

BREAST REDUCTION WITH THE SUPERIOR PARENCHYMAL PEDICLE: T-SCAR APPROACH

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Breast reduction for macromastia is a highly efficacious procedure with a high degree of patient satisfaction and a low rate of complications. The T-scar superior and superomedial pedicle techniques offer safe, reliable, and easily reproducible means of breast reduction, with a versatility that works for extremely large breasts while avoiding the bottoming out of inferior/central mound methods. The procedures are simple to learn and provide satisfactory preservation of nipple sensation. Because of the smaller area of de-epithelialization and the simplicity of the resection technique, the operative time can be reduced relative to other inverted "T" approaches. They allow easy mobility of the nipple-areolar complex, and give normal-appearing nipple-areolae and lasting cosmetic results. The senior author's procedural approach to these superior parenchymal breast reduction techniques is illustrated in detail and representative clinical examples are given.

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KEY WORDS: macromastia (breast hypertrophy), breast reduction, T-scar mammoplasty, superior dermoglandular techniques, superomedial pedicle

Breast reduction is undertaken to resolve the functional as well as the aesthetic problems for women with macromastia. Worldwide, this operation has very high patient acceptance and satisfaction, and effectively ameliorates the discomfort and functional problems of large breasts.¹⁻⁹ The women who request breast reduction are often well informed, highly motivated in their desire for smaller breasts, and have given detailed deliberation to this decision. Postoperatively, breast reduction patients readily incorporate their more shapely and smaller breasts into their body image and adjust to their changed appearance.¹⁰⁻¹¹ Although the adjustment is easier for the younger patient (under 25 years of age), most women with functional problems related to their large breasts are appreciative of the improvement. Physically, there is amelioration of pain (neck, shoulder, and back), shoulder grooving, and skin rashes, whereas, emotionally, there is relief of psychosocial distress, and enhanced emotional well-being, self image, and self esteem.^{3,5,7,12} Additionally, there is a remarkable concomitant improvement in the quality of life.^{7,13-14}

There are many methods of breast reduction, which basically involves removal of the excess breast parenchyma, and excising and reshaping the overlying skin envelope while maintaining a viable nipple-areolar complex. Transposition of the nipple-areola is achieved via superior, inferior, central, or bi-pedicle techniques. The shape of the reduced breasts is primarily controlled by the

shape of the underlying breast parenchyma. For most breast reduction techniques, the excess skin is removed as an ellipse along the inframammary fold, as well as a central ellipse. This leaves the patient with an inverted T scar.¹⁵ The parenchyma of the lower breast is left in situ with the central,¹⁶⁻¹⁷ or inferior,¹⁸⁻¹⁹ pedicle techniques, whereas this lower breast tissue is removed with the superior pedicle techniques.²⁰⁻²⁴

It is now widely accepted that the needs of all reduction mammoplasty patients cannot be readily met by a single technique.²⁵⁻²⁶ Therefore, whereas most breast reductions in the senior author's practice are carried out with the vertical scar technique,²⁷⁻³¹ this article focuses on the superior pedicle technique with the T scar, which is preferred for most women with extremely large breasts and when the shorter scar technique is felt not to be appropriate.

The senior author finds the inferior dermoglandular pedicle technique to be safe and predictable, with very satisfactory results for the patient and surgeon. It is widely known to be the safest pedicle with excellent blood supply.¹ There are, however, some aspects of this approach that have caused him to preferentially use other techniques of breast reduction. The breast parenchyma that is preserved in the central and lower breast inevitably descends (from the effect of gravity) after a few months, causing a lengthening of the nipple to inframammary fold distance and leading to what is described as a "bottoming out" of the reduced breast.²⁴ The requirements for preservation of the blood supply of the nipple-areolar complex dictate that in some large inferior pedicle reductions there is a limit to the amount of breast tissue that can safely be resected. The senior author has determined that this unpredictability in long-term result with the inferior pedicle technique could be ameliorated in some patients by using the superior^{20-24,32,33} and superomedial³⁴⁻³⁶ breast parenchymal

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pedicles. He, therefore, began this approach about 10 years ago after learning of the technique published by Finger and Given.³⁶ He now finds this technique to be equal in safety to the inferior pedicle approach. In this method, the nipple-areola blood supply is from the internal mammary artery perforators as well as the underlying breast parenchyma, now only supplied by the intercostal perforators and the thoracoacromial axis. The reduction is accomplished by removing the lower and central parts of the breast and this eliminates the lower breast parenchyma, which is subject to ptosis in the inferior pedicle reduction. Additional breast parenchyma may be removed from the lateral aspect of the breast in order to narrow the breast.³⁴⁻³⁶

The original superiorly based dermal flap technique described by Weiner et al²¹ in 1973 was unreliable for long pedicles, resulting in compromised nipple viability and sensation.^{25,37} The superior dermoglandular pedicle^{22-24,33} and the superomedial dermoglandular pedicle³⁴⁻³⁶ techniques are more reliable. The superior pedicle technique was designed to avoid late loss of projection while allowing easy transposition of the nipple-areolar complex. It was thought that its pedicle length was limited^{24-25,34,37} and neurovascular compromise could occur with larger pedicles, in addition to the difficulty with infolding of the dermal pedicles. Robbins and Hoffman,³³ for instance, reported a 5% overall (1.4% major) nipple slough with another 3% needing intraoperative conversion to a free nipple-areola graft because of vascular compromise. They recommended that it be restricted to reductions of up to 1,200 g only.³³

The superomedial pedicle technique, first described by Orlando and Guthrie in 1975,³⁴ was merely an extension of the superior pedicle method and has further been refined by Finger et al³⁶ In the latter's experience, it is highly versatile and can be safely and easily employed to reduce variously sized breasts regardless of the degree of ptosis.^{36,38} Its nipple-areolar necrosis rate is just under 1%.³⁶ and there is reliable preservation of sensation³⁴⁻³⁶ with a nipple-areola sensory loss of 15% comparable to other reduction methods. The oblique superomedial flap provides a safer and better arch of rotation compared with superior pedicle techniques. Although initially limited to moderate breast hypertrophy (mean of < 700 g per breast and < 12-cm mean nipple transposition),³⁶ it has proved to be useful for much larger reductions in the senior author's hands. Compared with the inferior pedicle technique, it is significantly quicker to perform^{1,38} because there is considerably less de-epithelialization and less intricate resection of the glandular tissue.

Outside North America, the trend over the last decade has been for more plastic surgeons to use reduction mammoplasty techniques with shorter or minimal scars.^{27-30,39-43} Of these techniques, the Lejour modification of the Lassus vertical mammoplasty³⁰⁻³¹ is the most popular, and gives a natural breast appearance and superior shape and projection with no horizontal scars. The senior author has found a high level of patient acceptance with the shorter scars of the vertical mammoplasty.²⁹⁻³¹ There is actually an improved shape (and projection) because the vertical resection narrows the breast in its lower aspect and removes the lower breast parenchyma, which contributes to the later ptosis. There is excellent nipple-areola vascularity, and liposuction³⁰⁻³¹ permits contouring the breast laterally as

well as internally. The long-term postoperative stability of the result is a function of the suturing of the gland pillars.²⁹⁻³¹ Recently the senior author has, therefore, moved toward the reduced scar vertical mammoplasty²⁹⁻³¹ for women with reductions less than 1,000 g and most mastopexies. It may, however, be more difficult to consistently and safely achieve natural looking breasts for reductions of more than 1,000 g. There is definitely a steep learning curve with this technique,⁴⁴⁻⁴⁶ especially for larger breasts. Additionally it takes too long for the vertical scar wrinkles to fade in these larger breasts.⁴⁶ For these larger breasts therefore (>1,000 g per reduced breast) the superior and superomedial technique is used because of its safety despite the obvious drawback of the long T-scars.

PREOPERATIVE MANAGEMENT AND SELECTION OF TECHNIQUE

All prospective breast reduction patients, regardless of technique, need a thorough preoperative assessment including a family breast cancer pedigree, other breast cancer risk factors, drug and smoking history, and, where indicated, a preoperative mammogram. A careful physical examination is then undertaken noting the skin type and changes, size and site of scars, size and shape asymmetry, nipple and breast ptosis, and breast and axillary masses. For insurance and planning purposes, an estimate of the weight to be removed from each side is made. In this preoperative consultation it is essential to understand the patient's motivation, objectives, and expectations so that a careful operative plan can be made.

A major challenge of breast reduction surgery is to determine the patient's desired breast size and appearance. The senior author has found that often the plastic surgeon underestimates the amount of breast parenchyma the woman wants removed and this underestimation can leave the patient with breasts that she feels are still too large. The problem of resecting too much tissue, though less common, is a serious one, as the reduction patient certainly does not want to have silicone breast implants later. Notwithstanding this, most breast hypertrophy patients fear that they will not be reduced enough. It is, therefore, important to discuss in detail the proposed changes and her expectations for breast size to ensure a more satisfying reduction. Frequently, it is helpful for her to view photographs of other patients who have had breast reductions. In addition when the patient is more than 30 lb (or 20%) over her ideal weight, the senior author recommends that she lose weight before the breast reduction. This is because weight loss after the breast reduction results in additional unpredictable loss of breast volume and this could be accompanied by postoperative breast ptosis. Other reasons for weight loss before reduction include: a less involved operation, less anesthesia needed (and other perioperative risks), and usually less complications,^{2,8,47} especially when there are fewer co-morbidities such as a history of cigarette smoking and usage of medications that thin the blood.

In addition to the preferred breast size, the patient's desire regarding the shape is an important consideration. Thus, the after reduction breast shape (breast contour) should also be discussed with the patient. Many women want flat chests and are happy with a large volume

reduction leaving them minimal projection. Some women (particularly those with significant breast ptosis) want more upper breast fullness. This requires preservation of more upper breast parenchyma and is easier to achieve with the superior parenchymal techniques. When there is an excess of lower breast parenchyma, the inferior parenchymal technique can be useful.

The patient's wishes with regard to size and shape should, thus, be thoroughly explored before the technique is planned. Her expectations for breast form are a significant influence on the choice of the breast reduction technique because breast shape depends on preservation of the breast parenchyma in the desired areas with removal of the areas that have an excess. Projection is an important consideration for some patients and this tends to be largely lost with inferior pedicle and concentric mammoplasty procedures.^{32,48}

Patients considering breast reduction should be counseled regarding surgical scars, possible nipple loss, possible skin necrosis, loss of nipple sensitivity, residual asymmetry, effects on lactation, possible fat necrosis, other surgical risks, and its relation to breast cancer.

Breast reduction generally requires rather long significant scars around the nipple-areola, down to the inframammary fold and along the inframammary crease. The location and length of these scars should be shown, described, and even actually marked on the patient before she decides to have breast reduction. The plastic surgeon should look for evidence of scar hypertrophy in the patient, and when this is present, should discuss with her that thick unattractive scars may be a reason to forego the breast reduction. If she still wants to have the operation, this may be an indication to use one of the shorter scar techniques.^{27-31,39-43} This is especially so because unacceptable scarring is the most likely reason for dissatisfaction with breast reduction in the small percentage of patients who are dissatisfied.^{3,49-50}

The potential for lactation is usually of less concern for many teenage breast reduction patients, but it is almost always important for her mother and the plastic surgeon. We believe it is very important to preserve lactation potential, especially in young or potentially child-bearing women. This function is maximized when the breast ducts and a major portion of parenchyma are preserved beneath the nipple-areola in a "physiological" type of operation.⁵¹ For this reason, we prefer breast reduction techniques that preserve adequate glandular (central breast) tissue attached to the nipple such as the inferior, superior, and central parenchymal techniques, as well as the vertical mammoplasties. Normal lactation occurs frequently after breast reduction albeit mildly reduced,^{1,51-52} but may be impaired in some patients, the exact percentage of whom is still unknown.

Many preoperative reduction patients mention that they have minimal sensation in their breasts.⁵³⁻⁵⁵ One possible reason is that when the areola is distended by a significant breast hypertrophy, the sensory nerves are stretched over a larger area.⁵⁵ In the senior author's practice, sensation is discussed with each patient preoperatively to establish her ideas of her current breast sensitivity and the relative importance she attaches to it. In a small percentage of patients, full sensation does not return—these patients

have usually had large reductions.⁵³ The breast reduction techniques that preserve the underlying breast parenchyma and do not divide the sensory nerves usually have the best postoperative preservation of sensation.¹⁸ The superomedial pedicle is thought to preserve more sensation than the conventional superior central technique because of its added medial parenchyma, which carries nerve fibers from the anterior cutaneous branches of the third to fifth intercostal nerves.^{34-35,56} The anterior cutaneous branches of the third to fifth intercostal nerves are equally important as the lateral cutaneous branches in supplying sensation to the nipple-areolar complex⁵⁶⁻⁵⁸ and there are overlapping sensory zones³⁷ with multiple nerves mostly on the superficial surface of the gland supplying the nipple-areolar complex.⁵⁷

Oncologic Considerations

Women worry about development of breast cancer, and do not want to do anything that can affect the ability to detect a breast cancer. The extensive dissection during reduction mammoplasty and the resultant postoperative fibrosis and scar tissue may conceivably interfere with breast cancer detection.⁵⁹ Women past menopause have a higher risk for breast cancer and have a greater chance of fat necrosis after a breast reduction. Clinically and radiologically, it may be difficult to differentiate postoperative fat necrosis from breast cancer.⁶⁰ Patient and physician awareness with careful preoperative evaluation, intraoperative, and postoperative monitoring are the best methods for avoiding a delayed or missed diagnosis of breast cancer. The incidence of breast cancer in patients having reduction mammoplasty is extremely low (< 1%).⁶¹⁻⁶² Additionally, there is no evidence that breast reduction increases the incidence of breast cancer⁶³ and actually the tissue that is removed gives a good idea of the microscopic condition of the breast parenchyma. [On the contrary, in a recent cohort study of breast cancer risk in breast reduction patients, Brown et al⁶³ found a significantly decreased risk in reduction mammoplasty patients compared with controls after a 6.5 year follow-up.] Of significant note is that breast reduction does not affect survival rate from breast cancer,⁶⁴ suggesting that it does not hinder diagnosis or treatment of breast cancer. Although currently there are no established protocols for the preoperative evaluation of breast reduction patients regarding cancer, it is prudent to suggest that all patients over 40 years of age or younger patients with a strong family history of breast cancer should have a preoperative mammogram before undergoing reduction mammoplasty.⁶⁵ Breast cancers found in women at the time of breast reduction are less advanced than in the general population of women with breast cancer possibly because they are diagnosed at an earlier stage.⁶² This may also account for why the survival of the former is better than that of the latter.⁶⁴ Concerned patients wishing to know what treatment they will receive if an incidental cancer is found during breast reduction should be informed that this will most likely take the form of a complete mastectomy⁶² except in the unlikely event that the small tumor was completely removed with good margins during the breast reduction.

PLANNING FOR THE SUPERIOR PARENCHYMAL TECHNIQUE

Surgical planning focuses on the patient's desired size and shape of the reduced breast, required skin removal, areas and volume of breast resection, scar length and placement, areas of lateral and abdominal fullness, preservation of breast function and nipple-areolar sensation, and nipple-areolar size and position.

Amount of Breast Reduction

After determining the patient's current breast volume, her desired breast size, and the proposed percentage of reduction, the intended volume after reduction should be estimated. Determination of size is made in concert with the patient to most accurately ensure that the volume of her reduced breasts will meet her expectations. In this regard, it is helpful to understand how brassieres are sized because that is the way most women conceptualize, discuss, and explain their desired breast size. As the chest circumference increases, the brassiere cups are sized to allow for progressively greater volume for each lettered brassiere size. For example, a woman with a 40-inch chest circumference and size D breasts would require a relatively larger reduction to become a size 40B than if her chest circumference were 34 inches and her breasts were size D. These are only approximations. We never promise or guarantee a postoperative brassiere size because of the variations among manufacturers, individual patient body habitus, and brassiere fittings.

Judging volume asymmetry and volume discrepancy is helpful in planning resection and correction for asymmetric breasts. At all times it is important to remember that it is not the amount of tissue that is removed but rather the amount to be preserved that is key to producing a balanced result. Regardless of the volume resected, the most important concern for the patient is that the appropriate amount of tissue is preserved in the proper location so that her breasts are aesthetically contoured. If one side is larger preoperatively, we try to let it remain the larger side postoperatively. This is because it is more difficult for the woman's body image to transfer sides of an asymmetry. When there is a breast asymmetry, it is the senior author's routine practice to mark the anticipated additional resection in grams on the larger breast. This marking is a reminder that more should be removed from this side. It also affords the surgeon the opportunity to check his/her estimates of breast volume.

Most reduction techniques today depend on the upward mobilization of a viable nipple-areola on its underlying central breast parenchyma. Therefore, knowledge of the blood^{17,66} and nerve⁵⁶⁻⁵⁸ supply of the breast and nipple-areola is essential to ensure a safe and predictable operation. The most carefully contrived surgical plan can fail because of tissue necrosis.

Because the specifications for breast reduction will vary with each patient, depending on age, skin quality, breast size, nipple position, and desire for change, the surgeon needs to be skilled in a number of different techniques that can be applied or modified for a given individual.²⁵⁻²⁶ The superior and superomedial parenchymal techniques are, however, applicable to a variety of breast sizes and degrees

of ptosis, although in the senior author's practice they are reserved for large reductions of more than 1,000 g/side.

In these techniques, breast parenchyma is removed initially from the inferior and then from the lateral aspect of the breast. The majority of the excess breast tissue, which is located in the inferior part of the breast, is removed by horizontal resection, whereas the deep upper lateral resection narrows the breast before closure of the inverted T incision. The horizontal resection removes the lower central breast parenchyma, which is the heaviest and most ptotic. The nipple-areola is moved on the superior or superomedial breast parenchyma and its vasculature supports and nourishes this important tissue. The periareolar subdermal vascular plexus is also preserved to enhance and support the blood supply to the nipple-areola. The dermis can, however, be divided along the limits of the upper V to facilitate mobility. The nipple-areola is moved to its new, elevated position after the breast is reduced in width and volume and contoured to an improved natural, conical shape.

SURGICAL APPROACH FOR THE SUPERIOR PEDICLE BREAST REDUCTION

Indications

In addition to the above considerations, preoperative mobility of the nipple-areola over the underlying breast parenchyma also influences selection of the breast reduction technique. Patients whose breasts are soft with elastic, mobile skin and underlying breast parenchyma require minimal parenchymal incision to elevate their nipple-areolae. These patients are good (ideal) candidates for transposition of the nipple-areola on a superior or superomedial breast parenchymal pedicle. The technique is also useful for the full, wide breast with minimal ptosis that does not need much upward mobility of the nipple. Patients with tighter, dense parenchyma exhibit greater difficulty and resistance to upward nipple-areolar movement. They usually need additional breast parenchymal release to effect the required mobility of the nipple-areola. The inferior/central parenchymal pedicle transfer is more suitable for these patients.

The superomedial pedicle technique provides acceptable breast reduction for patients with mild hypertrophy requiring reductions of up to 2,000 g or less and upward repositioning of the nipple-areola (< 15 cm).³⁶⁻³⁷ When this procedure is used, the breast tissue should preferably be soft and pliable and the nipple should be readily and easily elevated to its new position. Mobility is tested preoperatively to determine how difficult it is to position the nipple-areola upward. When there is excellent mobility, the pedicle does not need significant incisions. In contrast, when the pedicle is longer, or the breast parenchyma is firm, a more formal superomedial pedicle is developed.

Preoperative Surgical Markings

In general, fixed distances should not be used for all breast reductions. Consideration should be given to the proportions and size of the patient's body and breasts. The new location for the upper margin of the areola (A) is determined (Fig 1). With the patient sitting upright, the midline

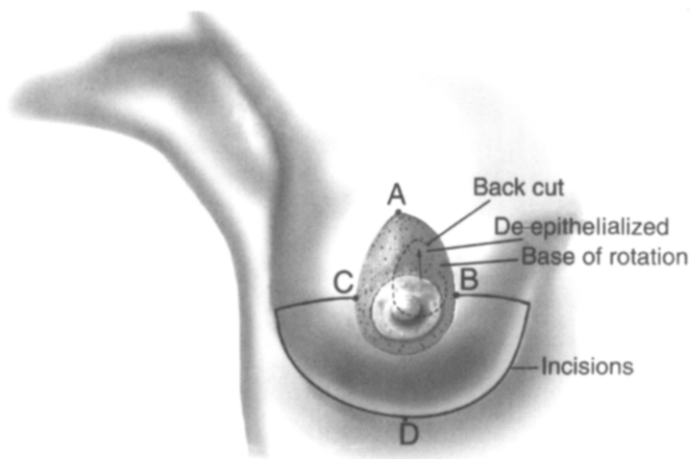


Fig 1. The skin markings are carried out as described in the text. Skin incisions around the new nipple-areola and the upper V are made with a 10 blade. The shaded area is then de-epithelialized (with big scissors). The back cut at A and the relaxing dermal or dermoglandular division at B facilitate subsequent rotation of the flap and its nipple-areolar complex.

(suprasternal notch to xiphisternum), the midbreast line (midclavicle to nipple), and the inframammary crease are marked. The new nipple position will be located on a point on this midbreast line, approximately 19 to 21 cm from the suprasternal notch with the weight of the breast (depending on the patient's height and body shape). When there is a medial or lateral inclination of the nipple away from this line, the true line is from the midclavicular point to the anterior superior iliac spine. The nipple position can be arbitrarily moved medially or laterally to fit the patient's general body habitus. The nipple and its relationship to the inframammary crease is more important as a reference point for nipple placement than are the measurements taken down from the clavicle. The breast should be lightly supported when the anterior projection of the inframammary crease onto the midbreast line is marked. Usually the location for the nipple-areola is 1 to 2 cm above the inframammary crease when final breast volume is 300 g or less. For a larger volume, the point will be closer to the level of the inframammary crease.

Next, the upper V angle is identified by pushing a small portion of the breast upward approximately 7 cm below the proposed nipple position or 9 cm below the upper margin of the areola. The lateral and medial skin is brought together in a 9-cm arc below the future nipple site and then downward until it meets easily near the inframammary crease. The arc length can be 10 to 11 cm when the breasts are larger. Then points B and C are marked. The distance from the proposed areolar apex to the inverted T is indicated by the 9-cm measurement.

The intersection of the midbreast line with the inframammary crease is marked as point D. The lowest points of the V (B and C) are then brought toward point D on the inframammary line to check the new breast size, the resultant elevation of the nipple, and the eventual tension on the two skin flaps. The senior author positions these points for conservative skin excision because more skin can always be removed at the final stages of the operation. When points B and C are approximated, the patient can see the changes in breast size and contour.

The lines A-B and A-C are then connected to the respective ends of the inframammary crease line medially and laterally. Curved or S lines should be avoided because they create unnecessary tension during the final closure and can cause wide scars.

OPERATIVE TECHNIQUE

After induction of general anesthesia, a dose of intravenous prophylactic broad spectrum antibiotic such as cefazolin 1 g is given. A 42- to 46-mm diameter circle is then drawn within the areola. The inframammary crease lines are re-marked with the patient in this supine position. This shortens them and places them along the new inframammary fold. The breasts are infiltrated with a tumescent fluid mixture (1 L of Ringer's Lactate plus 30 mL of 1% lidocaine plus 1 mL of 1:1000 epinephrine) concentrating on the proposed sites of the incision, resection lines, and the lower prepectoral area. This infiltration minimizes bleeding during the resection.^{47,66,67} The nipple-pedicle region is avoided.

Superior Central Pedicle Technique

The initial skin incision is made around the perimeter of the nipple, along lines A-B, A-C and 1 cm around the lower half of the nipple (from B to C) with a knife (10 blade) (Fig 1). Large scissors are then used to de-epithelialize the upper V, carefully preserving the nipple-areolar attachment to underlying central breast tissue, lactiferous ducts, and nerves.

The inframammary incision is made down to the deep fascia and then around the lower breast to elevate it from the superficial layer of the deep fascia up to the nipple-areolar level (with big scissors or a Bovie coagulator). When perforators supplying a portion of the central breast parenchyma are encountered, they are coagulated.

The breast is then lifted straight up perpendicular to the chest wall. The lower portion of the breast, which projects below the final inframammary crease, is resected (Fig 2). Adequate volume of preserved breast is ensured by elevating the breast at the top of the V and at the center of the lower resection line using tissue forceps or double hooks.

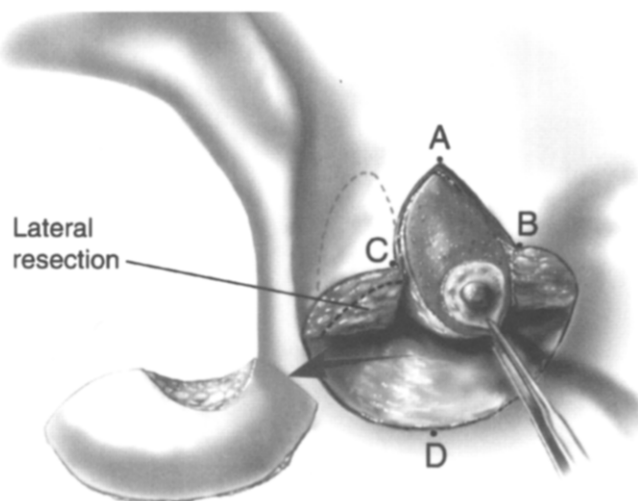


Fig 2. The inferior and central resection should leave adequate tissue behind the nipple to augment the projection and preserve the superior lactiferous ducts.

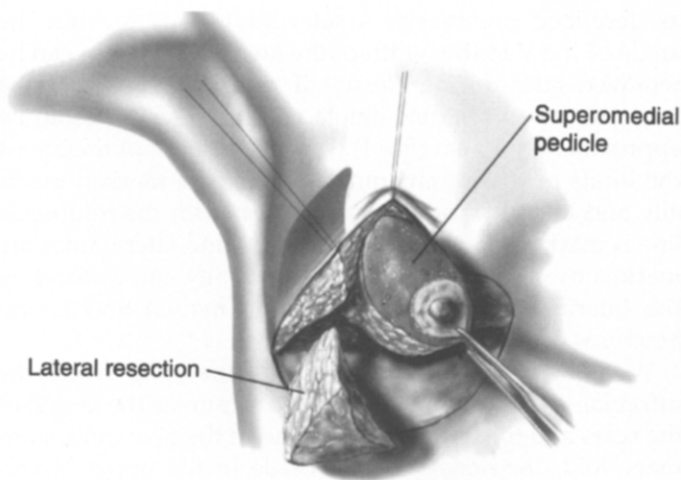


Fig 3. Appearance after development of the pedicle and excision of the inferior and central parenchyma. Resection of the lateral wedge narrows the breast and allows adjustment of the final volume of the reduced breast.

Breast tissue at least 2 cm thick must be preserved beneath the areola to ensure a good forward projection of the nipple and prevent nipple inversion.³⁵ This thicker pedicle also augments the mediocranial volume of the breast.

Next the upper breast width and projection are addressed. The breast is narrowed and reduced to its eventual size and shape when a wedge of lateral tissue and tangential disk of deep central tissue are resected (Fig 3). The tissue has now been removed from the inferior and lateral portions of the breast (Fig 4). The resected breast parenchyma extends below the inframammary crease and also contributes to increased breast width and fullness. Despite the division of some central musculocutaneous perforators during the deep lateral section, the vascularity of the remaining breast is good because perforators are preserved medially, laterally, and superiorly and in the upper central region.¹⁷

The nipple-areola should be easily moved to its new position. This can be facilitated by releasing and undermining the skin superiorly and dividing the dermis medially

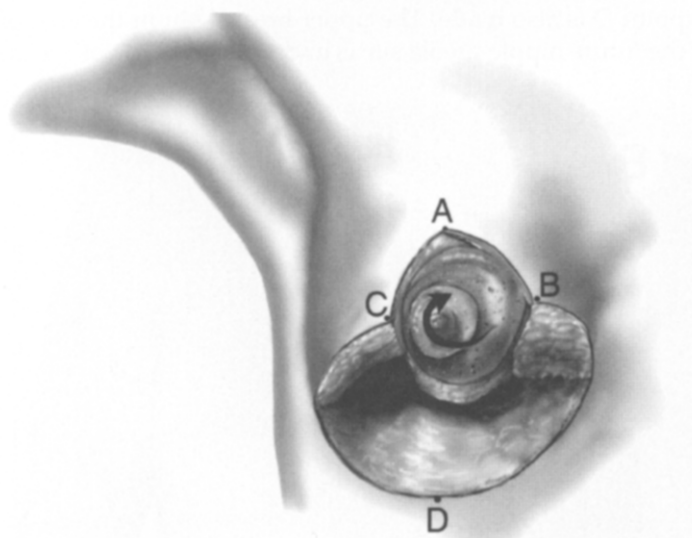


Fig 4. The NAC is rotated laterally and elevated as shown, and its apex is secured to point A. The superomedial dermoglandular pedicle should not be excessively narrowed by the back cut and/or the medial relaxing incision.



Fig 5. The medial and lateral flaps are then approximated to point D.

and laterally in the V (Fig 4). The nipple should be easily re-positioned and rest there without undue tension. Some of the lower dermal attachments of the nipple-areola can be released to allow it to move upward more easily. The medial relaxing dermal or dermoparenchymal incision used to facilitate the rotation of the nipple should not exceed 1 to 2 cm.

The areolar apex is then secured to point A with a temporary staple and the medial and lateral flaps B and C are similarly approximated to D (Fig 5). The patient is then sat up on the operating table and the breasts are checked for symmetry. The surgeon should be sure that each breast has the same volume before they are re-assembled with clips. It is usually obvious when there is more tissue on one side. The resected volumes should be checked, as well as the size and appearance of each specific breast quadrant.

Temporary clips are used to close the inframammary incision from the peripheries to point D, and the breasts are rechecked for symmetry. If excess skin persists, it is removed centrally from point A to point D along limits of the inframammary incision. The medial and lateral resections are checked to determine if sufficient underlying soft tissue has been removed, thus avoiding problems with lateral fullness, contour irregularities, and "dog ears". Conventional liposuction is used to empty the lateral bulges beyond the actual lateral breast margins (in the axillary area and around the anterior axillary fold).⁶⁸⁻⁶⁹

The proposed areolar position is prepared by marking a circle with a diameter 2 to 3 mm less than the nipple-areola and with A as its superior most border. The skin is excised full thickness taking care not to damage the dermis of the superomedial dermoglandular pedicle. The larger areola is fit into the smaller circle, thereby avoiding tension on the areolar suture line. Closure of these incisions proceeds along the vertical line (A-D) to 5 cm above point D (Fig 6). The placement of the nipple-areola is determined with the patient upright on the operating table. The nipple-areola should be pointing approximately 5° downward with its lower margin about 4.5 to 5.5 cm above the inframammary crease for a breast of 300 to 500 g. Larger breasts need a longer crease-to-areola distance. The position for the nipple

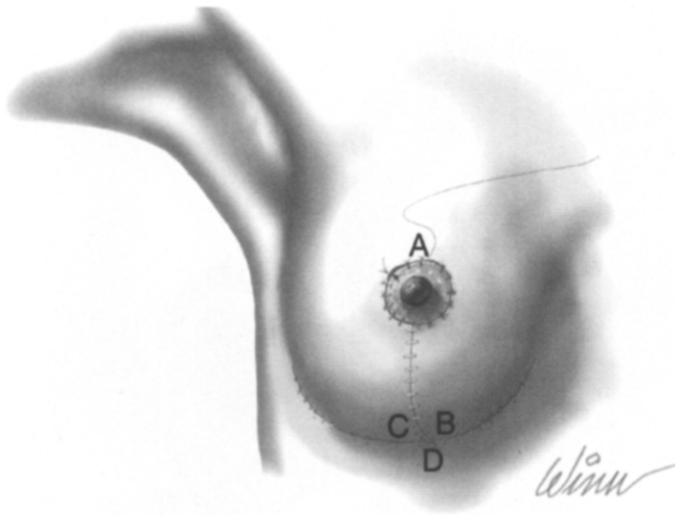


Fig 6. The final closure of the incisions is done with running intracuticular absorbable sutures (interrupted sutures merely illustrative).

is marked, and a 38 to 42 mm circle is drawn around it. The lower portion of this circle is 5 cm above point D.³⁵

The incisions are closed in two layers with absorbable sutures. Intracuticular absorbable sutures are used to close the nipple-areola (3-0 and 4-0 Vicryl) and other incisions (2-0 and 3-0 Vicryl). Effective hemostasis is essential, but drains are usually unnecessary.⁷⁰ All incisions are reinforced with steri-strips. A light dressing is required postoperatively, and the patient is put in a soft supportive brassiere on the operating table or from the next day.

Superomedial Pedicle Technique

This is a variant of the superior central pedicle technique and the markings are the same as for the superior pedicle technique. The point for the placement of the upper portion of the areola is determined as follows. The projection of the inframammary crease at the midline is marked. And a second line 2 cm above this line is also marked as point A. With the breast lifted somewhat, this point can be identified by the projection of a finger through the breast on the midbreast line.^{34-36,71}

The upper V is marked subtended by lines A-C and A-B

as described previously. A safer strategy is to limit the angle of the V to the width of the areola. More skin can be removed later during closure if necessary. The distance from the top of the new areola to point C or B should be approximately 10 cm (Fig 1). With the weight of the breast the limits of the inframammary crease are marked medially and laterally and the intersection with the midbreast line is marked as point D. The medial and lateral lines are marked by displacing the breasts centrally and connecting the inferior points of the V to the medial and lateral junctures of the inframammary crease.

With the patient supine on the operating table, the inframammary fold is re-marked to minimize the length of the scars and to ensure that they fall in the new inframammary fold. Incisions are then made in the upper V and around the areolar marks. The upper V and a subdermal plexus surrounding the nipple are de-epithelialized.

The inframammary crease incision is made, and the breast is lifted off the deep fascia up to the level where the areola will be repositioned (Fig 2). The medial portion of the resection is done by beveling the breast parenchymal resection 45° superiorly with the breast flat on the chest wall. This preserves important medial breast tissue and obviates flattening in this area postoperatively. With the breasts elevated off the chest wall, the lower breast tissue is resected below the future inframammary crease.

The area for the lateral resection is marked (Fig 2). This resection will contribute to narrowing the breast and reducing the superior lateral fullness when the breast skin is closed. The breast has now been resected both inferiorly to reduce future ptosis and laterally to reduce breast width (Fig 3).

Before moving the nipple-areola upward to its new position, the mobility of the tissue is again checked. If the tissue is mobile and the nipple-areola can be moved upward, then the superior pedicle technique is used rather than the superomedial pedicle technique. Otherwise, a full thickness cut (C-A) is made through the breast parenchyma laterally within the V from the inframammary crease area up to the nipple-areola site (Fig 4). A small back cut of about 1 to 2 cm along the medial border starting at point D is also made. The upper breast skin in the area of the future nipple-areola site is undermined. A cut of ~1 cm

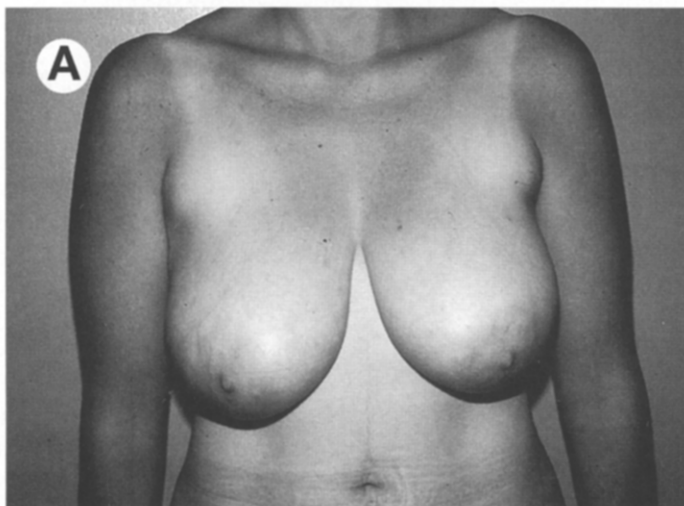


Fig 7. (A) Preoperative photographs of an ideal patient for the superomedial reduction technique. (B) Postoperative appearances of the patient shown in A.

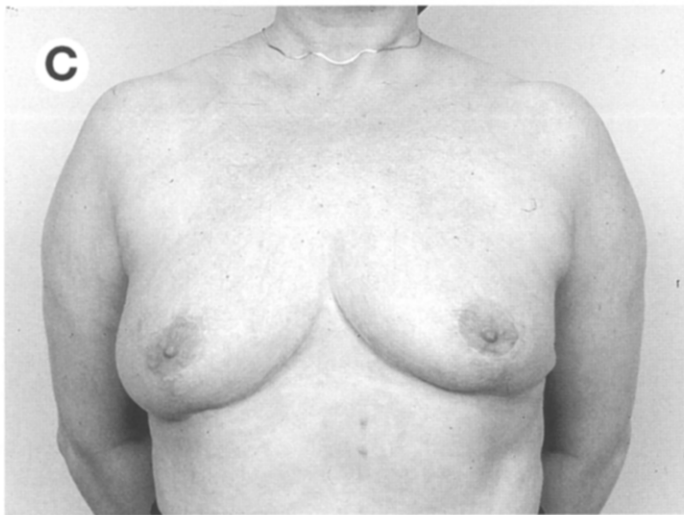
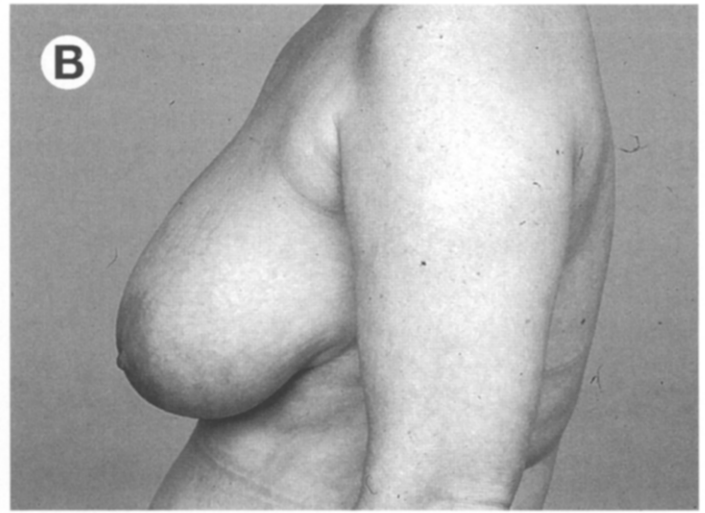
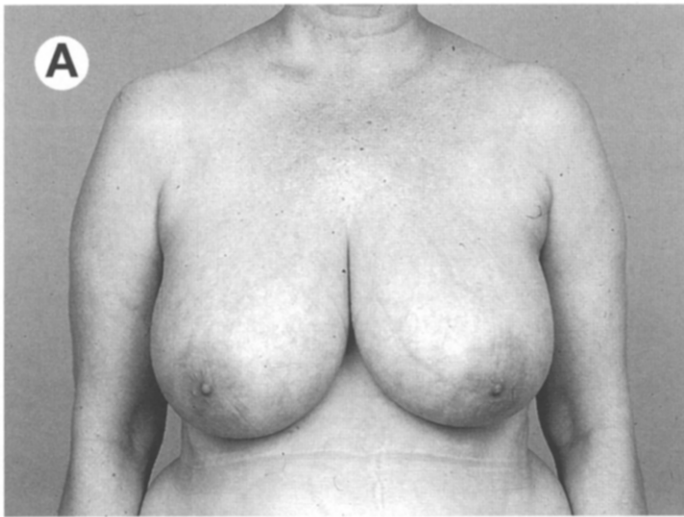


Fig 8. (A-B) Preoperative photographs of patient with moderate macromastia. (C-D) Note the lack of bottoming out in the postoperative appearances.

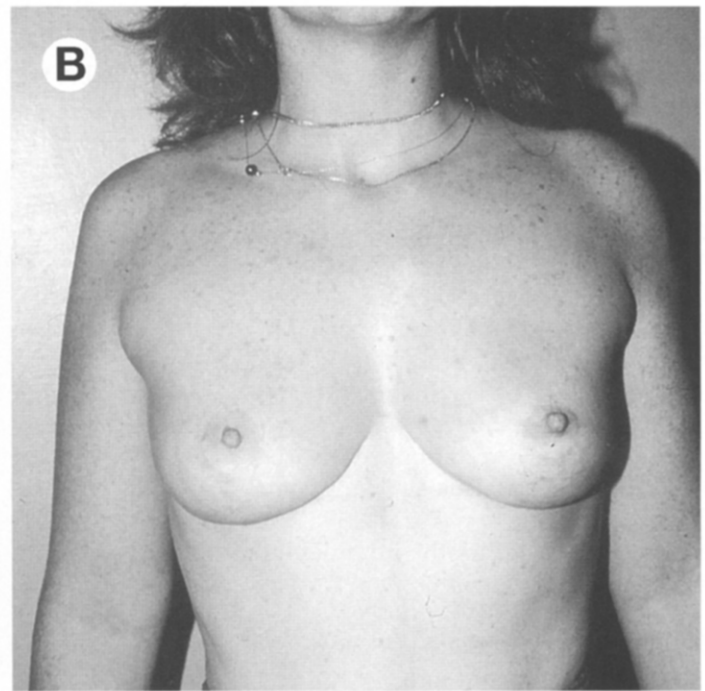
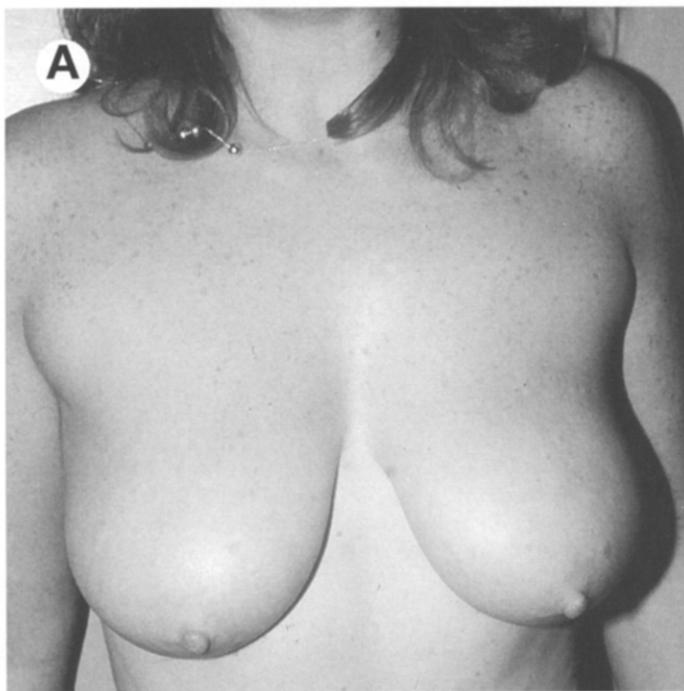


Fig 9. (A-B) Pre- and postoperative photographs of a reduction mammoplasty patient after the superomedial pedicle reduction technique with satisfactory correction of the severe (grade 3) ptosis.

is made on the medial portion of the V upward from the future inframammary crease area. This creates a medially based portion of breast parenchyma surmounted by the nipple-areola at its lower pole. The nipple-areola and the superomedial pedicle are then rotated upward until the nipple-areola is at the proposed site (Fig 4). To enhance pedicle transposition some of the medial dermis but not the subdermal vessels can also be incised. This medial relaxing incision (starting at point B) should not exceed 2 cm³⁶ and is usually required only for shorter pedicles (smaller breasts) or highly glandular breasts.

The rotation is easier when the pedicle is longer and the breast is larger because as the length of the pedicle increases the tension on the nipple-areolar complex decreases.³⁶ The combination of the pedicle based superomedially and the nipple-areolar complex rotated laterally avoids the kinking that can sometimes occur with the superior central pedicle technique, especially in larger breasts.³⁶

The nipple-areola is inset as described earlier. With the nipple rotated to its new position and secured, the incision is closed from lateral to medial toward the center T (Fig 5). The lateral to medial closure fills the deficit from the upward pedicle transposition. Excess skin is resected medially for a gentle closure without tension.

The nipple-areolar recipient site is marked to have a diameter a few millimeters less than the incised diameter of the nipple-areola. It is also positioned to restore its medial inclination. Closure is effected with intracuticular sutures and the surgical clips are removed (Fig 6). Subsequent postoperative care is identical to the superior central technique.

RESULTS

Superior Pedicle Technique

This 48-year-old patient had moderate breast hypertrophy with some asymmetry (Fig 7A). Her breasts are soft and mobile and the nipple-areola moves upward easily. The superior pedicle technique is selected to reduce the heaviness inferiorly and laterally.

The patient is shown 18 months after the procedure that removed about 700 g from each breast (Fig 7B). Symptoms of breast heaviness have been alleviated. She wears a 38C brassiere and is satisfied with the healing of her incisions. The breasts have been reduced, lifted, and narrowed. The incisions, placed well within the inframammary fold, are healing without scar hypertrophy. There is, however, mild residual asymmetry of the nipple-areolar positions.

This 40-year-old woman complained of heaviness and discomfort from the weight of her breasts (Figs 8A-B). The superior pedicle technique was used to remove 1,000 g from each breast. This satisfied patient is shown 2 years after breast reduction (Figs 8C-D). Note that the scars have faded and fall within the inframammary fold. There is no evidence at this time that hypertrophy or ptosis will recur.

Superomedial Pedicle

This 19-year-old woman had hypertrophic, asymmetric breasts with a marked degree of ptosis (Fig 9A). The breast parenchyma was, however, somewhat firm, and the nipple-

areola did not move easily to the new nipple position. She underwent a reduction mammoplasty with transposition of the nipple-areola on a superomedial pedicle. The excellent cosmetic results 2 years later are shown in Fig 9B.^{34-36,70}

CONCLUSION

Although in our practice superior parenchymal reduction techniques are reserved for extremely large breasts, they can be used for a variety of breast sizes and shapes. The choice between the conventional superior central and its superomedial variant can be varied on the operating table depending on the size and features of the breasts to be reduced. These breast reduction techniques are easy to learn and teach, quick to perform, and can provide lasting cosmetic results, especially with regard to the ptosis of the lower part of the breast.

REFERENCES

1. Sandsmark M, Amland PF, Abyholm F, et al: Reduction mammoplasty. A comparative study of the Orlando and Robbins methods in 292 patients. *Scand J Plast Reconstr Surg Hand Surg* 26:203-209, 1992
2. Dabbah A, Lehman JA Jr, Parker MG, et al: Reduction mammoplasty: An outcome analysis. *Ann Plast Surg* 35:337-341, 1995
3. Davis GM, Ringler SL, Short K, et al: Reduction mammoplasty: Long-term efficacy, morbidity, and patient satisfaction. *Plast Reconstr Surg* 96:1106-1110, 1995
4. Miller AP, Zacher JB, Berggren RB, et al: Breast reduction for symptomatic macromastia: Can objective predictors for operative success be identified? *Plast Reconstr Surg* 95:77-88, 1995
5. Raispis T, Zehring RD, Downey DL: Long-term functional results after reduction mammoplasty. *Ann Plast Surg* 34:113-116, 1995
6. Boscherf M, Barone CM, Puckett CL: Outcome analysis of reduction mammoplasty. *Plast Reconstr Surg* 98:451-454, 1996
7. Shakespeare V, Cole RP: Measuring patient-based outcomes in a plastic surgery service: Breast reduction surgical patients. *Br J Plast Surg* 50:242-248, 1997
8. Atterhem H, Holmner S, Janson PE: Reduction mammoplasty: Symptoms, complications, and late results. A retrospective study on 242 patients. *Scand J Plast Reconstr Surg Hand Surg* 32:281-286, 1998
9. Makki AS, Ghanem AA: Long-term results and patient satisfaction following reduction mammoplasty. *Ann Plast Surg* 41:370-377, 1998
10. Glatt BS, Sarwer DB, O'Hara DE, et al: A retrospective study of changes in physical symptoms and body image after reduction mammoplasty. *Plast Reconstr Surg* 103:76-82, 1999
11. Waitze S-Y, Bostwick J III: A retrospective study of changes in physical symptoms and body image after reduction mammoplasty. *Plast Reconstr Surg* 103:83-85, 1999
12. Hollyman JA, Lacey JH, Whitfield PJ, et al: Surgery for the psyche: A longitudinal study of women undergoing reduction mammoplasty. *Br J Plast Surg* 39:222-224, 1986
13. Klassen A, Fitzpatrick R, Jenkinson C, et al: Should breast reduction surgery be rationed? A comparison of the health status of patients before and after treatment: Postal questionnaire survey. *Br Med J* 313:454-457, 1996
14. Klassen A, Jenkinson C, Fitzpatrick R, et al: Patients' health related quality of life before and after aesthetic surgery. *Br J Plast Surg* 49:433-438, 1996
15. Wise RJ: A preliminary report on a method of planning the mammoplasty. *Plast Reconstr Surg* 17:367-375, 1956
16. Balch CR: The central mound technique for reduction mammoplasty. *Plast Reconstr Surg* 67:305-311, 1981
17. Hester TR Jr, Bostwick J III, Miller L, et al: Breast reduction utilizing the maximally vascularized central breast pedicle. *Plast Reconstr Surg* 76:890-900, 1985
18. Robbins TH: A reduction mammoplasty with the areola-nipple based on an inferior dermal pedicle. *Plast Reconstr Surg* 59:64-67, 1977
19. Georgiade NG, Serafin D, Morris R, et al: Reduction mammoplasty utilizing an inferior pedicle nipple areola flap. *Ann Plast Surg* 3:211-218, 1979

20. Pitanguy I: Surgical correction of breast hypertrophy. *Br J Plast Surg* 20:78-85, 1967
21. Weiner DL, Aiache AE, Silver L, et al: A single dermal pedicle for nipple transposition in subcutaneous mastectomy, reduction mammoplasty, or mastopexy. *Plast Reconstr Surg* 51:115-120, 1973
22. Arufe HN, Erenfyrd A, Saubidet M: Mammoplasty with a single, vertical, superiorly-based pedicle to support the nipple-areola. *Plast Reconstr Surg* 60:221-227, 1977
23. Conroy WC: Reduction mammoplasty with maximum superior subdermal vascular pedicle. *Ann Plast Surg* 2:189-194, 1979
24. Hugo NE, McClellan RM: Reduction mammoplasty with a single superiorly based pedicle. *Plast Reconstr Surg* 63:230-234, 1979
25. Georgiade NG, Serafin D, Riefkohl R, et al: Is there a reduction mammoplasty for "all seasons"? *Plast Reconstr Surg* 63:765-773, 1979
26. Spear SL, Mijidian A: Reduction mammoplasty and mastopexy: General considerations, in Spear SL (ed): *Surgery of the Breast. Principles and Art.* Philadelphia, PA, Lippincott-Raven Publishers, pp 673-684
27. Lassus C: A technique for breast reduction. *Int Surg* 53:69-72, 1970
28. Lassus C: Breast reduction: Evolution of a technique—A single vertical scar. *Aesth Plast Surg* 11:107-112, 1987
29. Lassus C: A 30-year experience with vertical mammoplasty. *Plast Reconstr Surg* 97:373-380, 1996
30. LeJour M, Abboud M: Vertical mammoplasty without inframammary scar and with breast liposuction. *Perspect Plast Surg* 4:67-90, 1990
31. LeJour M: Vertical mammoplasty and liposuction of the breast. *Plast Reconstr Surg* 94:100-114, 1994
32. Reus WF, Mathes SJ: Preservation of projection after reduction mammoplasty: Long-term follow-up of the inferior pedicle technique. *Plast Reconstr Surg* 82:644-652, 1988
33. Robbins LB, Hoffman DK: The superior dermoglandular pedicle approach to breast reduction. *Ann Plast Surg* 29:211-216, 1992
34. Orlando JC, Guthrie RH Jr: The superomedial pedicle for nipple transposition. *Br J Plast Surg* 28:42-45, 1975
35. Hauben DJ: Experience and refinements with the superomedial dermal pedicle for nipple-areola transposition in reduction mammoplasty. *Aesth Plast Surg* 8:189-194, 1984
36. Finger RE, Vasquez B, Drew GS, et al: Superomedial pedicle technique of reduction mammoplasty. *Plast Reconstr Surg* 83:471-480, 1989
37. Bostwick J III: *Breast reduction, in Plastic and Reconstructive Breast Surgery.* St Louis, MO, Quality Medical Publishing, Inc, 1990
38. van der Meulen JC: Superomedial pedicle technique of reduction mammoplasty. *Plast Reconstr Surg* 84:1005, 1989 (letter)
39. Peixoto G: Reduction mammoplasty: A personal technique. *Plast Reconstr Surg* 65:217-225, 1980
40. Marchac D, de Olarte G: Reduction mammoplasty and correction of ptosis with a short inframammary scar. *Plast Reconstr Surg* 69:45-55, 1982
41. Basile RD: Mammoplasty: Large reduction with short inframammary scars. *Plast Reconstr Surg* 76:130-135, 1985
42. Bozola AR: Breast reduction with short L scar. *Plast Reconstr Surg* 85:728-738, 1990
43. Bostwick J III, Benelli L, Courtiss EH, et al: Minimizing scars in breast surgery. *Perspect Plast Surg* 7:59-85, 1993
44. Pickford MA, Boorman JG: Early experience with the Lejour vertical scar mammoplasty technique. *Br J Plast Surg* 46:516-522, 1993
45. Tapia A, Blanch A, Salvador J, et al: Evolution of the vertical scar in Lejour's mastoplasty technique. *Aesth Plast Surg* 20:377-384, 1996
46. LeJour M: Vertical mammoplasty for breast reduction and mastopexy, in Spear SL (ed): *Surgery of the Breast. Principles and Art.* Philadelphia, PA, Lippincott-Raven Publishers, pp 735-747
47. Blomqvist L: Reduction mammoplasty: Analysis of patients' weight, resection weights, and late complications. *Scand J Plast Reconstr Surg Hand Surg* 30:207-210, 1996
48. Mathes SJ, Nahai F, Hester TR: Avoiding the flat breast in reduction mammoplasty. *Plast Reconstr Surg* 66:63-70, 1980
49. Brühlmann Y, Tschopp H: Breast reduction improves symptoms of macromastia and has a long-lasting effect. *Ann Plast Surg* 41:240-245, 1998
50. Godwin Y, Wood SH, O'Neill TJ: A comparison of the patient and surgeon opinion on the long-term aesthetic outcome of reduction mammoplasty. *Br J Plast Surg* 51:444-449, 1998
51. Marshall DR, Callan PP, Nicholson W: Breast feeding after reduction mammoplasty. *Br J Plast Surg* 47:167-169, 1994
52. Harris L, Morris SF, Freiberg A: Is breast feeding possible after reduction mammoplasty? *Plast Reconstr Surg* 89:836-839, 1992
53. Gonzalez F, Brown FE, Gold ME, et al: Preoperative and postoperative nipple-areola sensibility in patients undergoing reduction mammoplasty. *Plast Reconstr Surg* 92:809-814; discussion 815-818, 1993
54. Courtiss EH, Goldwyn RM: Breast sensation before and after plastic surgery. *Plast Reconstr Surg* 58:1-13, 1976
55. Slezak S, Dellön AL: Quantitation of sensibility in gigantomastia and alteration following reduction mammoplasty. *Plast Reconstr Surg* 91:1265-1269, 1993
56. Craig RDP, Sykes PA: Nipple sensitivity following reduction mammoplasty. *Br J Plast Surg* 23:165-172, 1970
57. Sarhadi NS, Shaw Dunn J, Lee FD, et al: An anatomical study of the nerve supply of the breast, including the nipple and areola. *Br J Plast Surg* 49:156-164, 1996
58. Jaspars JJ, Posma AN, van Immerseel AA, et al: The cutaneous innervation of the female breast and nipple-areola complex: Implications for surgery. *Br J Plast Surg* 50:249-259, 1997
59. Beer GM, Kompatscher P, Hergan K: Diagnosis of breast tumors after breast reduction. *Aesth Plast Surg* 20:391-397, 1996
60. Mandrekas AD, Assimakopoulos GI, Mastorakos DP, et al: Fat necrosis following breast reduction. *Br J Plast Surg* 47:560-562, 1994
61. White RR IV: Incidence of breast carcinoma in patients having reduction mammoplasty. *Plast Reconstr Surg* 102:1774-1775, 1998
62. Tang CL, Brown MH, Levine R, et al: Breast cancer found at the time of breast reduction. *Plast Reconstr Surg* 103:1682-1686, 1999
63. Brown MH, Weinberg M, Chong N, et al: A cohort study of breast cancer risk in breast reduction patients. *Plast Reconstr Surg* 103:1674-1681, 1999
64. Tang CL, Brown MH, Levine R, et al: A follow-up study of 105 women with breast cancer following reduction mammoplasty. *Plast Reconstr Surg* 103:1687-1690, 1999
65. Titley OG, Armstrong AP, Christie JL, et al: Pathological findings in breast reduction surgery. *Br J Plast Surg* 49:447-451, 1996
66. Palmer JH, Taylor GI: The vascular territories of the anterior chest wall. *Br J Plast Surg* 39:287-299, 1986
67. Wilmink H, Spauwen PH, Hartman EH, et al: Preoperative injection using a diluted anesthetic/adrenaline solution significantly reduces blood loss in reduction mammoplasty. *Plast Reconstr Surg* 102:373-376, 1998
68. Bostwick J III: Breast reduction under intravenous sedation: A review of 50 cases. *Plast Reconstr Surg* 97:957-958, 1996
69. Teimourian B, Massac E Jr, Wiegering CE: Reduction suction mammoplasty and suction lipectomy as an adjunct to breast surgery. *Aesth Plast Surg* 9:97-100, 1985
70. Matarasso A, Wallach SG, Rankin M: Reevaluating the need for routine drainage in reduction mammoplasty. *Plast Reconstr Surg* 102:1917-1921, 1998
71. Asplund OA, Davies DM: Vertical scar breast reduction with medial flap or glandular transposition of the nipple-areola. *Br J Plast Surg* 49:507-514, 1996