9 The Triple-Flap Interposition Mammaplasty: Personal Technique

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9.1 Introduction

The history of reduction mammaplasty from 1980 until the present day can be seen as a period of refinements of existing techniques that mostly focused on the reduction of the final scar. These existing techniques were established from the late 1950s to the late 1970s, a period defined as a "period of safety" (Psillakis and Cardoso de Oliveira 1990). Many of these techniques share the principle of Lexer and Kraske (Kraske 1923; Lexer 1925), that is, a central wedge dissection in the lower half and an approximation of the lateral poles to form the breast.

Almost all techniques reinforced an element that was felt to be neglected before and is nowadays associated with Schwarzmann (1930), that is, de-epithelialization of the skin around the areola and avoidance of skin separation from the gland to respect the cutaneous–glandular unity.

However, less consideration has been given to what we believe to be the fundamental principle in mammaplasty reduction. To produce a long-lasting aesthetically pleasing breast shape, the gland itself should be altered into the desired form. Some breasts need to be reduced at their base to control the height and form the conical projection. Thus, there may be a need for dissection of the gland from the pectoralis fascia.

Other breasts need a reduction in their axillary pole and should be put into a more medial position, with the areola on the apex of the newly created cone. To transform a pendulous breast into a cone-shaped one, there a method needs to be formulated that is versatile enough to allow this transformation.

The concept of glandular shaping goes back to Biesenberg (1928). However, in retrospect, the critical attention given to this approach focused on the complete dissection of the skin from the gland and the associated complications. Less attention was given to the merit of glandular shaping.

If the goal of the surgical procedure is to alter the form and volume of the breast, then the focus should be on the nature of the breast. This included analysis of skin quality, shape, and projection of the breasts, asymmetries, contouring of the surrounding areas (upper abdomen and lateral thorax), and content of the gland. Many of the existing techniques produce excellent results,

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depending on the surgeon's ability to analyze the preoperative situation and to find a safe surgical solution for the required improvement in shape and thereby reduction in volume.

As many have pointed out, there is no one single technique for every patient. Consequently, the author suggests viewing the triple-flap interposition technique more as an approach, a base to start from, as the formation of three flaps offers variables that can change the breast shape.

9.2 History

The surgery of reduction mammaplasty was developed during this century, and is divided into five periods (Psillakis and Cardoso 1990):

1. Before (1900)
2. The pioneers (1901)
3. The trend period (1931–1960)
4. The period of safety (1961–1979)
5. The period of refinement (1980 until the present day)

9.2.1 The Pioneers (1901)

The most important contribution from this period was the improvement of different surgical methods.

Lexer (1925) described a technique with resection of the inferior pole, absence of the separation of the skin from the breast tissue, conification of the breast, and transposition of the nipple to a higher position (Kraske 1923; Lexer 1925).

Biesenberg (1928), after dissection of the skin, resected the other half of the breast parenchyma, using an S-shaped incision beginning in the axilla and extending to the lower pole under the areola. To rebuild the conical shape of the breast, the lower portion of the breast segment carrying the nipple was displaced upward and outward, the skin was replaced and the excess removed with a final inverted T-shaped scar (Biesenberg 1928).

9.2.2 The Period of Safety

Arié (1957) used a technique in cases of moderate ptosis and/or breast hypertrophy combined with skin excess, the lozenge or rhomboid technique, which yields good results and avoids a horizontal scar. It is indicated when the resection of only a quadrant of the mammary tissue is necessary to correct the breast. The incision along the inframammary fold would yield a more favorable scar. They believed that the technique predetermined the site of the nipple, and used resection of the upper pole, resulting in a flat breast with a quadrangular shape, and with diminished breast sensitivity (Pitanguy 1960, 1961; Pitanguy et al. 1984).

Liacir Ribeiro (1975) used several pedicles, and separated them into five groups; with the use of this new technique, vascularization would be from the lower breast pole, contrary to existing techniques at the time (Ribeiro 1975, 1989; Ribeiro et al. 1992).

9.2.3 The Period of Refinement

Peixoto's technique, published in 1980, was indicated in patients with simple and small breast ptosis and correction of moderate hypertrophy, with minimal skin resection and minimal breast tissue resection, resulting in smaller scars. It did not involve any changes of breast shape, it always maintaining the original form (Peixoto 1980).

The senior author returned to the concepts of Biesenberger, the opposite of Peixoto's technique. It was our belief that few techniques guarantee a conical breast base, and we developed a technique that guaranteed a conical-shaped breast and would facilitate placing the nipple–areola complex (NAC) at the apex of this cone. The first mammaplasties were performed in 1984 using the classical Pitanguy, Arié (1957), and Lozenge procedures (Pitanguy 1960, 1961; Pitanguy et al. 1984; Ribeiro 1975, 1989; Ribeiro et al. 1992).

A critical observation of the results, being in dialogue with other surgeons throughout the

world, and reading critical publications, led to the conclusion that in many cases the results of these procedures did not meet the patient's and surgeon's expectations, especially in the long run, and sometimes also in the immediate postoperative state (Lassus 1986; Lima 1975; Maillard 1986; Marconi 1989; Marconi and Cavina 1993; Martins 1991; Mathes et al. 1980; McKissock 1972; Nicolle and Chir 1982).

The results were considered sometimes unfavorable because of the lack of conical shape of the breasts, pointing out that most procedures produce a round shape. Moreover, there was a consensus that many procedures do not provide adequate resection of the breast base and do not allow for medialization of the breast.

Most important was the observation that the operated breast tended to resume its previous shape in the late postoperative stage (Caldeira 1994a, b, c, 1995; Candiani et al. 1991; Peixoto 1980).

The triple-flap interposition technique was first presented in 1994 in the Annals of the 8th Congress on Senology (Breast Diseases), Rio de Janeiro. Follow-up was presented and published in the Transactions of the 11th Congress of the International Confederation for Plastic Reconstructive and Aesthetic Surgery in Yokohama, Japan, in April 1995. This approach was used by the senior author in his private practice with 1754 cases up to 1987 (Caldeira 1994a, b, c, 1995).

9.3 Triple-Flap Interposition Technique

The triple-flap interposition technique relies on an upper pedicle to the areola and is defined by the creation of three glandular flaps to shape a conical breast using skin resection that results in minimal scarring.

Glandular tissue is resected in a rhomboid or oblique manner, while creating a central, lateral, and medial glandular flap. The idea of the technique is to shape glandular tissue to create a conical breast, and to allow for, whenever necessary, the reduction of the mammary base and the axillary pole in addition to the medialization of the breast.

The areola is placed on the apex of the cone supplied by an upper pedicle. The interposition and suturing of the three glandular flaps promote the reformulation of the Cooper ligament system, thus resulting in a long-lasting conical breast configuration. Accordingly, the skin simply covers what has been shaped, free of traction or tension.

Skin glandular undermining takes place only in a limited area of the inferior hemisphere; the breast base is widely undermined from the pectoral fascia, although care should be taken not to injure the perforators of the internal and lateral thoracic arteries, which supply the glandular flaps. The triple-flap interposition is a mammaplasty technique that involves the following:

1. Shaping of glandular tissue to create a conical breast configuration.
2. Relocating the areola on a superior pedicle on the apex of the cone.
3. Skin undermining on the inferior hemisphere of the breast.
4. Undermining of the breast base from the pectoralis fascia.
5. Skin resection that results in minimal scarring.

The goals of the triple-flap interposition technique in mammaplasty can be outlined as the shaping of a conical, aesthetically pleasing breast, thereby reducing breast volume. The breast shape should be stable, the scars limited, and the procedure safe (Marconi and Cavina 1993; Nicolle and Chir 1982; Pitanguy 1960).

9.3.1 Markings and Skin Incision

The types of skin incision may vary depending on the skin condition and breast volume. Generally, apply the Lozenge (Fig. 9.1) (Ribeiro 1989), Peixoto's (1980), or circumferential techniques (Bustus and Loureiro 1985; Hinderer 1969). Alternatively, the marking of other short scarring techniques (Hollander 1924; Lalardrie and Mouly 1978), for example, the vertical mammaplasty of Lejour (1994), can be used (Fig. 9.2).

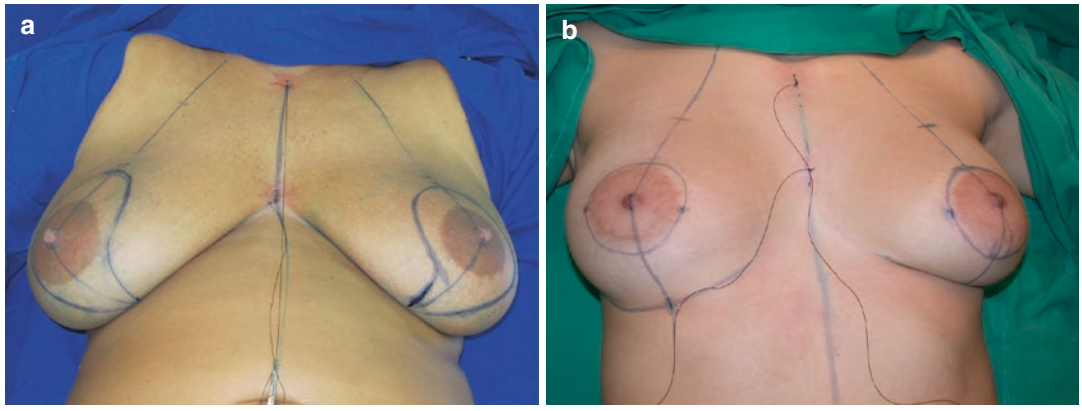

Fig. 9.1 Outline of incisions. (**a**) Lozenge and (**b**) circumferential marking

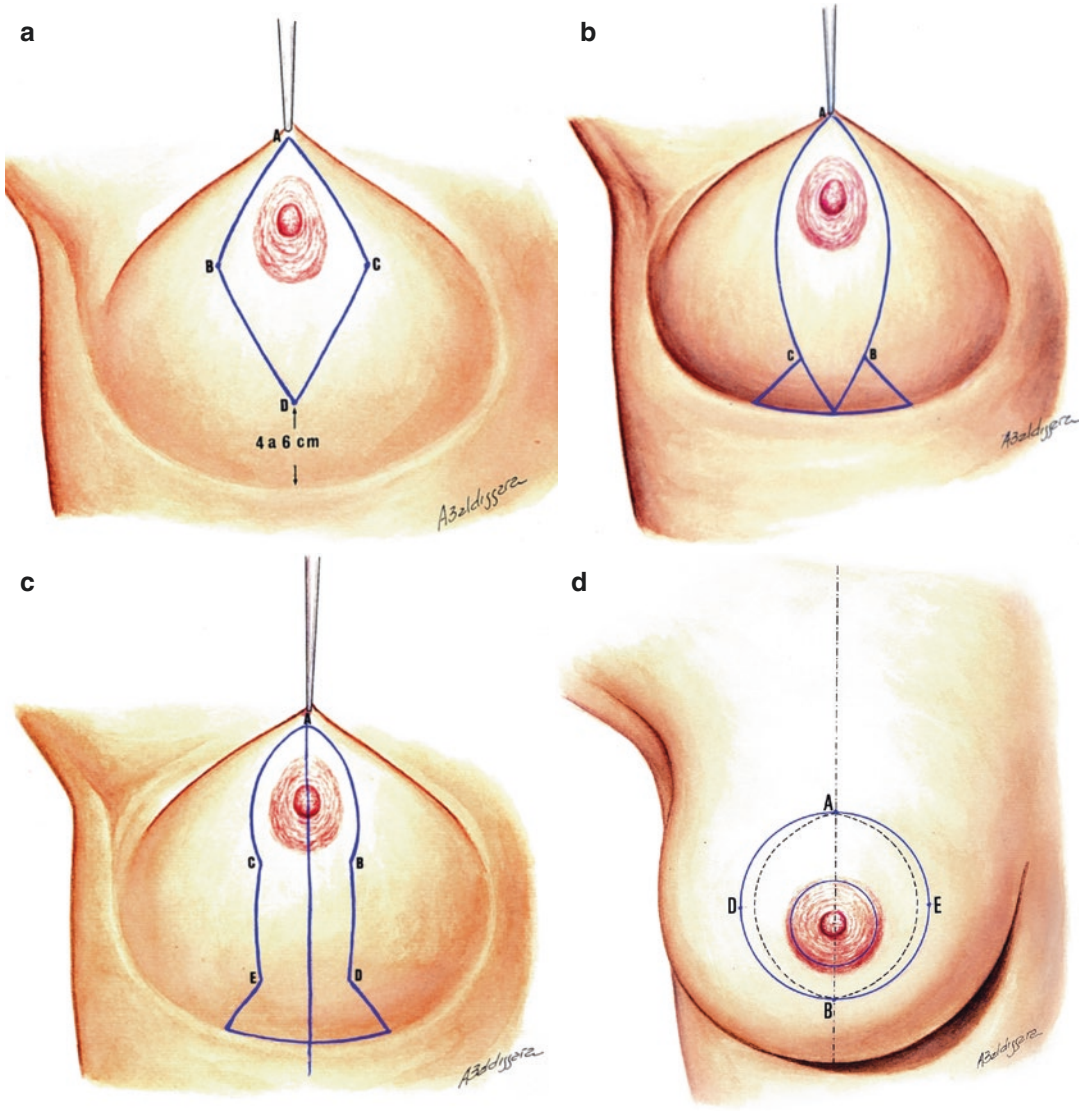

Fig. 9.2 (**a**–**d**) Diagram showing four marking examples used in this technique

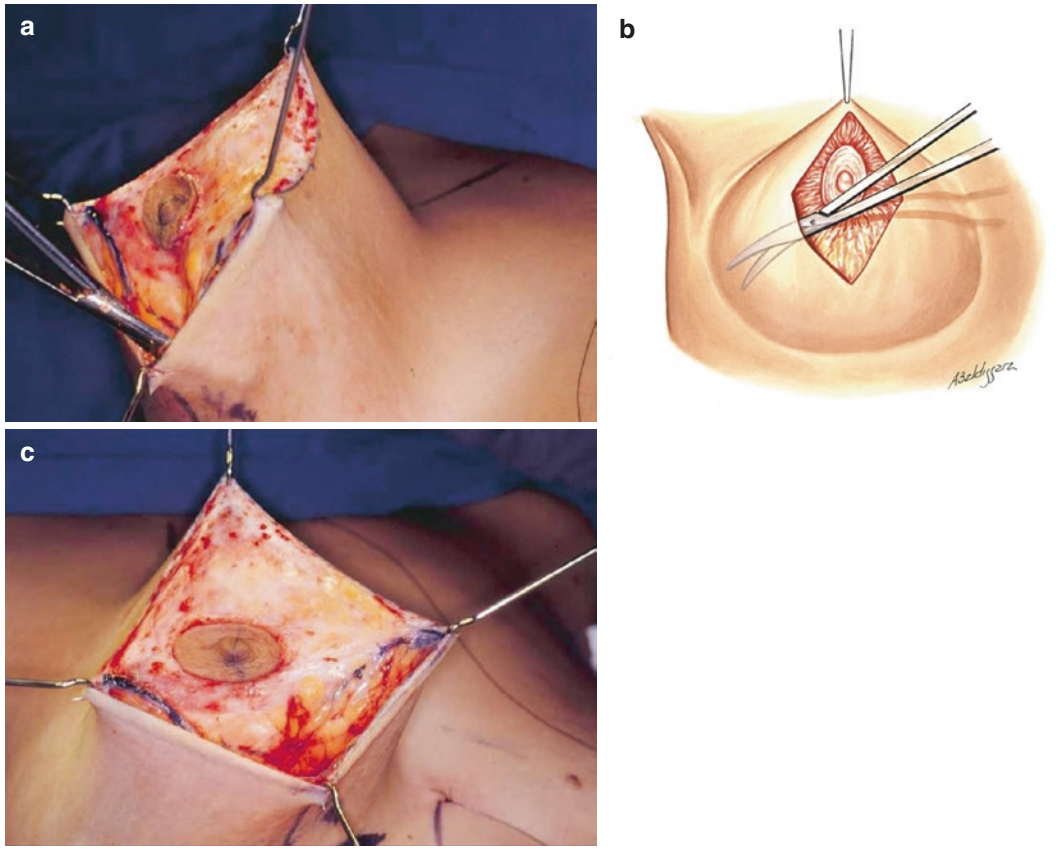

Fig. 9.3 (**a**–**c**) Skin–glandular undermining

After skin incision, de-epithelialization is carried out carefully to safeguard the NAC and the central flap, which will be formed later. Skin–glandular undermining of the interior hemisphere begins on the decorticated area and extends to the axillary region when necessary. This undermining should be carried out between the glandular and the areola tissue (Fig. 9.3).

The breast base is undermined from the pectoral fascia, and upon reaching the parasternal region, this should be done in a careful manner to preserve the perforators (second, third, and fourth rami) of the internal thoracic artery. The breast tissue is raised and two vertical incisions converging downward are made to create the central vertical flap with a base pedicle adequate for its extension. This flap is irrigated by the second perforator of the internal thoracic artery (Fig. 9.4) (Bertelli and Pereira 1994).

Two glandular tissue flaps corresponding to the medial and lateral pillars of the breast are created posteriorly. The medial horizontal flap is vascularized mostly by the third and fourth perforators of the internal thoracic artery and the lateral horizontal flap is vascularized by the ramification of the lateral thoracic artery and rami acromialis (Fig. 9.5) (Bertelli and Pereira 1994; Cardoso et al. 1984).

After comparing the total breast volume bilaterally, the glandular tissue is resected in a rhomboid, oblique manner (Pitanguy et al. 1984). Alternatively, the base of the gland can be removed in a disc-like fashion (Peixoto 1980). Thus, if the breast has a large base, it is easier to narrow and/or reduce the height of the projection of the new breast cone. In addition, the combination of both types of resection may be applied to achieve the desired shape (Caldeira et al. 1999).

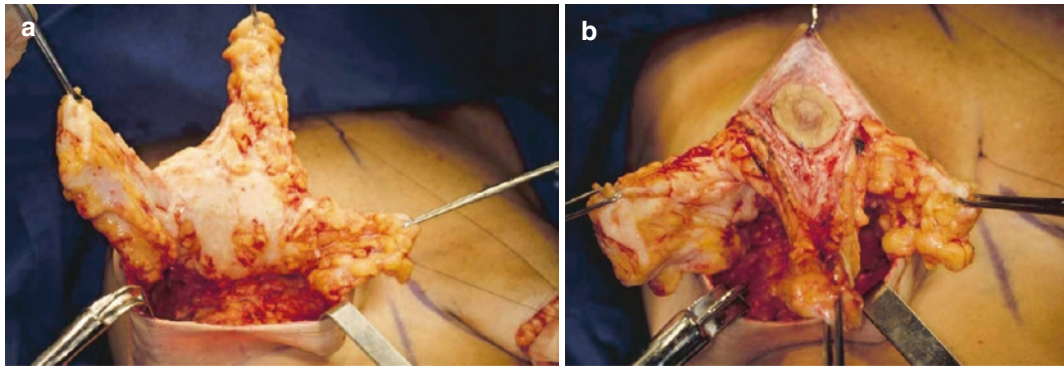

Fig. 9.4 (**a**, **b**) Central, medial, and lateral flaps

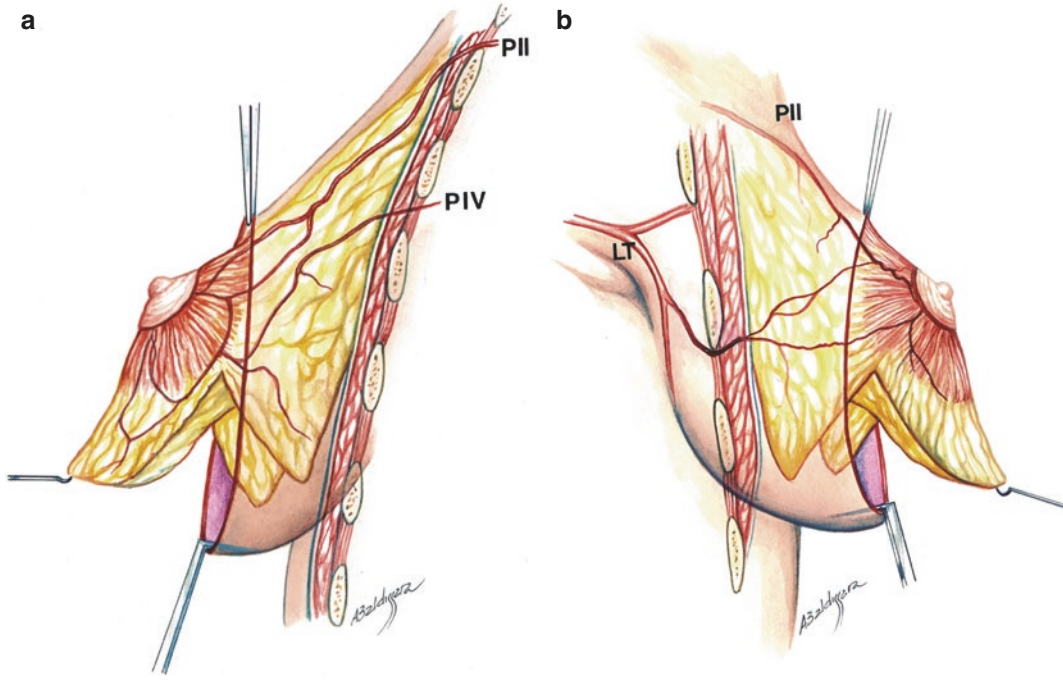

Fig. 9.5 (**a**) Medial view: the skin surface area and the glandular tissue are considerably vascularized by the second perforator. It includes the upper portion of the breast, the nipple–areolar complex (NAC), and the subjacent antero-medial region. (**b**) Lateral thoracic artery

Following careful hemostasis, the breast is raised by a hook placed at the apex that remains throughout the shaping of the breast. The distal end of the central flap is sutured to the fascia pectorals using three 2-0 Vicryl or Prolene sutures. The adequate length of the flap prevents the downward traction of the NAC (Fig. 9.6). The main purpose of this flap is to provide projection of the NAC and prevent a flattened aspect (Fig. 9.7). The two medial and

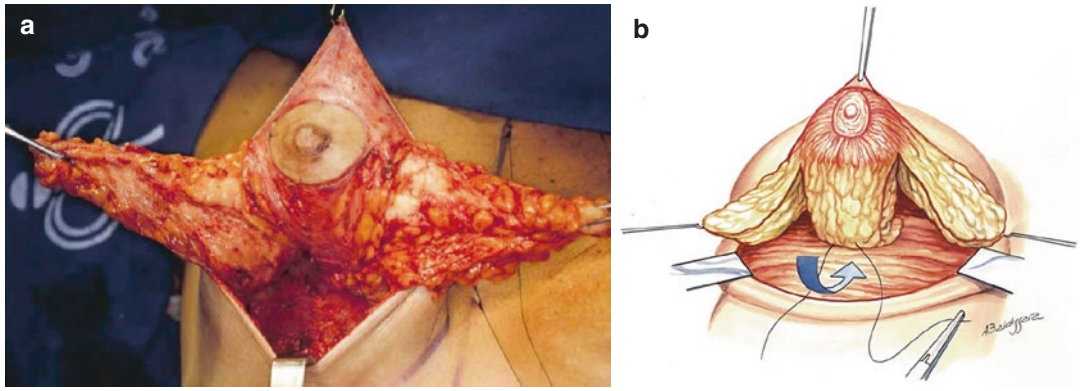

Fig. 9.6 (**a**, **b**) Fixation of the central flap

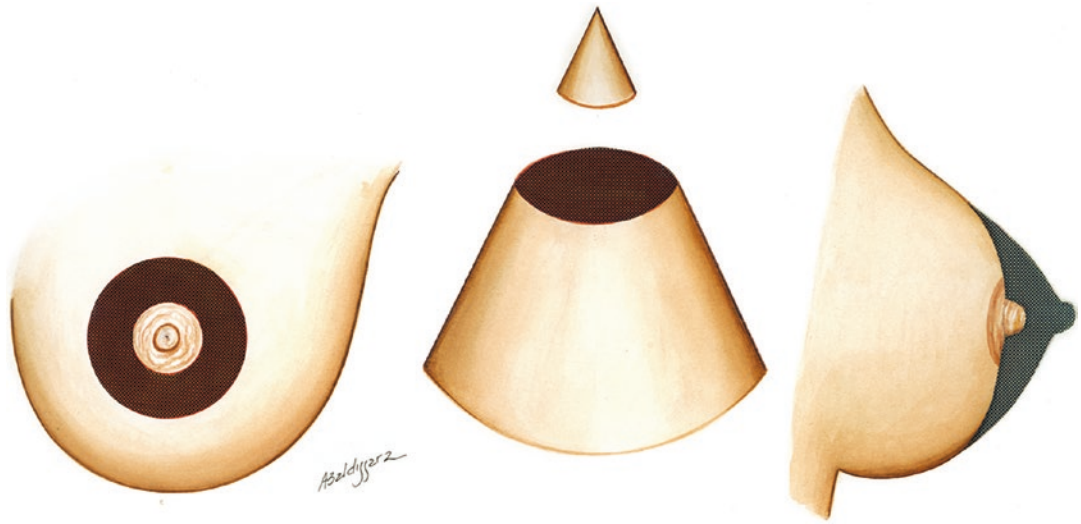

Fig. 9.7 The central flap has the function to improve the natural projection of the NAC

lateral horizontal flaps are rotated toward the midclavicular line and are transposed one over the over (Fig. 9.8).

The placement of these flaps determines the contour of the lower breast hemisphere, shapes the lateral and medial poles, and narrows the base. Moreover, this maneuver defines the new submammary fold, and helps to correct important breast asymmetries (Fig. 9.9). Positioning of the medial and lateral flaps depends on the need to provide more volume to either of these segments. Generally, the medial flap is deeply secured to the base of the lateral flap, which is rotated over the medial flap and sutured over its surface using 2-0 Vicryl or Prolene. Minor irregularities are corrected by trimming the fat tissue with scissors. Skin resection renders tension-free wound borders where the skin does not function as an outer brassiere. The areola is sutured using Gillies sutures with 6-0 Prolene (Fig. 9.10).

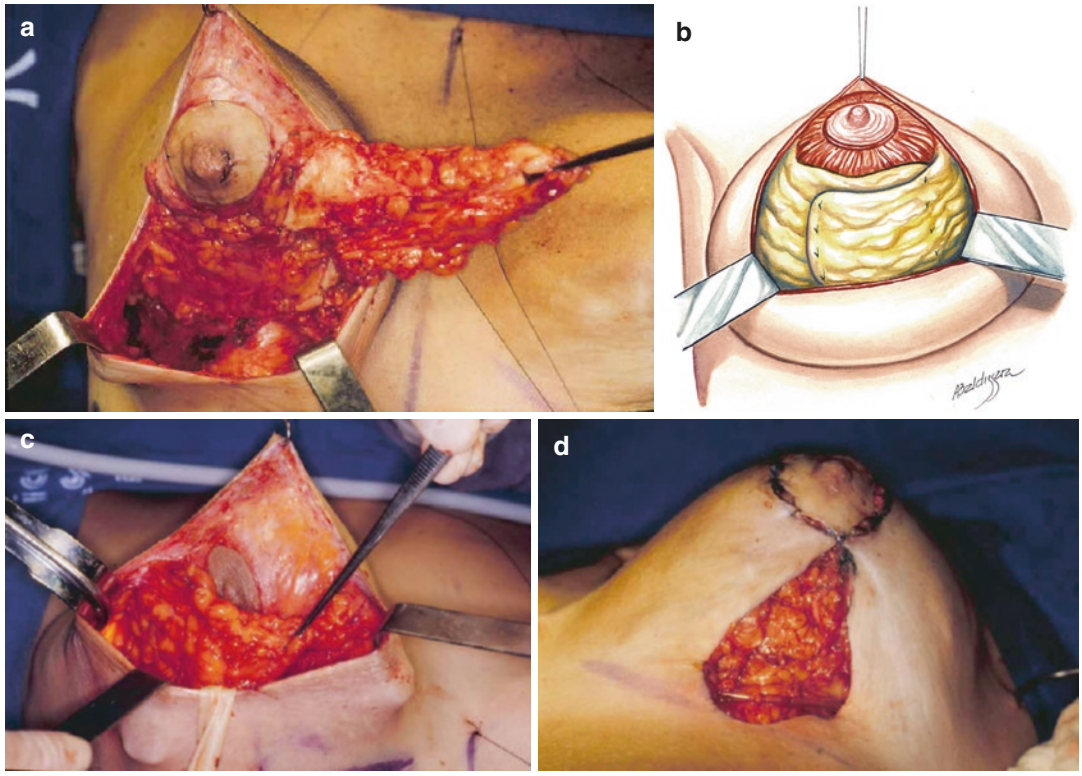

Fig. 9.8 Shaping the breast. (**a**–**c**) Interposition of the lateral and medial flaps. (**d**) The breast shape is sustained even before being sutured to the skin

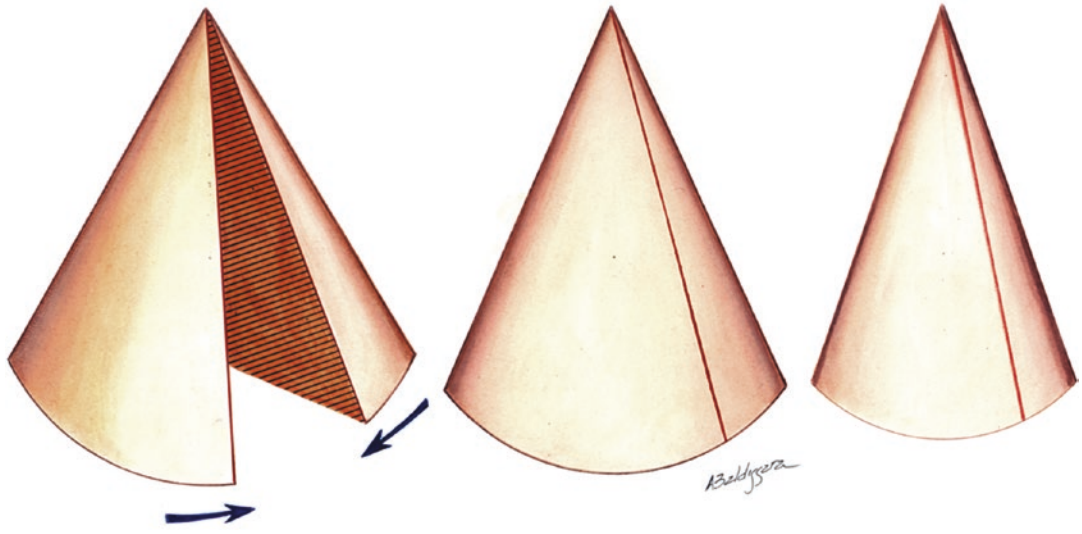

Fig. 9.9 Interposition of the lateral and medial flaps leads to a new breast shape through effective breast base reduction

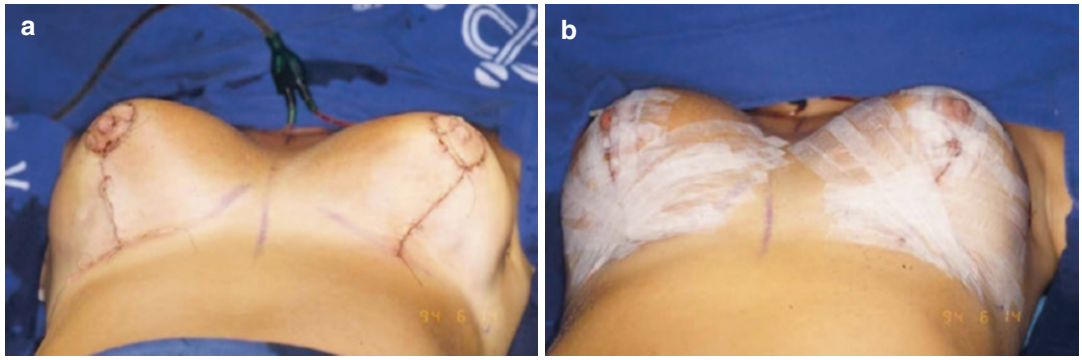

Fig. 9.10 (**a**, **b**) After the subcuticular and intradermal suturing, the new breast form is sustained by micropore tape remodeling and compressive dressing

9.4 Discussion

The goal of this technique is to provide breast stability by forming a glandular cone. Consequently, the skin covers what has been shaped, without tension, accommodating the ideal conditions for the scar to heal. Postoperatively, the reshaped breasts proved to be stable and maintained the desired conical shape in the long term (Figs. 9.11 and 9.12).

When used in a narrow-based or slightly wide breast, standard techniques generally produce good results. Many of these are Lexer–Kraske-type methods that approximate the lateral and medial pillars after wedge dissection (Cardoso et al. 1984; Lassus 1986; Lejour 1994; Lexer 1925; Strombeck 1961).

However, they often do not yield a satisfactory and stable result when applied to large-based, pendulous breasts with inelastic skin (Weiner et al. 1973; Williams and Hoffman 1981).

The reason why the breasts relapse to their former ptotic shape is because the nature of the shape has not been changed by these techniques. They have less volume, but the broad base and the glandular tissue have no "inner support" that prevents them from "falling down" (Hoffman 1986, 1987; Peixoto 1980; Pers et al. 1986).

The author believes that the forming of a narrow-based breast, together with interglandular suturing, provides a stable shape. One reason for this is that the Cooper ligaments are reorganized; thus, the gland is liberated from what could be called the "structural mammary memory." Another reason is that interglandular scarring leads to more fibrous content of the breast; the breast content will be firmer, especially in those cases where liposuction has been carried out to reduce the fat content of the gland.

Most importantly, the formation of the lateral and medial flaps, which are rotated toward the midclavicular line and are transposed over each other, creates an inner "brassiere," thereby giving the necessary inner support to prevent the breast from relapsing into their former shape. It may be argued that some of the heavy pendulous breasts have a substantial fat content and that the creation of a cone consisting of mostly fat tissue will not produce a long-lasting result. In these cases, we would extend the technique to a procedure that uses a strip of the pectoralis muscle to provide the "inner brassiere" (Fig. 9.13) (Caldeira et al. 1999).

The triple-flap interposition technique involves glandular undermining from the pectoralis fascia. The axial blood supply of the flaps should be respected; thus, the gland is not dissected completely and parts of the upper inner and outer quadrants remain untouched. There is a tendency for large adipose breast to atrophy in the postoperative period.

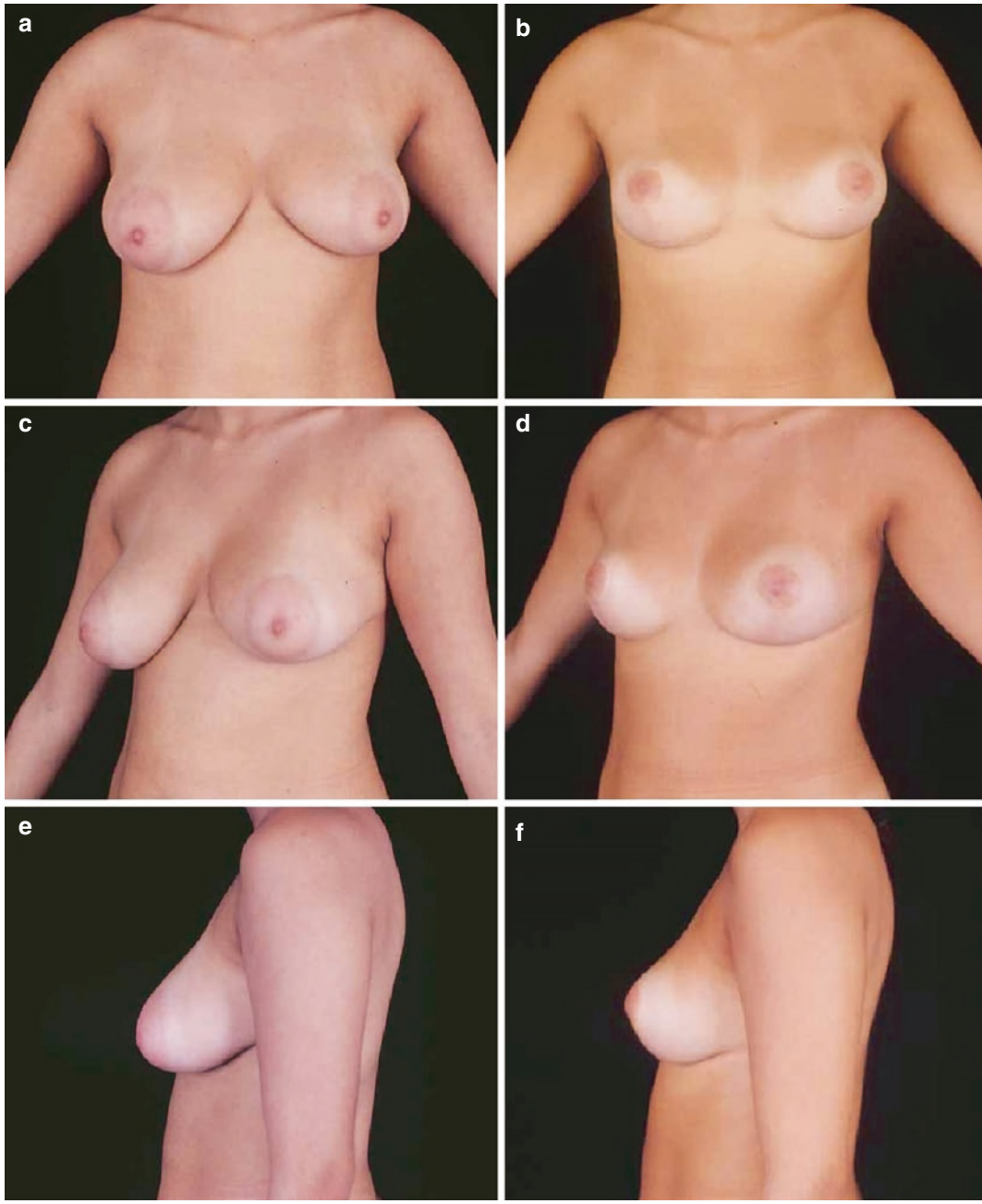

Fig. 9.11 A 20-year-old patient. Correction of moderate hypertrophy, ptosis, asymmetric breast volume and shaping. (**a**, **c**, **e**) Preoperative views. (**b**, **d**, **f**) Postoperative views. Evolution over 3 years

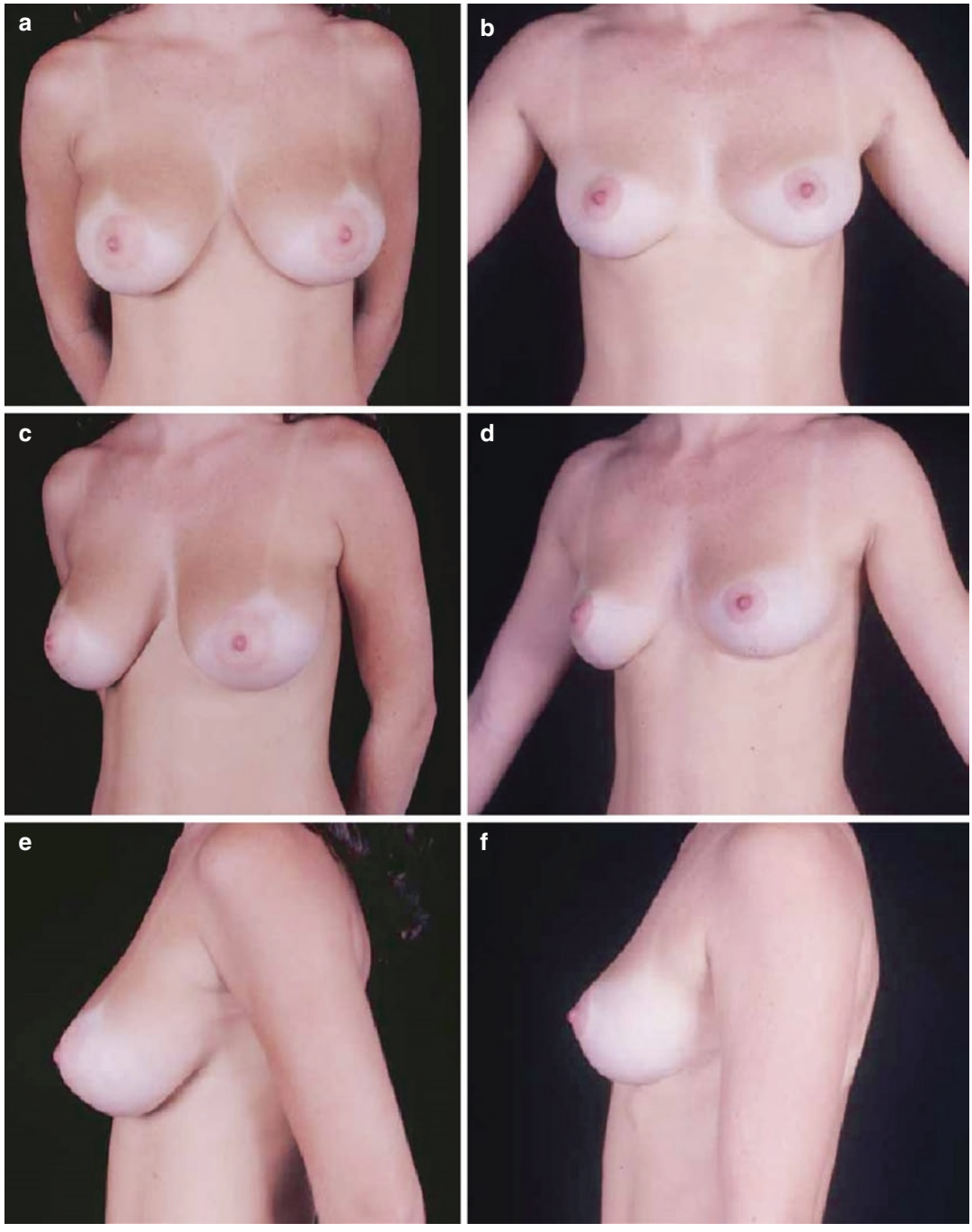

Fig. 9.12 A 23-year-old patient. Correction of moderate hypertrophy. (**a**, **c**, **e**) Preoperative views. (**b**, **d**, **f**) Postoperative views. Evolution over 4 years

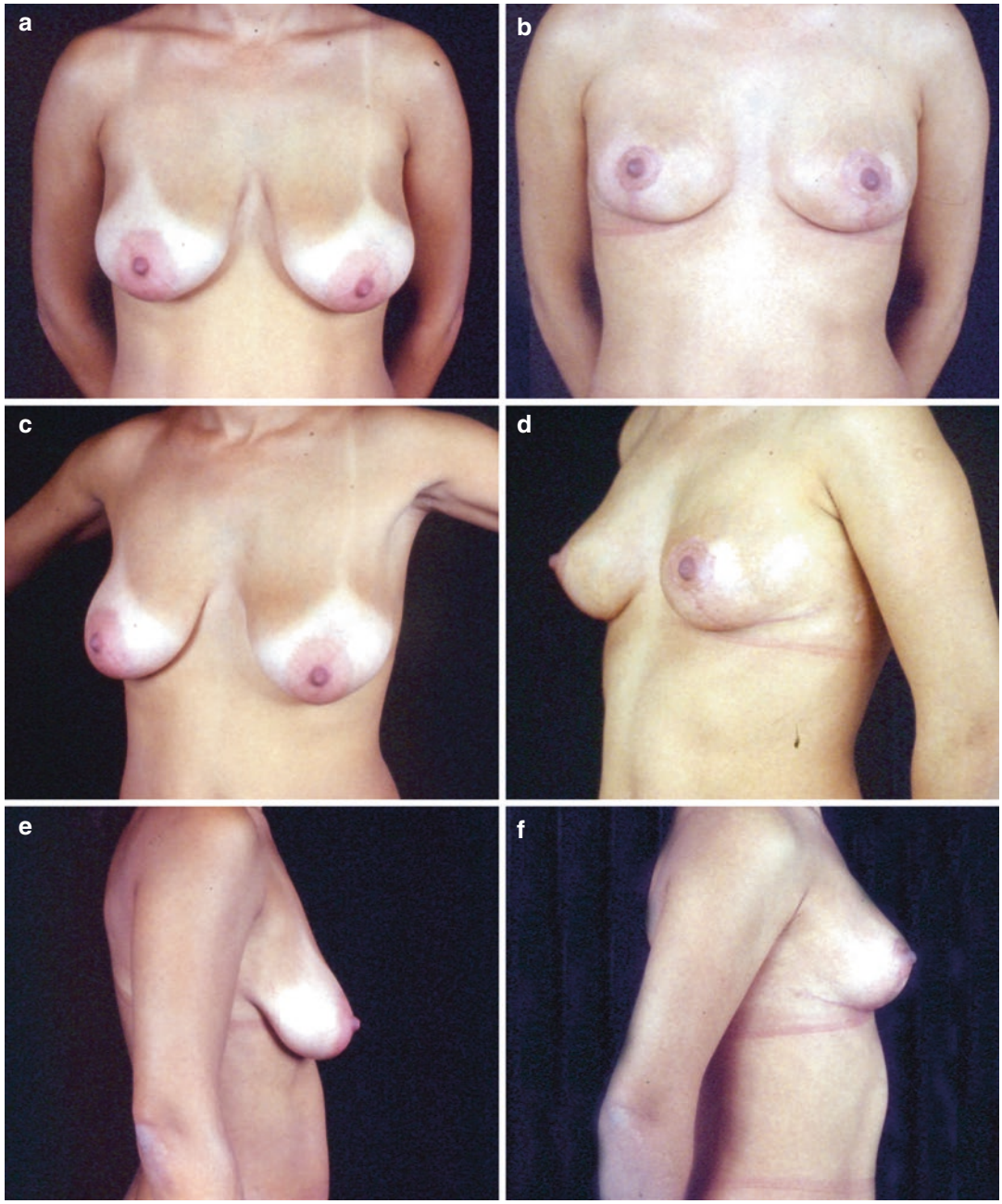

Fig. 9.13 A 31-year-old patient. Correction of moderate hypertrophy, ptosis, asymmetric breast volume, and shaping. (**a**, **c**, **e**) Preoperative views. (**b**, **d**, **f**) Postoperative views. Evolution over 5 years

This observation led the authors to reduce the breast and perform a second intervention when necessary after 6 months. This second procedure could be liposuction alone depending on whether the breast shape proved to be stable, or it could be a secondary reduction mammaplasty using the triple-flap interposition technique with or without the use of a pectoralis muscle flap (Caldeira and Lucas 2000).

The cutaneous–glandular undermining proposed by this technique allows complete visualization and manipulation of the various breast segments and consequently favors the treatment proposed.

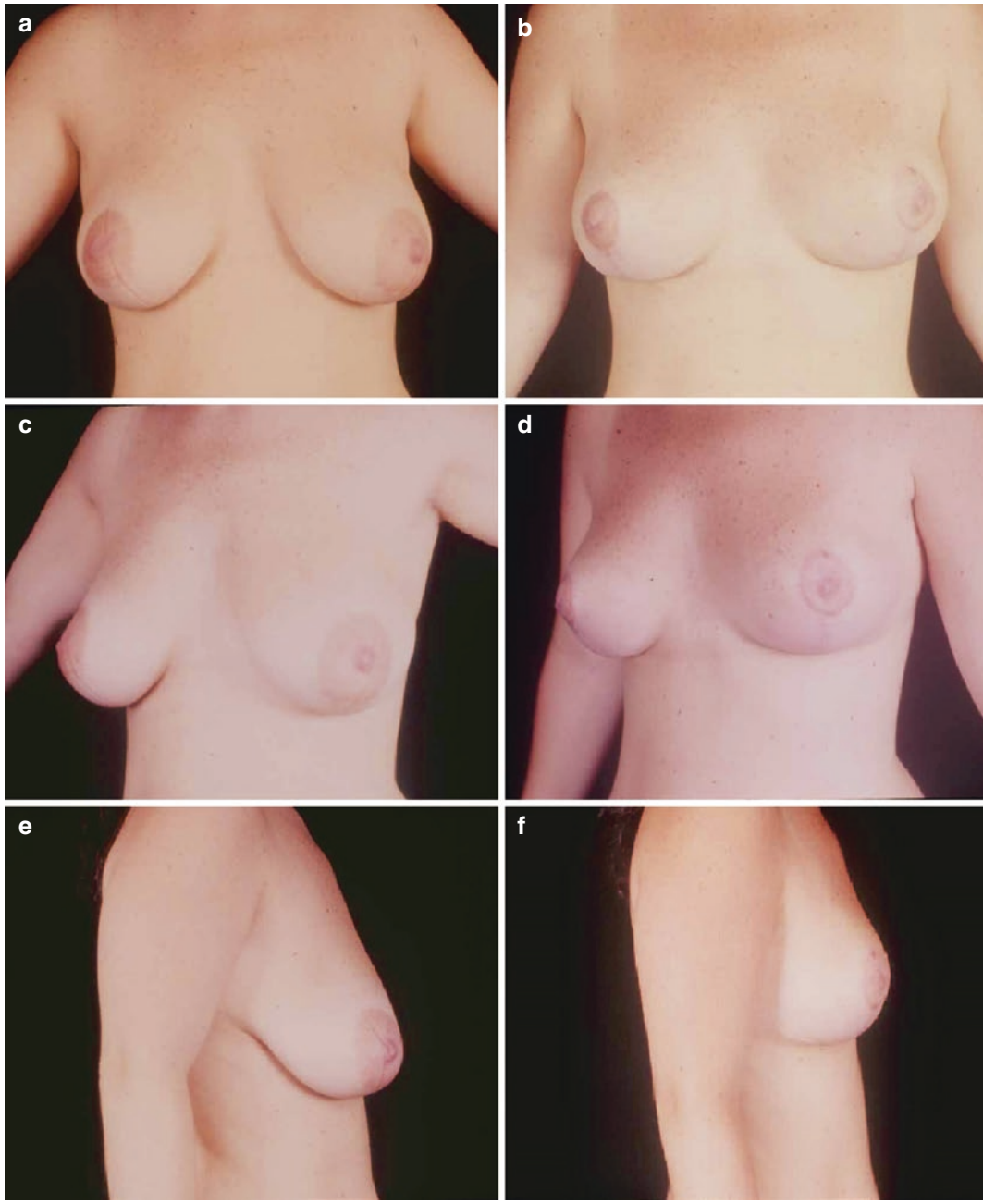

Fig. 9.14 A 19-year-old patient. Correction of mild hypertrophy and round breast shape. (**a**, **c**, **e**) Preoperative views. (**b**, **d**, **f**) Postoperative views. (**g**, **h**) Postoperative oblique and profile views. Evolution over 15 years maintaining the new conical shape

However, undermining the whole inferior hemisphere should be avoided per se. Specifically, when the skin resection yields and there is an inverted T scar, unnecessarily wide undermining causes skin necrosis in the conjunction area of the skin flaps (Fig. 9.14).

Consequently, the authors restrict the cutaneous–glandular undermining to an area that rarely exceeds the breast base. As a rule of thumb, undermining stops at approximately 1 cm away from the medial or lateral borders of the corresponding poles.

The use of a superior-based flap to the areola has proved to be safe in this specific technique and corresponds to the experience of other authors, who also rely on a superior-based flap.

The creation of the central flap that relies on the superior-based flap for blood supply provides the volume that is needed in the central and upper parts of the conical breast.

Thus, the fixation is not positioned superior to the future apex, but exactly under the future position of the areola. Plication of a central pedicle or flap to the pectoralis fascia alone does not provide sufficient long-lasting support for glandular tissue, that is, the breast will become ptotic again as the glandular tissue slides, along the pectoralis fascia, downward, as others authors have reported (De Souza Pinto et al. 1983; Hakme 1983; Nicolle and Chir 1984; Pers et al. 1986; Pitanguy et al. 1984; Ribeiro 1989; Rohrich et al. 2006). Stability of the breast shape is granted largely by interpositioning the three flaps with one another and not by plicating glandular tissue to the pectoralis fascia.

After the cutaneous–glandular undermining in the lower half, dissection of the gland from the pectoralis fascia, and creation of a conical gland, the new submammary fold ideally lies 2–3 cm above the old one. If not, there is a need for further reshaping and reduction.

The distance between the relocated areola and the new submammary fold should not exceed 6 cm. Underlying these statements is the observation that within the first 2 postoperative months, the breast descends by approximately 2–3 cm.

Consequently, the distance between the areola and the submammary fold enlarges as well. A distance of more than 8 cm is associated with a ptotic breast shape and thus the postoperative result would be less than ideal. The reason why the breast descends, that is, the submammary fold settles in a lower position, is subject to speculation.

The superficial fascial system needs 2–3 months to reorganize its collagen fibers, settling at a point where the gravitational pull is offset by the suspension given by the newly reorganized superficial fascial system; this "suspension" is also influenced, among other factors, by the shape of the breast, its content, and skin quality. In other words, a multitude of factors play a role in the descending of the submammary fold (Fig. 9.15). Therefore, the numbers described are the empirical answer to where the submammary fold settles and thus dictates the design of the breast intraoperatively.

Is the triple-flap interposition technique easy to learn? In the author's opinion, the technique is not more difficult to learn than other techniques.

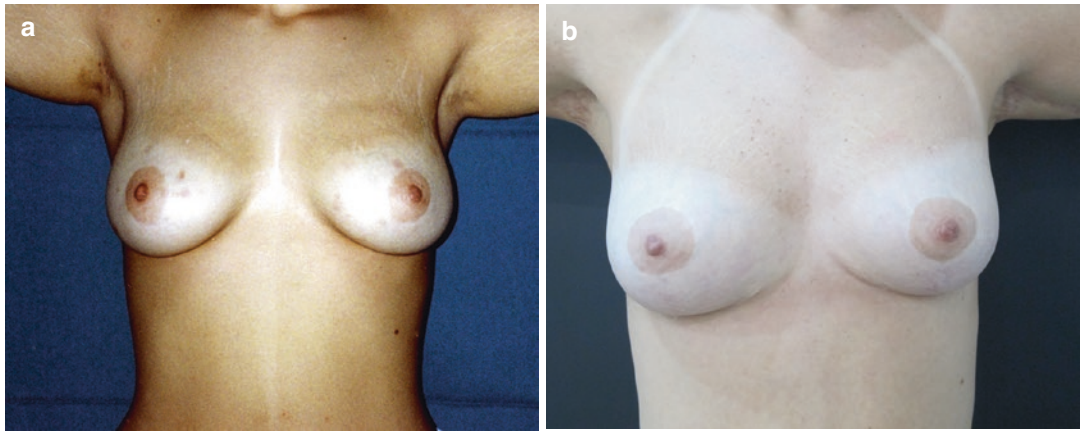

Fig. 9.15 A 34-year-old patient. Correction of moderate hypertrophy, ptosis, asymmetric breast volume, and shaping. (**a**, **c**, **e**) Preoperative views. (**b**, **d**, **f**) Postoperative views. Evolution over 8 years

Fig. 9.15 (continued)

Fig. 9.16 A 43-year-old patient. Correction of severe hypertrophy, ptosis, asymmetric breast volume, and shaping, associated with body lipodystrophy. (**a**, **c**, **e**) Preoperative views. (**b**, **d**, **f**) Postoperative views. Evolution over 2 years

The creation of three flaps may sound complicated, but it only means that after dissection from the pectoralis fascia, the gland is divided into three parts. A fixed, predetermined tissue excision pattern is advocated by many authors, who often point out that the residents find it easier to adhere to fixed patterns during an operation (Caldeira et al. 1999; Lalardrie and Mouly 1978; Strombeck 1961) (Fig. 9.16).

However, it is exactly the "pattern" that often hinders the younger surgeon in grasping the operative technique, as she or he just needs to

cut along the markings. With predetermined tissue excision patterns with no skin undermining, the skin tends to be excised during an early operation state, that is, before the gland has been reshaped. In the triple-flap interposition technique, skin excision takes place only after glandular shaping. In cases of asymmetric breasts, it is easier to obtain a symmetrical result with three flaps to shape the breast in comparison with techniques that use a wedge resection and approximation of two pillars (Caldeira and Roth 2008).

Conclusion

The triple-flap method has proved to be safe as long as the blood supply of the glandular flaps is respected. The results accomplished are long lasting and render the desired, aesthetically pleasing, conical breast. The Lexer–Kraske-type methods reduce the volume, but often fail to alter the nature of the breast form. Consequently, they tend to resume to their former shape in the long term; in other words, they are often subject to bottoming out. Reduction mammaplasty is about reshaping the gland into the desired form. Creating three glandular flaps to do this is suggested by the authors.

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