Vertical Scar Reduction Mammaplasty: A 15-Year Experience Including a Review of 250 Consecutive Cases

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Background: Vertical scar reduction mammaplasty has the advantage of reduced scar burden and improved long-term projection of the breasts. The technique has been criticized for being restricted to cases of mild to moderate mammary hypertrophy and is considered more intuitive and difficult to learn when compared with more conventional inverted-T scar reduction mammaplasties. This article describes the technique used in the largest reported series of vertical scar reduction mammaplasties performed by a single surgeon.
Methods: The technique performed in this series uses a mosque dome skin marking pattern; transposition of the nipple-areola complex on a superior or medial dermoglandular pedicle, depending on its position with respect to the skin markings; an excision en bloc of skin, fat, and gland; postexcision liposuction; and wound closure in two planes, with gathering of the skin of the vertical wound. A chart review of 250 consecutive patients treated between November of 2000 and December of 2003 was performed.
Results: The average reduction per breast (including liposuction) was 636 g (range, 60 to 2020 g). Complications were minimal (5.6 percent of breasts), with no nipples being lost, attesting to the safety of this technique.
Conclusions: This technique for vertical scar reduction mammaplasty has been applied to breast reductions of all sizes and has consistently produced good breast shape, with an operation that is shorter to perform and leaves less scarring than standard breast reductions. This technique is straightforward and easy to learn, and offers a safe, effective, and predictable way for treating mammary hypertrophy. (*Plast. Reconstr. Surg.* 117: 2152, 2006.)

A recent study by Cruz-Korchin and Korchin[1] showed that patients who underwent medial pedicle/vertical pattern breast reduction rated their satisfaction with the amount of scarring and the overall aesthetic outcome significantly higher than those who underwent inferior pedicle/Wise pattern breast reduction. Vertical scar reduction mammaplasty has the advantage of reduced scar burden and improved long-term projection of the breasts. The technique has been criticized for being restricted to cases of mild to moderate mammary hypertrophy, and is considered more intuitive and difficult to learn when compared with more conventional inverted-T scar reduction mammaplasties.[2] Many different techniques and modifications for vertical scar reduction mammaplasty have been described in the literature.[3–41]

In 1925, Dartigues[3] described a vertical scar technique used for mastopexy. In 1957, Arie[4] described a technique for reduction mammaplasty finishing with a vertical scar. This technique did not gain popularity because the vertical scar often crossed the inframammary crease and extended onto the chest wall, leaving an unsightly scar. In 1969, Lassus[5–10,42,43] renewed interest in vertical scar reduction mammaplasty by developing a technique using a superior dermoglandular pedicle for transposition of the nipple-areola complex; a central excision en bloc of skin, fat, and gland; no undermining; and a vertical scar to finish. The shape of the breast was produced solely by reapproximating

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the skin of the medial and lateral pillars with sutures, without gathering of the skin of the vertical wound. In large reductions, the vertical scar often extended inferior to the inframammary crease, so Lassus added a short inframammary scar to avoid this complication.[42,43] Later, Lassus reverted to using a vertical scar only, but limited the inferior extent of the skin resection to prevent the scar from extending inferior to the inframammary crease.[8–10] In 1994, Lejour[13] described a modification of Lassus' technique. Liposuction was used preexcision to eliminate fat contributing to breast volume, the skin surrounding the excised area was undermined, the superior dermoglandular pedicle was sutured to the pectoralis fascia, sutures were used in the breast parenchyma to reapproximate the pillars producing a more durable breast shape, and gathering of the skin of the vertical wound was used to keep the scar above the inframammary crease. Lassus' and Lejour's techniques demonstrated positive outcomes when applied not only in mild and moderate cases of breast hypertrophy, but in severe cases as well,[9,10,15,16] although Lassus used a lateral dermoglandular pedicle when the nipple-areola complex had to be transposed more than 10 cm[10] and Lejour still advocated considering other techniques to deal with severe cases.[15,16] Despite these advances, vertical scar reduction mammaplasty was still considered intuitive and difficult to learn.[2] Hall-Findlay[27–29] described a modification of Lejour's technique using a full-thickness medial dermoglandular pedicle, no skin undermining, no suturing of the pedicle to the pectoralis fascia, and liposuction only rarely to reduce breast volume. Hall-Findlay believed that using a medial pedicle increased the reliability of the blood supply to the nipple-areola complex and decreased the difficulty of the procedure, particularly that associated with insetting of the nipple-areola complex. This technique was applied to breasts of all sizes, producing good results.

This article describes the largest reported series of vertical scar reduction mammaplasties performed by a single surgeon. The technique performed in 1501 patients is described and the results in 250 consecutive patients are reviewed. This technique has been applied to breast reductions of all sizes and has consistently produced good breast shape, with an operation that is shorter to perform and leaves less scarring than standard breast reductions. Technical considerations that improve the safety, effectiveness, and predictability of the procedure are discussed.

PATIENTS AND METHODS

Clinical Series

Between October of 1989 and December of 2003, vertical scar reduction mammaplasty was performed in 1501 patients by a single surgeon. These procedures were performed at Trillium Health Centre and the surgeon's private clinic, in Mississauga, Ontario. A chart review of 250 consecutive patients (500 breasts) treated between November of 2000 and December of 2003 was performed. The average age of the patients was 38.5 years (range, 15 to 76 years). The average body mass index was 28.8 kg/m^2 (range, 17.3 to 46.3 kg/m^2). The average weight of tissue excised per breast was 526 g (range, 10 to 2020 g). Liposuction was performed in 78.4 percent of cases and the average volume liposuctioned per breast was 140 cc (range, 50 to 500 cc). The average total reduction per breast (including liposuction) was 636 g (range, 60 to 2020 g). The minimum follow-up period was 6 months.

Operative Technique

Skin Markings

The patient is marked in the sitting position (Fig. 1). The midline of the chest and the inframammary creases are marked. The central axis of the breast is drawn by extending a straight line from the midpoint of the clavicle through the nipple to intersect with the inframammary crease. One hand is inserted behind the breast to the level of the inframammary crease, and this point is projected anteriorly onto the breast and marked (A). Point A will be the new location of the superior border of the areola. Point B is the inferior limit of the skin excision. Point B is marked 2 to 4 cm above the inframammary crease, depending on the size of the reduction, the distance being shorter in smaller reductions and longer in larger reductions. The inframammary crease moves up in vertical scar techniques. This phenomenon accounts for the vertical scar extending onto the chest wall in earlier vertical scar techniques. Limiting the inferior end of the vertical scar to a point above the inframammary crease prevents this problem.

A mosque dome pattern, as described by Lejour,[13] is marked onto the breast. The roof of the mosque dome pattern is constructed by extending curved lines from point A to points C and D to form the border of the new nipple-areola complex. The roof is drawn so that when points C and D are brought together, it will form a circle. The vertical limbs of the mosque dome pattern are

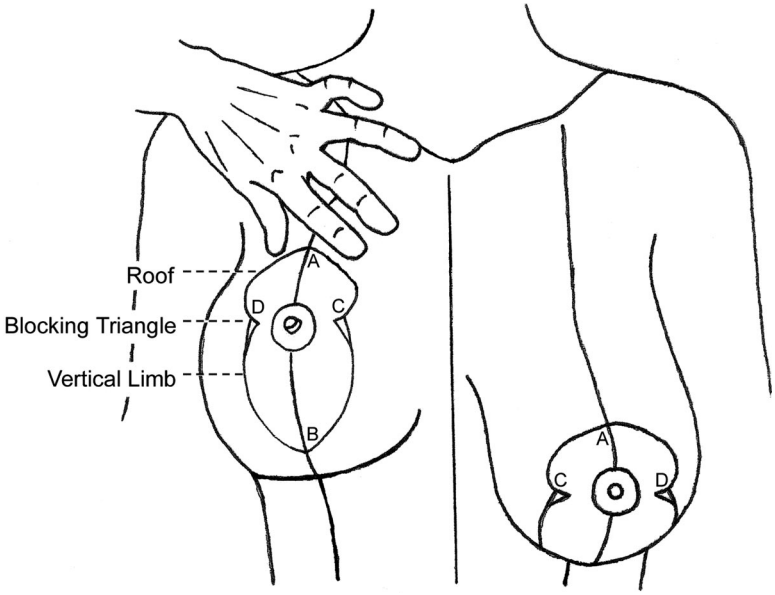

Fig. 1. Mosque dome skin marking pattern. *Point A* is at the level of the anterior projection of the inframammary crease on the breast. *Point A* will be the new location of the superior border of the areola. *Point B* is the inferior limit of the skin excision. *Point B* is 2 to 4 cm above the inframammary crease along the central axis of the breast. Blocking triangles are extended from *points C* and *D*.

constructed by extending curved lines from point B to points C and D to form the margins of the skin to be excised. We draw the inferior end of the vertical incision to form an angle similar to the end of an elliptical incision. This is in contrast to the technique described by Hall-Findlay[27–29] where a more rounded inferior end of the vertical incision is used.

It is difficult to use the standard Wise pattern[44] because the keyhole produces a teardrop-shaped areola and the vertical limbs of the pattern form an area of skin to be excised that is excessively wide. Blocking triangles are drawn from point C and point D, toward the central axis of the breast. These triangles will prevent the formation of the teardrop deformity of the areola postoperatively. The skin in the axillary area and along the lateral chest wall is marked denoting the areas to be liposuctioned.

After the patient has been anesthetized and placed in the supine position, a tourniquet is applied to the breast to keep the skin overlying the breast taut. The nipple-areola complex is outlined using a metal washer, 4.5 cm in diameter, centered over the nipple. It is important to note that if any part of the new areola lies superior to a line joining the blocking triangles, a superior dermoglandular pedicle is used; if all of the areola lies inferior to this line, a medial dermoglandular pedicle is used (Fig. 2). This rule limits pedicle length and avoids vascular compromise of the nipple-areola complex.

The superior pedicle is drawn from the blocking triangles inferiorly, leaving a 2.5-cm border around the nipple-areola complex. The medial pedicle can be drawn with a base that is partially in the roof and in the vertical limb or completely in the vertical limb of the mosque dome, depending on the location of the nipple-areola complex (Fig. 3, *above, left*). A 2.5-cm border is left around the nipple-areola complex. The base of the medial pedicle should be wide enough to maintain a pedicle width-to-length ratio of no less than 1:2 to preserve its blood supply but should be narrow enough to allow easy insetting of the nipple-areola complex.

Infiltration

A small incision is made superior to point B. Infiltration is performed just deep to the skin and then within the breast tissue. Each breast is infiltrated with 500 ml of a solution made with 1000 ml of Ringer's lactate solution mixed with 40 cc of 2% lidocaine and 1 cc of 1:1000 epinephrine.

Deepithelialization

To facilitate deepithelialization of the skin, a tourniquet is applied to the base of the breast to

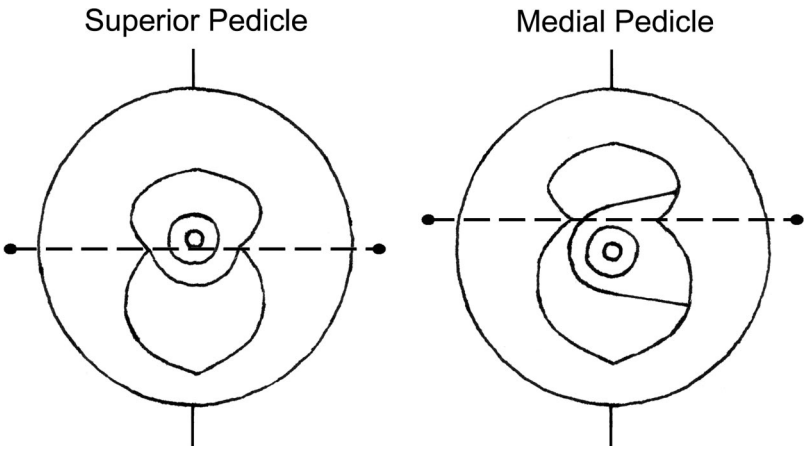

Fig. 2. Selection of the pedicle depends on the position of the nipple-areola complex with respect to the skin markings. (*Left*) Superior pedicle. (*Right*) Medial pedicle.

increase tension of the skin overlying the breast (Fig. 3, *second row, left*). Before deepithelialization, the nipple-areola complex and the pedicle are marked, as explained above.

Surgical Excision

Surgical excision en bloc of skin, fat, and gland is performed as outlined by the skin markings (Fig. 3, *third row, left*). The excision is extended down to the chest wall, leaving a layer of breast tissue over the pectoralis fascia to prevent bleeding. If more volume reduction is needed, the excision may be extended deep to the skin to encompass more breast tissue (Fig. 3, *below, left*). We have found that modification of skin markings intraoperatively is not required, thus removing a great deal of the "intuitiveness" of this operation. We prefer to excise breast tissue laterally and superiorly and to leave breast tissue intact medially (Fig. 3, *above* and *second row, right*). This leaves more breast fullness medially and better breast shape. When deep to the pedicle, it is important to leave the pedicle at least 2.5 cm thick to preserve its blood and nerve supply. When excising breast tissue laterally and superiorly, the flaps should be maintained 2.5 cm thick throughout their length. The tissue between the end of the vertical wound and the inframammary crease is thinned to prevent a dog-ear from forming. No excisional modification of the skin is required in this region to control dog-ear formation.

When using a superior pedicle, a superficial incision can be extended 2 cm superiorly from each blocking triangle to facilitate the insetting of the nipple-areola complex.[14]

Liposuction

If required, postexcision liposuction is performed using a 4-mm, three-hole blunt cannula for volume reduction of the axillary area of the breast and contouring of the lateral chest wall. In excessively fatty breasts, liposuction can be performed on the superior half of the breast for volume reduction. Access to these areas is through the medial and lateral pillars created by the surgical excision. Liposuction is performed after excision because it is very difficult to accurately assess the composition of the breast preoperatively by clinical examination.

Breast Shaping and Wound Closure

Wound closure is performed in two planes. Inverted 1-0 Vicryl sutures (Ethicon, Inc., Somerville, N.J.) are used to reapproximate the medial and lateral pillars of the breast parenchyma (Fig. 3, *third row, right*). These sutures are important in preventing pseudoptosis or "bottoming out" of the breast. Usually, two sutures are used, but the inferiormost suture should be placed no closer than 4 cm from the inferior end of the incision. Placing the pillar sutures too far inferiorly may lead to the formation a dog-ear at the inferior end of the vertical scar.

Temporary skin staples are used to close the vertical wound while suturing the skin (Fig. 3, *below, right*). All suturing of the skin is done using a 4-0 Monocryl suture (Ethicon). A four-point gathering box stitch (Fig. 4) is used to gather the skin of the vertical wound. The skin is gathered beginning at the inframammary crease. Gathering of the skin assists in eliminating dog-ears close to the inferior end

Fig. 3. Operative technique for vertical scar reduction mammaplasty using a medial dermoglandular pedicle for transposition of the nipple-areola complex. (*Above*, *left*) Mosque dome skin marking pattern. (*Second row*, *left*) The pedicle is deepithelialized. (*Third row*, *left*) Excision en bloc is performed. The medial dermoglandular pedicle is 2.5 cm thick. (*Below*, *left*) Excision en bloc of skin, fat, and gland. The excision of breast tissue is more extensive than the skin excision. (*Above*, *right*) The superior limit of the excision of breast tissue is shown. (*Second row*, *right*) The lateral limit of the excision of breast tissue is shown. (*Third row*, *right*) The medial and lateral pillars are sutured together. (*Below*, *right*) Temporary skin staples are used to close the vertical wound while suturing the skin.

of the vertical scar (Fig. 5, *above*, *left*). Skin within 1 cm of the areola is not gathered to prevent distortion of the areola. After gathering of the skin, any gaping of the horizontal pleats along the vertical wound is corrected using a deep dermal, inverted suture (Fig. 5, *above*, *left*). Correction of horizontal pleats is essential because they do not settle with time and lead to small horizontal scars within the larger vertical scar. The box stitch successfully shortens the length of the vertical wound (Fig. 5, *below*, *left*). Skin staples are used along the vertical wound for final closure (Fig. 5, *above*, *right*). Deep dermal, inverted sutures are used to inset the nipple-areola complex. Intradermal, continuous sutures are used for closer approximation of skin edges of the periareolar wound, promoting better wound healing (Fig. 5, *below*, *right*).

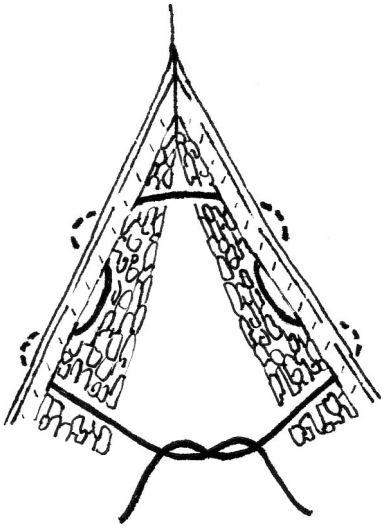

Fig. 4. A four-point gathering box stitch is used to gather the skin of the vertical wound.

Each breast is injected with 10 cc of 0.5% 1:200,000 bupivacaine for postoperative pain relief. The wounds are covered with paraffin gauze, followed by dry gauze, and finally by abdominal pads. These are held in place by the patient's brassiere.

Postoperative Management

Patients undergoing vertical scar reduction mammaplasty are listed as day surgery cases. Unless additional major procedures are performed

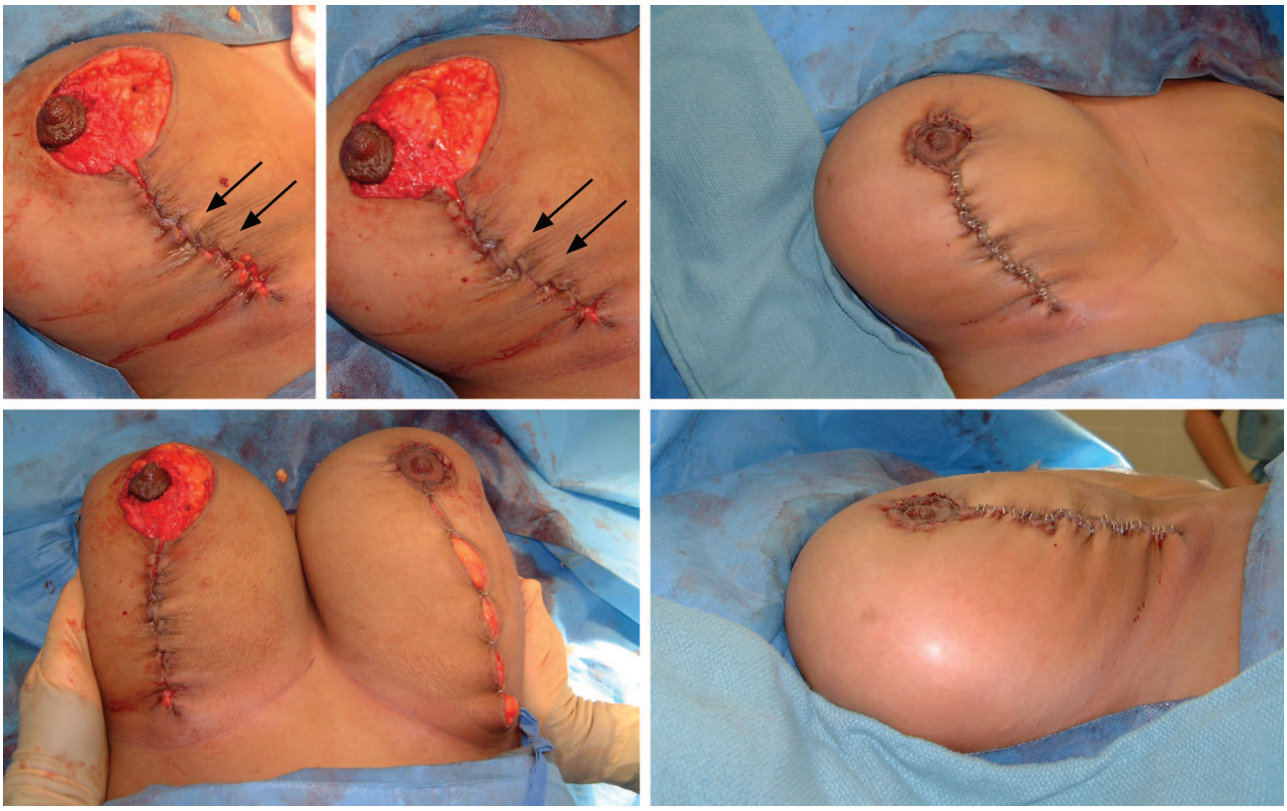

Fig. 5. Operative technique continued. (*Above*, *left*) Gathering of the skin of the vertical wound before and after correcting gaping of the horizontal pleats (*arrows*). (*Below*, *left*) Comparison of gathered and ungathered vertical wound. (*Above*, *right*) The nipple-areola complex has been inset and skin staples are used along the vertical wound for final closure. (*Below*, *right*) At the end of the operation, there is exaggerated superior pole fullness, inferior pole flatness, and indrawing of the nipple.

(e.g., abdominoplasty), patients are discharged to home on the same day as their surgery is performed. Starting 1 day postoperatively, patients are instructed to shower and wash their wounds with soap and water and dress them with dry gauze. Patients are seen on day 5 postoperatively for removal of skin staples and Steri-Strips (3M, St. Paul, Minn.) are applied and can be removed 2 weeks postoperatively. Patients may return to their normal level of activity 3 weeks postoperatively. Physically demanding activity may be started 1 month postoperatively.

RESULTS

This technique has been used to perform breast reductions of all sizes (Figs. 6 through 11). The average total reduction per breast (including liposuction) was 636 g and ranged from 60 to 2020 g. The average weight of tissue excised per breast was 526 g (range, 10 to 2020 g) and the average volume liposuctioned per breast was 140 cc (range, 25 to 500 cc). Liposuction was performed in 78.4 percent of cases, and 18.2 percent of breasts underwent a reduction of less than 400 g, 59.6 percent of breasts underwent a reduction of between 401 and 800 g, and 22.2 percent of breasts underwent a reduction of greater than 800 g.

Bilateral superior pedicles and bilateral medial pedicles were used in 78.4 percent and 18.4 percent of cases, respectively. In 3.2 percent of cases, a superior pedicle was used on one side and a medial pedicle on the other. A superior pedicle was used in 80 percent of breasts and a medial

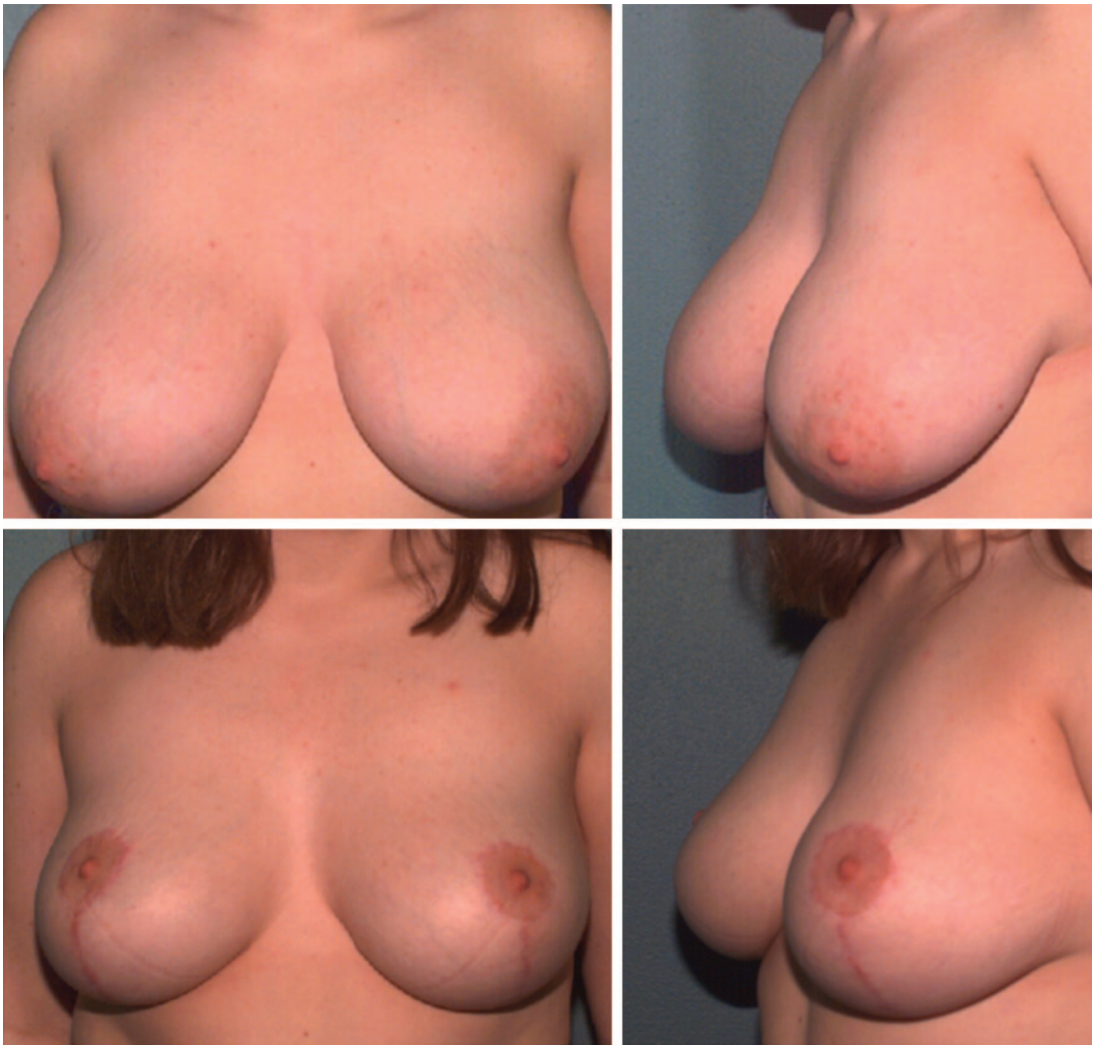

Fig. 6. (*Above*) A 21-year-old woman underwent vertical scar reduction mammaplasty using bilateral superior pedicles; 650 g was excised from the right breast and 615 g was excised from the left breast. In addition, 150 cc was liposuctioned from each breast. (*Below*) Results 3 months postoperatively.

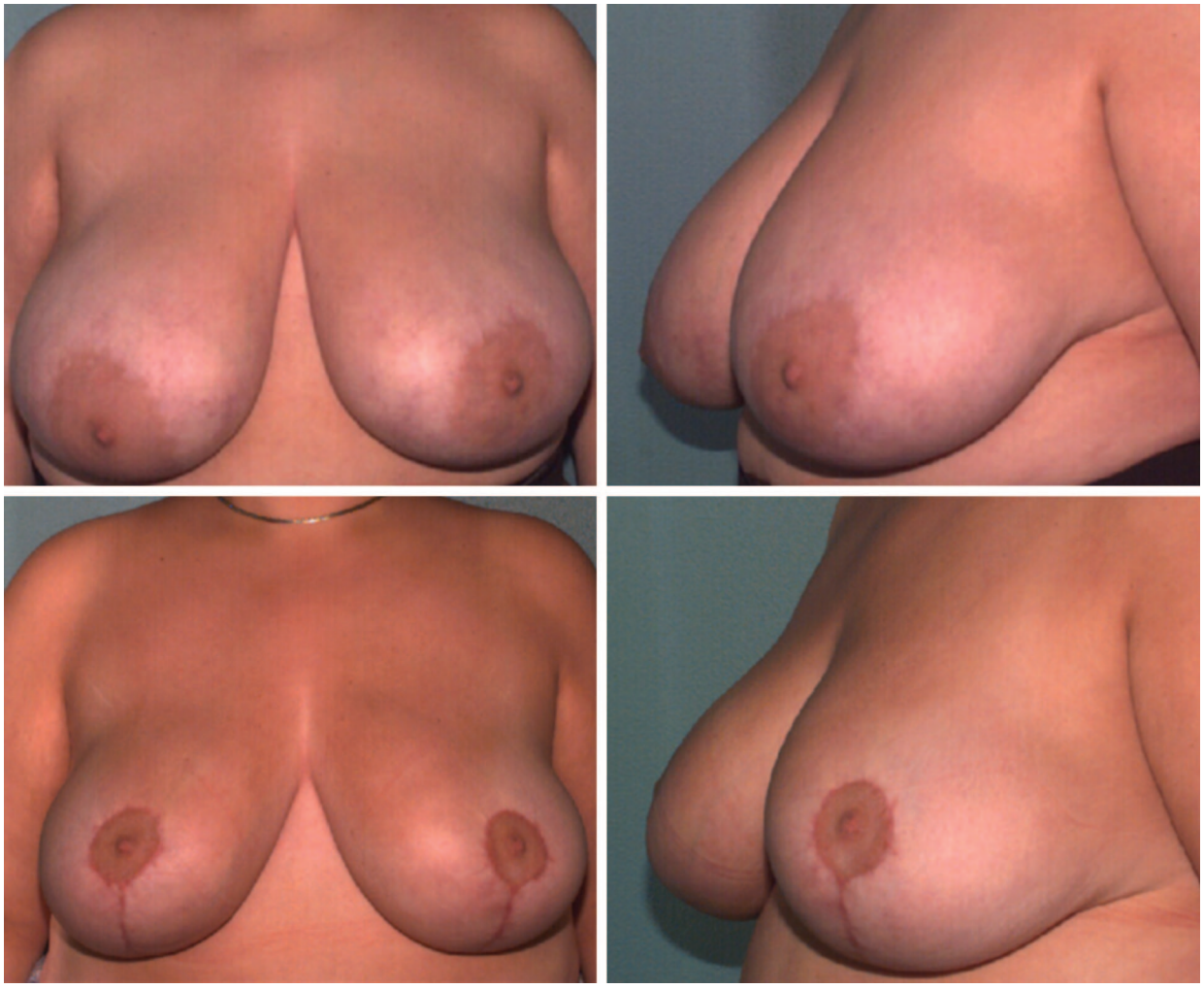

Fig. 7. (*Above*) A 26-year-old woman underwent vertical scar reduction mammaplasty using bilateral superior pedicles; 670 g was excised from the right breast and 690 g was excised from the left breast. In addition, 300 cc was liposuctioned from the right breast and 250 cc was liposuctioned from the left breast. (*Below*) Results 2 months postoperatively.

pedicle was used in 20 percent of breasts. Using a superior pedicle, the average reduction per breast was 584 g (range, 60 to 1700 g), whereas using a medial pedicle, the average reduction was 843 g (range, 340 to 2020 g). The distributions of the amount of reduction per breast using superior and medial pedicles are shown in Table 1. The average operative time was 62 minutes (range, 34 to 131 minutes).

Complications

Of 250 patients reviewed in depth, complications were seen in 28 breasts (5.6 percent). Table 2 shows the total number of complications. Table 3 shows complications distributed by body mass index, amount of reduction, pedicle selection, and use of liposuction. A modified chi-square test was used to analyze complications based on body mass index, amount of reduction, pedicle selection, and use of liposuction. With a value of $p < 0.05$, there was no statistically significant difference between groups for amount of reduction ($p = 0.107$), pedicle selection ($p = 0.662$), and use of liposuction ($p = 0.831$). However, there was a marginally statistically significant difference between groups for body mass index ($p = 0.048$), with complications occurring less frequently in patients of normal weight (body mass index, 18.5 to 25.0).

The most frequent complication was superficial wound dehiscence, which occurred in 11 breasts (2.2 percent). None of these wound dehiscences required surgical revision. Glandular infection occurred in one breast (0.2 percent) and was treated with antibiotics.

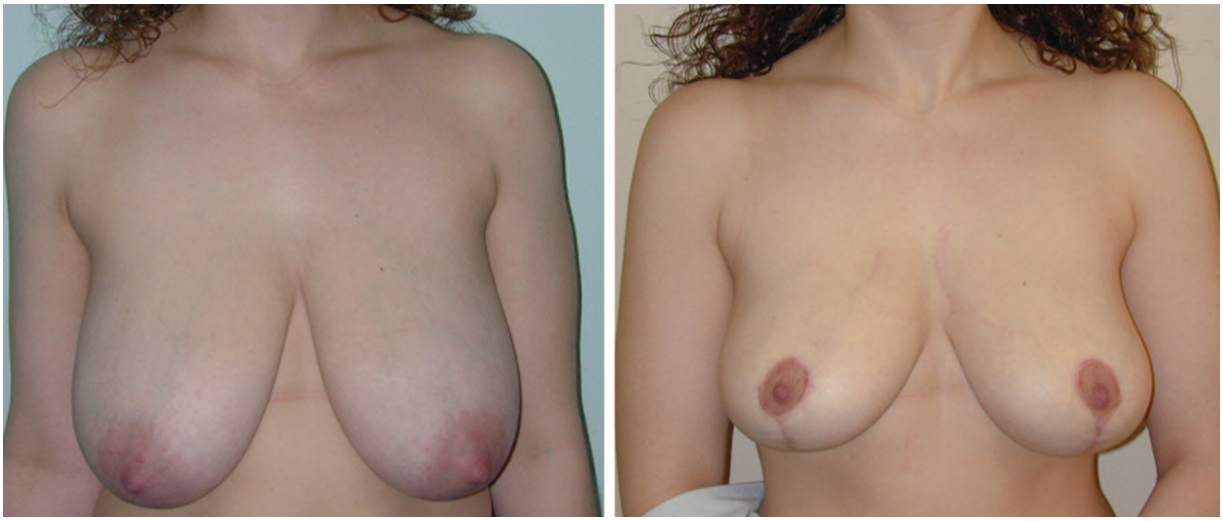

Fig. 8. (*Left*) A 32-year-old woman underwent vertical scar reduction mammaplasty using bilateral superior pedicles; 498 g was excised from the right breast and 460 g was excised from the left breast. In addition, 100 cc was liposuctioned from each breast. (*Right*) Results 8 months postoperatively.

Fig. 9. Same patient as shown in Figure 8. Results 8 months postoperatively.

Hematomas were uncommon, occurring in only six breasts (1.2 percent) and were evacuated under general anesthesia. Seromas were rare and occurred in only two breasts (0.4 percent). They required one to four aspirations of 40 to 180 cc to resolve. Interestingly, both hematomas and seromas occurred only in breasts that had undergone liposuction.

Fat necrosis occurred in four breasts (0.8 percent) and two required excisions under general anesthesia. Fat necrosis occurred only in large reductions.

In the complete series of 1501 patients, there has never been complete nipple loss, let alone any necrosis of the nipple-areola complex. The selection of a superior versus medial dermoglandular pedicle based on where the nipple-areola complex lies with respect to the skin markings limits the use of long pedicles, with the potential for compromised blood supply.

An inverted nipple occurred in one patient. Tethering to the underlying breast tissue was released under local anesthesia. In one patient, a dog-ear at the inferior portion of the vertical scar was revised using a short horizontal scar under local anesthesia.

One patient required a second breast reduction. A total of 1412 g of tissue was excised bilaterally during the first breast reduction. Liposuction was not used. Subsequently, the patient felt that her breasts were still too large, so a second breast reduction was performed 10 months later; 1085 g of tissue was excised and 500 cc was liposuctioned bilaterally to achieve the desired result.

DISCUSSION

Positioning of the Nipple-Areola Complex

Early in our experience, we used standard marking techniques that used landmarks such as mid-humeral point or sternal notch to nipple distance for positioning of the nipple. This routinely led to a nipple that was overly high in relation to breast position. To prevent high nipples, the skin markings were adjusted so that the superior border of the new areola was marked at the level of the

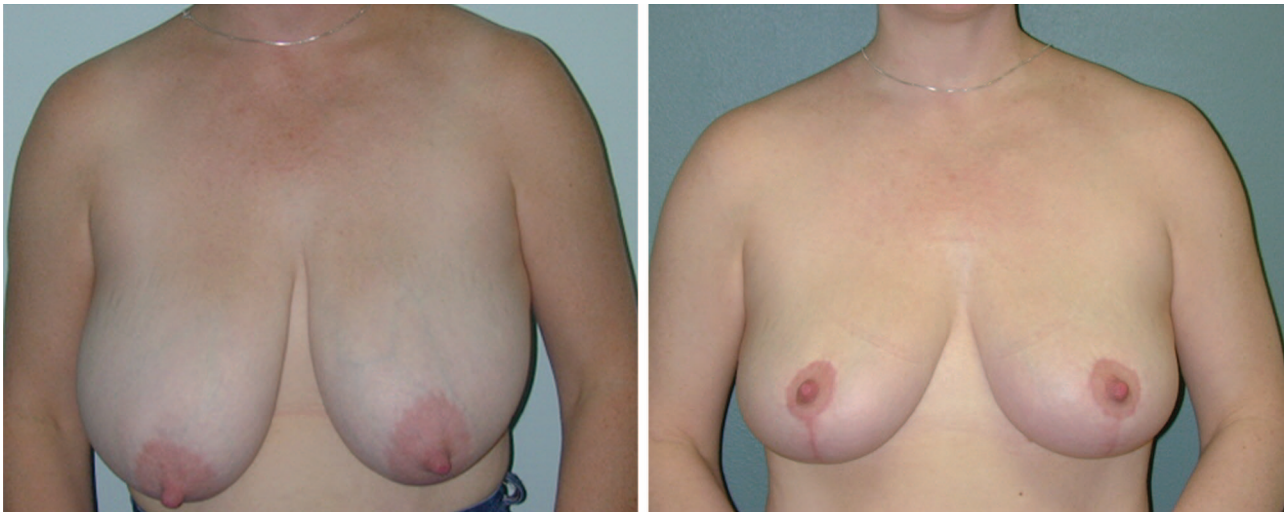

Fig. 10. (*Left*) A 39-year-old woman underwent vertical scar reduction mammaplasty using bilateral superior pedicles; 602 g was excised from the right breast and 460 g was excised from the left breast. In addition, 240 cc was liposuctioned from each breast. (*Right*) Results 4 months postoperatively.

Fig. 11. Same patient as shown in Figure 10. Results 4 months postoperatively.

anterior projection of the inframammary crease. Suturing of the medial and lateral pillars produces coning of the breast and pushes the nipple superiorly.

Intraoperative Appearance of the Breast

The operation is carried out with the patient supine, unlike other techniques, where the patient is sitting or semisitting. Early on in our experience, we were sitting the patient up to adjust nipple position and skin excision. We now find that no deviation from the preoperative markings is required and that sitting the patient up during surgery is unnecessary.

Adequacy of the Reduction

Some authors feel that it is difficult to assess the adequacy of the reduction because the endpoint of the operation is unfamiliar to those who normally perform inverted-T scar reduction mammaplasties.[2] At the end of the operation, there is exaggerated superior pole fullness, inferior pole flatness, and indrawing of the nipple with which one must become familiar. Although vertical scar breast reductions have a characteristically unusual appearance on the operating room table at the end of the procedure, they invariably give a much more aesthetically pleasing result postoperatively.

While learning this technique, there was a tendency for underresection because we were hesitant to resect breast tissue laterally and superiorly. However, with the simple design of the excision in this technique, increased reduction can be safely achieved by excising breast tissue laterally to the anterior axillary line and superiorly deep to the pedicle, if necessary. Provided that the thickness of the pedicle and skin flaps is 2.5 cm, it is possible to resect more tissue without compromising the blood supply of the pedicle or skin of the vertical wound.

The Vertical Scar

After vertical scar reduction mammaplasty, the inframammary crease moves superiorly. To pre-

Table 1. Distribution of Amount of Reduction for Superior and Medial Pedicles (500 breasts)

No. of Breasts	No. of Breasts	%
Superior		
<400 g	86	21.5
401–800 g	257	64.2
>800 g	57	14.3
Medial		
<400 g	5	5.0
401–800 g	41	41.0
>800 g	54	54.0

vent the vertical scar from extending below the inframammary crease, the skin incision must end 2 to 4 cm above the inframammary crease. Using box stitches, the skin can be gathered several centimeters so that the vertical scar measures 8 cm or less. Rarely, the vertical scar measures more than 8 cm. In Wise pattern reductions, it is necessary to keep the length of the vertical scar to less than 5.5 cm.[28] However, in vertical pattern reductions, a much longer vertical scar is acceptable. Lassus[9] measured the distance between the inferior border of the areola and the inframammary crease in young women with beautiful breasts and found measurements ranging from 4.5 to 10 cm and concluded that the distance was dependent on the size of the breast. Lassus[8] reported vertical scar lengths up to 9 cm in large reductions and Hall-Findlay[27] showed results where this distance was up to 12 cm. Along with other authors,[16] we have observed that after vertical scar reduction mammaplasty, the length of the vertical scar remains stable over time. Cutaneous wrinkling of the vertical scar associated with gathering of the skin will disappear by 6 months postoperatively.[45]

Immediate versus Long-Term Breast Shape

A common problem associated with inferior pedicle/inverted-T scar reduction mammaplasties is the "wide and flat" appearance of the breast.[9,13]

Table 2. Complications after Vertical Scar Reduction Mammaplasty in 250 Patients (500 breasts)

	No. of Breasts	%
Seroma	2	0.4
Hematoma	6	1.2
Fat necrosis	4	0.8
Areolar necrosis	0	0.0
Nipple loss	0	0.0
Superficial wound dehiscence	11	2.2
Glandular infection	1	0.2
Inverted nipple	1	0.2
Scar revision	1	0.2
Repeat reduction	2	0.4

Table 3. Complications Distributed by Body Mass Index, Amount of Reduction, Pedicle Selection, and Use of Liposuction (500 breasts)

	Breasts		Complications	
	No.	%	No.	%
Body mass index				
<18.5 kg/m^2	2	0.4	0	0.0
18.5–24.9 kg/m^2	108	21.6	1	0.9
25–29.9 kg/m^2	198	39.6	15	7.6
>30 kg/m^2	192	38.4	12	6.3
Amount of reduction				
<400 g	91	18.2	2	2.2
401–800 g	298	59.6	16	5.4
>800 g	111	22.2	10	9.0
Pedicle selection				
Superior	400	80.0	21	5.3
Medial	100	20.0	7	7.0
Use of liposuction				
Yes	392	78.4	21	5.4
No	108	21.6	7	6.5

Maintaining a short vertical limb produces lateral dog-ears, which necessitates the horizontal scars of a Wise pattern reduction. With vertical scar reduction mammaplasty, the inferior wedge resection and subsequent bringing together of the medial and lateral pillars causes coning of the breast. This results in a narrower, more projecting breast, which is the hallmark of the procedure.

Another problem associated with inferior pedicle/inverted-T scar reduction mammaplasties is the poor long-term breast shape.[2] The inferior breast tissue that caused the primary ptosis is not excised, leading to the occurrence of pseudoptosis or bottoming out of the breasts. This problem rarely occurs after vertical scar reduction mammaplasty because the inferior breast tissue that caused the original stretching of the skin envelope is removed. Suturing of the pillars provides further support to the inferior aspect of the breast.

When remodeling the breast tissue, it is unnecessary to suture the pedicle to the pectoralis fascia. Good long-term results have been reported independent of the pedicle being sutured to the pectoralis fascia.[10,16,27] Settling of the breasts takes longer if the pedicle is sutured to the pectoralis fascia. This may delay the descent of the breasts to their final position.

When bringing the vertical limbs together, wound closure must be performed in two planes. The pillar sutures are responsible for the long-term shape of the breast. Gathering of the vertical wound using box stitches shortens the vertical scar and helps prevent pseudoptosis in the large breast. Unlike other vertical scar techniques that take several months to achieve their final breast shape,

in this technique, the patients have a normal appearing breast when seen in the office at day 5 postoperatively.

Breast Asymmetry

In cases of breast asymmetry, the distance between the vertical limbs of the mosque dome pattern is increased in the larger breast, so that more skin will be excised. It is possible to use a superior pedicle in one breast and a medial pedicle in the other, if necessary. This was done in 3.2 percent of cases and did not lead to any noticeable differences in final breast shape. Any difference between breasts in the distance from the areola to the inframammary crease is corrected by differential gathering of the skin of the vertical wound.

Safety of the Technique

Fewer complications occurred with this technique than described in previous articles.[15,41] The fact that necrosis of the nipple-areola complex never occurred in more than 1500 cases is related to pedicle choice and design. In this technique, by using a medial pedicle for cases of mammary hypertrophy with greater degrees of ptosis, pedicles are kept short. Long pedicles that require excessive thinning and folding during insetting of the nipple-areola complex are not used. Lassus also restricted the use of the superior pedicle to cases in which the nipple-areola complex was transposed no more than 10 cm; a lateral pedicle was used when transposition was greater than 10 cm.[10] Also, maintaining a thickness and a border of at least 2.5 cm of breast tissue surrounding the nipple-areola complex helps to prevent necrosis.

Blood loss is decreased with this technique. Use of an infiltration solution containing epinephrine, an excision en bloc of breast tissue, and thorough cautery of all bleeding vessels contribute to hemostasis. In over 1500 cases, no patient has ever required a blood transfusion. Drains are rarely used. Along with other authors,[46,47] we believe that routine insertion of drains is unnecessary following breast reduction. Wrye et al.[47] reported that performing reduction mammaplasty without the use of closed suction drainage does not increase complications and is preferred by patients.

It is recognized that the excessive skin undermining of Lejour's technique leads to delayed healing.[27,36] It is, in fact, unnecessary because the skin of the vertical wound can be easily gathered without separating it from the underlying tissue. Delayed wound healing occurred infrequently in this series because skin undermining was avoided, and when the excision deep to the skin was carried out laterally and superiorly, the skin flaps were maintained 2.5 cm thick throughout their length.

Operative Time

The patients are admitted and discharged on the same day of the surgery. The average operating time is less than 70 minutes and is significantly shorter than that reported by other authors.[27,36]

Learning the Technique

We believe that this technique is easy to learn because of the simple design of the excision and the use of shorter pedicles that are easy to inset. In accordance with Lassus[10] and Hall-Findlay,[27] we recommend learning the technique by initially operating on patients with mild to moderate hypertrophy, elastic skin, and firm breasts. As one becomes more familiar with the technique, they can progress to performing the technique on patients with more severe hypertrophy and poorer skin quality.

Comparison with Other Techniques

Table 4 shows a comparison of four techniques for vertical scar reduction mammaplasty. Superior or medial pedicles are used in all of the techniques to allow removal of breast tissue at the inferior pole. With this technique, limiting pedicle length by using a superior pedicle for hypertrophic breasts with lesser degrees of ptosis and a medial pedicle for those with greater degrees of ptosis has increased the safety of transposing the nipple-areola complex and the efficiency of the technique. Attempting to use a single pedicle for all types of breasts prevents the breast reduction from being tailored to the individual. It is possible to resect tissue deep to the pedicle and beneath the superior and lateral skin flaps without compromising the nipple-areola complex. It is unnecessary to use a full-thickness pedicle for safety, but aggressive thinning of the pedicle is not recommended.

The design of the excision used in this technique is similar to that of Hall-Findlay[28,29] in that it is extended deep to the skin in superior and lateral directions to encompass more breast tissue to achieve greater volume reduction. However, with this technique, the skin flaps are maintained at a thickness of 2.5 cm throughout their length, whereas Hall-Findlay[28,29] begins with a flap thickness of 5 mm at the edge of the vertical wound and then "bevels out" the excision so that the flaps become progressively thicker at the periphery. Another important difference is our belief that the

Table 4. Comparison of Four Techniques for Vertical Scar Reduction Mammaplasty

	Lassus	Lejour	Hall-Findlay	Lista
Skin markings	Elliptical pattern	Mosque dome pattern, rounded inferiorly	Mosque dome pattern, rounded inferiorly	Mosque dome pattern, pointed inferiorly
Pedicle selection	Superior (or lateral)	Superior	Medial	Superior or medial
Pedicle thickness	5 mm	2–3 cm	Full-thickness	2.5 cm
Design of excision	Central with superior and inferior extensions	Central with superior, inferomedial and inferolateral extensions	Central with superior, lateral and inferior extensions	Central with superior, lateral and inferior extensions
Liposuction	Limited	Extensive preexcision	Limited	Extensive postexcision, if required
Skin undermining	No	Yes	No	No
Pedicle sutured to chest wall	No	Yes	No	No
Breast shaping	Only skin of medial and lateral pillars sutured together	Skin and parenchyma of medial and lateral pillars sutured together	Skin and parenchyma of medial and lateral pillars sutured together	Skin and parenchyma of medial and lateral pillars sutured together

vertical incisions should meet at a point inferiorly, rather than being rounded, because this gives better control of the inferior end of the incision and may help to prevent puckering at the inferior end of the vertical scar. Finally, we use four-point box stitches to gather the skin of the vertical wound where it is needed, as opposed to using a continuous intradermal suture that gathers the excess skin evenly along the vertical wound.

CONCLUSIONS

The technique for vertical scar reduction mammaplasty performed in this series uses a mosque dome skin marking pattern; transposition of the nipple-areola complex on a superior or medial dermoglandular pedicle, depending on its position with respect to the skin markings; an excision en bloc of skin, fat, and gland; postexcision liposuction; and wound closure in two planes, with gathering of the skin of the vertical wound. This technique has been applied to breast reductions of all sizes and has consistently produced good breast shape, with an operation that is shorter to perform and that leaves less scarring than standard breast reductions. The technique is straightforward and easy to learn, and offers a safe, effective, and predictable way of treating mammary hypertrophy.

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