Inverted-T Versus Vertical Scar Breast Reduction: One Surgeon’s 5-Year Experience With Consecutive Patients

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BACKGROUND: Breast reduction is one of the most commonly performed plastic surgery procedures. Many approaches to breast reduction have been described, including inverted-T and vertical scar techniques and various types of dermoglandular pedicle for the nipple.

OBJECTIVE: This study compares the outcomes of patients undergoing vertical scar medial pedicle versus inferior pedicle inverted-T scar breast reduction by a single surgeon.

METHODS: Ninety-five consecutive patients who had undergone inverted-T scar breast reduction between January 2002 and July 2005 were compared with 96 consecutive patients undergoing vertical scar breast reduction between September 2005 and August 2007. Patient age, body mass index (BMI), resection weight, complications, and surgical revision rates were compared.

RESULTS: Mean age, BMI, and resection weight were comparable in both groups. The rates of major complications of both groups were equal (24%). There was a higher hematoma rate in the vertical series (8 vs 3; *P* < .05). The inverted-T series was complicated by more wound dehiscence (37 vs 11; *P* < .05), surgical site infections (16 vs 8; *P* < .05), and involved a longer operative time (102 minutes vs 83 minutes; *P* < .05). There was a higher scar revision rate in the inverted-T series (11 vs 32; *P* < .05).

CONCLUSIONS: Vertical scar breast reduction is associated with a major complication profile similar to that for inverted-T scar breast reduction with a shorter operative time and fewer scar revisions. There were fewer minor complications with the vertical series, and it is safe and easy to adopt by the surgeon. (Aesthetic Surg J 2008;28:521–527.)

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try, superficial surgical site infection (SSI), dehiscence, and seroma. The complications were further divided into major and minor categories. Major complications included postoperative hematoma, fat and nipple necrosis, and SSI. Minor complications included breast asymmetry, nipple sensibility, and wound dehiscence. The surgical revision rates for scar and breast shape were also extracted. Patients undergoing mastopexy or unilateral breast reduction were excluded from the study. The average length of follow-up was 6 months.

Operative Technique
The breast reductions were performed in 3 private hospital facilities. A Hall-Findlay modelled breast reduction was performed in the vertical scar series with a medial dermoglandular pedicle. A medial pedicle with key-shaped skin resection pattern was marked with the patient in the upright position (Figure 1). The inframammary crease, sternal notch, and midclavicular line were marked preoperatively. A solution of ropivacaine (Naropin; AstraZeneca, London, UK) with 1:200,000 adrenaline solution was infiltrated around the skin and breast parenchyma resection pattern (but not the pedicle) before skin incision. Antibiotics were not routinely used, and lipoplasty of the inframammary fold and axilla was performed in selected patients only. All breasts had drains inserted, and patients were discharged 1 or 2 days postoperatively.

Patients who had undergone inverted-T scar breast reduction had standard Wise pattern breast markings and an inferior pedicle designed for the nipple, with an inverted-T scar skin excision.

Statistics
The data extracted were analyzed using descriptive statistics. Student t tests with statistical significance set at $P < .05$ were used for comparing patient demographics, resection weight, BMI, and age of the inverted-T scar group versus the vertical scar group. Complications between both groups were analysed with $\chi^2$ tests, and the revision rates were compared with the Fisher exact test.

RESULTS
Table 1 illustrates the relationship between age, BMI, resection weight, and operative duration between the inverted-T scar and vertical scar groups. The range of breast tissue removed in the T-scar group was 160 to 2741 g (mean, 1140 g) compared to 41 to 2170 g (mean, 875 g) in the vertical scar group. The mean operative time of the inverted-T scar group was longer than the vertical scar group (102 vs 83 minutes; $P < .05$; Table 1).

The percentage of major complication rates was equal in both groups (24%; Table 2) with a higher incidence of postoperative hematoma in the vertical group (8 vs 3; $P < .01$; Table 2). The overall (major and minor combined) complication rate was higher in the inverted-T scar group (67%) versus the vertical scar group (39%). There was a statistically significant difference in hematoma rate (higher in the vertical scar group) and in SSI and wound dehiscence (higher in the inverted-T scar group) as illustrated in Figure 2.

The breast reduction scar revision rate was significantly higher in the inverted-T scar group (11 vs 2; $P < .01$) and the breast size revision rates were equal (Figure 3). Figures 4 and 5 demonstrate the appearance at 12 weeks of an inverted-T scar breast reduction and a vertical scar breast reduction, respectively.

| Table 1. Patient variables: Inverted-T scar versus vertical scar breast reduction |
|-----------------------------------|----------|
| Age                              | 41 ± 1.3 | 38.6 ± 1.45 |
| Body mass index                  | 29.2 ± 0.6 | 28.5 ± 0.4 |
| Operative duration (min)         | 102 ± 2.0 | 85 ± 1.95 |
| Total resection (g)              | 1140 ± 60.5 | 875 ± 41.75 |

*P from Student t tests.
DISCUSSION

There was no statistical difference in the mean age and BMI between the 2 groups (Table 1). The mean resection weight was higher in the inverted-T scar group (1140 g) compared to the vertical scar group (875 g). This can be attributed to the surgeon requesting a period of weight loss in patients with BMI higher than 35 presenting for breast reduction in the last 2 years. The large range in the amount of breast tissue removed in the vertical scar method (41 to 2170 g) shows that this technique can be used in all breast sizes, as shown by Azzam and De Mey.23 The mean operative time for breast reduction in the vertical group was statistically shorter than the inverted-T group; this is important because it allows for a shorter anesthesia time for the patient and a more efficient use of operative resources.

Figure 2 demonstrates that there were fewer overall (major and minor combined) complications in the vertical scar group. Because the percentage of major complications was the same in both groups, this supports the clinical observation by the surgeon of a higher rate of minor complications with the inverted-T scar technique, before switching techniques. The fact that the percentage of major complications is equal (Table 2) shows that the 2 techniques have equal safety profiles. The differences in major complications between the 2 groups are attributable to the postoperative hematoma rate, which was higher in the vertical scar group (8 vs 3; \( P < .01 \)), and the higher SSI rate in the inverted-T group (16 vs 8; \( P < .01 \); Table 2). Figure 3 and Table 3 both demonstrate that there were more scar revisions (11 vs 2; \( P < .01 \)) and wound dehiscence (37 vs 11; \( P < .01 \)) with the inverted-T scar group. These findings again correlate with the clinical observations that led the surgeon to change from an inverted-T scar to vertical scar breast reduction technique.

It is interesting to note that there were no seromas in either group. Many reviews of breast reduction outcomes have reported a high seroma rate.12–14,24,25 The lack of seromas can be attributed to the routine use of postoperative drains, which are not used in some other centers.24,25

Some of the complication rates presented in this paper are higher than in the published literature on breast reduction outcomes.1,2,12–14,16–19,23,24 There are several reasons for this. First, the way an SSI was defined included all wounds requiring oral antibiotics and no debridement and those requiring intravenous antibiotics and debridement. Wound dehiscence was defined as wound breakdown of greater than 1 cm. Fat necrosis was defined as breasts requiring surgical debridement as well as those requiring only dressings and no surgery. These inclusion criteria account for the higher reported complication rate in this series. The high hematoma rate in the vertical scar group is of con-

Table 2. Major complications: 95 inverted-T scar versus 96 vertical scar breast reductions

<table>
<thead>
<tr>
<th></th>
<th>Inferior pedicle/</th>
<th>Medial pedicle/</th>
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<tr>
<td></td>
<td>T scar (n [%])</td>
<td>vertical scar (n [%])</td>
</tr>
<tr>
<td>Hematoma</td>
<td>3 (3.1%)</td>
<td>8 (8.3%)*</td>
</tr>
<tr>
<td>Fat necrosis</td>
<td>4 (4.2%)</td>
<td>6 (6.2%)</td>
</tr>
<tr>
<td>Superficial surgical</td>
<td>16 (16.8%)</td>
<td>8 (8.3%)</td>
</tr>
<tr>
<td>site infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nipple/areolar necrosis</td>
<td>0</td>
<td>1† (1%)</td>
</tr>
<tr>
<td>Seroma</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>23 (24%)</td>
<td>23 (24%)</td>
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*\( \chi^2 \) tests demonstrating statistical significance (\( P < .01 \)).
†Partial (10%) necrosis of nipple.
Figure 3. Breast reduction revision rates for scar and breast shape: inverted-T scar versus vertical scar (*P < .01; Fisher exact test).

Figure 4. Comparison of the 3-month postoperative scar appearance of the inverted-T versus vertical scar breast reduction. A, B, Postoperative views of a 32-year-old patient who underwent inverted-T scar breast reduction with resection weights of 322 g in the right breast and 320 g in the left breast. C, D, Postoperative views of a 28-year old patient who underwent vertical scar breast reduction with resection rates of 365 g in the right breast and 265 g in the left breast.
The relationship between complications and age, BMI, and resection weight yielded no trend in either patient group. There was significantly more tissue resected in the inverted-T scar group that is not reflected in higher complication rates (Table 4). Unfortunately, not all patients who underwent breast reduction disclosed their smoking status, but in those who did there was a correlation between smoking and complications in both groups (Tables 4 and 5). A study by Parsa et al.\(^2\) also showed a relationship between smoking and complications of breast reduction. There is no doubt that smoking has many effects on bleeding, wound healing, and infection.\(^2\)

Figure 4 compares the 3-month postoperative results of the inverted-T breast reduction with those of the vertical scar reduction. It illustrates the problems with wound dehiscence and scar redness of the inverted-T reduction in comparison with the healed wound and minimal bunching of the vertical scar. The vertical scar technique is reliant on the dermoglandular component of the breast for shape and, in this author’s opinion, this leads to superior breast projection and contour, in comparison with the inverted-T scar technique, which relies on skin tension over the breast parenchyma to maintain the desired shape.\(^1\)\(^-\)\(^4\) The bunching below the vertical scar is typical of this technique, because the inferior part of the wound is gathered with subcuticular suture.\(^1\)\(^-\)\(^4\)

There is a need for continued evaluation of the hematoma rate in vertical scar breast reduction. A vertical scar and inverted-T scar reduction survey on outcomes is in the process of being implemented. The results of this survey should help to better understand subjective opinions on both methods and evaluate scarring and the long-term aesthetic appearance of the breast.

**CONCLUSIONS**

This comparison between inverted-T and vertical scar breast reduction demonstrates that both techniques are equally safe and can be used for both large and small breasts. The vertical scar approach resulted in a statistically lower rate of wound dehiscence and surgical site infections, fewer scars (and fewer scar revisions), and a shorter operative time. In our series, however, the vertical scar technique was associated with a statistically higher rate of hematomas. This study also demonstrates that the learning curve to change from inverted-T scar to vertical scar breast reduction is not overly steep and presents few safety concerns, as described by Chen et al.\(^2\)\(^7\).

**DISCLOSURES**

The authors have no disclosures with respect to the contents of this article.

**REFERENCES**


COMMENTARY

Victoria A. Vitale-Lewis, MD

I appreciate Zoumaras and Lawrence\(^1\) sharing the experience of a single surgeon in the conversion of breast reduction techniques from the inverted-T scar to the vertical scar procedure. They compare 95 patients who underwent inverted-T scar, inferior pedicle breast reduction between January 2002 and July 2005 with 96 consecutive patients who underwent a vertical scar pedicle breast reduction from September 2005 to August 2007. Many of us use the anticipated volume of breast tissue to be resected as an important determinant of the type of reduction technique applied, reserving the vertical technique for only smaller reductions.\(^2\) Other surgeons limit use of the vertical technique to an infra-mammary fold to nipple–areolar complex distance of no more than 15 to 18 cm.\(^3\) Zoumaras and Lawrence, however, have been able to make the leap to applying the vertical scar breast reduction to all breast reduction patients without reservation.

One of my concerns about the results is the difference in the mean resection weight between the 2 groups. They note that “the mean resection weight was higher in the T-scar group (1140 g) compared to the vertical scar group (875 g).” They attribute the lower resection weight in the vertical scar group to the request for weight loss in patients with a body mass index of more than 35 in the last 2 years. In light of the fact that there was no significant difference in the preoperative body mass index between the 2 groups, I am not sure that explanation is sufficient.

One interesting result of this study is the lower overall complication rate for the vertical scar group than the traditional T-scar group. This differs from the 2002 survey by Rohrich et al,\(^2\) in which “the distribution of complication rates suggest that the limited incision techniques are associated with greater complications than the traditional incision technique.” However, a point of concern in the study by Zoumaras and Lawrence is that the complication rates for both the vertical scar group and the traditional T-scar group are higher than previously reported. I accept their explanation for the higher complication rate in the traditional T-group based on their low threshold definition for superficial surgical site infection (requiring oral antibiotics and no debridement) and for wound dehiscence (wound breakdown of >1 cm). Their explanation of the higher hematoma rate for the vertical scar group based on inexperience is a little more disconcerting.

Zoumaras and Lawrence show lovely postoperative results. I only wish that they would have included the preoperative photographs of these patients. They noted that the breast size revision rates were equal between the 2 groups. In my opinion, on the basis of the postoperative photographs, the patient with the vertical scar shown

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