c = \text{width}/2$. The average postoperative stay for those patients is 2 days. After that, patient is discharged (With the wound drain in situ, if it was applied, to be removed at the outpatient clinic according to the wound progression)



Fig 8: Final appearance.

Results

Twenty females with invasive breast cancer were subjected to tumor resection with SILM between January 2018 till January 2022. The median age of the patients was 48 (Range 27–75) years. The breast size were: cup A (4 cases), cup B (5 cases), cup C (7 cases) and cup D (4 cases). Eleven patients (55%) were postmenopausal. 14 patients were on hormonal therapy (10 postmenopausal patients as a replacement and 4 patients as a means of contraception). 17 patients had palpable tumors and three patients had impalpable breast mass and were diagnosed on routine mammographic screening and required guide wire localization of the lesion. Four (4) patients had their tumor less than 5 cm from the NAC. Two patients had microcalcifications on sonomammography and DCIS IN the preoperative histopathology. Two patients had a multifocal bilobulated-shaped breast lesion in the upper outer quadrant and their median size was 3.9 (Range 3.4–5.2 cm). Axillary surgery was done in the same session for all patients (Sentinel node biopsy for three cases was proved to be negative, and axillary dissection level I and II was completed in 17 cases). (**Tables 1,2**). The tumor classification according to

(TNM classification) was T1b in 3 patients (15%) and T1c in 4 patients (20%), T2 in 7 patients (35%) and six patients were staged T3 (30%). Two cases (10%) presented with palpable axillary lymph nodes and 18 patients (90%) had impalpable lymph nodes. On sono-mammographic assessment of patients with clinically negative axillary lesions, 14 patients (70%) had pathological lymph nodes, and 4 patients (20%) had no axillary lymph nodes abnormalities. 13 patients received neoadjuvant chemotherapy with the response was as follows: 6 patients showed tumor lesions reduced to half, with 7 patients showing no response. None of the patients in this study received radiotherapy before SILM, but they received postoperative radiotherapy according to our institutional protocols.

Two cases (10%) required re-excision to reach free surgical margin after intraoperative frozen section assessment for involved medial and lower margin respectively. None of the patients required contralateral breast symmetrization, by either reduction or mastopexy. The median follow-up period was 20 (Ranging 1–48) months; one patient (5%) developed ipsilateral recurrent breast cancer

that recurred after 32 months. The recurrence appeared in a different quadrant and was managed by mastectomy. She was 64 years old with an infiltrating duct carcinoma 42 mm in diameter and she had free surgical margins on frozen section and did not require re-excision. That patient had neither micro-calcification nor multifocal lesions on radiography. None of the patients developed a contralateral breast cancer.

One patient (5%) developed distant metastases in the vertebral column and a hepatic focal lesion, she had pathological lymph nodes at presentation and passed away from the disease. No patient has been lost to follow-up. No NAC or skin flap necrosis was observed. Three patients (15%) had early postoperative complications. One patient (5%) had a wound infection and two cases of seroma. All the patients were managed conservatively (**Table 3**). No revisional surgery was needed on an aesthetic basis. Concerning the aesthetic outcomes, excellent outcomes were recorded in 80 % of cases, 15 % were good and 5 % were fair. Poor scores were not recorded in our study.

Table 1: Demographic data of study population

Total Number of patients (N)	20
Median Age (Range)in years	48 (27-75)
Menopausal candidates	11 of 20 (55%)
Patients on hormonal therapy	14 of 20 (70%)
• Replacement	10 (50%)
• Contraceptive	4 (20%)
Patients with comorbidities	15 of 20 (75%)
Breast size	
• A	3 (15%)
• B	5 (25%)
• C	8 (40%)
• D	4 (20%)
Mean of lesion detection	
• Clinical (Palpable mass)	17 (85%)
• Radiological (Impalpable)	3 (15%)
Patient on neoadjuvant chemotherapy	13 of 20 (65%)
• Clinical response	6 (30%)
• No clinical response	7 (35%)

Table 2: Tumor data of patients

Median Tumor size (Range) in mm	25 (4-55)
Tumor distance from the NAC	
• Less than 5 cm	5 patients (25%)
• More than or equal 5 cm	15 patients (75%)
Tumor breast ratio	
• Less than third	12
• More than third	8
TNM classification(n)(%)	
• T1b	3 (15%)
• T1c	4 (20%)
• T2	7 (35%)
• T3	6 (30%)
• N0	4 (20%)
• N1	16 (80%)
• M0	20 (100%)
• M1	0 (0%)
Patients with pathological axillary lymph nodes(n)(%)	
• Positive	16 (80%)
• negative	4 (20%)
Pathological type of tumor	
• DCIS	2 (10%)
• Ductal	17 (85%)
• mucinous	1 (5%)
Axillary surgery	
• Sentinel lymph node	3 (15%)
• axillary dissection	17 (85%)
Cases with initial frozen section positive margins requiring re-excision	2 (10%)

Table 3: Postoperative complications

Complication	Number	Notes
Ipsilateral recurrence	1 (5%)	After 32 months in different quadrant
Contralateral lesions	0 (0%)	
Distant metastasis	1 (5%)	Vertebral and hepatic
NAC and skin necrosis	0 (0%)	
Wound infection	1 (5%)	Managed by antibiotics and dressing
Seroma	2 (10%)	Managed by u/s guided aspiration and wound compression

Discussion

BCT is now considered as the standard treatment for early-stages of breast cancer, without difference in the general metastasis-free survival from that of mastectomy.^{4,5} However, BCT showed an increased rate of local recurrence.⁴ As the mortality rate decreases, women became uncomfortable with the deformity after completing their therapy. Oncoplastic breast surgery (OBS) provides not only oncological safety but also the aesthetic features of breast cancer surgery. SILM developed particularly for palpable tumors in the lateral breast quadrants. For the usefulness of such a new approach, it should be oncologically safe. Margin status is a strong predictor of local recurrence.¹⁹ There was a strong statistical significance between increase in tumor size and aesthetic results.²⁰ It is worth to be mentioned that SILM is suitable for patients with large tumors where the alternatives are either mastectomy or conventional BCT with higher risk of incomplete resection; having the incision hidden in the lateral axillary fold and the reduced size of the breast parenchyma shifted laterally in an area easily hidden by the garments while excising the whole destined tumor with adequate safety margin.²⁰ In our study, six (6) patients with large locally advanced tumors (T3) were selected in that study and two of them had palpable axillary lymph nodes. All of them received neoadjuvant chemotherapy with half of the cases showing no response and two patients had initial incomplete excision by frozen section requiring re-excision; a rate comparable to those mentioned in the literature i.e., 10-57% of margins would be infiltrated in case of breast conserving surgery.¹⁹⁻²⁶ Rietjens et al.²⁷ reported a re-excision rate of 8%. Although the re-excision rate of in our study was 10%, Rietjens et al. were not concerned with the cosmetic outcome. Despite the high recurrence rate for BCS in literature,²²⁻²⁷ we had only one case developed local recurrence in the ipsilateral breast but in another quadrant. However, this point has to be validated on a larger population-based study before being extrapolated to the community. In the present study, the two patients who had microcalcification performed SILM and had no local recurrence in the course of the study. Deeper analysis of those two patients revealed that they had their microcalcification within the tumor bed. We believe that such calcification within the tumor is a kind of dystrophic calcification from central tumor necrosis. Reviewing the literature, Heaney et al. reached similar results concluding that calcification within the tumor bed is mostly benign while fine microcalcifications are suspicious especially if found within the same quadrant but separated from the tumor bed.²⁸ We believe that the importance of SILM in tumors following down staging via neoadjuvant therapy is increasing. In our study, 13 out of 20 (65%) received neoadjuvant

chemotherapy and were fit for SILM with good aesthetic score. Many evidence exists demonstrating the safety of BCT following a clinical response after neoadjuvant therapy.^{29,30} Several long-term reports are comparably in favor of neoadjuvant therapy.³¹ Many foci of residual tumor cells were discovered after pathological examination of tumors following neoadjuvant therapy.³² It would be highly beneficial to obtain wider resection margins in such cases. In our study, the mean volume of the excised specimens was 210 cc with excellent to good aesthetic outcome despite the relatively large specimen excised. The estimated mean specimen/ breast ratio was 21%. In their study, Hashem et al. recommended 14.6% as a cut-off value beyond which poor cosmetic outcome becomes more likely.¹⁸ Earlier studies suggested the cut-off value to be only 12%.⁹ This fact could be explained by the ongoing advances in oncoplastic breast surgery research as well as the difference in the ambient circumstances within the study population beside the role of preoperative patient counselling to give a good postoperative insight. The role of patient culture, social background and psychological status can't be neglected taking in account that cosmetic outcome assessment tools are subjective.¹⁸ Meticulous surgical technique in flap creation, avoiding wider and unnecessary skin undermining protects against post-irradiation sequelae and necrosis and skin viability is optimized. None of the patients in our study suffered skin flap necrosis with no impairment in the vascularity of the NAC. Postoperative wound complications are not to be neglected, taking in account the resulting delay in postoperative adjuvant therapy and poor cosmetic results besides the psychological trauma and increased costs.³³ In our study, one patient developed surgical-site infection (SSI), in the form of tender hyperemic edges during the first postoperative follow up visit i.e., 10 days after the operation. Wound swab showed staphylococcus aureus infection. The patient had uncontrolled diabetes with chronic asthmatic bronchitis for which patient was on steroids. Two patients developed seroma classified by ultrasonic examination as moderate and ultrasound-guided aspiration was done. Those patients were found to be obese i.e., BMI above 35, having preoperative breast cup size C and D. Despite being a high ratio in an operation classified as a "clean operation".³⁴ i.e., 15% (three cases out of 20 patients in the study population), similar results were reported in the literature especially in obese patients.^{35,36} Pastoriza et al., concluded that COPD, diabetes and BMI >35 were among the important predictors for SSI occurrence after breast surgery.³⁷

Conclusion

Single incision lateral mammaplasty (SILM) is an oncologically safe and simple technique in the management of breast cancer providing high-quality

cosmetic results.

Limitations

Being concerned mainly with the results of adopting SILM at our institution, the effect of different neoadjuvant chemotherapy regimens on texture of breast parenchyma, consequently the cosmetic results of breast oncoplastic surgeries is recommended to be addressed in dedicated research. Despite being against the guidelines, applying breast conservation in patients with initial T4 tumors showing good response to neoadjuvant treatment was detected sporadically in some countries.³⁸ This point has to be investigated separately in dedicated research. The rates deduced for SSI occurrence have to be examined on a wider community-based observational studies before being extrapolated on general population.

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