

Liporeduction: A Faster and Safer Breast Remodeling Technique

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Background: Breast reduction is a time-consuming procedure with a relatively high complication rate. Furthermore, recurrent breast enlargement can occur in case of postoperative weight gain. The authors describe a breast reduction technique based on liposuction, followed mostly by skin resection alone, which makes this operation easier, faster, and safer, with more stable results.

Methods: Two hundred thirty-three patients were treated by breast liporeduction between 2006 and 2017, with an age range of 18 to 70 years (average age, 42 years). The patients were selected after careful clinical and instrumental assessment among those in whose breasts the fat component was prevalent over the gland. Most of the soft-tissue reduction consisted of fat aspiration. The follow-up ranged from 12 months to 9 years (average, 4.5 years).

Results: The results of this study have been extremely satisfactory. Most of the patients healed uneventfully and were happy with the final outcome. Very few complications were encountered, among which were small steatonecroses and partial nipple-areola complex necroses.

Conclusions: For the past 15 years, all four authors have preferred this breast reduction technique over others. Fat only is selectively removed by aspiration with a blunt cannula, sparing the vascular network and easily mobilizing the nipple-areola complex. Liporeduction provides a good stable result because any postoperative weight variation will not change the volume of a breast consisting mainly of glandular and fibrous tissue. (*Plast. Reconstr. Surg.* 149: 00, 2022.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

Identifying an effective and safe technique to reduce voluminous breasts has been an important issue since the early days of plastic surgery. Obtaining breasts with correct size, that are ideally positioned, and with minimal scarring and complications has been the goal. Since the beginning of this type of surgery, from the end of the nineteenth century, and up until the present time, the focus has been primarily on the type of scar and pedicle most suitable for avoiding ischemia. Various techniques were proposed and revisited, ranging from purely periareolar, to a combination of periareolar and vertical, inverted-T, transverse and periareolar without vertical, together with a wide number of variants.¹⁻⁸

Only rather recently have the different breast tissue components become of interest, highlighting that it is not always essential to reduce the

gland, but in most cases it is possible to sculpt the breast by selectively reducing the fat and then removing the excess skin.⁹⁻¹¹ Credit for having gone down this new pathway first goes to the Belgian plastic surgeon Madeleine Lejour, who, in addition to promoting the so-called vertical technique, introduced the option of partially remodeling the breasts with liposuction.^{12,13} Taking this concept to the extreme, her pupil, Marwan Abboud, proposed a breast reduction based exclusively on liposuction without any skin resection,¹⁴ to which he has also lately been adding internal breast reshaping by means of suspensory threads, thus allowing a virtually scarless procedure. Similarly, Roger Khouri¹⁵ proposed reducing the breast volume by fat removal and remodeling it through a suspension suture.

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AQ14

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The present article introduces an easier technique, combining volume reduction by liposuction with skin “tailoring,” to correct any type of breast hypertrophy including gigantomastia. While appreciating the concepts of Abboud and Dibo¹⁴ and Khouri,¹⁵ the authors believe in most cases skin elasticity in hypertrophic breasts is not sufficient to allow adequate retraction after volume reduction. Therefore, they propose first selectively aspirating the fat and then, after appropriate soft-tissue remodeling (when necessary), removing the skin excess. In most cases, this quick and easy technique will provide excellent results. Precise preoperative markings for skin resection and fat aspiration with cannulas of rather large diameter (3 to 5 mm) are crucial aspects.

PATIENTS AND METHODS

Two hundred thirty-three patients were treated by liporeduction from 2006 to 2017 by four different surgeons (G.B., C.B., A.A., and M.P.), with an age range between 18 and 70 years (average age, 42 years). Among the inclusion criteria, the fat-to-gland ratio was the most important. For this purpose, each patient underwent careful clinical examination, ultrasound, and mammography (only for patients older than 40 years). In selected cases, by radiologist’s request, a magnetic resonance imaging scan provided further instrumental assessment. This screening allowed selecting and including the cases in which the fat component was prevalent, and excluding those with mainly glandular breast tissue. Patients with neoplastic disease and those who had already undergone reduction mammoplasty by other techniques were also left out. The latter exclusion allowed obtaining a more consistent series. It should be noted that the proposed technique can be safely used in patients who have been previously operated on, making the type of pedicle used in the primary intervention a less important issue. In fact, this technique is particularly suitable in secondary cases in which the used pedicle is unknown because it maintains an intact blood supply and selectively reduces the adipose component. In these instances, it is advisable to wait at least 1 year after the primary procedure to make sure the tissues have been completely revascularized. Two different approaches were used: in case of moderate reduction with acceptable skin elasticity, a purely vertical technique was chosen, whereas in other cases, an inverted-T technique was adopted. Experience kept the authors from using a purely vertical technique in the larger reductions in the

attempt to avoid further postoperative revisions. The follow-up ranged from 12 months to 9 years (average, 4.5 years).

Objective and Subjective Evaluation

To evaluate the results of this series, the authors used both a subjective and an objective method. The subjective method consisted of sending a questionnaire to all patients 1 year postoperatively, when the results of the procedure could be considered stable (Tables 1 and 2). For an objective evaluation of the result, a jury of three independent surgeons examined the preoperative and postoperative photographs, grading each result from 1 to 10, representing the overall quality of the outcome and the symmetry and visibility of the scars (Tables 1 and 2).

T1, T2

Surgical Technique

Preoperative Planning

The first step involves marking the patient in the standing position. The new nipple-areola complex position is determined according to standard rules. However, in the experience of the authors, it is better to place it approximately 1 cm lower, when choosing a purely vertical technique. In fact, in this case, the stability of the new position will be maintained more than with the inverted-T approach. With the latter, the distance between the nipple-areola complex and the inframammary fold will vary in the first 12 months after surgery, with a progressive lengthening that can reach up

Table 1. Results of the Self-Assessment Questionnaire Sent to All Patients (n = 233) with an Explanatory Letter for Evaluation 12 Months after the Intervention

	Subjective Evaluation 12 Mo after Surgery*
General level of satisfaction†	8.1 ± 1.4
Intensity of postoperative pain	2.3 ± 1.2
Scar quality	7.8 ± 1.4
No presence of preoperative-to-postoperative asymmetry, %	97.3
No change in breast volume following any further weight loss or weight gain, %	98.5
Consistency of the breasts, %	
Natural	73.4
Soft	21.3
Firm	5.3

*Data are expressed as mean ± SD.

†The general level of satisfaction was an overall score above 8 (range, 1–10); more than 85% of the patients had an average score between 8 and 9 (as shown in Fig. 8). The intensity of postoperative pain (≤ 2.5) and the scar quality (≥ 7.5) emphasize the general high level of satisfaction. According to 97.3% of the patients, preoperative-to-postoperative asymmetry is not present, and 98.5% confirm the absence of change in volume attributable to weight loss or gain. It should be noted that only 5.3% confirm the firm consistency of the breasts.

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Table 2. Objective Evaluation*

	Surgeons' Evaluations (I, II, and III)†		
	I	II	III
Overall quality	8.0 ± 1.1	8.3 ± 0.9	7.8 ± 2.1
Symmetry	9.1 ± 0.4	8.8 ± 1.1	8.5 ± 1.4
Scar visibility	7.9 ± 1.3	8.4 ± 1.0	7.7 ± 1.6

*Data are expressed as mean ± SD.

†Result of the objective evaluation was performed by three independent plastic surgeons. The overall quality obtains an average score of 8 according to the view of the patient's subjective evaluation. The statistical test proves that the symmetry and the scar visibility are rated with a total score between 7.7 and 9.1 with a low amount of dispersion (maximum SD ± 1.6).

to 2 cm.¹⁶ In the vertical technique, the markings are made as described by Lejour and Abboud (and Lassus),¹³ taking care to place the lower end of the vertical incisions at least 2 to 3 cm cephalad to the original inframammary fold. In the inverted-T approach, preoperative planning does not differ from that classically described by various authors.^{17,18}

Following the above rules, in both cases, the midline, the position of the original inframammary fold and the meridians of the two breasts (which, at the inframammary fold level, are normally 11 to 13 cm from the midline, depending on the chest circumference), is traced. The next step involves demarcating the peripheral incisions of the new areola. For this purpose, a wire pattern of the same length as the circumference of the new areola is used. In most cases, an areolar diameter of 4.5 cm requires a wire of 14 cm. The Aufricht maneuver, which involves pushing the breast medially and laterally, will allow marking the vertical incisions; they go from the two lower ends of the outer periareolar incision toward the crossing between the breast meridian and the inframammary fold. In case of purely vertical technique, the two vertical lines join at the breast meridian approximately 3 cm above the inframammary fold. In the inverted-T technique, the length of the two vertical incisions is proportional to the final breast size, normally ranging from 6 (B cup) to 8 cm (C cup). Even if one opts for an inverted-T, after the volume reduction, the new inframammary fold will be higher than the original one, often by 3 to 4 cm. Therefore, to avoid long, low, and visible scars (not hidden by the bra), and to allow creating geometrically correct markings, it is useful to draw the two lower transverse lines, which converge laterally and medially with the upper ones, above the original inframammary fold (on a supine patient). This will provide not only a correctly positioned new inframammary fold, but also will limit the length

of the transverse scar. Furthermore, by placing the lateral and medial ends of the horizontal marking cephalad to the inframammary fold, it will be easier to obtain two isosceles triangles the identical sides of which will be sutured together at the end of the procedure.

All patients were operated on under general anesthesia. The breasts were infiltrated to reduce postoperative pain and improve hemostasis. The solution contained mepivacaine (0.2%) with adrenaline (1:500,000); moreover, 500 mg of tranexamic acid was added to every 500 ml of fluid. For medium breast reductions, approximately 200 ml of infiltration per side were used, which was increased to 500 ml in cases of gigantomastia, when removing over 1 liter of fat per breast.

The technique first involves skin incisions along the peripheral markings and around the areola. [See [Video 1 \(online\)](#), which demonstrates the different steps of breast liporeduction.] Then, the upper part of the keyhole-shaped area is deepithelialized. In the cases treated with an inferior pedicle, the lower pole is also deepithelialized. In the majority of cases, though (at least 95 percent), a superior pedicle or superomedial/lateral pedicles were used.

Even if a superior pedicle is used, it is always useful to deepithelialize a 1-cm-wide strip along the lower incision lines as well, to facilitate and stabilize the final suture. At this point, two small stab incisions (preferably in the skin that will then be removed), a medial one and a lateral one, allow introducing the liposuction cannulas. To avoid passing through the same tunnel too many times, it is useful to start with a thinner cannula (3 mm) and then move on to a cannula with a larger lumen (4 to 5 mm) ([Fig. 1](#)).

In moderate reductions, liposuction should be mainly carried out on the lateral quadrants and lower pole, whereas the superomedial area is initially left intact and remodeled, only if necessary, at the end of the procedure. In large reductions, it is better to start with direct surgical excision from the areas that will certainly have to be reduced (e.g., the lower pole for a superior pedicle or the upper pole for an inferior pedicle).

Then, liposuction is performed, especially in the lateral quadrants and in the axillary extension. The areas in which the pedicles slide must instead be aspirated with caution. Except for moderate reductions, where liposuction alone often allows for adequate relocation of the nipple-areola complex, in most cases, the dermis will have to be incised, and often these incisions are carried down toward the fascia to sculpt a true

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Fig. 1. Fat is selectively removed from the superolateral quadrant of the left breast. In this case, manual liposuction with a 4-mm cannula connected to a syringe is performed. It is not unusual to aspirate more than 1 liter of fat per breast.

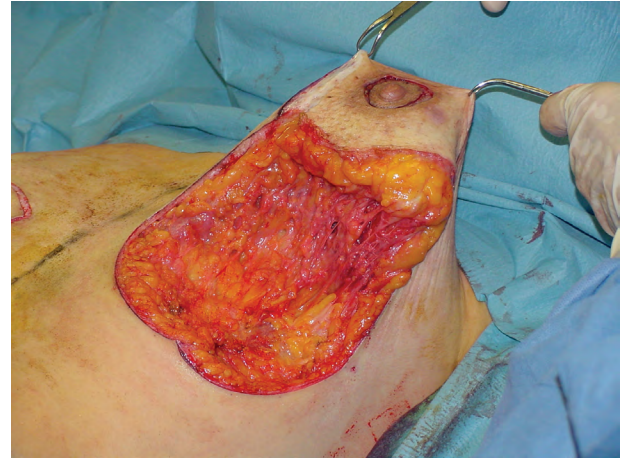


Fig. 2. The residual glandular parenchyma and the tunneling after liposuction are shown. The mobilization and relocation of the nipple-areola complex with this technique depends not so much on pedicle selection as much as on an adequate liposuction of the area, with complete preservation of its vascularity.

areola-bearing pedicle and to move the nipple-areola complex more easily. The mobilization and relocation of the nipple-areola complex with this technique does not depend so much on pedicle selection as much as on an adequate liposuction of the area with complete preservation of its vascularity (Fig. 2). Nipple-areola complex mobilization is mainly made possible by fat aspiration, which facilitates the operation, regardless of the pedicle choice. When the amount of removed adipose tissue seems to be adequate, temporary sutures or staples will set the areola in the new position joining the wound margins.

If the shape and volume are satisfactory, provisional sutures can then come out. If necessary, the residual excess of the lower or upper portion of the breast (depending on the chosen pedicle), skin included, will be removed. Then, the deep sutures are placed, among which the ones joining the pillars are particularly important, and finally the intradermal ones. [See Video 2 (online), which demonstrates liposuction, lifting and reshaping of breast tissue, mammary pillar reconstruction, and skin suture.] If, in contrast, at the provisional assemblage, the breast appears to have inadequate projection, in the superior pedicle technique, it will be sufficient to mobilize the residual intact breast tissue of the inferolateral quadrant, initially spared from liposuction. This glandular-adipose flap is repositioned superomedially and fixed to the pectoralis major, like in an “autoaugmentation,” until a satisfactory shape is reached. [See Video 3 (online), which demonstrates breast reshaping with liposuction and autoaugmentation technique.] Instead, in the case of inferior

pedicle, the residual tissue has to be remodeled and partially folded onto itself, for better breast contour, projection, and stability.

Polyglactin 2-0 sutures are placed in depth, whereas polyglactin 3-0 is used intradermally, taking care to bury the knots. Finally, instead of completing the suture with a knot, which would be too superficial, the needle is guided back along the same line and then taken out through the skin, and the suture is cut very short. The surgical wounds are covered with very resistant sterile adhesive strips, to be changed by the operator 1 week later and by the patient every 15 days for the following 3 months. This allows keeping the wound margins perfectly adjoined with less tension, thus preventing diastasis.

RESULTS

The results obtained with this method have been extremely satisfactory (Figs. 3 through 7). [See Video 4 (online), which shows a 58-year-old female patient. In the right breast, 570 ml of fat was removed by lipoaspiration, and 130 g of breast tissue, including the skin, was removed by direct resection. In the left breast, 640 ml was removed by liposuction and 150 g was removed by surgical excision. Postoperative result 12 months after surgery is shown. See Video 5 (online), which shows that in a 47-year-old female patient, the breast volume was reduced exclusively by aspirating 550 ml of fat per side while removing the extra skin. There is no doubt that without reducing the skin envelope, already redundant

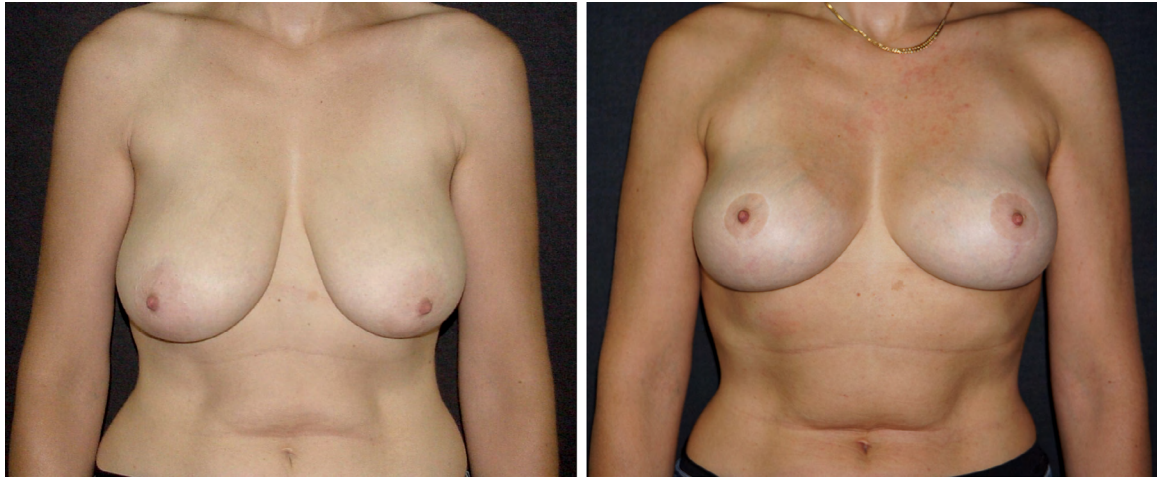


Fig. 3. (Left) Breast liporeduction. A 48-year-old female patient. In the right breast, 550 ml of fat was removed by lipoaspiration and 100 g of breast tissue, including the skin, was removed by direct resection. In the left breast, 600 ml was removed liposuction and 120 g was removed by surgical excision. Postoperative result 12 months after surgery is shown (right).

preoperatively, the ptosis would have worsened. Postoperative result 12 months after surgery is shown.] When using different pedicles, the addition of liposuction to reduction mammoplasty has made it easier to obtain an adequate shape, with rather inconspicuous scars and rare complications. The postoperative check-ups and the patient questionnaires revealed a high general satisfaction level (≥ 8), with a low dispersion from the mean value ($SD \pm 1.4$) (Fig. 8). The overall patient score (0 to 10) accounts for a rapid postoperative recovery, minimal pain, good scar quality, and absence of significant asymmetries. The expert judges confirmed these results as shown in the statistics in Table 2. The average score for

overall quality was 8, confirming the patients' subjective evaluation.

Complications

No major complications were observed. In two cases, two small areas of fat necrosis occurred, in which the fat liquefied and oozed out through a small wound opening. In one of the two cases, the dressings were changed every 2 to 3 days for 1 month until the end of discharge. Four months after surgery, the small segment of visible scar was excised and resutured. In the other case, to accelerate healing, the area was débrided, and a surgical revision was performed before complete reepithelialization. In another

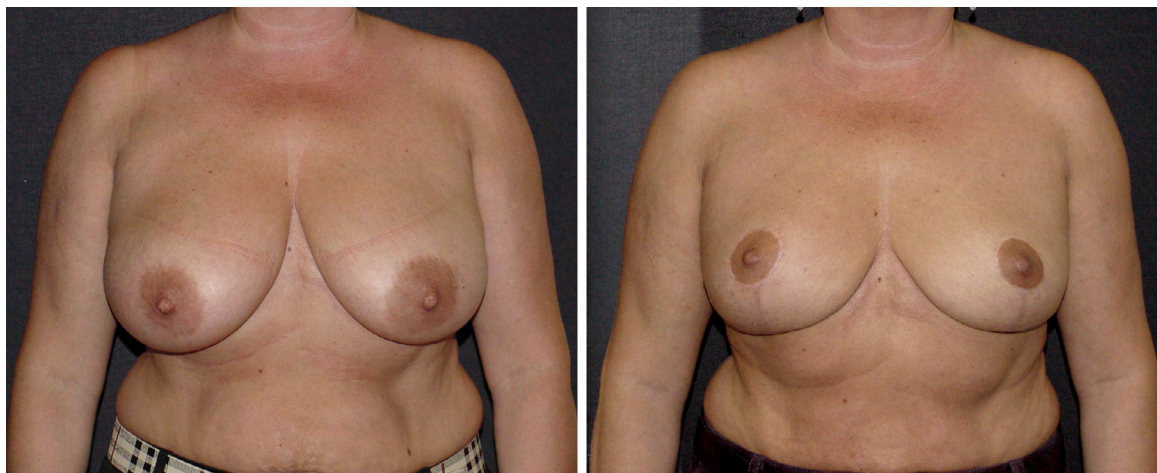


Fig. 4. (Left) Breast reduction performed mainly by liposuction. In this 55-year-old female patient, the breast volume was reduced exclusively by aspirating 450 ml of fat per side. Postoperative result 12 months after surgery is shown (right).

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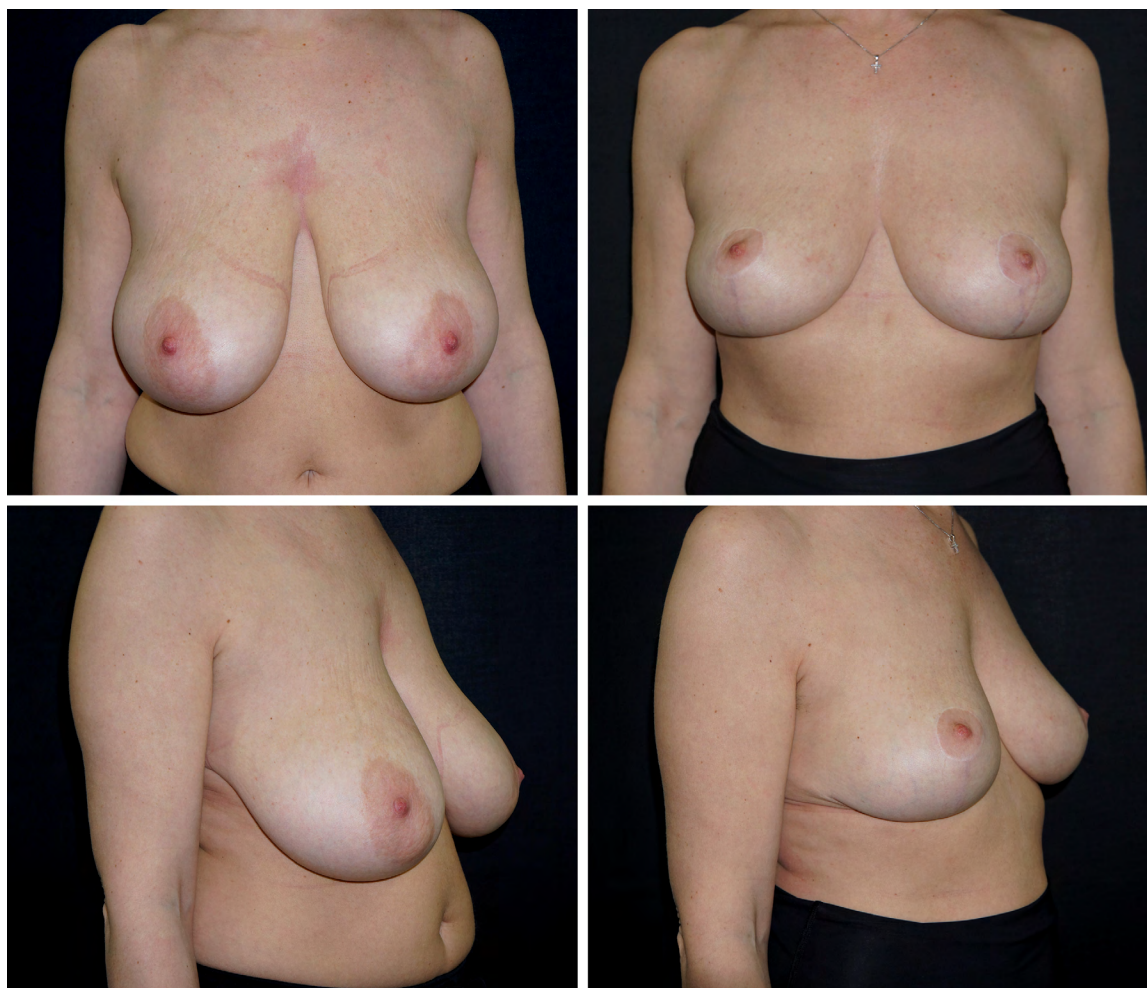


Fig. 5. (Above, left) Breast reduction and correction of severe ptosis (PAR 4/nipple-areola complex, 4) in a 44-year-old female patient. In this case, 630 ml of fat was aspirated from each side. The skin of these breasts was very thin and stretched, and it was necessary to remove it using an inverted-T approach. Postoperative result 24 months after surgery is shown (above, right). Preoperative three-quarters view of the same patient (below, left) and postoperative three-quarters view obtained 24 months postoperatively (below, right) are shown.

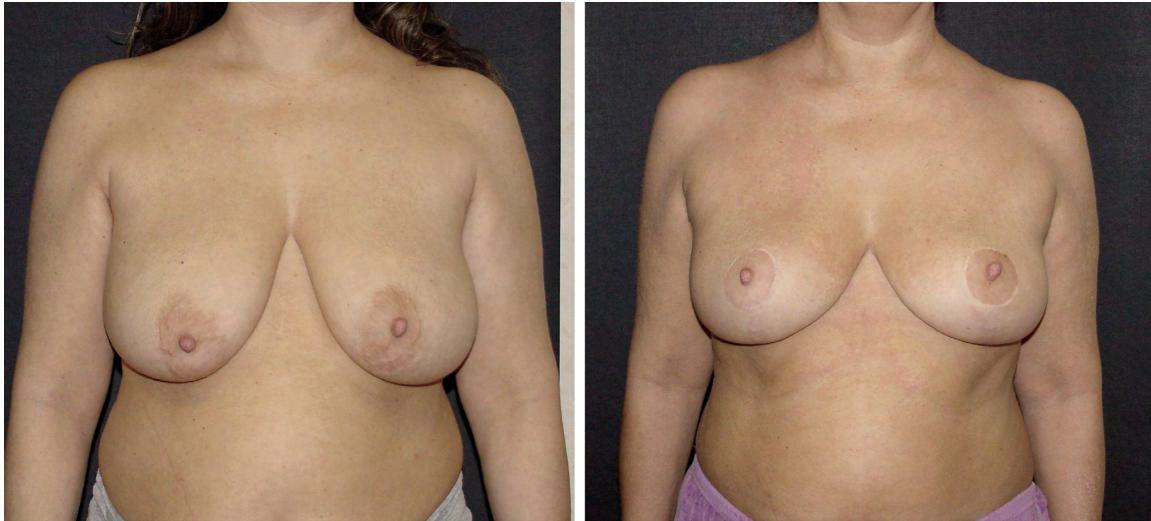
two cases, a few hours postoperatively, venous engorgement of the nipple-areola complex developed, possibly because of the considerable edema caused by liposuction. Immediate decompression was achieved by removing some sutures, and the area was treated with nitroglycerin paste. In both cases, complete healing occurred in approximately 3 months, after which the patients refused further corrections, being satisfied with the results (Fig. 9). In one case, a small hematoma (60 ml) occurred approximately 6 hours after surgery. It was immediately evacuated by means of a 3-mm blunt cannula connected to a 30-ml syringe. Finally, in one case, the surgeon revised a scar, which had widened at the crossing between the vertical and the transversal segment of the T.

DISCUSSION

Reduction mammoplasty has always been considered one of the more invasive and risky procedures in plastic surgery, because of the problems related to nipple-areola complex vascularization and the complex trauma suffered by the tissues. Because it presents many technical difficulties, the operator must be experienced.¹⁹

In fact, the literature contains several articles reporting major complications of breast reduction.²⁰⁻²³ The authors describe a technique based on liposuction followed mostly by skin resection alone, which makes this surgery easier, faster, and safer. Abboud and Dibo,¹⁴ as mentioned earlier, proposed a breast reduction technique based on liposuction alone, without any skin resection. However, according to the authors' experience, the skin of

Volume 149, Number 3 • Liporeduction



AQ6

Fig. 6. (Left) Moderate reduction in breast with converging CAC. In this 44-year-old female patient, it was sufficient to aspirate 160 ml of fat per side and then correct the ptosis and the nipple-areola complex position with an inverted-T procedure. Postoperative result 24 months after surgery is shown (right).

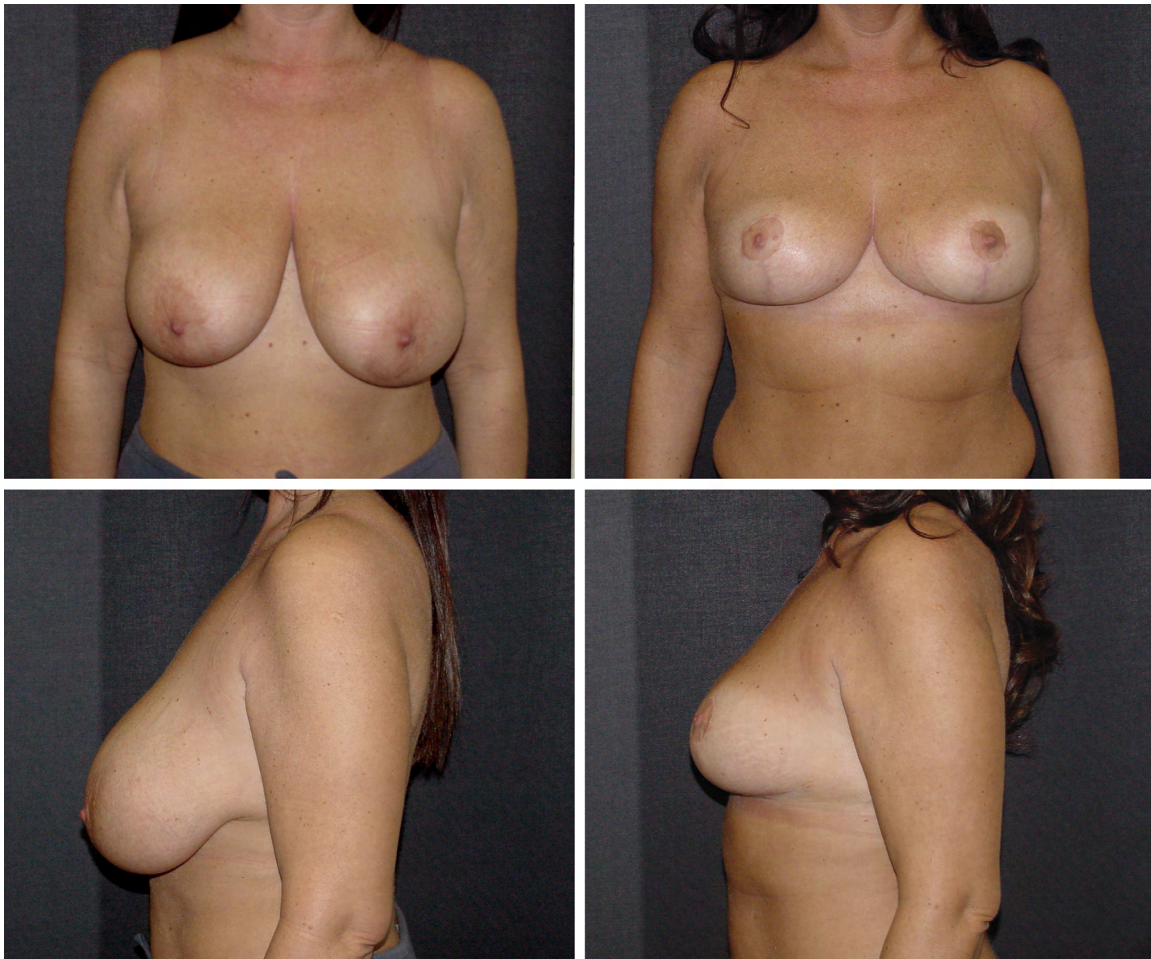


Fig. 7. (Above, left) Liporeduction in severe asymmetry. In this young woman (aged 34 years), 230 ml of fat was removed by liposuction on the right, and 150 g of breast tissue was removed with direct resection; on the left, 350 ml of fat was aspirated and 170 g was removed surgically. In this case, it was enough to resort to a purely vertical technique. Postoperative result 24 months after surgery is shown (above, right). Preoperative lateral view of the same patient (below, left) and postoperative lateral view obtained 24 months postoperatively (below, right) are shown.

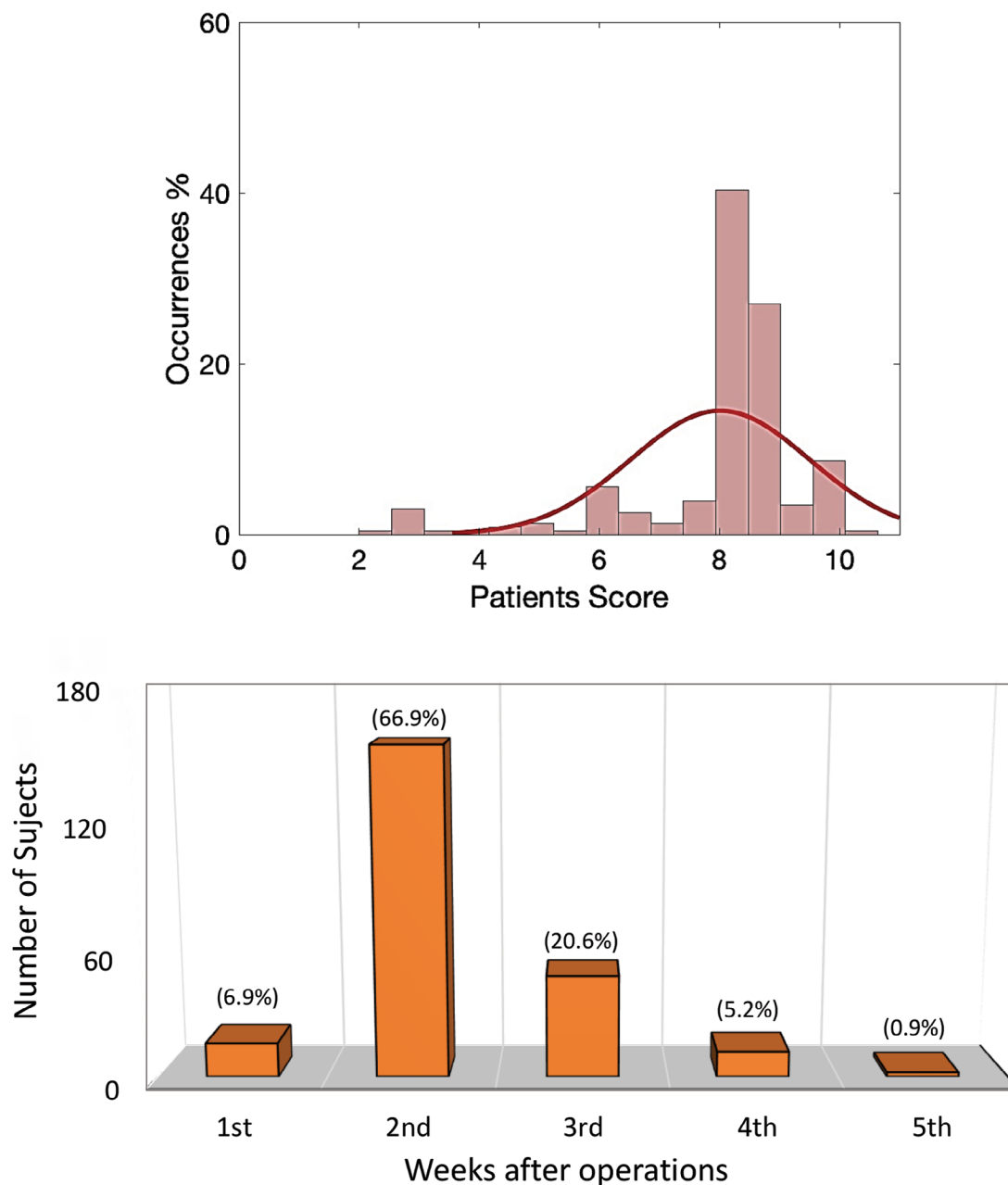


Fig. 8. The general level of satisfaction is described. (Above) The x axis represents the patient scores (0 to 10) and the y axis represents the occurrences as a percentage. The Gaussian curve shows a mean value of approximately 8.1, with a low-dispersion SD of 1.4. The occurrences (percent) indicate that more than 70 percent of the patients show a general level of satisfaction between 8 and 9. The statistical overview emphasized the high level of satisfaction. (Below) Bar graph showing the subject with the recovery time and resumption of work. The statistical method shows the number of subjects (y axis) and the number of weeks after surgery (x axis). Above each bar is shown the percentage of subjects. At the second week after the intervention, 66.9 percent of the patients are recovered; 219 patients declare the recovery and the resumption of work after the third week. Only 0.9 percent of the subjects are recovered after the fifth week.

hyperplastic breasts is often too inelastic to retract enough to fit a volume reduction and therefore needs excision at the end of the operation.

The first point to make is that this method avoids damaging most blood vessels. Although fat

only is selectively removed and the vascular network spared, the nipple-areola complex can be adequately mobilized. In addition, conservative fat aspiration along the vascular pedicle reduces to the minimum risks of vascular damage, allowing



Fig. 9. Partial necrosis of the areola. A few hours postoperatively, the areola already appeared dark. Despite the immediate decompression, obtained by removing some sutures, and the application of nitroglycerin ointment, part of the areola necrosed. It took approximately 3 months for the tissue to fully reepithelialize. The patient was nonetheless satisfied with the outcome and refused any further revisions.

adequate arterial supply and preventing venous engorgement. All this provided that, of course, the skin envelope is not overtightened.

The proposed method allows a very precise modeling of the different areas of the breast that are accurately “sculpted” in a gradual way to obtain a pleasant breast shape with full upper pole and correct volume. To eliminate overhanging ptotic tissue at the end of the operation, it is often advisable to remove a segment of skin parallel to the inframammary fold with its underlying residual soft tissues. This excision also can be modulated, until a suitable shape is achieved.

Soft-tissue manipulation is limited to the bare minimum, according to the case, as shown in two of the videos, where liposuction alone was carried out and followed by mere skin resection and suture. Only when necessary (e.g., to increase projection) are other maneuvers added.

This is normally a quick procedure, which can vary from 1½ hours, for a small reduction, up to 3 hours for gigantomastia, whereas traditional techniques are often much longer to perform²⁴ and may last up to twice the duration of a liporeduction. This is a great advantage, being well known that the length of the operation is inversely proportional to the complication rate.

An additional benefit of this technique is the stability of its results. In most other techniques, the adipose tissue is only partially removed; therefore, any incidental weight gain after the operation

may lead to a significant breast volume increase; conversely, using liporeduction, any postoperative weight variations will not alter the breast volume by much. In fact, after this type of operation, the new breast will consist mainly of glandular and fibrous tissue, whereas the fat component will be minimal if not virtually absent. As for the extension of the scars, the choice between purely vertical and inverted-T scar will depend on the degree of tolerance for possible revisions.

Although the authors used to favor the vertical scar technique, with experience, they have come to realize that pushing the indications of this technique too far often leads to the need for secondary operations. Therefore, currently, they opt for an inverted-T approach at the slightest doubt that a purely vertical approach may result in the scar extending too caudally or need any kind of future revision. In most cases, liposuction with surgical excision of the residual ptotic tissue allows a beautiful breast mound to be obtained, with adequate projection and shape, which, if need be, can be further improved by rotating local flaps or grafting fat. In this series, drains were inserted in 22 cases only (approximately 10 percent). To reduce the dead space, a transcutaneous hemostatic net suture, originally described by one of the authors (A.A.), can be useful. [See [Video 6 \(online\)](#), which demonstrates the hemostatic net suture.]

The authors believe that this technique is suitable for correcting 90 percent of breast

AQ13

hypertrophies. However, it is known that, after menopause, there is a natural involution of the glandular component, whereas adipose tissue tends to grow; therefore, breast liposuction is on average easier in older women than in younger ones, although also in fertile women the fat component may often be very significant. In postmenopausal patients, both cannula insertion and liposuction can sometimes be so easy that one may risk excessive emptying. In these cases, aspiration will require the same effort as in any other body region. In young women, in contrast, the procedure may be harder, the tissue being denser and more glandular. It will still usually be possible to perform a liporeduction, although less effectively, which will at least loosen up the dense central part of the breast. This maneuver will favor nipple-areola complex repositioning and facilitate final reshaping. Many use liposuction in breast surgery at the end of the operation for final touchups (e.g., with a thin cannula to eliminate dog-ears or to symmetrize minor volume differences). In this article, instead, lipoaspiration is the predominant strategy to reduce breast volume rather than a “refinement” tool. However, it is important to consider that a teenage patient with a predominantly glandular parenchyma is not the ideal candidate for this method, and better results may be achieved with traditional techniques.

CONCLUSIONS

The procedure proposed in this article consists of reducing hyperplastic breasts mainly through fat aspiration followed by residual soft-tissue excision and skin excess resection. It represents a valid alternative to traditional techniques. It has proven to be a fast and safe approach, able to guarantee stable results over time.

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REFERENCES

1. Hammond D, Loffredo M. Breast reduction. *Plast Reconstr Surg.* 2012;129:829–839.

2. Hall-Findlay EJ, Shestak KC. Breast reduction. *Plast Reconstr Surg.* 2015;136:531e–544e.
3. Hammond D, O'Connor E, Knoll G. The short-scar periareolar inferior pedicle reduction technique in severe mammary hypertrophy. *Plast Reconstr Surg.* 2015;135:34–40.
4. Swanson E. Mastopexy and breast reduction. In: *Evidence-Based Cosmetic Breast Surgery.* New York: Springer; 2017:121–156.
5. Fernandez S, Coady L, Cohen-Shohet R, Molas-Pierson J, Mast BA. Comparative outcomes and quality analysis of inverted-T and pure vertical scar techniques in superomedial pedicle reduction mammoplasty. *Ann Plast Surg.* 2016;76(Suppl 4):S328–S331.
6. Hall-Findlay EJ. Vertical breast reduction. *Semin Plast Surg.* 2004;18:211–224.
7. Bozola AR. Periareolar breast reduction. *Aesthetic Plast Surg.* 2009;33:228–234.
8. Lista F, Ahmad J. Vertical scar reduction mammoplasty: A 15-year experience including a review of 250 consecutive cases. *Plast Reconstr Surg.* 2006;117:2152–2165; discussion 2166–2169.
9. Moskovitz MJ, Muskin E, Baxt SA. Outcome study in liposuction breast reduction. *Plast Reconstr Surg.* 2004;114:55–60; discussion 61.
10. Lejour M. Evaluation of fat in breast tissue removed by vertical mammoplasty. *Plast Reconstr Surg.* 1997;99:386–393.
11. Moskovitz MJ, Baxt SA. Breast reduction using liposuction alone. *Semin Plast Surg.* 2004;18:225–229.
12. Lejour M. Vertical mammoplasty and liposuction of the breast. *Plast Reconstr Surg.* 1994;94:100–114.
13. Lejour M, Abboud M. Vertical mammoplasty without inframammary scar and with breast liposuction. *Semin Plast Surg.* 1990;4:67–90.
14. Abboud MH, Dibo SA. Power-assisted liposuction mammoplasty (PALM): A new technique for breast reduction. *Aesthet Surg J.* 2016;36:35–48.
15. London Breast Meeting, September 2019. AQ15
16. Botti G. *Aesthetic Mammoplasties Practical Atlas of Plastic Surgery.* 1st ed. Firenze: SEE editrice; 2008:383–395. AQ16
17. Fahmy FS, Hemington-Gorse SJ. The sitting, oblique, and supine marking technique for reduction mammoplasty and mastopexy. *Plast Reconstr Surg.* 2006;117:2145–2151.
18. Aufricht G. Mammoplasty for pendulous breasts; empiric and geometric planning. *Plast Reconstr Surg (1946)* 1949;4:13–29.
19. Kordahi AM, Hoppe IC, Lee ES. Reduction mammoplasty: A comparison between operations performed by plastic surgery and general surgery. *Eplasty* 2015;15:e41.
20. Lejour M. Vertical mammoplasty: Update and appraisal of late results. *Plast Reconstr Surg.* 1999;104:771–781; discussion 782–784.
21. Shestak KC, Davidson EH. Assessing risk and avoiding complications in breast reduction. *Clin Plast Surg.* 2016;43:323–331.
22. Cunningham BL, Gear AJ, Kerrigan CL, Collins ED. Analysis of breast reduction complications derived from the BRAVO study. *Plast Reconstr Surg.* 2005;115:1597–1604.
23. Kerrigan CL, Slezak SS. Evidence-based medicine: Reduction mammoplasty. *Plast Reconstr Surg.* 2013;132:1670–1683.
24. Beer GM, Spicher I, Cierpka KA, Meyer VE. Benefits and pitfalls of vertical scar breast reduction. *Br J Plast Surg.* 2004;57:12–19.