Autologous Mastopexy and Autoaugmentation of the Breast

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Background: Autologous mastopexy is an alternative for patients with small breasts, ptosis and upper pole hollowness, who desire improvement in their breast shape without using an implant. A variety of techniques have been tried throughout the years. Recently the use of autologous fat grafting (AFG) for breast augmentation increased in popularity and showed satisfying cosmetic outcome in enhancement of size, shape and texture of the breast.

Methods: 25 patients with grade 2 ptosis were included in this study. Lower Island Flap Transposition (LIFT) technique was modified and either done alone or in combination with lipofilling, whether at the same setting or as a second stage. Preoperative and postoperative measurements and pictures were documented.

Results: Lateral upper pole projection measurements showed an average increase of 28.5% equal to about 1.8 cm. As for the maximum breast projection an increase of about 33% accounting for about 2 cm was documented.

Conclusions: This study shows that the combination of LIFT technique after its modification with AFG has proven to be an effective technique with consistent results for patients presenting with grade 2 ptosis and upper pole hollowness. The addition of AFG to the modified LIFT technique can be considered a step forward in achieving autoaugmentation and autologous mastopexy without using implants.

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INTRODUCTION

The breast is a very important organ for women’s self-esteem and is regarded as a symbol of femininity. Deviations from normal size, shape, and symmetry are interpreted as unattractive and a sign of aging. Far from posing merely a cosmetic problem, such deviations deeply disturb both the patient’s perception of her body and her emotional balance, as well as markedly diminishing patient self-esteem and wellbeing. The first breast surgeries started as early as the Bronze Age and Iron Age, yet the aesthetic breast surgeries and specifically mastopexy techniques were first recorded in the 19th century in parallel with the evolution of reduction mammoplasty. Most of these techniques involved suspension targeting breast mound elevation.

One way of analyzing the breast is the three-step principle, which divides the breast into three main anatomical features that interact together; the footprint—which is fixed and individual to each patient—the skin envelope; and thirdly, the conus, formed by the breast parenchyma. Different techniques tackle either one or more of these features with the aim of restoration of youthful breasts. Mastopexy procedures are similar and traditionally derived from reduction procedures, involving skin resection with no or minimal parenchymal resection. There are three main surgical goals that should be attained to correct breast ptosis and give a firm youthful aesthetic breast shape. These include nipple areola complex (NAC) elevation, skin envelope excess management and breast reshaping. Breast flaps and parenchymal shaping maneuvers can help autoaugment the upper breast pole and correct any shape defects. The skin is then closed in a circumvertical pattern.

The Lower Island Flap Transposition technique (LIFT)—a vertical scar mastopexy—added more flexibility in breast parenchyma redistribution by releasing the flap from its dermal attachment thus giving it the ability to autoaugment the upper pole. One of the disadvantages of vertical mastopexy techniques is the occasional skin redundancy at the lower pole. This can be overcome by bringing the vertical closure line obliquely and laterally, thus transforming the vertical scar into a J or L scar. This removes excessive redundant skin without adding a medial horizontal scar.

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Autologous fat grafting (AFG) has grown in popularity both as a reconstructive and an aesthetic technique and is increasingly being used in breast surgeries, either alone or as a complementary procedure. Several techniques for fat harvesting and AFG are currently being employed. Gentle technique of lipofilling has shown statistically higher fat survival percentages. With an increased number of patients refusing silicone implants increased popularity and satisfying cosmetic outcomes of AFG, the search for a technique characterized of being easy, with fewer scars and better aesthetic outcomes with maximal projection and upper pole fullness as an alternative to implants was our goal.

METHODS

Study Design

A local ethical committee approval was obtained from the Ethics Board of Cairo University hospitals. Patients provided verbal and written consent for the procedure and participation in the study.

All patients reviewed for this randomized prospective study underwent bilateral breast autologous mastopexy between January 2017 and January 2018. The patients in the study requested mastopexy for cosmetic reasons only, seeking correction of ptosis, upper pole fullness and a youthful breast appearance. During the study period patients underwent bilateral breast mastopexy with the LIFT technique. All the women selected for this study were between the age of 18 and 45 years. The patients included in this study complained of grade two ptosis according to the Regnault classification and upper pole hollowness. Patients with history of breast diseases or medical conditions or morbidities (such as Diabetes mellitus) that could affect general health condition or wound healing were excluded.

Preoperative Preparation

Preoperatively accurate history and patient counseling were done. Examination included body mass index, general, and breast examination. Breast measurements were taken and included suprasternal notch to nipple (SN-N) and nipple to inframammary fold (N-IMF). Upper pole projection, lateral maximum projection and humerus length were measured with the patient standing in lateral position. Finally, circumference measurements were obtained at three different levels; upper pole, level of maximum projection and at the level of IMF.

Preoperative photographs were taken for each patient in anterior, oblique and lateral views. Preoperative laboratory work-up included metabolic and nutritional parameters, such as hematocrit, hemoglobin and basic metabolic panel.

Smokers were encouraged to stop smoking 1 month before surgery.

Consent

Before the surgery, potential complications with their published rates were explained to all patients and they signed a standard informed consent. Furthermore, it was explained that a second stage for fat injection might be needed to achieve final desired results concerning the breast size.

Operative Planning and Markings

Patients were marked preoperatively in an upright position. Midline was then marked starting from Supra Sternal Notch (SSN) extending down to pubis. The IMF and anterior axillary lines were then delineated. Breast meridians were drawn through a clavicular point that is about 6.5–7.5 cm—chosen according to patient’s body built- lateral to SSN. The suggested new nipple position was defined on the meridian as an average of three different measurements. These included mid humerus level, SSN to new nipple position between normal values of 19 and 22 cm and Pitanguy point technique, which is at the level of the IMF. A 5–4 cm point from the IMF was marked defining the end point of vertical incision line. The vertical lines of the pattern were estimated by slightly pulling and rotating the breast inwards and upwards then outwards and downwards for the medial and lateral vertical lines respectively. This was then confirmed by a pinch technique. The wedge-shaped area between the vertical lines was shaded representing the lower island flap. The superior border of the breast footprint was obtained by pushing the breast upwards and making a distinct transition between the breast tissue and chest wall. Finally, a horizontal line was marked at the superior breast pole- usually between second and third rib- delineating the fixation point of the lower island flap. With the progress of cases this line has been set more medially at the upper inner quadrant of the breast as it has been recognized that the more medial fixation of the flap helps create more prominent medial breast fullness (Fig. 1).

Operative Technique

Surgery was done under general anesthesia with the patient put in supine position. After marking the incisions and new nipple position, the areola was slightly stretched and marked with a 5 cm-cookie cutter. The periareolar area till new nipple position and wedge-shaped vertical segments were deepithelialized for preparation of the flap for autoaugmentation.

The superior curved border of the lower island flap was cut from the lower aspect of the areola. Dissection using diathermy was done vertically downwards till pectorals major fascia was seen while the breast was held by the surgical assistant keeping it in place and not falling laterally. During dissection of the superior border, two wings corresponding to curvature of areola were kept as part of the flap. The lateral vertical border of the flap was dissected subcutaneously till anterior axillary line to help decrease the lateral fullness of the breast.

The medial border, however, was divided vertically downwards to the pectoralis fascia, leaving medial fullness of the breast intact. As with the superior border, dissection was done with the breast supported by a surgical assistant. The island flap was partially separated by cutting the lower dermal end of the flap.
A subglandular pocket was then directed upwards and medially reaching the marked superior border of the breast, with a width equal to superior border flap length. After hemostasis, the flap was transposed superomedially and three separate sutures were taken between upper border of flap and pectoralis muscle and fascia using polypropylene 1 or 0 (Fig. 2).

The NAC was attached at the 12 o’clock point at the new nipple position and the vertical lines were approximated together. The stapled vertical line was pulled and stretched, showing the excess skin envelope, which was marked and excised. In case of skin envelope horizontal excess, it was ended in J pattern or a small T. The new NAC was marked using a cookie cutter at the most projecting point of the lifted breast. Skin was closed using polyglactin 910 2-0 and 3-0 for subcutaneous tissue and poliglecaprone 25 for dermis.

Patients who had an adjunct session of AFG either had it at the same time with mastopexy or at a later stage of an average of three months. The donor areas for lipoaspiration were mainly lower abdomen and inner thighs. The patient choice was taken into consideration. Infiltration of the area was doing using saline, adrenaline 1:500,000, lidocaine 20% 1:25 ml saline, bicarbonate sodium 1:100. The infiltrated amount equalled the amount planned for aspiration. Aspiration was done using a wide bore 3 mm cannula. Fat was processed by sedimentation after passing through a sieve and washing it with saline in a canister. After about 20 minutes adipose portion of separated fat was decanted.

The fat was then transferred to 20-ml syringes. To emulsify the fat, a two-way metal syringe connector was used. Six passes were done to help emulsify the fat, which was transferred to smaller 10-ml syringes.

A small stab incision using the tip of an 11 blade was done at a point between the anterior axillary line and superior border of the breast. A second periareolar incision was added, occasionally to be able to reach medial quadrant of the breast.

The fat was injected in the subcutaneous and subglandular planes of the breast according to whether
contouring alone or volume increase and projection were targeted. Using a 2.5 mm fat injection cannula attached to the 10 ml syringes, about 1 ml fat was injected per pass while the cannula was withdrawn.

An average of 50-100 ml of fat was injected into the upper quadrants of each breast along the superior border of footprint of the breast when contouring was targeted. An average of 10-150 ml was added in the subcutaneous and subglandular planes when increased volume was targeted. Fat injection was done in fanning pattern technique with cross hatching through the second incision.

Drains were not inserted in any of our patients. Adhesive bandages in C shape pattern supporting outer breasts were used. Soft elastic bras were worn for an average of three weeks. Average operative time was 150 minutes (±20 mins), and hospital stay was usually just till the evening of operative day or overnight.

Postoperative Care
A change of dressing was carried out after 48 hours. Skin stitches usually absorbed within 3 weeks. Postoperatively, patients were instructed to lie supine and refrain from using the breast for a period of at least three months. Results were assessed according to patient’s satisfaction—measured at a scale of 1–10 with 1 being extremely unsatisfied and 10 extremely satisfied. Measurements of the breast were taken during follow-up visits three months postoperatively and compared to preoperative measurements.

RESULTS
This study included 25 patients. Their ages ranged from 22 to 45 years with a mean age of 33. Mean body mass index was 27 ± 2.2.

All patients presented with grade 2 breast ptosis according to the Regnault classification. The majority of the patients complained of postpartum breast changes. However, 24% of the patients presented with post weight loss breast changes. One of them was a post massive weight loss patient. The rest of the patients (32%) complained of age-related breast ptosis (Fig. 3).

According to patient’s expectations concerning breast volume and the patient preoperative parenchymal volume, AFG was added for contouring and volume increase. AFG was either combined with mastopexy at the same stage or was done as a separate delayed stage. Seven patients (28%) did not require AFG and were satisfied by their results without the need for AFG. Five patients (20%) had mastopexy combined with AFG at one stage, whereas eleven patients (44%) underwent AFG at a second stage. Two cases (8%) had a combined LIFT and AFG surgery and a delayed second stage of AFG for volume increase and contouring (Fig. 4).

The average length and width of the flaps were 8 and 6 cm, respectively. They varied according to patient’s horizontal skin excess and vertical markings (Table 1).

Patient follow-up ranged from 6 to 10 months postoperatively. During each visit, photographs and breast measurements were taken and compared to their preoperative measurements.

The average new nipple position measured from SSN to nipple was 21 cm, with a maximum of 22 cm and a minimum of 19 cm. Preoperative measurements of SN-N showed a maximum of 31 cm and a minimum distance of 22.5 cm, with a mean value of 27 cm. The SN-N distance decreased by an average of 21% (Fig. 5).

The average distance of the N-IMF distance preoperatively was 13.6 cm, while the average postoperative N-IMF distance amounted to 11.5 cm. The N-IMF distance decreased by about 15% postoperatively.

The upper lateral projection increased by about 1.8 cm, indicating an average of 29% increase of the upper pole. On the other hand, the maximum lateral projection of the breast showed an increase of about 33%, accounting for about two cm average increase. The circumference measured at the level of the IMF showed no changes between preoperative and postoperative measurements with a mean average value of 82 cm (Fig. 6).

As for the other two circumference measurements, the upper and maximum circumference had a preoperative average of 88 cm and 94 cm, respectively. The postoperative mean value is 92 cm for the upper circumference and 99 cm for maximum circumference. The

Table 1. Autoaugmentation Flap Dimensions

|             | Flap Width | Flap Length |
|-------------|------------|-------------|
| Mean        | 6.16       | 8.24        |
| Maximum     | 8          | 11          |
| Minimum     | 4          | 6           |
upper circumference showed an average increase of 5% and a maximum circumference of about 6% (Fig. 6) (Table 2).

Only two patients (8%) complained of superficial partial wound infection, which was managed by repeated dressings and antibiotic ointments for 10 days. These patients had a small T-junction closure at the IMF. Other than that, no complications such as nipple loss, flap necrosis, seroma, nipple malposition, cosmetic disappointments, or hematoma were recorded.

Patient satisfaction measured at a scale of 1–10, with 1 being extremely dissatisfied and 10 being extremely satisfied, indicated an overall satisfaction with an average of 8.96. The minimum satisfaction score given was 7 (Fig. 7).

Example cases were chosen and their preoperative and postoperative pictures are shown in Figures 8 and 9.

**DISCUSSION**

Increasing the upper pole fullness of the breast and reshaping it into a more youthful appearance using autologous tissues has been the aim of many surgeons in recent publications. Autoaugmentation of the breast has been considered a myth.8

Breast implants have several complications. The most common complications are contracture and capsule formation, which occur in about ten percent of cases.9,10 Since the 1960s several cases have been reported associating
breast implants to systemic diseases. Several literature reviews have been done in this concern, yet no scientific based evidence has been found. The fact that breast implants need to be changed after an average of 10 years or may need revision surgery in about 24% of patients 1 year postoperatively made them less appealing to the public, as they cannot be considered as a permanent solution.

The LIFT technique was described by Hammond & O’Connor in 2014 as an update for autoaugmentation techniques. In 1975 Ribeiro suggested parenchymal redistribution to the upper pole. Since then, hundreds of articles have been published describing a variety of autoaugmentation techniques. Hoenig et al as well as Botti aimed autoaugmentation using Ribeiro’s posterior based pedicle. The achievement of an aesthetically appealing breast, that is unique for each patient, while respecting the key parameters and ratio as described by Mallucci et al, as well as modification to previous autoaugmentation techniques described in literature, was our goal.

This study used a combination of LIFT technique with AFG in cases needing breast autoaugmentation and mastopexy, while implants were refused and only autologous tissues were to be utilized. Measurements have proven that autoaugmentation and breast lifting was achieved in all patients of the study.

In contrast to prior autoaugmentation mastopexy techniques, this study has modified its technique to suit each patient individually while achieving aesthetically appealing results with maximum volume. This included the use of artistic technique similar to short scar periareolar inferior pedicle reduction SPAIR mammaplasty. According to skin excess, sometimes a small T or J scar was needed. The two wings at the superior border of the flap helped give more length to the flap, thus reaching higher inset level, as well as redistribution of breast parenchyma for more projection. The flexibility and simplicity of this technique helped us achieve better satisfaction with our patients. The dissected subglandular pocket was more medially directed to improve superomedial fullness. The use of nonabsorbable sutures in fixation of lower flap helps in long-term results.

Irrespective to the etiology of ptosis, whether postpartum atrophy, post weight loss or age-related ptosis, the combination of LIFT technique with AFG has provided satisfactory results to both patient and surgeon. The reason of the patient incomplete satisfaction was due to bigger breast volume expectations, as their satisfaction grade concerning the shape was much higher. Further volume increase can be achieved with further AFG.

The planes in which fat was injected were either subcutaneous, subglandular, intraglandular, or a combination of different planes according to the individual need of each case. During the time of the study it has been noticed that the choice of AFG at a second stage gave more accurate results, as the amount and plane of fat injection were optimized after edema has subsided. However, patients having AFG at the same or at a second session were equally satisfied with an average satisfaction grade of 9 at a scale of 1–10. Hammond based the lower island flap on the breast septum with the aim of maintaining sufficient blood supply, ensuring flap viability after its release from the dermis.
In this study, a different approach was taken while releasing the flap. Wueringer’s septum was not searched for nor usually seen while releasing the flap. It was randomly based on the intercostal perforators. In 3 cases the Wueringer’s septum was identified and left with the superior pedicle supplying the NAC. Postoperatively, no differences were noticed between the patients. The fact that no complications—other than superficial localized wound infection in 8% of the cases—such as seroma, wound dehiscence or NAC ischemia or sensitivity loss were documented proves that the random blood supply of the lower island flap is sufficient with no need to search for the Wueringer’s septum which cannot be easily identified in most of the cases. The versatile blood and sensory supply...
of the NAC, helps decrease postoperative complications in form of NAC affection.20,21

Furthermore, Swanson15 has mentioned another concern with the LIFT intraoperative technique steps, claiming that closure of the breast without parenchymal approximation, relying on the skin alone, would give the breast a boxy appearance and clefts would be a problem. Evaluating the results of this study, this concern did not appear to be of significance. None of the cases had postoperative dehiscence nor complained of a boxy lower pole. The main objective of this study was to document an increase in the upper pole and maximum projection of the breast.

Lateral upper pole projection measurements showed an average increase of 28.5%, equal to about 1.8 cm, compared to a 0.5 cm increase described by Hammond and O’Connor5 with LIFT technique alone. As for the maximum breast projection an increase of about 33% accounting for about 2 cm was documented. The 2 cm increase is of close similarity to the 2.3 cm projection increase achieved with augmentation-mastopexy, which is considered the technique of choice in improving upper pole fullness and ptosis. The LIFT technique provided a 0.8 cm increase in projection, which is less than half the projection achieved in this study.5,15

Breast circumference at upper pole level and level of maximum projection were also documented. An average increase of 4.5% at upper circumference and an average of 6.1% additionally prove that autoaugmentation has been achieved in this study.

It is worth mentioning that choosing the new nipple position as an average of several measurements and furtherly adjusting it intraoperatively before delivering the NAC have showed ideal results of SN-N distance and symmetry.

The concept of using fascial sutures has been described by several authors. Forty-two percent of publications concerning mastopexy or reduction have utilized fascial sutures. None of the studies have found an increase in breast or upper pole projection.22

**CONCLUSIONS**

This study showed that the combination of LIFT technique with AFG has proven to be an effective technique with consistent results for patients presenting with grade 2 ptosis and upper pole hollowness.

It can be considered as a versatile technique irrespective to the etiology of ptosis. The blood supply of the lower island flap does not have to be based on Wueringer’s septum. Random centrally based flaps showed equal viability to septum-based flaps, while protecting the NAC blood and sensory supply.

Combining AFG with the LIFT procedure allows this technique to be classified as autoaugmentation, rather than just a redistribution of breast parenchyma.

**Fig. 9.** CASE 5: Preoperative (A, B) and 3 months postoperative (C, D) photographs of a 32-year-old patient (LIFT + first and second stages of AFG).
In conclusion, the addition of AFG to the LIFT technique can be considered a step forward in achieving autoaugmentation and autologous mastopexy without using implants.

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