Assessment of the lipodermal flap for avoidance of lateral dog-ear deformity in mastectomy

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Background
Patients who are at an elevated risk of developing lateral dog ears deformity following mastectomy, such as those who have high body mass index, or who have too much tissue in the lateral chest wall, and who are not ideal candidates for immediate reconstruction or the Goldilocks mastectomy, should have a lateral dog-ear assessment and should consider the lipodermal flap technique. The purpose of this study was to explain a modification to the mastectomy incision known as the lipodermal flap procedure that avoids this deformity and improve patient satisfaction and quality of life.
Methods
This study included 50 female breast cancer patients who were recommended for a modified radical mastectomy (MRM); they had large cup-size breasts and were expected to develop a dog-ear deformity after the mastectomy.
Results
The type of mastectomy was MRM in 48 patients, and palliative toilet mastectomy in only two patients. The operative time median is about 1.5 h (1.5–1.5), the wound length median is about 20 cm (19–20), and the blood loss median is about 200cc (180–220). Scar discomfort: 45 patients (90%) did not experience scar discomfort, and five patients (10%) felt scar discomfort. Regarding wound dehiscence, 46 patients had no wound dehiscence and four patients (8%) had wound dehiscence and 48 patients (96%) had no flap necrosis and 2 patients (4%) had flap necrosis. Cosmetic result: 4 patients (8%) with wound cosmesis were not accepted and 46 (92%) patients were accepted; 46 (92%) patients were satisfied; 100% of the cases had no dog ear in the lateral part of the mastectomy scar.
Conclusions
The lipodermal flap technique is safe, feasible, and reliable and could be applied during MRM once lateral dog-ear deformity is anticipated with a high satisfaction rate and lower incidence of wound complication.

Keywords:
lateral dog-ear deformity, lipodermal flap, mastectomy

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Introduction

Because the majority of Egyptian women are overweight and have breasts that range in size from C to D cup size, a mastectomy surgery in such ladies is usually accompanied by a high rate of dog-ear deformity [1]. As a consequence, when a mastectomy is performed on an obese or overweight patient with a much more lateral fatty chest wall, there is an increased risk of bulging excess tissue lateral to a mastectomy scar, resulting in the so-called dog ear [2]. The lateral apex of the incision is pushed medially to closure in a 'Y fashion' utilizing the fish-tail technique, which is a common surgical option to improve lateral dog-ear complaints [3].

This approach may generate tension at the wound's Y-junction, increasing the chance of complications such as necrosis and wound breakdown [4]. Wound care may be challenging, especially in high-risk patients with multiple comorbidities and a high BMI [5], despite the fact that the incidence of mastectomy wound complications without reconstruction is typically low, with reported rates ranging from 1 to 4% [4].

Furthermore, issues risk delaying the start of adjuvant treatment and, when healing is complete, may lead to functional and aesthetic problems, as well as psychological morbidity. We introduce the lipodermal flap approach to mastectomy to avoid lateral dog-ear deformity and maintain a tension-free wound closure [4].

This work aimed to describe the lipodermal flap technique in mastectomy incision as a modification of the mastectomy incision to avoid lateral dog ears.

Patients and methods

This study involved 50 female patients with breast cancer, who were admitted to the surgical oncology unit at Alexandria Main University Hospital from December 2021 to December 2022. These patients were indicated for modified radical mastectomy (MRM) using the lipodermal flap technique due to their large breast cup size and propensity for lateral dog ears.

The study was carried out following clearance from the Surgical Oncology Unit's Ethics Committee at Alexandria Main University Hospital. All patients provided written, fully informed consent.

Exclusion criteria were patients eligible for BCS and patients with locally advanced breast cancer who need skin flaps for skin coverage as well as those with laterally located cancers invading the overlying skin at the typical site of the lipodermal flap.

All patients were subjected to: history and personal data, clinical examination [body mass index, general examination, and local breast examination (inspection and palpation)] and investigations [Radiological investigations (bilateral mammosonography for both breasts and/orMRI if indicated and metastatic work (computed tomography (CT) chest, and pelvis with IV contrast or PET-CT if indicated) and biopsy (US-guided core needle biopsy from breast mass and fine needle aspiration cytology (FNAC) from axilla lymph node)].

Management

All patients underwent the lipodermal flap technique for the avoidance of dog-ear formation during MRM. And this technique assessed for the following: Absence or presence of dog ear, the relation between the technique and the following (pain and/or discomfort, length of the wound, wound dehiscence, time cost, and patient satisfaction).

To measure the success of the surgery, a variety of subjective and objective criteria were used:

Subjective criteria using questionnaires to all patients about the appearance (in the mirror dressed—satisfaction, feeling normal in clothes—satisfaction, and appearance in mirror undressed—satisfaction). Patients were asked about these points and given a score from 1 to 5, from very unsatisfied to very satisfied.

Objective criteria included the shape and length of the scar, the persistence of dog ear, and the incidence of postoperative complications. The overall satisfaction was determined.

Operational strategy

Steps of the technique: (Fig. 1).

Sterilization, prophylactic use of antibiotics, and drawing

Markings are made on the table with the arm abducted at not more than 90° angle. To avoid stretch injury of brachial plexus, the standard mastectomy elliptical incision is used based on the location of the tumor, size of the tumor, size of the breast, and skin laxity. The ellipse extends medially from the parasternal line to join the deepithelized lipodermal flap laterally. The midaxillary line is drawn laterally between the superior and inferior borders of the traditional elliptical mastectomy incision. The length of this midaxillary line depends on the amount of excess tissue laterally. An equilateral triangle will be drawn based on this line. A square extension is drawn from the middle of each triangle's medial side. The lipodermal flap is formed by this square extension.

The preparation of lipodermal flap and incision design

The incision pattern is done to the dermis alone along the markings, retaining the midaxillary line marking (ie, the base of the equilateral triangle). The lipodermal flap component is then deepithelialized to its borders.

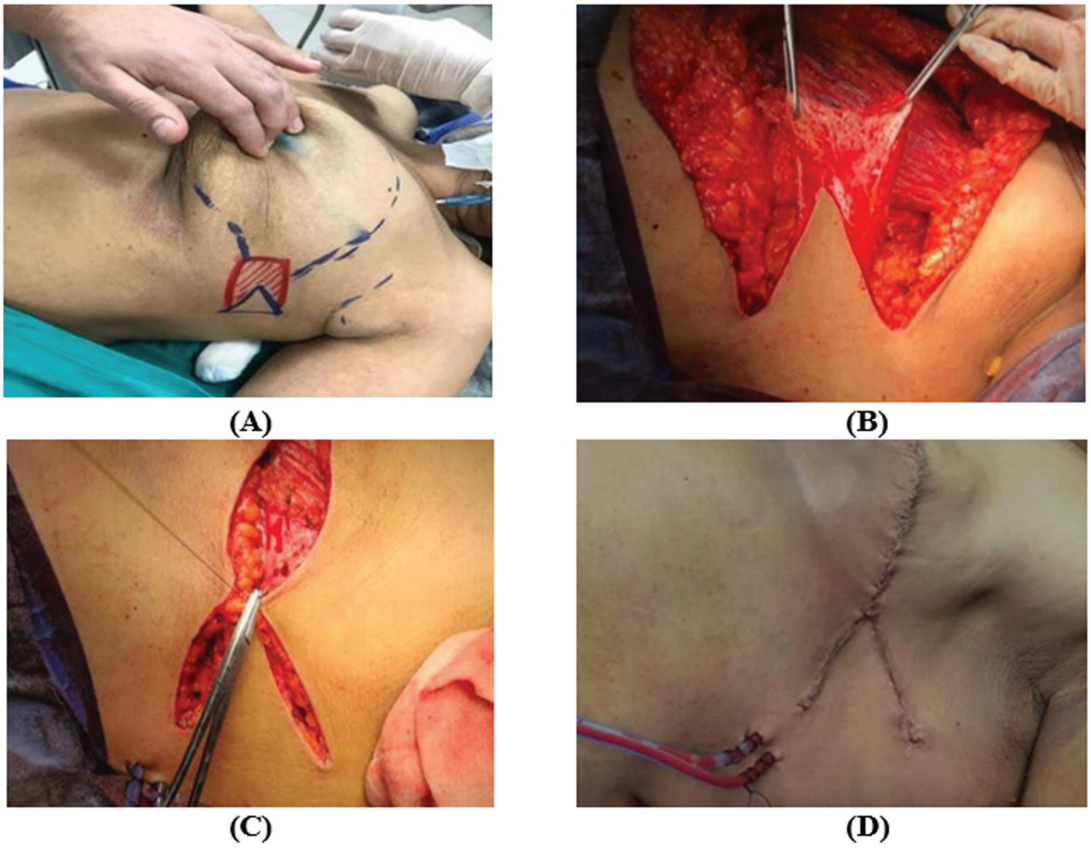
Performing the mastectomy

The routine mastectomy is complete. The superior flap is elevated just superficial to the anterior mammary fascia up to the clavicle, then the lower flap is dissected in the same avascular plane down to the level of the rectus sheath and external oblique aponeurosis in the anatomical mastectomy plane (diathermy or tumescent dissection technique may be used depending on surgeon preference). The lipodermal flap is incised and deepened to the anatomical mastectomy plane, then dissected from the mastectomy specimen until the level of the latissimus dorsi muscle is reached, followed by removal of whole breast tissue including fascia overlying the pectoralis major muscle.

Lipodermal flap attachment to the pectoralis

The lipodermal flap will be lifted medially till the appropriate position of the flap is achieved (by the degree of desired flattening of the chest wall); the

Figure 1



(a) Marking of the incision, (b) Lipodermal after dissection and deepithelization, (c) closure of the incision, (d) final result with no dog ear.

lipodermal flap is connected to the pectoralis major with 3–4 absorbable sutures. These sutures secure the medialized flap and decrease skin tension at the apex of the wound and support this weak point even if dehiscence occurs.

Wound suturing

A drain is implanted depending on the size of the mastectomy. After deep dermal and subcuticular closure with absorbable sutures, the lipodermal flap is buried beneath the superior and inferior mastectomy flaps. Dressings are employed.

Statistical analysis

To conduct the statistical study, SPSS v26, IBM Inc., Chicago, Illinois, USA, was used. Histograms and the Shapiro–Wilks test were used to assess the normality of data distribution. Mean and standard deviation (SD) were used to display quantitative parametric data. Interquartile range (IQR) and the median were used to show quantitative nonparametric data. Frequency and percentages (%) were used to illustrate qualitative characteristics.

Results

Regarding age, 23 patients were aged less than or equal to 50 years (46%) and 27 patients were aged more than 50 years (54%). Sex distribution revealed that all patients were females (100%). Regarding history, 46% (23 patients) were with free past medical history, 54% (27 patients) were with a positive history of comorbidities like diabetes mellitus and hypertension; 41 pateints (82%) had a negative family history of breast cancer, and 9 patients (18%) with a positive family history of breast cancer. TCNB was invasive ductal carcinoma in 42 patients (84%), in 8 patients (16%) biopsy showed invasive lobular carcinoma. Regarding BMI with mean±SD= 31.38 ±2.55, 43 patients were obese class 1 and 7 patients were obese class II. Regarding cup size, nine patients (18%) had breast cup size C and 41 patients (82%) had breast cup size D. Regarding axilla status, 43 patients had positive axillary lymph nodes confirmed by fine needle cytology or clinically and radiologically positive nodes and so all of them underwent complete axillary dissection and the remaining seven patients underwent sentinel LN biopsy using the blue dye technique; five of

them were negative and only two patients had positive LN and so completion was done. Regarding hormonal status considering immune histochemistry for the patients, 48 patients were luminal A and two patients were triple negative. Staging of the tumor was done, and one patient (2%) was stage I, 22 patients (44%) were at Stage II, 25 patients (50%) were at Stage III, and two patients (4%) were at Stage VI. (Table 1).

As regards neoadjuvant treatment, only 13 patients received chemotherapy preoperatively because of immunological subtyping (2 cases being triple negative), fixed axillary LN (6 patients), or inflammatory breast cancer (5 patients).

Regarding the type of mastectomy, 48 patients (96%) underwent MRM, and only two patients (4%) underwent palliative toilet mastectomy. Regarding operative time median is about 1.5 h (1.5–1.5), the wound length median is about 20 cm (19–20), and the blood loss median is about 200 cc (180–220). (Table 2).

Regarding scar discomfort, 45 patients (90%) did not experience scar discomfort, and five patients (10%) felt scar discomfort; about wound dehiscence, only four patients (8%) had partial wound dehiscence and only two patients (4%) had partial flap necrosis. All of them were diabetic and improved by frequent dressing. Regarding cosmetic results, four patients (8%) with wound cosmesis were not accepted due to crumbled scars, and 46 patients (92%) were accepted. Regarding patient satisfaction, four patients (8%) were not satisfied with the scar, and 46 patients (92%) were satisfied. (Table 3, Fig. 2).

Table 1 Preoperative data (*n*=50)

	Number (%)
Age (years)	
≤50	23 (46.0)
>50	27 (54.0)
52.02±8.62	
History	
History	27 (54.0)
Family history	9 (18.0)
TCNB	
IDC	42 (84.0)
ILC	8 (16.0)
BMI (kg/m^2)	
Underweight $_{(<18.5)}$	0
Normal (18.5–24.9)	0
Obese class I (30 $-_{34.9)}$	43 (86.0)
Obese class II (35 $-_{39.9)}$	7 (14.0)
(31.38±2.55)	
Cup size	
Cup C	9 (18.0)
Cup D	41 (82.0)
Axilla status	
Negative	7 (14.0)
Positive	43 (86.0)
Hormonal status	
ER+ PR+ HER2-	48 (96.0)
ER- PR- HER2-	2 (4.0)
Staging	
1	1 (2.0)
2a	6 (12.0)
2b	16 (32.0)
3a	16 (32.0)
3b	9 (18.0)
4	
I	1 (2.0)
II	22 (44.0)
III	25 (50.0)
IV	2 (4.0)
PET scan + bone scan	
Not done	41 (82.0)
Done	9 (18.0)

Data presented as mean±SD or frequency (%). TCNB: tru-cut needle biopsy. IDC: invasive ductal carcinoma, ILC: invasive lobular carcinoma. BMI: body mass index.

Discussion

Patients who are expected to have a lateral dog-ear deformity following mastectomy, such as those who

Table 2 Operative data (*n*=50)

	Number (%)
Type of mastectomy	
MRM	48 (96.0)
Toilet mastectomy	2 (4.0)
Operative time	1.46±0.14
Wound length	19.72±1.18
Blood loss	202.8±20.8

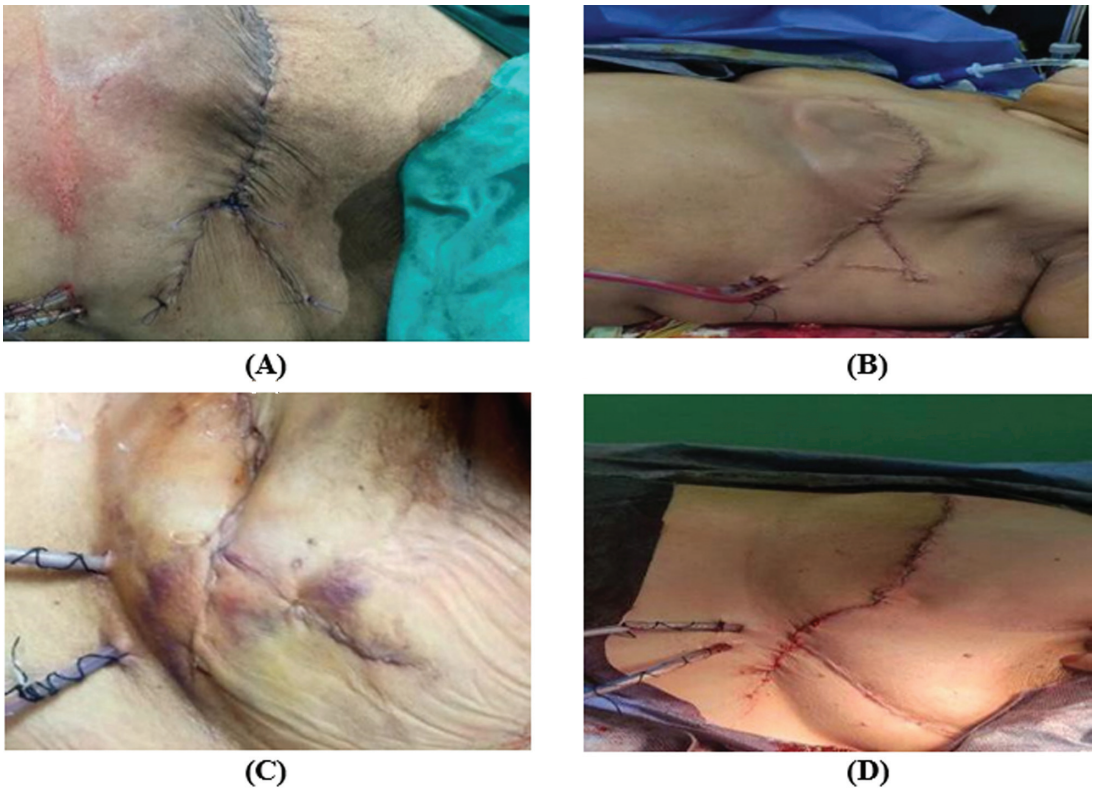
Data presented as frequency (%) or mean±SD. MRM, modified radical mastectomy.

Table 3 Postoperative data (*n*=50)

	Number (%)
Scar discomfort	
Yes	5 (10.0)
Wound dehiscence	
Yes	4 (8.0)
Partial flap necrosis	
Yes	2 (4.0)
Seroma	
Yes	20 (40.0)
Cosmetic result	
Not accepted	4 (8.0)
Accepted	46 (92.0)
Patient satisfaction	
Not satisfied	4 (8.0)
Satisfied	46 (92.0)

Data presented as frequency (%).

Figure 2



(a): Another diabetic, old age, large breast cup size D case with the lipodermal flap technique, (b): another case with breast cup size C, (c): 50-year-old patient with complicated MRM by seroma and skin discoloration, (d): another case with breast cup size D with satisfactory scar shape.

have high body mass index, or who have excess tissue bulging in the lateral chest wall, and who are suitable for immediate reconstruction or the Goldilocks mastectomy, should have a lateral dog-ear assessment and should consider the lipodermal flap technique Meybodi and colleagues [6].

In our study, the mean age was 52.02±8.62 years; 23 patients were aged less than or equal to 50 years (46%); and 27 patients were aged more than 50 years (54%). Sex distribution revealed that all patients were females (100%). The mean BMI±SD was (31.38±2.55); 43 patients were obese class I and seven patients were obese class II. In harmony with our results, Ismail [7]. included 60 female patients over the age of 20 years, who were undergoing MRM and they found that the age ranged from 29 to 70 years with a mean age of 46.53±11.77. In addition, Samy and colleagues [8] found that the age ranged from 40.0 to 70.0 years, and the BMI ranged from 35.20 to 41.80.

In the current study, according to cup size, nine patients (18%) had breast cup size C and 41 patients (82%) had breast cup size D. The arbitrary parameters used to characterize obesity, such as weight, kg over optimal body weight, % over ideal body weight, BMI, and body surface area, may be blamed for the inconsistent link that has always existed between obesity and comorbidities. There is no correlation between BMI and a higher frequency of problems, according to Cunningham and colleagues [9]. This result contrasted with that of Setala and colleagues [10], who reported a considerable rise in the total complication rate (52%), with skin necrosis or wound dehiscence (18%) and delayed healing with superficial infection (26%) being the most frequent complications. An increase of greater than5% in obese patients was observed by Zubowski and colleagues [11]. This was in line with the findings of Khalil and colleagues [12], which demonstrated to be statistically significant. Samy and colleagues [8] observed that 60.0% of patients had cup C, and 40% had cup D in groups I and III; 50.0% of patients had cup C; and 50% had cup D in group II.

Our findings showed that staging of the tumor was done and one patient (2%) was of Stage I, 22 patients (44%%) were of Stage II, 25 patients (50%) were of Stage III, and two patients (4%) of Stage VI. This came in harmony with the Ismail [7] study findings.

According to the operative time the median is about 1.5 h (1.5-1.5), wound length median is about 20cm (19–20), and the blood loss median is about 200cc (180–220), which is Similar to the Rizvi and colleagues [13] study. According to scar discomfort, 45 patients (90%) did not experience scar discomfort, and five patients (10%) felt scar discomfort; regarding wound dehiscence 46 patients (92%) had no wound dehiscence and 4 patients (8%) had wound dehiscence and 48 patients (96%) had no flap necrosis and 2 patients (4%) had flap necrosis.

According to a prior study, seroma development was the most typical consequence seen in our patients. Due to variations in definitions and drain installation practices, seroma incidence in the documented literature shows a broad range Chin and colleagues [14]. Even while most individuals only experience little fluid accumulation, this phenomenon is only noticeable when there is a considerable volume of fluid present. Furthermore, only a few patients develop obvious or symptomatic fluid aggregation enough to be aspirated Thomsen and colleagues, Klifto and colleagues [15,16]. In the Samy and colleagues [8] research, the incidence of wound dehiscence occurred in two instances (10%) in the fish-tail group, one case (5%) in the teardrop group, none in the modified suturing group, and all of them on top of infection. According to the Szynglarewicz and colleagues [17] investigation, two elderly individuals had marginal skin flap necrosis. There was no evidence of axillary triangle boundary necrosis. One diabetes mellitus woman experienced a distinct apical necrosis. Vilar-Compte and colleagues [18], on the other hand, reported that wound dehiscence occurred in 10.8% of patients, with infection occurring in 4.8% of those instances. Besides, they noted that in 23.9% of instances, flap necrosis occurred in addition to infection in half of the cases. In 25.6% of patients, seroma was detected. When compared with the Vilar-Compte and colleagues study [18], our control case study demonstrates that adding our three procedures did not raise the incidence of various problems, demonstrating the safety and applicability of our techniques.

According to Choi and Oh [19], a dog-ear skin flap can be a promising alternate donor site for reconstruction if a patient has postmastectomy skin flap necrosis and a dog-ear deformity on both sides of the flank following a DIEP flap.

In accordance with the aesthetic results, patient satisfaction was distributed as follows: 46 patients (92%) were pleased, whereas four patients (8%) were dissatisfied with the scar. In 100% of the cases, there was no dog ear in the lateral region of the mastectomy scar.

According to studies, M-plasty can be used to decrease dog ears on the face. M-plasty is usuallyperformed before or after excision by adding a free-drawn 'M' to the end or ends of an ellipse. There are various advantages to incorporating the lipodermal flap into the M-plasty that improves wound healing and closure. In the modified M-plasty, keeping the lipodermal flap at the triangle's tip promotes collateral perfusion and reduces ischemia there. Furthermore, by using the lipodermal flap as a 'bucket-handle,' less stress is applied to the skin above when contacting tissues. The lipodermal flap distributes the tension from the incision over a larger area. The lipodermal flap can thus be used to flatten the lateral chest wall and the overlying skin flaps, possibly with reduced wound complication and protected viability [20].

Meybodi and colleagues [6] reported that including a lipodermal flap flattens the lateral form of the chest wall and allows for a tension-free closure, which is similar to what we discovered.

The Goldilocks principle is well-known, and this concept applies to any mastectomy flap that may include a little amount of breast tissue buried in a deeper plane. The labeling of the lipodermal flap component may become more consistent in the future. This may be accomplished by comparing the lengths of the equilateral triangle to proportional measurements based on patient factors such as breast cup size and BMI Becker and colleagues [21].

Limitations: A one-center research with a modest sample size.

Conclusions

The lipodermal flap technique is safe, feasible, and reliable and could be applied during MRM once lateral dog-ear deformity is anticipated with a high satisfaction rate and lower incidence of wound complication.

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Conflicts of interest

No conflict of interest.

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