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ORIGINAL ARTICLE
Cosmetic

Kite Mastopexy: Small Scar and Tissue-conserving Technique

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Background: Breasts are considered one of the most physically and sexually appealing features of the female body. Reduction/augmentation techniques have greatly evolved in the last decades.
We are reporting our experience with an innovative technique for mastopexy that recovers the aesthetics of the breast and avoids over-resection of its lower pole.
Methods: Inclusion criteria were women who underwent kite mastopexy with or without implants between January 2018 and May 2022 in a single center (Bogota, Colombia). Exclusion criteria were patients with American Society of Anesthesiology score more than II, with any uncontrolled chronic illness and/or medical history of diabetic mellitus, metabolic syndrome, body mass index more than 32 kg per m^2, and active smokers.
Results: We found 133 consecutive female patients. Age range was 18 and 67 years (median 39). Breast implants were used for the purpose of kite mastopexy in 52% cases. Patients were divided into two groups: implants (group 1) versus no implants (group 2). Procedure 1 involved mastopexy without implants; procedure 2 included current implant users who underwent either implant removal or in whom implants were not used for the sake of mastopexy. Procedures 3 and 4 included patients who underwent either new implant placement or implant exchange, respectively. Average time of surgery was 1.5 hours. Minor complications were mostly related to wound dehiscence. No major complications were reported.
Conclusions: Kite mastopexy restores the breast aesthetics by following specific markings, a new plication of breast pillars, and a reduced scar. Our technique demonstrates a very low rate of complications while entailing natural and appealing results.
(Plast Reconstr Surg Glob Open 2023; 11:e5265; doi: 10.1097/GOX.0000000000005265; Published online 14 September 2023.)

INTRODUCTION

Breasts are considered one of the most prominent and aesthetically appealing features of the female body. Both women and men are highly perceptive when it comes to complications, scars, and potential adverse effects that may arise from breast surgery procedures.[1] Reduction and augmentation mammoplasty procedures have greatly evolved in the last decades and have recently moved into more conservative techniques.[2] However, the typical large, inverted T-scar after mastopexy remains a common concern after reduction mammaplasty.[3]

Techniques for mastopexy have effectively addressed the correction of large and/or ptotic breasts (eg, II and III in Regnault classification); however, the visual perception of the abdomen and breasts proportion has not been addressed properly after reduction of redundant breast tissue (Wise "inverted T" pattern). We strongly believe that ptotic breasts make the abdomen look not only shorter but also wider. In fact, the larger the breasts, the more visual space they seem to "steal" from the abdomen. In addition, adipose deposits at the axillary breast mound (Spence's tail) alter the overall breast contour by preventing the breast footprint from forming a continuum with the upper chest and the deltopectoral sulcus.[4] Although liposuction of this area often resolves the issue, attention

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Received for publication July 1, 2023; accepted July 20, 2023.

Presented at the 4th annual meeting of the Moroccan Society of Aesthetic Plastic Surgeons

DOI: 10.1097/GOX.0000000000005265

Disclosure statements are at the end of this article, following the correspondence information.

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should also be given to addressing upper breast pole fullness and the available breast tissue for reconstruction. In consequence, surgeons must acknowledge the breasts' biomechanics that might affect the aesthetic outcome of the entire torso, especially when using implants. Multiple factors might influence these biomechanics, mostly hormone-related, such as pregnancy, menopause, menstruation, and weight changes, among others.[5] Comparatively, implants result in an additional load for the breast to bear,[6,7] particularly in the case of large-volume implants (400–550 cm^3), which might be associated with a higher rate of short-term and long-term complications (Fig. 1).[8]

Breast Artistic Anatomy

The concept of ideal breast aesthetics has evolved over time, with preferences for shape, size, and position varying across different societies, cultures, and socioeconomic status. In the mid-1950s, Penn explained the relationship between an equilateral triangle and the beauty of the breasts in a study of 150 women, where the breasts of 20 women were considered the most aesthetically pleasing.[9] Recently, Mallucci et al conducted two studies between 2011 and 2014 and drew four important conclusions regarding breast aesthetics[10,11]:

1. The ratio (%) between upper and lower poles should be 45/55 respectively, with the lower pole exhibiting the greatest fullness.
2. Nipple angulation should be 20 degrees pointing upward.
3. The upper pole must have a discrete concavity.
4. The lower pole should have a notable convexity.

A proper understanding of breast anatomy is crucial for optimal results. Surgeons must address both vascular and ligament structures that are relevant for each type of surgery.[12,13] We perceive that Latin American women may prefer a ratio of 50%–50% between the upper and lower poles of the breast.[14] However, when planning breast surgery, it is also important to consider the proportion between the abdomen and breasts, as well as the patient's individual preferences. We are reporting our experience with a new technique for mastopexy both with and without implants, which combines liposculpture and innovative dynamic methods for reshaping the breasts after breast ptosis.

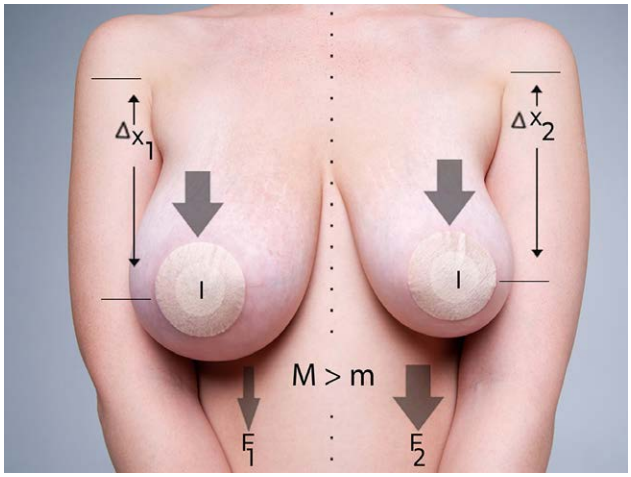

Fig. 1. Hooke law and breast ptosis due to implants. Gravity forces in left breast are displacing breast downward with proportional force to implant's weight, as described in the formula: F = m*g, where m = implant weight, F = force, g = gravity constant, I = implant, Δx = tissue displacement. Heavier implants will increase down forces compared with the right breast (M > m).

Takeaways

Question: Is there any way to reduce the scar length after mastopexy with or without implants?

Findings: We designed a technique for mastopexy in which the lower pole is given projection by improving its mass with less tissue resection, a new flap reconstruction, and dynamic closure (Kite). Overall aesthetics of the anterior torso need to be revisited in terms of the relation of the thorax with the abdomen and the role of the breasts in such proportions.

Meaning: Small scars, new inframammary fold relocation, and functional outcomes are all important aspects of our technique.

PATIENTS AND METHODS

We conducted a retrospective analysis of our patients' records to identify women who underwent kite mastopexy, a technique developed by the main author, with or without implants. The procedures were performed at a single center, Dhara Clinic, in Bogotá, Colombia, between January 2018 and May 2022. Exclusion criteria were patients with American Society of Anesthesiology score more than II, patients with any uncontrolled chronic illness, patients with a medical history of diabetic mellitus, metabolic syndrome, body mass index (BMI) more than 32 kg per m^2, and active smokers, or those with less than 30 days from quitting.

Operative Technique

Markings were made in standing position, with arms down and completely relaxed. The suprasternal notch, the clavicles, and the inframammary fold (IMF) served as the main anatomical references to address each patient's phenotype and measure the ideal abdomen/breast ratio. The lateral limit of the breast footprint was marked by following the lateral border of the pectoralis muscle, the anterior axillary line, and no more than 2 cm behind it (**see Video 1 [online]** and **Supplemental Digital Content 1**, **http://links.lww.com/PRSGO/C761**). We followed Lejour markings for breast tissue resection,[15] although the definitive resection was carried out during surgery after lodging or removing the implant depending on each case. Two additional critical features were considered: (1) improving the S-shaped body contour using the high-definition lipoplasty (HDL) technique described by Hoyos et al (Fig. 2); and (2) achieving the ideal proportion between the lower and upper breast poles at 65/35 (Fig. 3). (**See Video 1 [online]**, which shows a 30-year-old woman with BMI = 22.4 kg/m^2 with no history of breast

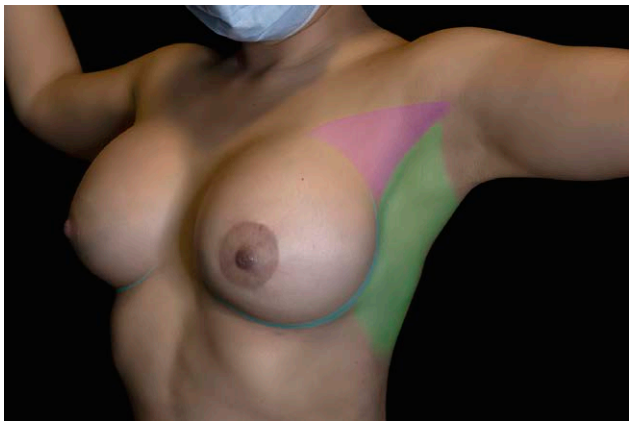

Fig. 2. Breast surroundings subject to liposuction after Hoyos et al[4] algorithm for HDL. The definition of the negative spaces at the pectoral-latissimus dorsi triangle (green) and Spence tail (purple) will enhance the volume perception of the breast. Its footprint (blue line) must be defined as well to achieve a slim but also natural breast contour.

Fig. 3. Ideal breast/abdominal proportion for the anterior torso: 65% should be covered by the abdomen and 35% for the breast. Although 60/40 would be closer to the golden ratio (1.618), we believe such value to be rather low for the average-height women, as it would make the torso look even shorter for them.

surgery. G0P0. Note: She is performing as a model for the purpose of explaining the markings, but she is not an actual patient.) (**See figure, Supplemental Digital Content 1**, which shows markings for kite mastopexy. **http://links.lww.com/PRSGO/C761**.)

Surgery

HDL was done through a three-step method: (1) subcutaneous infiltration with tumescent solution (1000 mL of Saline + 1 mL of 1:1000 epinephrine + lidocaine 10 mg/kg), (2) fat emulsification VASER (Bausch Health Companies Inc, Bothell, Wash.), and (3) liposculpture with Microaire (MicroAire Surgical Instruments, LLC., Charlottesville, Va.).[14] Zones for liposculpture included those from the abdomen, arms, and posterior torso.

Kite mastopexy was done after HDL (**See Video 2 [online],** which shows a 39-year-old female patient, with BMI = 23 kg/m^2 and grade III breast ptosis, who underwent kite mastopexy with implants.):

1. Mark the new NAC with a 42-mm areola marker.
2. Infiltrate the breast with 20 cm^3 of lidocaine plus 1% epinephrine, diluted in 500 cm^3 of normal saline.
3. Complete periareolar de-epithelialization.
4. Make a periareolar incision to perform either implant removal or exchange.
5. Measure the new distance from the lower border of the de-epithelialized NAC to 5 cm in direction to the new IMF and perform a vertical incision.
6. Dissect the medial and lateral skin flaps (de-epithelialization) for 4–5 cm, depending on tissue excess. A 3-cm dissection is performed at the inferior border, and the total flap raise should not exceed 10 cm in width.
7. Demarcate skin excess with curved Rochester forceps and cut out the flaps.
8. Horizontal 4-cm incision along the IMF with subsequent pocket dissection of the subfascial plane (new implant users).
    - Dissect the breast parenchyma away from the pectoralis major muscle to create the implant pocket.
    - Pinch test of the skin dictates the future implant position, either at the subfascial or retro pectoral planes.
9. Patients with prior implants: Close and demarcate the lateral sulcus of the breast by doing five consecutive and equidistant simple stitches with 3-0 polyglactin 910 suture. *Notes*: Capsulectomy was performed only if capsule was thick, calcified, or the implant was ruptured. Additional stitches/dissection might be necessary for cases where the former pocket is too big/small for the new implant.
10. Pocket lavage with iodine and then normal saline.
11. Lodge the implant within the pocket. Compare symmetry after finishing the contralateral breast mastopexy.
12. Close the pocket incision with 3-0 polyglactin 910.
13. Flap advancement:
    - Patients with implant removal: Ribeiro inferior flap technique[16] + former implant's lateral pocket closure to improve the lateral breast footprint curvature.
    - New implant users: advance the medial and lateral flaps to the center without making incisions or

resecting the inferior pole. The lateral flap will fill in the inferior pole and improve its projection.

14. Draw the sketch for "kite plication" with methylene blue over mammary tissue (**See Video 2 [online]**:
    - Mark the midline of the lower pole and measure 3–4 cm away from it at the midpoint.
    - Join those points and shape a rhombus with the top and bottom midpoints (kite).
    - Complete the plication from top to bottom with figure-of-eight stitches (3-0 Poliglecaprone).
15. Close skin flaps of infra-areolar incision with interrupted stitches (3-0 poliglecaprone).
16. Draw a waning-moon shaped flap that comprises the IMF and the skin excess below it, which must follow the natural shape of the patient's breast. Cut out the excess skin flap.
17. Fix the inferior pole of the breast by anchoring its lower border to the immediate superior costal periosteum (Usually fifth or sixth rib) with three interrupted stitches (2-0 polyglactin 910). Such fixation will re-shape the new IMF.
18. Subcutaneous flaps are closed first with a buried horizontal corner stitch (2-0 polyglactin 910). Then we do a buried interrupted suture to close the remaining gaps.
19. Skin closure with subcuticular continuous suture (3-0 Poliglecaprone).
20. For NAC closure, we use four cardinal points first (5-0 Poliglecaprone), then a periareolar purse string suture (4-0 poliglecaprone).
21. Areolar closure is done with 5-0 Stratafix Poliglecaprone (Johnson & Johnson Services, Inc.1997-2022).
22. Finally, we use a tape-based splint to hold breast tissue/implant in place.

All patients underwent general anesthesia, which included a combination of IV medication (propofol, dexmedetomidine and remifentanil) plus inhaled anesthetics (sevoflurane). Additional IV medications were antibiotic prophylaxis with cefazolin (2 gr IV, 60 minutes before incision), dexamethasone 8 mg, metoclopramide 10 mg, diclofenac 50 mg, ranitidine 50 mg. Normothermia was mandatory for the entire surgical period (pre-, intra-, and postoperatively). Photographic records were taken before and during follow-up at 2 days and 1, 3, 6, and 12 months after surgery.

Ethical Considerations

Each patient was informed of the purpose, methods, sources of funding, any possible conflicts of interest, institutional affiliations of the authors, the anticipated benefits and potential risks of the study and the discomfort it may entail, poststudy provisions, and outcomes according to the Declaration of Helsinki. They were also informed of the right to refuse to participate in the study or to withdraw consent to participate at any time without reprisal. A freely given informed consent was signed for each patient participating in our report.

Outcome Evaluation

We conducted a nonstandardized survey to evaluate the overall satisfaction index (SI) with the procedure. Patients were asked to rate their results in a scale from 1 to 4 (1 = bad, 2 = average results, 3 = good results, 4 = excellent) during the postoperative follow-up appointment.

RESULTS

We identified and analyzed a total of 133 consecutive female patients for our study. Age range was 18–67 years (median 39). The patients were divided into two groups: group A (n = 64, 48%) included those who did not require breast implants for mastopexy, whereas group B (n = 69, 52%) included those who did. The procedures performed were as follows: procedure 1 included patients who underwent mastopexy without implants; procedure 2 included current implant users who underwent either implant removal (n = 7) or did not use implants for mastopexy. Procedures 3 and 4 involved patients who underwent new implant placement or implant exchange, respectively. Forty-five of 64 patients had implants that were neither removed nor exchanged, and hence, were considered within the group without implants (Table 1). The average duration of surgery was 1.5 hours, with most procedures lasting between 61 and 90 minutes, or 120 minutes or more. Minor complications were observed in 23% of patients (n = 32), with most of them related to wound dehiscence, which was treated with daily wound care. Infections were all secondary to suture rejection with superficial erythema, though no deep wound infections were reported. We did not find association between ptotic large breasts and complications; however, new implant users above 400 cm^3 had a higher rate of wound dehiscence than those without implants. Neither hematoma nor necrosis were reported. Patients who experienced NAC ischemia were treated with hyperbaric oxygen therapy and thermal therapy to improve tissue perfusion. All were solved without further morbidity. Outcomes evaluation revealed SI of 82% (good + excellent/all results; Table 2). No differences in SI were found among groups. Of those two patients who qualified results as bad in group 1, one had NAC ischemia and the other had abnormal scarring, whereas for group 2, both of them were related to wound dehiscence.

DISCUSSION

Proper lifting of breasts restores the natural and youthful appearance of the torso. Procedures with such purpose require adequate measurements and repositioning not only of the NAC but also the IMF and scar placement. Ptotic breasts, a low umbilicus position, and the absence of a waistline can create an illusion of a shorter torso. Our results show that kite mastopexy, in addition to HDL, effectively restores the aesthetic appearance of the torso. Our technique shares similarities with that from Lejour, but we have introduced a new plication ("kite) that reduces breast tissue resection, fits the patient needs, and improves the lower pole projection. We also add HDL and the breast/abdomen ratio to the aesthetics of the anterior torso, with excellent results and minor rate

Table 1. Patient Demographics

	Without Implant			With Implant		
n = 133	Range (Avg)	n = 64	48%	Range (Avg)	n = 69	52%
Age (y)	23–67 (39.2)			18–54 (39.3)		
BMI (kg/m^2)	18.4–31.1 (24.4)			21.2–31.9 (25.0)		
Weight (kg)	46–70 (64.2)			53–88 (65.5)		
Race						
White		21	15.8%		26	19.5%
African American		0	0.0%		1	0.8%
Hispanic		43	32.3%		42	31.6%
Degree of breast ptosis						
I		2	1.5%		4	3.0%
II		38	28.6%		50	37.6%
III		24	18.0%		15	11.3%
Number of procedures						
First time		46	34.6%		8	6.0%
Second time		13	9.8%		57	42.9%
Third time or more		5	3.8%		4	3.0%
Surgery						
Kite M w/o implants		19	14.3%		0	0.0%
Kite M w/o new implants*		45	33.8%		0	0.0%
Kite M w/ new implants		0	0.0%		10	7.5%
Kite M w/ implant exchange		0	0.0%		59	44.4%
Implant size						
200–250 cm^3		0	0.0%		16	12.0%
255–300 cm^3		0	0.0%		24	18.0%
305–350 cm^3		0	0.0%		10	7.5%
355–400 cm^3		0	0.0%		13	9.8%
>400 cm^3		0	0.0%		6	4.5%
Surgical plane						
Subfascial		0	0.0%		41	30.8%
Submuscular		0	0.0%		28	21.1%
Autologous breast fat grafting		19	14.3%		7	5.3%
Duration of surgery						
≤60 min		3	2.3%		10	7.5%
61–90 min		24	18.0%		30	22.6%
91–120 min		1	0.8%		4	3.0%
≥120 min		36	27.1%		25	18.8%
Implant and capsule						
Capsular contracture		3	2.3%		11	8.3%
Ruptured implant		1	0.8%		3	2.3%
Wound dehiscence		8	6.0%		18	13.5%
Abnormal scarring		1	0.8%		0	0.0%
NAC ischemia		1	0.8%		1	0.8%
Infection (superficial)		2	1.5%		1	0.8%

Data are portrayed as range and averages (Avg) for quantitative variables and in number (n) and percentages (%) for categorical ones. Degree of breast ptosis is based on Regnault classification[2]

*Patients with implants who underwent either implant removal (n = 7, 5%) or the same one was used to perform mastopexy.

Table 2. Survey Results for Outcome Evaluation after Kite Mastopexy

Answers (n = 121)	Group w/o Implant Use (n = 59)		Group w/ Implant Use (n = 62)	
Nonrespondent	5	7.8%	7	10.1%
Bad	2	3.4%	2	3.2%
Average	9	15.3%	9	14.5%
Good	22	37.3%	20	32.3%
Excellent	26	44.1%	31	50.0%

Those who rated the results as good and excellent accounted for 81.4% and 82.3% of patients among the group of patients who did not require implants versus those who did, respectively.

for complications. Kite mastopexy implies not only restoration of the breasts' anatomical shape but also the circumvention of standard tissue resections. We believe that protecting the lower pole,[17] reinforcing the breast pillars by relocating the IMF and anchoring them to the ribcage, improving the breasts footprint through liposculpture, and hiding the usual transverse incision are all far more important than just lodging a big implant and removing breast tissue. Moreover, new aesthetic subunits around the breast are becoming very important in improving the overall outcomes after breast surgery.[18] Incorporation of the 1.85 (65/35) abdomen/breast ratio is a great innovation

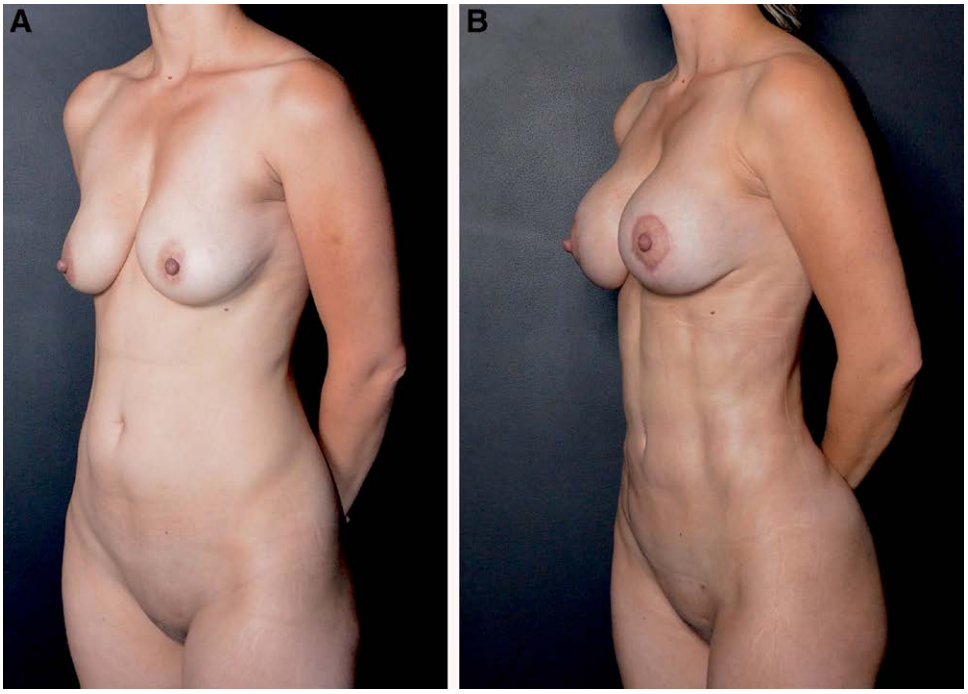

Fig. 4. A 40-year-old female patient who underwent kite mastopexy in addition to HDL Xtreme definition + fat grafting of the buttocks. We used 255 cm^3 nanotexturized breast implants placed at the subfascial plane for procedure 3. A, The preoperative photograph shows a middle-aged woman with grade II breast ptosis (Regnault classification) and a 55/45 breast/abdominal ratio, that has been restored to a more harmonious 65/35 proportion and a new athletic and slim appearance of the anterior torso 6 months after surgery (B).

of our technique. It allows the abdomen not only to display its slim curves but also to boost up the attractiveness of the breast with a size almost perfectly aligned with the patient's biotype (Fig. 4). In addition, the IMF fixation to a stable structure (ribcage) will help hold the breast tissue in position, while also preventing "bottoming out" in cases where implants were used. In effect, only one patient experienced 1-cm descend of the implant 12 months after surgery, in our study. Kite mastopexy indirectly improves the functional result after breast surgery by avoiding injury to the neurovascular pedicles and minimizing tissue dissection/resection. These will sort out some pitfalls from other techniques, such as long/visible scars, prolonged recovery time, and unpleasant aesthetic outcomes.

Although single-stage augmentation mastopexy was described over 50 years ago, challenges persist in achieving multiple goals within a single procedure, including increasing breast volume, reshaping the soft tissue, and reducing skin excess. These are all common concerns for the patient and surgeons.[19–21] We believe our technique might reduce both surgical time and postoperative convalescence, as it avoids additional tissue resection and closures. By reducing trauma to the tissues, we may also indirectly reduce the need for postoperative use of narcotics, which has been a critical issue in plastic surgery in recent decades.[22] Comparatively, the recent increasing demand for implant removal among women populations has prompted plastic surgeons to develop new techniques with different flap arrangements and fat grafting.[23,24] Although we did not revise fat grafting in detail, it has emerged as a great alternative for breast augmentation not only after implant removal but also after reconstructive surgery.[20,25,26] We used selective fat grafting to improve projection of some breast areas (eg, cleavage, upper pole), but did not analyze it separately (Figs. 5 and 6, **Supplemental Digital Contents 2-4**). (**See figure, Supplemental Digital Content 2,** which shows a 37-year-old female patient who underwent kite mastopexy in addition to HDL basic definition + miniabdominoplasty + rectus abdominis muscular plication + buttocks fat grafting. **http://links.lww.com/PRSGO/C762**.) (**See figure, Supplemental Digital Content 3,** which shows a 41-year-old patient who underwent hybrid kite mastopexy (implants and 40 cm^3 fat grafting e/a) + HDL moderate muscular definition + abdominoplasty. **http://links.lww.com/PRSGO/C763**.) (**See figure, Supplemental Digital Content 4**, which shows a 40-year-old female patient who underwent kite mastopexy in addition to HDL Xtreme definition + fat grafting of the buttocks. **http://links.lww.com/PRSGO/C764**.)

One would expect a 10%–15% increase of areolar area in those patients who undergo kite mastopexy with breast implants. However, this has not affected our patient's perception of their aesthetic outcomes. In fact, we only perform areolar resection when the diameter exceeds 4 cm. Our approach involves conducting the most tissue-stressing procedure first, such as implant placement or inferior pole repositioning. We then recreate the natural shape of the breast through progressive

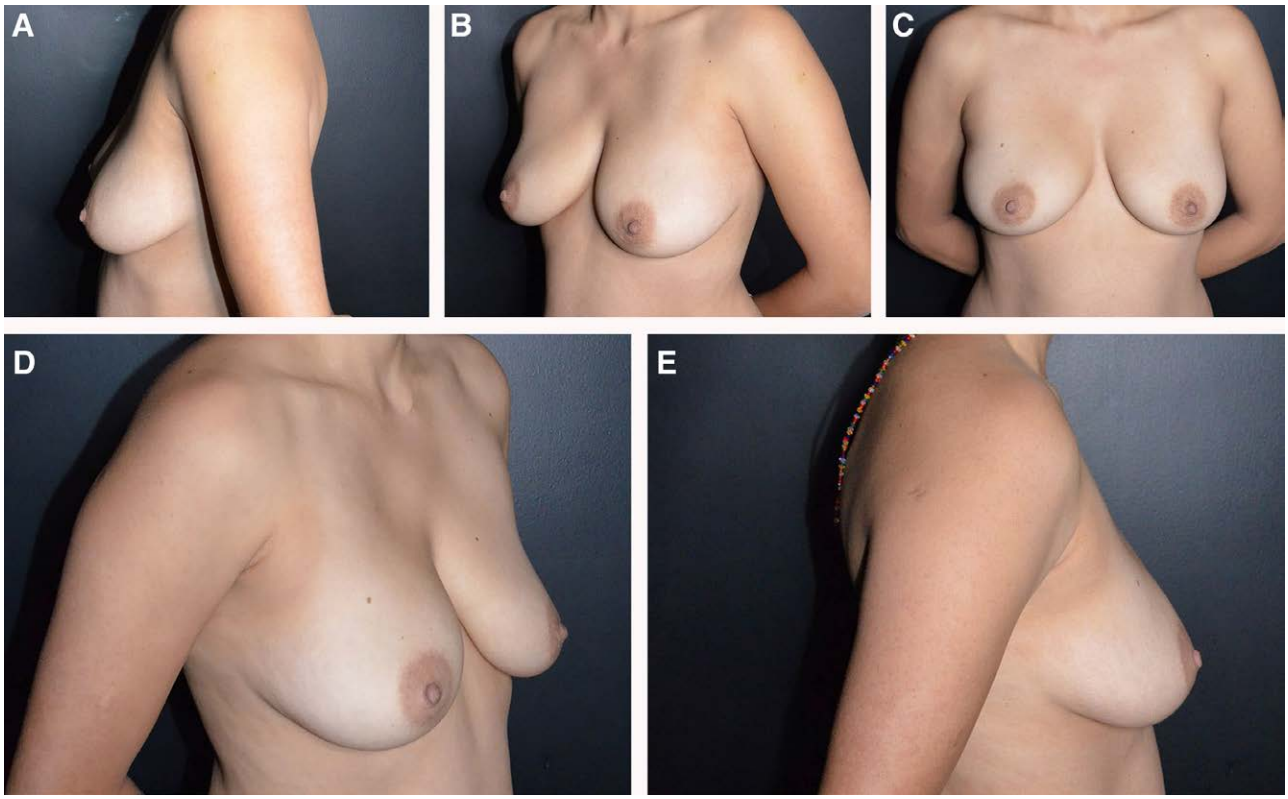

Fig. 5. A 29-year-old female patient who underwent kite mastopexy in addition to HDL basic definition + miniabdominoplasty + rectus abdominis muscular plication. We used 275 cm^3 nanotexturized breast implants placed at the subfascial plane for procedure 3. Preoperative photographs (A-E) show grade II breast ptosis with an anterior torso ratio of 55/45 for the abdomen and breast, respectively. Almost no difference between the upper and lower poles of the breast is also noted.

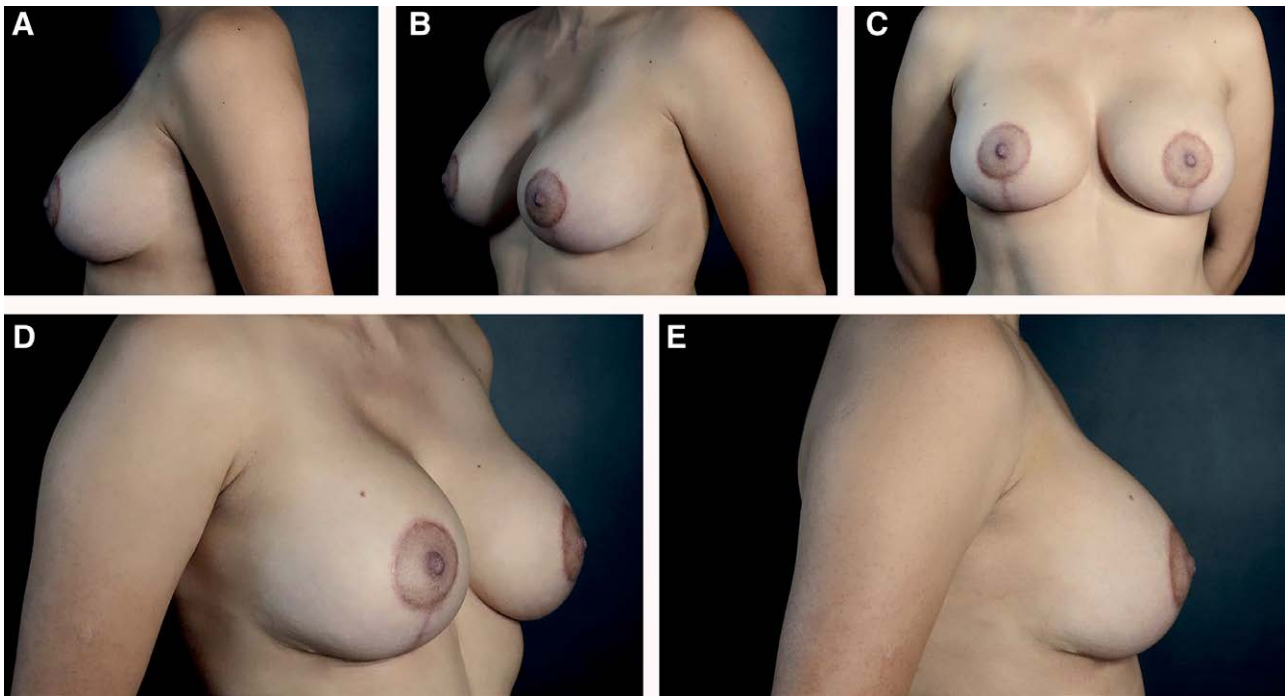

Fig. 6. The 4-month postoperative photographs show a new enhanced breast projection with a youthful NAC location and a natural bust cleavage (A-E).

small steps, rather than immediate excision and closing procedures.

Limitations

There is a lack of multivariate analysis, and the evaluation of outcomes was not conducted using a standardized survey or questionnaire. The retrospective nature of our cohort study sets the level of evidence at IV. However, conducting randomized controlled trials in plastic surgery is challenging due to limited funding, medical-legal restrictions in private practice, and a low acceptance rate among patients. We believe kite mastopexy displays better results for grade I and II ptosis, but not for grade III patients.

CONCLUSIONS

Kite mastopexy is an innovative and reproducible technique that effectively restores the breast aesthetics. It involves simple markings and a new plication of the breast pillars, and results in a reduced horizontal scar. These factors contribute to reduced operating time and better preservation of breast tissue perfusion. The procedure has a low rate of complications, leading to faster recovery and achieving natural and appealing results. However, large-scale clinical studies are required to further support our findings.

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DISCLOSURES

Dr. Cala Uribe serves as a consultant and as speaker for both MOTIVA implants and INMODE Aesthetics, from which she receives compensation/royalties/sponsorships. All the other authors have no financial interest to declare in relation to the content of this article.

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