

# Vertical Augmentation Mastopexy with Implant Isolation and Tension Management

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**Background:** The increasingly popular vertical method of mastopexy is less commonly the technique of choice in augmentation mastopexy possibly due to concerns raised in the literature. The purpose of this report is to evaluate safety and satisfaction of the author's variation of the vertical method in this combination surgery. It includes unique tension management steps and total implant isolation from cut parenchyma.

**Methods:** A retrospective analysis was done of 105 consecutive patients treated with the author's method over an 8 year 6 month period. Clinical outcomes were examined, and a Breast-Q survey and Spear's 2004 survey were mailed to all patients who agreed to it by phone.

**Results:** There were no hematomas or delayed healing but one pulmonary embolus treated as an outpatient and one infection appearing 6 weeks postoperatively. There were only 3 grade 3 or 4 capsular contractures. Sixty-seven patients consented to the survey and 36 were returned. With Breast-Q, there was a mean score of 82.78 for outcome satisfaction and 75.94 for satisfaction with breasts. Spear's survey confirmed high satisfaction with 90.9% indicating that they were satisfied or extremely satisfied. Comparison with Spear's own surgical results did not reach statistical significance.

**Conclusions:** The author's specific adaptation of vertical augmentation mastopexy appears to be very safe and successfully addresses a variety of healing, tension, and exposure concerns mentioned in the literature. Implant isolation may decrease capsular contracture rate. Both Breast-Q survey and Spear's more specific survey indicate high patient satisfaction. (*Plast Reconstr Surg Glob Open* 2019;7:e2226; doi: 10.1097/GOX.0000000000002226; Published online 14 June 2019.)

## INTRODUCTION

Simultaneous augmentation mastopexy is now generally accepted as a safe procedure in experienced hands,<sup>1-6</sup> although some questions and controversies remain. The vertical method of mastopexy enjoys widespread popularity, but why so much less in this setting of simultaneous implantation?<sup>7</sup> The superior medial pedicle of the vertical technique has advantages that even large implants do not risk the vascular supply and the most ptotic tissue is removed. There are no undermined inferior skin flaps, but Spear et al<sup>8</sup> previously recommended against vertical

parenchymal excision in augmentation mastopexy saying that it increases the risk of implant exposure and vascular compromise. The pillar closure of this method is placed immediately over the implant exposing it to disrupted parenchyma and ductal bacteria known to increase the risk of capsular contracture.<sup>9</sup> Hidalgo<sup>10</sup> warns a sinus tract through this closure risks implant exposure, and for this reason, he recommends against the method over an implant.

There may be hesitation among surgeons to tackle the vastly different skin tension issues of the vertical technique over an implant and relevant discussion is lacking. Especially with wider vertical wedge excisions, there is profound parenchymal narrowing and projection over an implant platform of 3–5 cm of projection. Some implant profiles and routines of mastopexy skin excisions may not be optimal. With narrow chests or lateral breast footprint, this

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breast narrowing can make nipple position appear more lateral. The author's adaptation of the vertical technique utilizes Mladick's 1993 method of pectoralis split for implant placement,<sup>11</sup> where muscle suture closure provides durable and complete implant isolation from breast parenchyma. This extra vascular layer also eliminates the risk of sinus tract implant exposure. As to tension, a three prong tension management method addresses the need for more central breast skin required to accommodate the stacked projection of the vertical technique over an implant. Traditional tailor tacking cannot apply to a method that has intervening parenchymal excision and pillar closure, and for this, a variation is proposed, the "3D tailor tack." Finally, Hidalgo's<sup>12</sup> method of setting recipient periareolar tension is utilized to give the surgeon absolute control before deepithelializing the recipient circle. Vertical mastopexy using complete implant isolation along with these methods of tension management has not been previously published. A retrospective review was conducted to demonstrate technique safety, as well as patient satisfaction.

## PATIENTS AND METHODS

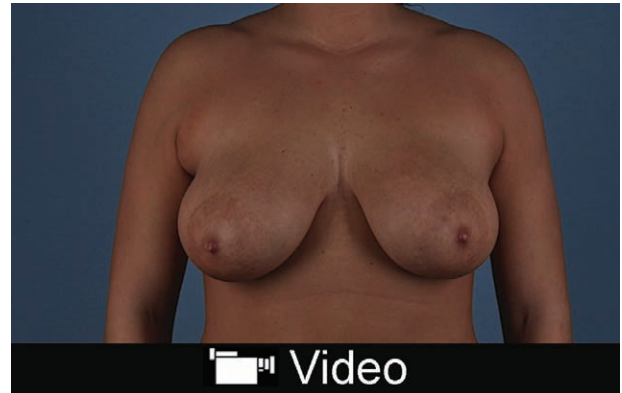
A retrospective chart review was carried out on 105 consecutive patients who underwent this novel method consecutively during the period of February 2007 and December 2015. Charts were screened to exclude patients with previous implants and, then, reviewed for prior breast surgery, size and type of implants, grams of parenchyma removed, sternal notch-to-nipple distance, areolar edge to inframammary fold (IMF) distance, complications, and revision surgeries.

To evaluate patient satisfaction, contact had to be re-established from the 105 identified and screened patients. If contacted and consent granted, the patient was sent 2 unmarked satisfaction surveys, which could be returned anonymously. The Breast-Q survey<sup>13</sup> reduction/mastopexy module measures surgery outcome satisfaction, and the Spear's 2004 survey<sup>14</sup> is specific to augmentation mastopexy satisfaction (see figure, Supplemental Digital Content 1, which shows Spear's survey, <http://links.lww.com/PRSGO/B72>). There were 67 patients contacted and consented, from which a total of 36 patients returned 1 or both surveys by mail, a 53.7% response rate.

This study was approved by the Institutional Review Board of Eastern Virginia Medical Center (IRB # 16-07-XX-0143). The author has no financial interest in any of the products, devices, or drugs mentioned in this article. Verbal and written informed consent was obtained from all patients.

### Surgical Technique

The Tebbetts<sup>15</sup> method of distraction of nipple upward with patient supine, measuring downward based on implant size was used to determine if lowering of the IMF was necessary. With the patient in a standing position, a level was used to transpose the present or planned lowered IMF to midline. Measuring upward, the proposed top of areolar choices of 3, 4, and 5 cm up were marked and then trans-



**Video Graphic 1.** Marking. This video is available in the "Related Videos" section of the Full-Text article on PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/B73>.

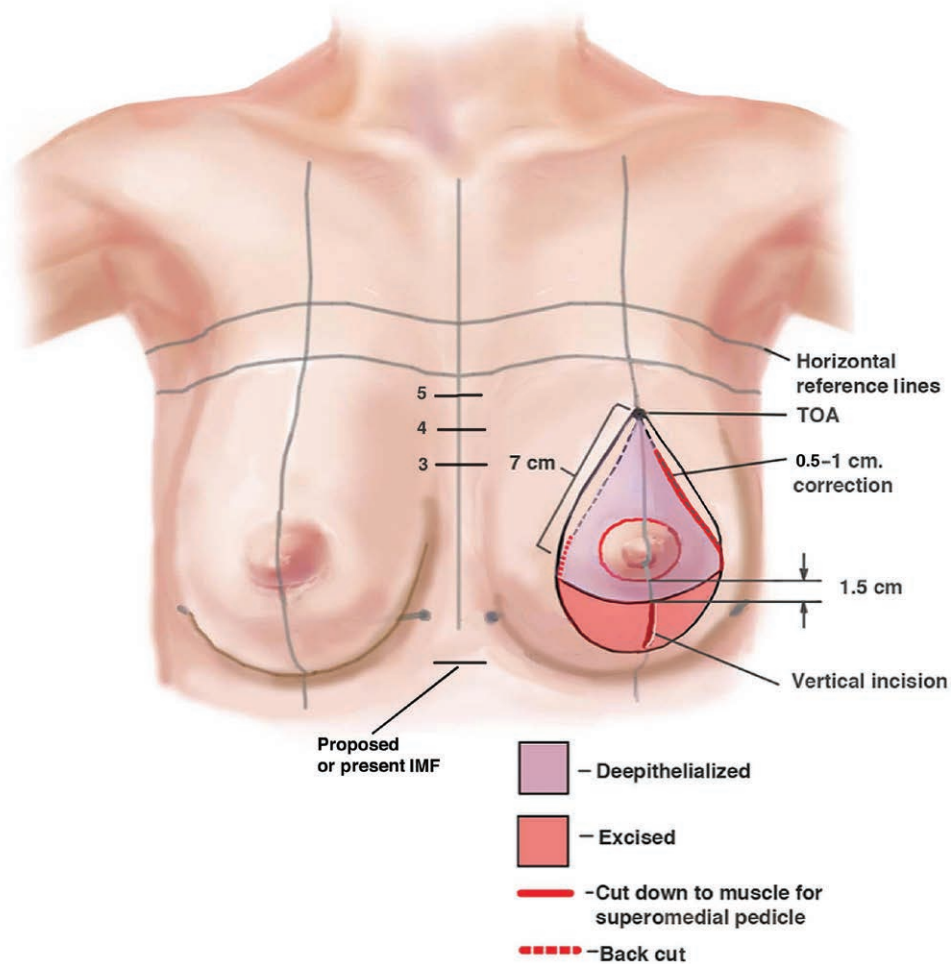
posed over to breast meridian with the level (see video, Supplemental Digital Content 2, which shows the marking. This video is available in the "Related Videos" section of the Full-Text article on PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/B73>).

The breast was displaced medially and laterally to draw out the planned vertical ellipse for excision and to end cephalically at the described point and inferiorly 2–4 cm above the present IMF (Fig. 1). The first of 3 tension management measures was a narrowing of the upper third of the ellipse, the proposed recipient area (see figure Supplemental Digital Content 3, which shows the marking work sheet, <http://links.lww.com/PRSGO/B74>).

In surgery, the areola was scored at 45 mm and a horizontal arc was drawn 1.5 cm below to delineate the lower edge of the superomedial pedicle. Through a vertical incision, dissection through parenchyma with retractors directing the position to 8 cm off midline led to the site for pectoralis muscle split over a rib (see video, Supplemental Digital Content 4, which shows implant insertion. This video is available in the "Related Videos" section of the Full-Text article on PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/B75>). With retraction, a finger is pushed directly on rib to the top of the sternum. A lateral sweep



**Video Graphic 2.** Implant insertion. This video is available in the "Related Videos" section of the Full-Text article on PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/B75>.



**Fig. 1.** Vertical augmentation mastopexy surgical plans are shown in illustration. TOA refers to top of areola. TOA in the preoperative markings is based solely on measurements upward from proposed or present IMF, usually begins with 3.5 or 4 cm and then corrects upward later if needed with the patient sitting up. The 0.5–1-cm correction is purposefully adding skin to the periareolar area in anticipation of the future projection. Measurements in the illustration are not to scale.

lifting up against the underside of the pectoralis completed the blunt dissection, which was followed by cautery to completely divide the inferior origin.

Four braided 2–0 sutures were placed for later closure. The implants were inserted with no touch technique through a sleeve (baggies not labeled for this use from As-



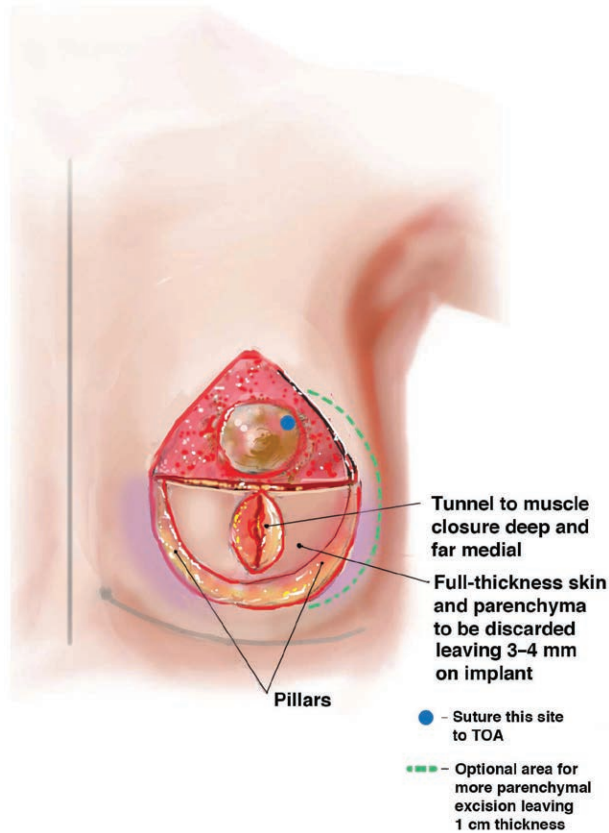
Video

**Video Graphic 3.** Parenchymal excision. This video is available in the “Related Videos” section of the Full-Text article on PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/B76>.



Video

**Video Graphic 4.** Closure. This video is available in the “Related Videos” section of the Full-Text article on PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/B77>.



**Fig. 2.** Parenchymal excision is begun after deepithelialization with the patient completely supine to avoid unintentional beveling.

sociated Bag Company, New Kingstown, PA; 7" × 8" 2MIL item 270-51H, gas sterilized, or gel implants the Funnel; Allergan Corporation, Dublin, Ireland).

While supine, a 3D tailor tack to lower and upper third of the vertical ellipse accomplished a 1.5–2 cm of overlap confirming a safe wedge to fully excise. Deepithelialization was followed by block excision that left 3–4 mm of vascular tissue over the implant (Figs. 2, 3). For more parenchymal excision, only after first preserving pillars as described by Hidalgo,<sup>16</sup> lateral excision was done (see video, Supplemental Digital Content 5, which shows parenchymal excision. This video is available in the "Related Videos" section of the Full-Text article on PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/B76>).

The lateral full thickness vertical cut used to create a superomedial pedicle was made as cephalad as necessary, up to 1 cm from top of areola. When needed, sequential back cuts to the pedicle medially eliminated tethering.

The pillars were closed (see video, Supplemental Digital Content 6, which shows closure. This video is available in the "Related Videos" section of the Full-Text article on PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/B77>). With the patient near sitting, nipple position was adjusted. Tension-free recipient preparation was begun only partially closing the upper ellipse using the shoestring stitch of Hidalgo<sup>17</sup> before marking a 4 cm circle. An in-

ferior J ellipse excision of skin was usually done with underlying wedge of parenchyma. Figures 4–6 demonstrate preoperative and postoperative images.

In the early months after surgery, implant settling on occasion was influenced by an underwire program.

### Statistical Analysis

For the Breast-Q scores, the survey-specified scoring methodology was used by aggregating the responses and converting the total into a scale from 0 to 100. Similar to a percentage, the higher score indicates high satisfaction or better quality of life.

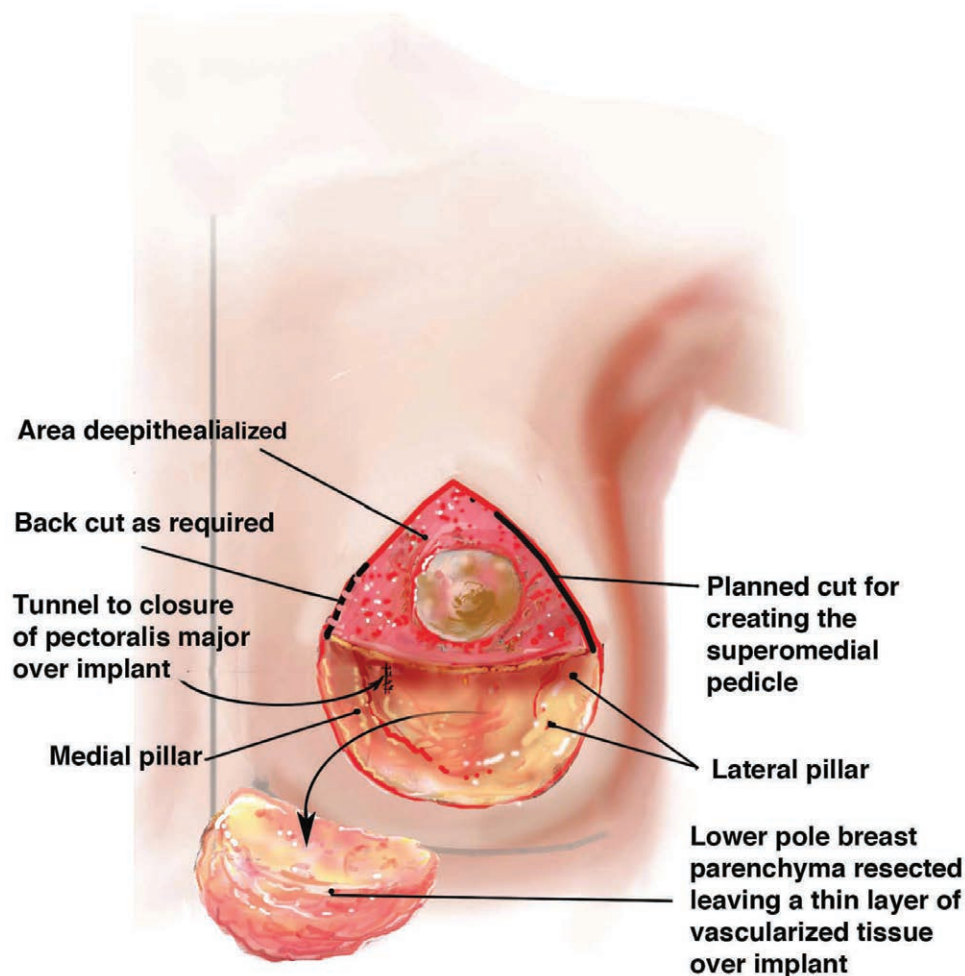
The repeat Spear's survey responses are reported in means and percentages, to be consistent with the published Spear's study. The nonparametric categorical data was analyzed using percentages and Fisher's exact tests of association. All analysis was conducted with SPSS statistical software for preliminary and final data analyses.

## RESULTS

The average patient age was 38 years with height 5'4" and 145 lb. One had prior breast surgery, a reduction. Implants were smooth round saline except for 2 which were gel. Overall average size was 333 cm<sup>3</sup>, and none were high profile (see table, Supplemental Digital Content 7, which shows patient demographics, <http://links.lww.com/PRSGO/B137>). Average amount of tissue excised was 58 g (right) and 62 g (left) with range 6–251 g. This included a full thickness central vertical wedge of parenchyma as much as 14.5-cm wide, with many having lateral excision as well. One breast had skin-only excision. The follow-up was an average of 12.6 months (SD 15.43). Three patients had mastopexy on one side only. Only one patient during the time of the series was treated with 2-stage surgery due to the severity of ptosis and asymmetry. All other patients with severe ptosis and/or extreme asymmetry were offered 2-stage surgery as an option with potentially better result, but none chose that option and were thus included in the series.

There were 2 reported postsurgery adverse events. One patient with pulmonary embolus was treated outpatient and recovered completely. She was 50 years old with a smoking history of 20 years but had quit 1 month before surgery. One patient had an infection at 6 weeks marked by 1 day of flu symptoms, sudden swelling, and firmness without redness. Treatment was aggressive multiagent irrigation<sup>18</sup> and implant replacement with total resolution. *Staphylococcus aureus* was cultured. There was no loss of nipple-areola of any degree, delayed healing, or hematoma. There were 2 implant displacements and 3 grade 3 capsular contractures. There were 0 periareolar hypertrophic or wide scars, but a number of areolar shape or step deformities needed revision mostly early in the series.

Revisions are listed in Table 1. Of a total of 28%, 22% were under local anesthesia and 6% were under general anesthesia. The latter does include the 3 capsular contractures, although none have had surgery yet. This does not include one patient who wanted over 600 cm<sup>3</sup> implants as placement of larger implants was a planned later procedure. There were no revisions for pseudoptosis.



**Fig. 3.** Creation of superomedial pedicle with back cut as needed.

As measured by the Breast-Q instrument, there was a mean score of 82.78 (SD = 19.29) for outcome satisfaction and 75.94 (SD = 16.52) for satisfaction with breasts.

Table 2 summarizes the author's method's quantitative answers of the Spear's survey. Table 3 compares Spear's survey data from the author's method with those of Spear's own series of 34 augmentation mastopexy patients over 6 years 6 months. The greatest difference in satisfaction is seen in amount of lift, although no difference reached statistical significance.

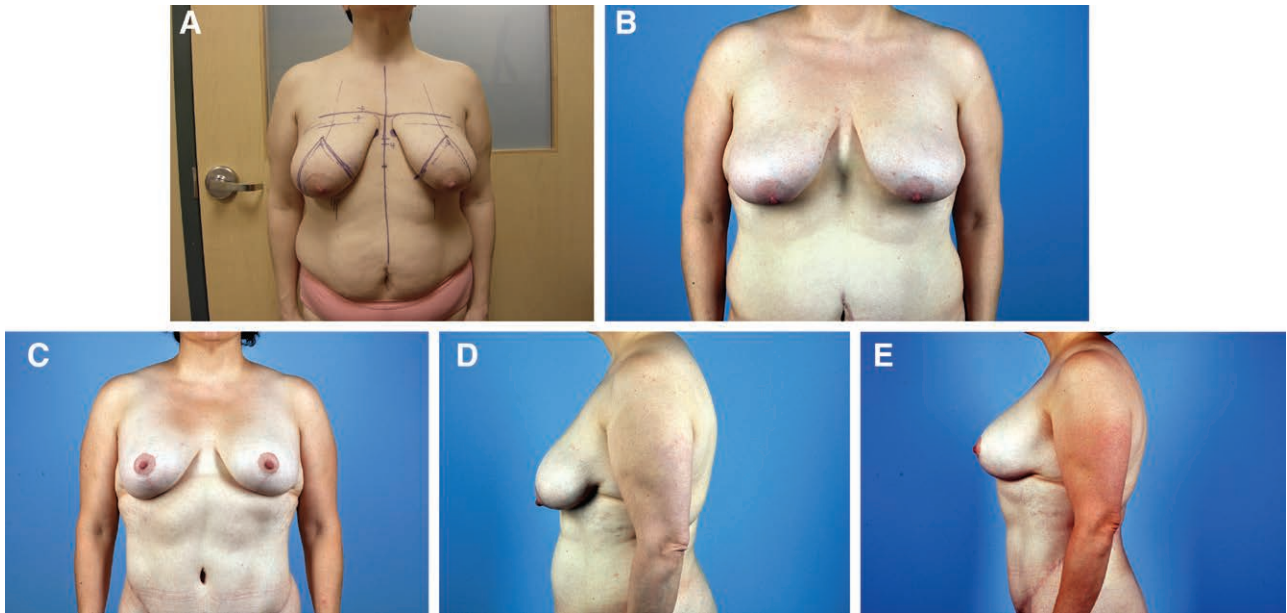
Fifty-four percent of Spear's patients desired revision surgery, and 31% wanted more lift. Thirty-one percent of this author's patients desired revision surgery ( $P = 0.184$ ), and 14% indicated an interest in more lift ( $P = 0.220$ ).

## DISCUSSION

In recent decades, the vertical method swept North America to become the preference of many surgeons for mastopexy. Hall-Findlay,<sup>19</sup> Hidalgo,<sup>16</sup> and Lista and Ahmad<sup>20</sup> made key technical and anatomical contributions. Hall-Findlay<sup>21</sup> recommends this removal of an inferior wedge of tissue also in the setting of augmentation mastopexy. This author's adaptation of the vertical method to

simultaneous implants appears to be safe and address a number of concerns in the literature. Aided by 3 methods of tension management, there was no delayed healing or partial or complete nipple loss in any case. With the extra vascular layer for implant isolation, there was no sinus tract through the vertical parenchymal closure. One patient had a pulmonary embolism. This is similar to Swanson's 0.8% rate of deep venous thrombosis in his series.<sup>22</sup>

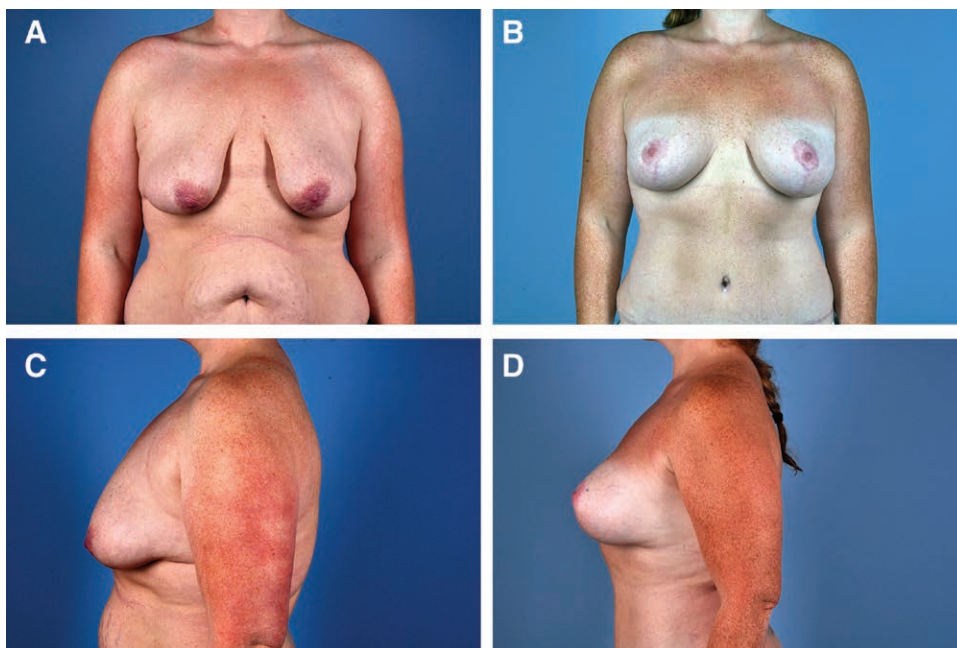
The capsular contracture rate was only 2.9%. All other methods described in detail of vertical mastopexy with implant placement involve cut parenchymal edge closure over the implant. Swanson<sup>22</sup> reports a capsular contracture rate of 4.8%. Since this study, we have used sizers for all final pocket manipulation followed by betadine irrigation and permanent implant placement with immediate overlying muscle suture closure isolating the implant. There have been no capsular contractures in the subsequent 37 cases. We hope to match Mladick's<sup>11</sup> augmentation capsular contracture rate of 0.6% that he accomplished through a periareolar approach through cut parenchyma as well using a sleeve, also closing the muscle split isolating the implant. The author practiced with Mladick 6 years and never saw a capsular contracture



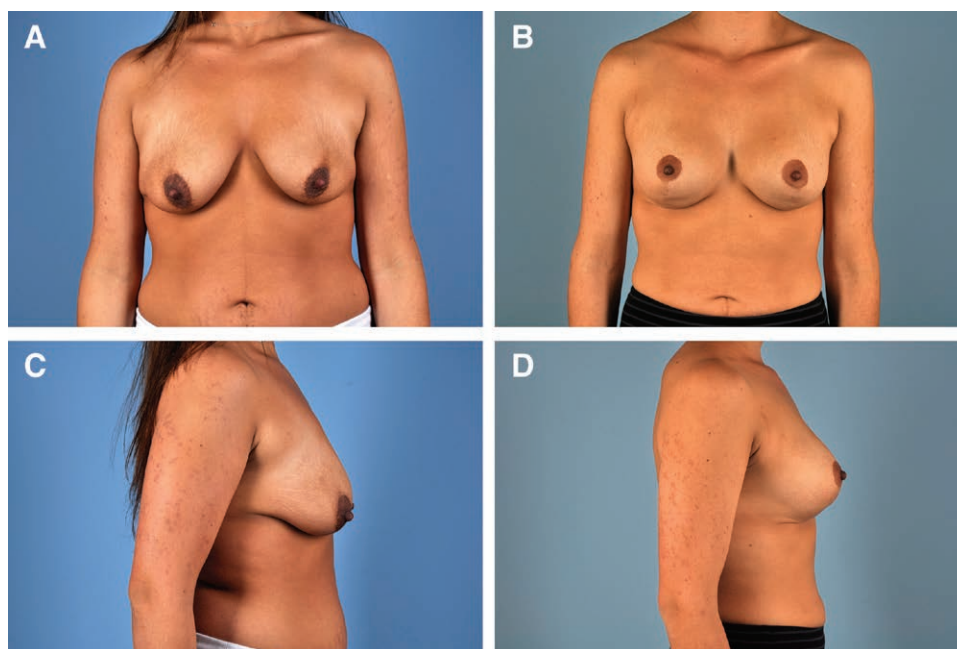
**Fig. 4.** This 38-year-old woman is 5'1" 158 pounds and had lost 50 pounds. She was happy with her size but accepted being a little larger for more upper pole fullness. A, Her preoperative markings show the recipient area conservative remarking of the cephalic 7 cm that anticipates the coming projection of vertical technique over implants. She is seen before (B, D) and 6 months after (C, E) vertical augmentation mastopexy with liposuction of the lateral chest. Her implants are both 225 cm<sup>3</sup> round smooth saline (Style 1600; Mentor, Irving, TX), and resection weights are 143 g (right) and 131 g (left).

of his during or after this time. Wiener<sup>23</sup> using a periareolar approach with no sleeve found a capsular contracture rate of 9.5%. It appears crucial to avoid any contact of implant to cut parenchyma.

The literature provides no other augmentation mastopexy Breast-Q outcomes for comparison. Cogliandro et al<sup>24</sup> studying retrospectively breast reduction results of a 10-year period found satisfaction with breasts' Breast-Q



**Fig. 5.** This 35-year-old woman is 5'8" 190 pounds, lost 70 pounds, and quit smoking 1 month preoperatively. She had constricted ptotic breasts and wanted to be over a cup larger. She is seen before (A, C) and 4 months after (B, D) vertical augmentation mastopexy with liposuction of the lateral chest. Her implants are both 420 cm<sup>3</sup> saline (Style 1600), and resection weights are 86 g (right) and 94 g (left). Key to optimal implant positioning especially with weight loss patients is the intraoperative measured muscle split 8 cm off midline. Skin landmarks in these patients are less reliable and can lead to lateral and inferior malposition.



**Fig. 6.** This 23-year-old woman is 5'9" 170 pounds and wanted mastopexy scars limited to around the areola. She had considerable difficulty with the decision to accept other scars with her implants, especially with her husband initially against it. After several discussions, they agreed to the vertical lift. She is seen before (A, C) and 2 years after (B, D) vertical augmentation mastopexy with liposuction of the lateral chest and tail of breast. Her implants are both saline (Style 1600) 265 cm<sup>3</sup> on the right, where there is upper rib prominence, and 280 cm<sup>3</sup> on the left. Resection weights are 49 g (right) and 68 g (left).

scores average well over 80 (77.1–88.9 with higher scores more severe hypertrophy). It appears that with this surgery after years, these women remain pleased to be rid of that extra weight and related symptoms. This method of augmentation mastopexy cannot offer long-term symptom relief, and with implants over time, many come to desire larger or smaller or no implants at all, affecting satisfaction with breasts. The current protocol Breast-Q results are more similar to that of breast augmentation. Gyskiewicz and LeDuc<sup>25</sup> studying transaxillary breast augmentation found outcome satisfaction 80 (SD = 22.4) and satisfaction with breasts 76.0 (SD = 16.6).

With persistent yearly weight gain of most patients in our society, perfect size cannot be determined, correction of sag is often a matter of degree, and there is inherently significant length and visible scar, but the degree of correction and relative quality of scars along with nipple position, areola size, optimal implant size, and position are valued by patients and each deserves individual efforts. Spear's multipoint survey reveals his insight into the need to address so many variables. He pursued this by means of

skin-tightening lifts including permanent pursestrings.<sup>26</sup> The comparison of survey results (Table 3) seems to suggest that there might have been room for improvement with the type of lift, delayed recipient preparation, and tension management, but the data from the Spear's 2004 study was unavailable beyond the reported means and percentages, so an in-depth analysis was not possible. In the comparison, the greatest difference was amount of lift, but this and the other comparisons did not reach statistical significance.

Although 31% at up to 10 years desiring revision surgery may seem high, it compares favorably with Spear's 54%. The author is not aware of any other study, where augmentation mastopexy patients were asked this question for any other comparison. Furthermore, it is not a revision rate but response to questions so many years postoperative. On review of the author's 11 patients comprising the 31%, 3 patients wanted larger implants and 1 patient wanted correction of asymmetric animation deformity. A subset of the 31% is the 14% desiring more lift. There should be some recognition of the influence of aging and weight gain in an 8 year 6 month series. Recent data from Mundy et al<sup>27</sup> on normative data for the Breast-Q reduction module indicates an association between higher body mass index and lower Breast-Q scores. Because most women gain weight over time, this must be a factor long term.

Since this study, the author began more aggressive resection below pillars of at most 8 cm height, usually converting to a "T" instead of a "J" and easily maintaining implant isolation. A persistent long distance of areola to IMF can give the impression of persistent ptosis. Swan-

**Table 1. Revisions Indicated and/or Performed**

	Value (%)
10 periareolar lifts	10
9 revisions areolar shape	9
5 scar revisions vertical scar	3
3 Baker 3 or 4 capsular contractures	3
2 implant displacement	2
1 infection	1

**Table 2. Descriptive Statistics of the Author's Technique Results Using Spear's Survey**

	N	Minimum	Maximum	Mean	SD	Satisfied or Extremely Satisfied (%)	Missing (%)
Happy with size of breast	33	1	4	3.48	0.71	93.9	8.3
Happy with amount of lift achieved	35	1	4	3.26	0.85	85.7	2.8
Happy with scars	35	1	4	3.20	0.96	80.0	2.9
Happy with N/A position	35	1	4	3.60	0.69	94.3	2.8
Happy with N/A size	36	1	4	3.47	0.77	94.4	0.0
Happy with softness/feel of breast	36	1	4	3.58	0.69	94.4	0.0
Overall result or rate your outcome	33	1	4	3.45	0.83	90.9	8.3
Did surgery meet your desired goal?	35	1	4	3.40	0.81	91.4	3.0

Survey with permission from *Aesthet Plast Surg* 2004;28:259–267.

**Table 3. Augmentation Mastopexy Patient Satisfaction with Spear's Survey**

Study	Size	Amount of Lift	Scars	Nipple–Areola Position	Nipple–Areola Size	Softness–Feel
Spear*	3.1	2.8	2.9	3.3	3.3	3.30
Author, mean (SD)	3.48 (0.71)	3.26 (0.85)	3.20 (0.96)	3.60 (0.69)	3.47 (0.77)	3.58 (0.69)

\*Spear's original survey.

Data with permission from *Aesthet Plast Surg* 2004;28:259–267.

son's<sup>22</sup> early revision rate for persistent ptosis was 10.3% in this setting. He lowered this by half with changes that included a wedge resection of lower pole parenchyma.

Swanson<sup>22</sup> provides other complication and survey data: delayed wound healing in 7.1% and patient-reported dissatisfaction with scars 16.7%. With the author's 3 modalities of tension management, there were no cases of no delayed healing and Spear's survey patient-reported dissatisfaction with scars was 8.6%. The periareolar area is for accommodation, not lift. Scar satisfaction is likely a product of the controlled low tension environment. Furthermore, this leads to better projection and facilitates all periareolar shape and scar issues to be fixable and under local anesthesia. In contrast, some areolar size, shape, and scar issues in a setting of high postoperative skin tension have no viable surgical solution.

This repeat Spear's questionnaire gives a rare comparison of patient impressions of saline and gel. For softness and feel, the author's predominantly saline population compared quite favorably with gel (Table 3).

The community setting of this study comprised many mobile military, which greatly affects follow-up. The survey response could influence the result. There are limitations to the comparisons with Spear considering his was a phone survey of a series over 6 years versus the author's mailed format for a series over 8 1/2 years. Spear used a combination of periareolar and circumvertical surgeries versus all but one breast vertical for this author. None of Spear's surveyed patients had prior revision surgery, but 3 of the authors did and they were implant removal for weight gain, placement of larger implants (in her case planned from the initial consultation), and adjustment of areolar shape. Many more of Spear's patients had prior breast surgery including mastopexies and implants. It is likely that this author's patients averaged greater ptosis because during the 105 patient series over 8 years 6 months, those with severe ptosis or asymmetry were almost never diverted to 2 stages (one patient). It is not known what portion of Spear's patients with more severe ptosis or asymmetry

were diverted 2 stages. Any more than 1 such patient over his 6-year series diverted to 2 stages would make the study populations quite different.

For those planning a transition to the vertical technique over implants, 2 issues must be addressed. One is to recognize the dramatic stacking of projecting technique over projecting implant requiring more skin. Traditional tailor tacking is misleading and potentially dangerous in this setting as it is oblivious to the intervening step of wedge excision and pillar approximation. The 3 methods of tension management including 3D tailor tack completely manage these dynamics. Another consequence of the vertical method is breast narrowing and, thus, less visible breast lateral to nipple. Frontal view can give the impression of a laterally displaced nipple, more apparent in keel-shaped chests and breasts that have a more lateral footprint or rest on a narrow side of chest (see video, Supplemental Digital Content 6, which demonstrates this on her left more narrow side. This video is available in the "Related Videos" section of the Full-Text article on PRSGlobalOpen.com or at <http://links.lww.com/PRSGO/B77>).

## CONCLUSIONS

A vertical method of mastopexy that includes unique tension management steps and complete implant isolation from cut parenchyma appears to offer advantages in softness, safety, and patient satisfaction. Breast-Q indicates this method's high level of satisfaction. A repeat of Spear's survey designed for augmentation mastopexy gives a more detailed look at patient-specific postoperative concerns and confirms high patient satisfaction, but a direct comparison with Spear's skin tightening types of lifts lacks statistical significance.

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