43 The Crossed Dermal Flaps Technique in Breast Reduction

R. de la Plaza, L. de la Cruz

The authors would like to thank Springer Science + Business Media for consenting to the reproduction of part of the text, illustrations of the technique and some of the photographs of the clinical cases from our article published in *Aesthetic Plastic Surgery* 28:383–392, 2004.

43.1 Introduction

More than a hundred techniques and variations for breast reduction have been published. In the majority, the differences are principally concerned with the method of transpositioning the nipple areola complex (NAC) and the pattern of skin resection.

Skin resection inevitably causes scar sequelae, and this has given rise to a long-running debate over long scar techniques and short scar techniques. There would be no debate if only the extent of the scar was evaluated, as ideally the shorter the better. However, this limitation of scar extension requires other elements to be evaluated in the results. On the other hand, there are a great variety of clinical cases in which we must consider not only volume but also the degree of ptosis, quality of the skin, age, lifestyle, patient's complexion, type of mammary parenchyma and, most importantly, the patient's wishes.

We present the technique which we usually perform in selected cases of mammary reduction. This technique was designed by the first author. We also present the results obtained in 195 patients from June 1986 to June 2006. In 37 % of cases, apart from hypertrophy, we observed marked asymmetry.

The quantity of resected tissues varied between 345 and 4,400 g with an average of 1,099 g in both breasts.

The age of the patients varied between 14 and 69 years, with an average of 36 years.

Most of the operations were performed with the patient under general anaesthesia with controlled hypotension.

The postoperative controls were after 1 month, 6 months, 1 year, 2 years and occasionally longer. The technique used is based on a Wise type skin marking, glandular resection in the lower and lateral poles and the transpositioning of the nipple-areola complex (NAC) with a superior-medial dermoglandular pedicle. The novelty of this technique consists of the use of two horizontal, crossed dermal flaps which have proved to be highly efficient in the prevention of two of the most frequent undesired effects in breast reduction: dehiscence with later bad scar at the level of the junction of the vertical and horizontal suture lines, and displacement of the lower pole after a period, which involves the NAC and the horizontal scar moving upwards and the lengthening of the submammary fold-NAC distances.

We also verify the excellent vascularisation of the superior-medial pedicled dermoglandular flap with only three partial losses of areola, which healed by secondary intention, with no aesthetic repercussions. This flap is very little used at present in spite of the important advantages it possesses during the operation and in the late postoperative period.

The debate over long scar techniques and short scar techniques has intensified in the last 10 years since the diffusion of Claude Lassus's vertical scar technique, performed by him since 1966 [14]. Lejour has been a great defender and instigator of this vertical technique with added liposuction [15–17]. As we said above, the debate would not exist if only the length of the scars was evaluated, because ideally the shorter the better; if this were so, the techniques with periareolar scars exclusively of the Benelli type would be those of choice [1]. However, the poor results offered by the latter in shape and quality of the scar in the long term restrict their indications. On the other hand, there is a great variety of clinical cases in which we must consider the conditions

for the choice of one or another technique, as mentioned above.

In 1978 the senior author of this chapter established the general principles on which he considers reduction and remodelling techniques should be based. These objectives and principles, which have been broadcast since then in communications and participations in round tables at numerous symposia and congresses, constitute the foundation of the dermal crossed flaps technique which we present.

43.1.1 Fundamental Principles

- To avoid tension in glandular and cutaneous sutures which could give rise to ischemia and poor quality scars.
- Suspension of the glandular and adipose tissues with short pedicles or their transposition to the upper pole and fixing to the fascia pectoralis, in order to avoid the said tissues acting as expanders of the skin due to the effects of gravity and the posterior deformity of the breast with relapse of ptosis, as normally occurs in the techniques based on the inferior pedicle, described principally by Courtiss [4] and Georgiade [8] in the late 1970s. Careful selection of the ideal technique is necessary for each case.
- Maximum respect as far as possible of the function of the mammary gland and prevention of artifacts which can interfere with future mammary diagnostics.

43.2 Description of the Technique

Most interventions were performed with the patient under general anaesthesia and controlled hypotension with median arterial blood pressure of 60 mm Hg until after shaping the nipple-areola flap, when arterial pressure was gradually raised.

In our experience, hypotension above 80 mm Hg systolic pressure is not effective, bleeding being very similar to that occurring when pressure is slightly or very much higher. For this we used halothane and trimethaphan up to 1990 – 1991 and halogenated anaesthetic gases, remifentanil, beta blockers, and sodium nitroprussiate since then. We are now using urolapril more frequently as a hypotensive agent. This is a new drug, easier and safer to use than the previous ones, as its effects are easily reversible in cases of sudden drops in blood pressure.

With the patient in an orthostatic position, we mark the ideal position for the nipple, which should be level with a mid humeral line and the anterior projection of the submammary fold, and a line from the union of the internal third with the external two-thirds of the clavicle to the nipple. This point can be modified according to the characteristics of each case. In voluminous breasts, the mark should be moved towards the medial line, avoiding in this way excessively divergent breasts. In very heavy breasts it is useful to evaluate the height of the nipple in order that the caudal traction of the skin does not result in an excessively high position of the same. The remainder of the marking is performed in theatre with the patient semi-seated, anaesthetised, and a sterile surgical field, taking as a reference point the marks already made for the nipple preoperatively. The horizontal incision line is marked 1½–2 cm above the submammary fold and it ascends gradually towards the lateral pole of the breast. We then delimit two rectangular areas under each cutaneous vertex, which will correspond to the union of the vertical suture line with the horizontal line, and which correspond to the future dermal flaps 5 cm long by 1½ cm wide (Figs. 43.1a, 43.2a). We deepithelialise the area using the Wise pattern, this being limited at the lower margin of both future flaps (Figs. 43.1b, 43.2b).

The dermal flaps are then elevated, eliminating all the subcutaneous fat, and resection in one piece of the excess skin, adipose and glandular tissues of the lower pole, with a wedge-shaped prolongation towards the centre of the breast (Fig. 43.1c). We then tailor a pedicled superomedial dermoglandular flap for the transposition of the NAC. The flap is thicker towards its base,

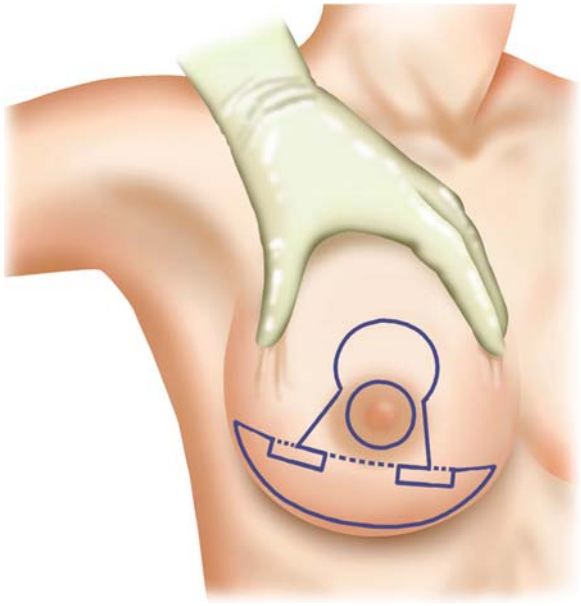


Fig. 43.1. a Preoperative marking of the skin. Observe that the incision is above the submammary fold.

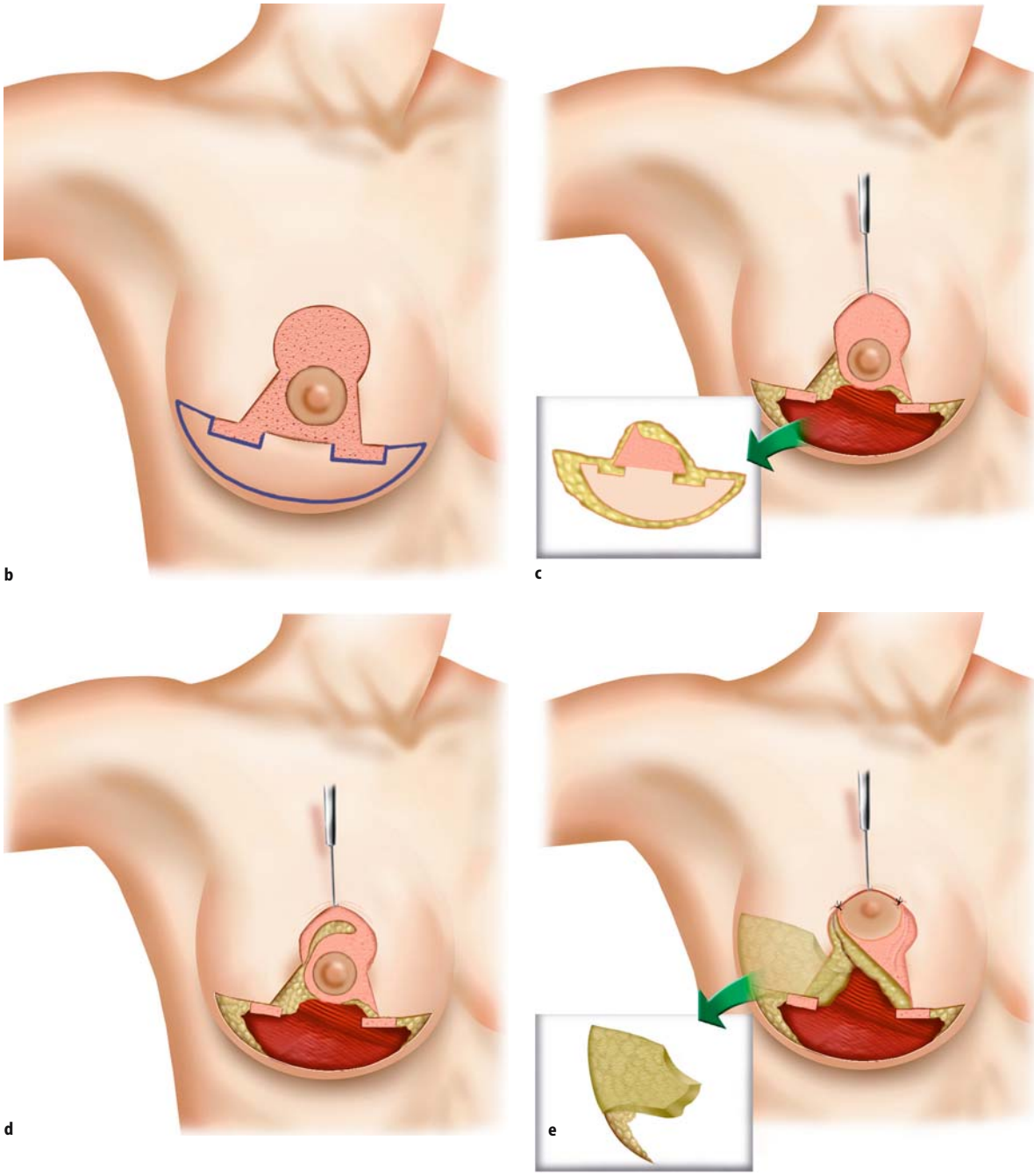
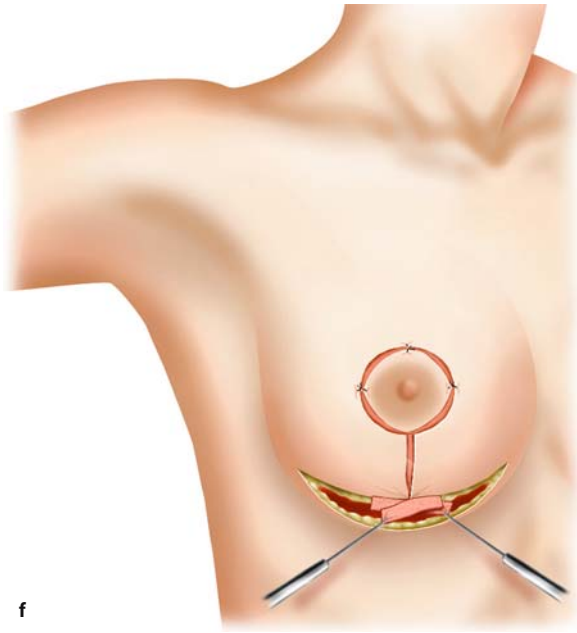


Fig. 43.1. b Shows the deepithelialised area, including the two small dermal flaps. **c** Resected piece, which includes excess skin, adipose and glandular tissues of the inferior pole with a wedge-shaped prolongation towards the centre of the breast. **d** Tailoring of the superomedial pedicled dermoglandular flap for transposition of the NAC. **e** Transposition of the dermoglandular flap. In cases which require greater reduction, this may be performed at the expense of the base of the lateral glandular flap

▷

Fig. 43.2. a Intraoperative view. Preoperative marking of the skin. Cutaneous incision in *blue* and the area of the future dermal flaps in *red*. **b** Intraoperative view showing the deepithelialised area, including the two small dermal flaps. **c** Intraoperative view of the superomedial dermoglandular flap and the dermal flaps. **d** Intraoperative view. Crossing the dermal flaps to avoid tension at the medial line



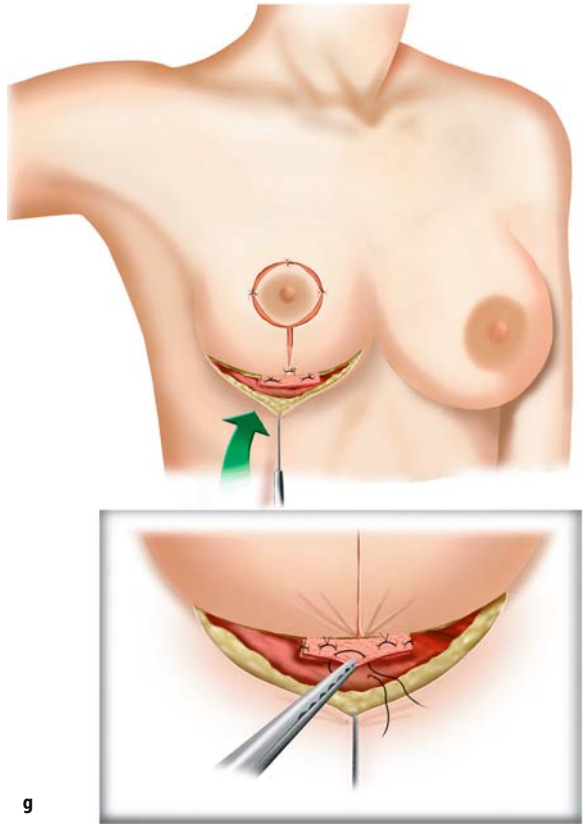


Fig. 43.1. f Crossing of the dermal flaps, taking the lateral tension at the medial line. **g** Suture of the dermal flaps with monofilament glycomer 631 (Biosyn, USSC) horizontal U stitches. The magnified view shows the fixing of the flaps to the musculoaponeurotic wall with non-absorbable 2-0 sutures

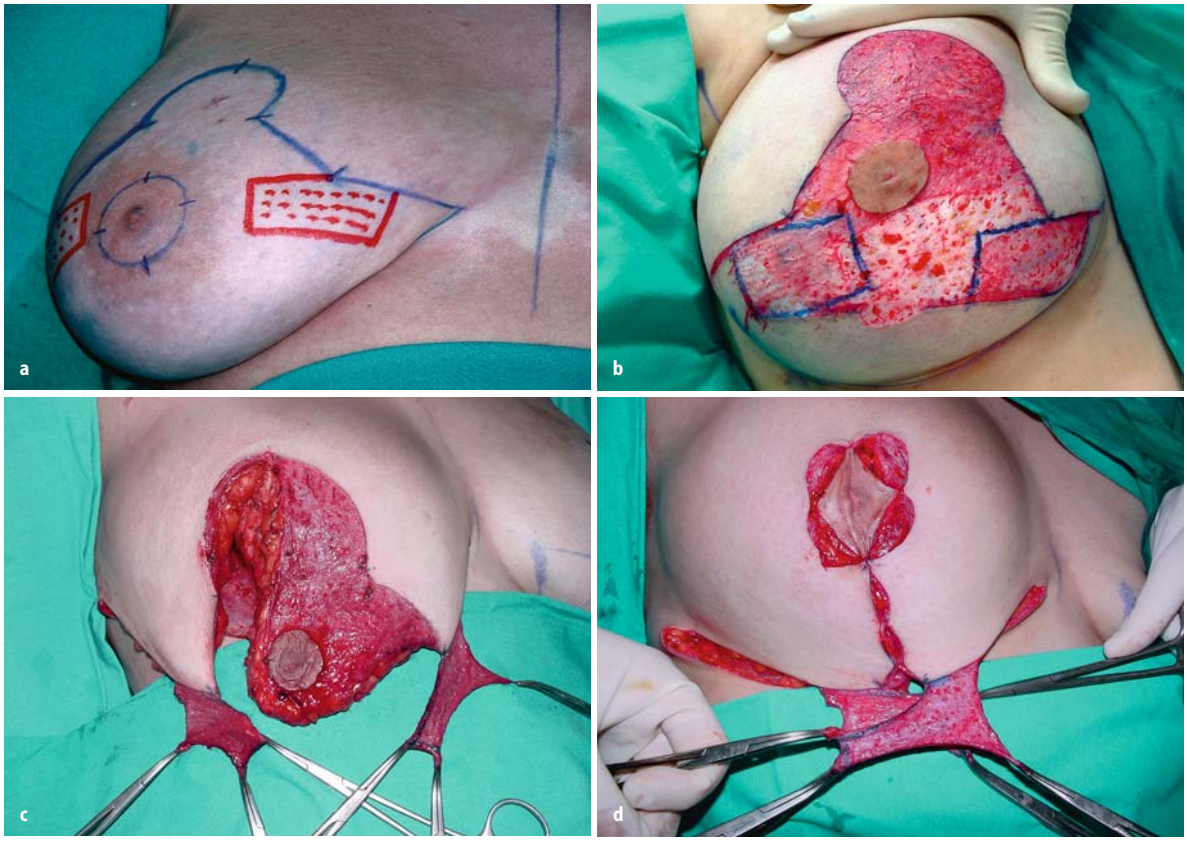


Fig. 43.2 (Legend see p. 352)

Fig. 43.2. e Intraoperative view. Suture of the dermal flaps to the musculoaponeurotic wall to achieve firmness and stability of the breast

assuring good vascularisation as well as sufficient tissues in the superior mammary pole as has been described in different works by Finger [6], Hauben [10], and Orlando [20] (Figs. 43.1d, 43.2c). The transposition of the superomedial dermoglandular flap is not difficult. In those cases where the morphology of the flap or especially rigid parenchyma make the transposition more difficult, a back-cut or small resection in the superolateral area of the pedicle is performed. It is important that the NAC be rotated easily without tension, and it is desirable to use absorbable sutures in the glandular tissues to fix it to the superior pole of the breast. Conification of the breast is done by suture of the two pillars with 3.0 absorbable polyglycolic acid suture (Dexon Sherwood Medical, St. Louis, MO) until the desired projection is obtained.

In cases where we need greater reduction and remodelling after the breast is assembled, this can be obtained at the expense of a resection of the base of the lateral glandular flap, the volume of which is usually greater in cases of severe hypertrophy (Fig. 43.1e). The base of this pillar can also be sutured to the aponeurotic muscular wall in order to better stabilise it in its most elevated and medial position.

Once the areola is fixed in its new position at the four cardinal points, we proceed to cross the dermal flaps, positioning the medial over the lateral, until both cutaneous angles cross slightly (Figs. 43.1f, 43.2d). Once this superposition is obtained, the two flaps are fixed with Crile forceps and joined with several 4-0 absorbable polyglycolic acid transfixive U stitches. In this way the cutaneous edges of the angles and the vertical lines meet without tension, as all the tension rests on the dermal flaps below the angles (Figs. 43.1g, 43.2e).

The centre of the dermal flaps is fixed to the musculoaponeurotic wall with a 2-0 coated, braided polyester suture (Ti-Cron, Sherwood Medical, St. Louis, MO). The choice of the point where we fix both horizontally and vertically is fundamental to obtaining correct positioning of the breast and the submammary fold. Horizontally this is usually 1½ cm lower than the original submammary fold. Suture of the inferior edge of the crossed dermal flaps to the musculoaponeurotic wall is performed with continuous 2-0 absorbable suture which fixes definitively the position of the dermal flaps and therefore the breast (Figs. 43.1g, 43.2e). It is advisable to defat the central portion of the inferior edge of the horizontal suture so that there is no bulge when this is superimposed on the dermal flaps. For the last 2 years, trying to obtain a shorter horizontal scar, in voluminous breasts we limited the lateral extension of the incision, resecting the excess adipose tissue on a plane very close to the dermis, in this way allowing better remodelling at the expense of cutaneous retraction. We use liposuction as an aid; we do not trust those reduction techniques which are based exclusively on classical liposuction as has been described by Matarasso [19], or ultrasonic liposuction as has been recommended in the works of Zocchi [23] and Price [21]. We even believe that this last type of liposuction can give rise to long-term changes in the glandular tissues which, as yet, have not been sufficiently studied. Until 1999 we used 4-0 and 5-0 absorbable polyglycolic acid sutures in the dermal and subcutaneous planes, and polyamide 6 monofilament suture (Ethilon, Johnson & Johnson Intl., Saint-Stevens, Woluwe, Belgium) intradermically, taking out the vertical and areolar stitches at 5 days, and the horizontal stitches at 15 days. Since that year we changed to 4-0 and 5-0 monofilament glycomer 631 (Biosyn, USSC, Ville St. Laurent, Quebec, Canada), and have observed excellent tolerance and ease of use, both for the surgeon and the patient, as no stitches need removing.

Routinely we use Redon type drainage, brought through the skin behind the anterior pillar of the axilla and moderate compressive dressing with adhesive elastic bandage.

Drainage is removed after 12 – 24 h and the patient is discharged.

After 72 h, the dressing is removed and a normal bra is used, the majority of patients resuming their normal social and working activities.

We recommend the use of hypoallergenic tape (Micropore, 3 M Health Care, St. Paul, MN) over the suture lines for 3 weeks.

43.3 Results

Only two patients presented cutaneous epidermolysis without dehiscence at the level of the union of the vertical and horizontal sutures, with later spontaneous healing, without interfering with the aesthetic result.

Three cases showed partial and superficial necrosis of one of the areolae, healing during the following 3 weeks without secondary surgery.

Three patients developed hematomas, which were drained in the dressing room with no complications. One case presented evident thickening of the scar. No infections were observed.

Seventeen patients required excision of small folds at the medial and/or lateral extreme of the horizontal scar. In one case the cutaneous opening was extended to observe the state of the dermal flaps, and it was seen that at 8 months they were united to the thoracic wall like a ligament. Two patients required remodelling with liposuction of one of the extremes of the scar.

The maintenance of the shape and position of the breasts has been evaluated as very satisfactory during the periodical controls of the patients (Figs. 43.3 – 43.6). During the control after 2 or more years, no upward tilting of the breast was observed, nor significant elongation of the distance submammary fold – areola, which is so typical in this type of technique when fixing of dermal flaps to the thoracic wall is not performed. Also, the horizontal scar remained stable at the level of the submammary fold.

No local or general complications were observed after controlled hypotension, neither operative nor postoperative. In our experience, the principal advantages observed were a diminution of blood loss and a dryer surgical field. The latter facilitates the surgical procedure and reduces the length of the intervention. No patient needed transfusion, which we consider of particular importance given the complications which can arise from this at the present time. This logically results in a more rapid recuperation, allowing the patient to resume her normal activities.

43.4 Discussion

A frequent problem in breast reduction is bottoming-out of the breast after some months or a year. This hap-

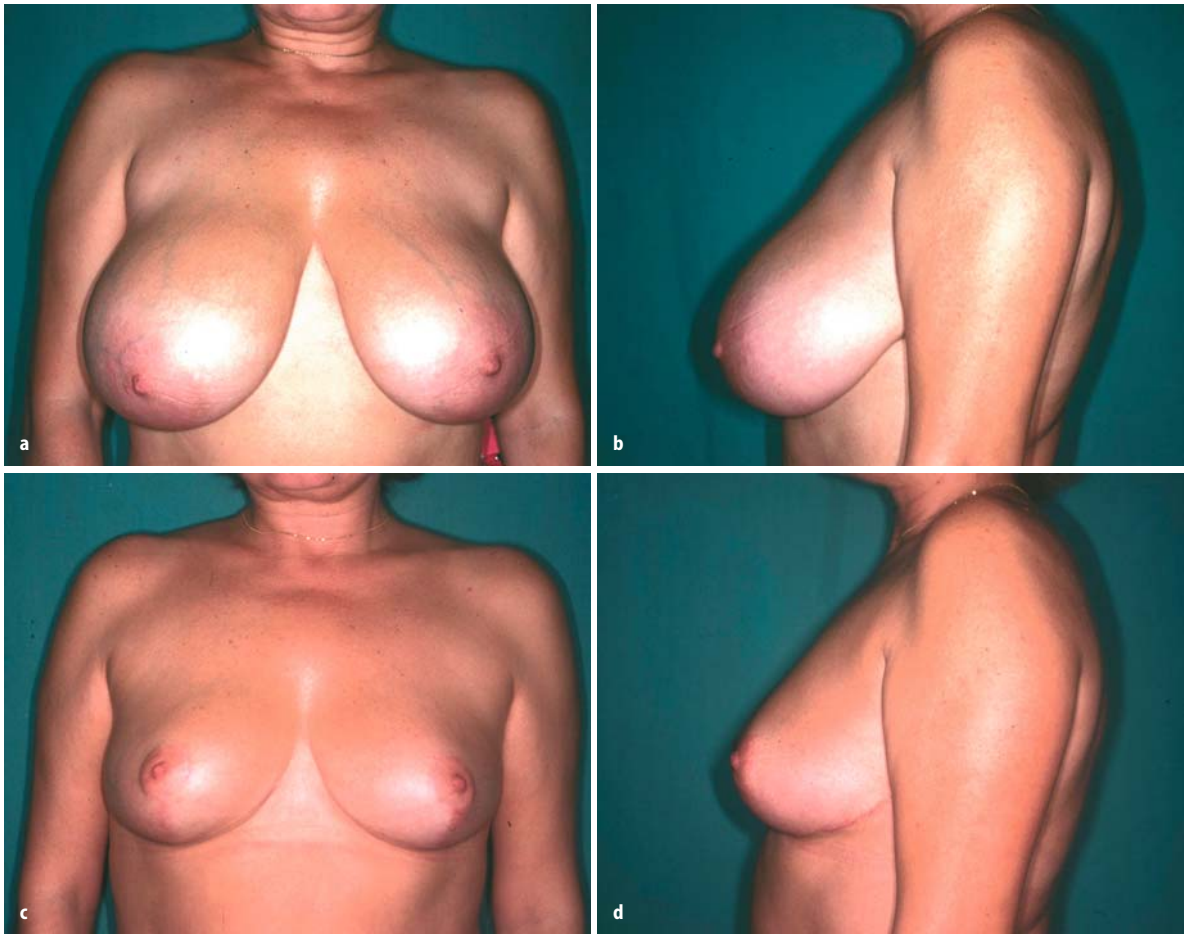


Fig. 43.3. Case 1. Forty-one-year-old patient with severe bilateral hypertrophy and ptosis. A total of 1,472 g was resected. **a, b** Preoperative views. **c, d** Postoperative views after 1 year

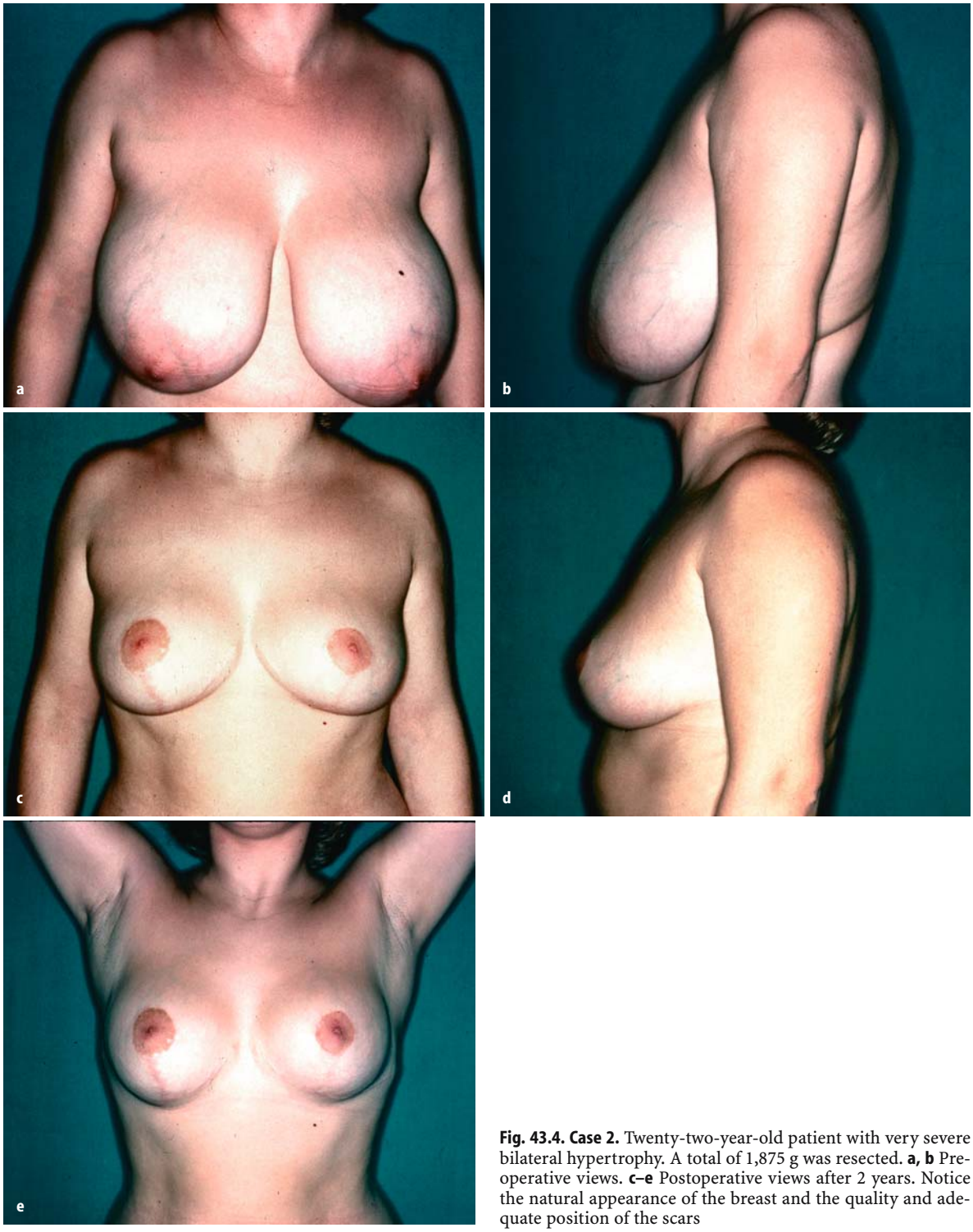


Fig. 43.4. Case 2. Twenty-two-year-old patient with very severe bilateral hypertrophy. A total of 1,875 g was resected. **a, b** Preoperative views. **c–e** Postoperative views after 2 years. Notice the natural appearance of the breast and the quality and adequate position of the scars

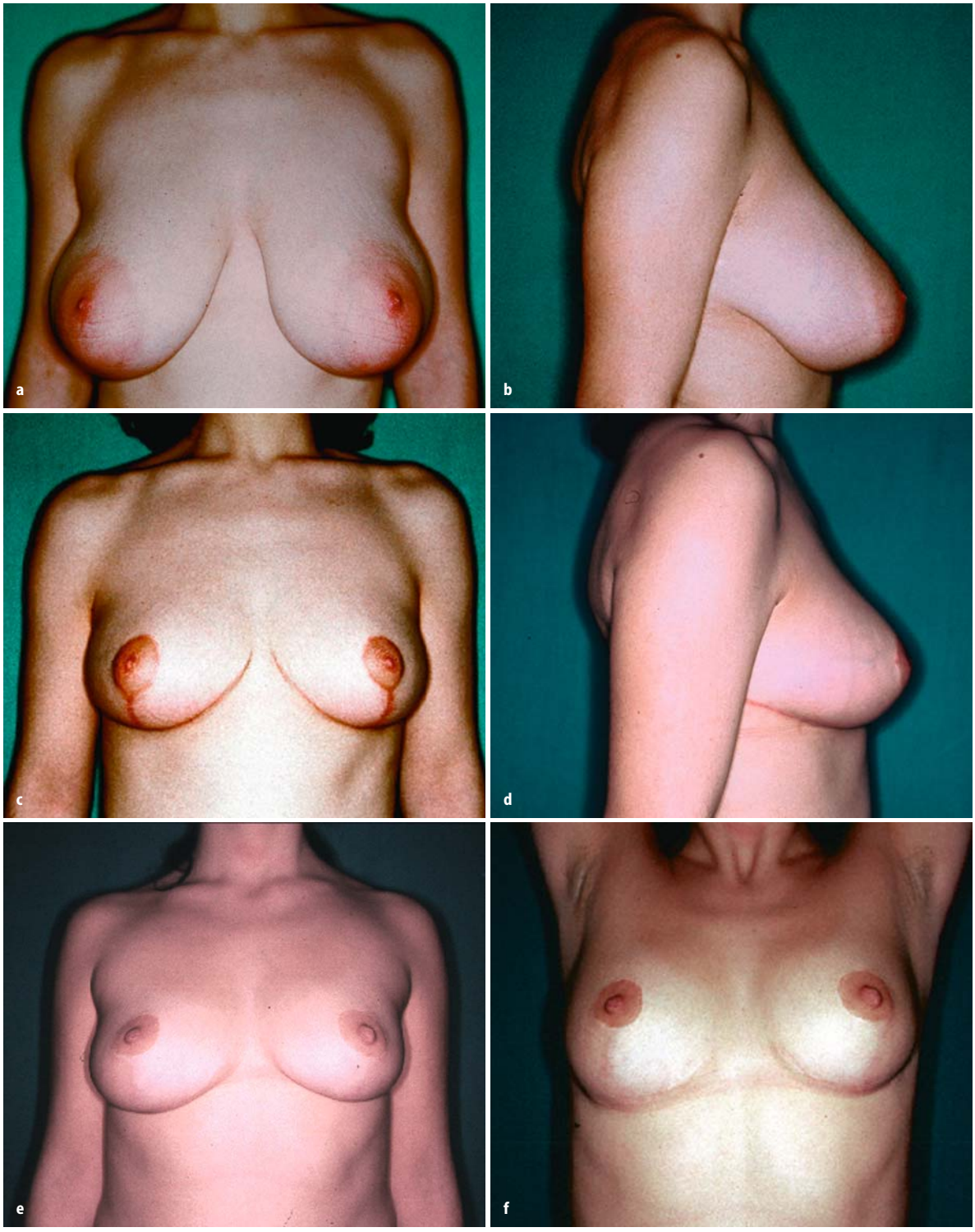


Fig. 43.5. Case 3. Twenty-three-year-old patient with moderate bilateral hypertrophy and severe ptosis. A total of 915 g was resected. **a, b** Preoperative views. **c, d** Postoperative views at 1 year. **e, f** Postoperative views at 9 years. Observe the reasonable condition of the breast and scars, despite her having had two full-term pregnancies during this period

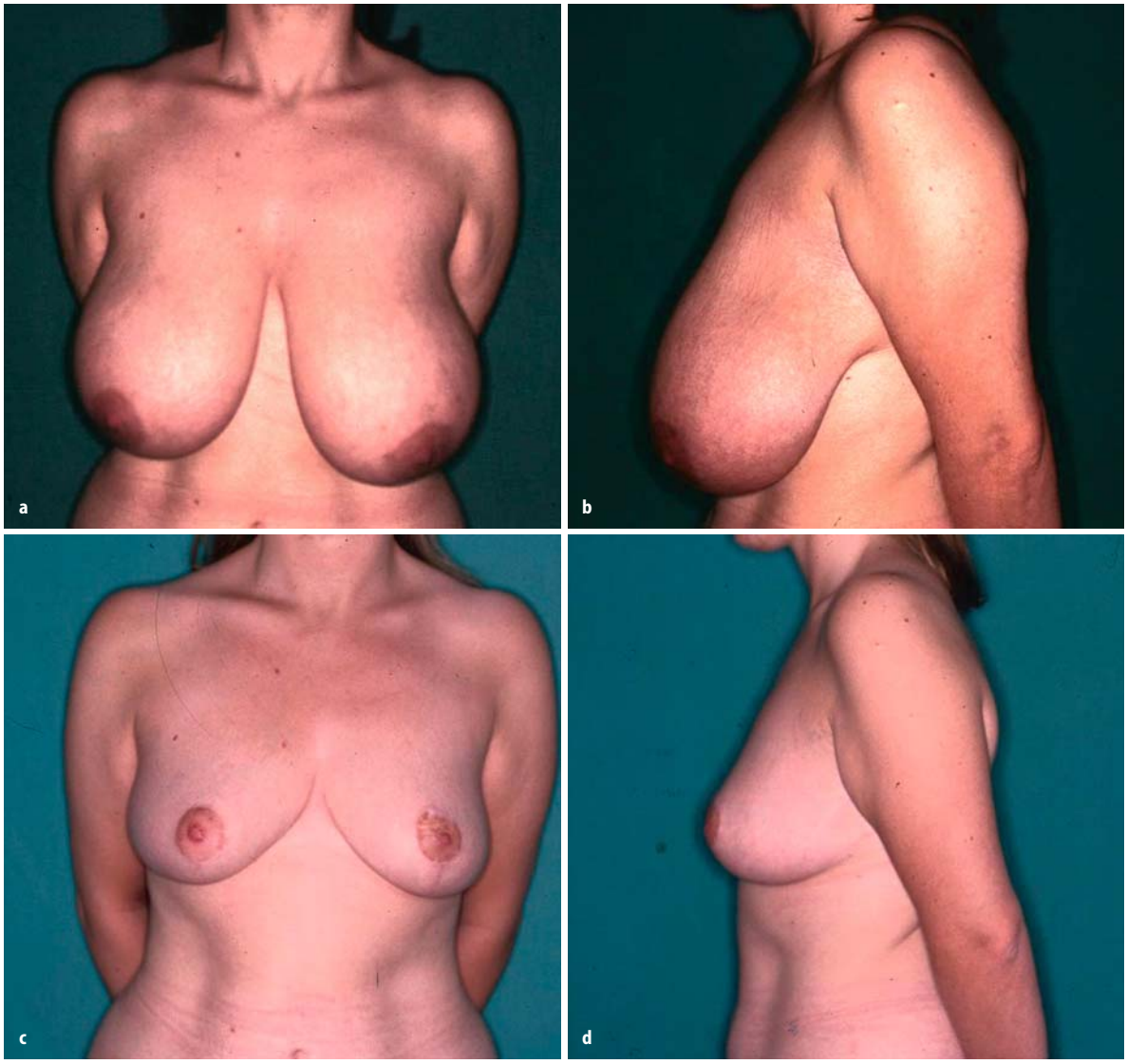


Fig. 43.6. Case 4. Twenty-one-year-old patient with severe bilateral hypertrophy and ptosis with asymmetry. A total of 1,660 g was resected. **a, b** Preoperative views. **c, d** Postoperative views after 1 year. This case reaches a ceiling for pediculated transplanting of the nipple areola complex (NAC), particularly on the left side. This is one patient who suffered a slight epidermolysis of the left areola but who did not require secondary treatment

pens especially with the inferior pedicle techniques described by Courtiss and Georgiade in the late 1970s. The causes of this are usually the use of techniques which base the suspension of the tissues fundamentally on the cutaneous covering, and therefore the glandular tissues weigh on the skin of the inferior pole, which distends and increases the distance between the areola and the submammary fold, lessening the volume of the upper pole, which has the effect of making the areola and the nipple look upwards. In short, the effects of gravity on the tissues act as an expander, which not only distends the skin but also widens the scars. For this reason we have chosen and redesigned a technique in which, as the tissues of the lower pole have been eliminated, the mammary tissues sustain themselves fundamentally thanks to the short-pedicled tissues of the upper pole and the fixing of the lateral and medial pillars to the aponeurotic muscular wall with non-absorbable stitches after dermoglandular resection. After the glandular and adipose excision, the problem we face in the remodelling of the breast is adapting the cutaneous layer in its caudal part. The distance between the areola and the submammary fold, originally already excessive, is increased by the cephalic transposition of the NAC. In the vertical technique, the convex line of the contour of the lower pole is transformed into two concave lines after the excision. Obviously, the suture in the medial line of these two concave lines will greatly re-

duce the skin in a transverse sense and, on converting to a straight line, will also diminish the vertical length, thanks to cutaneous elasticity and retraction. However, this vertical reduction is not always sufficient, dog-ears often being the result on both sides of the scar and excessive length of the scar itself. The solution to this problem is the excision of the dog-ears, converting the vertical scar into a small inverted T, or waiting a few months until the skin retracts, which does not always occur, in which case secondary excision of the excess skin would be necessary. This delay of several months until the reduction of the folds or the second intervention creates an uncertainty in the patient which can often be overwhelming, both for the patient and the medical team. In the last few years, techniques have been designed to improve these aspects, such as those described by Chen [3] and Hall-Findley [13], although both admit that the learning curve for these techniques is longer than for those based on the Wise pattern. In any case, the distance of the NAC from the submammary fold is usually longer than is desirable.

It is well known that techniques with inverted T scars allow a satisfactory cutaneous reduction, both in the transversal and in the vertical sense, naturally at the expense of the transversal scar and possible risks of cutaneous necrosis in the angles of the flaps. However, with the technique we present, the possibilities of necrosis are practically nil, as the tension in the cutaneous suture has been eliminated. This tension increases during the immediate postoperative period due to oedema. On the other hand, with the elimination of tension, both in the vertical and the transversal suture lines, the scars are usually of excellent quality. Fixing the crossed flaps to the musculoaponeurotic wall allows adequate and symmetrical positioning of the breast, and at the same time maintains the position of the submammary fold and prevents sagging of the breast with the unsightly result of deformity of the lower pole, widening of the scars and upward migration of the NAC. We should remember that poor quality scars and the loss of projection of the breast are considered the greatest disadvantages when using inverted T techniques as described by Hidalgo [11, 12] and Davis [5]. In fact, the degree of patient satisfaction after a mammoplasty is directly related to her subjective perception of the scar quality. In an unsatisfied patient, in the majority of cases you will find an aesthetically unacceptable scar as described by Brülman [2] and Makki [18]. We should remember that in the USA mammary reduction is the primary cause of lawsuits, principally due to poor quality and position of scars. **The trajectory of the transverse incision line 1.5 – 2 cm above the submammary fold and the resection of fat below the said line, as well as fat and glandular excision in the lateral pole, allow not only better remodelling of the contour, but also an important shortening of the transversal scar, which is incorporated within the submammary fold.** When there is notable adiposity in the lateral region of the breast (anterior axilla line up to the posterior axilla line) we perform common liposuction with satisfactory results as the skin has excellent retraction.

In our opinion, L, comma, J, and similar techniques are excellent for moderate hypertrophy or narrow based breasts and/or good quality skin which allows retraction. We have been using the reduction in comma for more than 20 years with excellent results in cases like these. The breast reduction techniques which use inverted T shaped incisions are attractive for the surgeon as they are predictable and versatile, with practically no limit in the tissues to be resected nor a reduction in correct remodelling, apart from allowing adequate control of the quantity of tissues to be resected and the process of transoperative remodelling [11, 12].

The use of a dermoglandular flap with superointernal pedicle gives excellent vascularisation to the NAC, propitiates the recuperation of sensitivity of the skin and NAC within 3 – 6 months after surgery, with no significant difference to that found with inferior pedicle techniques as described by Hamdi [9]. It also allows easy transposition, even in those cases of very little ptosis or moderate reduction, and gives great security in those other cases of marked ptosis and even gigantomastia. We should not forget that forced transpositioning of the NAC could lead to ischaemia and secondary deformity of the shape of the areola; this type of flap also gives excellent projection of the nipple.

In our experience, the best indications of the crossed dermal flaps technique are in breasts with moderate hypertrophy and an ample implantation base, moderate hypertrophy with ptosis and poor quality skin and large hypertrophies, including some cases of gigantomastia. In the cases with a large degree of ptosis, we complement the technique with an inferior pedicled dermoglandular flap, of the Ribeiro type, fixing the crossed dermal flaps to the musculoaponeurotic wall through an incision in the base of the pedicle. In other cases, we completely section the pedicle, leaving the vascularisation of the flap at the expense of the perforators. This flap will help to fill up the upper pole of the breast and to increase projection.

43.5 Conclusions

Breast reduction is an intervention which in general gives a high degree of satisfaction, both to the patient and to the medical team. In a survey carried out among the members of the ASAPS and published by Rohrich [22], following a scale from 1 “unsatisfactory” to 5 “very satisfactory”, the degree of surgeon’s satisfaction was 4, both for vertical incision techniques and for

Wise pattern techniques. Patient satisfaction was 5 for Wise pattern techniques and 4 for vertical incision techniques. Another conclusion was that the vertical incision statistically has more complications than the inverted T incision. It is interesting to note the difference in techniques performed in different countries and the reasons are apparently multiple (legal, racial, customs, education at different schools). Whilst in the USA 75% of surgeons habitually use the Wise pattern, in Germany 66% of surgeons choose vertical incision techniques as studied by the Eisenmann-Klein team [7].

Given the results obtained in the short and long term, we believe that this technique has proved to be safe and applicable to an extensive variety of cases. It is easy to execute and to teach, and therefore those who are beginning to use inverted T techniques such as that described, can, from the beginning, diminish the incidence of short and long term complications such as we mentioned before: (1) dehiscence with later bad scar at the level of the convergence of the flaps; (2) bottoming out of the inferior pole, with the horizontal scar displaced upwards and an increase in the distance between the submammary fold and the NAC, and with uniformly good and long-lasting results.

We conclude also that the use of controlled hypotension is of great help in breast reduction, as in our practice it has not implied added risks and has given the previously mentioned advantages. We also insist that in no cases is blood transfusion required, which is very important if we take into account present-day risks inherent in transfusions.

The improvement in breast reduction techniques with minimal scars supposes a lesser use of the inverted T technique in our patients. However, we believe that there are clear indications, when the volume to be resected and the search for optimum long-term results suggest the use of an inverted T technique.

The average volume resected was 1,099 g, which fully justifies the use of this technique as a preferred procedure and evidently supposes an advantage as we only had one case of thickening of the scar among 195 patients operated on.

References

1. Benelli L (1990) A new periareolar mammaplasty: round block technique. Aesth Plast Surg 14:93 – 100
2. Brühlman Y, Tschopp H (1998) Breast reduction improves symptoms of macromastia and has long-lasting effect. Ann Plast Surg 41:250
3. Chen C, White C, Women S (2004) Simplifying the vertical reduction. Plast Reconstr Surg 113:162 – 172
4. Courtiss E, Goldwyn RM (1977) Reduction mammaplasty by the inferior pedicle technique. Plast Reconstr Surg 59: 500
5. Davis GM, Ringler SM (1995) Reduction mammaplasty. Long-term efficacy, morbidity and patient satisfaction. Plast Reconstr Surg 96:1006
6. Finger RE, Vazquez G, Oren GS et al (1989) Superior medial pedicle technique for reduction mammaplasty. Plast Reconstr Surg 93:471
7. Eisenmann-Klein M, Menke M, Olbrisch RR (2003) Paper presented at the German Association of Plastic Surgeons Annual Meeting, Freiburg, Germany
8. Georgiade NG, Serafín D (1979) Reduction mammaplasty utilizing an inferior pedicle nipple-areolar flap. Ann Plat Surg 3:211
9. Hamdi M, Greuse M, DeMey A et al (2001) A prospective quantitative comparison of breast sensation after superior and inferior pedicle mammaplasty. Br J Plast Surg 54:39
10. Hauben DJ (1985) Experience and refinements with the superomedial dermal pedicle for nipple areola transposition in reduction mammaplasty. Aesth Plast Surg 8:189
11. Hidalgo D (1999) Improving safety and aesthetic results in inverted T scars breast reduction. Plast Reconst Surg 103: 874
12. Hidalgo D et al (1999) Current trends in breast reduction. Plast Reconst Surg 104:806
13. Hall-Findley E (2004) A simplified vertical reduction mammaplasty. Plast Reconstr Surg 113:162 – 174
14. Lassus C (1996) A 30 years experience with vertical mammaplasty. Plast Reconstr Surg 97:373 – 380
15. Lejour M (1994) Vertical mammaplasty and liposuction of the breast. Plast Reconstr Surg 94:100 – 114
16. Lejour M (1999) Vertical mammaplasty: update and appraisal of late results. Plast Reconstr Surg 104:771 – 781
17. Lejour M, Abboud M (1990) Vertical mammaplasty without inframammary scar and liposuction perspect. Plast Surg 4:67
18. Makki AS, Grahem AA (1999) Long-term results and patient satisfaction with reduction mammaplasty. Ann Plast Surg 41:370
19. Matarasso A, Courtiss E M (1991) Suction mammaplasty: the use of suction lipectomy to reduce large breast. Plast Reconstr Surg 87:709 – 711
20. Orlando JC, Guthrie RH (1975) The superomedial pedicle for nipple transposition. Br J Plast Surg 24:42
21. Price M, Massey B (2001) Liposuction as an adjunct procedure in reduction mammaplasty. Ann Plast Surg 47:115 – 118
22. Rohrich JR, Amanda A, Gosman MD (2002) Current preferences for breast reduction techniques: a survey of Board-Certified Plastic Surgeons. Plast Reconstr Surg 114:1724 – 1733
23. Zocchi M (1993) Clinical aspects of ultrasonic liposculpture. Perspect Plast Surg 7:153 – 174