



FAM–Fat Augmentation Mastopexy: A Method to Avoid Implants

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Abstract

Background Despite high complication rates, patients persistently present for single-stage augmentation mastopexy. In empty, deflated breasts, we perform one-stage augmentation mastopexy; however, in heavy ptotic breasts, our preference is to stage the procedure with mastopexy and fat graft first. With volume from fat grafting focussing on the upper pole and cleavage areas, many of our patients avoid implants altogether. This reduces subsequent risks of waterfall deformity, implant displacement, rupture and a lifetime of implant exchanges.

Objectives We aim to describe our findings and technique for reducing progression to the second stage of a two-stage augmentation mastopexy with the appropriate use of moderate to high volume of fat grafting at the primary operation.

Methods This is a retrospective review of all patients who presented to the senior author (KT) requesting breast implants and requiring mastopexy, from January 2018 to December 2022.

Results Over the five-year period, 137 patients were identified. Seventy-one (51.8%) underwent single-stage augmentation mastopexy, 55 (40.1%) underwent mastopexy with fat grafting and 11 (8.0%) underwent mastopexy with no fat grafting. Our key finding in this study is that 52 of 66 (78.8%) of planned staged patients, who underwent mastopexy with or without fat grafting, were happy with the volume attained and no longer wished to undergo further implant augmentation.

Conclusion In selected patients, appropriate volume and position of fat grafting at the time of primary mastopexy can significantly obviate the need for a second stage implant (alloplastic) augmentation.

Level of Evidence V This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Fat graft · Mastopexy · Augmentation · Breast

Background

The breast undergoes considerable change as a result of weight fluctuation, pregnancy, breastfeeding and senescence. The goal of mastopexy is to restore the breast volume to its ideal platform, reduce any skin laxity and return the nipple areola complex (NAC) to the most projected part of the breast mound [1]. In patients with breast ptosis due to deflation or hypoplasia, the addition of volume may be required to achieve aesthetic ideals. In heavy ptotic breasts however, volume is often not the primary cause for consultation, but rather the wish for volume redistribution into the more aesthetically pleasing medial upper pole and cleavage areas.

Augmentation mastopexy with implants remains a challenging and controversial procedure. The surgeon must concurrently balance opposing objectives: the augmentation of the volume of the breast, and the reduction and redistribution of its constraining skin and parenchymal envelope [2–4]. A systematic review on 4856 cases of single-stage mastopexy–augmentation reported an overall complication rate of 13.1% [5]. The benefit achieved by the

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breast lift can be negated by inappropriate use of implants, particularly in women with heavy lower pole breasts. Staging the mastopexy allows the breast to mature in its improved platform prior to the addition of appropriate volume. This can produce more reliable results; however, the benefit must be balanced with the increase in both financial outlay and addition of another recovery period.

Patients presenting for augmentation mastopexy often believe that implants are the only way to restore or create their previous or ideal aesthetic outcome. When their request is broken down into constituent concerns, we find that the prompt for implant augmentation is not necessarily due to a desire for absolute volume increase, but for fullness in the superomedial aspect of the breast. To achieve better cleavage and upper pole fullness, without alloplastic augmentation we can perform mastopexy with fat grafting [6–9]. This has become our first recommendation of procedure for women with a ptotic and glandular lower pole. We present five years of experience, decision-making, assessment and surgical technique to obtain the best aesthetic results for patients desiring a mastopexy and a fuller look whilst avoiding the complications associated with implants.

Methods

This is a retrospective review of all patients who presented requesting implants and were planned for a mastopexy as their primary procedure. Inclusion criteria were all patients presenting with a request for implants and proceeding to mastopexy with the senior author over a five-year period, from January 2018 to January 2023.

All patients were assessed and counselled by the senior author and three approaches discussed: mastopexy with implants in one stage or mastopexy with fat grafting or mastopexy alone, with the option for implants at a second stage. Patients planned for one-stage augmentation mastopexy have a deflated, empty breast with generalised loss of glandular tissue and a desire for more volume. Patients planned for a staged procedure with mastopexy first have a heavy lower pole of glandular tissue. These patients are offered fat grafting to the upper pole; and are examined for sufficient fat graft donor sites. Fat grafting may avoid a second procedure and implant insertion if these patients are satisfied with their volume. If not satisfied, after 9 to 12 months once the breast platform is stable, an implant is inserted. Dates for two stages of surgery are arranged with patients before their first procedure, to allow them to adequately plan if they decide to proceed with implants.

Financial costs for the second procedure are only implants and theatre time. For the purpose of this study, patients were deemed to be satisfied with their outcome without implants by choosing to cancel the planned second stage implant surgery.

Patients were only included if they requested implants for larger breast volume and had ptosis requiring mastopexy. Exclusion criteria included patients requesting reduction, history of previous breast surgery or breast cancer. Data points examined included patient demographics, details of breastfeeding, asymmetry, tuberous characteristics, breast size and changes, ptosis grade and striae. Baseline breast measurements recorded were NAC to IMF, sternal notch (SN) to NAC, inter-NAC distance. Operative details and outcomes were recorded including early complications, operative revisions, second-stage implant insertion, implant complications and follow-up duration. Ethics approval was obtained from our institution's medical advisory committee, and written consent was obtained from all patients for procedures.

Surgical Technique for Mastopexy with Fat Graft (video 1)

In addition to a largely traditional vertical or inverted T type mastopexy with a central or superior pedicle, large volume fat grafting was performed in the group with heavy ptotic breasts. Importantly, for the mastopexy the excess lower pole, ptotic glandular tissue is resected and glandular pillar sutures are done with 3-0 polydioxanone.

Large volumes of fat grafting were planned. Superwet tumescent liposuction was performed on all patients; the donor sites included abdomen, flanks, and thighs. Infiltration was performed with a fluid mix comprised of 1 litre normal saline with 1mg adrenaline and 10 ml 1% (100 mg) ropivacaine. To optimise harvest volume, ultrasound-assisted liposuction (UAL) with VASER (Sound Surgical Technologies, Louisville, Colorado) was used. Liposuction was performed with a 4-mm Mercedes liposuction cannula at 25 mmHg pressure. The lipoaspirate was centrifuged at 2500 rpm (1054 g) for 2 min, before liquid and oil are discarded, and transferred into 20-mL luer-lok syringes. Fat is injected, focussing on the upper pole and cleavage, into the subcutaneous plane. Access points for the fat grafting cannulae are through the medial aspect of the mastopexy incision and a separate stab incision in anterior axilla. We aimed to fill the upper and medial poles until no more fat can be injected, overfilling slightly to account for fat survival. The grafted aliquots were then massaged until a smooth contour is achieved.

Results

Over the five-year period, 137 patients were identified. Seventy-one (51.8%) underwent single-stage augmentation mastopexy, 55 (40.1%) underwent mastopexy with fat grafting (Figures 1, 2 and 3) and 11 (8.0%) underwent

mastopexy with no fat grafting. Demographics and baseline measurements are shown in Table 1. Groups were similar in terms of BMI (mean 23.2), and the mastopexy alone group was slightly older (36.7 years) than the one stage and mastopexy with fat graft groups (33.3 and 32.5 years, respectively). Most patients were asymmetrical (114,

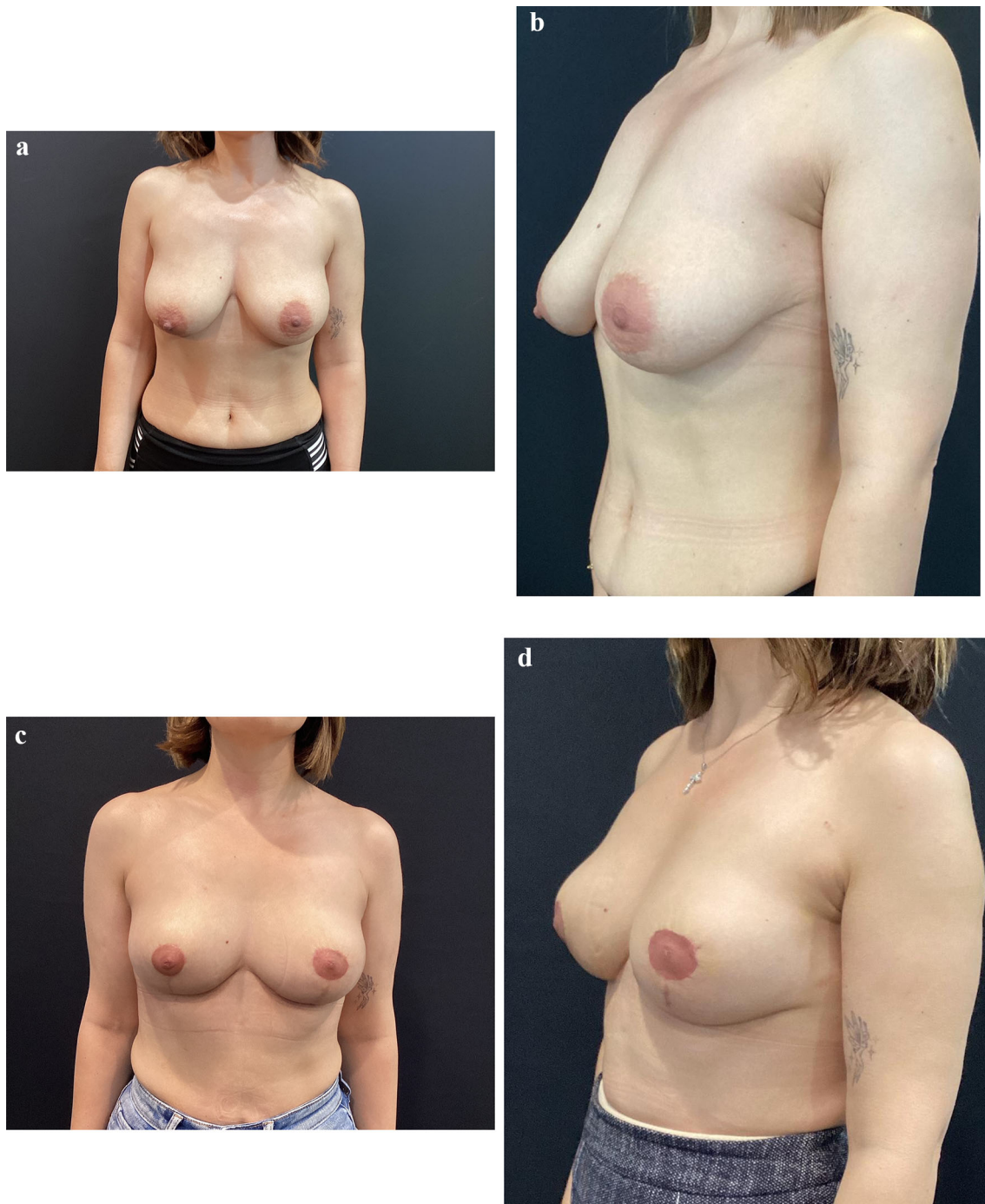
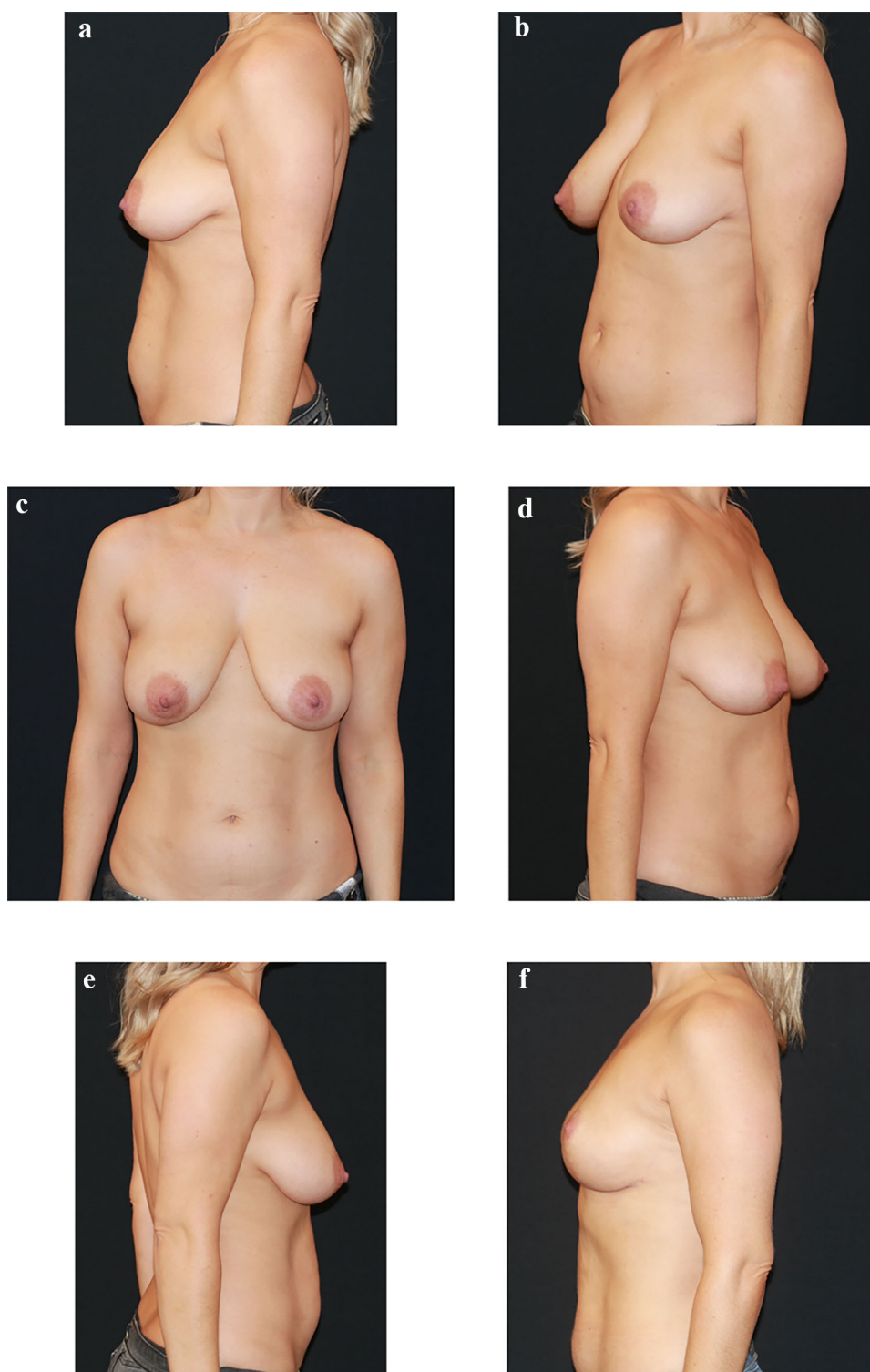


Fig. 1 a–b Pre-operative views of a 32-year-old female c–d 6-month post-operative views following mastopexy and fat grafting to the upper breast pole

Fig. 2 a–e Pre-operative views of 36-year-old female planned initially for two-stage augmentation mastopexy, who subsequently declined implants **f–j** 12-month post-operative views following wise pattern mastopexy and fat graft with 150cc per side to the upper breast pole



79.8%) with 31 (24.1%) being tuberous and most, 95 (73.9%) had striae. Patients who underwent one-stage augmentation mastopexy tended to be smaller cup size than those whose initial procedure was mastopexy with fat graft or mastopexy alone.

Operative details divided by each group's first procedure are described in Table 2. Significantly more tissue was excised in patients undergoing mastopexy first, with fat graft (72.2 g) or mastopexy alone (51.4 g), compared to augment mastopexy in one stage (12.6 g), $p < 0.01$.

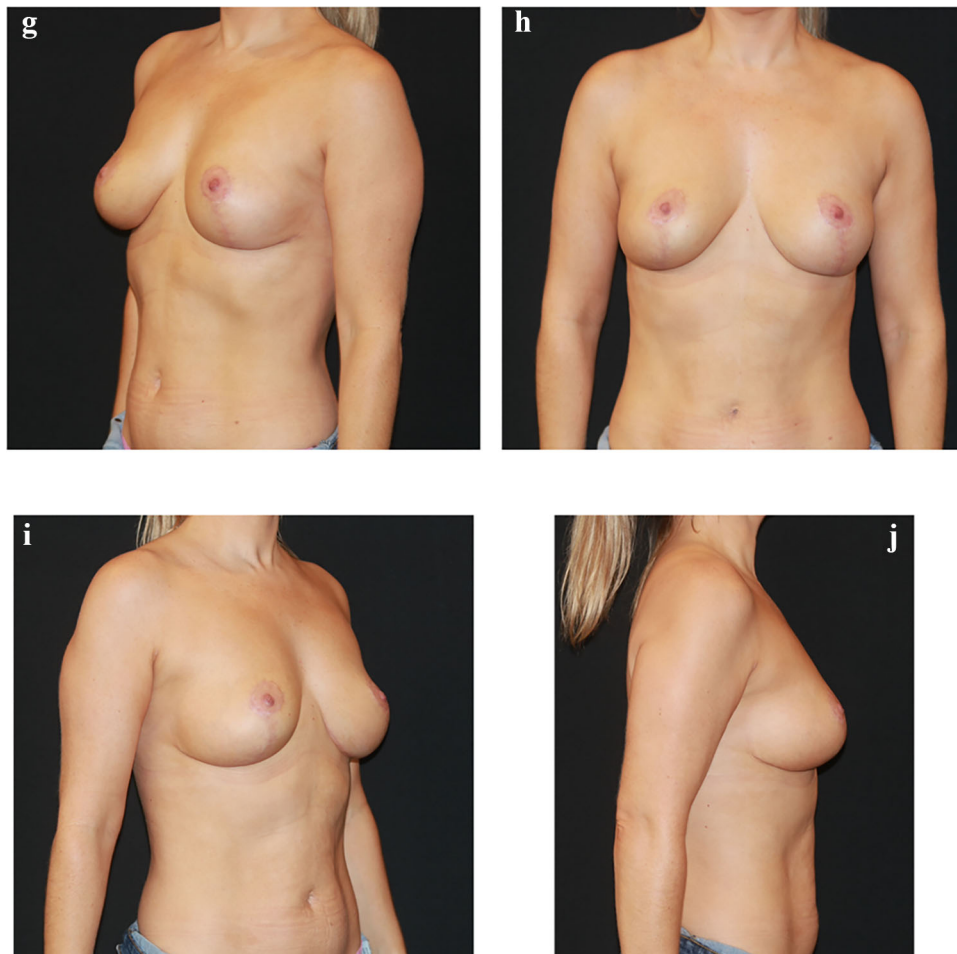


Fig. 2 continued

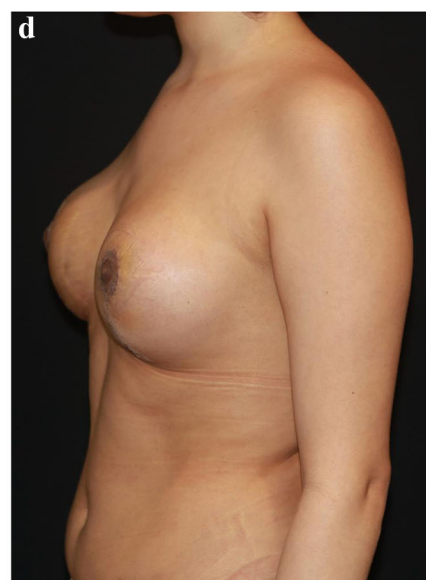
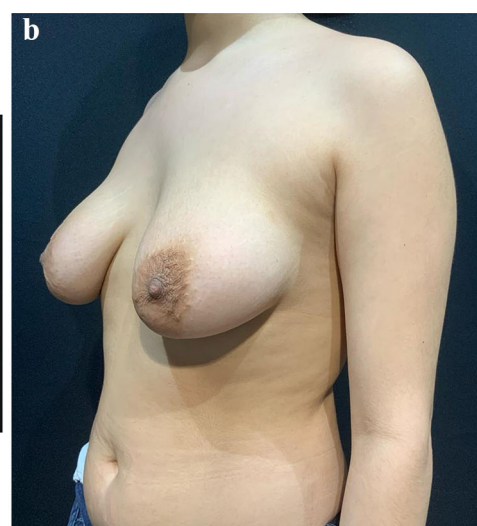
Periareolar mastopexies were performed for tuberous patients in 9 one-stage patients and one mastopexy with fat graft patient. For one-stage augmentation mastopexy, most patients had vertical mastopexy (63.3%) and fat grafting to cleavage in 47.9% (mean 25.2 ml) or upper pole in 4.2% (mean 23.3 ml). For the mastopexy alone patients, most were wise pattern (72.7%) and subsequently 3 (27.3%) went on to have implants.

In terms of complications, there were no early complications: wound breakdown, haematoma or infection. In the longer term, 7 (9.9%) one-stage patients required revision; four for ptosis, two for pocket adjustment and one for scar revision. Seven (12.7%) of mastopexy with fat graft had revisions, five of these did not have implants and had scar revision of the vertical limb or NAC. The remaining two from this group had implants at a second stage and subsequently required revision: one for IMF adjustment and one for upsize with asymmetrical implants. In total revision rate for any form mastopexy without implants was 5 of 52 (9.6%) and for two-stage augmentation mastopexy 2 of 14 (14.3%), $p = 0.52$. Mean follow-up was 11.9 months.

Discussion

The key finding in this review was that 52 of 66 (78.8%) patients who initially planned for staged augmentation mastopexy were satisfied with their breasts and did not progress to their second-stage implant insertion. Their volumetric and aesthetic goals were sufficiently sated by the concurrent use of moderate to high volume of fat grafting in their primary procedure. The vast majority of patients who present requiring a mastopexy request implants to achieve better cleavage or upper pole fullness. Mastopexy alone improves the breast shape and position but does not properly address upper pole and cleavage; however with fat grafting, we can target volume to this region. Large volume fat graft, with around 150 mls of centrifuged fat to the upper pole, allowed us to save almost 4 out of every 5 women planned for this procedure from the lifetime sequelae associated with alloplastic breast implants. This technique modification shows statistically significant benefit to a substantial proportion of women considering or requiring two-stage augmentation mastopexy. It is the authors' view

Fig. 3 a–b Pre-operative views of a 20-year-old female c–d 6-month post-operative views following vertical mastopexy and 70cc per side fat grafting to the upper breast pole



that this is a crucial arrow in the quiver of aesthetic breast surgery and should be offered as an alternative to this patient cohort, not only as a substitute volume adjunct, but also as a potential solution for patients who are wary of undertaking two procedures or committing themselves to the added risks of alloplastic implants.

The high-risk cohort for single-stage augmentation mastopexy are the patients with a dense parenchyma manifesting as a heavy ptotic lower breast pole. Given their greater amount of breast tissue, they have risk of recurrent ptosis, asymmetry and implant complications such as malposition, and waterfall deformity. This is the group we believe recommending mastopexy with high-volume superomedial fat grafting will yield the desired result for most patients in a single stage. Potentially saving almost

80% of these patients the complications, cost and re-operative risks associated with implants.

Through appropriate triaging and counselling of patients for the most appropriate primary operation to achieve their goals, we have maintained low revision rates, which also reduces financial stress, recovery time and psychological burden of ongoing revisions. In our follow-up period, 5 of 52 (9.6%) mastopexy without implants patients, 7 (9.9%) one-stage patients and 2 (14.3%) two-stage augmentation mastopexy required revisions. In the short term, patients who avoid implants, have reduced tension on a skin envelope that has been tightened and reduced chance of complications such as infection, wound breakdown stretching of scars and macroareola. Furthermore, in the long term, not using implants in mastopexy patients maintains the longevity of their result without the need for

Table 1 Demographics and baseline details according to primary operation

	1-stage augmentation mastopexy (<i>n</i> = 71)	Mastopexy with fat graft (<i>n</i> = 55)	Mastopexy alone (<i>n</i> = 11)
Mean age (years)	33.3	32.5	36.7
Mean BMI (kg/m ²)	23.0	23.6	22.7
Asymmetry	61 (85.9%) – 17 tuberous (23.9%)	45 (81.8%) – 11 tuberous (20%)	8 (72.7%) – 3 tuberous (27.3%)
Breastfed proportion and mean time	46 (64.8%) 18.2 months	27 (49%) 18.4 months	5 (45.5%) 31.2 months
Cup size	Average 2.0 children A 10 (16.7%) B 22 (36.7%) C 16 (22.5%) D 11 (15.5%) DD 1 (1.7%)	Average 1.2 children A 2 (3.6%) B 8 (14.5%) C 17 (30.9%) D 14 (25.5%) DD 11 (20%) E 2 (3.6%) F 1 (1.8%)	Average 1.2 children A 1 (9.1%) B 1 (9.1%) C 2 (18.2%) D 2 (18.2%) DD 5 (45.5%)
Ptosis grade	0–5 (7.0%) (tuberous) 1–7 (9.9%) 2–40 (56.3%) 3–19 (26.8%)	1–1 (1.8%) 2–33 (60%) 3–21 (38.2%)	2–8 (72.7%) 3–3 (27.3%)
Striae	50 (70.4%)	37 (67.3%)	8 (72.7%)
Mean SN-NAC distance (range) (cm)	21.9 (18–26)	23.6 (17–29)	24.4 (20.75–30)
Mean inter-NAC distance (range) (cm)	20.0 (17–24)	20.9 (16.5–27)	21.7 (18.5–23.5)
Mean N-IMF distance (range) (cm)	7.6 (4–10)	8.6 (5–12)	8.6 (6.5–9)

Table 2 Operative details of primary operation

	1 stage augmentation mastopexy (<i>n</i> = 71)	Mastopexy with fat graft (<i>n</i> = 55)	Mastopexy alone (<i>n</i> = 11)
Mastopexy pattern	Vertical 45 (63.3%) Wise 17 (23.9%) Periareolar 9 (12.7%)	Wise 30 (54.5%) Vertical 24 (43.6%) Periareolar 1 (1.8%)	Wise 8 (72.7%) Vertical 3 (27.3%)
Mean weight tissue excised per side	12.6 g	72.2 g	51.4 g
Fat graft cleavage proportion and mean volume per side	34/71 (47.9%) 25.2 ml	11/55 (20%) 55.3 ml	0
Fat graft upper pole and mean volume per side	3/71 (4.2%) 23.3 ml	44/56 (78.6%) 129.2 ml	0
Implant	100%	11 (20%)	3 (27.3%)
Revision/complication	7/71 (9.9%) – 4 ptosis – 1 scar revision – 2 pocket	7/55 (12.7%) 5 scar revision (no implants) 2 after implants – 1 IMF after implants – 1 upsize	0

pocket revision, implant exchange, risk of rupture or waterfall deformity.

To optimise our results for mastopexy and fat grafting, we cannot underestimate the importance of sufficient harvest and retention of fat. VASER works as an internal

ultrasound to turn electric energy into vibration, causing thermal, cavitation and mechanical effects which leads to fragmentation of fat and improve ease of removal with decreased bleeding [10]. This technique has previously been doubted for potential damage to adipocytes; however,

the harvested adipocytes have been shown to have 85.1% viability and successful long-term retention [11, 12]. In addition, providing smaller clusters of cells, VASER-assisted fat harvest may facilitate independent adipocyte behaviour, leading to increased angiogenesis, better retention and in our patient cohort, better upper pole fullness [12–14]. These smaller clusters of adipocytes may also reduce formation of oil cysts and potential confusion in breast screening, which we also aim to reduce by grafting into the subcutaneous plane.

Most women with ptotic breasts who present for augmentation mastopexy typically desire a breast lift and implants for better breast position, cleavage and greater upper pole fullness, with mastopexy alone usually insufficient to fill this region [15, 16]. Only a small proportion actually desire truly increased volume. Previously described ‘auto- augmentation’ methods and fascial suspension sutures can be unpredictable and Regnault’s ‘minus-plus’ principle with a breast implant to restore the upper pole volume, and lower pole reduction to correct sagging has prevailed [17, 18]. Augmentation mastopexy is widely recognised as a challenging procedure, requiring extensive patient education and caution related to risk of complications [19]. Surgeons continue to strive to optimise one-stage augmentation mastopexy, to avoid the 100% two-stage re-operation rate. In this effort to not stage the procedure and always place implants in the first surgery, they miss the opportunity to achieve the patient’s goal with mastopexy and fat graft, avoiding implants altogether, their associated necessary revisions and higher complications.

Mastopexy with fat graft has been previously described in four other studies [6–9]. De Fazio et al [6] reported 34 cases of fat grafting and superior pedicle-based mastopexy using an anchor, periareolar or vertical pattern, with successful mild-moderate volume increase. Walters et al. [8] described 140 cases of mastopexy with fat grafting using a central mound pedicle with excellent aesthetic outcomes. Raafat et al. [7] reported 18 cases of mastopexy with fat grafting as one- (27.8%) or two-stage (72.2%) procedure, in order to avoid implants and improve upper pole hollowness. Mangaliardi et al. [9] report on 21 patients with grade two or three ptosis and upper pole hollowness, who underwent superior pedicle mastopexy using a vertical or anchor pattern and fat grafting, with successful contour and volume increase. We are the first to describe use of centrifuged VASER-assisted liposuction as an adjunct for fat harvest for grafting in mastopexy patients, in order to harvest greater volumes and aid fat take. We are also the first to compare fat grafting with mastopexy to patients undergoing implant augmentation mastopexy and to describe a population planned for second-stage breast implants and subsequent avoidance through success of fat graft volume.

Limitations of this study are the small sample size and retrospective nature, meaning we could not assess patient satisfaction such as by using the BREAST-Q. We were limited by low follow-up rates, being mean 11.9 months, due to patients being from all over Australia, including interstate and regional areas. Due to distance, it can be difficult for regional patients to return for follow-up. Future studies with longer follow-up, particularly for fat graft volume assessment, potentially with imaging, and patient satisfaction questionnaires would strengthen our findings.

Conclusions

Our technique for mastopexy and fat graft should be recommended for all patients with heavy glandular ptotic breasts, who require a lift and initially request implants. The senior author’s series shows that the rate of implants after such a procedure is significantly diminished. The use of fat graft to improve the upper pole and cleavage areas is most likely to achieve their goals and thus serve as their definitive procedure. This obviates the need for implant augmentation and the associated costs, complications and future procedures.

Declarations

Conflict of interest No disclosures, funding sources or conflict of interest to declare

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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