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A Safe and Simple Method of Augmentation Mastopexy

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Abstract

Introduction: Combining breast augmentation with mastopexy has historically been considered challenging, with concerns about complications and suboptimal aesthetic outcomes. However, recent data suggest that the combined procedure can be performed safely and effectively.

Materials and Method: This article presents a technique for augmentation mastopexy that aims to minimize complications and is safe to perform. The technique focuses on preserving a robust blood supply, minimizing lower breast contour bottoming out, maintaining upper pole fullness, reducing the risk of recurrent ptosis, minimizing scar burden, and avoiding periareolar scar widening. Precise preoperative and intraoperative markings are crucial for achieving long-lasting results. The use of tailor tacking and marking the vertical excess with the patient in an upright position provides a reliable method for determining the amount of soft tissue resection required.

Results: The results are shown in the postoperative photographs at 10 days, 1 month, and 3 months, respectively. These are compared with the preoperative photographs of the patient's features.

Discussion: The technique incorporates the use of an implant placed in the dual-plane subpectoral pocket to address upper pole flatness and provide structural support in the lower pole. The article emphasizes the importance of preserving Cooper's ligaments during skin resection to maintain the supportive role of the skin. Vertical wedge resection of the lower pole is employed to reconstruct the breast cone and create a strong vertical fibrous band, which contributes to the long-term shape and support of the breast. The article also discusses techniques to mitigate nipple-areolar complex widening and emphasizes the importance of patient selection based on specific criteria.

Conclusion: Overall, the authors present a safe and simple technique for augmentation mastopexy that aims to achieve long-lasting results with minimal complications. The authors advocate for careful patient selection and adherence to their methodology, which incorporates principles of preserving blood supply, maintaining breast contours, and minimizing scar burden.

Keywords

breast augmentation, mastopexy, breast lift, single-stage, breast ptosis, nipple repositioning, purse string suture, round-block suture, tailor tack mastopexy

Introduction

Augmentation mastopexy is a complex procedure that reconciles the diametrically opposed goals of breast shape correction and augmentation of breast volume. It faces challenges by 2 opposing forces: soft tissue expansion through implant placement and skin envelope reduction during mastopexy.[1] We believe that the 2 separate maneuvers can be synergistic when executed sequentially in a manner that safely manages soft tissue tension and simultaneously creates aesthetically pleasing breast volume, contour, and nipple-areolar complex (NAC) appearance.

We believe that the goals of combined augmentation mastopexy should be aimed at maximizing predictability, improving safety, and managing patient expectations.

This article describes a safe and simple surgical technique of augmentation mastopexy that has the goals of preserving the vascular supply of the refashioned soft tissue, creating aesthetic contours of the breast, maintaining the structural support mechanisms of the breast, customizing the amount of resection required, and minimizing the complications commonly associated with the procedure.

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Materials and Method

Patient Selection

In patients considered appropriate for a simultaneous combined procedure, the degree of ptosis as described by Regnault's classification[2] was a useful measurement tool for evaluating the location of the nipple in relationship to the inframammary fold (IMF), and the location of the nipple in relationship to the overall breast mound (Figure 1).

Our patient selection included those with at least Grade II ptosis and had generally healthy lifestyles with minimal medical comorbidities, not obese, and were not current smokers.

The patient consultations consisted of two 1-hour appointments, with the second appointment being scheduled 4 weeks before the day of surgery to perform final assessments, photography, discuss the procedure, manage expectations, and perform screening tests. The patients were offered informed consent and provided written consent to undergo the procedure.

Markings

Thoughtful and precise markings are the key to performing successful vertical augmentation mastopexy.[3] Initial preoperative markings are made on the patient in the upright position before she is premedicated. The midline of the chest is marked first to serve as a landmark. Following this, the IMF is marked. It is a very important breast landmark upon which other significant markings are based. For example, the distance of skin 2 to 4 cm above the IMF represents the lowest limit of skin and glandular dissection during the vertical mastopexy. The new nipple position is also dependent on the IMF level.

Next, the breast meridian is marked from the clavicle down toward the nipple, temporarily omitting the NAC to avoid over-marking of that planned area intraoperatively and continuing the extrapolated meridian line across the IMF.

The new nipple position is marked on the anterior surface of the breast and represents the forward projection of the center of the IMF. This is best done by placing a finger on the central part of the IMF where it joins the meridian of the breast, and imagining a horizontal line extending from this point through the breast to its anterior surface (Figure 2). Where this imaginary line meets the breast meridian becomes the site of the new nipple position.[4-7] In large breasts, this site can be relocated medially 1 to 2 cm to avoid placing the NAC too laterally on the newly augmented breast.[8]

The distance between the new nipple site and sternal notch is then measured (normally 18-22 cm). This measurement should be equidistant on both sides to achieve symmetry and produce an aesthetically pleasing result. The mid-humeral level is also a point of reference to confirm the marking of the new nipple position[9] (Figures 3 and 4).

Shiffman templates (KMI Instruments, Irvine CA, USA) are used to mark the area of dissection required for placement of the implant (Figure 5). The shape and size of the templates

Grade I: Nipple is at the level of the IMF.
Grade II: Nipple is below the IMF but still above the lower breast contour.
Grade III: Nipple is below the IMF and below the lower breast contour.

Figure 1. Regnault's Classification of True Ptosis.

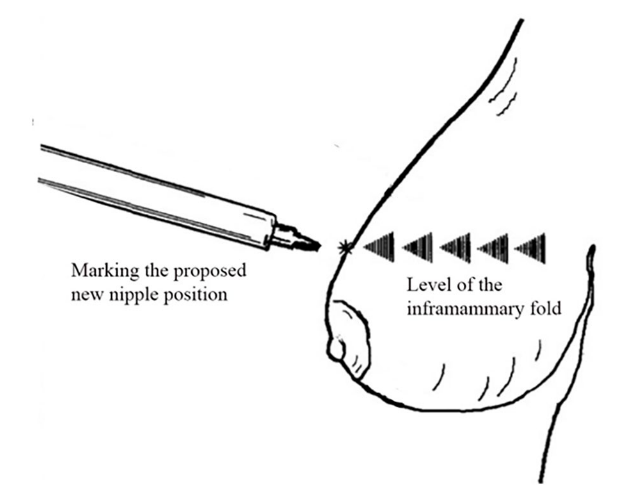

Figure 2. Marking the position of the new nipple position, relative to the level of the inframammary fold (IMF).

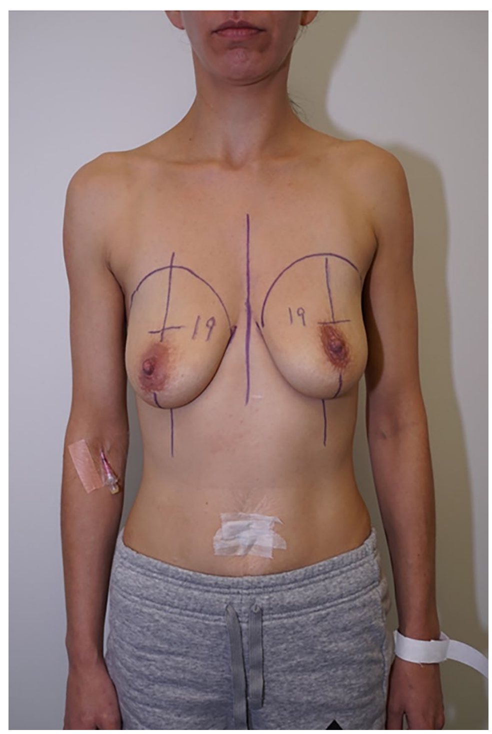

Figure 3. Frontal view of the preoperative markings.

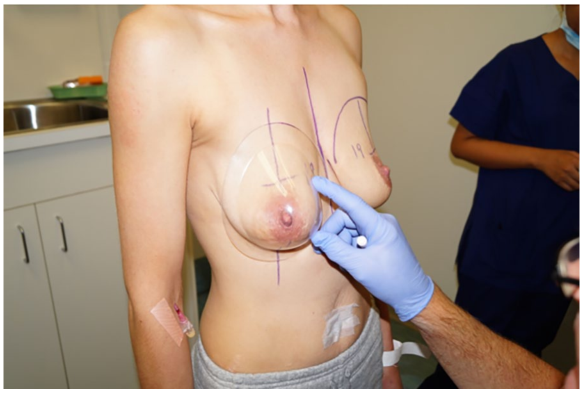

Figure 4. Using the Shiffman template to mark the area of dissection.

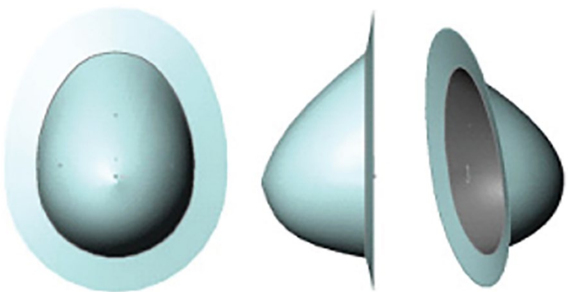

Figure 5. Shiffman template. (KMI Instruments, Irvine CA, USA)

are based on the specific dimensions of the implants (Figure 6). The inter-breast distance is checked at the medial limits of the markings to ensure it is at least 3 cm, to avoid synmastia.

Surgical Technique

The patient is placed supine on the operating table, under general anesthesia, with arms abducted on arm boards. Intravenous antibiotics are given prior to the first incision.

Topical povidone-iodine (10% solution) is used as skin preparation, and a transparent film dressing is applied to the NAC after the povidone-iodine has dried.

The access to the subpectoral pocket is created through a 6 cm vertical skin incision (Figure 7). The location of the incision is placed within the area that is planned for resection in the mastopexy component of the procedure. The incision is inferior to the inferior edge of the areola and at least 3 cm away from the IMF marking.

Local anesthetic infiltration with 10 to 15 mL of tumescent solution (Figure 8) along the vertical marking is followed by skin incision and deeper incision through the subcutaneous tissue. The glandular tissue is incised in a vertical fashion, down to pectoral fascia (Figure 9). We proceed with a type 2

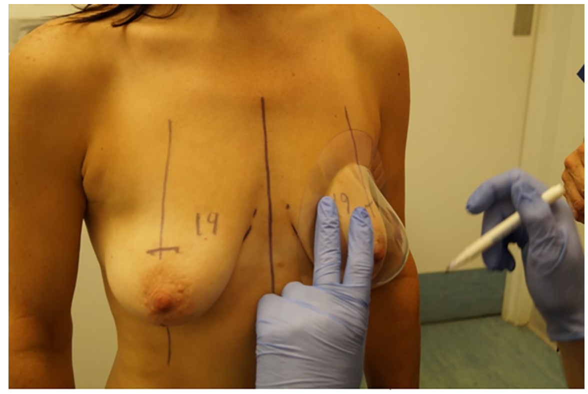

Figure 6. Preoperative markings using the Shiffman template.

Figure 7. Perioperative marking of the 6cm vertical skin incision.

Local anesthetic tumescent solution: 300 mg of lignocaine, 1 mg of adrenaline, and 10 mEq of sodium bicarbonate added to 1 liter of warmed 0.9% normal saline.

Figure 8. Formula used to prepare the tumescent solution.

dual-plane modification by Tebbetts.[10] This involves dissecting the subglandular plane to release it from the pectoral fascia, followed by the creation of a subpectoral pocket.

Pocket Dissection

To avoid burning bridges and producing undue compression on the nipple-areolar complex and the remaining soft tissue, the implant is inserted first and closure of the pocket occurs *before* the vertical mastopexy component begins.

Infiltration of the subpectoral space with tumescent local anesthetic solution is used to hydro-dissect the pocket. We use a dual-plane subpectoral pocket technique,[10] which involves partially dissecting the inferolateral fibers of the pectoralis

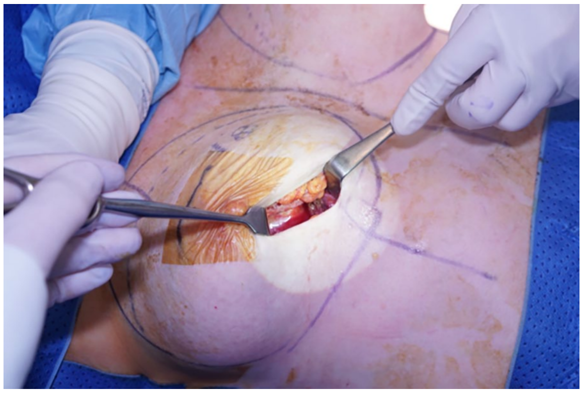

Figure 9. Vertical dissection of the glandular tissue to reach the pectoral fascia.

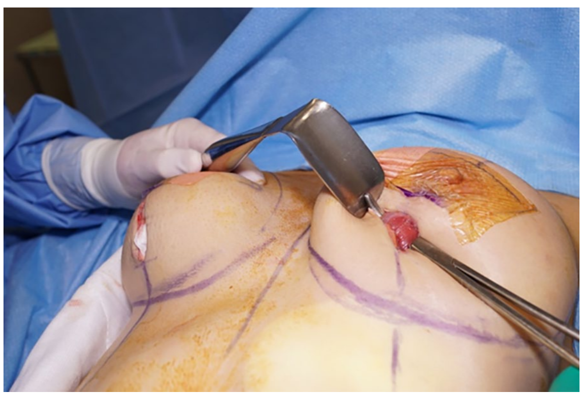

Figure 10. Perioperative photograph identifying the lateral edge of the pectoralis major muscle.

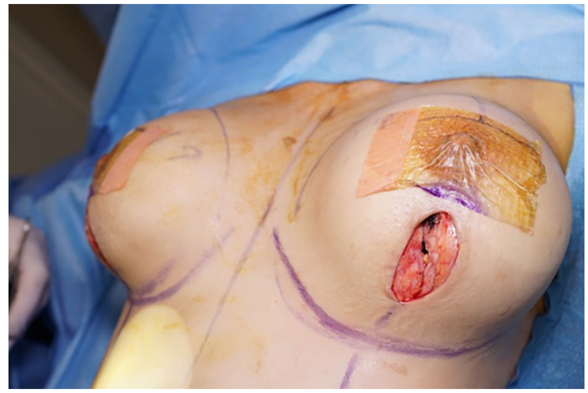

Figure 11. Perioperative photograph of the incision after the implant has been inserted in the dual-plane subpectoral pocket.

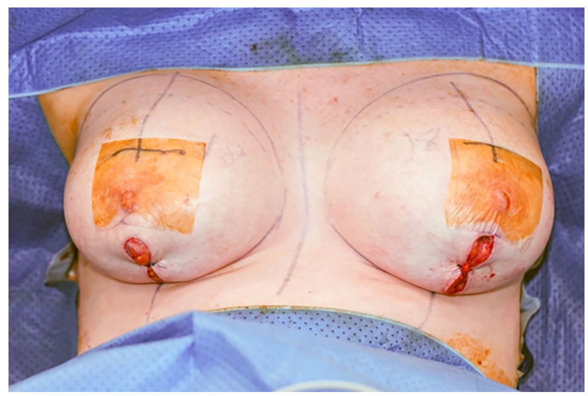

Figure 12. Photograph of the anesthetized patient in the upright position, with a cardinal suture in the inferior incision, prior to tailor tacking.

major muscle. Local anesthesia with chemical vasoconstriction provided by the adrenaline in the tumescent solution facilitates hemostasis during the dissection process.

The inferomedial origins of the pectoralis major muscle are identified (Figure 10) and dissected with cautery. Starting with the most lateral edge of the muscle we proceed in a superomedial direction, being cautious to leave 1 cm of muscle origin attached and not dissecting beyond the medial limit as defined by the Shiffman template marking. Limiting the medial extent of the subglandular release and medial extent of dissection of the subpectoral plane ensures that a minimum breast separation of 3 cm is maintained.

Blunt dissection proceeds with the use of a customized paddle instrument to create the subpectoral pocket (KMI Instruments, Irvine CA, USA).

Hemostasis is achieved within the pocket and surrounding soft tissue. Using a gentamicin-saline solution, we first irrigate the skin around the incision and follow with irrigation of the pocket with the antibiotic solution (gentamicin 80 mg/500 mL normal saline).

Using washed gloves, the implant is inserted into the pocket (Figure 11). If the access incision is tight, we employ a Keller funnel to assist with insertion.[11] The 14-point plan[12] is implemented as practical as possible to reduce the development of bacterial biofilms. Round, smooth, form-stable silicone gel-filled implants are used (Allergan, Santa Barbara CA, USA).

Insertion is followed by closure of the incision with a single 1-0 polypropylene suture through all layers of the deep soft tissue. The skin layer is closed with skin staples (Covidien, Medtronic, USA).

The amount of planned tissue resection is conservatively estimated and should not be finalized until the implant is securely positioned in the closed pocket. This involves repositioning the anesthetized patient in the upright position, visualizing the new breast mound with the implant inserted, and tailor tacking the inferior breast skin to evaluate the vertical excess, which needs to be removed (Figures 12-14). This part of the planning process is crucial in determining the

Figure 13. Photograph of the anesthetized patient in the upright position, prior to tailor tacking.

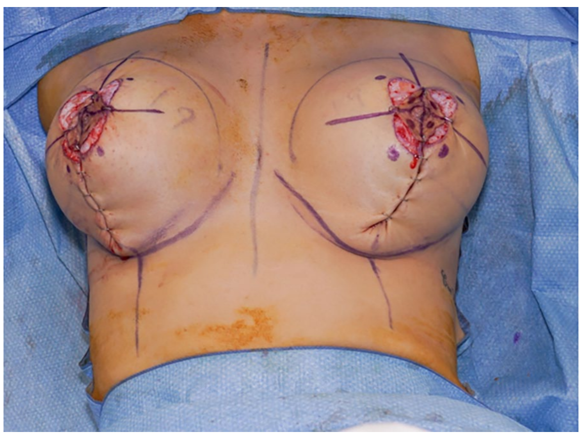

Figure 14. Photograph of the patient in the upright position after tailor tacking has been completed with skin staples.

final skin-and-soft-tissue brassiere, which will ultimately bolster the implant and breast mound, and support the new NAC in its optimal position.

The proposed vertical tissue excision is not marked until confirmation that closure can be performed without tension. The first tailor tack is placed with 1 cardinal 2-0 polypropylene suture in the middle of the planned vertical excision (Figure 12). The surgical assistant pinches the skin of the lower pole of the breast laterally and medially, to appose the edges of the proposed vertical closure. The rest of the vertical pillars are apposed and temporarily fixed using skin staples (Figure 15).

The amount of vertical excision is marked with the tailor tacks in place (Figure 16). These vertical markings will determine the medial and lateral limits of the vertical skin closure. Once the vertical skin is marked, the staples are removed and the marking plan continues. The lower edges of the vertical markings are joined in an elliptical manner to meet at a point approximately 3 cm above the IMF marking

Figure 15. The vertical pillars are apposed and temporarily fixed with skin staples.

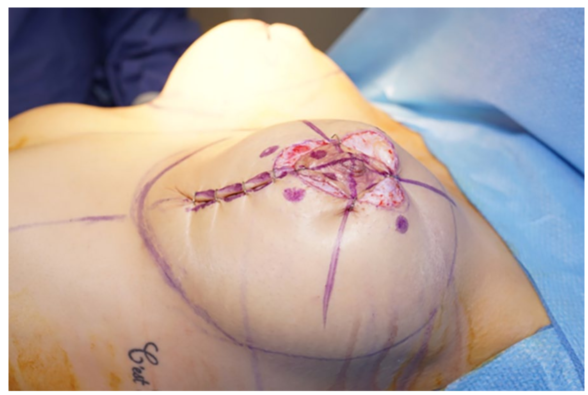

Figure 16. Photograph of the marked vertical pillars, with the tailor tacks in place.

(Figure 17). This completes the markings and plan for the vertical component of the mastopexy.

Vertical Tissue Excision

Using 2 Allis skin forceps to grip all layers of the vertical pillars on the stretch, we excise the vertical excess off the medial and lateral soft tissue flaps. The scalpel blade is beveled toward the breast meridian to avoid skin undermining. Equal amounts of soft tissue are removed from both pillars and weighed to ensure symmetry of tissue excision (Figure 18).

Once adequate vertical excess tissue is excised, cardinal markings are made on the skin of the vertical pillars to assist with guiding the closure of the vertical wound. This involves marking the middle of the vertical pillars with a dash on each side, and a dot on each side, which bisects the halves created by the dash. Through experience, we have determined that this is the best way to achieve aesthetically pleasing apposition of the vertical pillar edges and produce a straight scar that best represents the new lower breast meridian (Figure 19).

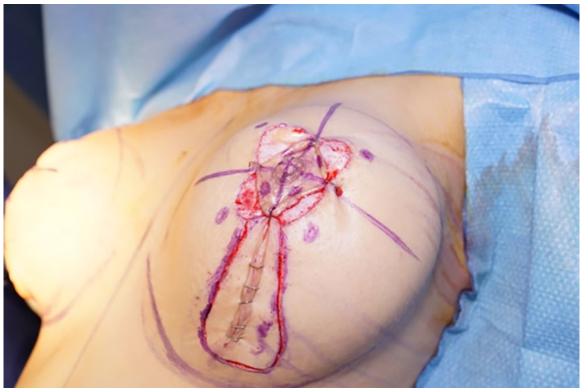

Figure 17. Photograph of the vertical pillar markings with the tailor tacks removed, and the skin marking scored with a scalpel blade.

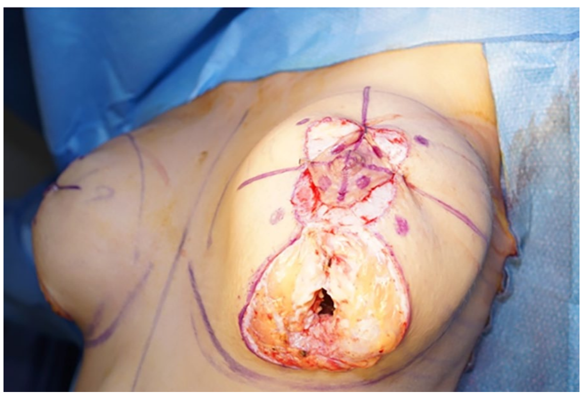

Figure 18. Perioperative photograph of the inferior wedge excision of excess soft tissue, prior to the vertical pillars being closed by matching composite anatomical subunits on opposing surfaces (breast parenchyma, fat, subcutaneous fat, and dermis).

The vertical pillars are closed in layers; matching breast parenchymal subunits on each side; subcutaneous fat on each side; dermis on each side and finally subcuticular sutures. Wound drains are not used in our technique. For added strength in the vertical closure, we use skin staples to minimize the wound tension during the initial phase of healing (Figure 20). The skin staples are removed in 10 to 14 days.

Figure 19. Cardinal markings are made on the skin of the vertical pillars to assist with closure of the vertical excision.

Figure 20. Skin staples are used to strengthen the vertical wedge resection wound closure. The staples are removed in 10 to 14 days.

NAC Markings

We incorporate a 42 mm diameter areolar cutter ("cookie cutter") to facilitate planning of the area of de-epithelialization (DE), in preparation for transposition of the NAC. The cookie cutter is used to mark the reduced NAC circumference, centered on the nipple, which defines the internal limits of the DE area (Figure 21). Next, we mark the new position of the NAC with the same areolar cutter, the center of that marker being centered on the predetermined site of the new nipple. The superior edge of the new NAC circumference marks the upper most limit of the area of DE, which is 2 cm above the new nipple site; or approximately half the diameter of the areolar cutter (Figure 22).

The external limit of the area of DE is determined with the dome pattern skin marking.[13-15] This dome pattern is drawn freehand as 2 curvilinear lines that aim to enclose the new, reduced NAC (Figure 23). The area between the dome and cookie cutter circle around the NAC is planned for DE.

Figure 21. The cookie cutter is used to mark the reduced NAC circumference.

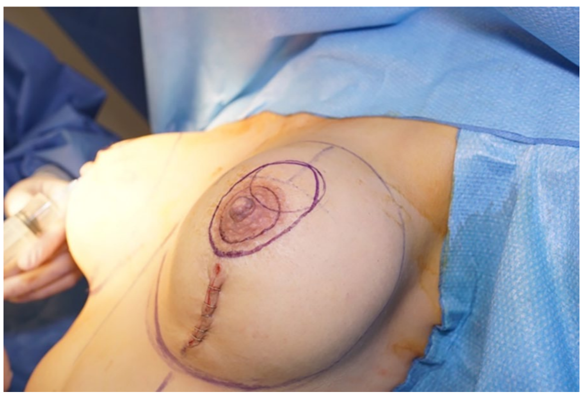

Figure 22. The superior edge of the new NAC circumference marks the upper most limit of the area of de-epithelialization.

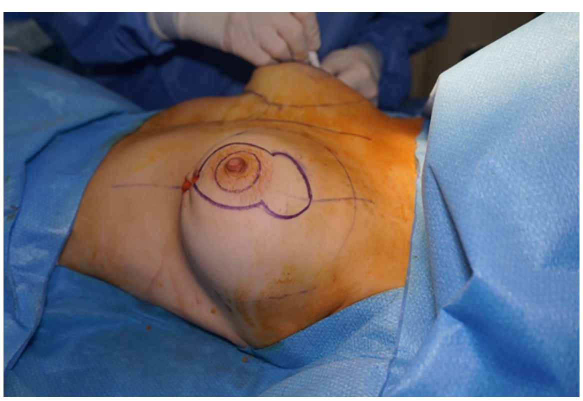

Figure 23. Perioperative marking of the dome skin pattern for moderate NAC transposition and closure.

After the end of the dome markings, 2 more curvilinear lines are marked outside the areolar skin and these inferior lines meet below the areola, ensuring that all pigmented areolar skin is included in the area to be de-epithelialized. The inferior lines usually meet the upper edges of the vertical pillars created earlier in our vertical excess excision pattern. Depending on the planned distance of NAC transposition, these external markings are customized to this dome-type pattern, or a Benelli-type pattern if the distance of NAC transposition is short.[16]

Figure 24. Perioperative photograph of the final area of de-epithelialization. (Benelli-type pattern, because the distance of NAC transposition is short)

Figure 25. Perioperative photograph of the Parry markings.

With the area of DE now marked and infiltrated with tumescent solution, we proceed with DE (Figure 24).

NAC Closure

Cardinal markings are made on the outer dome to match corresponding positions in the inner NAC skin: The tip of the dome (12 o'clock) is at the meridian line and it corresponds with a vertical line marked on the NAC skin (Figure 25).

The middle of the curvilinear line of the dome is determined by bisecting it and placing a dash horizontal marking. This corresponds with a horizontal line marked on the NAC skin. Exactly in between the vertical and horizontal lines on

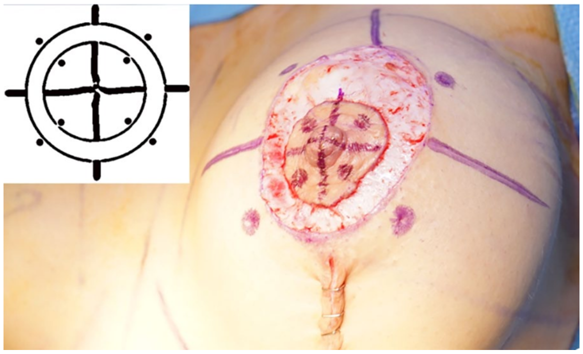

Figure 26. A diagram and perioperative photograph of the Parry markings.

the dome and the NAC are corresponding dots placed strategically to help with NAC orientation for closure; dashes matched to dashes, dots matched to dots. We call these "Parry markings," named after our anesthetist Dr Kevin Parry who suggested the technique (Figure 26).

An initial cardinal suture is placed to join the top of the dome with the 12 o'clock position of the NAC. The next cardinal suture is a 3-point suture placed at the 6 o'clock position of the NAC, drawing together that part of the NAC to the 2 upper edges of the vertical pillars below (Figure 17).

The next cardinal sutures are placed at the 3 o'clock and 9 o'clock positions to approximate the Parry markings on the NAC border with the corresponding markings on the borders of the dome (Figure 19).

Round-Block Purse String Suture

The medial cardinal suture is removed and the start of the purse string suture begins at this point. The areola is fixed to the medial border of the dome incision with a 2-0 polypropylene suture through a dermal window created near the medial skin edge. This will determine the final position of the purse string suture knot for future reference should any complications occur involving the suture. The second purpose of the dermal window is to bury the knot subcutaneously to avoid extrusion.

Our use of a round-block purse string suture involves both the dome skin edge and the edge of the NAC, bringing together matching points of dashes and dots according to the Parry markings. This permanent round-block suture resists stretching and enlargement of the NAC.[17]

With a non-absorbable 2-0 polypropylene suture on a straight cutting needle, the purse string suture is started at the deep dermal edge of the outer skin marking and extends to the deep dermal edge of the NAC. The direction is alternately away and toward the NAC, to the outer dome edge, matching corresponding dashes to dashes, and dots to dots, keeping in the deep dermal plane. The matching dermis is gradually

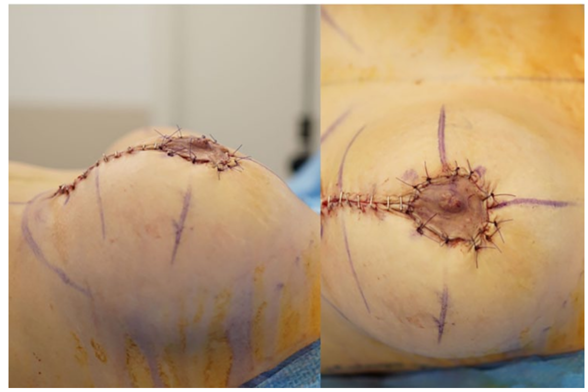

Figure 27. Lateral and frontal views of the final closure of the vertical resection, with the patient in the supine position.
Note. Interrupted sutures are used to close the small gaping areas in the nipple-areolar complex (NAC) wound, after the round-block purse string closure.

cinched together as the purse string suture continues along the new NAC, approximating the size of the new nipple-areolar complex (Figure 20). Due to the larger circumference of the outer skin edge compared with the desired areolar circumference, there is some expected degree of skin pleating. The small areas of gaping are closed with interrupted 3-0 dyed Monocryl sutures (Ethicon, Georgia USA) on a non-cutting tapered needle (Figure 27). Our experience with this type of suture is that it is non-irritant to the circumareolar scar during the healing process and holds the NAC wound adequately to produce satisfactory NAC scar appearance. Paper surgical tape (Micropore, 3M, USA) is applied on the wounds after closure. The interrupted Monocryl sutures are removed in 7 to 10 days and the surgical tape is replaced at this time (Figure 28).

Results

The results are shown (Figures 28, 29, and 31) in the postoperative photographs at 10 days, 1 month and 3 months, respectively. These are compared with the preoperative photographs of the patient's features presented in Figure 30.

Discussion

Augmentation mastopexy aims to achieve multiple goals, including elevating the breast mound and NAC, increasing breast volume, and transforming sagging, discoid-shaped breasts into symmetric, conical, and youthful-looking breasts with ideal NAC appearance. This involves a balance between reducing the skin envelope and expansion of the breast volume through augmentation.[18]

Augmentation mastopexy was introduced in the 1960s by Gonzalez-Ulloa[19] and valuable advances were made by Regnault[2] to treat the hypoplastic and ptotic breast. The complexity of the combined procedure is considered challenging

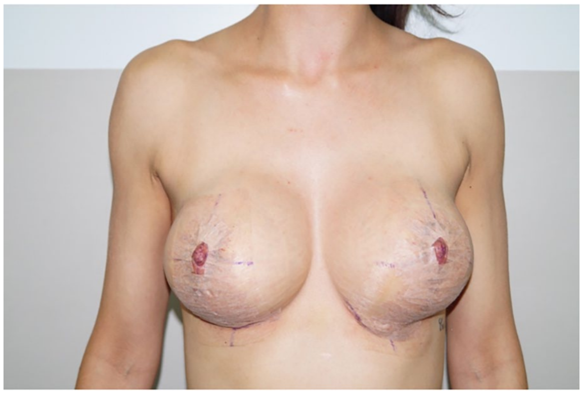

Figure 28. Frontal view of the results 10 days postoperatively.

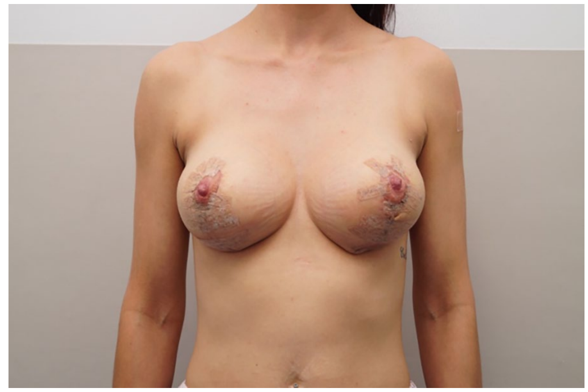

Figure 29. Frontal view of the results 1 month postoperatively.

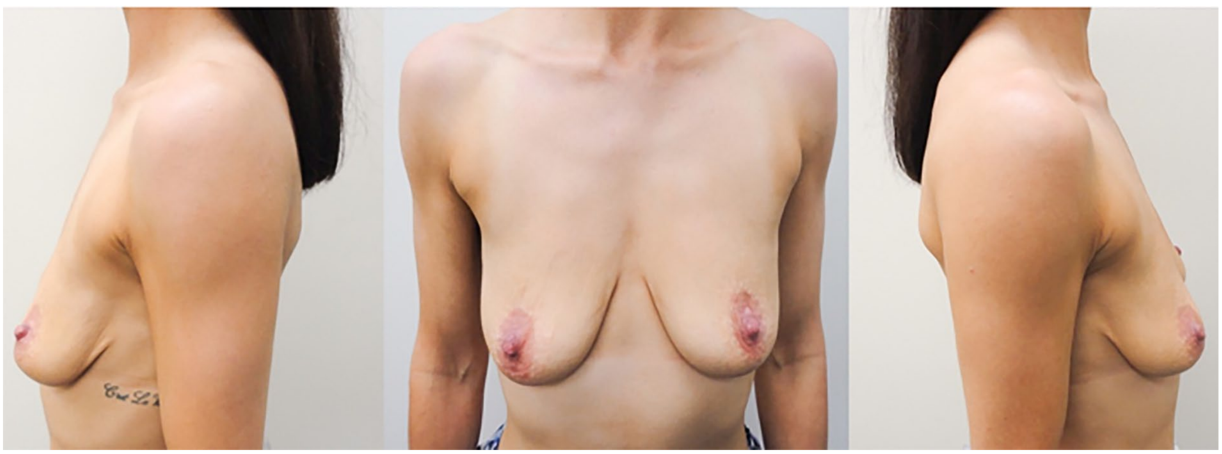

Figure 30. Frontal and lateral views of the patient's features preoperatively.

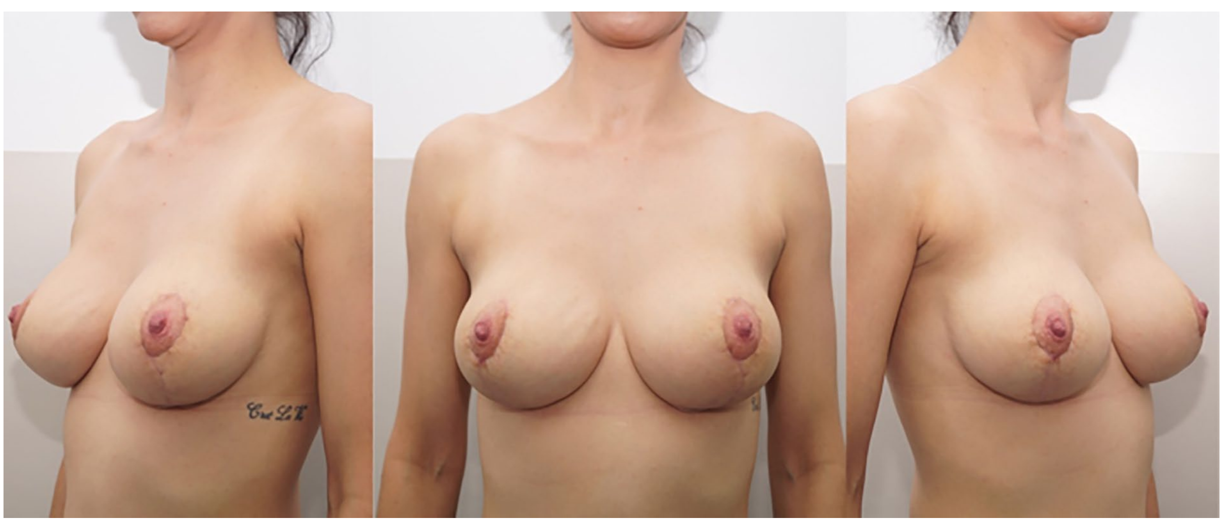

Figure 31. Frontal and oblique views of the results 3 months postoperatively.

and it has inspired much debate, including cautionary publications eluding to potential complications and aesthetically displeasing outcomes. Previously, it has been declared that combining the procedure generates a more-than-additive risk for complications normally associated with each of the individual procedures.[20-22]

Recent data has suggested the combined procedure can be performed with rewarding results and with reoperation risks that are acceptable, if the surgeon is experienced and the patient selection is appropriate.[23-25]

Perhaps as a result of the historic difficulty associated with the single-stage procedure, there is reluctance to promote a "low risk" and universally accepted technique. This may explain why there is heterogeneity of surgeons' experiences with their own advocated method and a paucity of data related to any universally adopted surgical techniques, their associated complications and identified risk factors.

Our technique aims to minimize the potential complications associated with single-stage breast augmentation mastopexy. The contributing factors include preservation of a robust blood supply, utilizing a tailored resection technique to minimize excessive excision and avoid skin undermining, employing operative principles to prevent lower breast contour bottoming out and maintain a rounded lower pole contour, achieving and preserving upper pole fullness, mitigating the risk of recurrent ptosis, minimizing scar burden, and reducing the likelihood of periareolar scar widening.

The use of thoughtful and precise markings preoperatively and intraoperatively are the key to long-lasting results. Shiffman templates are used to precisely mark the area of dissection of the subpectoral pocket. Each template is customized in size and shape to accommodate the corresponding base-width of the round implant. Marking the new position of the nipple as the forward projection of the IMF is a reliable method.[26] We double check the new nipple position as the most projected part of the new breast mound, both by this method and intraoperatively when the anesthetized patient is positioned in the upright position with the implant in the subpectoral pocket.

To avoid producing undue compression on the NAC pedicles and tension on the soft tissue pillars, the implant is inserted first and temporary closure of the pocket occurs before the vertical mastopexy begins. The breast and soft tissues are reshaped *after* volume augmentation. This means that the soft tissue and skin needs to be re-draped over the new breast mound, with NAC transposition in the optimal position.

In our technique, the incorporation of an implant under the muscle addresses the flatness in the upper pole and adds structural support in the lower pole to maintain the rounded contour.

Because of the competing nature of soft tissue rearrangement over an implant and concomitant movement of the nipple-areolar complex, it has been suggested that augmentation mastopexy, as a combined procedure, introduces the opportunity for disastrous complications, including nipple loss, nipple malposition, and necrosis of skin flaps.[27,28] Perhaps because of the historical difficulty assigned to the operation and surgeons' subsequent reticence to perform a single-stage operation, few articles have sufficient numbers to identify statistically significant risk factors. Arguments continue on the safety and reliability of this procedure as breast surgeons search for a simple, reliable method with minimal complications or requirements for revision.[29-34]

The use of tailor tacking and marking the vertical excess with the patient in the upright position was a reliable method to determine the exact amount of soft tissue resection required. This is in contrast to the Wise pattern technique[35,36] which involves finalizing the markings of the predetermined area of resection with the patient in the supine position and in some cases, *before* the implant is inserted. We believe that this adds unnecessary risk to producing tension on the closure of the soft tissue.

The benefits of inferior vertical wedge resection were described by Lassus in reduction mammaplasty[37,38] and also apply in augmentation mastopexy. In our approach of vertical wedge resection of the lower pole, the remaining blood supply comes from multiple sources preserved from the remaining pedicles, as well as the subdermal plexus.

We believe the inferior vertical wedge resection technique is a reliable method, which produces long-lasting and predictable results. The contributing factors include preservation of a robust blood supply by preserving superior, medial and lateral breast pedicles, and the customized "en-bloc" resection that limits unnecessary excision and avoids skin undermining. These operative principles minimize lower breast contour bottoming out, maintain the rounded lower pole contour, reduce the risk of recurrent ptosis, and reduce the scar burden.

What causes bottoming out? Lassus believes disruption or weakening of Cooper's ligaments and undermining of the skin produce bottoming out.[39] Between the deep layer of the mammary gland and the fascia of the pectoralis muscle is a well-defined space, the retromammary (RM) space, which contains loose areolar tissue that allows the breast to glide over the chest wall. There are portions of the gland, which form connective tissue extensions that pass through the RM space and join with the pectoral fascia, which help support the breast. However, the mammary gland is more intimately connected with the skin than with the muscle. Particularly in young patients, the adherent elastic skin and its subcutaneous structures play a dominant role in the support of the mammary gland.

The skin of the breast is closely adherent to the underlying structures. Numerous strong fibrous projections extend into the inner aspect of the skin covering. These projections of fibrous tissue constitute Cooper's ligaments. They link the skin to the gland, the gland to the NAC, and various portions of the gland to one another (Figure 32). Once the skin and its suspensory ligaments are weakened or disrupted, they lose their supportive ability. Therefore, bottoming out can be caused by poor skin tone, damaged skin, repeated lactations or fluctuations in weight, strain imposed by breast hypertrophy, age-related involution, or surgical disruption.

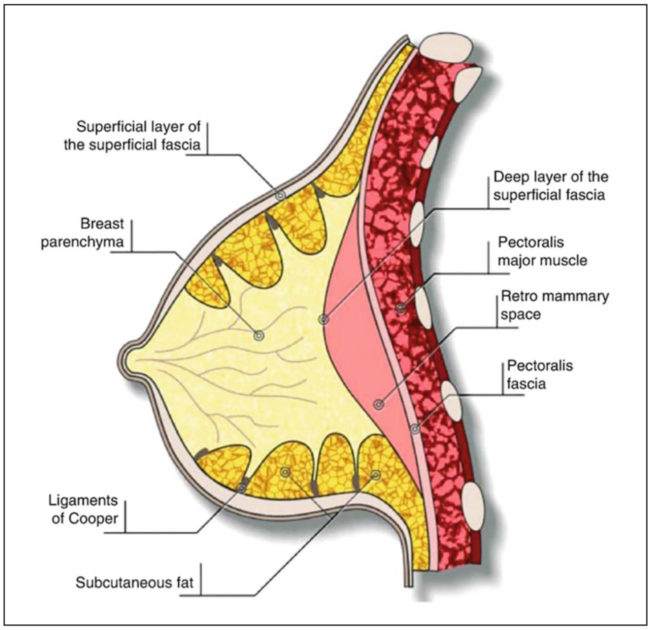

Figure 32. Diagram of the breast, showing Cooper's ligaments and their relationship with the breast parenchyma, the superficial fascia and skin, and the retromammary space.
Source. Reprinted with permission from Anatomy of the Breast: A Clinical Application. In: Hamdi, M. Vertical Scar Mammaplasty. Springer, Berlin, Heidelberg (2018).

Figure 33. Photograph of a corset with whalebone supports.

In our technique, we limit skin resection and avoid skin undermining to preserve Cooper's ligaments, which we believe contributes to long-lasting results. This is achieved by customizing the amount of skin resection we perform through the use of tailor tacking. Our perioperative marking for resection of the central vertical wedge is similar in principle to the modification of the Lejour vertical mammaplasty technique[5] but does not include any skin undermining. We believe that this conservative approach limits complications related to the vascularity of the remaining dermato-glandular flaps, which form the new inferior pole contour.

The advantage of vertical wedge resection is removing almost the entire ptotic inferior portion of the breast, leaving the remaining part of the breast at the level of the IMF or above it (Figures 27-30). This simple principle is compared with the disadvantages of Wise-type procedures of skin and parenchymal resection, which reduces the size of the breast by a combination of vertical and horizontal resections, and produces a less projected breast compared with the vertical resection technique.[40] Furthermore, if the skin and gland have been detached in the Wise-type resection, the remaining part of the breast will glide and descend, creating bottoming out of the lower pole over time. This is due to the fact that the skin will no longer play a supportive role because Cooper's ligaments have been severed. In our surgical technique, there is no undermining of skin, therefore preserving the breast structures in their original anatomic configurations and supportive roles.

With central vertical wedge resection the breast cone is reconstructed by repositioning the lateral parts of the remaining breast centrally toward each other to create the new inferior pole. This maneuver both eliminates any dead space in the breast and overall, puts the 2 composite anatomical subunits in close contact, in perfect congruency with each other upon closure. The composite subunits are breast parenchyma, fat, and skin. They match perfectly together and therefore fit perfectly together. After healing occurs, because the units are perfectly matched, this produces a strong vertical fibrous band that is believed to play the same role as the "whalebone" in a corset.[39] The whalebone structures in a corset form the integral components that maintain shape and strength in all the other parts of the corset (Figure 33).

In contrast to vertical wedge resection, many of the "inverted T" (Wise-pattern type) approaches to breast reduction involve a horizontal wedge resection of both skin and parenchyma, which may result in lateral and medial dog ears at the horizontal wound. This type of resection pattern tends to produce a wider base and hence the "boxy" shape in the lower breast pole.[41]

The vertical resection mammaplasty technique, originally described in 1994 by Lejour, cones and narrows the breast,[4] but it may also result in dog ears upon closure of the vertical incision. Our technique avoids the dog ear deformity at the end of closure by a combination of customization of resection, and matching subunits from each of the pillars of the vertical wedge resection, in congruency. This can only be achieved by intraoperatively gauging the amount of resection required and planning the exact amount of excision needed to avoid dog ears, while still producing the rounded lower pole contour.

In our technique, we compensate for mild predicted descent of the implant and soft tissue. Similar to Lejour's approach to vertical resection mammaplasty, our method of closure of the lower pole is slightly less rounded to account for mild descent of the rounded profile of the implant and its effect on the lower breast contour, with time and gravity (Figure 27). Our technique does not incorporate liposuction, as was described in Lejour's technique.

Widening of the NAC is a potential adverse effect of mastopexy procedures. We have chosen a stable closure method that combines the wagon-wheel suture technique described by Hammond et al[17] and the use of a permanent suture, but we have chosen not to interlock the suture. The de-epithelialized skin is enclosed over the new NAC using a purse string suture that is non-absorbable (2-0 polypropylene). The degree of NAC widening after mastopexy is mitigated by the use of a permanent round-block suture.[42] It is also minimized because our customization of resection and degree of NAC transposition affords us the ability to close the incision with little to no outward tension, which would contribute to the risk of NAC scar widening.

In our approach, we present a consistent and reproducible surgical methodology that is characterized by its simplicity in planning and safe execution. However, it is important to note that we have intentionally limited the scope of this procedure to patients exhibiting mild or moderate breast ptosis and those who are in excellent overall health. This restriction represents a specific limitation of our surgical method.

The decision to stage or combine the procedure must be based on an individualized, aesthetic evaluation of the patient and the surgeon's experience. Based on a survey of the literature,[23] the ideal candidate for single-stage augmentation mastopexy generally has a soft, flaccid breast, requires correction of Regnault Grade I or II ptosis without the need for extreme skin or parenchymal resection, desires moderate augmentation (<360 mL), has good skin elasticity, and has low perioperative risk factors (no current smoking and is not obese). These ideal characteristics in patient profile and breast anatomy were featured in the selection of our patients who underwent single-stage augmentation mastopexy using our technique. In contrast, patients with extreme ptosis or those presenting with additional complexities, such as extreme asymmetry or high perioperative and postoperative risk factors, were excluded as potential candidates for our single-stage technique.

Another limitation of our study is the temporary lack of access to some patient notes at the time of writing. Due to permanent closure of the cosmetic surgical facility in which the procedure was performed and studied, some of the patient notes were temporarily unavailable. The impact of this limitation means that the current article remains a descriptive manuscript on the surgical method only.

Given the constraints in our study concerning the availability of follow-up data, it would be pertinent to conduct a comprehensive review of the adverse effects and patient satisfaction data, encompassing both short-term and long-term outcomes. We intend to present this essential research in a forthcoming article that is presently under development, as we are collecting the notes of over 50 patients who underwent this procedure.

The common complications, which surgeons need to be aware of, can be categorized as implant-related and mastopexy-related. Spear, in a study of 23 primary and 30 secondary augmentation mastopexy patients after 3 years of follow-up, noted rare but significant risks.[33] In the primary augmentation mastopexy patients, there was 1 case of transient NAC ischemia, 1 minor wound separation, 2 revisions for capsular contracture necessitating reoperation, and 1 revision for correction of nipple malposition. Other risks, although not unique to the combined augmentation mastopexy procedure but were increased relative to simple augmentation, included implant exposure, infection, poor or hypertrophic scars, and decreased nipple sensation.

In a 5-year follow-up study of 332 patients, Calobrace et al revealed comparable soft tissue and implant-related reoperation rates for both the combined augmentation mastopexy procedure and individual procedures, contrary to the belief that the combined procedure carried a higher risk compared with each individual procedure.[34] Specifically, this large study indicated a tissue-related reoperation rate of 13.6% for simultaneous augmentation mastopexy, akin to the 10.2% reoperation rate observed for mastopexy alone. These rates align with previous research reporting an 8.6% reoperation rate for mastopexy alone by Stevens et al.[31] Furthermore, the implant-related reoperation rate of 9.6% in their simultaneous procedure did not surpass rates reported for augmentation alone. Mentor's 6-year data reported a 19.4% reoperation rate in primary breast augmentation,[43] and Allergan's data showed a 28% reoperation rate.[44] In Calobrace's investigation, the main implant-related reoperation indications (capsular contracture, implant size change, and implant malposition) aligned with Mentor and Allergan's primary augmentation findings.

However polarized the subject of combined augmentation mastopexy is, the literature is relatively limited with respect to surgical technique and outcomes of interest. In cosmetic surgery reporting, complexities arise because aesthetic outcomes and patient satisfaction often hold equal importance to tangible factors like hematoma, infection, or wound breakdown. Moreover, due to the need for careful patient selection and the procedure's inherent technical complexity, numerous reports suffer from limited patient cohorts.[23]

In a systematic review and meta-analysis of 15 studies, Khavanin et al demonstrated a pooled complication rate of 13%, with the most common individual complication being recurrent ptosis (5.2%). The other tissue-related complications included poor or hypertrophic scarring (3.74%), and asymmetry of the breast or NAC (2.7%). In terms of implant-related complications, the most common was capsular contracture (pooled incidence of 3%). Hematoma, seroma, and infection were rare, with pooled incidences of 1.4%, 1.4%, and 0.93%, respectively. Pooling data from 13 studies, a reoperation rate of 10.65% emerged. In the studies with at least 1-year follow-up, the rate increased to 16.13%. This notably contrasts with the 100% reoperation rate in 2-stage procedures. The diverse range of reoperation definitions encompassed minor procedures under local anesthetic, to reoperations for more severe complications, to implant size exchanges based on patient preference.

The procedure's complexity and variable execution, along with the importance of precise patient selection, often result in small patient cohorts in existing reports.[23] The current state of the literature is relatively sparse and heterogeneous.[24,27-29,31,33] Considering these constraints within the available literature, making evidence-based decisions that balance the potential increased risks of complications and suboptimal aesthetic outcomes with the advantages of a single-stage procedure is challenging.

Conclusion

There are concerns about the technically challenging nature of the combined procedure of breast augmentation and mastopexy. It encompasses 2 objectives that are at odds with each other; expansion of breast volume and reduction of the skin envelope. In contrast, the recent literature has demonstrated acceptable complication and reoperation rates with the concomitant advantages of avoiding a second operation, avoiding a second anesthetic, lower costs and potentially achieving greater patient satisfaction. We have described a single-stage augmentation mastopexy technique, which is simple in planning and execution. In our method, we have anticipated and minimized the risks of potential complications. By respecting the vascular supply of the breast parenchyma and skin, and minimizing unnecessary resection of the breast tissue through the use of tailor tacking, we have avoided soft tissue-related complications. The placement of an implant in a dual-plane subpectoral pocket, the customized inferior wedge resection technique, and the subsequent reformation of the lower pole contour by matching congruent subunits, all contribute to promoting fullness in the upper pole and a rounded contour in the lower pole of the breast. A round-block suture was used in the NAC closure to minimize the risk of widening, while mitigation of bottoming out ensured the NAC position remained in the ideal position and the lower breast contour is smooth and rounded. Considering the limitations in our current study's follow-up data, a comprehensive evaluation of adverse effects and patient satisfaction data, covering both short-term and long-term outcomes, would be highly relevant. We plan to present this crucial research in an upcoming article, which would demonstrate that our simple technique allows combined augmentation and mastopexy to be performed aesthetically and safely.

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References

1. Patronella CK, Mentz HA, Johnson-Alviza J. The delay fill technique: a safer approach to combination augmentation mastopexy. *Semin Plast Surg*. 2015;29(2):85-93.
2. Regnault P. The hypoplastic and ptotic breast: a combined operation with prosthetic augmentation. *Plast Reconstr Surg*. 1966;37(1):31-37.
3. Chirappapha P, Pornchai S. Vertical mastopexy. *Thai J Surg*. 2019;40(4):117-125.
4. Lejour M. Vertical mammaplasty and liposuction of the breast. *Plast Reconstr Surg*. 1994;94(1):100-114.
5. Wallach SG. Technical refinements of the vertical mammaplasty: a modified lejour approach. *Aesthet Surg J*. 2006;26(2):179-187.
6. Schneider MS, Gouverne ML. Explantation and mastopexy: the vertical mammaplasty technique to optimize breast shape. *Aesthet Surg J*. 1997;17(1):18-21.
7. Tebbetts JB. A process for quantifying aesthetic and functional breast surgery: I. Quantifying optimal nipple position and vertical and horizontal skin excess for mastopexy and breast reduction. *Plast Reconstr Surg*. 2013;132(1):65-73.
8. Jessica Lai HM, Lam T. A mathematical design in creating the new nipple-areolar complex in vertical mammaplasty. *Plast Reconstr Surg Glob Open*. 2014;2(7):e177.
9. Highton LR, Murphy JA. Immediate nipple-areolar complex reconstruction for patients undergoing implant-based reconstruction or therapeutic mammoplasty. *Plast Reconstr Surg*. 2017;5(9):e1234.
10. Tebbetts JB. Dual plane breast augmentation: optimizing implant-soft-tissue relationships in a wide range of breast types. *Plast Reconstr Surg*. 2001;107(5):1255-1272.
11. Morkuzu S, Ozdemir M, Leach GA, Kanapathy M, Mosahebi A, Reid CM. Keller Funnel efficacy in "no touch" breast augmentation and reconstruction: a systematic review. *Plast Reconstr Surg Glob Open*. 2022;10(11):e4676.
12. Adams WP Jr, Culbertson EJ, Deva AK, et al. Macrotextured breast implants with defined steps to minimize bacterial contamination around the device: experience in 42,000 implants. *Plast Reconstr Surg*. 2017;140(3):427-431.
13. Hall-Findlay EJ. Vertical breast reduction. *Semin Plast Surg*. 2004;18(3):211-224.
14. Guridi R, Rodriguez JR. A step-by-step approach to a successful cosmetic breast reduction. *Plast Reconstr Surg Glob Open*. 2019;7(4):e2117.
15. Palumbo SK. The lejour vertical mammaplasty: "user-friendly tips." *Aesthet Surg J*. 1999;19(1):65-66.
16. Benelli L. A new periareolar mammaplasty: the round block technique. *Aesthetic Plast Surg*. 1990;14(2):93-100.

17. Hammond DC, Khuthaila DK, Kim J. The interlocking Gore-Tex suture for control of areolar diameter and shape. *Plast Reconstr Surg*. 2007;119(3):804-809.
18. Beale EW, Ramanadham S, Harrison B, Rasko Y, Armijo B, Rohrich RJ. Achieving predictability in augmentation mastopexy. *Plast Reconstr Surg*. 2014;133(3):284e-292e.
19. GONZALEZ-ULLOA M. Correction of hypotrophy of the breast by means of exogenous material. *Plast Reconstr Surg Transplant Bull*. 1960;25:15-26.
20. Spear SL. Augmentation/mastopexy: "surgeon, beware." *Plast Reconstr Surg*. 2003;112(3):905-906.
21. Spear SL. Augmentation/mastopexy: "surgeon, beware." *Plast Reconstr Surg*. 2006;118(suppl 7):133S-134S; discussion 135S.
22. Friedman RM. Augmentation/mastopexy: "surgeon beware." *Plast Reconstr Surg*. 2004;113(7):2230-2231.
23. Khavanin N, Jordan SW, Rambachan A, Kim JYS. A systematic review of single-stage augmentation-mastopexy. *Plast Reconstr Surg*. 2014;134(5):922-931.
24. Stevens WG, Macias LH, Spring M, Stoker DA, Chacón CO, Eberlin SA. One-stage augmentation mastopexy: a review of 1192 simultaneous breast augmentation and mastopexy procedures in 615 consecutive patients. *Aesthet Surg J*. 2014; 34(5):723-732.
25. Swanson E. Vertical augmentation/mastopexy: "surgeon, embrace.." *Plast Reconstr Surg*. 2015;135(6):1063e-1064e.
26. John W, Little SLS, Romm S. Reduction mammaplasty and mastopexy. In: Smith JW, ed. *Grabb and Smith's Plastic Surgery*. 4th ed. Little Brown and Company; 1991:1157-1202.
27. Handel N. Secondary mastopexy in the augmented patient: a recipe for disaster. *Plast Reconstr Surg*. 2006;118(suppl 7): 152S-163S.
28. Spring MA, Macias LH, Nadeau M, Stevens WG. Secondary augmentation-mastopexy: indications, preferred practices, and the treatment of complications. *Aesthet Surg J*. 2014;34(7): 1018-1040.
29. Stevens WG, Stoker DA, Freeman ME, Quardt SM, Hirsch EM, Cohen R. Is one-stage breast augmentation with mastopexy safe and effective? A review of 186 primary cases. *Aesthet Surg J*. 2006;26(6):674-681.
30. Stevens WG, Spring M, Stoker DA, et al. A review of 100 consecutive secondary augmentation/mastopexies. *Aesthet Surg J*. 2007;27(5):485-492.
31. Stevens WG, Freeman ME, Stoker DA, Quardt SM, Cohen R, Hirsch EM. One-stage mastopexy with breast augmentation: a review of 321 patients. *Plast Reconstr Surg*. 2007;120(6):1674-1679.
32. Spear SL, Pelletiere CV, Menon N. One-stage augmentation combined with mastopexy: aesthetic results and patient satisfaction. *Aesthetic Plast Surg*. 2004;28(5):259-267.
33. Spear SL, Boehmler JH IV, Clemens MW. Augmentation/mastopexy: a 3-year review of a single surgeon's practice. *Plast Reconstr Surg*. 2006;118(suppl 7):136S-147S.
34. Calobrace MB, Herdt DR, Cothron KJ. Simultaneous augmentation/mastopexy: a retrospective 5-year review of 332 consecutive cases. *Plast Reconstr Surg*. 2013;131(1):145-156.
35. Xue AS, Dayan E, Rohrich RJ. Achieving predictability in augmentation mastopexy: an update. *Plast Reconstr Surg Glob Open*. 2020;8(9):e2784.
36. Qureshi AA, Myckatyn TM, Tenenbaum MM. Mastopexy and mastopexy-augmentation. *Aesthet Surg J*. 2018;38(4): 374-384.
37. Lassus C. A 30-year experience with vertical mammaplasty. *Plast Reconstr Surg*. 1996;97(2):373-380.
38. Lassus C. The Lassus vertical technique. *Aesthet Surg J*. 2011; 31(8):897-913.
39. Lassus C. Long-lasting results of vertical mammaplasty In: Hamdi M, Hammond DC, Nahai F, eds. *Vertical Scar Mammaplasty*. Springer; 2005:17-22.
40. Swanson E. Comparison of vertical and inverted-T mammaplasties using photographic measurements. *Plast Reconstr Surg*. 2014;1(9):e89.
41. Hall Findlay-EJ. *Aesthetic Breast Surgery, Principles and Technique*. Quality Medical Publishing; 2010.
42. Dinner MI, Artz JS, Foglietti MA. Application and modification of the circular skin excision and purse string procedures. *Aesthetic Plast Surg*. 1993;17(4):301-309.
43. Cunningham B. The mentor core study on silicone memory gel breast implants. *Plast Reconstr Surg*. 2007;120:19S-29S; discussion 30S-32S.
44. Spear SL, Murphy DK, Slicton A, Walker PS, Inamed Silicone Breast Implant U.S. Study Group. Inamed silicone breast implant core study results at 6 years. *Plast Reconstr Surg*. 2007; 120(7)(suppl 1):8S-16S; discussion 17S-18S.

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