BREAST REDUCTION WITH THE POSTEROSUPERIOR PEDICLE: A SERIES OF 200 CONSECUTIVE PATIENTS

Hristo Shipkov1,2, Ali Mojallal1, Fabienne Braye1
1Department of Burns and Plastic Reconstructive and Aesthetic Surgery, Edouard Herriot Hospital, Lyon, France, 2Division of Plastic and Craniofacial Surgery, St George University Hospital, Plovdiv, Bulgaria

ABSTRACT

AIM: To present and evaluate the outcomes of the posterosuperior pedicle breast reduction technique.

PATIENTS AND METHODS: 200 patients were included in the present retrospective study. They were operated on between January 2006 and January 2009. The mean age was 35.9 years (range 22 to 58 years). The average notch-to-nipple distance was 35.8 cm (range, 29 to 42 cm). The mean body mass index was 27 (range, 22 to 35 cm). Results were assessed by means of self-evaluation and by an independent 5-member jury. Fifty two patients (26%) had had bariatric surgery and 48 (24%) had had abdominoplasty. None of the patients had any previous breast surgery. All patients reported dorsal and cervical pain.

RESULTS: The mean follow-up period was 16 months (range, 13 to 23 months). The average weight resected was 981 g (range from 370 g to 1800 g). The average duration of surgery was 2h (range, 1.50 to 2.30 hours) and average length of hospital stay was 2.3 days (range, 2 to 4 days). The duration of the outpatient postoperative care until complete wound healing was 15.2 days (range, 13 to 20 days). There were 4 major complications (2%) (1 bilateral and 3 unilateral infections) treated by drainage and intravenous antibiotics. Twenty-two minor complications were recorded (11%) including one desquamation of the nipple-areola complex without necrosis (0.5%) delayed healing at the junction site of the inverted T incision in 21 cases (10.5%). One hundred and forty eight patients evaluated their results as “very good” (74%), 36 as “good” (18%), and 16 as “acceptable” (8%). There were no results assessed as “poor.” Fifty-eight percent of the patients found that back pain had totally resolved versus 42% who had significant improvement though not complete resolution.

CONCLUSIONS: The postero-superior pedicle for breast reduction is a reproducible and versatile technique. The preservation of the anterior intercostal artery perforators enhances the reliability of the vascular supply to the superior pedicle.

Key words: breast hypertrophy, reduction, postero-superior pedicle

INTRODUCTION

Reduction mammoplasty is one of the most commonly performed procedures in plastic surgery. Although the ideal breast weight is not fixed the normal mean breast weight was reported to be about 300 g.1 Macromastia can be a morbid condition for women with symptoms like shoulder pain2,3, low-back pain2,4, neck pain3, intertrigo5, shoulder/bra strap grooving2, decreased physical performance2,4,6, and brachial plexus compression resulting in paraesthesia of the hand3.

Furthermore, psychosocial effects can include difficulty in exercising7, potentially worsening or contributing to poor self-image and body dysmorphic disorder8,9.

In this sense surgery has provided the most satisfactory results in terms of symptoms relief and psychological and self-confidence improvement.10 Various surgical techniques were used in reduction mammoplasty. The horizontal bilateral pedicle11, the superior pedicle12, the McKissok technique13, the supero-lateral14 and supero-medial pedicles15, as well as the inferior pedicle16 were all reported for the treatment of breast hypertrophy.

In 1999 Würinger et al. described the importance of the horizontal septum for the vascularisation and innervations of the nipple-areola complex17 and developed a respective technique of breast reduction18. Based on these anatomic findings we have designed a dermoglandular pedicle based on...
the 4th and 5th intercostal mammary perforators. The aim of this study was to present and analyze the results of breast reduction in 200 patients operated on with the posterior-superior technique.

**PATIENTS AND METHODS**

This study was conducted after obtaining approval by the Institutional Review Board of the University of Lyon.

Two hundred patients with breast reductions performed at our hospital between January of 2006 and January of 2009 were included in this retrospective study. All overweight patients were advised to reduce and stabilize their body weight and to stop smoking at least 1 month before surgery. The mean age was 35.9 years (range 22 to 58 years). The average notch-to-nipple distance was 35.8 cm (range, 29 to 42 cm). Forty of these patients (20%) had a sternal-to-notch distance of 34 cm or more. The mean body mass index was 27 (range, 22 to 35). Fifty two patients (26%) previously had undergone bariatric procedure for weight reduction and 48 (24%) had had abdominoplasty. Thirty two patients presented with diabetes mellitus, without the need for insulin administration (16%), and twenty smoked regularly (10%). Patient data are listed in Table 1. None of the patients had any previous breast surgery.

All patients reported dorsal and cervical pain, which were the basic indications for surgery. A written consent form was signed by all patients. In cases with language barrier the visual documentation of oral consent, as described by Danino et al, was used.

The breast tissue removed was weighed and documented at the time of surgery. The evaluation criteria were as follows: duration of surgery, length of hospital stay, complication rate, duration of dressing care, and patient satisfaction. Medical records were reviewed at postoperative days 15 and 30, and at 3 months, 6 months, and 1 year. Subjective and objective methods were used to evaluate the results. Patient satisfaction was evaluated at 1 year and was rated as “very good,” “good,” “acceptable,” or “poor” by the patient. The same scale was used by an unbiased third party jury.

The subjective method included a self-evaluation by anonymous questionnaire, sent to all patients, accompanied by an explanatory letter. The corresponding responses were mailed back to the surgeon and the information recorded and analyzed. We have used the method of closed-ended question scale for collecting and evaluating the results.

The objective method was based on evaluation of preoperative and postoperative photographs by five adults (three women and two men), not doctors, nurses, or other medical staff. Photographs of each patient (frontal, oblique, and profile) were presented to the jury on a computer screen: on the left, a preoperative photograph; and on the right, a postoperative photograph. The photographs were of the same dimensions, brightness, and contrast. The presentation was performed using Power Point, Microsoft Office software (Microsoft Corp., Redmond, Wash.). The duration of each case presentation was 20 seconds. The raters were asked to evaluate the result as “very good,” “good,” “acceptable,” or “poor.”

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean (range) (%)*</th>
</tr>
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<tbody>
<tr>
<td>Number of patients</td>
<td>200</td>
</tr>
<tr>
<td>Age (yr)</td>
<td>35.9 (22 – 58)</td>
</tr>
<tr>
<td>Notch-to-nipple distance (cm)</td>
<td>35.8 (29 – 42)</td>
</tr>
<tr>
<td>BMI</td>
<td>27 (22 – 35)</td>
</tr>
<tr>
<td>Patients with previous bariatric surgery</td>
<td>52 (26)*</td>
</tr>
<tr>
<td>Patients with previous abdominoplasty</td>
<td>48 (24)*</td>
</tr>
<tr>
<td>Patients with diabetes mellitus</td>
<td>32 (16)*</td>
</tr>
<tr>
<td>Smokers</td>
<td>20 (10)*</td>
</tr>
</tbody>
</table>

* Percentage of all patients; BMI = body mass index.
**Vascular Supply to the Breast**

In breast hypertrophy, the vascular anatomy of the breast remains the same but with an increased sternal notch-to-nipple distance and broad base. The vascular supply to the nipple-areola complex relies on perforating branches from (1) the internal mammary artery, (2) the lateral thoracic artery at the level of the fourth intercostal artery, and (3) the anterior intercostal artery at the level of the mid fourth and mid fifth intercostal space. This latter artery is crucial in our technique as we include it in the pedicle (Fig. 1). The fibrous septum of Wuringer which contains the vascular pedicle to the areola begins at the inferior portion of the pectoralis major muscle.

**Operative Procedure**

The operative procedure was previously described in detail. The patient is operated on in a semi-sitting position. The incisions are made following the preoperative drawings after desepidermisation. Figure 1 summarizes the basic design of the technique and its vascular basis (Fig 1). Point A corresponds to the midline point of the new areola (Wise key-pattern). The distance BC corresponds of the new inferior breast pole (or segment III) which is between 5 and 6 cm. Point B will be sutured to point B on the contralateral side. Point C to point C, respectively. The dotted areas correspond to the subcutaneous glandular resection. The white area enclosed between BC and inframammary crease is the area of cutaneous-glandular resection. The pedicle which is deepithelialization according to the manoeuvre of Schwatzmann is filled in with horizontal lines. The radius of the of the key-hole is between 6 and 7 cm.

Glandular resection is started in the lower central portion of the breast and continued to its lateral and inferomedial portion (Fig. 1). The glandular resection joins the distal part of the nipple-areola complex bearing pedicle and is limited to a plane joining caudally the inferior border of the nipple-areola complex bearing pedicle and the pectoralis major muscle, cephalically. The result is a pedicle thinner toward its tip and thicker toward its pectoralis major origin. The posterior sheath of the horizontal septum may be carefully incised to render the pedicle more pliable. Perforators from the anterior intercostal artery emerge from the pectoralis major muscle and are cranial to this posterior sheath of the horizontal septum (Fig. 1).

A limited tunnel 4 to 5 cm wide is dissected above the pectoralis major fascia. The role of this tunnel is to reach the superior pole of the breast and to facilitate the plication and suspension of the reduced breast. We make the tunnel between the anterior intercostals artery perforators and internal mammary artery perforators to preserve both vascular supply to the breast. A single drain (for 48 to 72 hours) is used for each breast and incisions are closed with resorbable 3-0 and 4-0 monofilament sutures.

The results were recorded and processed using descriptive statistics and Excel on SPSS® (SPSS Inc., 12.0.0, Chicago, IL, USA).

**Table 2. Postoperative results and details about the surgical procedure**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Mean (range) (%)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of surgery (h)</td>
<td>2 (1.5 – 2.30)</td>
</tr>
<tr>
<td>Length of hospital stay (days)</td>
<td>2.3 (2 – 4)</td>
</tr>
<tr>
<td>Weight of resected tissue (g)</td>
<td>981 (370 – 1800)</td>
</tr>
<tr>
<td>Follow-up period (mo)</td>
<td>18 (14 – 30)</td>
</tr>
<tr>
<td>Major complications (infection with drainage and i.v. antibiotics)</td>
<td>4 (2%)*</td>
</tr>
<tr>
<td>Minor complications</td>
<td></td>
</tr>
<tr>
<td>Areolar desquamation</td>
<td>1 (0.5)*</td>
</tr>
<tr>
<td>Delayed wound healing</td>
<td>21 (10.5)*</td>
</tr>
<tr>
<td>Total complications rate</td>
<td>26 (13)*</td>
</tr>
</tbody>
</table>

* Percentage of all patients.
RESULTS

The mean follow-up period was 18 months (range, 14 to 30 months). The average weight resected was 981 g (range from 370 g to 1800 g). The average duration of surgery was 2 h (range, 1.50 to 2.30 hours). The average length of hospital stay was 2.3 days (range, 2 to 4 days). The duration of the outpatient postoperative care until complete wound healing was 15.2 days (range, 13 to 20 days). Results are shown in Table 2.

Four major complications were observed. It consisted of bilateral infection in one case (0.5%) and unilateral infection in three cases (1.5%), treated with incision and drainage as well as intravenous antibiotics. Twenty-two minor complications were recorded (11%), including one desquamation of the nipple-areola complex without necrosis (0.5%) and 21 cases (10.5%) of delayed healing at the junction site of the inverted T incision.

Thus, the overall complications rate (minor and major complications) was of 26 cases or 13%. The postoperative sequelae included a hypochromic areola at 1 year after the procedure, corrected with tattooing. Twelve hypertrophic scars in the lateral part of the horizontal scar were observed.

Patients were asked about their overall satisfaction 1 year after surgery. One hundred and forty-eight patients evaluated their results as “very good” (74%), 36 as “good” (18%), and 16 as “acceptable” (8%). There were no results assessed as “poor.” When asked about their chief complaint, 16 patients reported insufficient breast reduction, despite a functional improvement in their daily life (8%). Forty-six percent of the patients found that their back pain had totally resolved versus 54% who had significant improvement though not complete resolution.

Figures 2 and 3 illustrate the results accomplished with the technique described above in 2 cases.

DISCUSSION

The introduction of deepithelialization of the nipple-areola complex bearing pedicle, described by Schwartzmann in 1930, revolutionized the concept of breast reduction.

The posterosuperior pedicle technique, as described above, seems to be a reliable and versatile alternative in breast reduction, regardless of the weight and ptosis of the breast. Three important components have been identified: (1) the vascular supply of the nipple-areola complex, (2) the breast shape, and (3) scars left

Figure 1. Basic design of the technique and its vascular basis. Schematic presentation of the preoperative markings (A). Lateral views of the resection technique (B). The inferior portion of the breast which will be included in the resection is shown by the dotted area.
Figure 2. A 58-year-old woman with breast hypertrophy and asymmetry. Breast reduction was performed removing 490 g from the right and 370 g from the left breast. Preoperative frontal (A) and right profile (B) view. Postoperative frontal (C) and right profile (D) view at 18 months.

Figure 3. A 39-year-old woman with breast hypertrophy. Breast reduction was performed removing 640 g per breast. Preoperative frontal view (A) and left oblique and profile (B, C) view. Postoperative frontal view (D) and left oblique and profile (E, F) view at 18 months.
Breast Reduction with the Posterosuperior Pedicle: a Series of 200 Consecutive Patients

The most important criterion is the shape of the breast which is determined by the way the glandular resection is performed. With the introduction of the key-hole model (with or without a predefined areolar incision) and wedge glandular resection, satisfactory aesthetic shape of the breast was achieved.12,21

More recently, the focus has been placed on reducing the length of the scars - the concept of the large inverted T pattern was followed by J or L scars.22,23 and ending with the vertical scar mammaplasty24. In our opinion, the inframammary scar is not an issue as long as it is located within the inframammary fold and maximal breast projection area. Furthermore, the shape of the reduced breast should not be compromised to shorten the scars.

In breast hypertrophy, because of the increased sternal notch-to-nipple distance, the vascular safety of the nipple-areola complex remains a primary concern.

Reduction mammaplasty can be considered safe from a vascular standpoint. To further secure the nipple-areola complex vascularisation we decided to combine the superior pedicle technique with the central mound technique (posterior pedicle).25 When the breast is largely ptotic under the inframammary fold, all vascular branches have a vertical direction. In these cases, the wide superior pedicle receives blood supply from perforators of the internal mammary artery, the lateral thoracic artery, and branches of the thoracoacromial artery. However, the preservation of the perforating branches of the 4th and 5th anterior intercostal artery would spare the corresponding sensitive nerves in all types of breast reduction, thus respecting the sensitivity of the nipple-areola complex. This was reported also by Würinger18 and Hamdi26.

The complication rate in this series remains low, without no total nipple-areola loss and one case of superficial epidermolysis. We noted delayed healing in 12% of the cases at the junction of the inverted T, which is less than other reported results, but not significantly different.28,29

Other reports give similar complication rates. Landau et al. reported an overall complications rate of 22.5% with partial areola necrosis in 8 patients (6.5%) and other minor complications, including T-junction breakdown in 22 breasts (18%) and dog-ear excisions. Lacerna et al. reported a complications rate of 7%.

The posterosuperior pedicle technique represents another useful and safe option in breast reduction regardless of the amount of ptosis and resected tissue.26,30

CONCLUSIONS

The posterosuperior pedicle for breast reduction is a reproducible and versatile technique. The preservation of the 4th and 5th anterior intercostal artery perforators enhances the reliability of the vascular supply to the superior pedicle, rendering the procedure safe and reliable even in cases of large breast hypertrophy and gigantomachia.
REFERENCES

РЕДУКЦИОННАЯ МАММОПЛАСТИКА С ПРИМЕНЕНИЕМ ТЕХНИКИ „ВЕРХНЯЯ-ЗАДНЯЯ НОЖКА” (НАБЛЮДЕНИЕ ЗА 200 ПАЦИЕНТКАМИ)

Х. Шипков, А. Моjallal, Ф. Btaye

РЕЗЮМЕ

Цель: Работа ставит себе цель представить и анализировать результаты редукционной маммопластики с применением техники „верхняя – задняя ножка”.

Пациенты и методы: Настоящее ретроспективное исследование включает 200 пациенток, оперированных в период январь 2006 – январь 2009 г. Средний возраст – 35.9 (от 22 до 58 лет). Среднее расстояние от югулярной ямки до маммилы – 35.8 см (от 29 до 42 см). Средний body mass index – 27 (от 22 до 35 см). Результаты оценены самооценкой с одной стороны и жюри из 5 членов с другой стороны. 52 пациентки (26%) оперированы по причине ожирения (барятрическая хирургия). 48 пациенток (24%) имели абдоминопластику. Ни одна из пациенток не претерпела операцию груди ни по какому поводу. Все пациентки сообщают о болях в спине и/или шее.

Результаты: Средний период прослеживания - 16 мес (от 13 до 23 мес). Средний вес резецированной груди 981 г (от 370 до 1800 г). Средняя продолжительность операции 2 часа (от 1.50 до 2.30 ч), а средняя продолжительность пребывания в больнице – 2.3 (от 2 до 4 дней). Продолжительность постоперативного периода до полного зарастания раны – 15.2 (от 13 до 20 дней). Регистрировано 4 тяжелых осложнения (2%) (1 билатеральная и 3 unilateralные инфекции – применен дренаж и интравенозые антибиотики). Легкие осложнения – 22 (11%) и включают десквамацию ареоламамилярного комплекса без некроза (0.5%) и дехисценцию раны - 21 случай (10.5%). 184 пациентки оценивают результаты как „очень хорошие” (74%), 36 пациенток – как „хорошие” (18%) и 16 – как „приемлемые” (8%). Оценка „плохие результаты” не отмечена. У большинства (58%) пациенток боли в спине вполне исчезли, а у остальных (42%) наступило значительное улучшение.

Выводы: Техника „верхняя-задняя ножка”, применяемая в целях редукционной маммопластики, легко воспроизводима. Сохранение перфорантов передних межреберных артерий увеличивает надежность кровоснабжения верхней ножки.