The Triple-Flap Interposition Mammaplasty

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15.1
Introduction

The history of reduction mammaplasty from 1980 until now can be seen as a period of refinements of existing techniques which mostly focused on the reduction of the final scar. These existing techniques were established in the late fifties to the late seventies, a period defined by Cardoso de Oliveira in Goldwyn's "Reduction mammaplasty" as the "period of safety" [1]. Many of these techniques share the principle of Lexer-Kraske [2, 3], that is, central wedge dissection in the lower half and 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 [4], that is, deepithelialization 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 reduction mammaplasty. To produce a long lasting aesthetically pleasing breast shape, the gland itself has to be altered into the desired form. Some breasts need to have reduction in their base to control the height and form of the conical projection. Thus, there may be need for dissection of the gland from the pectoralis fascia. Other breasts need a reduction in their axillary pole and have to be put into a more medial position, with the areola on the apex of the newly created cone. Consequently, it may be necessary to manipulate the lateral and medial poles.

To transform a pendulous breast into a conical-shaped breast, there has to be a method that is versatile enough to allow this transformation. The concept of glandular shaping goes back to Biesenberger [5]. However, in retrospect, the critical attention given to his approach focused on the complete dissection of the skin from the gland and the associated complications [6, 7]. Less attention was given to the merit of glandular shaping.

If the goal of the surgical procedure is to alter form and volume of the breast, then the focus has to be on the "nature" of the breasts. This includes analysis of skin quality, shape and projection of the breast, asymmetries, contour of the surrounding areas (such as the upper abdomen and lateral thorax), and content of the gland. The latter two points will raise the question of whether liposuction should be applied to improve the surrounding contours of the breast to allow for better projection and to reduce the volume of the breast where needed. In many of the patients, the authors choose to use liposuction as the first surgical step.

Many of the existing techniques can produce excellent results, 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 authors suggest viewing the triple-flap interposition technique more as an approach, a base to start from, as the formation of three flaps offers various variables that can change the breast shape.

15.2
History

The senior author's first mammaplasties were performed in 1984 using classical Pitanguy, the Arie-Pitanguy, and the lozenge procedures [6–11]. Critical observation of the results, being in dialogue with other surgeons throughout the world, as well as reading critical publications, led to the conclusion that in many cases the results of these procedures did not meet the patients' and surgeons' expectations, especially in the long run, and sometimes also in the immediate postoperative state [12–22]. The results were considered sometimes unfavorable because of the lack of a conical shape of the breasts, pointing out that most procedures produce a round shape. Moreover, there was consensus that many procedures do not provide adequate resection of the breast base and do not allow for a medialization of the breast. Most important was the observation that the operated breasts tended to resume its previous shape in the late postoperative stage [23–28].

The Triple-flap interposition technique was first published in English in 1995 [27]. From 1987 to 2007, the approach was used by the senior author in his private practice in 1,289 cases.

15.3
Principles of the Triple-Flap Interposition Technique in Mammaplasty

The Triple-flap interposition technique relies on an upper pedicle to the areola and is defined by the creation of three glandular flaps in order to shape a conical breast using skin resections that result 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 shaped breast, and to allow for, whenever necessary, the reduction of the mammary base and the axillary pole as well as 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 pectoral fascia, though care has to be taken not to injure the perforators of the internal and lateral thoracic arteries, which supply the glandular flaps.

Liposuction might be the first surgical step, depending on the contour of the lateral thorax and upper abdomen, as well as on the fat composition of the gland.

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 (1) shaping of conical, aesthetically pleasing breasts, thereby reducing breast volume and (2) the breast shape has to be stable, scars limited, and the procedure safe.

15.4
Triple-Flap Interposition Technique

15.4.1
Markings and Skin Incision

It is not necessary to adhere to one fixed pattern of skin incision with this technique. Types of skin incisions may vary depending on the skin condition and breast volume. Generally, the authors apply the lozenge [10], Peixoto's [23], and circumferential techniques [29, 30] (Fig. 15.1). Alternatively, the markings of other short scarring techniques [31, 32], for example, the vertical mammaplasty of Lejour, can be used [33].

After skin incision, deepithelialization is carried out carefully to safeguard the nipple–areola complex and the central flap, which will be formed later. Skin-glandular undermining of the inferior 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 areolar tissue (Fig. 15.2).

The breast base is undermined from the pectoral fascia, and on reaching the parasternal region, this should be done in a careful manner to preserve the perforators (rami II, III, IV) of the internal thoracic artery. The breast tissue is raised and two vertical incisions converging downward are carried out to create the central vertical flap with a base pedicle adequate to its extension. This flap is irrigated by the II. Perforators of the internal thoracic artery [34] (Fig. 15.3).

Two glandular tissue flaps corresponding to the medial and lateral pillars of the breast are created posteriorly (Fig. 15.3). The medial horizontal flap is vascularized mostly by the III and IV perforators of the internal thoracic artery and the lateral horizontal flap is vascularized by the ramifications of the lateral thoracic artery and rami acromialis [34, 35] (Fig. 15.3).

After comparing the total breast volume bilaterally, the glandular tissue is resected in a rhomboid, oblique manner [8]. Alternatively, the base of the gland can be removed in a disc-like fashion [23]. 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 [36]. Following
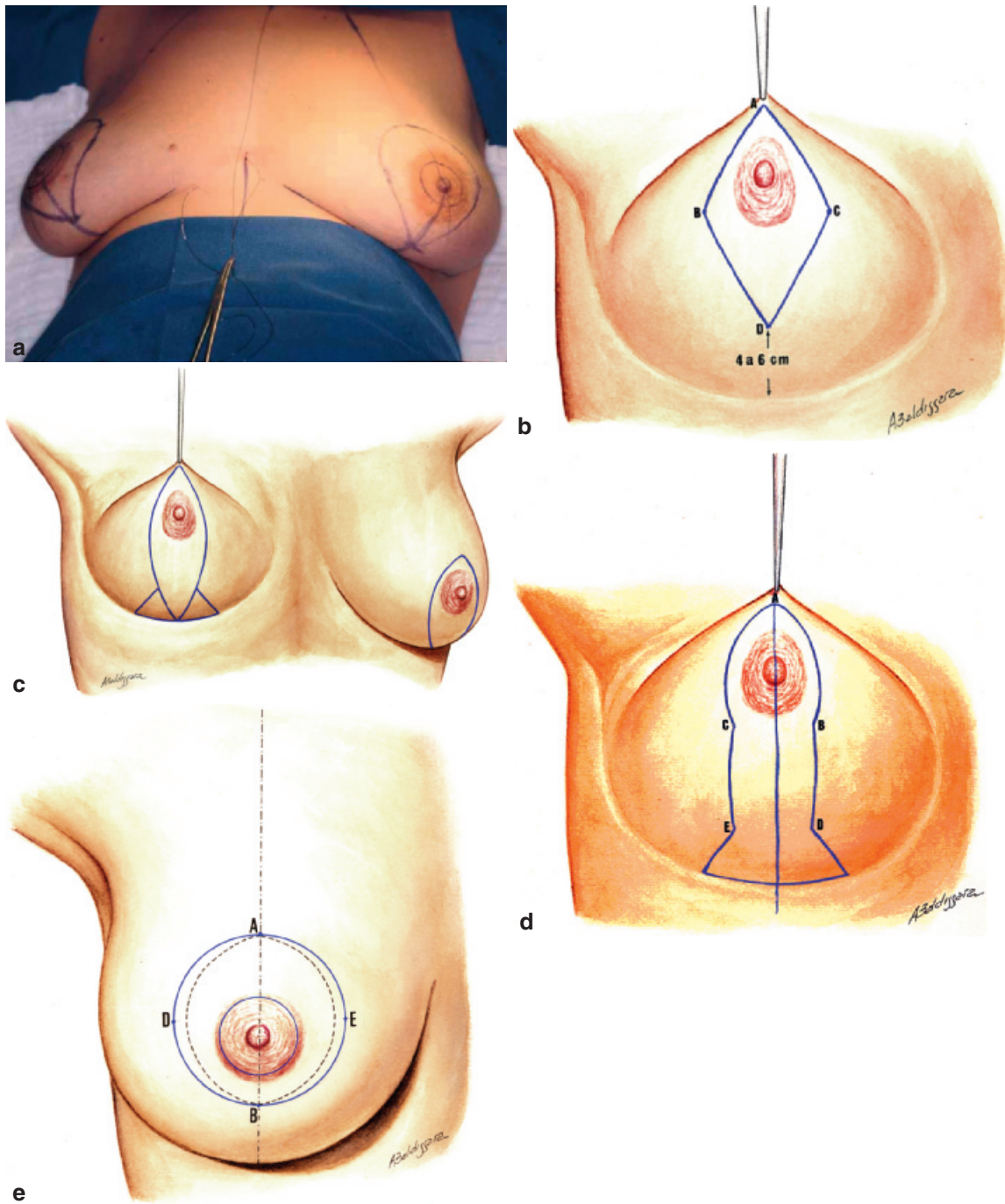
Fig. 15.1 (**a**) Preoperative marking. Note "dome-shaped" supra-areolar design. (**b**) Lozenge marking. Note that distance ACB equals the circumference of the areola. (**c**) Alternative markings. (**d**) Alternative markings. (**e**) Circumferential marking
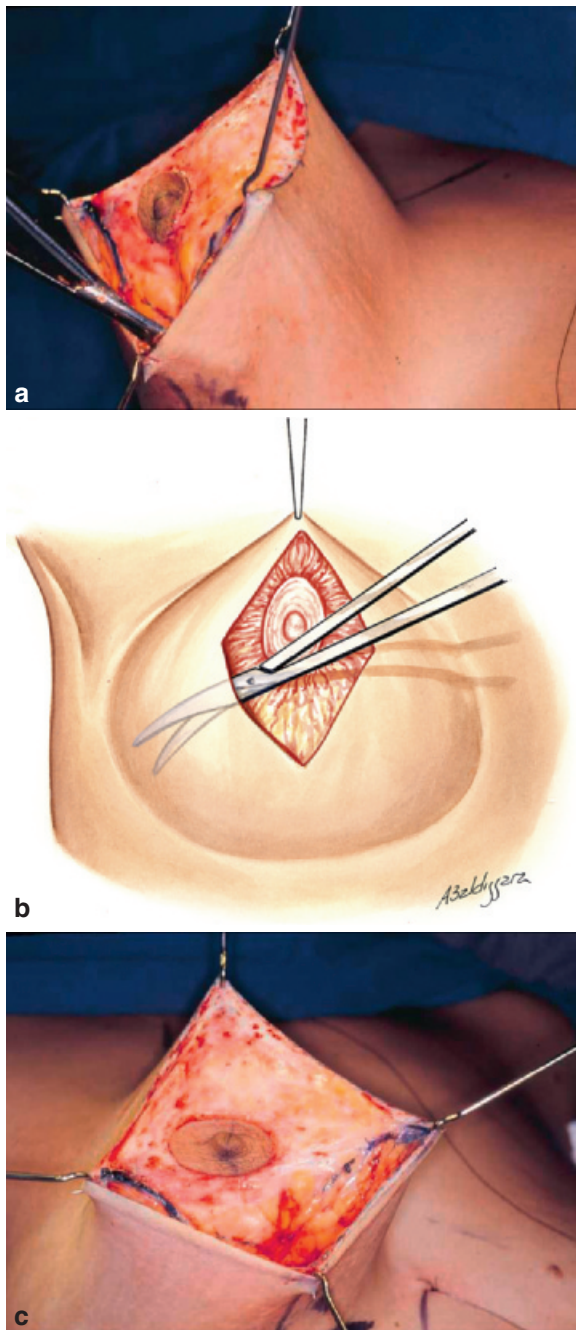
Fig. 15.2 (**a**) Intraoperative view. (**b**) Skin-glandular undermining. (**c**) After skin-glandular undermining

careful hemostasis, the breast is raised by a hook placed at the apex that remains throughout the shaping of the breast (Fig. 15.4).

The distal end of the central flap is sutured to the fascia pectoralis using three 2-0 Vicryl or Prolene sutures. The adequate length of the flap will prevent downward traction of the areolar complex (Fig. 15.5). The main purpose of this flap is to provide projection of the areolar complex and prevent a flattened aspect (Fig. 15.6).

The two medial and lateral horizontal flaps are rotated toward the hemiclavicular line and are transposed one over the other (Fig. 15.7). The placement of these flaps will determine the contour of the lower breast hemisphere, shape the lateral and medial poles, and narrow the base. Moreover, this maneuver defines the new submammary fold, besides helping to correct important breast asymmetries.

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 that 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 (Fig. 15.8).

Skin resection renders tension-free wound borders where the skin does not function as an outer brassiere. The areola is sutured by four Gillies sutures with 6-0 Prolene (Fig. 15.9).

15.5
Complications

During the initial development phase of this procedure, the authors observed three cases of partial steatonecrosis and one total steatonecrosis in the area of the central flap. This led us to always maintain a wide enough flap base while reducing the gland.

In three others cases, formation of nodules in the lateral region was observed, caused by partial steatonecrosis. Again, after limiting the manipulation of inferior and medial parts of the lateral flap, no further complication with regard to flap necrosis occurred.

In the early phase of using this procedure, there were 14 seromas in the area of the lateral pole. These seromas were mainly caused by liposuction of the thoracolateral region. On account of this, a second drainage is used for this region specifically.

During the last 20 years, the complications were limited to the so-called *minor* complications, such as hypertrophic scarring, especially in patients of African origin; the infection rate lies below 1.95%; partial skin dehiscence is below 1%, as well as hematomas is below 1%.

The occurrence of asymmetries in 18 patients in the later postoperative period was difficult to deal with. In 11 of these cases, a secondary reduction mammaplasty was undertaken to correct the asymmetry.

In 15 cases, the shape of the breast distorted 1 month postoperatively, because the lateral flap lost its internal fixation, causing the breast to shift laterally. All these cases were reoperated on, with satisfying results and no further complications.
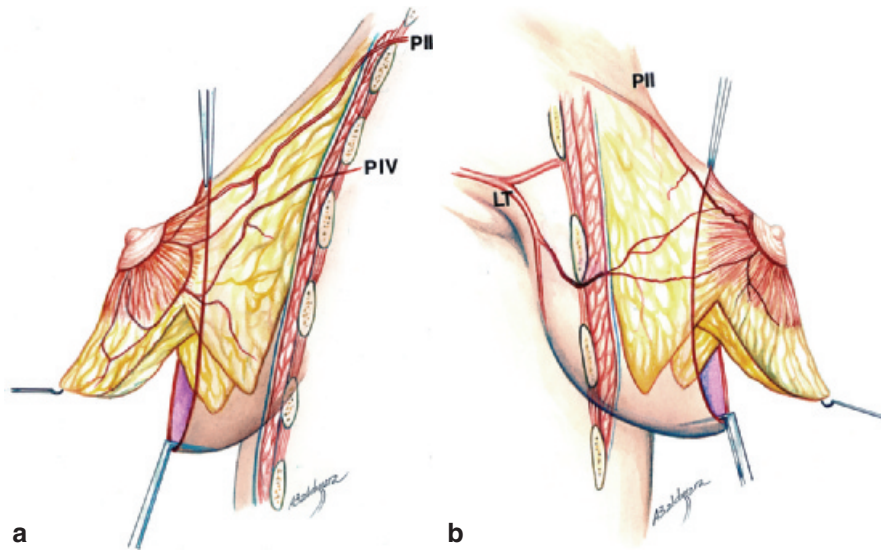
Fig. 15.3 (**a**) The skin surface area and the glandular tissue are considerably vascularized by the pII. It includes the upper portion of the breast, the nipple–areolar complex, and the subjacent antero-medial region. (**b**) Vascular network of the lateral artery
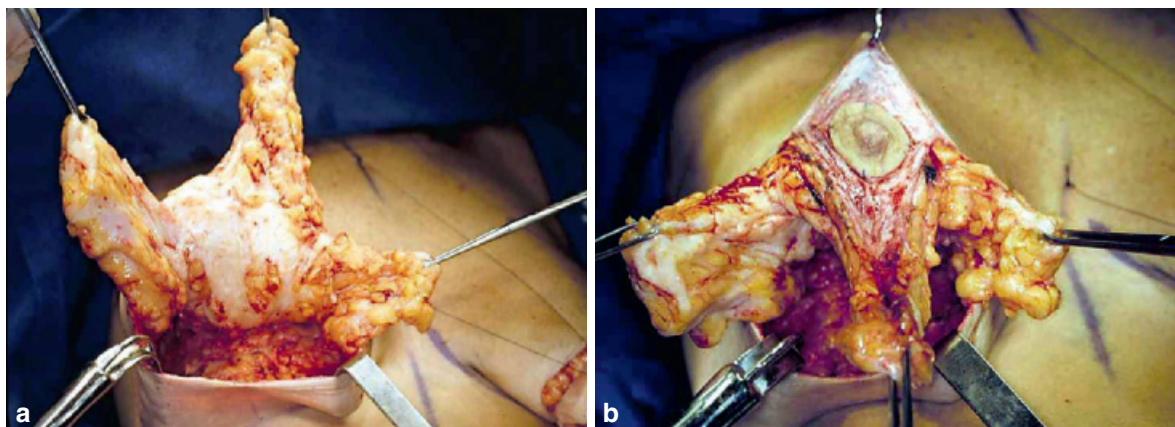

Fig. 15.4 (**a**) Central, medial, and lateral flaps. (**b**) Central, medial, and lateral flaps
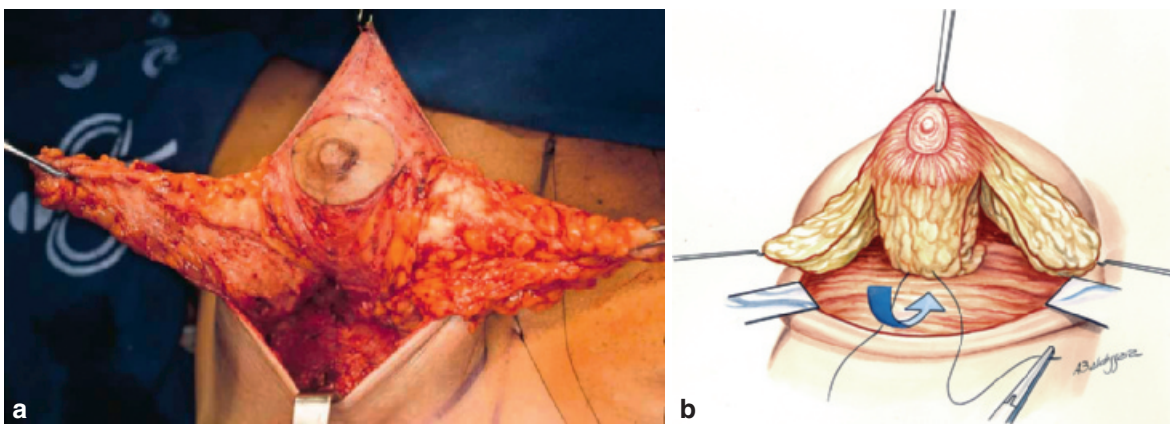

Fig. 15.5 (**a**) Positioning of the central flap. (**b**) Positioning of the central flap
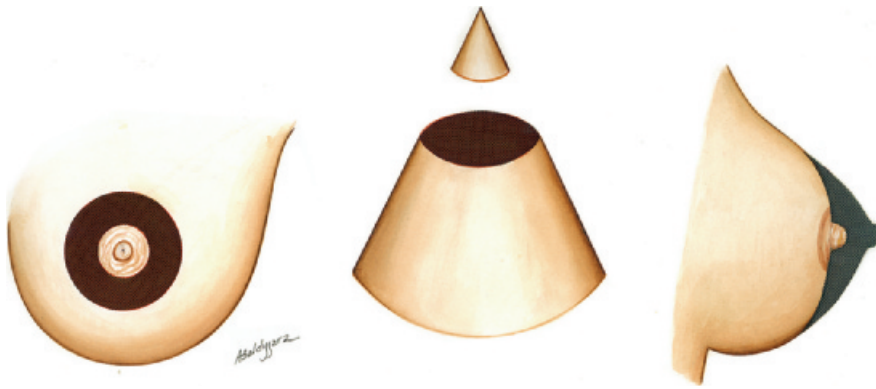
Fig. 15.6 Resections of circumareolar skin have a truncating effect on breast contour
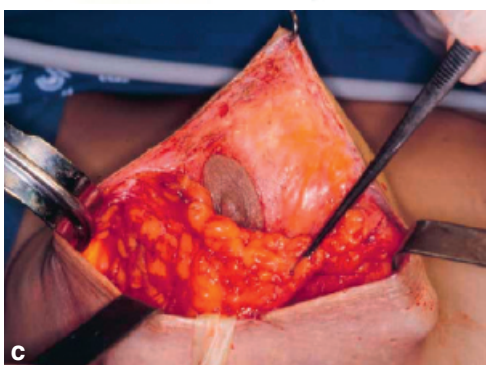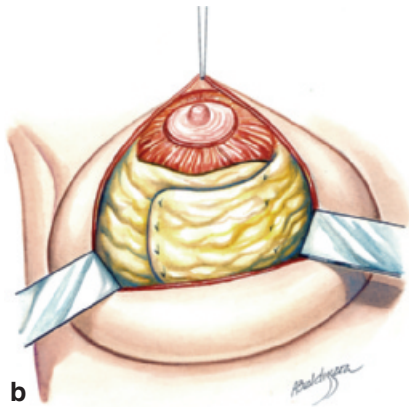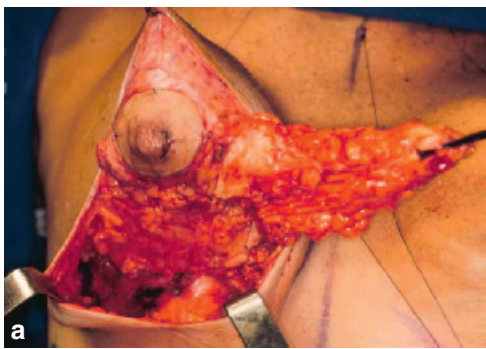

Fig. 15.7 Shaping the breast. (**a**) Interposition of lateral and medial flaps. (**b**) The interposition of the medial and lateral flaps sustains the breast and plays a crucial role in reshaping the gland. (**c**) Positioning of the lateral flap
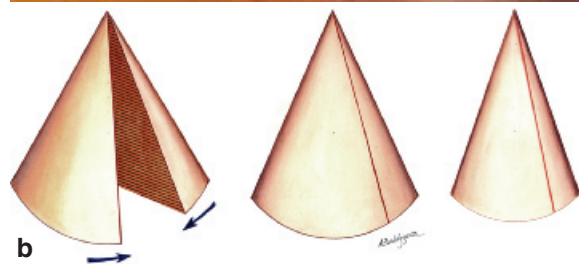

Fig. 15.8 (**a**) The breast shape is sustained even before being sutured to the skin. (**b**) The one-dimensional sector excisions from a cone, when carried out to an extreme, result in a shape of a spire

With regard to nipple sensitivity, the study the authors undertook in 1999 [36] showed a temporary decrease in 12% of the patients. In all these cases sensitivity recovered within 6 months.

15.6
Discussion

The goal of this technique is to provide a stable shape of the breast by forming a glandular cone. Consequently, the skin covers what has been shaped, without tension
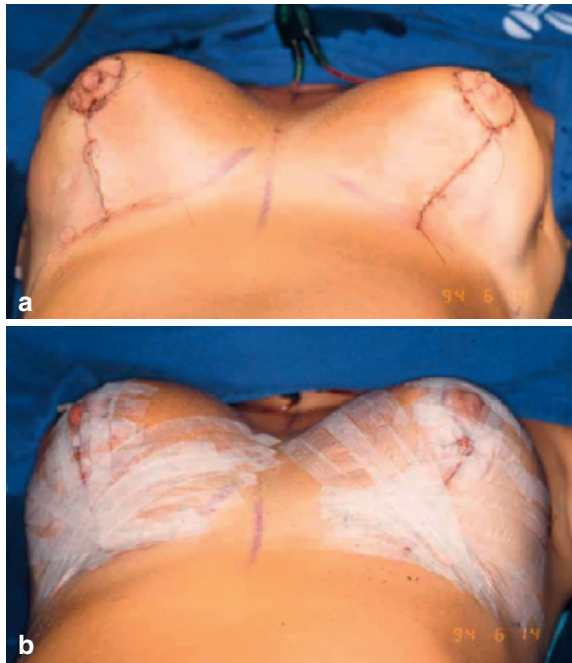
Fig. 15.9 (**a**) Completion of subcuticular and intradermal suturing. (**b**) During the first four postoperative weeks, the dressing substitutes a brassiere, which is recommended to be used only for 30 days after the operation

accommodating the ideal condition for the scar to heal. Postoperatively, the reshaped breasts proved to be stable and kept the desired conical shape in the long run (Figs. 15.10 and 15.11).

When used in narrow-based or slightly wide breasts, standard techniques generally produce good results. Many of these are Lexer-Kraske type methods that approximate the lateral and medial pillars after wedge dissection [2, 3, 6, 12, 33, 37–40]. However, they often do not yield a satisfactory and stable result when applied to large-based, pendulous breasts with inelastic skin [41, 42]. The reason for the breasts to relapse into their former ptotic shape is the fact that 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" [23, 43–45]. The authors believe that the forming of a narrow-based breast together with the 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 a more fibrous content of the breast; the breast content will be firmer, especially in those cases where liposuction has been used to reduce the fat content of

the gland. And most important, the formation of lateral and medial flaps which are rotated towards the hemi-clavicular line and are transposed over each other creates an inner "brassiere," thereby giving the necessary inner support to prevent the breasts from relapsing into their former shape. One may argue that some of the heavy pendulous breasts have a substantial fat content and that the creation of a cone more or less consisting of 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" [46]. Nevertheless, in our experience the indication for this procedure tends to be an exception in primary reduction mammaplasties, and is mostly applied to secondary reduction mammaplasties of breasts, which relapsed into their old ptotic shape and are dominated by a high fat content of the gland and inelastic skin.

The triple flap interposition technique involves glandular undermining from the pectoralis fascia. The axial blood supply of the flaps has to 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 breasts to atrophy in the postoperative period. This observation led the authors to reduce breast volume more conservatively in these breasts 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 could be a secondary reduction mammaplasty using the triple flap interposition technique with or without the use of a pectoralis muscle flap.

Reports on liposuction as the sole procedure in the reduction of a hypertrophic breast are encouraging, though they lack large patient numbers [47, 48]. Nevertheless, in certain cases, liposuction alone achieves excellent results in breast reduction. It is evident that liposuction is not a tissue selective procedure with fat, glandular, and to a lesser extent supportive tissue being removed. It is thus possible to reduce a "glandular" breast as well, though in this case liposuction is more difficult and time consuming. Consequently, the authors do not limit liposuction to a breast with a high fat content per se.

The cutaneous–glandular undermining proposed by this technique allows complete visualization and manipulation of the various breast segments and consequently favors the treatment proposed. However, one has to avoid undermining the whole inferior hemisphere per se. Specifically, when the skin resection yields an inverted T scar, unnecessary wide undermining will cause skin necrosis in the conjunction area of the skin flaps. 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.
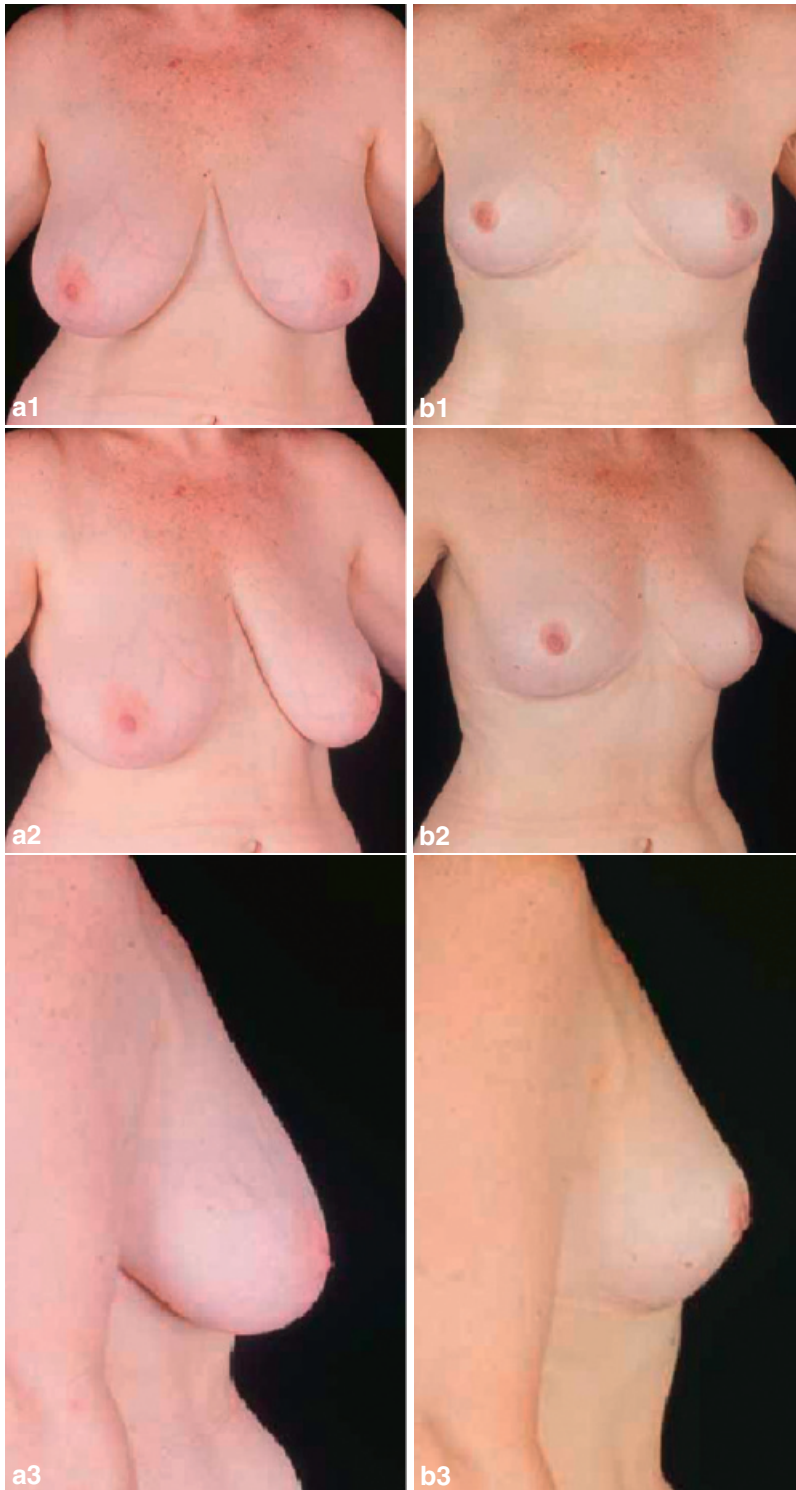
Fig. 15.10 (**a**1-3) Preoperative 62-year-old patient. (**b**1-3) Two years postoperative

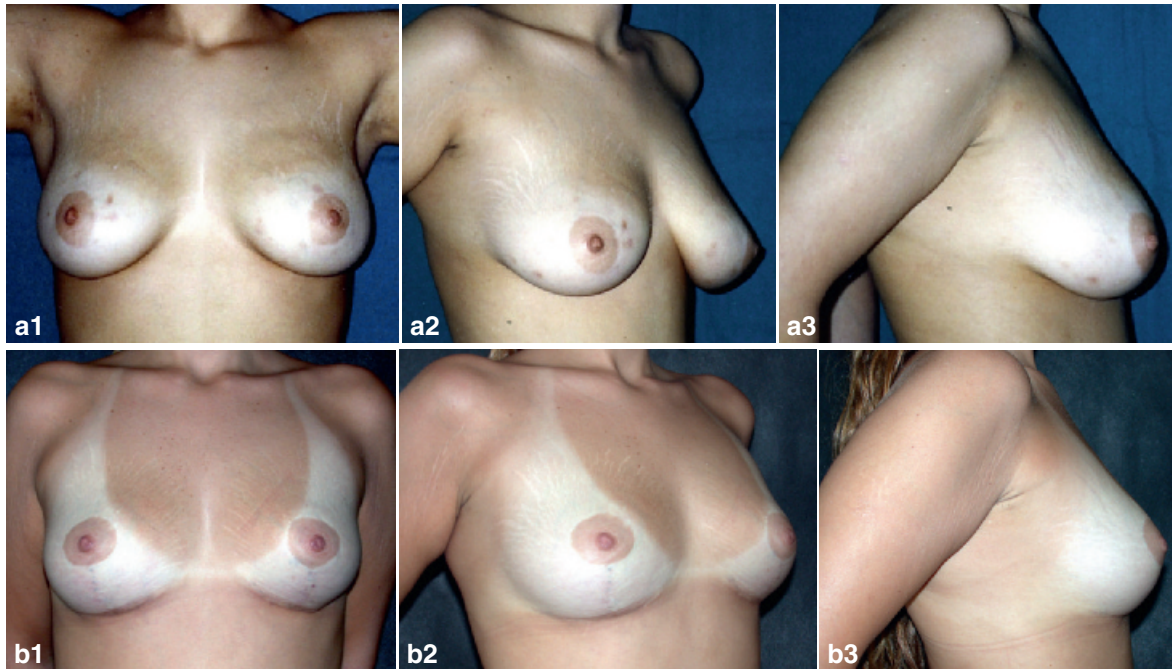**Fig. 15.11** (**a**1–3) Preoperative 19-year-old patient. (**b**1–3) nine years postoperatively

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 [48, 49]. The creation of the central flap that relies on the upper based flap for blood supply provides the volume that is needed in the central and upper part of conical-shaped 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 the glandular tissue, that is to say the breast will become ptotic again as the glandular tissue will slide, along the pectoralis fascia, downwards, as other authors have reported [8, 10, 22, 45, 50, 51]. 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 conical shaped gland, the new submammary fold ideally lies 2–3 cm above the old. If not, there is 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 two postoperative months, the breast descends by approximately 2–3 cm. Consequently, the distance between areola and submammary fold will enlarge 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 for the breast to descend, that is, the submammary fold to settle at a lower place, 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. 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 authors' opinion, the technique is not more difficult to learn than other techniques. The creation of three flaps might sound complicated, but actually it only means that after dissection from the pectoralis fascia, the gland will be divided into three parts. A fixed, predetermined tissue excision pattern is advocated by many authors who often point out that residents will find it easier to adhere to fixed pattern during an operation [32, 36, 37]. However, it is exactly the "pattern" that often hinders the younger surgeon to really grasp the operation technique, as she or he just has to cut along the markings. With predetermined tissue excision patterns without skin undermining, the skin tends to be excised at an early operation state, that is, before the gland has been reshaped. In triple-flap interposition technique, skin excision takes place only after glandular shaping has taken place.

In cases of asymmetric breasts, it is easier to obtain a symmetric result with three flaps to shape the breast in comparison to techniques that use a wedge resection and approximation of two pillars.

15.7
Conclusions

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 shaped breasts.

The Lexer-Kraske type methods reduce the volume but often fail to alter the nature of the breast form. As a consequence, they tend to resume to their former shape in the long run, 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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