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The Versatility of the Lateral-based Mammary Flap as an "Auto-implant" for Enhancing Breast Mound for Patients Undergoing Primary Mastopexy

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Background: The demand for augmentation-mastopexy surgery without using implants has significantly increased over the years. Fat transfer offers an alternative method, but some patients do not favor this procedure either. The purpose of this study was to evaluate the versatility of using a lateral-based mammary flap as an "auto-implant" for enhancing the breast mound for patients undergoing primary mastopexy.

Method: This retrospective study was performed between February 2016 and April 2019, including 36 female patients (72 breasts). Our technique involves using the inferior breast tissue by elevating the lateral-based dermoglandular flap that was moved cranially with a 90 degree rotation in a conical shape within the created pocket to refill the superior and central mound.

Result: The mean nipple projection was 11.2 after 36 months postoperative compared with 5.2 before surgery. The mean ± SD of pre- and postoperative measurements for the lower pole zone were 80.2±10.5 and 50.1±6.4, and those for the upper pole zone were 40.3±9.5 and 63.9±6.5, respectively. The distance of breast mound elevation after the surgical procedure ranged from 5.30 to 9.55 cm, with a mean of 7.90 cm.

Conclusions: The lateral-based mammary flap acts like an implant that helps shape and augment the breast, enhances the mammary projection, and restores the breast contour without requiring a synthetic implant or fat grafting. It is a reliable technique with high patient satisfaction but is unsuitable for patients with insufficient breast volume. *(Plast Reconstr Surg Glob Open 2023; 11:e5006; doi: 10.1097/GOX.0000000000005006; Published online 11 October 2023.)*

INTRODUCTION

The breast profile distorts severely after significant weight loss, multiple pregnancies, lactation, or as a part of the aging process.[1] The changes manifest as upper pole deficiency, loose skin, high-grade ptosis, and loss of the breast contour.[2,3] The goal of corrective procedures is to construct an aesthetically pleasing breast.[4] Breast surgery without synthetic prostheses is gaining popularity because it can help avoid foreign body reactions and related long-term complications.[5,6] As a result, multiple techniques, including parenchymal redistribution, have been proposed to help achieve favorable outcomes without using synthetic materials.[7,8] The challenges include correcting sagging, enhancing projection, and simultaneously restoring breast contour.[9,10] We believe that ideal technique should help achieve the same effect afforded by an implant in patients who refuse a prosthesis or fat grafting with mastopexy. The glandular rearrangement can be an optimal solution for women with adequate mammary volume. The purpose of this study was to evaluate the versatility of using a lateral-based mammary flap as an "auto-implant" and its effect on enhancing the breast mounds in patients undergoing primary mastopexy.

PATIENTS AND METHODS

This retrospective study was conducted between February 2016 and April 2019. The study included 36 women (72 breasts) aged 25–39 years. This study was conducted

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after receiving institutional review board approval and follows the principles of the Declaration of Helsinki. Informed consent was obtained from all patients for imaging, surgical procedures, and participation in the study.

We enrolled women who presented with volume loss in the upper pole; deficient mammary projection with a variable degree of breast ptosis; and desire for lifting, upper pole fullness, and enhanced projection without synthetic implants or fat transfer. The participants were preoperatively evaluated for skin envelope, parenchyma, nipple position, inframammary line level, and breast boundaries. Examination of the glandular component of the breast was performed using the skin pinch test to assess the ptotic glandular tissues within the lower breast quadrant, which is the main tissue for flap harvesting.

The inclusion criteria were patients who presented with sufficient breast volume (medium- or large-sized) who were suitable candidates for the procedure. The exclusion criteria included patients with small-sized breasts, body mass index greater than 30 kg per square meter, and significant comorbidities.

Takeaways

Question: What is the versatility of the lateral-based mammary flap in primary mastopexy?

Findings: The technique helps transfer the ptotic tissue from the inferior pole of the abundance zone to the hollowing upper zone. The distance of breast mound elevation after the surgical procedure ranged from 5.30 to 9.55 cm, with a mean value of 7.90 cm.

Meaning: The lateral-based mammary flap acts like an implant that helps shape and augment the breast, enhances the mammary projection, and restores the breast contour without requiring a synthetic implant or fat grafting.

Preoperative Marking

Preoperative marking and measurements, including the nipple to the suprasternal notch (SN-N), nipple to inframammary fold (N-IMF), nipple to the midline, inter-nipple distance, and nipple projection (NP), were performed in both upright standing and supine positions. We used the standard Wise "keyhole" pattern (inverted-T) for all patients. The new SN-N distance was 19–22 cm on the breast meridian, N-IMF was 6–8 cm, and nipple–areola complex (NAC) diameter was 35–45 mm. The zone of the lateral-based flap was drawn within the lower breast tissues where the lower border lies at the level of inframammary fold (IMF), and the upper border lies 2 cm below the lower edge of the areola (Fig. 1A, B).

Operative Technique

All surgical procedures were performed under general anesthesia in a semisitting position. We used a local infiltration solution to inject the incisional line and de-epithelialized zone with 500 cm^3 of saline solution, adrenaline (1:200,000), and 1% Xylocaine. After applying a breast tourniquet, we extracted a thin skin layer from the de-epithelialized zones using the dermatome while preserving the NAC. The lateral-based dermoglandular flap (within the inferiorly ptotic breast tissues) was elevated at the level of pectoral fascia in which the lower border of the flap was separated from the IMF attachment, and the upper border lying 2 cm below the lower edge of the areola, such that the flap received the blood supply from the lateral breast connection.

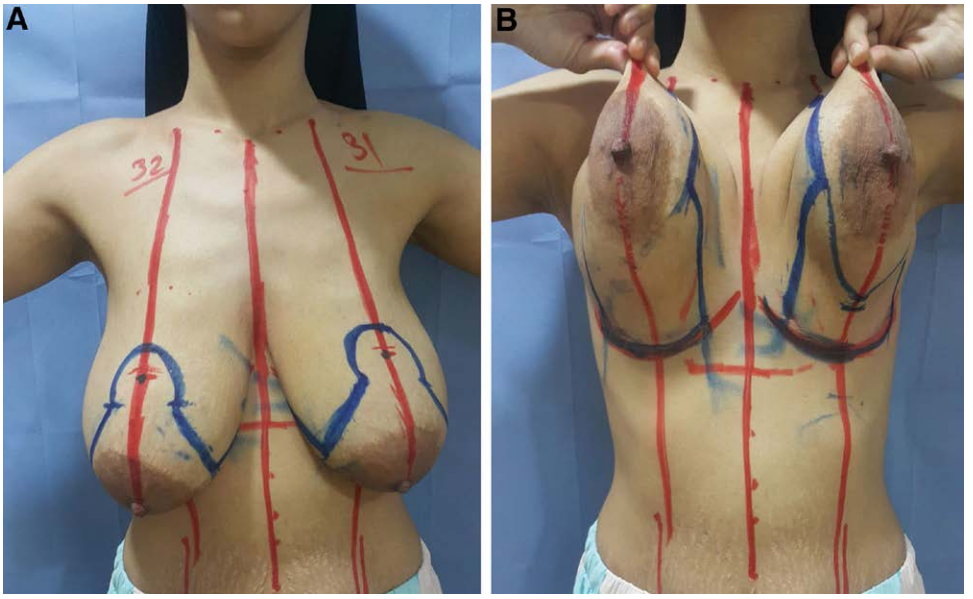

Fig. 1. Preoperative patient photographs. A, Preoperative marking showing the standard Wise keyhole pattern with inverted-T mastopexy. B, The zone of the lateral-based flap was drawn within lower breast tissues.

Furthermore, the superior-based NAC flap was elevated with its depth reaching the level of pectoral fascia, and dissection was performed all around the keyhole marking, leaving the upper part intact to allow for proper blood supply and to prevent compromising nipple viability. Hemostasis was done by bipolar diathermy.

The lateral flap was dissected laterally until the level of the anterior axillary line with a 2 cm back-cut at the lower part to facilitate the flap transposition cranially with a 90 degree rotation within the created pocket behind the undersurface of the elevated NAC flap slightly medial to the meridian line (Figs. 2 and 3). Subsequently, the transposed flap was anchored in a conical shape to the pectoral fascia by 1/0 polypropylene at the level of the four breast boundaries, including the second rib upward and the sixth rib downward, 2 cm away from the midline medially and the axillary line laterally. This technique leads to the refilling of the superior, medial, and central mound, giving a sandwich-like appearance. This is due to the elevated breast mound being refilled by the rotated lateral dermoglandular flap, enhancing breast projection and fullness (Fig. 4).

Fig. 2. The harvest of the lateral-based dermoglandular auto-implant flap superiorly, and the superior-based NAC flap inferiorly.

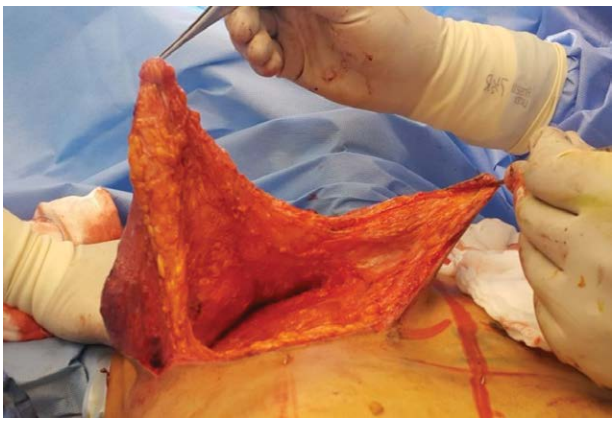

Fig. 3. The lateral auto-implant flap was rotated cranially within the created pocket.

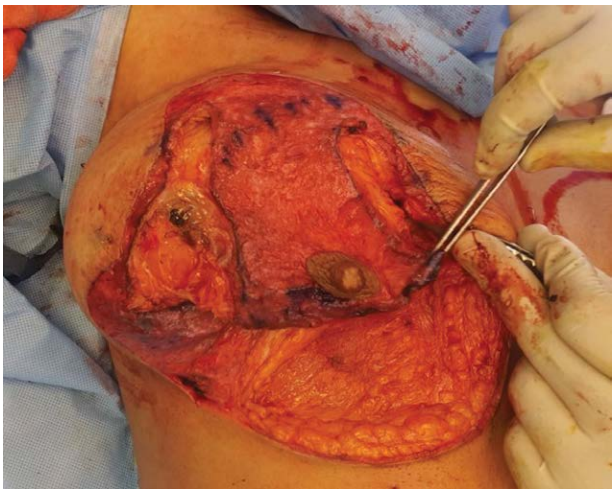

Fig. 4. The breast mound is refilled by the rotated lateral dermoglandular flap producing an implant-like effect with enhancement of projection and fullness.

The IMF was lifted and fixed to the rib periosteum using 3-0 polydioxanone sutures to maintain the position. The medial and lateral pillar flaps were sutured with 2-0 polydioxanone sutures to narrow the breast base, the suspension was added, and the breast projection was optimized. Deep dermal suturing was performed using 3-0 Monocryl, followed by 4-0 Monocryl subcuticular suturing in the skin without the need for drain insertion. (**See Video [online],** which shows the preoperative marking and harvesting of a lateral-based dermoglandular auto-implant flap.)

Follow-up

The patients were discharged within 1–2 days after surgery with brassiere support and were followed up in an outpatient clinic. The breast measurements were observed and documented at 12, 24, and 36 months postoperatively and were compared with the preoperative measurements to evaluate the outcomes (Fig. 5).

Statistical Analysis

The patients' general characteristics are presented as mean ± SD. The recorded measurements were compared pre- and postoperatively using paired *t* tests. A *P* value greater than 0.05 was considered statistically nonsignificant. A *P* value greater than 0.001 was considered highly significant.

RESULTS

The mean ± SD for some key patient demographics were as follows: age, 31 ± 1.3 (range: 25–39 years); body mass index, 23.6 ± 2.0 (range: 21–25 kg/m^2); operative time, 84 ± 1.6 (range: 80–95 minutes); and follow-up period, 34.5 ± 1.6 (range: 33–36 months).

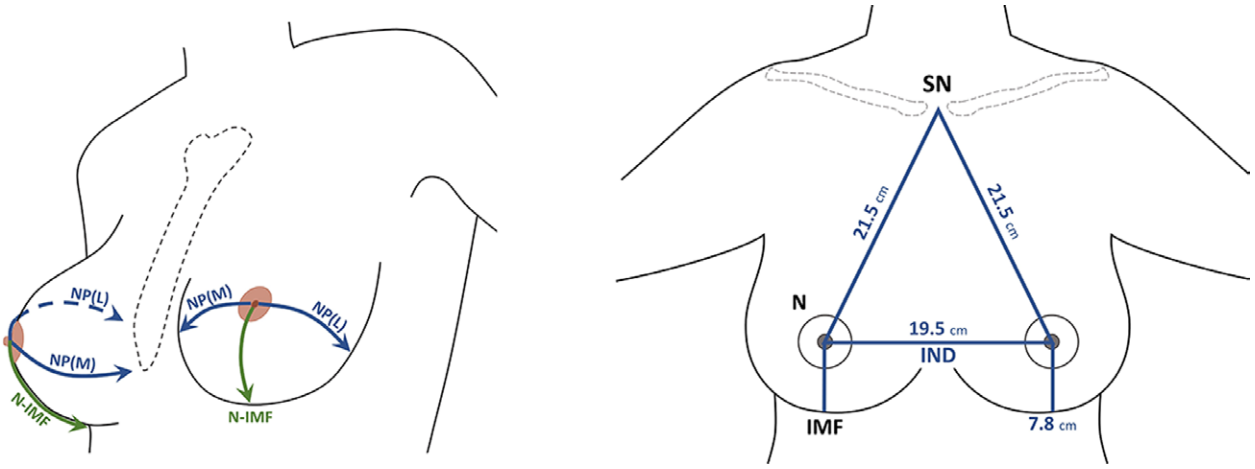

Fig. 5. The breast measurements: NP, N-IMF (nipple-inframammary fold), N (nipple), SN (suprasternal notch), IND (inter-nipple distance).

Upon comparing pre- and postoperative measurements at 36 months, including the change in the distance of NP, SN-N, N-IMF, and inter-nipple distance, we noted a highly statistically significant difference, indicating improvement in breast sagging. The mean NP was 11.2 after surgery, compared with 5.2 before surgery. The mean ± SD of pre- and postoperative measurements for the lower pole length were 9.3±0.8 and 7.5±0.8, respectively. The mean ± SD of pre- and postoperative measurements for the lower pole zone were 75.2±10.5 and 55±8.4, and those for the upper pole zone were 42.7±9.5 and 59.50±7.0, respectively. All data showed a high statistical significance ($P > 0.001$), suggesting that the auto-implant flap led to a prominent mammary projection. (Table 1).

The results indicate that the technique helps transfer the ptotic glandular tissue from the inferior pole of the abundance zone to the hollowing upper pole zone, thereby enhancing breast projection and restoring breast contour with upper pole fullness. The distance of breast mound elevation after the surgical procedure ranged from 5.30 to 9.55 cm, with a mean value of 7.90 cm. The mean postoperative N-IMF distance was 6.5 at 24 months and 7.8 at 36 months, with an increase about 1.3 cm; breast mound elevation was 7.50 cm at 24 months and 7.90 cm at 36 months, showing statistically nonsignificant differences. The incidence of increasing N-IMF and breast mound elevation distance over time is affected by the skin quality and body weight changes. The comparision of before and after the surgical technique was presented using the Adobe Photopea program, as in Figures 6 and 7.

Table 1. Measurements of the Breast Comparing Pre- and Postoperative at 36 Months

Distance	Preoperative	Postoperative	Paired *t* Test	*P*
Suprasternal notch to nipple (N-SN)	29.2±1	21.5±0.9	8.56	>0.001
Nipple to IMF	11.4±0.8	7.8±0.5	2.37	>0.001
Inter-nipple distance (IND)	23.7±0.4	19.5±0.7	4.20	>0.001
Nipple projection (NP)	5.2±0.9	11.5±4.2	2.44	>0.001
Upper pole zone (UPZ)	42.7±9.5	59.50±7.0	5.62	>0.001
Lower pole zone (LPZ)	75.2±10.5	55±8.4	7.32	>0.001
Lower pole length (LPL)	9.3±0.8	7.5±0.8	6.08	>0.001

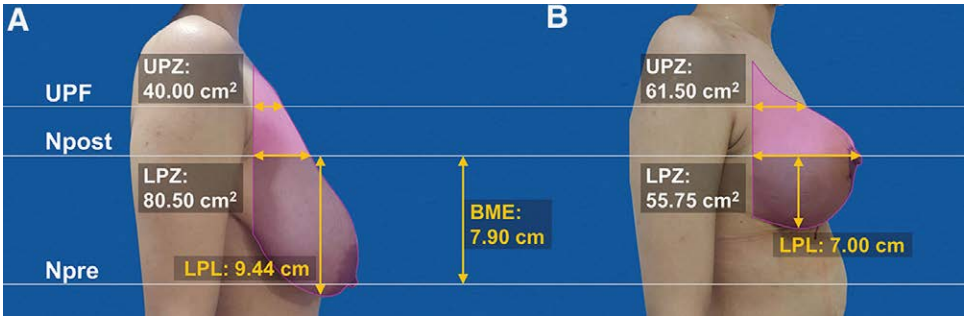

Fig. 6. View of breast measurements before (A) and after (B) the surgical technique using the Adobe Photopea program, showing significant difference in all parameters.

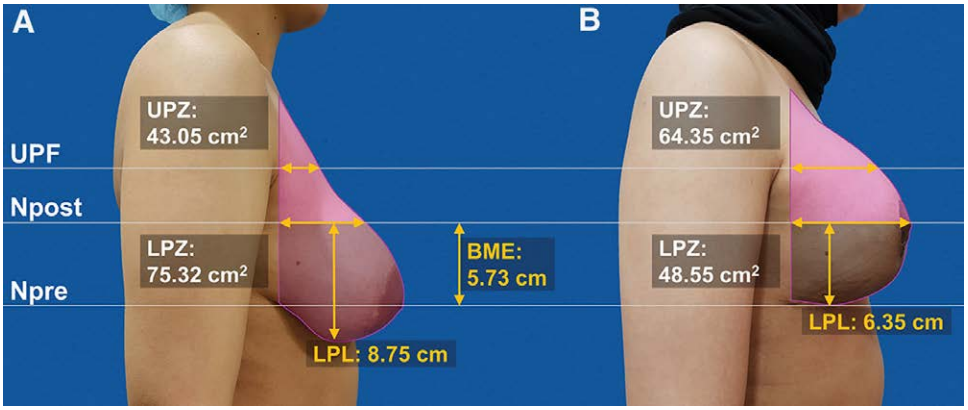

Fig. 7. View of breast measurements before (A) and after (B) the surgical technique using the Adobe Photopea program, showing significant difference in all parameters.

We did not observe any major complications associated with this technique, such as hematoma, NAC necrosis, fat necrosis, or wound dehiscence, and a bottoming out rate of 8.33% was documented in three cases. Patients were followed up for over 24 months to examine NAC sensation, and breastfeeding compared with preoperative state showed no significant changes.

The BREAST-Q mastopexy module was used to evaluate the results after the surgical procedure. The framework for satisfaction included breast, nipple, and surgeon assessments, while the framework concerning the quality of life assessed physical, psychological, and sexual well-being. All patients reported significant changes in their quality of life (78.5%) and were satisfied with their breast shape (91.7%).

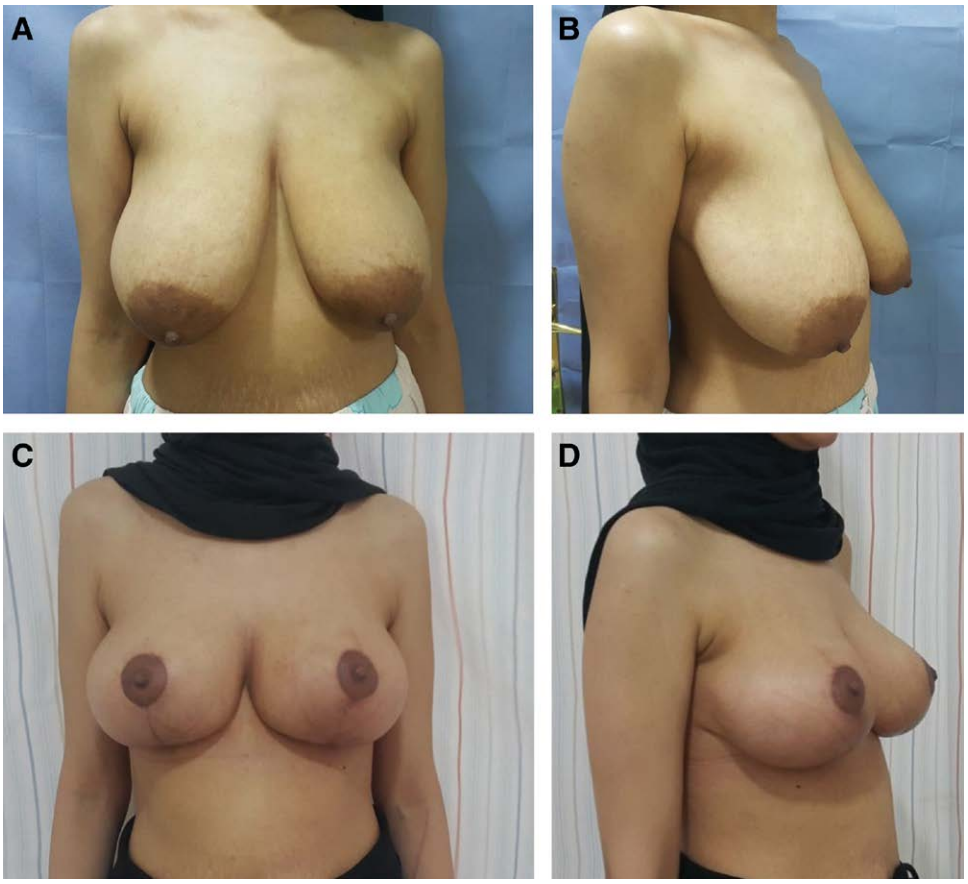

Fig. 8. Views of a 33-year-old patient. A–B, Preoperative photographs showing superior pole hollowing along with an abundance of lower breast tissue. C–D, Postoperative photographs showing enhanced shape and contour.

DISCUSSION

An inferior drop in breast tissue causes a volume loss in the upper quadrant, making the lower pole bigger and broader. This surgical procedure concerning mastopexy using a lateral dermoglandular flap as an auto-implant aims to redefine the apparent volume of the breast tissues, thereby improving breast projection, enhancing superior pole fullness, and restoring breast contour with correction of breast ptosis.

Many surgeons have implemented volume redistribution for auto-augmentation by mobilizing glandular tissue from the areas of excess to the deficient region.[11,12] Various types of pedicled breast flaps have been established to achieve upper pole fullness and breast lifting.[13,14] The reconstruction method should be selected based on a complete analysis of the skin and glandular components, in addition to the patients' desires and expectations.[15,16]

Graf and Biggs[17] used the inferior pedicle flap with passing under the elevated pectoral loop providing more support and decreasing the incidence of ptosis. Hall-Findlay[18] used a laterally based pedicle for the NAC, a medially based inferior recruitment flap, and a medially based superior "augmentation" flap. Hammond and O'Connor[19] used the lower island transposition flap, applying fullness to the superior quadrant of the breast. Watfa et al[20] used a superior glandular pedicle to fill the upper pole supported by the lateral and medial triangular dermal flaps. This significantly limited the descent at 21.4%, roughly 1 cm at 12 months, leading to high patient satisfaction. Ors[21] used a central pedicle with a dermal encapsulated round design where all patients were delighted and had a lower recurrence rate. Kelemen et al[22] used the inferior flap and superomedially based pedicle and called it a stacked technique, which helped them achieve upper pole enhancement.

However, in the case of atrophic or small-sized breasts, the autologous parenchymal flap redistribution requires the addition of a synthetic implant. Calvert et al[9] used the superomedial pedicle and the laterally based breast flap that was rotated cephalically to hold and reinforce the inserted silicone implant in position, resulting in enhancement of breast projection. Yilmaz[23] used the inferolateral-based flap as an auto-augmentation method in mastopexy operation in 22 patients with sufficient breast size and complaints of ptosis. They reported a mean postoperative

Fig. 9. Views of a 37-year-old patient. A–B, Preoperative photos show superior pole hollowing along with an abundance of lower breast tissue. C–D, Postoperative photos show enhanced shape and contour.

nipple elevation of 5.93 cm at 3 months and good patient satisfaction without flap or NAC necrosis.

This study used the inferior breast tissue by elevating the lateral-based dermoglandular flap as an autologous prosthesis, which we call an auto-implant flap. The flap is relocated cranially by moving upwards and medially with the fixation on the pectoral fascia through its dermal portion. This offers more stability and transfers the weight to the chest wall, decreasing tension on the suture lines. Additionally, the medial and lateral pillar flaps act as hammock suspensions by facilitating long-term breast projection. The lateral breast flap with mastopexy improves the projection and aesthetic shape by eliminating the bulged lateral breast portion.

This technique is suitable for women who do not want synthetic implants or fat transfer and have medium or large-sized ptotic breasts with sufficient glandular volume. It helps rearrange the breast tissues through the transposition of the abundant lower portion to refill the upper pole hollow, thereby restoring the defined breast contour with an aesthetically pleasing shape (Figs. 8–10). However, the technique is unsuitable for very atrophic or tubular breasts with narrow bases, as there are no sufficient inferior tissues.

Grünherz et al[24] used the BREAST-Q score to compare the long-term outcomes of auto-implant mastopexy and augmentation mastopexy. They reported a higher rate of satisfaction among patients in terms of breast shape (69 ± 18 versus 55 ± 16, $P = 0.03$) and superior pole fullness (71 ± 18 versus 48 ± 26, $P = 0.009$) with no significant difference between the two methods. In addition, in a prospective study of 36 patients undergoing mastopexy, Swanson[25] reported a high level of patient satisfaction (94.3%), self-esteem (89.3%), and quality of life (69.5%) for auto-augmentation mastopexy. We used the BREAST-Q mastopexy module to evaluate outcomes in our study; 91.7% of our patients were satisfied with the procedure, and 78.5% of patients reported a significant improvement in their quality of life.

In a systematic review of 43 studies published from 1980 to 2016, including 1888 patients treated with mastopexy techniques, di Summa et al[26] noted a complication rate of 10.4%, a bottoming out rate of 1.5%, and high patient satisfaction with relatively low complication rates. Hamdi et al[27] used the volume distribution mastopexy method for 50 patients over 10 years through a superior or superomedial pedicle and followed up the patients for 3 years. They reported that the nipple site gradually stabilized, and the elongation of the inferior pole was observed in five cases (20%). We did not record any major complications in our study; the percentage of minor complications was 5.3% in the form of a broadening scar that was later corrected under local anesthesia. Moreover, the percentage of bottoming out was 8.33% in three cases over 24 months of follow-up.

Fig. 10. Views of a 29-year-old patient. A–B, Preoperative photos show superior pole hollowing along with an abundance of lower breast tissue. C–D, Postoperative photos show enhanced shape and contour.

We preferred using the lateral-based flap in this study over other techniques, considering its advantages, such as (1) allowing complete separating of lower breast tissues away from IMF attachments; (2) allowing adequate mobility of parenchyma with upward flap transposition above the level of NAC, which enables enhancement of the superior and central breast mound; (3) minimizing incidence of lower pole broadening with the complete cranial transposition; (4) allowing easy upward repositioning of the inframammary fold to a more anatomical site; and (5) reducing the tension on the vertical suture line.

CONCLUSIONS

The lateral-based mammary flap can be used in mastopexy procedures because it acts like an implant, in which the inferior ptotic breast tissues are transposed cranially, refilling the upper and central breast mound. It also helps shape and augment the breast, enhances the mammary projection, and restores the breast contour without requiring a synthetic implant or fat grafting. It is a simple, safe, and reliable technique that can lead to high patient satisfaction; however, it may be unsuitable for patients with insufficient breast volume.

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DISCLOSURE

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

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