

## Maximizing Aesthetic Outcome in Breast Reduction by Three Crescentic Parenchymatous Excision: A Modification in Superomedial/Vertical Technique

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### ABSTRACT

**Background:** The optimal reduction technique for treatment of huge breasts still controversial. The purpose of this study is to describe and evaluate the outcome of breast reduction using the modified superomedial/vertical scar technique.

**Method:** Consecutive breast reductions have been done in two institutions using the same technique. Three overlapped independent crescentic pattern of parenchymatous resection with simultaneous creation of the breast mound around the pedicle is done. Results were evaluated subjectively and objectively at 3, 6 & 12 month postoperatively.

**Results:** 148 patients were included. The mean age was 33.4 years. The mean superasternal notch to nipple distance was 36.7cm. Mean follow-up period was 8 months. The mean resection weight per breast was 840g. All patients had viable nipples postoperatively; there was partial areola necrosis in three breasts (1%).

**Conclusion:** The superomedial pedicle/vertical scar breast reduction using the three crescentic parenchymatous resection modification is versatile and safe technique for breast reduction of any size.

### INTRODUCTION

Breast hypertrophy is defined by a breast volume disproportionately large with respect to the patient's morphology. Breast reduction can be defined as a diminution of breast volume to achieve a smaller, aesthetically pleasing breast mound and to solve simultaneously aesthetical and functional problems [1]. Although there is no universal technique applied for all breast reductions, many options are available to the surgeon. It is critically important to realize that in breast reduction surgery, the pedicles and the skin excision patterns are independent variables, so any pedicle can be used with any skin resection pattern [2].

The most popular two skin patterns are the wise "inverted-T" and "vertical" patterns were both can be combined with several different nipple pedicles. The "inverted-T" tends to be associated more with

an inferior or central pedicle whereas the "vertical" pattern is often associated with superior or superomedial pedicles [1,2].

Among the different breast reduction techniques; the superomedial/vertical technique since it was popularized by Hall-Findley in 1999 [3] has been gaining a wide acceptance as it is simple and reliable [4,5]. One of the major advantages of the superomedial/vertical reduction mammoplasty is the improved long-term projection of the breasts following this procedures [6]. However, only few surgeons used the this technique for huge breast reductions [7].

We are suggesting a new concept for breast reduction surgery concerning the parenchymatous fashioning as a separate entity from skin excision. The major "undesired" parenchyma is to be removed in three-crescent pattern; cephalic, lateral and caudal, whereas the "desired" parenchyma is contoured closely around the dermal portion of the pedicle.

This technique is combined to a superomedial dermoparenchymal pedicle had been used in this article. The pedicle and the skin design is similar to that described by Hall-Findley, [3] but the parenchymatous resection design is independent to both the overlying skin and near-by/partially enclosed pedicle to give the flexibility to shape the breast mound. With this modification, the superomedial pedicle/vertical scar reductions become more versatile to perform breast reduction surgery including even huge breasts.

### MATERIAL AND METHODS

Consecutive patients operated for reduction mammoplasty in two different institutions done between January 2006 and May 2012 had been

enrolled in the study. The inclusion criterion is any patient seeking reduction mammoplasty with age below 60 years. During preoperative evaluation, accurate history taking was done together with proper physical examination including documentation of BMI and the routine breast measurements immediately before surgery. The demographic data and patients characteristics are shown in Table (1).

Table (1): Demographic characteristics of patient's data.

Characteristic	Value (%)
No. of patients	148
Age (y):	
Mean	33.4
Range	18-57
Sternal notch to nipple distance (cm):	
Mean	36.7
Range	26-42
BMI:	
Mean	29
Range	25-39
BMI (25-30 kg/m <sup>2</sup> )	94 (63.5)
BMI (>30 kg/m <sup>2</sup> )	54 (36.5)
No. of patients with huge breasts (>1000g)	72 (48.6)

All patients were operated using the same technique. No breast liposuction was performed to any patient. The total amount of excised tissues is weighted each side separately. Almost the same postoperative regimen was conducted to all patients. They have been kept or regular follow-up. In 3, 6, 12, 18 and 24 months visits, all breast measurements are re-recorded with NAC viability and sensitivity documentation. Photography of the patients using the standard views was performed. The patients were asked about their satisfaction of

the surgical outcome. This was graded as “very satisfied”, “satisfied” or “unsatisfied”. Regarding objective evaluation, an office-based session including other three plastic surgery consultants in our institution were involved to evaluate the patient's photos obtained in her last follow-up visit compared to the preoperative one. They had been asked to comment on “projection”, “contour” and “medial fullness” in each patient. For each item their response is either potted or absent. The whole date had been recorded for each patient separately and then analyzed.

#### *Technique:*

##### *Preoperative markings:*

All markings are done with the patient in the standing position. The breast meridian and inframammary folds are marked. The breast meridian is marked by drawing a straight line extending from the midpoint of the clavicle through the nipple to the inframammary fold. The desired new location of the nipple areola complex is determined by projecting the inframammary crease anteriorly into the breast and setting the apex 1-2cm below this bisection point. This position is needed to accommodate for the skin traction by the weight of the breast and the increased projection that result. A nipple that is placed too high is very difficult to correct, so placing a nipple too low is always better than placing it too high. The apex of the nipple areola complex is usually 20-24cm when measured along the breast meridian from the clavicle according to the patient height. A mosque dome pattern is then marked into the breast. The roof of the dome traces the top of the new NAC, and extends laterally and medially, so that when these two points are brought together, it will form a circle with a circumference of 16-18cm (Fig. 1, Left).

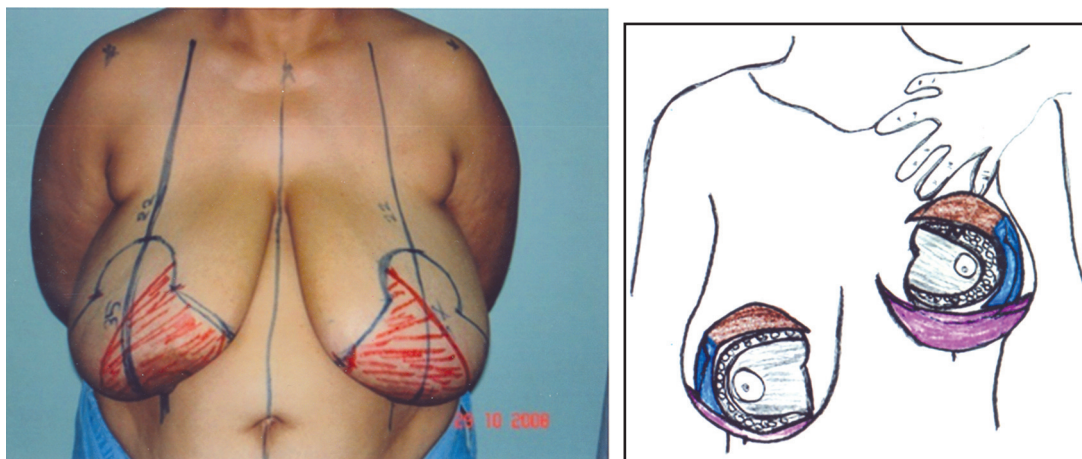


Fig. (1): Left, a photo of preoperative marking in direct anterior view. The nipple to midclavicular distances are 35 & 37 cm in right and left breasts respectively. Right, diagram showing the pedicle (gray lines) surrounded by the desired parenchyma (black circles) and the three crescents to be excised; cephalic (brown), lateral (blue) and caudal (violet). The left breast is elevated to show the caudal crescent clearly.

The vertical limbs of the skin resection are then marked. The breast is pulled medially to mark the point of the lateral breast that crosses the breast meridian at the inframammary fold. The breast is then pulled laterally to mark the point that the medial breast crosses the breast meridian. The breast is pulled superiorly, and vertical lines are dropped from each of these two points. The vertical extent of the resection is connected with a horizontal line 4cm above the inframammary fold so that the final scar will not extend beyond the inframammary fold. An important precaution is not to take too much skin. The skin does not hold the shape; rather, breast parenchymal resection determines shape [3].

#### *Pedicle design:*

The pedicle is best designed by placing one fourth of the base into the areolar opening and three fourths down the medial vertical limb. As long as the pedicle does not occupy too much of the areolar opening, it easily rotates into position. If the pedicle becomes too superiorly oriented rather than medially oriented, it does not rotate easily. If the pedicle is based too far inferiorly, excessive pillar height and bottoming out may result.

The width of the base ranges from 8-10cm according to the expected reduction weight and the pedicle length. The dermal part extends from the base in a straight line till reaching the areola. Then it surrounds the whole areola in a smooth curve. The parenchymatous part extends from the base upward in a gentle curve till reaching the areola to take some tissue superiorly; desired parenchyma. Some more arterial supply and venous drainage may be included. This gentle curve extends laterally and inferiorly till reaching the inferior point of the pedicle base taking more parenchymatous tissues with the pedicle in a smoothed and contoured fashion. Thus we are creating the breast mound around the pedicle. Also it creates a platform for the NAC so that it does not become depressed postoperatively (Fig. 1, Right).

#### *Parenchymatous resection:*

It is done in three unequal and overlapped crescents. The "cephalic crescent" is centered in the areolar opening to extend from the pedicle base medially and overlap the lateral crescent laterally. Its size is adjusted to leave a space for pedicle inseting and to leave about 1cm of tissue under the skin. The "lateral crescent" surrounds the areola and also adjusted to leave only about 1cm under the lateral skin flap and to overlap both the cephalic and caudal crescents. The "caudal crescent" extends

from the caudal margin of the pedicle to the inframammary fold and medially till the inferior point of the pedicle then goes further medially in a tapered way so that some of parenchymatous tissue is left to act as the inferior part of the medial pillar. Laterally it overlaps the lateral crescent and tapered far laterally to leave the parenchymatous tissue of the lateral pillar (Fig. 1, Right).

#### *Surgical procedures:*

The surgery is conducted under general anesthesia; the patient is lying in a supine position with both arms abducted. Tumescant solution is infiltrated in both breasts into areas of planed resections. It ranges between 200 to 500ml per breast according to the size. A rubber catheter is applied to the base of the breast to keep the skin overlying the breast taut. The NAC is outlined using a metallic areolar sizer; it may vary from 4-5cm in diameter depending on the breast size, centered over the nipple. The NAC and the pedicle are outlined then de-epithelialization of the skin is carried out using a no. 15 blade. The pedicle is incised perpendicularly down to the dermis followed by outward slanting in a smooth curve in cephalic, lateral and caudal directions. Thus creating the dermal pedicle surrounded by the desired parenchymatous part of the pedicle. The incision goes toward the chest wall without undermining to keep the full thickness of the pedicle using the knife. Then skin excision is done en bloc. The parenchymatous resection is carried out started by the cephalic crescent taking care to keep about 1cm thickness of the skin flap. The excision is further proceeded to include the lateral crescent. It is preferable to keep some tissues covering the pectoral fascia for the integrity of the NAC sensibility. This will be followed by excision of the caudal crescent including the subdermal tissues till just above the pectoral fascia; full thickness in the center of the crescent. Medial and lateral ends of the crescent should be tapered gradually. Homeostasis is secured and the lower end of the areola is approximated by staplers then rotation of the pedicle taking more care in the site of the caudal crescent resection. Closure is started after rotation of the preformed breast mound to its new position using stay stitches. Absorbable stitches are used to bring the medial and lateral pillars together. This started inferiorly in a deep plane and gradually getting more superficially as going superiorly to give the breast mound the best contour. Suction drains are then applied around the rotated mound. Skin closure using monofilament absorbable sutures is performed in layers. Regular dressing is applied under a special brassiere having a wide inframammary strap and broad lateral support.



## RESULTS

A total of 148 patients (296 breasts) were involved in this study. The study was done over a six years period in two different institutions. The whole patient's data were analyzed accurately with documentation of the range and mean of all pre and post operative variables. Mean age was 33.4 years (range 18 to 57 years). Mean body mass index was 29 (range 25 to 39). Fifty four patients (36.5%) were obese (BMI more than 30). The mean superasternal notch to the nipple distance was 36.7cm (range 26 to 42cm).

The postoperative results and details of the surgical procedures are listed in Table (2). The mean duration of surgery was found 3.4 hours while the mean hospital stay was 4 days. The average total reduction per breast was 840g (range 200 to 3400g). Most patients were amenable with regular follow-up (mean of 8 months). All complications were minor and self-limiting. There were no patients with total or near-total NAC loss. Only three patients suffered from unilateral partial superficial areolar loss (1%). All of which healed completely with dressings. Delayed wound healing especially in the junction if the vertical limb with the areola was noticed in 13 breasts (4.4%), none of them necessitate surgery. The sensation was intact in all patients except in four (1.4 %) breasts where hypoesthesia in NAC was persistent up to six months. Dog-ear deformity was noticed in most patients with long superasternal notch to nipple distance (>40cm); all of them (10 patients) had been gone spontaneously with proper positioning of a broad brassier strap.

Patients were asked about their overall satisfaction during the course of follow-up. One hundred and thirty one patients (88.5%) evaluated their results as "very satisfied", 17 (11.5%) as "satisfied" and no patients as "unsatisfied". Objective assessment was done by the three consultants in one setting comparing the preoperative photos with the last available postoperative ones. Their comments were the presence of "projection" in 146 (98.6%) patients, breast "contour" in 144 (97.3%) patients and "medial fullness" in 143 (96.6%) patients. Figs. (2,3,4) illustrate the possible results achieved with the modification described above.

Table (2): Postoperative details.

Characteristic	Value (%)
<i>Duration of surgery (hours):</i>	
Mean	3.4
Range	3 to 4.5
<i>Amount of breast tissue removed (g):</i>	
Mean	840
Range	200 to 3400
<i>Length of hospital stay (days):</i>	
Mean	4
Range	3 to 5
<i>Follow-up period (months):</i>	
Mean	8
Range	3 to 24
<i>Complications (per breast):</i>	
Hypoesthesia	4 (1.4)
Areola desquamation	3 (1.0)
Delayed wound healing	13 (4.4)
Dog-ear required excision	0 (0)
<i>Objective assessment:</i>	
Projection	146 (98.6)
Contour	144 (97.3)
Medial fullness	143 (96.6)
<i>Subjective evaluation:</i>	
Very satisfied	131 (88.5)
Satisfied	17 (11.5)
Unsatisfied	0 (0)

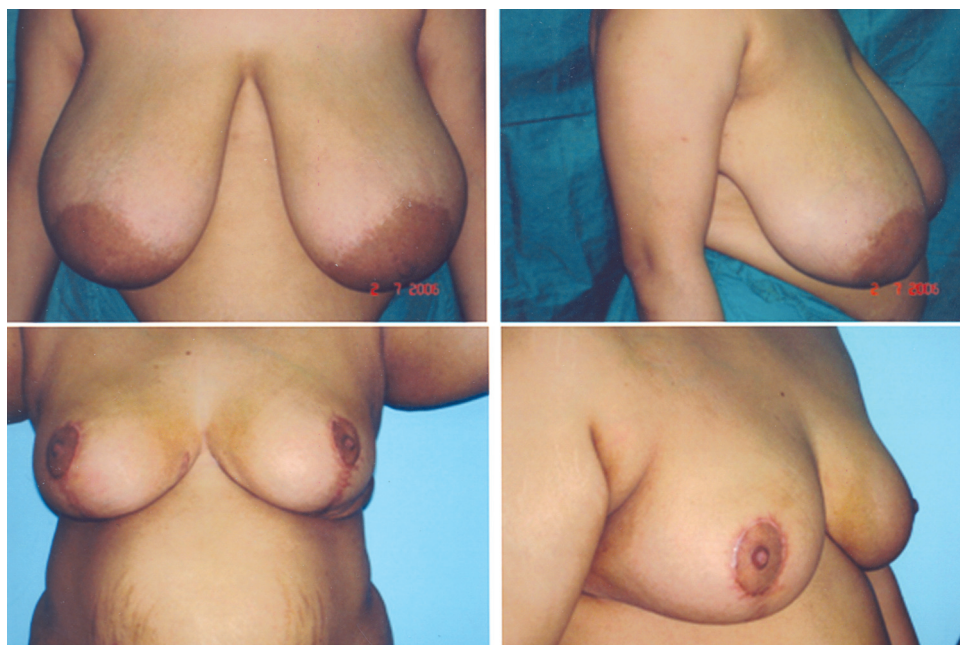


Fig. (2): A 32 year-old lady with hugely enlarged breasts and two years post-operative results.



Fig. (3): A 42 year old lady with large ptotic breasts shows front and left lateral views of preoperative and late postoperative. A smooth satisfactory spherical contour is obviously revealed.



Fig. (4): Pre and 3 months post operative views of a 38 year-old woman with hugely enlarged breasts.





Fig. (5): A 22 year old girl presented with virginal breast hypertrophy. A series of front views; preoperative, intraoperative, and 1, 2 & 3 months postoperatively showing good healing of the inverted T wound and enhanced aesthetic results. The intraoperative image shows clearly the elevated inframammary fold.

## DISCUSSION

Since the beginning of performing breast reduction surgery, it was associated with problems of maintain NAC viability and preventing partial breast parenchymatous and skin loss [8]. With better understanding of the breast anatomy and improvement in surgical techniques, these problems were almost solved except for cases of gigantomastia. The blood supply of the breast was extensively examined identifying the internal thoracic, intercostals, lateral thoracic, and thoracoacromial vessels as feeders [9-11]. This rich blood supply explains the relative success reported with different pedicles.

Palmer and Taylor [12] found that the internal thoracic artery is the dominant blood supply in 70% of patients. Furthermore, the only vessel to put in at least one perforator to the NAC in 100% of cases was the internal thoracic artery [6]. The superomedial pedicle is thus a sound anatomical

option and this makes it the most suitable for patients with massive breast hypertrophy necessitating mobilization of NAC for long distance. Finger et al. [13] used this pedicle for reductions as large as 4100g per breast and nipple transposition up to 30cm, with no total NAC necrosis.

The use of short scar breast reduction was common after the publication of Hall-Findley in 1999 [3]. Although she stated that it is not suitable in huge breast reductions in her original article, we tried it with the three-crescentic parenchymatous excision and keeping most of the desired parenchyma around the pedicle. This modification makes the superomedial/vertical scar pattern is a sound technique for huge breast reductions.

Several studies have been found to investigate the long-term changes in nipple position and breast shape following Wise pattern/inferior pedicle reduction. Although overall breast projection and

contour were well preserved and the midclavicular to nipple distance didn't change, the length of the vertical scar increased over time. This resulted in superior displacement of the NAC in its relationship with the breast mound [12]. This common complication of "bottoming out" let us shifting to the superomedial/vertical scar pattern in hugely enlarged breast reductions. We got excellent results with very good patient's satisfaction. Fig. (4) shows pre & post operative images of a hugely enlarged breasts case.

The superomedial pedicle was designed based mainly on the medial portion (three fourths down the medial vertical margin) with little superior attachment, thus permitting a wider arc of rotation. This modification effectively eliminates pedicle related complications while maintaining the advantages of the superomedial pedicle. [Findley] Once the pedicle choice is made, the resection is undertaken with the final breast shape in mind. With any type of resection, preservation of the pedicle to the NAC is the priority. Breast shape is three dimensional, and the resection pattern should take into account the preservation and readjustment of this shape [3]. There are a variety of patterns of parenchymal resection, and most of them follow the skin resection. This maneuver limits the surgeon to satisfactorily contour the desired breast mound.

Our principal to consider the parenchymatous resection as a separate entity from either the pedicle position or the skin excision patterns gives the surgeon a free hands. We would use this concept widely if we could imagine it. The "cephalic crescent" with its upward convexity will help to give space to the rotated pedicle. The "desired" convex parenchyma left with the upper margin of the pedicle will fill smoothly the concavity of the crescent in addition of providing more medial fullness after rotation. The "lateral crescent" resection, which is lying vertically and following the regular breast shape, helps in excision of large amount of "undesired" parenchyma and its medial concavity will gently hug the convexity of the "desired" parenchyma of the pedicle. The "caudal crescent", with its upward concavity towards the pedicle, functions mainly to complete resection of the inferior parenchymatous and all subcutaneous tissues so that decreasing dog-ear deformity in addition to help in elevation of the inframammary fold to a higher position. Another important advantage of this crescentic resection inferiorly allows gradual three-dimensional tapering of resection both medially and laterally for creation of the medial and lateral pillars.

As the cut edge of any sphere is not a straight line but simply a "curve". This three crescentic independent parenchymatous resection technique will help to reproduce the natural curve of the breast in the final result. To clarify our idea more, we are simply creating the breast mound around the pedicle. This will be followed by rotation, elevation and support of the mound by pillars in a smooth, nice and satisfactory contour.

In few patients we obliged to convert the vertical scar to small inverted T to avoid long visible scar. This was mainly in cases of hugely enlarged breasts. The results were still better than preoperative planning of inverted T design with enhanced late postoperative outcome.

The outcome of this surgical modification was very promising. The complication is less than most published series [6,7,13,14,15] with no single case of NAC loss. The subjective assessment shows excellent finding with great encouraging results in the objective evaluation.

Based on experience of this patient's series, the superomedial/vertical scar breast reduction with the three crescentic independent parenchymatous resection modification can be a versatile technique for breast reductions of any size.

## REFERENCES

- 1- Shewmake K.: Selected Readings in Plastic Surgery, 7: 30, 1994.
- 2- Hall-Findley E.J.: Vertical reduction mammoplasty, Grabb and Smith's Plastic Surgery, 7<sup>th</sup> Ed. Philadelphia: Lippincott-Raven, 604-615, 2007.
- 3- Hall-Findley E.J.: A simplified vertical reduction mammoplasty: shortening the learning curve. *Plast. Reconstr. Surg.*, 104: 748-759, 1999.
- 4- Hamdi M., Van Landuyt K., Tonnard P., Verpaele A. and Monstrey S.: Septum-based mammoplasty: A surgical technique based on Wuringer's septum for breast reduction. *Plast. Reconstr. Surg.*, 123: 443-454, 2009.
- 5- Kulkarni D., Beechey-Newman N., Hamed H. and Fentiman I.S.: Gigantomastia: A problem of local recurrence. *Breast*, 15: 100-102, 2006.
- 6- Landau A. and Hudson D.: Choosing the superomedial pedicle for reduction mammoplasty in gigantomastia. *Plast. Reconstr. Surg.*, 121 (3): 735-739, 2008.
- 7- Mojallal A., Comparin J.P., Voulliaume D., Chichery A., Papalia I. and Foyatier J.L.: Reduction mammoplasty using superior pedicle in macromastia (in French). *Ann. Chir. Plast. Esthet.*, 50: 118-126, 2005.
- 8- Sarafin D.: History of breast reconstruction. In N.G. Georgiade (Ed.), *Reconstructive breast surgery*. St. Louis: Mosby, 1976.
- 9- Nakajima H., Imanishi N. and Aiso S.: Arterial anatomy of the nipple-areolar complex. *Plast. Reconstr. Surg.*, 96: 843-849, 1995.

- 10- Wuringer E., Mader N., Posch E. and Holle J.: Nerve and vessel supplying ligamentous suspension of the mammary gland. *Plast. Reconstr. Surg.*, 101: 1486-1470, 1998.
- 11- Van Deventer V.: The blood supply to the nipple-areolar complex of the human mammary gland. *Aesthetic Plast. Surg.*, 27: 393-397, 2004.
- 12- Palmer J. and Taylor G.: The vascular territories of the anterior chest wall. *Br. J. Plast. Surg.*, 39: 287-291, 1986.
- 13- Finger R., Vasquez B., Drew G. and Given K.: Superomedial pedicle technique of reduction mammoplasty. *Plast. Reconstr. Surg.*, 83: 471-477, 1989.
- 14- Davidson S., Mesbahi A., Ducic I., Sarcia M., Dayan J. and Spear S.: The versatility of superomedial pedicle with various skin reduction patterns. *Plast. Reconstr. Surg.*, 120 (6): 1466-1477, 2007.
- 15- Almeida C.: Mammoplasty with L-incision. *Aesthetic Surg. J.*, 24: 102-111, 2004.