

Augmentation Mastopexy: A Five-step Standardized Strategy Approach

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Introduction: Planning a combined procedure requires ensuring an optimal fill of the reduced breast skin envelope, which in turn requires a system to quantify skin excess to ensure that the selected implant achieves that optimal fill. This has led us to develop a five-step approach that a surgical team can use to assess patients scheduled to undergo an augmentation mastopexy and arrive at an optimal surgical strategy.

Methods: This retrospective study included 50 consecutive cases where layered mastopexies combined with augmentation mammoplasties were performed. Step 1 entailed a preoperative examination and evaluation of the breasts. In step 2, the breast volume was assessed. The pocket plane was determined in step 3. The choice of which surgical technique to use was done in step 4, and in step 5, the horizontal skin excess was assessed.

Results: The average implant size was 300 cm³ (range: 170–350 cm³). The overall revision rate was 4%: on average, revision surgeries were performed 24 months after the first surgery. The average implant size was 300 cm³ (range: 170–350 cm³).

Conclusions: Early results of single-stage augmentation with mastopexy have shown that the design of this systematic five-step approach demonstrates a great potential for producing reliable results with minimal risk. Using this five-step approach will improve patient and surgeon satisfaction and help to replace the old concept of “fill and re-drape” with a new one of “plan, reduce, fill, and re-drape.” (*Plast Reconstr Surg Glob Open* 2022;10:e4349; doi: [10.1097/GOX.0000000000004349](https://doi.org/10.1097/GOX.0000000000004349); Published online 15 June 2022.)

INTRODUCTION

The evaluation of patients with ptotic breasts is quite challenging, and the corrective options available to a surgeon are as varied as the possible surgical results. A simultaneous augmentation mastopexy procedure remains an excellent option for many patients, and it can be performed safely with high patient satisfaction.^{1,2}

Since a variety of mastopexy procedures have been described (circumareolar, circumvertical, and inverted T-scar) with different implant and pocket placement, a systemic patient evaluation that balances safety and an optimal outcome is required.³

The opposing objectives (mastopexy requires skin envelope reduction and tightening while the augmentation stretches the skin and increases the breast volume

and weight) may increase morbidity and reoperation rates. There seems, therefore, to be a tendency toward compromising an optimal outcome for safety.⁴ Therefore, a standardized approach that balances safety and an optimal outcome is needed. Several techniques have been described in the literature; however, no clear step-by-step algorithm has been developed to guide surgeons to achieve optimal results for individual cases.

We developed a five-step approach that a surgical team can use to assess patients for an augmentation mastopexy and arrive at an optimal surgical strategy. This five-step approach is a sequential algorithm that helps classify the many possible scenarios. The strategy aims to achieve a positive outcome, reduce the margin of error, and manage the various factors involved in the breast implant placement/lift.

MATERIALS AND METHODS

Patients

This is a multicenter retrospective study of 50 consecutive augmentation mastopexies between January 2017 and February 2020. The local ethical committee approved this study in 2016.

Disclosure: The authors have no financial interest to declare in relation to the content of this article.

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Received for publication August 2, 2021; accepted April 1, 2022.

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DOI: [10.1097/GOX.0000000000004349](https://doi.org/10.1097/GOX.0000000000004349)

Although augmentation mastopexy is a fairly low-risk operation, we followed the American Cancer Society's guidelines for preoperative elective breast surgery.⁵

Patients included in this study had a body mass index less than 30 kg/m², ptotic breasts, and enough deficient or inadequate breast volume to enable autoaugmentation to be performed. Patients were screened for any medical issues associated with impaired wound healing. Patients were excluded if they had undergone weight reduction procedures, such as gastric bypass surgery and sleeve gastrectomy.

Three skin excision patterns were used in the surgeries: circumvertical technique in 27, inverted T-scar in 19, and circumareolar in four patients. The choice of skin excision technique was based on the degree of ptosis and presence of vertical and/or horizontal skin excess.

For descriptive purposes, the five-step approach is divided here into preoperative and intraoperative stages. None of the authors has a financial interest in any of the products, devices, or drugs mentioned in this article.

Preoperative Stages

Step 1: Ptotic versus Nonptotic Breasts

Step 1 entailed a preoperative examination and evaluation of the breasts. Breast measurements and markings, including sternal notch to nipple distance, breast height, midclavicular point to nipple distance, and intermammary distance, were performed. The nipple to inframammary fold (N-IMF) distance, at rest and under maximum stretch, was measured as well. Skin laxity was assessed by a skin stretch test, or by calculating the difference between the N-IMF distance both at rest and during maximal stretch.⁷

If skin stretch and N-IMF fold distances on maximal stretch were less than 4 and 10 cm, respectively, the breast could be appropriately corrected with a breast augmentation alone and dual-plane approach. Patients with these measurements were not considered ptotic and were excluded from this study. Patients with an N-IMF fold distance greater than 10 cm on maximal stretch or skin stretch of greater than 4 cm were considered for augmentation mastopexy and underwent further assessment to devise a case-specific management plan.^{1-4,6}

Step 2: Breast Volume Assessment, Synthetic versus Biological Fill

In step 2, the breast volume was assessed to determine whether the patient required a breast augmentation mastopexy, they were simply dissatisfied with the shape of their breasts, or had adequate breast volume requiring a mastopexy alone. Dissatisfaction with current breast volume was determined by whether the patient needed to use bra padding or whether they sought a larger cup size; these patients were identified as having inadequate breast volume.

Step 3: Implant

The pocket plane was determined in step 3, according to the skin pinch test in the upper pole as well as the medial and lateral breast.

Takeaways

Question: Planning a combined procedure requires ensuring an optimal fill of breast skin envelope, which in turn requires a system to quantify skin excess.

Findings: This retrospective study included 50 cases of augmentation mastopexy. Step 1 entailed preoperative evaluation. In step 2, breast volume was assessed, and pocket plane was determined in step 3. The surgical technique was decided in step 4, and in step 5, horizontal skin excess was assessed.

Meaning: Early results have shown that this systematic five-step approach demonstrates a great potential for producing reliable results with minimal risk.

Patients with a skin pinch test score greater than 2 cm were considered suitable for a subfascial pocket, whereas those with an upper pole pinch greater than 3 cm were planned for subglandular placement of the implant. Patients with a pinch test score less than 2 cm and increased skin laxity were considered for submuscular implant placement.

After that, the implant size, diameter, and projection were considered.⁷ In all patients, a rounded smooth cohesive gel implant with a medium projection profile was used. The patient's size preference was considered in terms of safely achieving the maximum volume possible.

In deciding on the width implant base, it was imperative to estimate how much the native glandular breast volume would contribute to the final achieved breast base width.⁷⁻¹⁰ Therefore, the width of the base was measured while the skin was pinched to simulate breast dimensions after mastopexy (Fig. 1). This maneuver effectively narrowed the base width and provided a close approximation of the outer limits of the implant diameter. The optimal implant width was calculated by measuring the desired final breast width (from the anterior axillary line to 1 cm short of the midline of the chest) and subtracting the breast soft-tissue contribution, recorded during step 3.¹¹

Step 4: Choice of Surgical Technique

The choice of surgical technique for excess skin envelope reduction was based on calculations of the vertical excess and the appropriate skin pattern design sought through operative management, using breast markings and measurements. The key element was to mark the skin pattern from the midpoint of the clavicle, usually 7 cm from the sternal notch, and to mark the breast meridian through the desired nipple position.^{6,11} An ideal nipple is approximately 10 cm from the breast meridian, measured on a straight line. During this step, we calculated the vertical excess: the total measured distance from the desired nipple areolar complex (NAC) level to the N-IMF minus the desired nipple IMF distance, which in most cases ranged from 8 to 10 cm in length (Fig. 2). The authors marked the NAC down by 2–3 cm in preoperative markings. The exact neo-NAC position was rechecked intraoperatively after implant insertion in accordance with the most projecting point of breast mound.

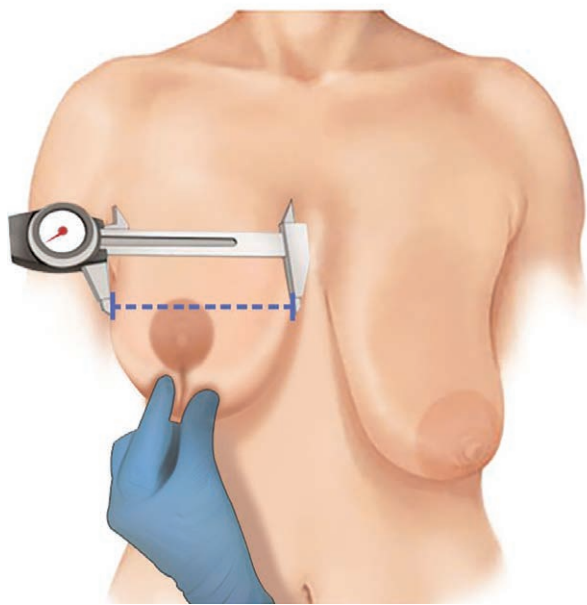


Fig. 1. Measuring the breast base width while pinching the skin to simulate the postoperative breast dimensions.

A periareolar technique was used to reduce the skin envelope if the vertical skin excess was less than 3 cm, a circumvertical technique if the excess was 3–4 cm, and a Wise pattern reduction technique if the excess was greater than 4 cm.^{1–4} The rest of the preoperative breast markings were drawn according to established techniques.

Intraoperative Stage

Step 5: Determining the Horizontal Skin Excess

In step 5, the horizontal skin excess was assessed after implant insertion in the predetermined pocket. This involved pinching the excess horizontal component of the envelope and draping it over the implant.

Surgical Procedures

Each patient was administered a standard dose of prophylactic antibiotics (1 g of ceftriaxone) 1 hour before the first incision. A field block was administered to reduce postoperative pain and limit the need for intraoperative narcotics. All surgical procedures were performed under general anesthesia.

In the upright position, the patient's pectoralis muscles relax, enabling a more accurate assessment and positioning of the implant level to be made during surgery. With the patient in an upright position, proper re-draping of the skin envelope during assessment of the horizontal excess can be accomplished.

A 42-mm-diameter cookie cutter was used to mark the new NAC. The skin was then incised according to the preoperative markings, and the implant placed in the pocket via a vertical incision, which was then sutured.

After the implant was placed in position, de-epithelialization of the marked skin was carried out systematically according to the mastopexy technique decided in step 4 of the preoperative procedure. Step 5, to assess the

horizontal skin excess, was performed intraoperatively and staples were used to outline the skin excess removal. The patient was tilted to the upright position to assess the implant height and overall shape.

Circumvertical Technique

A varying amount of skin along the vertical limbs of the incision was used to address the horizontal skin excess. This was done by approximating the medial and lateral limbs of the vertical incision and assessing the amount of skin to be removed while adjusting the lower pole shape. In patients with little vertical excess, it was used to expand the periareolar opening. In the preoperative evaluation and assessment of each patient, we determined how to incorporate any excess skin into either a small horizontal scar or a j-shaped scar. As a result, none of the patients in this study required removal of a horizontal wedge of skin.

Inverted T-scar Mastopexy Technique

A superior pedicle was used, allowing us to freely address the horizontal excess by removing tissue from the medial pillar of the vertical incision. The implant was placed in the dissected pocket and then the horizontal excess was accessed by bringing together the vertical limbs of the incision, starting at the base of the new areolar position and moving down to the distal point of the vertical scar (7–11 cm from the lower level of the new nipple position) (Fig. 3).

Finally, after proper hemostasis was ensured, wound closure was performed in multiple layers, starting with the underlying breast pillars—closed with polyglactin 910 2-0 sutures—followed by interrupted 3-0, 3-0 polydioxanone dermal, and ending with running subcuticular 4-0 poliglecaprone 25 sutures along the incisions. The areola was sutured using polydioxanone 3-0 dermal sutures and a running circumareolar 4-0 Prolene suture. No surgical drains were placed. Patients were dressed, and a supportive medical brassier was put on (Fig. 4).

Postoperative Satisfaction Assessment

A patient satisfaction questionnaire formed by our department was administered at the 1-year follow-up visit, allowing time for scar maturation and postoperative edema to subside. The questionnaire covered areas such as satisfaction with undressed appearance, satisfaction with dressed appearance, satisfaction with overall body image, and overall satisfaction with the surgery.^{12,13} A score of one indicated that the patient was not satisfied at all, and a score of five indicated that the patient was very satisfied.

Surgeon satisfaction was also rated at the 1-year follow-up visit; it was based on the three objective measures of suprasternal notch to nipple distance (SSN-N), N-IMF, and nipple to midline distance (N-ML), and the occurrence of complications.

RESULTS

This was a retrospective study of 50 patients who sought augmentation mastopexy and had no prior breast

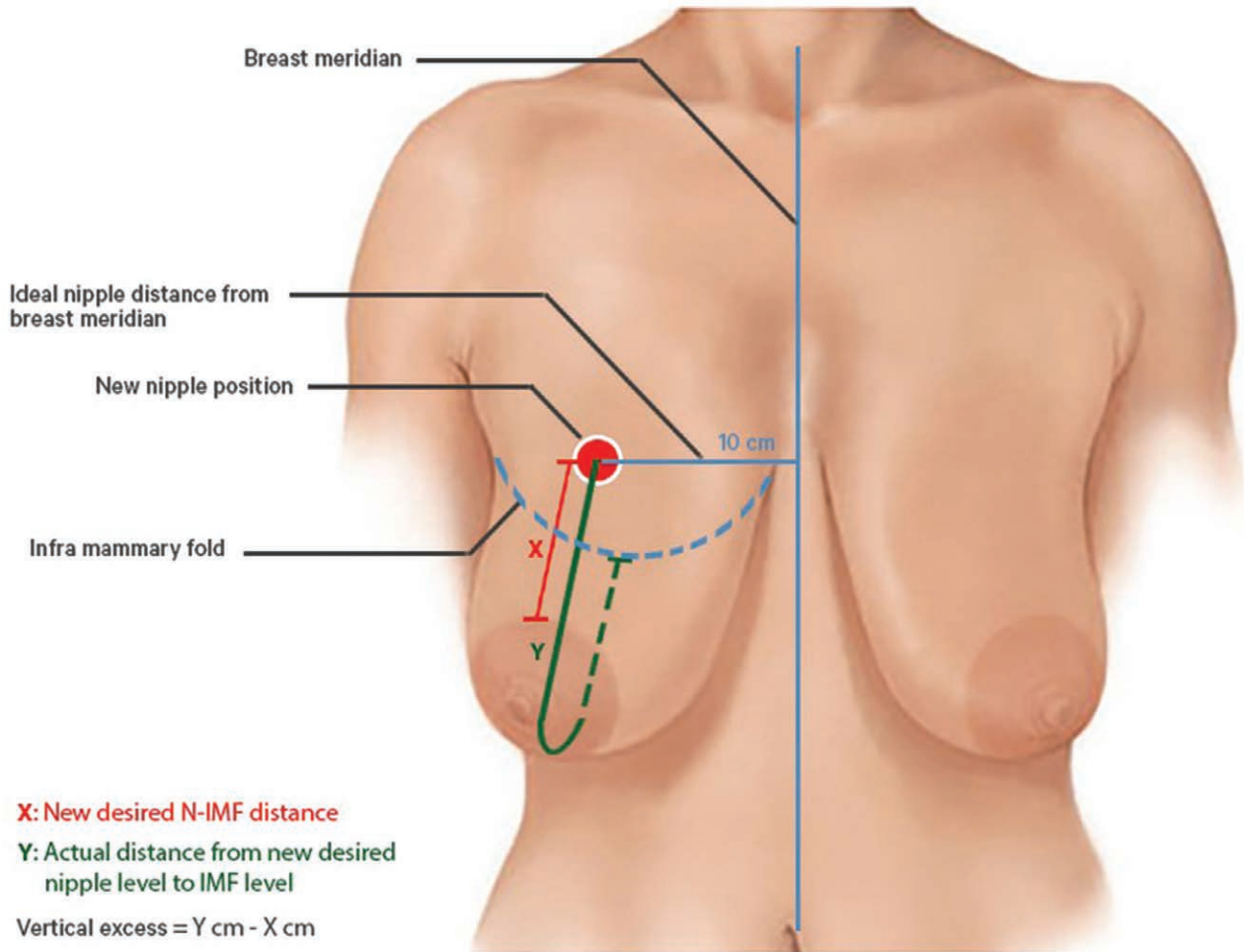


Fig. 2. Measuring vertical skin excess by subtracting the desired N-IMF distance from the actual distance from new desired N-IMF level [vertical excess = Y (desired nipple to actual IMF) – X (desired nipple to desired IMF [8–10 cm])].

surgeries. The average length of follow-up was 20 months; the average age of the patients was 35 years (range: 25–60 years). All patients had a body mass index <30 kg/m² with a 25 kg/m² mean.

The authors performed all surgeries, taking turns as surgeon and assistant. Of the 50 patients, 12% had a prior history of nicotine use. Patients who were still actively smoking or those who had quit less than 6 months before the procedure were excluded from this study. The average implant size was 300 cm³ (range: 170–350 cm³). None of the patients required immediate reoperation, and none experienced implant loss, implant exposure, or major wound dehiscence. One patient presented with a very small hematoma, which was allowed to heal on its own. There were no cases of major nipple necrosis, but partial nipple necrosis occurred in one patient. One patient had capsular contractures and needed a revision surgery. Two patients had minor bottoming out, which was managed by simple transverse wedge excision under local anesthesia. Pre- and postoperative views of patients who underwent each of the three different surgical techniques are shown in (Figs. 5–20).

The overall revision rate was 4%; on average, revision surgeries were performed 24 months after the first surgery and were related to the implants or the implant pocket.⁴ The overall patient satisfaction rate was 90%. The mean score for satisfaction with undressed appearance was 4.5; dressed appearance, 5; body image, 5; overall surgery, 4; and scar satisfaction, 4.^{12–14}

Circumvertical skin excision was performed in 27 patients. The preoperative measurements showed a median SSN-N distance of 23 cm, an N-IMF distance of 12 cm, and an N-ML distance of 12 cm.

An inverted T-scar skin excision pattern was performed in 19 patients. The preoperative measurements for the median SSN-N, N-IMF, and N-ML distances were 26, 14, and 14 cm, respectively.

Periareolar skin excision was performed in four patients, whose preoperative measurements for the median SSN-N, N-IMF, and N-ML distances were 22, 10, and 11 cm, respectively. One year after surgery, postoperative measurements for the three groups showed median SSN-N, N-IMF, and N-ML distances of 20, 9.5, and 11 cm, respectively.

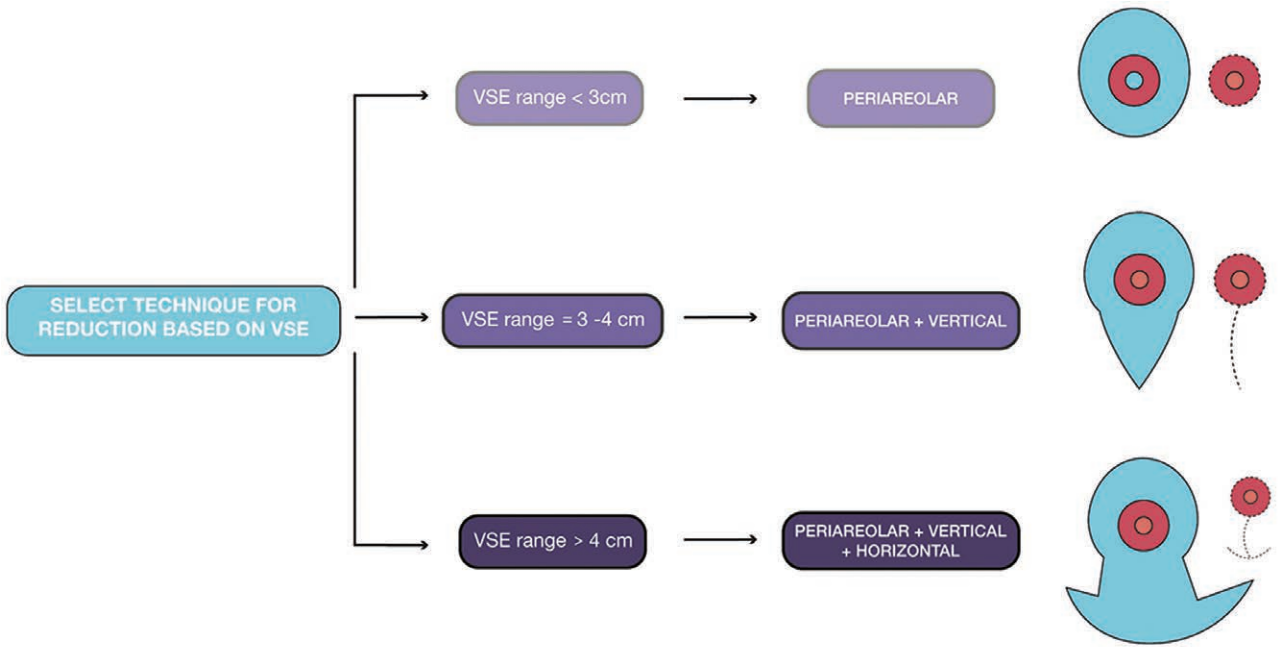


Diagram 1

Fig. 3. Flowchart outlining the determination of the surgical technique based on vertical skin excess.

DISCUSSION

Patients seeking breast lift may also want to fill volume deficiencies, requiring an augmentation procedure along with the mastopexy to achieve the desired esthetic outcome. Although this combined procedure is the most popular and successful method to date for achieving and maintaining upper pole volume postmastopexy, there are several factors involved in achieving a successful outcome with it. This makes the procedure challenging. In addition, predictable results with a low complication rate have not been standardized, resulting in numerous risks and higher morbidity rates.¹

Breast ptosis has classically been described as per Regnault’s definition, based on the relationship between the NAC and the IMF.^{15,16} However, this is insufficient to describe the true extent of drooping, as it fails to address different breast tissue compositions and integrity as well as the vertical skin excess amount, making it unsuitable for surgical planning.³ In 1993, Birk classified breast ptosis into true ptosis, glandular ptosis, and uncommon parenchymal maldistribution (or pseudoptosis), which helped produce more consistent results with fewer irregularities than that found with more generalized operative plans to morphologically different breasts.⁶

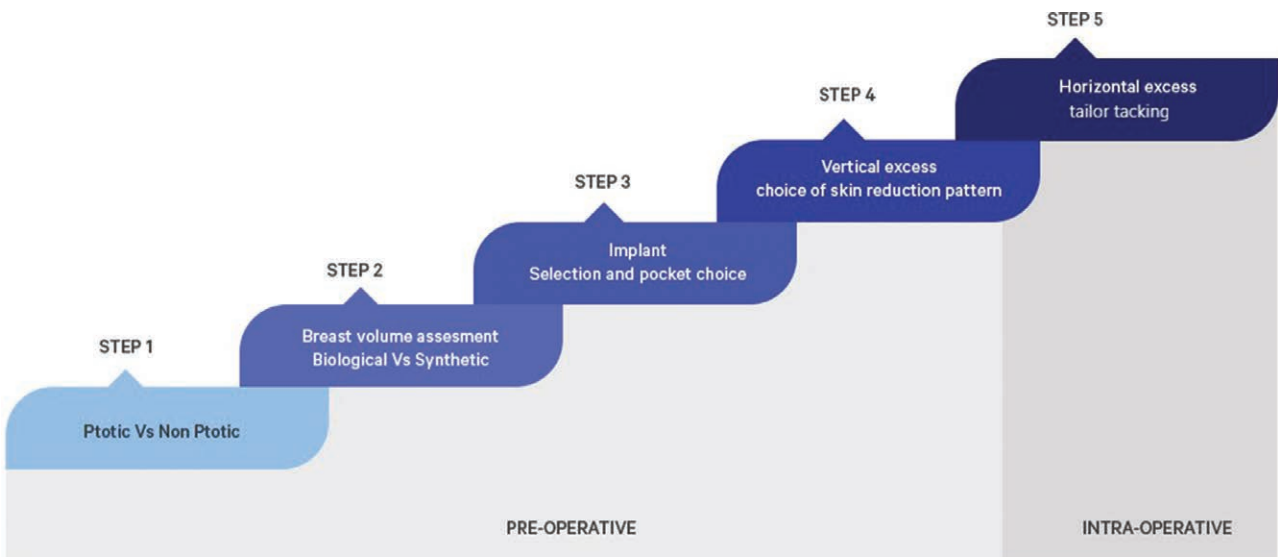


Diagram 2

Fig. 4. Five-step approach of the study.



Fig. 5. Inverted T-scar augmentation mastopexy, preoperative anterior view.



Fig. 8. Inverted T-scar augmentation mastopexy, 3 months postoperative anterior view.



Fig. 6. Inverted T-scar augmentation mastopexy, preoperative oblique view.



Fig. 9. Inverted T-scar augmentation mastopexy, 3 months postoperative oblique view.



Fig. 7. Inverted T-scar augmentation mastopexy, preoperative lateral view.



Fig. 10. Inverted T-scar augmentation mastopexy, 3 months postoperative lateral view.

Skin stretch and N-IMF distance on maximal stretch are the key variables in determining the need for augmentation mastopexy or augmentation only. Patients with a skin stretch greater than 4 cm or N-IMF greater than 10 cm require a skin envelope reduction.⁷

The calculated vertical skin excess allowed us to further classify patients into one of three groups. Hence,

a procedural strategy specific to each individual patient was mapped out according to our five-step approach.^{19,20}

Circumareolar mastopexy results in minimal scarring, but is not suitable for parenchymal ptosis and is thus used in patients with a vertical excess of less than 3 cm. This prevents excessive tension on the scar and stretched nipple. In patients with a larger vertical excess, it tends to result in a flattened,



Fig. 11. Inverted T-scar augmentation mastopexy, preoperative anterior view.



Fig. 14. Inverted T-scar augmentation mastopexy, 1 month postoperative oblique view.

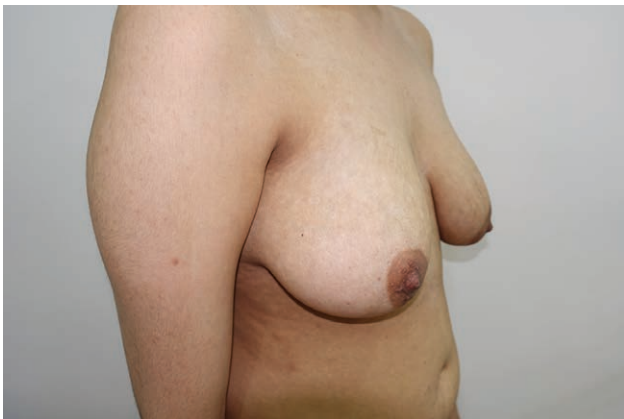


Fig. 12. Inverted T-scar augmentation mastopexy, preoperative oblique view.



Fig. 15. Circumvertical augmentation mastopexy, preoperative anterior view.



Fig. 13. Inverted T-scar augmentation mastopexy, 1 month postoperative anterior view.



Fig. 16. Circumvertical augmentation mastopexy, preoperative oblique view.

blunted configuration and decreased projection. This technique is of limited use in patients with a greater degree of ptosis.¹⁴

The circumvertical technique is a useful technique in patients with moderate ptosis, identified by a vertical excess of 3–4 cm and with a greater horizontal laxity than vertical. However, if the surgeon mistakenly selects this

technique, they may need to extend the horizontal component of the scar to form the so-called j-shaped mastopexy. This unplanned intraoperative draping may lead to postoperative asymmetries of the scarring or amounts of parenchymal and skin resection.^{3,17,18}

For patients with a greater degree of ptosis—a vertical excess of greater than 4 cm—we reverted to an inverted



Fig. 17. Circumvertical augmentation mastopexy, preoperative lateral view.



Fig. 19. Circumvertical augmentation mastopexy, 1 month postoperative oblique view.



Fig. 18. Circumvertical augmentation mastopexy, 1 month postoperative anterior view.



Fig. 20. Circumvertical augmentation mastopexy, 1 month postoperative lateral view.

T-scar mastopexy, in which both vertical and horizontal excess are adequately managed. The choice of which pedicle to use, however, is independent of the incision design. In all the inverted T-scar procedures conducted in this study, we used the superior pedicle so that we could correct both horizontal and vertical tissue excess while minimizing the incidence of bottoming out.¹⁹⁻²¹

In this study, the authors were not limited to performing a single- or two-stage augmentation mastopexy based on the degree of vertical excess as described by Adams and Mallucci.¹⁰ Our protocol for patients who have a vertical excess of greater than 6cm dictates the use of a single-stage augmentation mastopexy with an inverted T-scar.¹⁹⁻²¹

The choice of implant for placement in subglandular or subfascial pockets can impact results: larger devices may increase the risk of a stretch deformity developing if it is placed without muscular support.^{7,19-21} The use of subglandular and subfascial pockets avoids animation deformities that may arise with the use of a submuscular pocket and remain the more natural plane helping in maintaining mound expansion.^{22,23}

Moderate profile enhanced cohesive gel implants were used for all patients in this study. We selected this type of implant because the patients typically had breast tissue and therefore did not need projection. These implants

generally have greater safety and fewer complications than high profile implants, and they provide good fill, especially in the upper pole.²⁵

There is much concern regarding the use of textured implants. Traction wrinkling, double capsule formation, late seromas, and recently, association with breast implant-associated anaplastic large cell lymphoma have led to a growing trend toward the use of smooth or nanotextured devices.^{22,23} Smooth rounded implants have several advantages, including a natural mobility and an extremely low risk of wrinkling or palpability. These implants tend to settle at the bottom of the breast pocket, maintaining the stretch and width of the lower pole. They continue to descend naturally with the overlying breast tissue, safeguarding against the Snoopy deformity where the breast tissue descends over and under the implant.^{9,19,21}

The horizontal excess was addressed using a tailoring technique to access the horizontal skin excess and the amount of breast tissue resection in the inverted T-scar. With proper implant and pocket selection, we had a comparatively low revision rate of 4% at the 1-year follow-up. Swanson¹⁴ demonstrated that although one-stage augmentation mastopexy has a reoperation rate higher than either procedure being performed alone, the sum

of the revision rates for both procedures was higher than that of the combined procedure. It should also be noted that most studies have shown a decrease in revision rates as the experience of the surgeons increased.²⁴

The purpose of devising our five-step approach was to lay out a standard set of steps that can be followed to (1) assess the degree of ptosis and thus decide whether a mastopexy is required (and what type) or not; (2) determine whether implant augmentation is required or not (autoaugmentation); (3) select the optimal implant type, size, and positioning through base width and volume measurements; (4) choose the optimal surgical technique for addressing vertical skin excess to achieve an esthetically pleasing breast; and (5) assess the horizontal skin excess and ensure that it is removed during surgery. This approach lays a foundation for augmentation mastopexies that, if followed systematically, will help surgeons avoid many common pitfalls. Our experience with the approach described in this study agrees with a growing body of research indicating that with proper planning and technique, a simultaneous augmentation mastopexy procedure can be highly reliable and successful.

CONCLUSIONS

To the best of our knowledge, there are few specific guidelines for plastic surgeons for performing a combined augmentation mastopexy. Early results of single-stage augmentation with mastopexy have shown that the design of this systematic five-step approach demonstrates a great potential for producing reliable results with minimal risk.

Although patients need to be evaluated individually, the principles discussed here provide guidance in developing an efficient surgical plan. Using this five-step approach will improve patient and surgeon satisfaction and help to replace the old concept of “fill and re-drape” with a new one of “plan, reduce, fill, and re-drape.”

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