



Vertical Reduction Mammoplasty Using the Medial Pedicle

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O

ur doubts are traitors

And make us lose the good we oft might win

By fearing to attempt

William Shakespeare

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There are many approaches to breast reduction, and all have their advantages and their disadvantages; the challenge is in achieving the ideal balance for each patient. I have found that the vertical approach using the medially based pedicle has given me improved results for the majority of my breast reduction patients [1–3].

Reducing volume is the object of the procedure, but maintaining blood supply to the nipple and breast skin, maintaining sensory innervation to the nipple and breast skin, and preserving the ability to breast-feed are the functional goals. A pleasing and long-lasting shape is the cosmetic goal.

In designing an ideal breast reduction procedure, three issues must be addressed:

1. The shape of the skin resection pattern
2. The design of the pedicle to carry the nipple-areola complex
3. The nature of the parenchymal resection

Because of the popularity and wide applicability of the inverted T procedures along with the reliability of the inferior pedicle [4–6], we often forget to look at these three areas as separate issues.

Historically breast reduction surgery has attempted to combine various skin resection patterns with different pedicles to maintain blood supply (as well as sensation and breastfeeding potential) to the nipple-areola complex [7]. Observing principles of limited skin undermining of the remaining breast skin along with a dermoglandular pedicle for the nipple are ideal goals that were satisfied by the inverted T inferior pedicle (or central mound) techniques, and they have achieved wide acceptance. But other skin resection patterns and other pedicle designs have been described over the years – each with its advantages and disadvantages [8–13]. Shorter scar skin resection patterns have been slower to achieve wide acceptance [14–20].

Indications

Breast reduction surgery is indicated to reduce back and neck pain, shoulder strap grooving, and overall breast discomfort. The surgery helps to improve the problem of rashes in the area of overlapping skin underneath the breasts, and there is no question that many patients have improvement in headaches, posture, and ability to exercise. The psychological improvement in patients' self-esteem can be hard to measure, but many patients comment that their only regret was not having the surgery performed earlier. While an improvement in symptoms may be the primary goal, both surgeons and patients wish to have a good cosmetic result. Sometimes the two are in conflict, but many of us who perform the shorter scar techniques do not believe that function and shape are mutually exclusive.

Anatomy

The breast is a subcutaneous structure that consists of 15 to 25 separate lobules. We all know that the breast is a functional organ for breastfeeding, but we also need to remind ourselves that it is a very important cosmetic aspect of a woman's sense of self – both physically and psychologically.

The blood supply comes in from several different directions. Because the nature of breast reduction surgery is a blood-supply-reducing operation, we need to preserve and maximize the remaining blood supply to the parenchyma, to the pedicle, and to the skin. Probably the most robust blood vessels come medially through the internal mammary perforators and from the inferior perforators that arise through the pectoralis muscle in the midline (or meridian) of the breast a few centimeters above the level of the inframammary fold. There is a strong superior leash that comes from the supraclavicular vessels and that usually again lies to just either side of the breast meridian. These vessels do not come from the chest wall directly but enter the breast at a more superficial level about 1 cm below the surface of the skin. Lateral blood vessels are more variable in location, but there are usually a couple of fairly robust vessels that come up

from the lateral thoracic system and take a more superficial route as they pass into the breast tissue. Taylor [21] has shown that the blood supply comes from superficial tissue and then penetrates into the deeper breast tissue as it follows the pattern of ectodermal tissue that has penetrated the mesenchyme.

Much is made of the importance of the fourth intercostal nerve coming in from the lateral direction in providing sensation to the nipple-areola complex. There is no question that this is a key nerve, but there are branches that come in from all directions – superiorly, laterally, and medially, as well as those coming up from the chest wall vertically [22].

Operative Design and Markings

There are numerous approaches to breast reduction surgery using a vertical skin resection pattern. Lassus [23–25] usually uses a superior pedicle and does not bevel his resection or undermine the skin. He resects the breast tissue directly down to the chest wall and does not resect the parenchyma along the Wise pattern. His inframammary fold stays in place. Marchac [26] uses a superior pedicle but adds a small horizontal scar or T to the bottom of the vertical incision. Lejour [27–30] uses a superior pedicle and undermines the skin. She sutures the breast tissue up to the pectoralis fascia and gathers the vertical skin incision. Hammond [31] uses an inferior pedicle and takes some of the skin excess into the areolar opening as used in the circumareolar approaches.

I use a medially or superomedially based pedicle for the nipple-areola complex, and this has simplified the

procedure for me while still maintaining good sensation to the nipple. It allows the pedicle to be easily inset without any kinking or compression. It rounds out the inferior portion of the breast, giving it an elegant curve, and it avoids the problem of the medial and lateral dog ears that plague the inverted T approach. There is a slightly higher revision rate because of the inferior pucker that can result, but this pucker actually settles within weeks to months. A preoperatively informed patient accepts this compromise without question because of the improved shape and “perkiness” of the breast.

Nipple Position

The key to achieving a good cosmetic result lies in determining the ideal nipple position. This will not be the same in all procedures. Because the vertical approach results in significant breast projection, the new nipple position needs to be lower than expected (Fig. 7.1). The nipple will have the illusion of being higher because of the increased slope of the upper portion of the breast. The new nipple position needs to be lowered about 2 cm below what one is used to using in a typical Wise pattern [31] approach in order to accommodate this increased projection.

Grading's [32,33] technique of using a measuring tape under the inframammary fold on one side and over the breast on the other gives a more accurate determination of the inframammary fold. At this point, he uses the tape to mark the top of the areola. No matter what technique is used for new nipple position, surgeons need to drop the design at least 2 cm from their *usual* design with an inverted T approach.

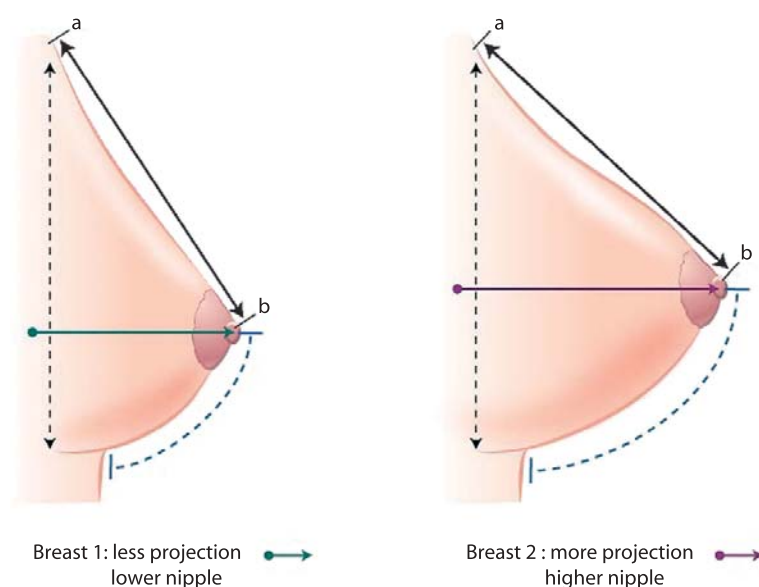


Fig. 7.1. This is an exaggerated drawing to show how the new nipple position appears to be higher with the vertical skin pattern techniques. The line *ab* is the same in both drawings, but the nipple appears higher because of the increased projection that is achieved with the coning of the breast parenchyma. The new nipple position must be marked at least 2 cm below what a surgeon would normally have marked with the Wise pattern to accommodate both the increased projection and the effect that is achieved from closure of the vertical ellipse

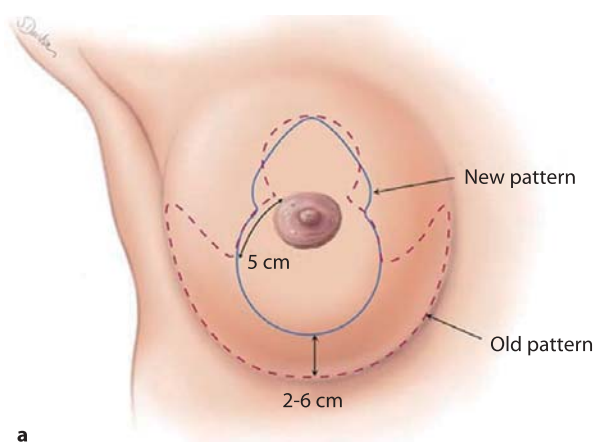
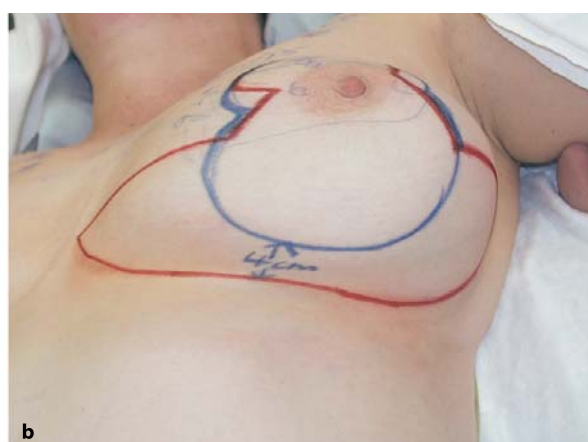


Fig. 7.2. Design of the vertical skin resection pattern compared to the inverted T skin resection pattern. **a** The Wise pattern is out-



lined in *dotted red lines*, whereas the vertical pattern is outlined in *solid blue lines*. **b** Similar comparison as seen drawn on a patient

It is important to note that, in cases of asymmetry, the new nipple position needs to be lowered in the larger breast. The closure of the vertical ellipse and the coning of the pillars not only pushes the vertical scar lower inferiorly, it also pushes the vertical scar higher superiorly. This results in a higher nipple position at the end of the procedure. It is important to keep the new nipple design lower in all large breasts, but especially in the larger side in cases of significant asymmetry.

Areolar Opening

Some surgeons prefer to design the areolar opening at the end of the procedure. It doesn't matter. Surgeons should adapt their current design to the vertical technique using whatever approach they find more comfortable. Wise's original design [31] incorporated a 14-cm circumference for the areola (about a 4.5-cm-diameter areola), and I just adapted what I learned to the vertical technique. I prefer a 5-cm-diameter areola that matches a 16-cm circumference.

Madeline Lejour adapts a mosque pattern to the areolar opening, but I would rather take more distance vertically than horizontally. Carolyn Kerrigan takes a circle in a silicone sheet and opens it out to meet the vertical limbs. As long as the final pattern results in a circular opening, the actual design is irrelevant.

Vertical Skin Resection

Vertical Lines

Because this procedure does not rely on the skin to hold the shape, the design of the skin resection is less important than in the inverted T technique. I like Madeline Lejour's rotation of breast tissue laterally and medially to determine the breast meridian. She initially marks the breast meridian down to the new nipple position and then marks the meridian at the level of the inframammary fold (which on average is 9 to 11 cm from the midline of the chest). She then takes the breast and rotates it upward and medially and then draws a line on the repositioned breast to connect the two marked meridians. She then repeats the rotation by pushing the breast upward and laterally and then marks the second line. The vertical lines drawn for a Wise pattern match these vertical lines (Fig. 7.2)

Joining the Vertical Lines

When joining these vertical lines, you must stay several centimeters above the inframammary fold. There are two reasons for this. The first has to do with the fact that closure of an ellipse results in a longer vertical line – and it could extend down below the inframammary fold. The second is that the resection pattern described in this chapter results in a change in the position of the inframammary fold itself. While the inframammary fold tends to drop with a Wise pattern, it rises with this method – usually between 1 and 2 cm. It may be tempting to bring the vertical lines down into a point, but both Dr. Kerrigan and I believe that you need to use a U pattern in order to remove some of the excess skin that will be left behind.

Pedicle for the Nipple-Areola Complex

Orientation

The pedicle is based medially, with some tissue left superomedially for fullness behind the areola and for increased security of blood supply. I have not had any problems rotating the pedicle into position if the base is designed such that half of it is in the areolar opening and half of it is in the vertical skin resection area (Fig. 7.3). I used to think that it didn't matter, but if the base is higher or lower, then it can be more difficult to

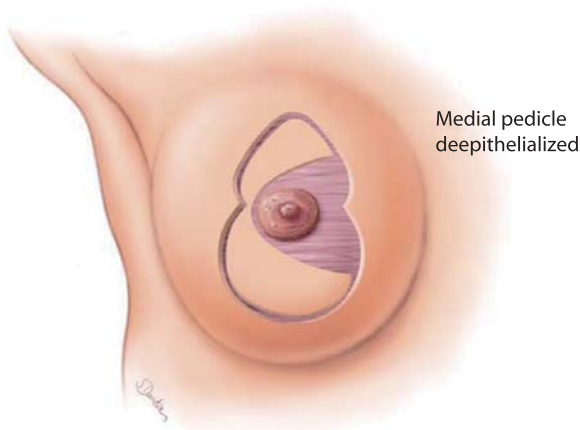


Fig. 7.3. The design of the vertical skin pattern with the medially based pedicle. The orientation of the base of the pedicle can be altered, but I have found that the pedicle is consistently easy to inset when half of the base is in the areolar opening and half is in the vertical opening. If the base is completely in the areolar opening, it can have the same problems as the superior pedicle with difficulty inseting. If the base is completely in the vertical opening, it can cause difficulties in rotation, and it may mean that there is too much inferior fullness, which can lead to pseudoptosis

rotate into position. If the base of the pedicle is too low, the weight of the pedicle could also contribute to too much lower pole fullness.

Base Width

The base of the pedicle should measure about 6 to 10 cm. The determining factor would be the length of the pedicle, but, as with the inferior pedicle, the base width probably does not need to be increased significantly to ensure good blood supply. I normally use a base width of 6 cm for the smaller (400 g) reductions, 8 cm for the medium-sized (800 g) reductions, and about 10 cm for the larger reductions. I wish I could provide a rationale for this, but my design is not based on any scientific data.

Thickness

The pedicle is designed to be a full-thickness pedicle (Fig. 7.4). It is believed that this is more likely to include good blood vessels and nerves. Although thinner pedicles have been described [35], a full-thickness pedicle is also more likely to preserve ductal tissue for future breastfeeding potential. Once created, the pedicle is full thickness down to the breast meridian.

Areas for Liposuction

Liposuction is performed not for volume reduction but for shaping. Any preaxillary fullness and any lateral chest wall fullness are marked. If one inframammary fold is higher than the other, then this fold is marked for more aggressive resection and liposuction along the inframammary fold.

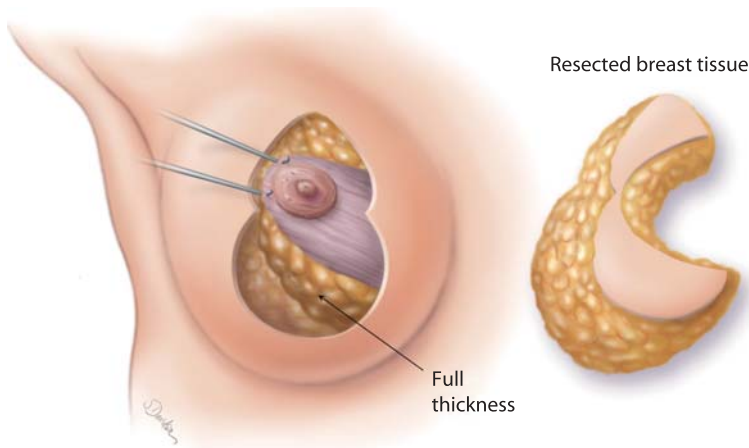


Fig. 7.4. The medial pedicle is a full-thickness pedicle carried down to the breast meridian. The base width measures about 6–10 cm (approximately a one-to-one ratio of length to base width). Although tissue needs to be removed superiorly to allow easy inset of the pedicle, it can be beveled out to help maintain blood supply and also to provide some support behind the nipple-areola complex. Any attempt, however, to push tissue up to achieve more upper pole fullness will fail and lower pole excess will result instead

Operative Technique

Infiltration

The procedure is performed under full general anesthesia, but xylocaine with adrenalin is infiltrated either as a mixture with Marcaine using a spinal needle or with a full tumescent type approach. Usually 40 cc of one-half percent xylocaine with 1/400,000 adrenalin is infiltrated into each breast. If the patient is heavy and there is a significant amount of fat along the lateral chest wall, the tumescent technique is used.

Creation of the Pedicle

The pedicle is deepithelialized, leaving a cuff of tissue around the new areolar edge (Schwartzmann maneuver [36]). With either a knife or cutting cautery, the pedicle is created directly down to the chest wall. Not only is the pedicle easily undermined inadvertently, but, like the inferior pedicle, it is floppy and appears to have been undermined. But the pedicle should be left full thickness, with the tissue in the pedicle extending directly down to the pectoralis fascia at the level of the breast meridian. Leaving a full-thickness pedicle should help to preserve both sensation and breastfeeding potential.

The pedicle can actually be superomedial rather than directly medial. Preserving some of the superior tissue can have two benefits. One is to preserve more vascularity to the pedicle; the second is to help provide a platform for the nipple-areola complex to prevent it from sinking or retracting inward. But it is important to realize that trying to push up breast tissue to create more upper pole fullness will not work. Instead, the pedicle will be pushed inferiorly and the breast will bottom out.

Skin and Parenchymal Resection

The skin and breast tissue are removed en bloc, with extra tissue removed later for shaping. I use both cutting cautery and a knife for resection. The medial pedicle allows easy access to the lateral breast tissue to allow adequate resection. This is often very fibrous and can only be removed with direct excision. The fat lateral to the actual breast can be suctioned, but the lateral breast tissue itself is often too firm for liposuction alone.

The skin is removed in a U shape. It is important not to remove too much skin. Removing excess skin will not help the shape and will only lead to wound-healing problems if there is too much tension. Bringing the lower end of the excision down to a V will only result in more loose skin inferiorly. The breast tissue

is removed following a Wise type pattern. Louis Benelli has stated that the Wise pattern is geometrically an excellent design for the breast parenchyma resection, but not for the skin.

Lateral Beveling

The tissue is excised by beveling out laterally and medially. The lateral resection can be extended up toward the breast meridian superiorly, but care must be taken to evaluate upper pole fullness. If the patient has very little fullness (and attempting to push the breast tissue up is doomed to failure), then all efforts must be made to maintain as much fullness as possible. There are some patients who have excess upper pole fullness, and some tissue can be safely resected in this area, but in general it is important not to carry the lateral parenchymal resection past the area just lateral to the breast meridian.

Medial Beveling

The breast tissue is also beveled out medially inferior to the pedicle, but some of this can be tailored at the end with liposuction. Direct excision will lead to some bleeding.

Inferior Undermining

The tissue is actually undermined, not beveled, down to the inframammary fold. This area needs to be cleared out; otherwise a pucker will be left behind. Often the puckers are a result of excess subcutaneous tissue rather than excess skin. Enough fat needs to be left on the undersurface of the skin to prevent scar contracture – usually about 1 cm. The fibrous tissue at the level of the inframammary fold can be difficult to suction, and direct excision is often necessary in this area. It is very important to be particularly careful to remove this tissue at and above the inframammary fold just lateral to the breast meridian because the inframammary fold itself will rise. It rises about 1 to 2 cm at the meridian (depending on how aggressive the resection is in this area), but it can rise several centimeters as it extends laterally. If this subcutaneous tissue is left behind, a pucker will remain.

Depth of Resection

The resection is performed without exposing the pectoralis fascia. This helps preserve sensation as some nerves travel just above the pectoralis fascia [22]. Exposing the pectoralis fascia also causes excessive bleeding.

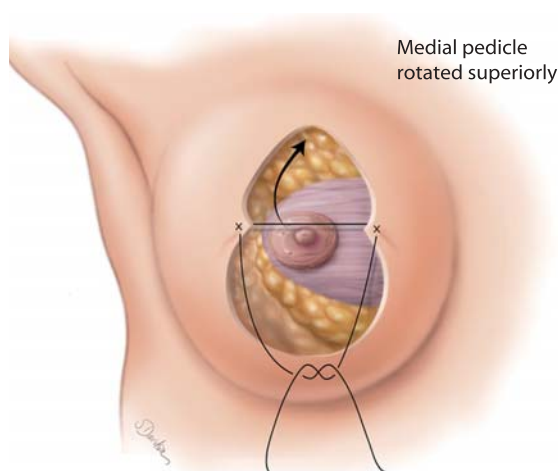


Fig. 7.5. The areolar opening is closed with a buried 3-0 Monocryl suture. The dermis at the base of the pedicle does not need to be undermined for this closure. Once the areolar opening is closed inferiorly, the pedicle is easily rotated into position. Note that the base of the pedicle itself is also rotated and the inferior border of the medial pedicle now becomes the medial pillar

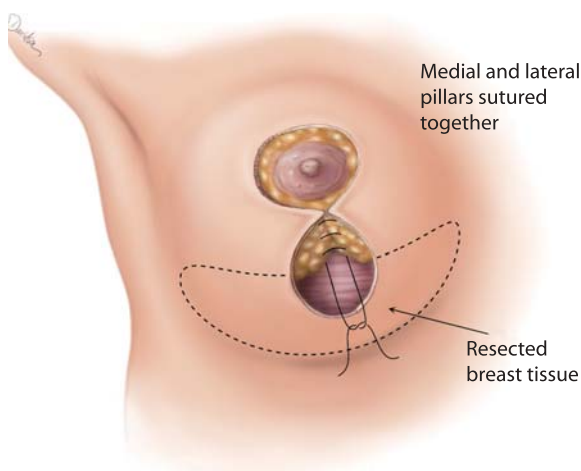


Fig. 7.6. The pillar closure starts about half way up the vertical skin opening. The Wise pattern is followed for the parenchymal resection (but not the skin resection), and the pillars should only measure about 7 cm in vertical height. The rotation of the medial pedicle along with its base rounds out the inferior aspect of the breast (a problem that can occur with the superior pedicle). The inferior border of the medial pedicle now becomes the medial pillar. The pillars are closed with only a few interrupted 3-0 PDS or Monocryl in the parenchyma. Care must be taken to suture solid fibrous tissue rather than using large constricting sutures in the fat

Insetting the Pedicle

As the pedicle rotates into position, the base of the pedicle rotates as well; it is not static. The inferior border of the medial pedicle now becomes the medial pillar.

Closure of the Areolar Opening

The pedicle rotates easily into position. A 3-0 Monocryl suture is used in the dermis to bring the base of the areolar opening together (Fig. 7.5). There is no need to undermine the dermis to achieve this closure.

Rotation of the Pedicle

The pedicle is then rotated into position. It usually rotates between 30° and 90°; it should only be rotated enough to sit easily without compression or kinking. The pillars need to be sutured first before this is determined.

Suturing the Pedicle to the Pectoralis Fascia

Sutures to the pectoralis fascia do not last. Any attempt to hold the breast tissue up and give better upper pole fullness will not be successful. Instead, the tissue will descend and cause lower pole fullness. It may look successful initially, but if the patient is followed for a year, this area drops out. If the pedicle is excessively long, there may be an indication to suture some of the body of the pedicle up to the superior breast tissue to help hold it there. Whether or not this makes a difference is uncertain, but breast-to-breast sutures do hold to some degree.

Closure of the Pillars

The inferior border of the medial pedicle is now the medial pillar. Depending on how aggressive the lateral resection has been, there may not be much tissue left for a lateral pillar. The pillars do not extend down to the inframammary fold; rather they extend 5 to 7 cm – thereby following a similar pattern to the Wise pattern – but in the parenchyma, not the skin. The area of the breast inferiorly has been cleared out, and the pillar sutures usually start about halfway up the vertical opening.

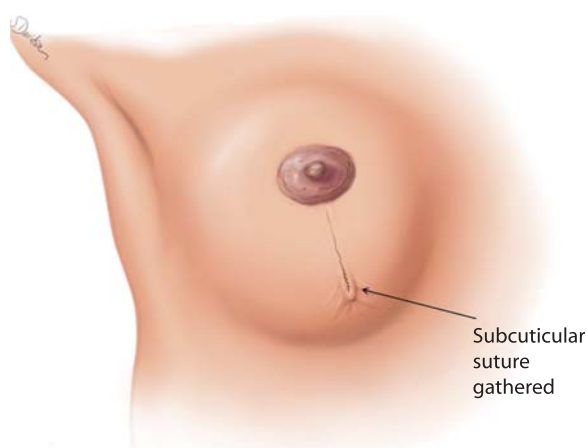


Fig. 7.7. Interrupted buried 3-0 Monocryl sutures are used in the deep dermis. The skin is closed with a subcuticular 3-0 Monocryl. I now use less gathering with this suture. Not only does it take the pucker longer to settle, but the vertical skin stretches out with time despite the gathering. If the skin has poor elasticity, then some gathering may be indicated, but only at the inferior aspect of the vertical incision. Excess gathering caused a tear-drop-shaped areola in the initial postoperative stages, and it could constrict the blood supply to the skin, causing wound-healing problems at the skin edges. Care must be taken not to take deep constricting bites of dermis when this suture is gathered

Only a few sutures of 3-0 Monocryl are used to bring the pillars together. These sutures are not large, and only solid breast tissue, not fat, is brought together. These sutures need only be strong enough to hold the breast tissue together until the normal healing process takes over.

Skin Closure

Deep Dermal Closure

The deep dermis is closed with interrupted buried 3-0 Monocryl. No attempt is made to suture the skin up to the breast tissue. If sutures are used from the dermis to the breast parenchyma, the final settling of the breast shape will be delayed.

Subcuticular Closure

The subcuticular closure is achieved with loose superficial bites of 3-0 Monocryl. If deep bites are used, or if backtracking is performed, the circulation to the skin edges may be compromised. This is especially true if the vertical skin closure is gathered too much.

Skin Gathering

The vertical skin has been gathered to varying degrees by various authors [27-30]. The thinking behind this is to help shorten the length of the vertical closure. Although loose skin inferiorly can perhaps be encouraged to tighten up somewhat, overgathering of the skin just slows healing. There are two important points to note about the vertical incision and gathering.

First, the vertical closure can accommodate significant length because of the increased projection inherent in this procedure. Second, if this length is measured postoperatively, it eventually lengthens out and excessive gathering does not lead to a shorter scar; instead it leads to impaired wound healing because of excessive constriction of the skin.

If gathering is performed, it should be confined to the loose skin at the lower end of the incision. I have been gathering this area less and less and I have found that the odd shape inferiorly settles down more quickly if minimal gathering is performed. If the vertical opening measures 14 cm, I might now gather it to about 12 cm. If the vertical opening measures 10 cm, I might now gather it to 9 cm.

It is very important to take small bites of the dermis and not to backtrack with the subcuticular suture. Otherwise the tension on the suture will cause constriction and interfere with the circulation to the skin edges. If there are small gaps left at the end, these can easily be approximated with tape.

Suturing the Pucker

I think any suturing of the pucker down to the chest wall is a mistake. First, it is not necessary. Second, it is difficult to know exactly where to put it, and it will cause more postoperative distortion. The dog ear inferiorly sticks out initially and very quickly tucks in quite nicely.

Adding a T

Several surgeons will add a T at the end of the procedure to avoid waiting for the pucker to settle [26]. This is especially tempting for those who are moving from their comfort level with the inverted T approaches, but De Mey has shown that his revision rate was not improved by adding a T at the end of the procedure [37]. Many of us may add a T in the very large reductions, but we still prefer the coning that results with this approach and we are not reverting to what one normally thinks of when discussing an inverted T with an inferior or central pedicle.

Liposuction for Final Tailoring

Prior to final skin closure, I perform liposuction not only along the lateral chest wall and in the preaxillary area, but also along the inframammary fold. I try to follow the Wise pattern for final parenchymal resection and remove the excess tissue just above the fold

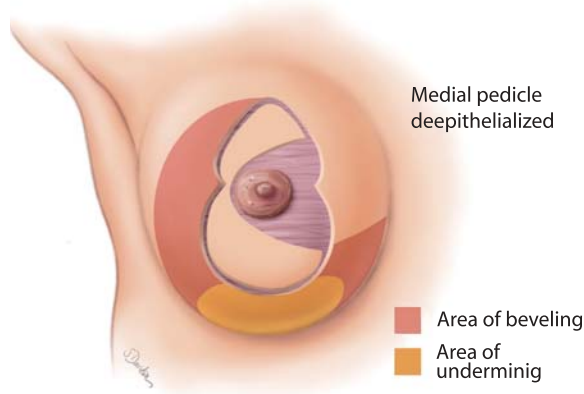


Fig. 7.8. This drawing shows the outline of the parenchymal resection. Very little tissue is removed superiorly unless the patient has significant upper pole fullness preoperatively. The tissue resection follows a Wise pattern. It is beveled out laterally and medially but undermined inferiorly. Because the inframammary fold rises with this technique, care must be taken to remove excess subcutaneous tissue in the region between the old and the new inframammary folds – especially just lateral to the breast meridian. Postoperative puckers are less a problem of skin excess than a problem of subcutaneous tissue excess. About 1 cm of fat must be left attached to the dermis to prevent scar contracture

medially and laterally. I am more aggressive laterally because the fold moves up more in this area. If subcutaneous tissue is left between the old and the new inframammary folds, this area will appear as a postoperative pucker.

I will use tumescent-type infiltration if the patient is overweight and has significant excess fat in the lateral chest wall. Otherwise, I will just use some of the lidocaine/marcaine/adrenalin solution and infiltrate with a spinal needle. There is no question that the tumescent type of infiltration results in less blood loss.

If I have underresected, or if there is some asymmetry left after partial closure, then I will use liposuction to correct the differences. I have used liposuction without any problem at the base of the pedicle, but on the other hand, I had a case of nipple necrosis after I suctioned this area on a patient. I do not know if the liposuction at the base of the pedicle contributed to the loss of circulation.

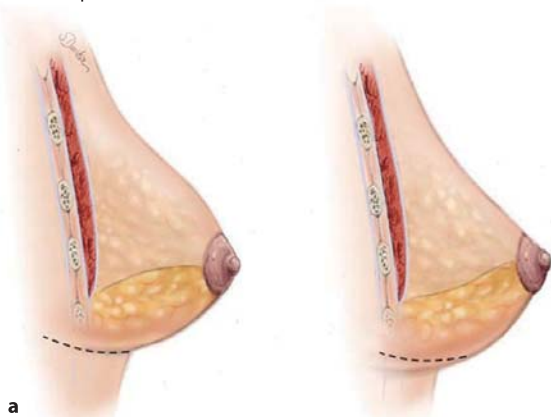
Drains

I rarely use drains. If a patient oozes a lot during surgery, or if a patient has had a very large resection (over 1200 g), then I will use suction drains overnight.

Antibiotics

The use of antibiotics for breast surgery is controversial. Americans tend to use antibiotics more freely than Canadians, but even before I stopped using drains I

Inferior pedicle



Medial pedicle

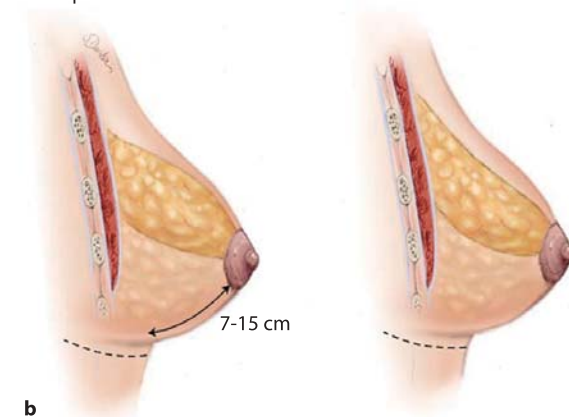


Fig. 7.9. The inferior pedicle stresses the skin brassiere by leaving tissue for gravity to affect. **a** Bottoming out is likely to occur with the inferior pedicle whether an inverted T or vertical skin resection pattern is used. **b** I believe that a superior, superome-

dial, or superolateral pedicle is less likely to cause pseudoptosis with time because the breast tissue can be coned better and the weight of the breast is not being carried by the skin

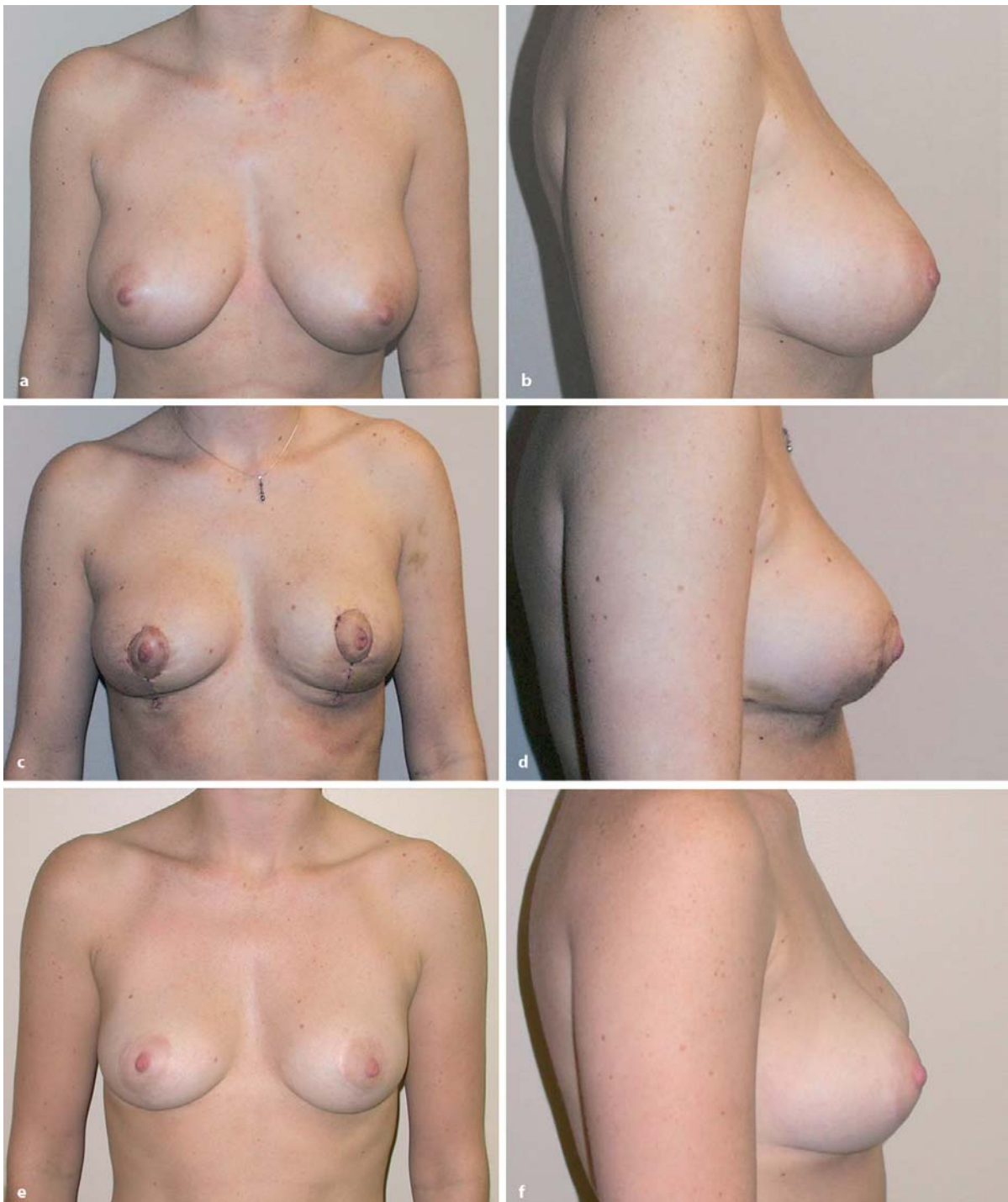


Fig. 7.10. Patient had 295 g removed from the right breast and 350 g removed from the left breast. **a** Preop frontal view. **b** Preop lateral view. **c** 10 days postop frontal view. **d** 10 days postop lat-

eral view. **e** 18 months postop frontal view. **f** 18 months postop lateral view



Fig. 7.11 a–g. Patient had 370 g removed from the right breast and 410 g from the left breast. **a** Preop frontal view. **b** Preop lateral view. **c** Intraoperative view at end of operation. **d** 3 weeks postop frontal view. **e** 3 weeks postop lateral view. **f** 2.5 years postop frontal view. **g** 2.5 years postop lateral view





had an infection rate of about 5%. I now put all my patients on one intraoperative dose of a cephalosporin and 5 days of oral cephalexin postoperatively. Not only did my infection rate fall to less than 1%, but patients stopped calling with wound-healing problems.

Taping

I use either steristrips or, more recently, paper tape (Micropore) to cover the incisions. Because I would rather leave some gaps in the closure with my subcuticular suturing so that the skin closure is not constricted, I use the tape to approximate any final openings in the skin edges. Some surgeons tape the inferior portion of the breast to encourage the dog ear to settle. I have avoided this because of fear of causing blistering in the skin from the tape. As long as the tape is applied without tension, this may very well help the area settle faster.

Bandages and Compression

I cover the incisions with gauze only to absorb any drainage of blood through the incisions. I use a “compression” brassiere that does not really compress anything. The main reason for using a brassiere is to hold the bandages in place. I allow the patient to shower the next day – and leave the tape on for three weeks. They are then encouraged to use pantliners in the bra for any persistent oozing. After the first 2 weeks, they can switch to a sports-type bra – preferably with a band that comes down onto the chest wall. A lycra camisole top is a good option before they feel comfortable enough to use a standard type of brassiere.

Recovery

Activities

I do not restrict patients’ activities or their arm movements. They are told to let their discomfort be their guide. Patients can return to work after about 2 weeks for a desk job to about 4 weeks for anything that involves heavy lifting.

Follow-up

Because the sutures are all absorbable, the follow-up routine varies. I usually try to see the patients sometime during the first month, then at 2 or 3 months, then about 6 months, and then at 1 year. But getting patients to return for follow-up is a difficult task.

We take photographs every time we see the patient. That way, the patient can see how the shape and the puckering are settling down. All patients have been warned that any revisions must wait a full year – that almost all patients worry about the puckering, but that it needs to be corrected in less than 5% of patients.

Complications

Puckering

The most common complication is puckering. There is no question that my revision rate for the vertical approach is higher than it was for the inverted T approach. However, I am also more demanding about the result than I used to be.

Necrosis

My most serious complication has been nipple-areolar necrosis. I had been fortunate in my series of 400 inferior pedicle, inverted T reductions never to have had a full nipple-areolar necrosis. I did have one partial and some marginal problems that had healed well without intervention. As Dr. Goldwyn has repeatedly warned us, however, having the complication of nipple necrosis is just a matter of time. Initially my problems were with the superior pedicle and trying to leave it too thick. I have, however, had problems with the medial pedicle with a necrosis rate of 0.5 % of patients. Although this is comparable to published studies, it is still very difficult for both patient and surgeon.

Infection

See discussion on antibiotics in Operative Technique.

Hematoma/Seroma

One note of caution is that the tumescent type of infiltration can lead to a false sense of security. It is important to identify the leash to what would have been an inferior pedicle and to make sure that the vessels are cauterized. I have had only two patients (out of 1100) require a return to the operating room to drain a hematoma, and both resulted from delayed bleeding from these vessels. I have had only one patient in whom I had to aspirate an infected seroma and a very few others where a seroma drained spontaneously. I suspect that there are more seromas, but I don't aspirate them – they seem to settle without intervention.

Underresection/Pseudoptosis

This is the second most common reason for revision. I still have problems with underresection with this technique. I cannot get breasts as small with the vertical approach as I could with the inverted T, inferior pedicle approach. The technique itself does not allow as much resection, but the result at the end of the procedure can be misleading. The breast looks smaller than it is. If the plan is to remove about 700 g, then it is important to get as close to 700 g as possible. I will use liposuction to help get the breasts smaller, but patients still find that they were hoping for a smaller breast. A secondary procedure can often be performed with liposuction only, but a further vertical resection (breast tissue, not much skin) will help im-

prove any pseudoptosis that remains. I firmly believe that much of the pseudoptosis that results with this approach is due underresection, not the design.

Asymmetry

Asymmetry problems occur with all breast reductions. Most of my problems with asymmetry occur in patients who were asymmetrical to start with. I find it interesting that these patients often can be very demanding – they have high expectations of the procedure (see Markings).

Wound-healing Problems

See discussion on antibiotics and on gathering of the vertical incision under Operative Technique.

Loss of Sensation

When I switched away from the superior pedicle, I moved to a lateral pedicle because I thought that sensation would be better coming in from the lateral direction. But the shape was not as good because the base of the pedicle prevented adequate lateral resection. It was surprising to me that the sensation in the nipple was the same whether a superior, a lateral, or a medial pedicle was chosen. Eighty-five percent of patients maintained normal to near-normal sensation. I have not studied comparisons with the inferior pedicle, but my experience tells me that the sensation with all four pedicles is comparable – or nearly so.

Breastfeeding

I have had only 19 out of 1100 patients who subsequent to the surgery had a pregnancy. Thirteen were able to breastfeed and seven supplemented. Five patients were not able to breastfeed, and one did not try.

Dr. Norma Cruz-Korchin has studied breastfeeding in large-breasted women who came for a breast reduction consultation but who decided not to have surgery. She compared these patients with those who underwent a medial pedicle vertical breast reduction. Interestingly, she found that between 60 and 65 % of patients in both groups were able to breastfeed, and one quarter of these patients supplemented. Maternity nurses have often commented that it is the large-breasted women who seem to have trouble breastfeeding. Does the size of the breast contribute as much to the problem as the surgery itself?



Fig. 7.12. Patient had 700 g removed from right breast and 800 g from left breast. **a** Preop frontal view. **b** Preop lateral view. **c** 4 years postop frontal view. **d** 4 years postop lateral view

Discussion

After 10 years of performing inverted T, inferior pedicle breast reductions, I can say that I was not particularly unhappy with the procedure. In my hands, the pedicle was very reliable and I had had only one instance (in approximately 400 cases) of a partial nipple necrosis that healed completely without intervention. There were, however, some patients who had developed very unsightly scars in the inframammary fold. Of the three scars (around the areola, vertically down to the fold, and along the fold itself), the vertical one was the least problematic. The areolar scar was variable, but the inframammary scar could be quite thick. Although it could often be hidden, patients did complain.

The shape was usually quite acceptable with the inverted T, but the longer I have been in practice (20 years), the more patients I have been seeing who had

developed some significant bottoming out, or pseudoptosis, with time. In retrospect, I realize that I had also accepted the persistence of the lateral and medial dog ears as an inevitable problem that could not be solved.

I have occasionally used a superior pedicle when the nipple did not have far to move. But it is not as satisfactory as the medial pedicle for two reasons. The first is a practical one in that it is still easier to resect the lateral breast tissue when the pedicle is based medially. But this was not a significant issue. On the other hand, there is something inherently better about the medial pedicle, and it involves not only the rotation of the part of the pedicle that carries the nipple and areola, but the fact that the whole pedicle, including the base, rotates. The inferior border of the medial pedicle becomes the medial pillar; this allows a shape and closure that is better than that achieved when a superior pedicle is used.

Now that I have had over 10 years' experience with the vertical technique, my analysis has led me to some other thoughts. There is no question that the procedure has resulted in fewer scars and has allowed me to eliminate the most unsightly scar – the one along the inframammary fold. But early on I realized that the shape that I was achieving was better than what I had seen in my patients with the inverted T reductions. Why was this happening? The breasts were coned more, resulting not only in better projection but in a shape where the problem of the lateral and medial dog ears completely disappeared. There is no question that these two dog ears were replaced by one inferior one (or pucker), but this pucker would often (but not always) settle with time. The increased projection meant not only that the nipple position needed to be designed at a lower level, but that a much longer vertical scar was not only acceptable but necessary to accommodate the increased projection.

The initial breast shape was better because of the coning and shaping of the parenchyma. It appears that the longevity of the shape may be due to the fact that we are not using the skin to hold the shape and because we are removing the heavy inferior breast tissue. We used the 5-cm rule for the vertical scar to try to prevent bottoming out, but instead the weight of the breast tissue – when an inferior pedicle was used – would cause either the scar to stretch or the breast tissue to push down the inframammary fold.

On the other hand, the vertical approach has its own problems. It is far from perfect. I do have a higher revision rate with the vertical technique (about 5%). But when I look back, part of the reason that I did not revise the inverted T procedures was because I did not have a solution to the problem of the medial and lateral dog ears. Once I realized that it is important to keep the vertical scar well above the inframammary fold, the problem of a scar falling onto the chest wall was eliminated. Once I realized that the inframammary fold was rising and that the pucker was more a problem of excess subcutaneous fat rather than excess skin, the need to revise puckering was reduced. I still need to revise some breasts because of puckers, but that can often be performed under local anesthesia in the office. I still need to revise patients who are asymmetrical, and I have patients who ask for a further reduction because I have been unable to make their breasts small enough.

The other problem with the vertical approach is that the inverted T procedure is more universally adaptable to all breast sizes. The vertical approach has definite limitations when volume resections are greater than 1200 g per breast. It can be done, and I believe that in these cases a vertical resection pattern with a small added horizontal scar would still give a better shape than the straight inverted T approach.

The final problem has to do with nipple circulation. Is the medial pedicle as reliable as the inferior pedicle? It does not seem to be as safe in my hands – but there are surgeons who have had fewer instances of nipple necrosis than I have experienced. Dr. Frank Lista has performed over 1800 vertical reductions using a superior or medial pedicle without any instances of complete nipple-areolar necrosis. Both the size of the breast reduction and the distance the pedicle needs to move need to be assessed. There are times when a free nipple graft may be the best solution.

Short-term satisfaction with the vertical approach is high, especially in preoperatively informed patients. As long as they have seen photographs of puckers and their resolution, they are very accepting. And there is no question that long-term satisfaction is far higher than with my patients who had the inverted T inferior pedicle approach.

Conclusion

Although the vertical technique using the medially based pedicle has its limitations, it has not only reduced scarring in breast reduction surgery, it has given patients a more pleasing shape and a longer-lasting shape than what I had achieved with the inverted T, inferior pedicle approach. Nipple sensation and breastfeeding appear not to be compromised any more than in other techniques. The procedure is faster, blood loss is less, and recovery for the patient is shorter. On the other hand, there are size limitations to the vertical breast reduction and the revision rate is slightly higher. There is a learning curve with all forms of breast reduction surgery, but the benefits outweigh the disadvantages.

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