

Does Knowledge of the Initial Technique Affect Outcomes after Repeated Breast Reduction?

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Background: This article examines outcomes following repeated breast reduction using vertical scar reduction mammoplasty. The results of performing repeated breast reduction in patients for whom operative records were available for the previous breast reduction were compared with those for whom these records could not be obtained.

Methods: A retrospective review of all patients who underwent repeated breast reduction for recurrent symptomatic mammary hypertrophy, inadequate volume reduction during the primary operation, and significant postoperative breast volume asymmetry was performed.

Results: Twenty-five patients had repeated breast reduction. The initial technique was known in 13 patients and unknown in 12 patients. The average total reduction per breast (including liposuction) was 658 g (range, 30 to 1150 g). Liposuction was used more often in cases for which the initial technique was unknown ($p = 0.000$). No patients experienced necrosis of the nipple-areola complex, and there was no significant difference in the complication rates between patients for whom the previous pedicle was known versus those in whom it was unknown ($p = 0.220$).

Conclusions: Using vertical scar reduction mammoplasty, repeated breast reduction is a safe procedure, even when the initial technique is unknown. A vertically oriented, inferior wedge excision of tissue can be safely excised, irrespective of the initial pedicle. For patients with ptosis in whom the nipple-areola complex needs to be transposed superiorly, a carefully planned and de-epithelialized superior pedicle should be used. In addition, liposuction is an important adjunct to achieve volume reduction, while limiting the amount of dissection during repeated breast reduction. (*Plast. Reconstr. Surg.* 129: 11, 2012.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

Despite breast reduction being one of the most commonly performed plastic surgery procedures,¹ only a few studies have been published reporting outcomes following repeated breast reduction.²⁻¹⁰ Repeated breast reduction may be required due to inadequate volume reduction during the primary operation, poor postoperative shape, and breast or nipple-areola complex asymmetries. In addition, age-related or postpartum breast changes and weight gain can lead to recurrent symptomatic mammary hypertrophy.

Several case series have been reported describing outcomes following repeated breast reduc-

tion. Lejour⁶ reported good results following vertical mammoplasty in 14 patients. She noted that liposuction allowed for volume reduction without compromising vascularity to the nipple-areola complex. Hudson and Skoll⁷ reviewed 16 patients following repeated breast reduction. Three patients suffered vascular compromise of the nipple-areola complex, with two experiencing complete unilateral loss. If the nipple-areola complex needed to be transposed, they recommended using the same pedicle that was used in the initial operation, if known. When the initial pedicle was unknown, they suggested that free nipple grafting may be the safest option. Losee et al.⁸ reported 10 patients who underwent repeated breast reduction. Seven of the 10 patients had a different tech-

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nique performed from that used in the previous operation. Four of these patients experienced self-limiting complications; there was no necrosis of the nipple-areola complex reported. They concluded that repeated breast reduction is a safe and viable option when performed with either a similar or different technique. Recently, Patel et al.¹⁰ reported a major complication rate of 37.5 percent following repeated breast reduction in eight patients. Three cases in which an inferior pedicle was used for both primary and repeated breast reduction operations led to complications, including one patient with nipple-areola complex necrosis. The authors suggested that free nipple grafting may be the technique of choice, as there were no complications in the two cases that were included in their series.

This article reviews our experience with repeated breast reduction using vertical scar reduction mammoplasty, including our modified technique and results. In particular, we compare the results of performing repeated breast reduction in patients for whom operative records were available from the previous breast reduction with those for whom these records could not be obtained, as this is a common situation faced by plastic surgeons who perform revisional operations.

PATIENTS AND METHODS

A retrospective review of all patients who underwent repeated breast reduction from 1998 to 2010 was performed. Repeated breast reduction for recurrent symptomatic mammary hypertrophy, inadequate volume reduction during the primary operation, and significant postoperative breast volume asymmetry were included. Revisional procedures, including scar revisions, excision of dog-ears, and excision of fat necrosis, were excluded. Patients' medical records were reviewed in detail, and an attempt was made to obtain the operative report describing the primary breast reduction technique. Demographic and clinical data were collected and analyzed. In particular, medical records were also reviewed to identify all complications, including seroma, hematoma, superficial wound dehiscence, infections, fat necrosis, areolar necrosis, nipple loss, poor scarring or asymmetries requiring revisional operations, and inadequate volume reduction requiring repeated breast reduction. A two-tailed Student *t* test and Fisher's exact test were used to test for statistical significance between comparison groups; *p* less than 0.05 was considered statistically significant.

All patients had their repeated breast reduction performed by a single surgeon. The technique for

vertical scar reduction mammoplasty performed in this clinical series used a mosque dome skin-marking pattern; a vertically oriented, inferior wedge excision en bloc of skin, fat, and gland; postexcision liposuction, if necessary; and wound closure in two planes, with gathering of the skin of the vertical wound with a four-point box stitch.¹¹ The following modifications for pedicle selection were used for repeated breast reductions (Fig. 1):

1. If the nipple-areola complex was in the ideal position, only a vertically oriented, inferior wedge excision was performed.
2. If the nipple-areola complex needed to be transposed superiorly, a partial-thickness, superior pedicle was used with careful de-epithelialization preserving the deep dermis and underlying circulation (Fig. 2).

Typical preoperative skin markings for patients with adequate nipple-areola complex position and those requiring superior transposition of the nipple-areola complex are shown in Figures 3 through 5. Minimum postoperative follow-up was 6 months. The principles outlined in the Declaration of Helsinki were followed during the completion of this study.

RESULTS

Between 1998 and 2010, 25 patients had repeated breast reduction using a modified technique for vertical scar reduction mammoplasty (Table 1). Twenty-three patients underwent secondary breast reduction, and two patients underwent tertiary breast reduction. Twenty-three cases were bilateral, and two cases were unilateral. Thirteen patients had a previous breast reduction performed by the senior author (F.L.). The operative

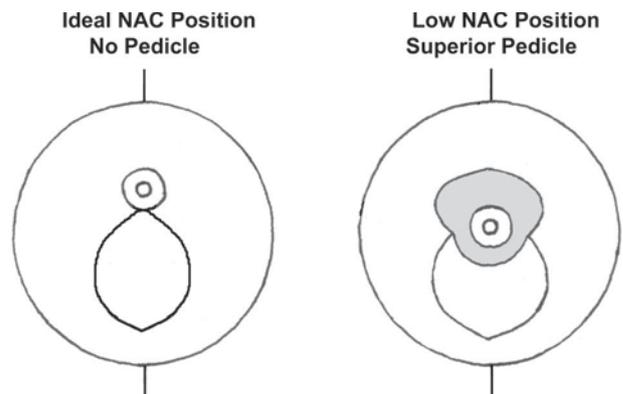


Fig. 1. Selection of the pedicle depends on the position of the nipple-areola complex. (Left) No pedicle is required with the ideal nipple-areola complex position. (Right) A superior pedicle is used with the low nipple-areola complex position.

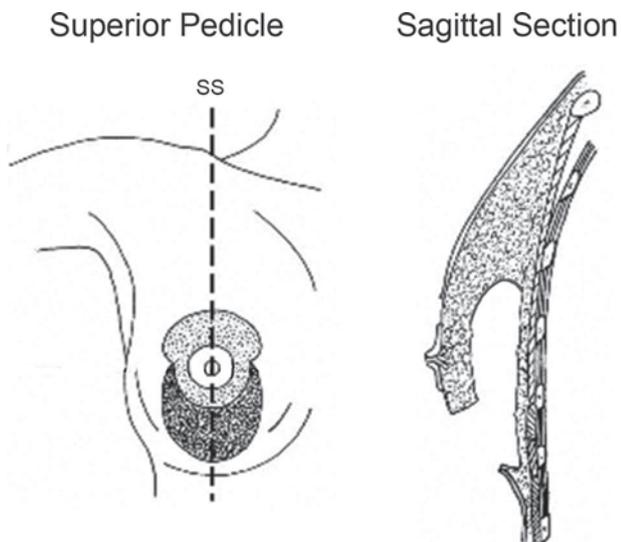


Fig. 2. (Left) A superior pedicle is used to transpose the nipple-areola complex. A sagittal section (SS) through the breast is marked. (Right) The extent of the excision using a superior pedicle is shown in the sagittal section. The superior pedicle is a partial-thickness one with careful de-epithelialization of the dermis to preserve the superficial blood supply to the nipple-areola complex.

report from the primary breast reduction operation was not available for 12 patients. The average time since the previous operation was 8 years (range, 1 to 25 years).

The average total reduction per breast (including liposuction) was 658 g and ranged from 30 to 1150 g. The average weight of tissue excised per breast was 332 g (range, 10 to 640 g), and the average volume liposuctioned per breast was 326 ml (range, 100 to 850 ml). Liposuction was performed in 64.5 percent of cases. For five breasts, the location of the nipple-areola complex was adequate, and no pedicle was created (Fig. 6). A superior pedicle was used to transpose the nipple-areola complex in 43 breasts. This was the same pedicle used in the previous operation for 18 breasts, whereas it was a different pedicle for four breasts. In 21 breasts, the pedicle used in the previous operation was unknown.

Patient characteristics and surgical data were further subdivided into those patients for whom operative records were available for the previous breast reduction and those for whom these records could not be obtained (Table 2). These groups were similar in the number of patients (13 versus 12 patients) and their age (37 versus 40 years). There was a significantly longer time interval between the previous and repeated breast reduction operations for patients in whom the operative records could not be

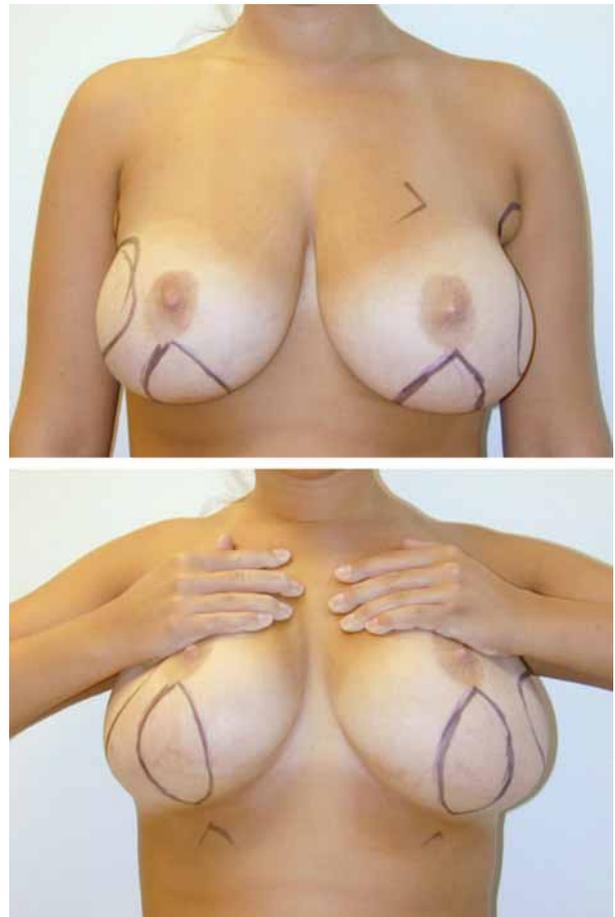


Fig. 3. (Above) A 24-year-old woman who underwent previous bilateral breast reduction 8 years before repeated breast reduction had an inverted-T scar pattern, but the pedicles were unknown. The nipple-areola complexes are adequately positioned, so she was marked for bilateral vertically oriented, inferior wedge excisions of breast tissue. (Below) The inferior extent of skin resection is marked above the inframammary creases.

obtained (5 versus 12 years). These patients had significantly larger repeated breast reductions (406 versus 682 g), and liposuction was used more often (38 versus 92 percent).

Three patients experienced complications in this series: one patient had unilateral cellulitis, and two patients required a transverse wedge excision to correct postoperative asymmetry. Fat necrosis was not detected by clinical examination in any patients during the follow-up period. No patient in this series experienced delayed wound healing or necrosis of the nipple-areola complex. There was no statistically significant difference in complications between patients for whom the previous pedicle was known versus those in whom it was unknown ($p = 0.220$).

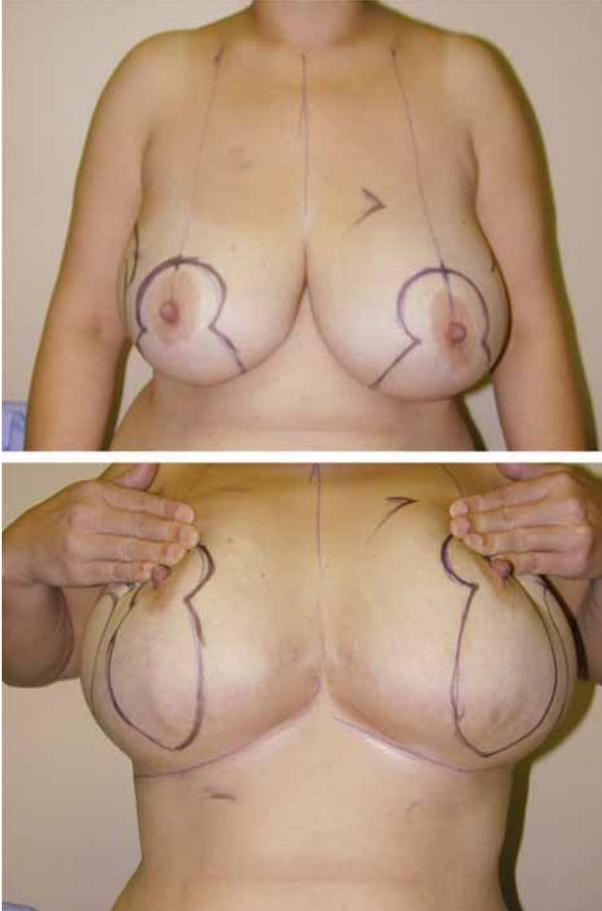


Fig. 4. (Above) A 40-year-old woman who underwent previous bilateral breast reduction 5 years before repeated breast reduction had an inverted-T scar pattern, but the pedicles were unknown. The nipple-areola complexes were located too low, so a mosque dome skin-marking pattern was drawn, and bilateral superior pedicles were used to transpose the bilateral nipple-areola complexes. (Below) The inferior extent of the skin resection is marked above the inframammary creases.

DISCUSSION

We performed this study to examine whether knowledge of the initial technique affected outcomes after repeated breast reduction, particularly complications. We have more often than not been faced with a patient presenting for repeated breast reduction whose operative report from the original surgeon could not be obtained. In some cases, patients have pseudoptosis with the nipple-areola complex at the ideal location; this was the case for four patients (five breasts) in this study. Repeated breast reduction using a vertically oriented, inferior wedge excision without creation of a pedicle is adequate for these patients. For many patients, the nipple-areola complex requires elevation for only a short distance, typically less than

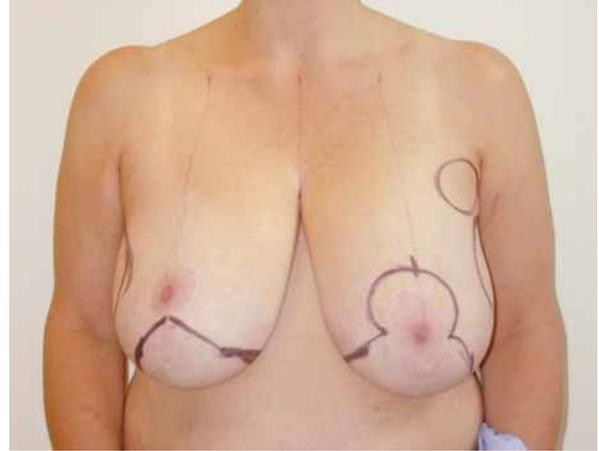


Fig. 5. A 49-year-old woman who underwent previous bilateral breast reduction 2 years before repeated breast reduction had an inverted-T scar pattern, but the pedicles were unknown. She had significant breast asymmetry, including the location of her nipple-areola complexes. On the right, her nipple-areola complex position is adequate, and she is only marked for a vertically oriented, inferior wedge excision of breast tissue. On the left, a superior pedicle will be used for transposition of the nipple-areola complex, followed by a vertically oriented, inferior wedge excision of breast tissue.

Table 1. Patient Characteristics and Surgical Data

	Value
No. of patients	25
Bilateral	23
Unilateral	2
Average age (range), yr	38 (24–61)
Average BMI, kg/m ²	27.8 (21.9–39.2)
Primary breast reduction pedicle	
Superior	20
Inferior	2
Lateral	2
Unknown	24
Average time since primary breast reduction, yr	8 (1–25)
Indication for repeated breast reduction, no. of patients	
Recurrent symptomatic mammary hypertrophy	15
Inadequate volume reduction during the primary operation	3
Postoperative breast volume asymmetry	3
Postoperative weight gain	1
Age-related breast changes	3
Repeated breast reduction pedicle	
Same	18
Different	4
None	5
Unknown	21

BMI, body mass index.

5 cm of superior transposition; this was the case for 21 patients (43 breasts) in this study. With this in mind, we have used a partial-thickness, dermoglandular superior pedicle with careful de-ep-

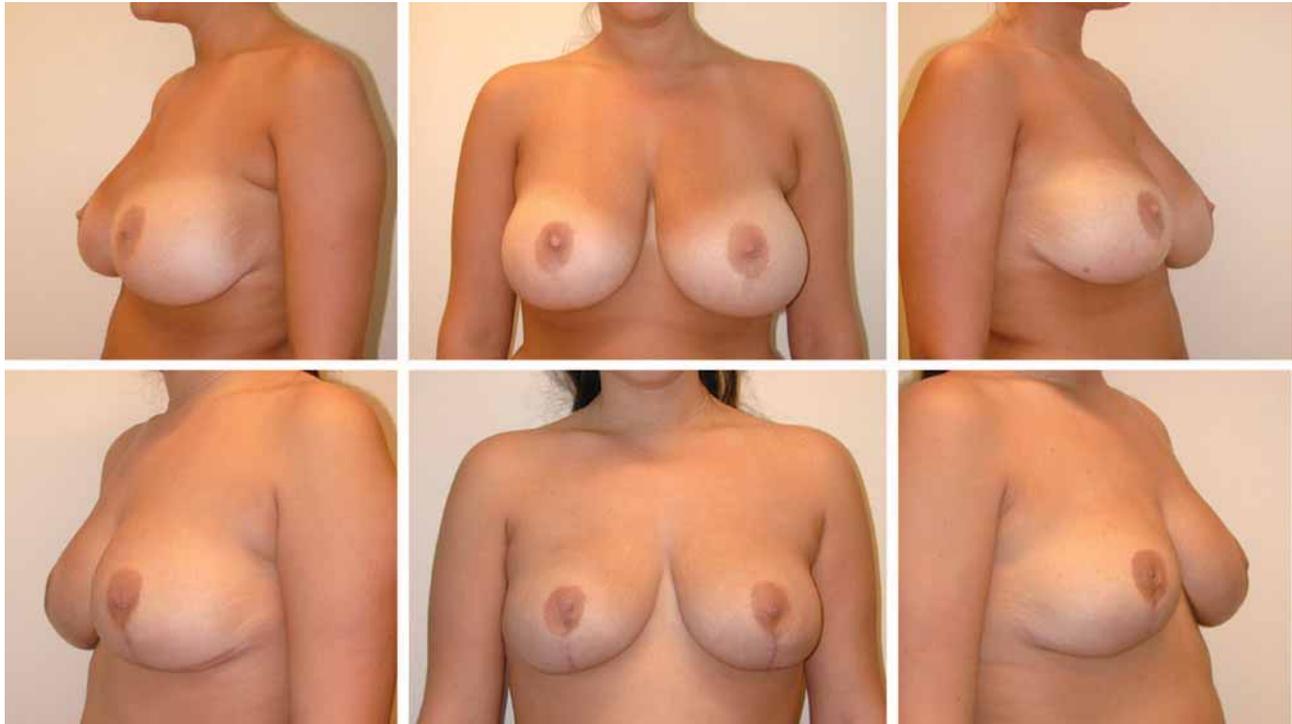


Fig. 6. (Above) A 24-year-old woman who underwent previous bilateral breast reduction 8 years before repeated breast reduction had an inverted-T scar pattern, but the pedicles were unknown. (Below) Result 4 months after vertical scar reduction mammoplasty with bilateral vertically oriented, inferior wedge excisions of breast tissue; 340 g was excised from the right breast, and 520 g was excised from the left breast. In addition, 250 ml was liposuctioned from the right breast and 150 ml from the left breast.

Table 2. Comparison of Patient Characteristics and Surgical Data for Repeated Breast Reductions for Which the Type of Pedicle Was Known versus Unknown

	Known Pedicle	Unknown Pedicle	<i>p</i>
No. of patients	13	12	0.777
Average age at repeated breast reduction, yr	37	40	0.397
Average time since previous breast reduction, yr	5	12	0.011*
Average total reduction per breast (including liposuction), g	406 (10–940)	682 (360–1150)	0.000*
Average weight of tissue excised per breast, g	310 (10–640)	354 (120–630)	0.296
Average volume liposuctioned per breast, cc	100 (100–700)	355 (100–850)	0.202
Percentage of cases with liposuction	38	92	0.000*
Repeated breast reduction pedicle			
Superior	22	21	0.828
None	2	3	0.527
Complications	3 patients	0 patients	0.220

*Statistically significant with $p < 0.05$.

ithelialization to preserve the deep dermis and subdermal plexus for repeated breast reduction without any major complications, regardless of whether or not the original pedicle was used or known. This was combined with a vertically oriented, inferior wedge excision without extensive undermining or creation of large skin flaps, as fashioned in inverted-T scar pattern reductions. This approach minimizes the degree of vascular compromise to the remaining breast tissue and likely contributed to the low complication rate in this study

as compared with other reported rates.^{7,8,10} In this study, complications occurred only in patients for whom the initial pedicle was known; this was not statistically significant. These three patients all underwent vertical scar reduction mammoplasty with a superior pedicle to transpose the nipple-areola complex during the first operation, followed by repeated breast reduction, again with a superior pedicle. However, complications, including fat or skin necrosis and loss of the nipple-areola complex, which are secondary to inadequate blood supply, were not ex-

perceived in this study. Interestingly, there was one patient who had her previous breast reduction performed using bilateral inferior pedicles and another patient in whom bilateral lateral pedicles were used; they both had repeated breast reduction performed using bilateral superior pedicles. Neither of these patients experienced complications. Although we have used this operative strategy safely on breast reductions up to 1150 g, most of the patients included in this series had grade 1 and grade 2 ptosis.¹² In our experience, patients presenting for repeated breast reduction with grade 3 ptosis were rarely seen.

Liposuction was used significantly more frequently when the initial pedicle was unknown. Liposuction is a powerful adjunct to achieve adequate volume reduction without creating large areas of continuous undermining or additional skin incisions, both of which can contribute to wound-healing problems. In repeated breast reduction, liposuction alone is usually not enough to achieve an aesthetically pleasing contour of the breast, as there is typically excess skin of poor quality, particularly in the inferior pole of the breast. Excision of this excess skin using a vertically oriented ellipse addresses this problem while creating a narrow more projecting breast, which is the hallmark of this procedure.^{11,13} In addition, this technique avoids the inframammary crease incision and likely preserves blood supply to the overlying skin, compared with an inverted-T scar pattern. This is an important factor during repeated breast reduction in which prior scars can contribute to unreliable blood supply and wound-healing problems. In this study, 11 of 12 patients in the group for whom the previous pedicle was unknown had inverted-T scar patterns secondary to their previous breast reduction.

In this retrospective review, we noted that repeated breast reductions for which the initial pedicle was unknown were significantly larger than those cases in which the initial pedicle was known. This observation was an unexpected finding. Another difference between the two groups was that those patients for whom the initial technique was unknown had their previous breast reduction performed by another surgeon and had a significantly longer interval between their breast reduction operations. Although only speculation, the etiology of recurrent mammary hypertrophy may be different between patients who present earlier versus later for repeated breast reduction. Earlier presentation may be related to inadequate reduction, and later presentation may be more related to age and physiologic changes.

Intuitively, one would expect that larger, repeated breast reductions should have a higher com-

plication rate. This, however, was not observed in this study. One explanation may be that the average time interval between the previous breast reduction and repeated breast reduction operations was significantly longer in cases in which the initial pedicle was unknown (12 versus 5 years). From this study, however, we cannot say what the minimal or optimal time interval should be before repeated breast reduction to increase the safety of the procedure and reduce the risk of complications. Our approach has been to wait at least 1 year postoperatively before performing any major revisional procedures following breast reduction.

Rohrich et al.¹⁴ suggest helpful concepts to guide plastic surgeons in the management of patients presenting for repeated breast reduction, including (1) review of history of breasts since the initial operation; (2) careful examination for asymmetries and masses; (3) mammographic radiological evaluation; (4) review of operative technique used from the operative report, *if available*; and (5) choice of operative technique based on examination findings and amount of reduction to be performed. Further review of the literature detailing experience with repeated breast reduction reveals conflicting opinions. It has been approached with great apprehension by several authors,⁷⁻¹⁰ including those who have reported significant complications, including complete loss of the nipple-areola complex,^{7,10} whereas others have reported that repeated breast reduction can be a safe option whether or not the same initial technique is used.^{6,8} Some authors advocate using the same pedicle to transpose the nipple-areola complex, as was used in the initial operation to decrease the risk of nipple-areola complex necrosis.^{7,8,14} However, as with most revisional operations, it is often impossible to obtain the operative note for the previous operation when it has been performed by a different surgeon. Even when the operative note has been obtained, it may not contain enough useful information to help with planning the revisional operation. For example, an operative note may state that “a Robbin’s¹⁵ type reduction mammoplasty” or a “Wise¹⁶ pattern, inferior pedicle reduction mammoplasty” was performed. However, although one can assume that both techniques used an inferior pedicle to transpose the nipple-areola complex, it may not have stated whether this pedicle was full-thickness or partial-thickness dermoglandular, or even a dermal pedicle. The location of this pedicle in relation to the overlying skin flaps may also be unknown. Thus, an attempt to create an inferior pedicle containing the original inferior pedicle

during repeated breast reduction may not include it at all. This may be why Patel et al.¹⁰ reported a high complication rate when an inferior pedicle was used in both the primary and repeated breast reduction operations. In this study, we used a superior pedicle regardless of the type of pedicle that was used during the initial operation, without any untoward complications. In primary breast reduction, we have found both the superior and medial pedicles to be very reliable and have not experienced any necrosis of the nipple-areola complex in over 2000 vertical scar breast reductions.¹² A review of the blood supply to the nipple-areola complex reveals that both of these pedicle designs afford rich superficial and deep circulation to the area.^{17–20} Perhaps this rich vascular bed may provide additional blood supply to the nipple-areola complex through revascularization following inferior pedicle breast reductions, allowing the superior pedicle to be used reliably for repeated breast reduction. Furthermore, in repeated breast reduction, the superior pedicle is typically short and may offer a more predictable random blood supply than trying to accurately redissect the initial pedicle. Although it is impossible to know what type of pedicle was used during the initial operation in the patient group for whom the previous technique was unknown, as mentioned earlier, 11 of 12 patients in this group had inverted-T scar patterns secondary to their previous breast reduction. The majority of these patients had their previous operation during the 1980s through to the early 2000s. During this time period in our geographical region, the most commonly used pedicle with an inverted-T scar pattern was an inferior pedicle,^{15,16} with a vertical bipedicle²¹ less frequently used. Superior and medial pedicle techniques have gained more popularity over the past 10 years, with descriptions by Hall-Findley.²² This local trend is also reflected in a 2008 survey of Canadian plastic surgeons, which revealed that inverted-T scar pattern/inferior pedicle breast reduction was the most common technique used.²³

With regard to free nipple grafting in repeated breast reduction, we have not performed this in 25 cases and do not routinely plan to perform free nipple grafting in any patient, regardless of the initial pedicle. However, as in primary breast reduction cases, the possibility of converting to a free nipple graft during the operation in the event of vascular compromise to the nipple-areola complex is important to discuss preoperatively with the patient.

CONCLUSIONS

From this study, we conclude that repeated breast reduction using a modified technique for vertical scar reduction mammoplasty is a safe procedure, even when the initial technique is unknown. For patients with pseudoptosis, a vertically oriented, inferior wedge excision of tissue can be safely excised, irrespective of the initial pedicle. For patients with ptosis in whom the nipple-areola complex needs to be transposed superiorly, a carefully planned and de-epithelialized superior pedicle should be used. This pedicle combined with a vertically oriented, inferior wedge excision limiting the amount of undermining of breast tissue helps to maintain blood supply to the remaining breast tissue. In addition, liposuction is an important adjunct to achieve volume reduction while limiting the amount of dissection during repeated breast reduction.

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