Minimizing Revisions after Medial Pedicle Breast Reduction: Anchorage of Pedicle to Chest Wall

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ABSTRACT

The medial pedicle breast reduction was introduced as a variation of the vertical technique, using a full-thickness dermo-glandular medial pedicle for nipple circulation and breast shaping and the location of tissue resection to give both an improved initial result and an improved, long-lasting shape. The procedure was simple, fast, reproducible, and reliable. The learning curve was relatively short, and the improved results were well worth the move from the reliable inferior pedicle techniques to the vertical technique, both in scarring and in shape. Its main disadvantage was the unacceptably high revision rates to manage puckers in the inferior edge of the vertical scar. To minimize that, the authors suggested routine anchorage of the pedicle to the chest wall, thus reducing tension on the vertical scar, hence minimizing drag and enabling puckers to resolve spontaneously and in a shorter time. In forty patients, this procedure was routinely done regardless of the volume of breast tissue to be excised, and in all patients the puckers settled down during the follow-up period, and none required secondary corrective surgery.

Keywords: Breast reduction, medial pedicle, anchorage, puckers, short scar.

INTRODUCTION

Reduction mammoplasty has been used not only for reconstructive and aesthetic purposes, but also for relief of neck, back, and shoulder pain, as well as psychosocial improvement. Different techniques for breast reduction have evolved in response to a great variety of ever-increasing demands (1).

The breast could be considered conceptually as a cone (2). Traditionally, inverted T techniques using that model have been popular for several decades, with the Wise-pattern resection considered the gold standard against which other methods were compared (3). Short-scar breast reduction techniques using the superior pedicle, managed to circumvent most of the problems of Wise pattern resection, but were eyed with suspicion (4) ever since their introduction more than thirty years ago.

Use of the superior pedicle in the initial vertical techniques of Lassus (5,6) and Lejour (7-10) prevented wide acceptance of the vertical approach (4). The superior pedicle was difficult to inset, and although thinning might have allowed for a better circulation by avoiding compression, the ability to retain sensation or allow for breastfeeding was reduced (4).

Modifications to combine the safety of the pedicle with the appeal of the short-scar techniques (2,11) include the medial pedicle technique, which has been popularized since the turn of the century (11).

When compared with the traditional inverted T technique, the medial pedicle short scar reduction had several advantages (1,2):

From a cosmetic point of view, there was a better ultimate outcome (2) : There was better projection and greater longevity. Furthermore, it seldom gave a square shape and was better at dealing with upper pole deficiency (1). Short-scar techniques focused mainly on reshaping the breast parenchyma, and skin redraping occurred secondarily (1,2), hence the more durable long-term effect on breast shape. In addition, there was less bottoming-out (1) over time because the breast shape was maintained by the parenchyma rather than the skin. Furthermore, short scar techniques ended up with less scars for the patient. Eliminating the transverse troublesome scar minimized the irritation caused by friction with the brassiere and tenderness in the inframammary region (6-9,11).

An additional advantage was the shorter operative time (1) with a mean of 104.5 mins in
the series of Abramson et al. rather than the almost double operative time with inverted T reductions (11).

An extra bonus to the operating surgeon was easier rotation of the pedicle into position, and allowance for adequate lateral breast resection (4).

Another important advantage would be the absence of significant difference in the rate of success of breast-feeding between women who had medial pedicle reduction mammoplasty and women who had no prior breast surgery (12).

Several studies confirmed that the postoperative ability to breastfeed depended mainly on preservation of adequate subareolar breast tissue, as well as adequate encouragement and support. In several large studies (12, 13), it was found that there was no significant difference in breast feeding regardless of the type of pedicle (13).

Another issue to address would be nipple and areola sensation. Claims that sensory nerves run in the inferior pedicle (14-16) have been challenged by the anatomic study of Hamdi et al. (14) and further validated by computer-assisted neurosensory testing (17,18). The final recovery of sensation in the breast after mammoplasty seemed to result from the regeneration of severed cutaneous nerve branches rather than the preserved adjacent cutaneous branches, hence did not depend on type of pedicle used in reduction.

A last but far from least benefit would be the size of the breast. This became no longer a limiting factor, since the medial pedicle could be performed even for most patients having >1000 g removed from each side (1,11,19).

However, the main problem with short scar techniques was the high revision rates which in the different published data varied from seven to twenty per cent (10). Revisions were mainly due to residual puckers, which may need excision. A less common cause of revision was residual scars that extended below the fold, and these could be corrected with a horizontal excision. To circumvent high revision rates, several modifications have been proposed (21), and we present as yet another modification in this article.

PATIENTS & METHODS

Forty females with bilateral breast hypertrophy underwent medial pedicle breast reduction with anchorage of the upper pole to the chest wall. Eighty breasts in all were operated upon. Patient age ranged 16-47 (mean 24.3), and volume of tissue resected from each breast ranged 550-1275 grams (mean 880 grams). All patients had no prior breast surgery, and in addition to the cosmetic disfigurement, complained of backache and inframammary intertrigo. The surgical procedure with all its pros, cons, and possible complications was fully explained to the patients, and all opted to have medial pedicle vertical scar reductions.

**Operative details**

It is not the scope of this article to describe the operative technique in detail, since it was previously described (4,22,23), but a few important operative particulars need to be highlighted.

**Markings**

The initial markings followed the traditional Wise pattern (3); however, instead of carrying the vertical lines out laterally and medially, the lines were joined together (Fig.1), staying at least 2-6 cm above the level of the inframammary fold (average 3 cm), thus the resulting scar would end up well above the fold.

The length of the final vertical scar ranged 7-11 cm (mean of 10 cm in this series). This was different from the often-quoted rule of the Wise-pattern inferior pedicle technique to keep the vertical incision shorter than 5 cm (3). Unfortunately, although this rule was designed to prevent bottoming-out with time, it instead prevented good projection. The coning of the breast with the medial pedicle vertical technique allowed better projection, and a longer vertical scar was far from undesirable.

The initial nipple placement was situated somewhat lower than the inframammary fold (as previously described) (4,22), because this method helped achieve better upper-pole fullness and better projection than the inferior pedicle method. In patients of this series, this distance of the nipple was 23-26 cm from the suprasternal notch (mean of 24.5 cm).

The areola opening was designed somewhat mosque-shaped (4) so that it formed a circle once the lower ends were joined together.
Medial Pedicle design
The pedicle base was determined by the position of the areola. Usually the base of the pedicle was partially inset into the areola opening and partially down the medial vertical margin. The width of the pedicle in average ranged 6-12 cm. (mean 10.2 cm).

Preparation
Xylocaine 0.5% with adrenalin 1:400,000 was infiltrated into the breast and into the proposed incision lines. One shot of Cefoperazone was administered preoperatively as antibiotic prophylaxis.

Pedicle creation
A No. 15 blade was used to incise the skin. The pedicle was deepithelialized in the usual fashion (using a rubber band around the base of the breast for tension). Cutting cautery was used to create the pedicle by cutting vertically down toward the chest wall. Care was taken to avoid undermining the pedicle.

Tissue resection
The breast tissue to be excised was bevelled outward, especially laterally and inferiorly. The flap was made at least 1 cm thick at the margins, and the beveling was performed as needed to resect the necessary breast tissue. Contrary to the original description where the pectoralis fascia was performed in every case of this series to enable subsequent anchorage of the pedicle (vide infra).

Following the initial description, care was taken to avoid excising too much skin. Not only would this flatten the breast, but would also increase the horizontal tension. Furthermore, skin did not hold the shape and if too much skin was taken, not enough remained to accommodate projection.

The lateral breast tissue was usually very fibrous and was always directly excised. Leaving breast tissue superiorly was important; only enough was removed to allow the pedicle to be rotated into position without any compression. Although skin resection was not carried down to the inframammary fold, the breast tissue resection was carried down to this point. This was achieved by again beveling the resection to the level of the fold, leaving the flap approximately 1 cm thick. Too thin a skin flap resulted in scar contracture whereas a too thick flap might end up with a residual pucker.

Pedicle anchorage and insetting
The medial pedicle (even of full thickness) was always floppy and easily rotated into position. In all patients of this series, the pedicle was sutured to the pectoralis major fascia as high up as possible, below the clavicle using 2/0 Poliglecaprone 910 (Vicryl, Ethicon, Inc.). Contrary to the original description where the pedicle was anchored only in larger breasts with reductions >1500gm., this step was performed in all cases of this series regardless of the initial size of breast. Approximately five interrupted stitches were taken in the pedicle with big bites and sutured to the pectoralis fascia superiorly as close to its clavicular origin as possible (Fig.2).

Shaping
The base of the areolar opening was closed with a 3-0 poliglecaprone 25 (Monocryl, Ethicon, Inc.). No undermining of the base of the pedicle was needed for this step. The medial and lateral pillars of breast tissue were then sutured together with 3-0 poliglecaprone 910 (Vicryl, Ethicon, Inc.) as previously described. This shaping caused coning of the breast tissue, and more or less projection could be achieved as desired. In four cases where the breast was very large, the lateral pillar was quite small and in this instance, only the deep dermis was sutured. Some sagging of the medial pedicle occurred centrally, giving the breast the desired shape.

Skin closure
The skin was closed with interrupted deep dermal sutures using 3-0 poliglecaprone 910 (Vicryl, Ethicon, Inc.) followed by subcuticular 3-0 poliglecaprone 25 (Monocryl, Ethicon Inc.); gathering the skin somewhat with closure. Minimal gathering was used superiorly, but most of the skin was gathered inferiorly. Gathering the skin effectively reduces the length of the vertical scar, especially at the lower end where the skin was usually quite redundant.

The areola was sutured with a few interrupted sutures of 3-0 poliglecaprone 25 (Monocryl, Ethicon, Inc.) in the deep dermis and continuous subcuticular 4-0 poliglecaprone 25 (Monocryl, Ethicon, Inc) around the circumference.
Drains were not used in any cases of this series. Total operative time ranged 90 – 125 minutes (mean 95 minutes) with only one operator with one assistant working on both sides. **Postoperative details:** The skin was covered with Steri-Strips, and a gauze bandage was lightly placed over the incisions. No skin taping was used; instead, a surgical brassiere was used for comfort and to hold the gauze in place. Patients were advised to use the surgical bra continuously for 4 weeks and then to progress to a sports bra. Prophylactic antibiotics were administered for 24 hours, and parenteral nalbuphine HCl was routinely administered as a painkiller.

**RESULTS**

Follow-up period ranged 6-18 months (mean 9.3 months). The puckering was poorly accepted by most patients when it became visible during the first dressing, and was a point of major concern to all patients without exception. However, gentle reassurance and reminiscence of the preoperative explanation were all that were usually needed to sail the patients safely during the stormy three months during which the puckering settled down.

The vertical scar settled down also within approximately 3 months, and ultimately became a thin unnoticeable line. The patients were spared the hypertrophic itchy disfiguring transverse scar used in other techniques.

In all cases and all through the follow up period, the shape was found to be both better and more durable. All patients were satisfied with the projection and with the upper pole fullness. None of the patients developed flat (“square-shaped”) breasts. Furthermore, the ultimate shape appeared to resist the effects of gravity better than with the inferior pedicle, and this was due to excision of the heavy inferior tissue and yet preservation of the more desirable superior breast tissue. During the follow up period, bottoming-out was not encountered in any of the cases.

**Wound dehiscence**

Some delayed healing of the skin was evident at the inferior end of the vertical incision, where skin gathering was performed. Minor wound healing problems with no evidence of clinical infection occurred in five breasts (6.25%). This reduced incidence might have been due to the routine antibiotic prophylaxis policy applied in all cases of this series as well as the care taken to close the vertical incision loosely and with superficial bites so that the skin does not become constricted. Local wound care and reassurance were all that were necessary to tide the patients through the 1-2 weeks during which the wound healed soundly.

**Nipple necrosis**

Partial nipple necrosis occurred in only one side of one patient of this series (1.25%) and warranted secondary correction. Three months later, a full thickness graft was taken from the inner thigh to reconstruct the remainder of the areola, whereas the nipple was reconstructed by the double-opposing tab flap (fig. 3). Complete nipple necrosis was not encountered in any of our patients.

**Nipple sensation**

Within three weeks after the surgery, all patients except one (with the partial nipple necrosis) had normal to near-normal nipple and areola sensation. Any numbness or parasthesias subsided by then, and none of the patients complained of sensory problems. There was no need to use objective tests for sensation, since all patients were satisfied with the outcome.

**Infection**

All patients have been placed on perioperative cephalosporins, and infection occurred in only two patients of this series (2.5%). In these cases, who incidentally had poor hygiene, additional quinolone therapy for five days settled the inflammatory process.

**Fat necrosis**

Fat necrosis was evident in eight breasts (10%) as small firm tender lumps along the margins of the pedicle. It probably arose from parasitic fat globules along the edge of the pedicle. No treatment was needed except explanation and reassurance. No patients required additional surgery to treat this complication.

**Hematoma**

None of the patients developed significant hematomas, and any minor blood collections resolved with conservative topical anti-inflammatory gel application.
Residual puckers

There were residual puckers in the inferior edge of the vertical scar in three cases of this series, but resolved with conservative topical silicone applications within 12 months and did not warrant excision. Representative cases are shown in figs 4-9.

Fig.1: Diagram of markings of medial pedicle breast reduction.

Fig.2: Placement of the stitches to anchor the pedicle to the pectoralis fascia.

Fig.3: Double opposing tab flap used to reconstruct the nipple in the case with partial necrosis.
Fig. 4a,b: Preoperative photograph of 19 year old patient showing marked breast hypertrophy.

Fig. 5a,b,c: Late Postoperative photographs of same patient following excision of 700 gms from each side. Note absence of wound problems.
Fig. 6 a,b,c: Preoperative photograph of 26 year old patient showing marked breast hypertrophy.

Fig. 7a,b,c: Postoperative photographs of same patient following resection of 850 gms from each side.
Fig. 8 a,b,c: Preoperative photographs of 43 year old patient with both breast enlargement and ptosis.

Fig. 9 a, b, c: Postoperative photographs of same patient following resection of 550 gms from each side.
DISCUSSION

The medial pedicle vertical breast reduction has been popularized during the past decade, and more and more plastic surgeons around the world have been offering it to their patients (11). Many plastic surgeons currently believe that the results of vertical reduction could not be equaled by any other technique with respect to projection and upper-pole fullness (4,5,16,22,23).

The medial pedicle was introduced as a variation of the vertical technique, using a full-thickness dermo-glandular medial pedicle for nipple circulation and breast shaping. The location of tissue resection gave both an improved initial result and an improved, long-lasting shape (4,22,23).

Initially, the vertical breast reduction techniques were adopted to reduce scarring (8-10). However, there seemed to be more to these procedures than just reduced scars... In the inferior pedicle techniques, the skin brassiere was the mould used to hold the shape of the breast cone, but unfortunately it tended to fail over the long-term. Thus arose the controversy as whether the skin brassiere or the breast parenchyma sutures were more important to maintain shape (11). Although both could be important, the well known fact that skin tends to “streeeeetch” by time made the latter theory more plausible (0). Another issue to address would be the nature of the resection. The medial pedicle vertical breast reduction removed inferior tissue that was susceptible to the effects of gravity and left superior tissue that was desired for shaping (19). Unfortunately, many of the Wise-pattern techniques left tissue inferiorly (3). These techniques then relied on the skin brassiere to hold the shape. Therefore, the question that must be answered is why should one rely on skin to prevent ptosis when the skin had failed and allowed ptosis to develop in the first place? Thus came the logic conclusion that one should rely on breast resection and suturing for shaping and not on skin tension for shape maintenance (4).

Considering the breast conceptually as a cone (2), several articles examined the base of the breast, breast projection, the inframammary fold, and the pedicle. There was unanimous agreement that the short-scar techniques had the advantages of better projection, seldom giving a square shape, greater longevity, and were better at dealing with upper pole deficiency (4,7,11,22,23). This was a reasonable scientific conclusion since short scar techniques focus on reshaping the breast parenchyma, and skin redraping occurs secondarily, thus they do not depend on the skin brassiere to maintain the shape.

These findings were further validated by Abramson et al. (6), who found that there was less bottoming out by the medial pedicle. This was confirmed by the finding that the distance from the inframammary fold to the nipple - as measured in patients with more than 1 year of follow up- exhibited an average increase of only 11 percent for reductions between 500 and 1200 g per side and of 34 percent for reductions greater than 1200 g per side.

There was a higher patient satisfaction rate with medial pedicle breast reductions than with inferior pedicle ones. This was found in a large study by Cruz-Korchin & Korchin (29), who used a 10-point questionnaire response format. The patients were required to assess breast size, shape, symmetry, nipple sensation, symptom relief, ease of brassiere/clothing fitting, and overall satisfaction on a scale from 1 to 10: with very disappointed (score of 1) to very pleased (score of 10). The vertical mammoplasty was ranked significantly (p < 0.05) higher by patients in regard to scars (6 +/- 2 versus 3 +/- 3) and overall aesthetic results (8 +/- 1 versus 6 +/- 3) than inferior pedicle techniques. These results were reproducible in patients regardless of the age group, body mass index, or amount of tissue excised (20).

Various studies have also shown that medial pedicle breast reductions had no untoward effects on nipple and areola sensation (14,18) as well as on breast feeding (12,13) (vide supra). In addition, the pedicle was easier to inset (4,22) and the operative time was cut into almost half (11). The procedure was simple, fast, reproducible, reliable, and as much breast tissue could be resected as with any other technique (11,18,23). The desirable breast tissue (superiorly) was left in place, whereas the undesirable breast tissue (inferiorly and laterally) was removed (4,23). The durability of the breast shape appeared to be due to the lack of reliance on skin for shaping. The learning
curve was relatively short (4), and the improved results, both in scarring and in shape were well worth the move from the traditional Wise pattern reductions to the vertical technique (4,22).

However, the major disadvantage of these procedures was the significantly higher rate of surgical revisions compared with patients who had a Wise pattern reduction. Patient gratitude for the reduced scars was counteracted by the trouble of going through secondary surgical procedures. Revisions were mostly due to residual puckers in the inferior edge of the vertical scar, which persisted for months or years after the procedure. The remaining fullness and puckering were less of a result of excess skin than a result of excess subcutaneous tissue that had inadvertently been left between the original inframammary fold and the new, higher inframammary fold (4). Leaving the weight of the pedicle to drag on these areas would increase the tension on the scar line and limit the ability of the excess subcutaneous tissue to relocate, puckers to settle down, and vertical scar to straighten up. Anchoring the pedicle to the chest would accordingly reverse these untoward mechanical effects. In all cases of this series, the medial pedicle was routinely suspended to the chest wall. The resultant puckers in all patients settled down during the follow up period, and none of the patients required secondary corrective surgery. It was the authors’ belief that the extra weight of the pedicle, even in small reductions, would create extra pressure on the inferior segment of the vertical scar (where puckers were usually found); and thus hinder the settling down process that otherwise would have normally occurred. Anchorage of the pedicle was previously described (4,22) but only in larger breasts with reductions >1500 gm. It was the authors’ conviction that this step should be routinely done in all reductions regardless of the amount of breast tissue resected. Spending a few extra minutes in the operating room suspending the pedicle would spare the patient weeks and months of agony until the puckers resolved spontaneously, or had secondary excision surgery.

Another alternative would be to change the vertical scar into an L-shaped one (25), thus minimizing the amount of puckering. However, this step would increase the length of the scar, add a troublesome transverse component to a trouble-free vertical scar, and undermine the principle of vertical reduction from its basic foundation. We would therefore recommend the routine anchorage of the pedicle as a better solution for the puckers.

CONCLUSION

No key fits every lock. No one best method exists, but the ability to use different approaches in different situations could expand the breast reduction repertoire of the plastic surgeon. Routine anchorage of the medial pedicle to the chest wall during short scar breast reduction would minimize the residual puckers and reduce the need for secondary corrective surgery.

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