Vertical Reduction Mammaplasty Utilizing the Superomedial Pedicle: Is It Really for Everyone?

Keith C. Neaman, MD; Shannon D. Armstrong, MD; Shawn J. Mendonca, BSE; Marguerite A. Aitken, MD; Douglas L. VanderWoude, MD; John D. Renucci, MD; and David R. Alfonso, MD

Abstract

Background: Classically, the vertical-style reduction mammaplasty utilizing a superomedial pedicle has been limited to smaller reductions secondary to concerns for poor wound healing and nipple necrosis.

Objectives: The authors reviewed a large cohort of patients who underwent a vertical-style superomedial pedicle reduction mammaplasty in an attempt to demonstrate its safety and efficacy in treating symptomatic macromastia.

Methods: A retrospective review was performed of 290 patients (558 breasts) who underwent a vertical-style superomedial pedicle reduction mammaplasty. All procedures were conducted by one of 4 plastic surgeons over 6 years (JDR, MAA, DLV, DRA).

Results: The average resection weight was 551.7 g (range, 176-1827 g), with 4.6% of resections greater than 1000 g. A majority of patients (55.2%) concomitantly underwent liposuction of the breast. The total complication rate was 22.7%, with superficial dehiscence (8.8%) and hypertrophic scarring (8.8%) comprising the majority. Nipple sensory changes occurred in 1.6% of breasts, with no episodes of nipple necrosis. The revision rate was 2.2%. Patients with complications had significantly higher resection volumes and nipple-to-fold distances ($P = .014$ and .010, respectively).

Conclusions: The vertical-style superomedial pedicle reduction mammaplasty is safe and effective for a wide range of symptomatic macromastia. The nipple-areola complex can be safely transposed, even in patients with larger degrees of macromastia, with no episodes of nipple necrosis. The adjunctive use of liposuction should be considered safe. Last, revision rates were low, correlating with a high level of patient satisfaction.

Keywords

superomedial pedicle, vertical reduction mammaplasty, symptomatic macromastia, breast reduction

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created with the help of internal shaping sutures, again relying on a superior pedicle for nipple vascularity. Much like Lassus’s approach, this procedure resulted in an inverted appearance to the breast that took time to settle postoperatively. Furthermore, scar revisions were often necessary as a result of the breast skin excess at the lower pole.

Both Lassus and Lejour utilized a superior pedicle, raising concerns for nipple vascularity in a large ptotic breast, given that kinking of the pedicle can occur when transposing the nipple to its new location. In an effort to address this, Hall-Findlay positioned the pedicle in either a medial or lateral position, decreasing the kinking. The author later adapted a superomedially based pedicle location that provided a robust blood supply to the nipple-areolar complex (NAC), maintaining nipple viability and innervation. However, her technique was classically limited to smaller reductions.

Complication rates have varied widely, with the most common complications involving issues with wound healing along the vertical closure. Recently, Lista et al reported a 15-year experience utilizing the “blank” technique, with a total complication rate of 5.6%. However, despite authors continuing to report low complication rates, acceptance of the superomedial pedicle has been minimal, as evidenced by a surveyindicating surgeons’ preference for the Wise-pattern, inferior-based pedicle techniques. This slow acceptance is likely secondary to the consistent results obtained by the Wise pattern, as well as concerns over controlling the length of the vertical scar and potential nipple compromise when using the superomedial pedicle, particularly in larger reductions. Historically, significant postoperative settling of the breast was required to achieve the final shape, raising patient and physician anxiety. The purpose of our study was to review a large series of vertical reduction mammoplasties utilizing the superomedial pedicle, showing that with minor technical modifications, the vertical reduction mammoplasty can be used safely with a low revision rate in a wide range of patients with symptomatic macromastia.

METHODS

A retrospective review of 290 consecutive patients (558 breasts) who underwent a vertical reduction mammoplasty utilizing the superomedial pedicle was performed. The study period included all patients within a 6-year time period (January 2004 to January 2010), with an average follow-up of 219 days. All operations were performed by one of 4 board-certified plastic surgeons, with little variation in each individual surgeon’s operative technique over the study period (JDR, MAA, DLV, DRA). Each surgeon almost exclusively utilized the vertical-style superomedial pedicle reduction mammoplasty technique over the determined study period. Of the surgeons, 3 received training in this technique while in residency/fellowship. One surgeon learned the technique on joining the practice several years prior to the study period. At the conclusion of the study period, all surgeons were in practice between 3 and 12 years.

The medical records of each patient were reviewed to identify characteristics such as age, sex, race, BMI (kg/m²), preoperative breast measurements, smoking status, comorbidities, and previous breast-related procedures. Complications and revisions were detailed and analysis was performed in an attempt to identify risk factors related to these outcomes. Statistical analysis of the data was conducted with the Statistical Package for the Social Sciences Windows version 14.0 (SPSS). The chi-square test, independent t test, logistic regression, and Pearson’s coefficient were used. Significance was assessed at P < .05.

Operative Markings

The vertical-style superomedial pedicle reduction mammoplasty was performed by the surgeons in our study using a similar technique, with only minor variations with regard to sequence and method of dissection (sharp vs Bovie; Bovie Medical Corporation, Clearwater, FL). Prior to the surgery, patients were marked in the upright position. Initially, the midline from the sternum to the xyphoid process was delineated. The IMF was marked bilaterally and any asymmetry was identified. This was followed by marking of the breast meridian both above and below the fold as it extended from the midclavicular point onto the chest wall. The fold was then transposed onto the anterior aspect of the breast.

The point at which the breast meridian crossed the projected IMF was marked as the future location of the nipple. A distance 2 cm higher was used as the proposed location of the upper areola and the traditional mosque pattern was drawn. The breast was then rotated upward and medially, identifying the extent of the medial pillar. This was repeated laterally. The pattern was completed by connecting the mosque pattern to the marks identifying the medial and lateral pillars, and was finally terminated 2 cm superior to the existing fold in a U-shaped fashion.

Operative Technique

The operative technique began with instillation of tumescent fluid inferiorly and laterally, with care taken to avoid placement beneath the pedicle. Approximately, 300 to 500 mL were infiltrated on each side with the majority being placed laterally, where liposuction was to be performed, to enhance contouring of the lateral breast and chest wall. The superomedial pedicle was outlined and then deepithelialized. The sequence of steps was then approached in one of 2 ways, either first developing medial and lateral pillars or first outlining, through dissection, the superomedial pedicle. Both approaches were used in this study.

For development of the pillars, the skin incision was followed by either knife or cautery dissection perpendicular to the skin. Laterally, on reaching approximately 1 cm
of dense parenchymal tissue, the dissection was then turned 90° outward and tangential to the skin toward the anterior axillary fold, creating a progressively thicker lateral flap. Medially, dissection commenced on reaching the areolar tissue plane superficial to the pectoralis fascia. Adipose tissue at the central IMF was aggressively resected to allow for elevation of the fold. For initial dissection of the pedicle, attention was directed to the top of the mosque. A small area of skin and fat was resected en bloc between the pedicle and the superior mosque. After outlining the entire pedicle, the superior chest wall skin is mobilized cephalad to the mosque in a prepectoral plane to enable superior displacement of the pedicle, creating a degree of upper pole fullness.

The pedicle was then rotated superiorly and inset with absorbable sutures. The vertical portion of the pattern was closed from superiorly to inferiorly. Once the IMF was reached, the standing cones (excess tissue at the base of the pillars) were removed medially and laterally, with the incision left in the fold. This modification eliminated bunching of the vertical incision. In addition, the most inferior portions of the pillars could be tacked to the chest wall as needed to reestablish the IMF. If needed, liposuction was performed along the lateral breast and chest wall to aid in contouring the breast (Figure 1). Typically, no drains were used. The patient was placed in a surgical bra postoperatively (Figures 2-4).

**RESULTS**

**Patient Demographics**

The average age of the patients was 42 years (range, 16-76 years). The average patient BMI was 29 (range, 20-54), while the average length of follow-up was 219 days. A summary of the patients’ significant past medical history is depicted in Table 1. The history of previous breast surgeries (per breast) was 10% (56/558), a majority of which were lumpectomy or breast biopsies to rule out malignancy. Two patients did have a history of previous bilateral breast reduction. Detailed measurements of the breast were taken preoperatively and are depicted in Table 2. Base width was defined as the width of the breast at the IMF, extending from the anterior axillary line to the medial limits of the breast. Preoperative asymmetry was present in 57% of breasts (318/558).
Operative Details

All surgeries were performed on an outpatient basis, with 4.5% (25/558) being performed in conjunction with another procedure. Tumescent infiltration was used for almost all procedures (97.3%; 543/558) with the addition of liposuction for removal of the axillary tail of the breast and/or contouring of the lateral breast and chest wall in 55.2% of breasts (308/558). The amount of lipoaspirate was recorded in 153 breasts, with the average amount being 153 ml (range, 20-500 ml). Postoperative closed suction drains were rarely placed (1.4%; 8/558). The average resection volume was 552 g (176-1827 g), with 15.4% of reductions involving over 750 g of resected tissue (Table 3).

Complications and Outcomes

Complications were divided into major and minor complications in an attempt to include all adverse outcomes. Major complications were defined as seromas requiring aspiration (0.7%; 4/558), hematomas requiring operative evacuation (1.4%; 8/558), and postoperative scarring requiring revision (0.9%; 5/558). All other complications were labeled as minor. Major and minor complications occurred in 3.0% (17/558) and 22.4% (125/558) of breasts, respectively (Table 4). All episodes of cellulitis were treated with oral antibiotics on an outpatient basis. There were no episodes of nipple necrosis. Nine patients subjectively complained of sensory changes to the NAC postoperatively. Nipple sensation was not measured by direct filament testing, nor were all patients asked about nipple sensory changes. Only a few patients complained about sensory changes, suggesting that nipple sensory changes are not frequent. Superficial epidermolysis involving the NAC occurred in 4 breasts (0.7%). Asymmetry, which was not considered a complication, was noted in 5.4% (30/558) of breasts postoperatively. A patient was determined to be asymmetric if both the patient and surgeon subjectively expressed concern with a difference in the size between the breasts. In all, 17 breasts underwent a revision, for a total revision rate of 3.0% (Table 5).

Risk Factor Analysis

Patients with complications had a higher resection amount than those without complications (596 g vs 534 g, respectively; $P = .014$). A similar relationship was found for nipple-to-fold distance (15.16 cm vs 14.72 cm, respectively; $P = .010$). Patients with hypertrophic scarring had a higher resection amount than those without hypertrophic scarring (635 g vs 543 g, respectively; $P < .001$).

Figure 2. (A, C) This 25-year-old woman presented for bilateral reduction mammoplasty. (B, D) Twelve months after removal of 470 g on the right and 555 g on the left.
A preoperative history of hypertension was also found to be associated with increased hematoma formation (8.5% vs 2.1%, respectively; \( P = .010 \)). No other significant correlations were found between complications or revision rates and patient demographics or operative interventions.

A logistic regression analysis was performed, with complications as the dependent variable and the use of a coprocedure, body mass index (BMI), smoking status, preoperative asymmetry, resection amount, use of liposuction, and base width as independent variables. Using this multivariate approach, resection weight was not associated with complications (odds ratio: 1.001, \( P = .19 \), 95% CI 1.000-1.002). However, increasing base width was significantly and inversely related to complications (odds ratio: –0.806, \( P < .001 \), 95% CI 0.727-0.893).

**DISCUSSION**

The vertical reduction mammaplasty has undergone a significant evolution since its inception. Various surgical modifications have been created to address the historical concerns raised over the past several decades regarding nipple viability, applicability to a wide range of patients, immediate postoperative shape, and a high rate of scar revision. In their original descriptions, Lassus and Lejour relied on a superiorly based pedicle.\(^2,^6\) This can become problematic when attempting to reduce larger breasts secondary to the kinking of the pedicle that can occur as the NAC is inset into its new location. Hence, Lassus performed a superior pedicle only when transposition of the pedicle was less than 10 cm.\(^10\) In cases where greater degrees of transposition were required, a laterally based pedicle was utilized.

Recent cadaveric studies have shown that superomedial-based pedicles capture the main venous outflow of the NAC, which drains directly into the internal mammary veins at the level of the second and third intercostal perforators.\(^11,^12\) In our study, there were no episodes of nipple necrosis, which supports the findings of other studies in which a superomedial pedicle was used.\(^13\) Nipple necrosis rates of 3.6% have been reported when performing a Lejour-type vertical reduction with a superiorly based pedicle.\(^14\) Altered nipple sensation was noted in 1.6% of breasts in our patients. While only subjective measures were used in our study, others have objectively determined the maintenance of nipple viability when using a superomedial pedicle.\(^8,^{15-17}\) In addition, the superomedial pedicle helps provide a full breast medially, which is an area of high aesthetic value.\(^18\)
Traditionally, the vertical closure has resulted in significant gathering of the breast skin and subsequent pleating that often led to secondary revisions, with rates ranging between 7% and 20%. Lassus originally described extending the scar onto the anterior surface of the abdomen but abandoned it for the addition of a short horizontal scar along the IMF. Others have described various techniques to avoid the addition of a horizontal scar by the placement of box stitches resulting in gathered vertical scars that can extend up to 8 cm in length. Marchac advocated the addition of a horizontal closure, noticing an increased need for revision when excessive gathering of the vertical closure was attempted, leading to large dog ears. In addition, lower levels of patient satisfaction within the initial 60 days postoperatively, secondary to pleating of the vertical scars, have been shown when compared to the inferior pedicle Wise-pattern breast reduction.

Berthe et al have shown that the addition of a short horizontal scar reduces wound healing issues associated with a tight vertical closure. In this series, a short horizontal scar was added, resulting in a revision rate of only 1.8% for issues related to scarring and gathering along the IMF.
vertical closure. This is in direct contrast to other reported revision rates, which have tended to be higher. The short horizontal scar is ubiquitously shorter than the large anchor-shaped scar associated with the Wise-pattern breast reduction. Patients rarely complain of this short scar, which is well hidden in the IMF. This maneuver can also significantly reduce revision rates and decrease the unpredictability associated with the settling that is required when excessive skin is gathered to perform a strictly vertical closure. This potentially played a role in decreased poor wound healing along the vertical closure, which comprised a majority of the postoperative complications.

Hall-Findlay described the breast as having a “pushed-up” appearance in the immediate postoperative period. This often required significant patient education and patience while waiting for the breast to settle. This altered postoperative shape also made predicting the amount of reduction difficult, potentially steepening the learning curve associated with this procedure. Immediate, long-lasting postoperative results are possible with the addition of a short horizontal scar, as well as a meticulous closure of the dermoglandular pillars created at the time of dissection. It is this pillar approximation that allows the surgeon to create a pleasing shape and projected appearance to the breast. Another important technical aspect to this procedure is ensuring that the inferior incision is made 1 to 2 cm above the IMF to preserve the integrity of the fold and restore it to a more natural, youthful position. All of these minor modifications provide the surgeon with the ability to create an “on the table” result that requires little postoperative settling.

The major and minor complication rates in our study were 3.0% and 22.4%, respectively. This corroborates previous studies with published complication rates in the range of 6% to 40%. The vertical reduction mammoplasty utilizing the superomedial pedicle is safe and effective for a wide range of patients with symptomatic macromastia. Of our patients, 15.4% underwent reductions greater than 750 g. Initial univariate analysis revealed increased complications and hypertrophic scarring with increasing resection weights. However, when a logistic regression analysis was performed, there was no increase in complications as the weight of resection increased, indicating the procedure’s safety even in larger reductions. Similarly, Chen et al found no increase in wound healing issues with increasing resection weights.

However, this finding is in contrast to several other studies that found increased complications rates with larger degrees of symptomatic macromastia when utilizing a vertical-type reduction pattern (32-50%). It is important to note that a majority of these complications were related to wound healing, which potentially could have been alleviated with the addition of a short horizontal scar. In our study, we found that base width was predictive of decreased postoperative complications. Anecdotally, patients with wider breasts were more likely to require a horizontal component to their incision to alleviate the tension associated with a vertical-only closure. This potentially played a role in decreased poor wound healing along the vertical closure, which comprised a majority of the postoperative complications.

Despite a low complication and revision rate with the vertical pattern superomedial pedicle, a majority of surgeons in the United States continue to use the Wise-pattern inferior pedicle breast reduction. Fear of high revision and complication rates, in addition to a steep learning curve, have hampered its acceptance. When compared to historical controls utilizing the Wise pattern, the vertical reduction mammoplasty provides an operation that is equally safe and effective. With the Wise pattern breast reduction, wound-healing issues along the T-junction, have been observed in approximately 19% of cases. In addition, revision and complication rates vary, with rates upward of 51% and 20%, respectively. This is in direct contrast to a revision rate of 3.0% and a major complication rate of 3.0% found in our study. In addition, the classic boxy shape and bottoming out that tends to occur over time is avoided by closure of medial and lateral pillars allowing the surgeon to produce a narrow, more projecting breast while at the same time providing support to the underlying breast parenchyma.

Last, we found the use of liposuction at the time of reduction mammoplasty to be safe, resulting in no added
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