Latissimus dorsi mini-flap after partial mastectomy: Ain Shams University Hospitals' experience

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Background
The breast-conserving surgery followed by radiation therapy has become the preferred treatment option for patients with breast cancer, over mastectomy. It becomes challenging to have good esthetic results after excising a large or a relatively large breast volume.
Objective
To assess the feasibility and safety and to detect complications of the latissimus dorsi mini-flap technique in patients undergoing partial mastectomy in Ain Shams University Hospitals.
Patients and methods
A total of 15 female patients candidate for lateral partial mastectomy were enrolled in this study. Demographic data, mass dimensions and place, operative time, blood loss, and early postoperative complications were collected, tabulated, and analyzed using appropriate computer statistical methods.
Results
The mean age in this study was 43.2 years, and the mean operative time was 244.8 ± 13.7 min. Of 15 patients, four (26.7%) had wound infection and four (26.7%) had wound seroma; no wound complications were recorded in the 1-month follow-up visit, which was statistically significant (P=0.019). Of 15 patients, two (13.3%) had difficulty to return to the usual daily tasks and shoulder pain in the 1-month follow-up, but at the 3-month follow-up visit, none experienced difficulty to return to the usual daily tasks or shoulder pain (P=0.002).
Conclusion
The latissimus dorsi mini-flap technique is a feasible and safe procedure for the reconstruction of lateral breast defects, especially after large volume excisions, with insignificant postoperative reported complications.

Keywords:
latissimus dorsi mini-flap, partial lateral mastectomy

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Introduction

Breast cancer is the most common cancer in women all over the world, representing 18% of all reported cancer cases among women. It is a leading cause of women mortality, as it represents 23% of all women cancer-related deaths [1]. According to the National Population-Based Registry Program of Egypt 2008–2011, breast cancer is the most common cancer in Egyptian women and accounts for 32.04% of total malignancies [2].

The diagnosis of breast cancer delivers the patients into a new and unfamiliar landscape and creates variants of stressors for the patient to face [3]. These stressors are related to not only the fear of facing death but also surgery decisions, as some decisions have the potential to alter their perception of physical and sexual wholeness forever [4].

Mastectomies were the only valid management for breast cancer for more than a century, but evidence evolved in 1970s and 1980s confirming equivalent survival rates for mastectomies and breast-conserving surgeries (BCS) when the tumors are smaller than 5 cm [5].

The past decades have witnessed significant progress in breast cancer diagnosis and treatment, including better diagnostic tools, better chemotherapy, and hormonal therapy options, as well as improvement in radiotherapy protocols and techniques. All of this was owing to the increased understanding of the biology and genomics of breast cancer. This progress led to the improvement of the breast cancer survival and the decline of local recurrence rates after both mastectomy

and BCS [6]. Cumulative evidence, with follow-up periods of 20 years, had reported equivalent survival rates between mastectomies and BCS with negative margins [7]. The breast-conservation therapy includes BCS and adjuvant radiation therapy; it is now the standard of care to achieve high local control with acceptable esthetic outcomes [8].

The oncoplastic breast surgery techniques had emerged as an integrated approach to reach a balance between achieving optimal oncological outcomes, by excision of wider margins, and having acceptable esthetic outcomes [9].

Extreme oncoplastic surgery (EOS) is a special subset of the BCS, using oncoplastic techniques, to achieve the balance between safety and esthetic result [10].EOS expands the indications of the BCS to involve some selected cases of multifocal, multicentric mass, or large masses in a relatively small breast; these conditions were originally treated by mastectomies. The safety and the long-term results of these procedures are under test by researchers [11,12].

The latissimus dorsi (LD) flap was first used to reconstruct a breast after mastectomy in 1986. Later, it was used to fill the volumes created after wide tissue excisions in BCS or oncoplastic breast surgery [13]. Harvesting the entire LD musculocutaneous flap may lead to functional defects and poor esthetic outcome for the donor site. This particular point of weakness is the strength point of the latissimus dorsi min-flap (LDMF) technique, which is performed from the same incision of the BCS. The technique has been described for breast reconstruction, maintaining the muscle innervation, function, and esthetics [14,15].

Patients and methods

A total of 15 female patients, candidates for lateral partial mastectomy, were enrolled in this study.

Study type

This was a concurrent cohort, feasibility study.

Study place

The study was conducted at the Breast Surgery Department, Ain Shams University.

Study period

The study was conducted from March 2021 to October 2021.

Inclusion criteria

Women between 20 and 65 years old, with lateral quadrants masses (a multifocal, a T3 mass or a mass in small breast) accepting the extreme oncoplastic techniques and accepting immediate reconstruction using a LDMF were included.

Exclusion criteria

Patients with any contraindication to radiotherapy, patients refusing adjuvant radiotherapy, and patients with multicentric masses (involving medial quadrants) were excluded.

Study procedures

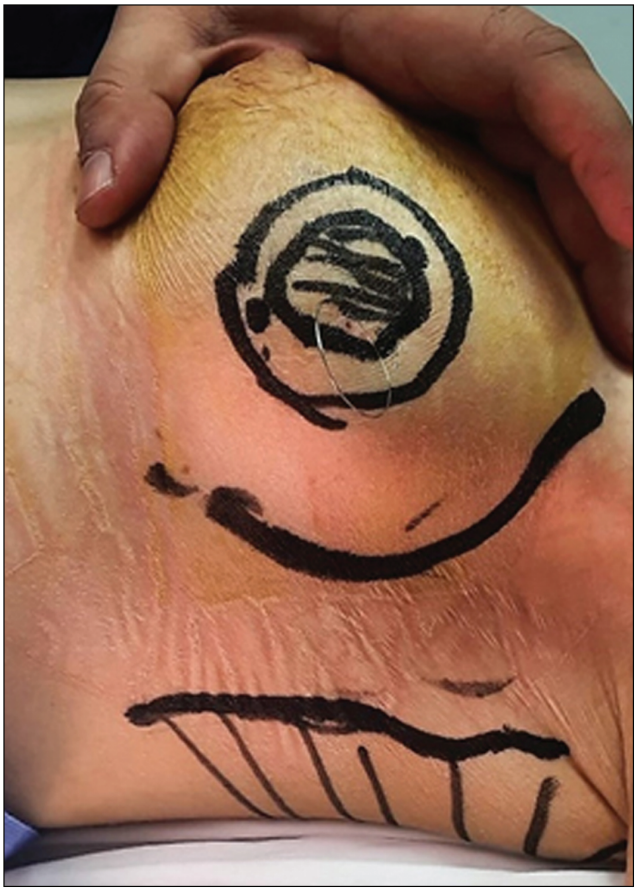
Upon approval of the procedure and signing out an informed consent, all recruited patients were subjected to full history taking, analysis of their disease along with thorough medical and family history with its relevance to the condition, and complete clinical examination, which included general and local breast examination. Ptosis was assessed and reported according to the Regnault's breast ptosis classification [16]. Preoperative investigations were performed, which included laboratory tests such as complete blood count, liver profile, kidney profile, coagulation profile, and blood sugar; radiological examination, such as bilateral digital mammography in at least two views (craniocaudal and mediolateral oblique), breast sonography, and MRI in some cases; and the metastatic workup protocol.

Tissue biopsy using ultrasound-guided core needle biopsy in all patients was performed. Core biopsy of the axillary lymph node (LN) was ordered if LNs were enlarged more than 1 cm. Multidisciplinary team of the Breast Surgery Department, Ain Shams University, reviewed every single case independently. The multidisciplinary team included a breast surgery consultant, a pathology consultant, a plastic surgery consultant, a radiology consultant, and an oncology consultant. Discussion was done for every case, including her history, examination, and investigations, until the decision was specially tailored for every case.

Surgical technique

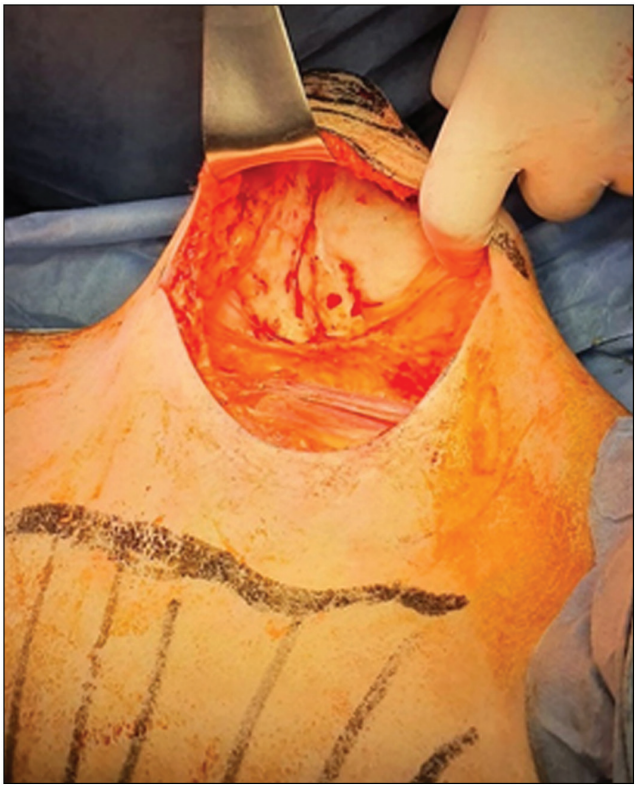
The preoperative skin markings were done immediately before the induction of anesthesia (Fig. 1). The patients were placed in the supine position. The mass was excised from a lateral incision, and then the tissue was dissected till we reached the pectoralis major muscle. The dissection of the mass started by dissection from the pectoralis fascia (deep margins) first, and then the dissection from the skin (superficial margin) was done, followed by the dissection of the superior and the inferior margins. The specimen was then marked with stiches and sent immediately for frozen section. We excised the sentinel LN biopsy or performed an axillary node dissection from the same incision (Fig. 2).

Figure 1



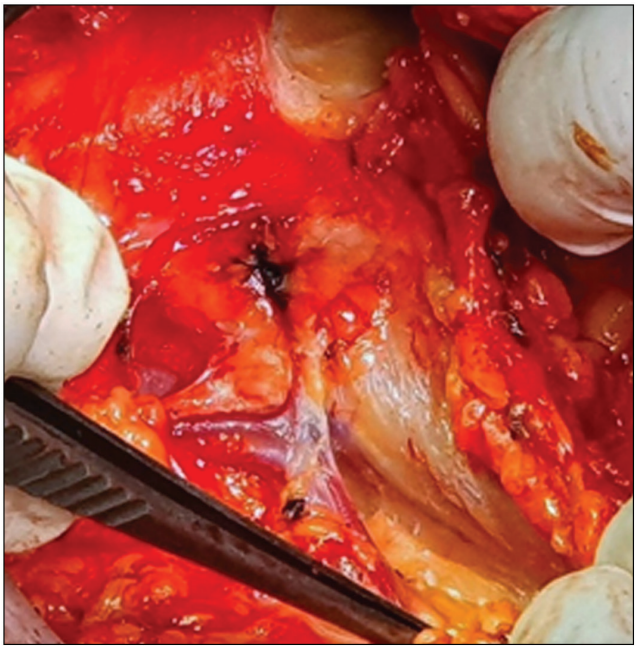
Preoperative marking.

Figure 2



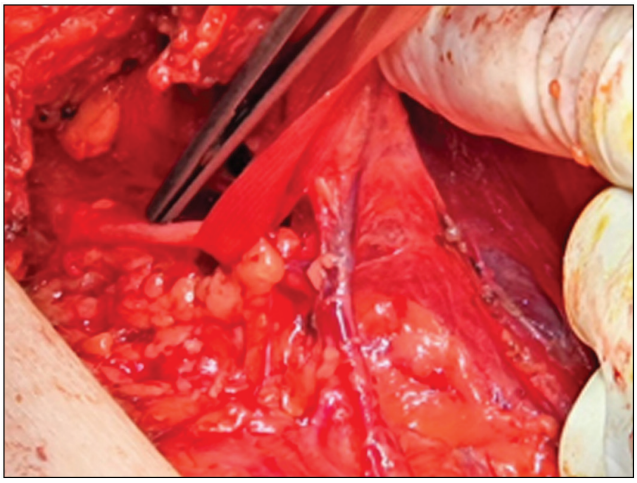
After the excision of the mass and lymph nodes.

Figure 3



The axilla after lymph node dissection.

Figure 4



Identification of the flap pedicle.

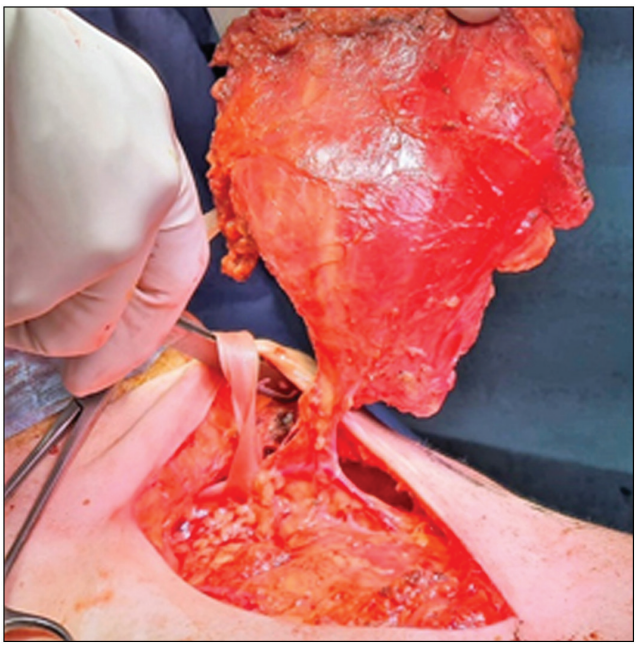
Then, the patients were positioned in the lateral position, with the back supported, and the ipsilateral arm was supported in the abduction position with flexion at the elbow joint. Both the axillary node dissection and raising of the pedicled descending branch LDMF were done from the same incision (Figs 3 and 4). The flap dissection started by dissection from the subcutaneous fat, followed by division of the muscle fibers starting inferiorly and then the medial margin, followed by the superior margin. The size of the mini-flap was designed based on the excised breast volume. The descending branch pedicle was identified, making sure the length from the bifurcation with the transverse branch to the distal mini-flap was sufficient for transfer (Fig. 5).

Sometimes, a tunnel was created through the retromammary space into the breast defect. The LDMF was then transferred to the defect without tension. Removal of moderate breast tissue around the tunnel was sometimes required in some patients for the symmetry of both breasts. Sutures were used to fix the mini-flap to the adjacent breast parenchyma and reshape the lateral breast mound (Fig. 6). Suction drains were placed in all patients.

Postoperative follow-up

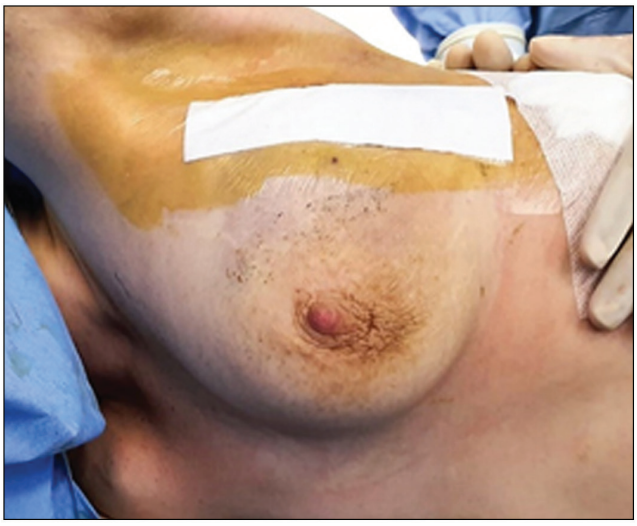
Weekly visits for a month postoperatively and then once per month for at least 3 months were done.

Figure 5



The latissimus dorsi mini-flap.

Figure 6



Immediate postoperative result.

Data to be collected

These including demographic data, mass dimensions and position, operative time, blood loss, early postoperative complications, and early esthetic results.

Statistical analysis

The collected data were recorded, tabulated, and coded, and then the data were analyzed using the statistical package for the social sciences, IBM, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean ± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

Results

The study was conducted on 15 female patients having breast cancer. Their ages ranged from 35 to 56 years, with a mean age of 43.20 ± 5.59 years. On history taking, six (40%) patients were found to be para-2 and two (13.3%) patients were found to be menopausal. Moreover, four (26.7%) patients had a positive history for receiving contraception. None of the recruited patients reported a positive past history of breast cancer, whereas two (13.3%) patients reported a positive family history for breast cancer. Regarding the associated comorbidities, there were two (13.3%) diabetic patients and four (26.7%) hypertensive patients, but there were no cardiac patients in the study group (Tables 1 and 2).

The findings of the clinical examination, such as the breast side and size, the LN status (clinical and radiological), and the presence of breast ptosis, according to Regnault classification, are presented in Table 3.

Table 1 Baseline characteristics distribution of the study group (*N*=15)

Baseline characteristics	*n* (%)
Parity	
P1	2 (13.3)
P2	6 (40.0)
P3	5 (33.3)
P4	2 (13.3)
Past history of breast cancer	
No	15 (100.0)
Yes	0
Family history of breast cancer	
No	13 (86.7)
Yes	2 (13.3)
Menopause	
No	13 (86.7)
Yes	2 (13.3)
Contraception	
No	11 (73.3)
Yes	4 (26.7)

Table 2 Comorbidities distribution in the study group (*N*=15)

Comorbidities	*n* (%)
Diabetic	
No	13 (86.7)
Yes	2 (13.3)
Hypertensive	
No	11 (73.3)
Yes	4 (26.7)
Cardiac	
No	15 (100.0)
Yes	0

Table 3 Examination data distribution among the study group (*N*=15)

Examination data	*n* (%)
Affected breast	
Left	7 (46.7)
Right	8 (53.3)
Positive ipsilateral LN clinically and radiologically	
No	4 (26.7)
Yes	11 (73.3)
Radiologic only detected LN	
No	13 (86.7)
Yes	2 (13.3)
Affected LN clinically or radiologically	
No	2 (13.3)
Yes	13 (86.7)
Fixed ipsilateral LN	
No	15 (100.0)
Yes	0
Contralateral LN	
Negative	15 (100.0)
Positive	0
Affected quadrant	
Lower lateral	5 (33.3)
Upper lateral	10 (66.7)
Size of breast	
Cup B	6 (40.0)
Cup C	7 (46.7)
Cup D	2 (13.3)
Breast ptosis	
G1	6 (40.0)
G2	7 (46.7)
G3	2 (13.3)

LN, lymph node.

The mean tumor size was 5.07 ± 1.86 cm. The most common pathological type present among the recruited patients was the invasive ductal carcinoma, which was present in 10 (66.7%) patients, and the most frequent molecular classification present was the luminal A tumors, which were present in six (40%) patients.

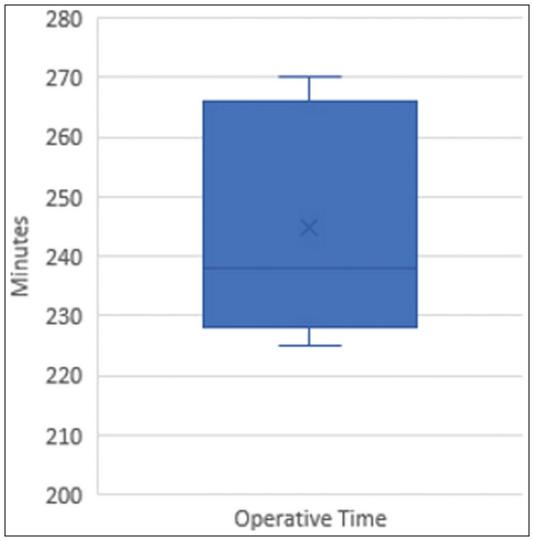
Regarding tumor grading, 11 (73.3%) patients had low-grade tumors, whereas four (26.7%) patients had intermediate-grade tumors, and none had high-grade tumors in the study group (Table 4).

Table 4 Pathology distribution among the study group (*N*=15)

Pathology	*n* (%)
Lesion size	
Range	3.46–8.37
Mean±SD	5.07 ± 1.86
Tumor molecular classification	
Luminal A	6 (40.0)
Luminal B	5 (33.3)
Triple negative cancer breast	2 (13.3)
Her 2 neo	2 (13.3)
Pathology	
IDC	10 (66.7)
ILC	5 (33.3)
Low grade	
No	4 (26.7)
Yes	11 (73.3)
Intermediate grade	
No	11 (73.3)
Yes	4 (26.7)
High grade	
No	15 (100.0)
Yes	0

IDC, invasive duct carcinoma; ILC, Invasive lobular carcinoma.

Figure 7

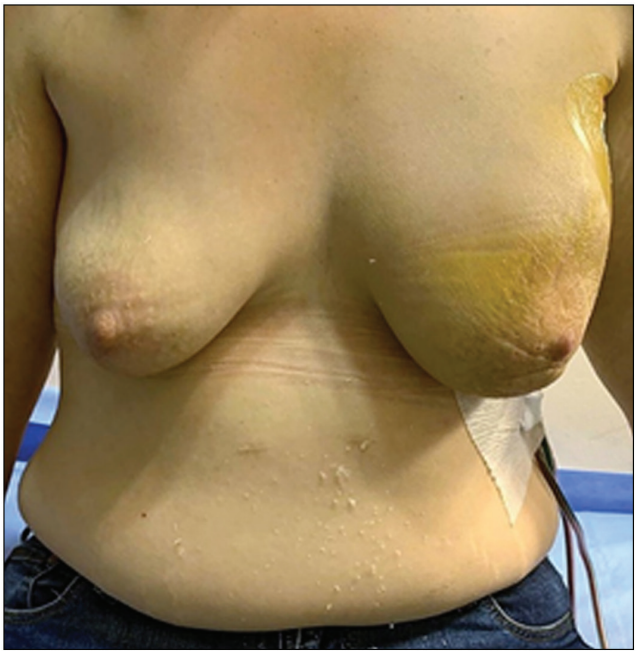


Operative time.

A wire was needed only in two (13.3%) patients to localize the mass. The mean intraoperative blood loss was 300.67 ± 32.83 ml, and it ranged from 250 to 350 ml. Suction drains were inserted in all the patient by the end of the surgery. None of the patients had positive resection margins or needed re-excision after the frozen section. Operative time is plotted in Fig. 7. The hospital stays ranged from 1 to 3 days, with a mean of 1.67 ± 0.72 days.

In the follow-up visit of the first week, no cases of hematoma formation or wound dehiscence were recorded, but four (26.7%) patients out of the

Figure 8



Week-1 follow-up visit; the patient had seroma.

15 experienced wound infection. They were managed by antibiotics, and no interventions were needed. Moreover, seroma appeared in four (26.7%) patients, which was treated by multiple aspirations for 3 weeks (Fig. 8). On the contrary, at the 1-month follow-up visit, no complications were recorded in any of the patients; this change was statistically significant, with P=0.019 by a McNemar test.

The difficulty to return to the usual daily tasks and shoulder pain were reported by two (13.3%) patients up to the 1-month follow-up visit, but at the 3-month follow-up visit, none of the patients reported this difficulty or shoulder pain. These clinical improvements were statistically significant, with P=0.002 by a χ^2 test.

Discussion

In 1990, Noguchi *et al.* [17] published their work on breast reconstruction after mastectomy and concluded that the immediate transposition of a LD muscle flap is useful in preventing breast deformities arising from quadrantectomy. The technique developed with time. The LDMF offers the use of the volume of the LD muscle with no back scar, but owing to the limited pedicle length, it is perfectly suitable for lateral breast defects [18].

In this study, we reconstructed the defects resulting from excision of tumors located in the lateral breast areas, the upper-outer quadrant, and the lower-outer quadrant, using LDMFs immediately in the same operative session, and from the same incision of the mass excision.

The mean age of the recruited patients in this study was 43.2 years old, a figure similar to that reported by studies performed using the same procedure [19–21]. Diabetes mellitus is considered to be one of the risk factors in oncoplastic breast surgeries [22]. It was present in two (13.3%) patients.

In this study, the cup sizes B and C were present in 86.7% of the recruited patients, whereas the cup D size was present in only 13.3% of the patients. In their study, Zhou *et al.* [21] reported similar percentages for breast sizes.

Some studies reported a mean tumor size of 2.87 cm [18] and others reported a mean size of 2.42 cm [19]. However, in this study, the mean tumor size was larger, as it was 5.07 ± 1.86 cm. This happened because most of the recruited patients were undergoing EOS for their masses.

In this study, all patients underwent immediate reconstruction using a LDMF, unlike a study that involved 30 patients, where 25 of them underwent a delayed, second-stage reconstruction using the LDMF after 5–10 days of their partial mastectomy [23].

The operative time in this study ranged from 225 to 270 min, with a mean of 244.8 ± 13.7 min. This was longer than the operative time reported by Ibraheem *et al.* [20], as they reported a mean operative time of 176.6 min. This longer time in this study may be attributed to the fact that we are still building our own learning curve with this technique.

The hospital stays during this study ranged from 1 to 3 days, with a mean of 1.67 ± 0.72 days. This was shorter than the mean hospital stays reported by both Elnahas *et al.* [19] and Ibraheem *et al.* [20].

There were no reported cases of hematomas or wound dehiscence in this study, unlike what was reported in a study that involved 30 patients who underwent LDMF after partial mastectomy, where four (13.3%) patients experienced wound gaping and were successfully managed conservatively [19].

Seroma formation occurred in four (26.7%) patients only. This was half the percentage when compared with a similar study done on 30 patients, who reported seroma formation in 53.3% of the patients, which required weekly aspiration for 4 weeks [19]. On the contrary, a study reported seroma formation in 21 (84%) of 25 patients, which required aspiration up to a maximum of five times [23]. This may be attributed to the fact that in that study the authors reoperated patients

who had clear histological margins after 5–10 days to perform the LDMF [23].In a study held from 2015 to 2017 that involved 60 patients with early breast cancer, where 32 patients were assigned for reconstruction with the LDMF, there were no significant differences in the strength and range of motion of the shoulder joint and in the disabilities of the arm, shoulder, and hand questionnaire between the two groups in the 1-year-follow-up after surgery [21]. These results go hand in hand with what we have reported in this study, as no patients in this study described shoulder pain or difficulty to return to their usual routine at the 3-month follow-up visit. However, the work of Duymaz *et al.* [24] disagreed with these results; in their study, they have concluded that the LDMF for reconstruction after partial mastectomy and axillary LN dissection had a negative effect on shoulder functions.

The overall follow-up period in this study was at least 3 months, with a range of 3–7 months. This was relatively a short period, especially when compared with studies with a mean follow-up period of 56 months [25].

Strengths

The strengths of the current study were that every effort was made to ascertain that all follow-up data were correct, and only complete information was included in data analysis. All clinical assessment, surgical interventions, and assessment of study outcomes were done by the same team.

Limitations

The limitations of the current study were due to the COVID-19 pandemic and the relatively small sample size and short follow-up period.

Conclusion

The LDMF technique is a feasible and safe procedure for the reconstruction of lateral breast defects, especially after large volume excisions, with insignificant postoperative reported complications.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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