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INNOVATIVE TECHNIQUE

"Upside-Down" Augmentation Mastopexy

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Abstract
Background The author's wide experience with postbariatric body contouring pushed him to find a technique suitable for correcting the two most common defects of the massive weight loss (MWL) breast: hypotrophy and ptosis. For these defects, a technique selection algorithm has been created. According to the algorithm, the "upside-down" technique was developed for those cases with a diagnosis of "minor ptosis" (<6 cm of vertical nipple–areolar complex correction).
Methods The upside-down technique is performed as follows. (1) Complete subcutaneous undermining of the glandular upper pole to the upper edge of the mammary gland is performed. (2) After rotation around the edge, upside-down retroglandular undermining is performed, with great care taken to leave the inframammary fold and 2 cm of the gland undetached. (3) Topside-bottom implant insertion is performed with a "mailbox posting" action. The inframammary fold and the undetached gland act as a bra to prevent implant ptosis. The upper one-third of the prosthesis can be placed beneath the pectoralis major muscle with the "dual-plane" technique if a round implant is used or left completely retroglandular if an anatomic implant is used. (4) The type of implant needed (round vs anatomic) basically depends on the type of aesthetic defect. Major upper pole defects need round implants, and major lower pole defects need anatomic implants. The patient's preferences are a primary factor in the decision. (5) Breast lifting is performed through strong anchorage to the fascia, muscle, and second rib periosteum. At least three stitches of threaded nonabsorbable 0 or 1 suture are positioned. The whole lower gland pole is left undetached to guarantee blood perfusion (only 1 or 2 cm of periareolar incision are undermined). (6) Periareolar suture is always performed with the "interlocking" technique according to Hammond.
Results From November 2001 to May 2010, 231 patients underwent surgery using the described technique. The patients all were Caucasian with an average age of 38 years (range, 31–53 years), and all underwent surgery bilaterally. The mean operating time was 150 min (range, 120–180 min), and the mean hospital stay was 3.5 days (range, 2–5 days) after surgery. The ptosis recurrence rate was evaluated. A recurrence is identified when the nipple–areola complex slides more than 2 cm 1 year after surgery. The recurrence rate was 27.6% for other techniques versus 9.1% for the upside-down technique.
Conclusions Natural shape, stable position, and short scars are the main advantages of the upside-down technique. The typical breast flatness after periareolar access is best corrected by the last-generation dual-cohesiveness anatomic implants, which the author strongly recommends to obtain the best results with this technique. The Body Uneasiness Test (BUT) study showed 100% improvement of patient discomfort.

Keywords Augmentation mastopexy · Hypotrophy · Inframammary fold · Ptosis · Upside-down technique

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Recent decades have seen a progressive rise in postbariatric patients undergoing various body-contouring procedures. Among all the possible problems of this specific patient group, breast defects have appeared more and more peculiar, resembling postpregnancy breasts but with added problems caused by previous bariatric surgery [19]. As a matter of fact, the various degrees of malabsorption and denutrition caused by bariatric procedures can modify the histologic structure of the cutaneous and subcutaneous tissues, resulting in loss of elastic fibers and collapse of the cellular structure. This is the main cause of macroscopic tissue looseness and flabbiness.

As specific consequences in the breast, which often looks flattened and deflated, two main defects are always seen: hypotrophy and ptosis. Therefore, I was pushed to develop a suitable algorithm to deal with all the different degrees of defects in postbariatric breasts [20]. With this algorithm, for those cases of "minor ptosis" and those "lacking volume," the clinical evidence showed that no current techniques gave successful results in terms of shape, patient satisfaction, and recurrence rate. I therefore progressively applied modifications, finally developing the "upside-down" technique.

Materials and Methods

Inframammary Fold

Throughout many years of mammary defect corrections, I persuaded myself that the only anatomic breast structure to be considered firm and stable is the inframammary fold (IMF). As well described by various authors [3, 17, 21, 22], the IMF is a definite anatomic structure. Despite the collapse of all the other anatomic breast districts, the IMF remains at its place, and what frequently is defined as an IMF ptosis should be more properly called a "pseudoptosis." This assertion can be easily checked with a simple diagnostic handling (Fig. 1): stretching a ptotic breast forward will cause a "lifting of the IMF" (not the real IMF but only a skin crease that could be defined as a pseudo-IMF) up to the actual IMF, which can be palpated firm and stable, even in postbariatric patients.

Accordingly, it seems reasonable, while treating a breast that has lost almost every anatomic stability, to preserve the only stable structure. Whatever surgical correction is planned, the IMF should not be cut or weakened.

Ptosis Evaluation and Correction Planning

Several smart schemes for ptosis classification have been described by authoritative surgeons. I am generally convinced that it is more important to know where we are going than where we are coming from. Thus, the main effort in this field should be an attempt to understand the suitable position and shape of the future breast. I do this through the following steps:

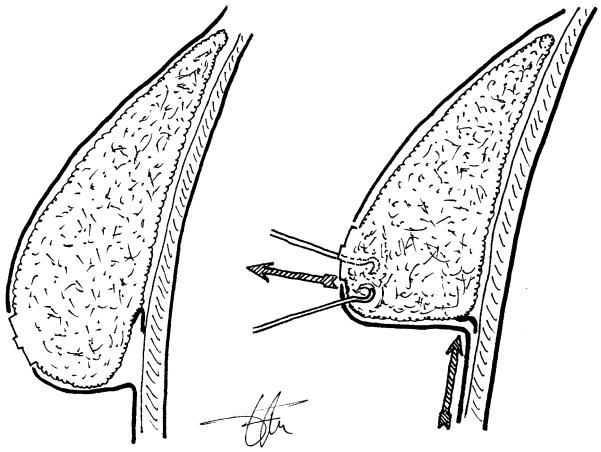

Fig. 1 Inframammary fold (IMF) detection. Breast ptosis does not affect the IMF, only the gland and skin (ptotic skin crease, *left*). If the breast is pulled forward (*right*), the skin crease slides upward and allows the IMF to be palpated

- Determine the real IMF position, as described earlier.
- The nipple vertical position should be at the IMF level (as described by various authors [1, 4, 15]) and should correspond more or less with half of the arm length (as described by other authors [10, 16]).
- The nipple horizontal position depends on the width of the chest and of the planned breast: usually it lies at 7–9 cm from the median chest line.
- Wherever the pseudo-IMF skin crease is located, the lower pole skin must be stretched until the real IMF can be identified and marked.
- Wherever the ptotic nipple is located, it must be moved to the projected location. If this distance is less than 6 cm, the upside-down technique can be applied, and the "egg" drawing must include the two positions, regardless of shape and orientation. The areola diameter depends on breast width, but it usually is 3.5–4.5 cm.
- The distance between the inferior areola edge and the real IMF skin crease (measured under stretching, from the IMF) must correspond with the inferior profile length of the selected implant and pass the pinch thickness test. The excess tissue must be included in the "egg" draw.

Volume

In the literature, I could not find a practical, reliable, and effective procedure for measuring breast volume. I have

empirically tried to use water displacement, submerging the breasts of the prone patient in a pot full of water and calculating the volume displaced. The result is good, but the method is very poorly tolerated by the patient, and the lack of an algorithm makes the results unusable.

If we do not know the volume of the old breast, and we have no idea about the right volume of the new breast (i.e., correspondence between volume, body weight and shape, height, age, and the like), the only thing we can focus on is the implant volume. Nevertheless, the decision must be determined on the basis of the surgeon's measurements and the patient's desires. The volume is not a starting point but a result. I proceed as follows:

- The *diameter of the implant* is obtained by the diameter of the emithorax, decreased by 1 cm for the intermammary crease, furtherly decreased by the pinch thickness test (for example: 15−1−2 = 12).
- The *height of the implant* (low (L), moderate (M), or full (F), related to the diameter of the implant) is determined by the patient's body structure, as smartly described [8], decreased by 2 cm (see "Technique" section).
- The *projection of the implant* should be determined by the patient's desires, even if the extra-projected implants are strongly suggested with the upside-down technique.
- The *volume* is derived by the aforementioned measures.

Implant

In the past, late complications were observed, derived from the association of mastopexy and implant, partly due to incorrect indications, partly due to poor choice of technique and partly due to inadequate implants. The complications all could be gathered into three main groups (Fig. 2):

1. *Bottoming out of the implant,* which usually is associated with damaging of the IMF or the use of inadequate implants (e.g., smooth surface or low aggressive texture, low cohesiveness gel, low profile).
2. *Sliding down of the gland* (or sliding up of the implant), which occurs mainly with submuscular positioning of the implant, providing two different degrees of firmness between implant and gland.
3. *Collapse of the whole breast,* often due to incorrect indications (i.e., breast tissues too loose and flabby).

Until a few years ago, almost all implants had structural characteristics limiting the indications in a ptotic breast because of ptosis recurrence and unaesthetic breast shapes. The advent of a new generation of mammary implants currently allows us to perform procedures that were inapplicable before and would have led to failure. The architectural requisites are anatomic shape, very highly cohesive gel, dual cohesiveness, and very highly aggressive texture. With these characteristics, the implant develops a Velcro-like capsule, grips on the chest wall without bottoming out, and maintains the shape without collapsing. The gland grips on the implant without sliding down; the shape and the upper edge of the implant are stable (Fig. 3); the breast is well projected; and the position is long-lasting.

Currently, new mammary implants could be defined as stabilizing or even suspending devices. A future evolution could be the development of an ultralight technology to produce a mammary implant weighing only a few grams (something like a "feather implant").

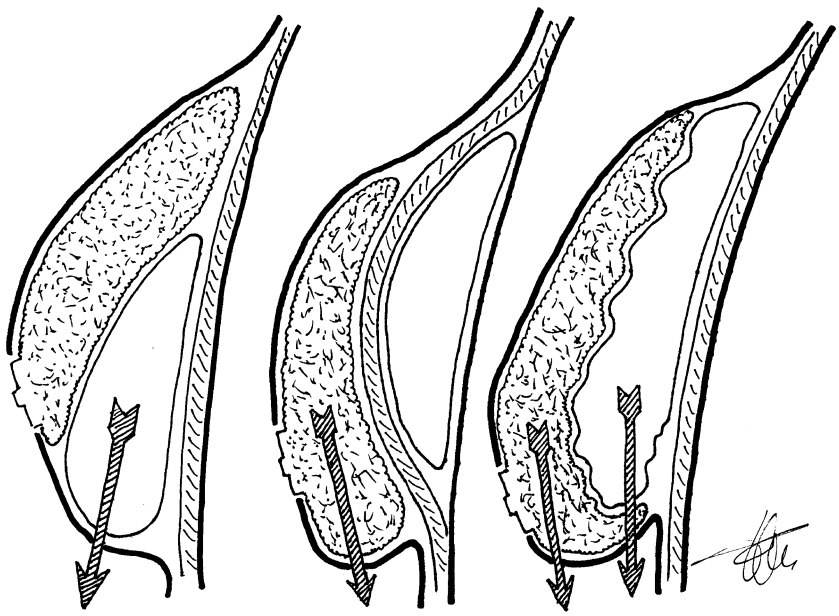

Fig. 2 Augmentation mastopexy recurrence types: bottoming out of the implant (*left*), sliding down of the gland and/or sliding up of the implant (*center*), and collapse of the breast (*right*)

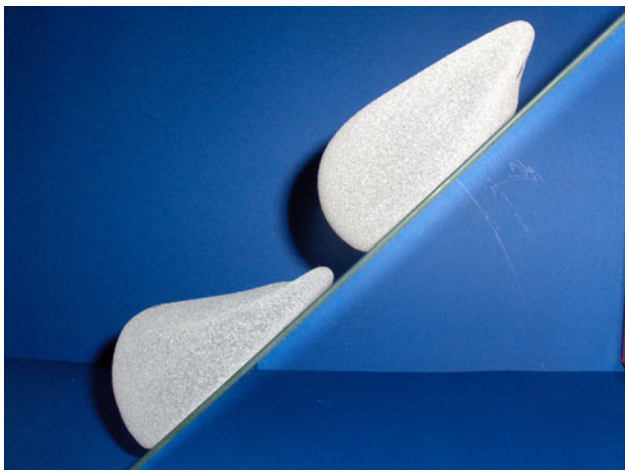

Fig. 3 Implant structure showing effects of gravity on implants lying on a 45° sloping surface. A standard anatomic implant (style 410, *above*) tilts the upper edge, whereas a dual-cohesiveness anatomic implant (style 510, *below*) maintains its shape unchanged

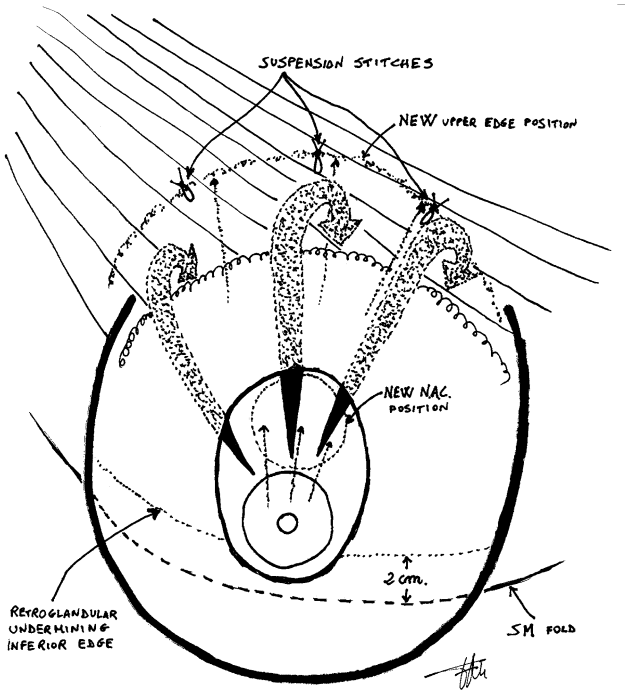

Fig. 4 Technique frontal view scheme. After the "egg-shape" incision, a subcutaneous upward undermining is performed, followed by a retroglandular downward undermining, leaving the caudal 2 cm of gland undetached. The whole gland is lifted and fixed by the upper edge. The nipple–areolar complex (NAC) follows lifting and occupies the new position

Technique

The upside-down technique is performed by the following steps, which can be visualized in frontal [Fig. 4] and lateral views [Fig. 5]):

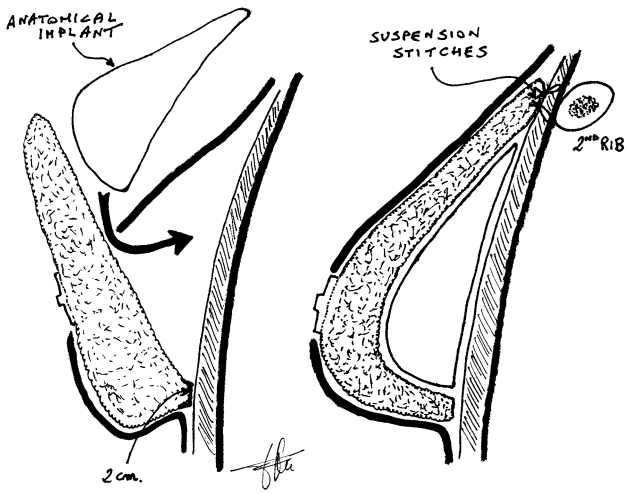

Fig. 5 Technique lateral view scheme. The anatomic implant is inserted in the upside-down direction ("mailbox" movement), and the gland upper edge is fixed at the second rib periosteum through muscle and underneath a 2-cm fascia flap

1. "*Egg*" incision. The egg has two axes. The *vertical* axis runs from the upper edge of the new areola position to the upper edge of the lower pole profile (as described earlier). It has a maximal average length of 9–10 cm. The *horizontal* axis is two-thirds of the vertical axis at its median point.
2. *Periareolar* incision. An attractive areola usually has a diameter of 3.5–4.5 cm in harmonic ratio with the estimated final diameter of the breast (2/3).
3. *Deepithelialization* of the included skin pattern.
4. Complete *subcutaneous undermining* of the glandular upper pole to the upper edge of the mammary gland. This step can result in significant bleeding. A wide infiltration with diluted adrenaline (1 ml in 500 ml of saline) and careful hemostasis are recommended. All other dissections are performed along bloodless natural cleavages.
5. Turning around of the edge and *upside-down retroglandular undermining*. The whole gland must be detached (to prepare the pocket and to allow a complete gland lifting), with great care taken to keep the IMF and 2 cm of the above gland undetached.
6. Whole superficial aspect of the lower gland poles left undetached to guarantee blood perfusion (only 1–2 cm of the periareolar incision are undermined).
7. *Topside-bottom implant insertion* with a "mailbox-posting" action. The IMF and undetached gland act as a bra, helping to prevent the implant from bottoming out. The upper one-third of the implant could either be placed beneath the pectoralis major muscle using the "dual-plane" technique or left completely retroglandular. This depends on the single patient tissue thickness and trophism.

8. *Breast lifting and fixing*. A horizontal band of fascia (2–3 cm high) at the second rib level is incised, undermined, and caudally overturned to induce a strong scar fibrous anchorage to fascia and muscle. At least three stitches of threaded nonabsorbable 0 or 1 suture are passed through the gland upper pole and the second rib periosteum. While these stitches are knotted, the lifting of the whole breast (gland, nipple–areolar complex [NAC], pseudo-IMF) is visible in real time.
9. The operation ends with the periareolar suture, which is always performed with the "interlocking" technique [11]. This technique has been a wonderful technical innovation, providing tension reduction on suture edges, a perfect round shape, and, most of all, stable dimensions in the long term (2–3 years). The results were not at all the same with the classical "round block" suture [2].
10. Two drains are placed and removed within 2–3 days. Postoperative bleeding usually is irrelevant.
11. A dedicated bra (shaping and stabilizing) is mandatory day and night for 1 month and 15–20 further days at nighttime only.

Results

From November 2001 to May 2010, 231 patients underwent surgery with the upside-down technique. The patients all were Caucasian, with an average age of 38 years (range, 31–53 years), and all had surgery performed bilaterally. The mean operating time was 150 min (range, 120–180 min), and the mean hospital stay was 3.5 days (range, 2–5 days) after surgery.

To evaluate the efficacy of the upside-down technique, two parameters (one objective and one subjective) were taken into consideration:

1. *Ptosis recurrence rate*. I define "recurrence" as follows. Because a mastopexy should provide not only a ptosis correction but also a ptosis *prevention* (or actually, a ptosis *delay*), I have arbitrarily assumed that an NAC sliding more than 2 cm 1 year after surgery has to be considered a *recurrence*. I compared 50 patients who underwent surgery by other techniques of augmentation mastopexy combined using the upside-down technique. The recurrence rate was 27.6% for the first group (with no significant difference depending on the technique), and 9.1% for the second group. The average follow-up period was 16 months, although a longer period would be better. Only the patients who underwent surgery with style 510 implants (last 3 years) have been taken into consideration.
2. *Patient satisfaction*. As with all postbariatric body-contouring procedures, the Body Uneasiness Test (BUT) [7] was self-administered by all the patients before surgery and then 1 year afterward. With upside-down mastopexy, the study showed 100% improvement of patient discomfort. This means that all the patients had an improvement, a *relevant* improvement for most of them, as stated by patients themselves.

No necrosis, anesthesia, or paraesthesia have ever been experienced with the upside-down technique. Capsular contracture has never occurred with the upside-down mastopexy or style 510 implants.

Discussion

The need for a specific technique to manage postbariatric breast problems came into focus with the rising evidence that many other techniques [5, 6, 12–14, 23, 25], all underscoring real problems and suggesting smart solutions, did not provide suitable results. Going with the flow, the need for specific implants came out.

As the new concepts took shape and a new approach started to have a physiognomy, the clinical results were so encouraging (Figs. 6a–b, 7a–b, 8a–b) that I was pushed to use the upside-down technique, even with nonbariatric patients, for aesthetic augmentation mastopexy. The results were even better (Figs. 9a–d, 10a–b) due to the better quality of tissues.

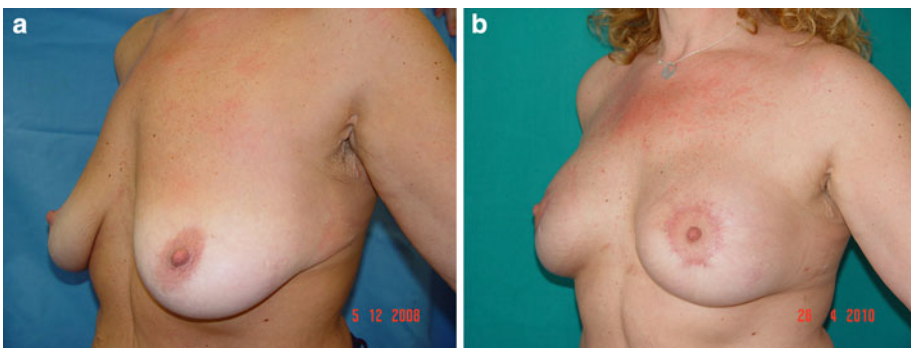

Fig. 6 Postbariatric breast in a 45-year-old showing sleeve gastrectomy and a 45-kg weight loss. **a** The NAC is at 26 cm preoperatively (programmed at 20 cm postoperatively). **b** View 16 months postoperatively, with the NAC still at 20 cm. The breast position and shape are attractive (**b**)

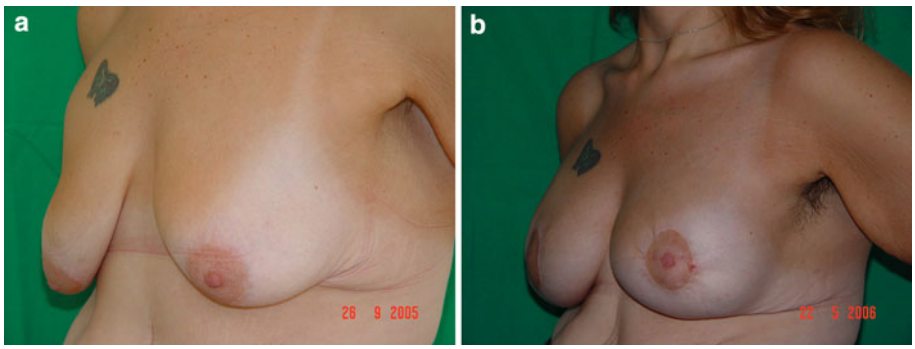

Fig. 7 Postbariatric breast of a 29-year-old showing laparotomic biliopancreatic diversion and 63 kg of weight loss. **a** The NAC is at 28 cm preoperatively (programmed 20 cm postoperatively). In this case, the indication for the upside-down technique was forced according to the algorithm for postbariatric breast [20] **b** View 8 months postoperatively, with the NAC still at 20 cm. The breast position and shape are attractive. Taking the tattoo as point of reference, it is easy to evaluate the amount of NAC and pseudo-IMF skin crease lifting

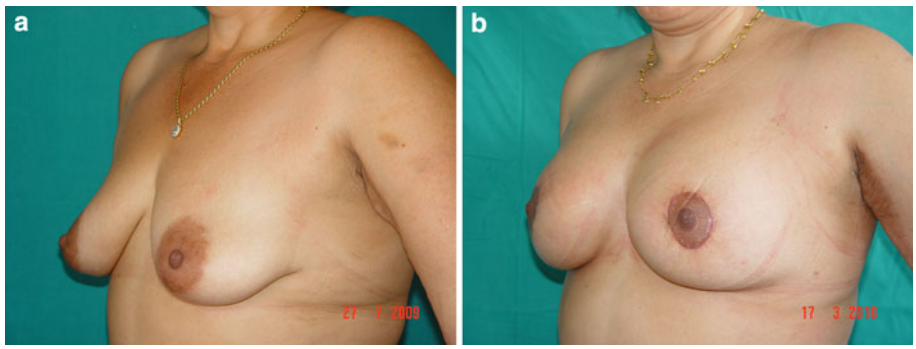

Fig. 8 Postbariatric breast of a 39-year-old showing laparoscopic biliopancreatic diversion and 52 kg of weight loss. **a** The NAC is at 24 cm preoperatively (programmed 20 cm postoperatively). **b** View 8 months postoperatively, with the NAC still at 20 cm. The breast is well projected and in place

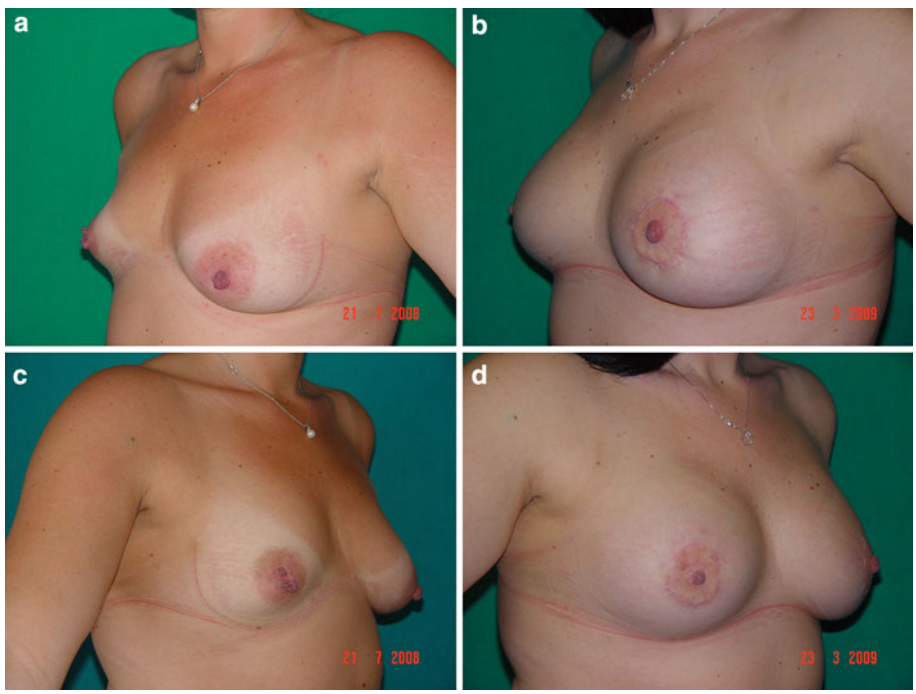

Fig. 9 Asymmetric malformed breast of a 29-year-old showing congenital asymmetry with hypotrophy on the right breast and ptosis on the left breast. **a** The NAC is at 23 cm on the left. **c** Preoperative view showing the NAC 20 cm on the right with a malformed nipple. **b**, **d** View 8 months later showing symmetric breasts with the NAC at 19 cm in the same position with the same shape and volume

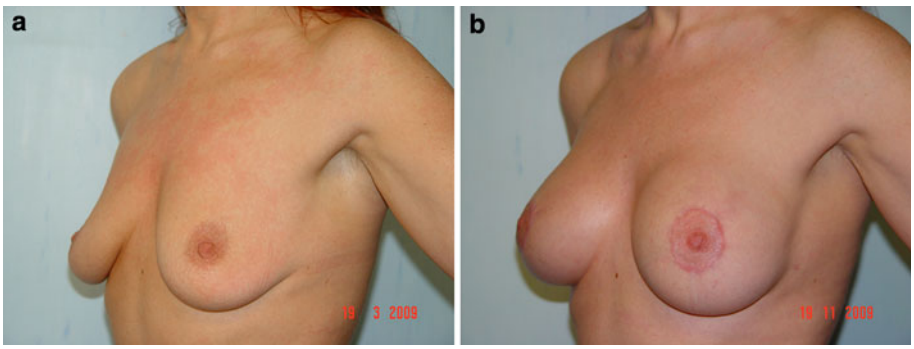

Fig. 10 Aesthetic breast of a 40-year-old postpregnant patient requesting an augmentation mastoplasty. **a** Preoperative view showing the NAC at 21 cm (programmed at 19 cm postoperatively). **b** View 8 months postoperatively showing the NAC still at 19 cm with a very natural position, shape, and volume. The patient is fully satisfied

The upside-down mastopexy has two main features:

1. A highly natural breast profile produced by a different type of ptosis correction (the gland is pulled and suspended, not pushed).
2. A long-lasting ptosis correction caused by a double process: (1) fixation to the periosteum, strongly holding the gland long enough to let the capsule develop and stabilize, and (2) the implant itself, acting as described earlier.

My personal persuasion is that a great percentage of all the augmentation mastoplasties, primarily for women older than 30-years and postpregnant patients, are mis-indicated [18]. If a study on postsurgical ptosis (similar to that described earlier) were to be conducted, probably alarming data would emerge. Something has been studied, but not specifically. The role of implant weight on breast-aging evolution has not often been emphasized. It appears undisputable that a breast wearing an implant during the same time (i.e., 5 years) runs through a ptotic evolution more severely than would have been faced without an implant. Also, the heavier a breast is (without implants), the deeper the ptosis.

For this reason, I have always discouraged augmentation mammaplasty, not only in any ptotic breast, but also in all the "borderline" cases (women older than 30 years with lower but normal breast position and postpregnant patients), in which the risk of postoperative early ptosis is high. An augmentation mastopexy seems to be more adequate in these cases, and the upside-down technique gives me a higher percentage of good results and patient satisfaction.

Natural shape, stable position, and short scars are the main advantages of the upside-down technique. The typical breast flatness after periareolar access is best corrected by the last-generation, dual-cohesiveness anatomic implants, which I strongly suggest to obtain the best results with this technique. The disadvantages of the upside-down technique are a quite long learning curve, a medium/long operating time, and a medium/long hospital stay.

Conclusions

The majority of the augmentation mastopexy techniques commonly follow the concept of accessing the breast from the lower pole, pushing the gland up, and inserting the implant bottom-up. It seems clear that the surgery is mainly concentrated on those structures (IMF and lower pole) bearing the gravity force of an increased weight, weakening them and exposing the breast to a higher risk of ptosis recurrence. For this reason, I am perfectly in agreement with so many authors and wary about augmentation mastopexy [9, 24].

The upside-down technique turns the traditional techniques upside down and gets around the problems by concentrating the surgery on the upper portion of the breast, lifting instead of pushing it, inserting the implant top-down, and leaving the suspending lower portion untouched and, if possible, reinforced. The first retrospective data seem encouraging.

Conflict of interest None.

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