Aesthetic Breast Surgery

Supplement Article

Retrospective Validation of a Tissue-Preserving Breast Augmentation Approach: From Native Tissue Geometry to Surgical Practice

Manuel Chacon-Quiros, MD; Renee Burke, MD; Ashley Gordon, MD, FACS; Geovanny Herrera-Mora, MD; Jeffry Solis-Torres, MD; Pablo Solis-Chaves, MD; and Wouter van der Pot, MD

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Abstract

Background: Breast augmentation has traditionally focused on implant volume and pocket selection, often overlooking the variability of native breast anatomy.

Objectives: Breast tissue preservation (BTP) emphasizes preservation of fascial planes and tissue integrity, enabling prepectoral implant placement within a preserved tissue envelope. When combined with 3-dimensional (3D) imaging and ultrasound-based geometric analysis, BTP supports selective implant positioning tailored to regional deficiencies, potentially improving stability and natural aesthetic outcomes while reducing reliance on larger implant volumes and the need for scaffold support.

Methods: A single center retrospective study analyzed 111 patients undergoing primary breast augmentation or augmentation–mastopexy using tissue preservation techniques, including transaxillary and inframammary approaches. Pre- and 12-month postoperative assessments incorporated 3D imaging and high-resolution ultrasound to evaluate breast geometry, tissue distribution, volumetric and angular changes, and stability. Safety outcomes and patient satisfaction were evaluated over 12 months.

Results: Among 111 patients, complication rates were low (4.5%), with no Baker III–IV capsular contracture, no implant ruptures and high satisfaction scores. Geometric analysis demonstrated consistent increases in upper, medial, and lateral angles, procedure specific inferior angle changes, preserved nipple alignment with maximal projection, and improved breast stability, supporting controlled and reproducible volume redistribution. These changes were achieved through targeted regional volume placement.

Conclusions: This study highlights the clinical value of a comprehensive native breast assessment in real-world practice. Integrating volumetric, topographic, and angular analysis enables individualized planning, precise implant positioning, with minimally invasive BTP techniques. This approach supports biomechanical stability, demonstrates a favorable safety profile, and promotes natural outcomes in everyday surgical practice.

Level of Evidence: 4 (Therapeutic)

Breast augmentation has traditionally been approached as a primarily volumetric intervention, in which implant size and pocket selection are considered the principal determinants of the final aesthetic outcome. While this strategy has produced reliable results, it does not fully account for the intrinsic variability of the native breast. Breast morphology represents a geometric expression of underlying anatomy, shaped by volume, projection, tissue distribution, and its relationship to the thoracic framework. In this context, breast tissue preservation (BTP) approaches appear particularly well suited to

Drs Chacon-Quiros, Herrera-Mora, Solis-Torres, and Solis-Chaves are plastic surgeons in private practice in San José, Morenos, Costa Rica. Dr Burke is a plastic surgeon in private practice in South Barrington, IL. Dr Gordon is a plastic surgeon in private practice in Austin, TX. Dr van der Pot is a plastic surgeon in private practice in Almere, Netherlands.

Corresponding Author:
Dr Manuel Chacon-Quiros, Centro Europeo de Cirugía, Avenida 3, San José, Morenos, Costa Rica.
E-mail: drmanuelchaconquiros@gmail.com; Instagram: manuelchaconmd

address these complexities, demonstrating high levels of safety, stability, and patient satisfaction while simultaneously reducing surgical trauma and recovery time.[1,2]

Breast tissue preservation has emerged as a biologically respectful surgical framework that prioritizes the preservation of the cellular, structural, functional, and dynamic integrity of the breast.[3] Prior work by Rehnke, Gaskin, and Takaya has emphasized the critical role of the fibro-adipose and superficial fascial systems as essential contributors to long-term breast support and shape.[4-9] By maintaining and integrating fascial planes, ligamentous support, and neurovascular structures into the surgical strategy, BTP allows the breast to be treated as an integrated anatomic system rather than as a passive recipient of implant volume, providing a reliable foundation for prepectoral implant placement.

Within this framework, atraumatic tunneling allows precise access to the posterior lamellar plane through a single corridor, preserving the circummammary ligament and surrounding structures. Controlled pocket expansion using an inflatable balloon creates a 3-dimensional (3D) space that conforms to implant geometry. This process establishes the basis for the "nesting" concept, in which the implant is integrated within a preserved tissue envelope within the confines of the ligamentous support structures of the breast rather than placed into a traditionally (electrocautery-guided) dissected pocket.[1,3]

To objectively assess and guide these advances, surgical planning can be informed by geometric analysis of the native breast. The use of 3D imaging and ultrasound enables comprehensive preoperative evaluation, including quantification of preexisting breast volume and preexisting breast projection, tissue thickness distribution, breast topography, and thoracic geometry. Collectively, these parameters define patterns of regional volumetric imbalance, identifying areas where additional volume or projection may be required to achieve balanced aesthetic outcomes.

Over the past 5 years, clinical experience at the authors' center has further refined the understanding of breast anatomy and emphasized patients' preference for nonaugmented looking and feeling results based on BTP techniques. This evolution has reinforced a shift in mindset in which implant selection and positioning with this tissue preservation approach are tailored to address specific regional deficiencies rather than global volume addition, frequently resulting in selective and decentralized implant positioning. Such an approach enables the use of smaller implants placed with precision according to the native geometric configuration of the breast, while preserving biomechanical behavior and structural integrity.

In this study, we conducted a retrospective observational analysis to evaluate the safety and efficacy of tissue-preservation techniques in patients undergoing primary breast augmentation and augmentation–mastopexy using this modified surgical paradigm. By correlating preoperative native breast characteristics with postoperative volumetric, angular, and stability parameters, we aim to better define the role of geometry-driven implant positioning in achieving stable, natural, and reproducible breast augmentation outcomes.

METHODS

Study Design and Patient Population

This single-center retrospective observational study analyzed 111 consecutive female patients who underwent primary breast augmentation or primary augmentation–mastopexy using tissue-preservation techniques between December 2023 and March 2025, all of whom completed the 12-month postoperative follow-up. Of these, 37 patients underwent breast augmentation using the Mia minimally invasive system (Establishment Labs, Alajuela, Costa Rica) through a transaxillary approach. The remaining 74 patients underwent primary augmentation using the same tissue-preservation technologies via an inframammary (IMF) approach with Preservé minimally invasive tools (Establishment Labs, Alajuela, Costa Rica), of whom 26 underwent primary mastopexy.

Postoperative follow-up visits were conducted at 3, 6, and 12 months. At each visit, safety was assessed through standardized clinical examination and documentation of adverse events, including infection, capsular contracture (Baker classification), implant rupture, wound-healing complications, and any other clinically relevant findings. Nipple sensitivity was assessed during the clinical consultation by direct patient self-report of sensory loss. Patient satisfaction was assessed at 12 months postoperatively using a 5-point Likert scale (1 = complete dissatisfaction, 5 = maximum satisfaction). This evaluation included independent assessments by the patient, the operating surgeon, and a clinical staff member.

Preoperative and 12-month postoperative assessments were performed using a combination of 3-dimensional (3D) imaging and high-resolution ultrasound (HRUS). The authors confirm that all procedures and data management in this retrospective analysis were conducted in accordance with the ethical standards of the Declaration of Helsinki.

Geometric Morphologic Analysis Framework (GMA-BA)

All participants underwent a structured geometric morphologic analysis designed to evaluate the breast as a 3-dimensional system. This framework integrated volumetric, geometric, tissue-distribution, and topographic parameters using 3D imaging technology (Crisalix, Lausanne, Switzerland) (Figure 1).

Ultrasound Assessment

Breast tissue distribution was evaluated using HRUS with a GE Logiq V2 system (GE Healthcare, IL, USA) equipped with a 10-MHz linear probe. Tissue thickness measurements were obtained from the skin surface to the superficial fascia of the pectoralis major muscle at 3 standardized locations: the superomedial quadrant, the central (retroareolar) region, and the inferolateral quadrant. These measurements were used to characterize regional tissue thickness and distribution.

Data Integration for Surgical Planning and Implant Selection

Implant positioning was guided by the location of preoperatively identified geometric deficits and frequently involved decentralized placement. Superomedial positioning (Figure 2A) was used to enhance upper-pole fullness in cases of superior deficiency, while inferomedial positioning (Figure 2B) was employed to enhance overall contour.

A compensatory geometric strategy was applied with the objective of correcting regional volumetric imbalances rather than achieving a predetermined volumetric increase for the entire breast. A threshold breast volume of 300 cc was used as a reference point. In breasts with greater native volume and projection, implants with smaller bases and lower projection were selected, resulting in lower implant volumes in selected areas lacking breast volume. Conversely, in breasts with reduced native volume and projection, implants with wider bases and higher projection were chosen, typically resulting in larger implant volumes overall (Figure 2).

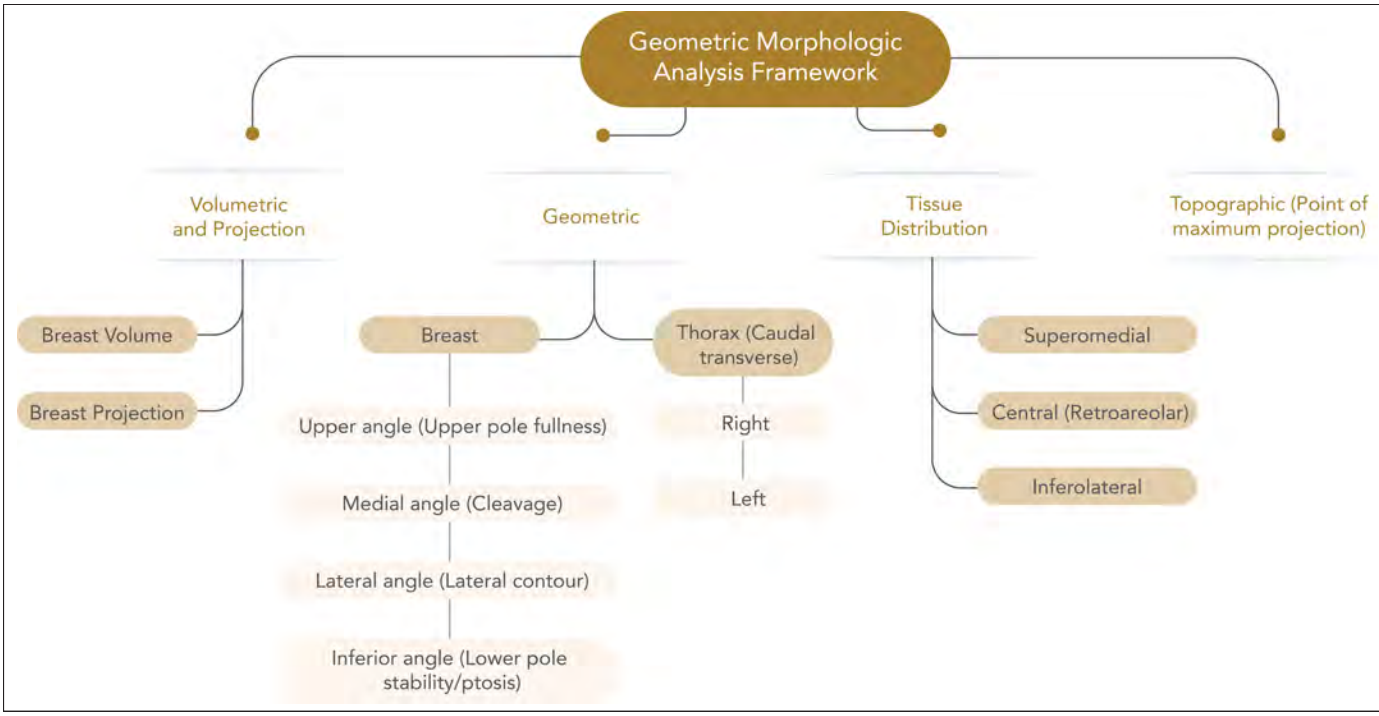


Figure 1. Geometric morphologic analysis framework (GMA-BA). Property of Establishment Labs (Alajuela, Costa Rica).

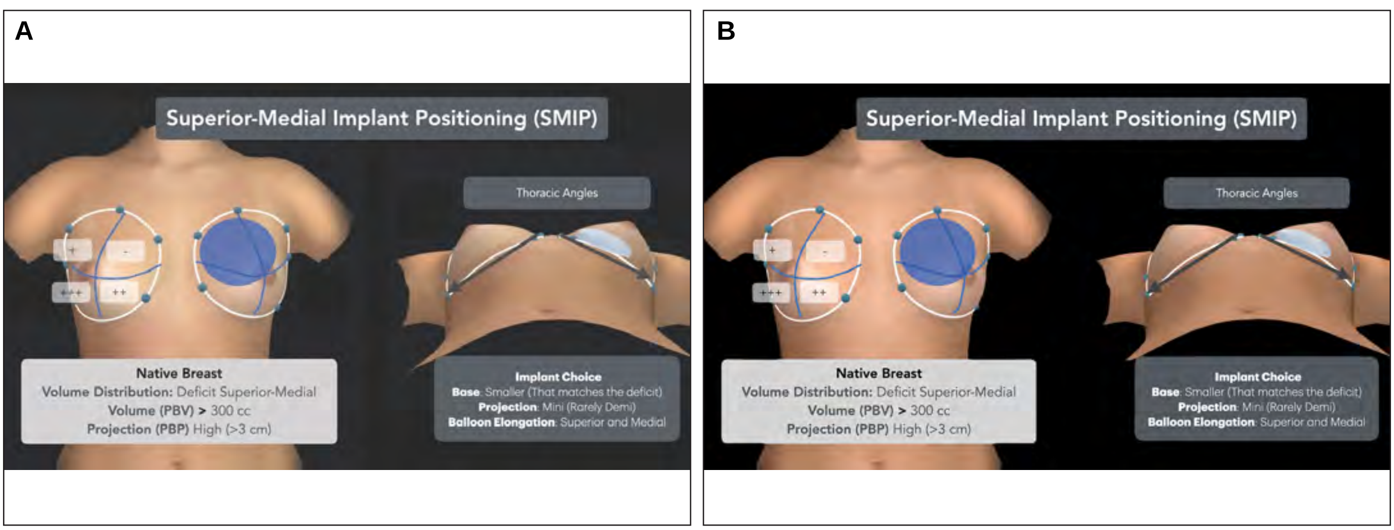


Figure 2. Framework for implant positioning (superomedial (a) and inferomedial (b)), and selection based on assessment of native tissue characteristics. Property of Establishment Labs.

Surgical Technique

Following preoperative markings, sedation-only anesthesia was administered by a board-certified anesthesiologist. To facilitate separation of anatomic planes, provide local anesthesia, and enhance vasoconstriction, approximately 100 to 150 cc of a modified Klein solution[10] containing local anesthetic and epinephrine was infiltrated. Gentle breast massage was subsequently performed to ensure uniform distribution of the solution. Patients undergoing a mastopexy received general anesthesia.

Following hydrodissection, a set of minimally invasive technologies is used to create the implant pocket. All implant pockets were created under ultrasound guidance in the prepectoral posterior intralamellar plane, between the breast parenchyma and the posterior lamella (Figure 3). A tunnel is established from the incision site—either at the IMF or the axillary crease—to the precise breast region identified as volume deficient during preoperative 3D imaging and HRUS evaluation. This step is performed atraumatically using a separator with a purpose-designed multi-angled tip and a rigid handle, allowing for a single penetration of approximately 2 cm in diameter through the circumammary ligament and into the posterior intralamellar plane (Figure 4A). Subsequently, an inflatable balloon with an integrated handle is introduced along the same tunnel and progressively expanded to create the mammary pocket as a 3D space through controlled elongation of the multilayered posterior lamella. This maneuver is intended to replicate the dimensions of the planned implant and to form a cushion-like structure that serves as a "nest," providing structural support for the device (Figure 4B). Finally, the implant is

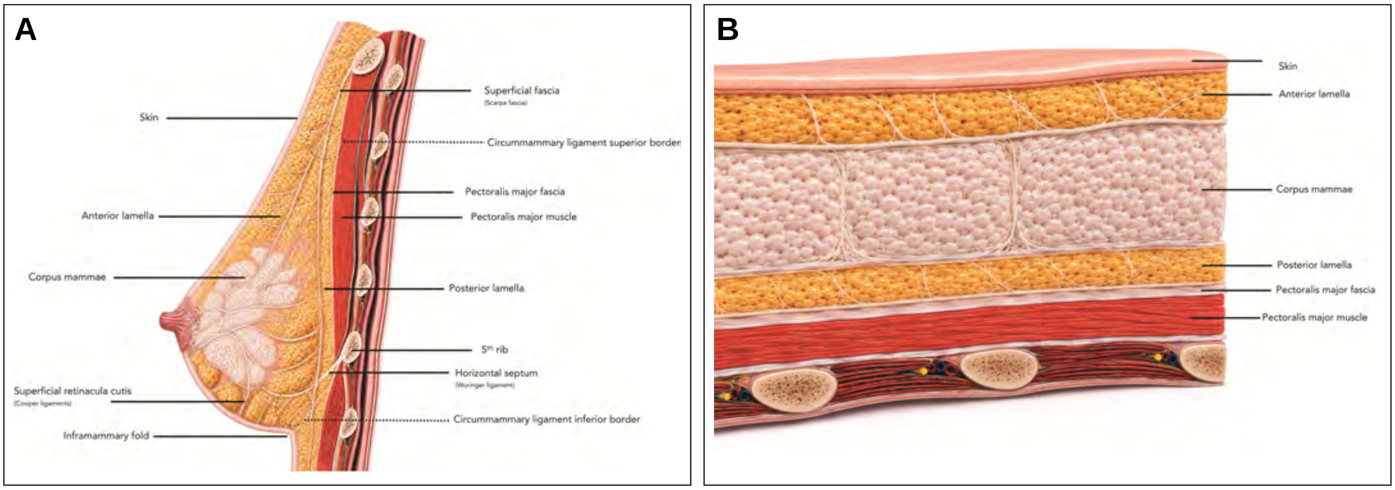


Figure 3. Anatomical representation of the breast demonstrating glandular tissue, underlying musculature, and supporting fibrous structures, which define the anatomical basis of the posterior intralamellar dissection plane and its surrounding structures, shown in a sagittal view (A) and a transverse section (B). Property of Establishment Labs. All rights reserved, 2026. Reproduced with permission.

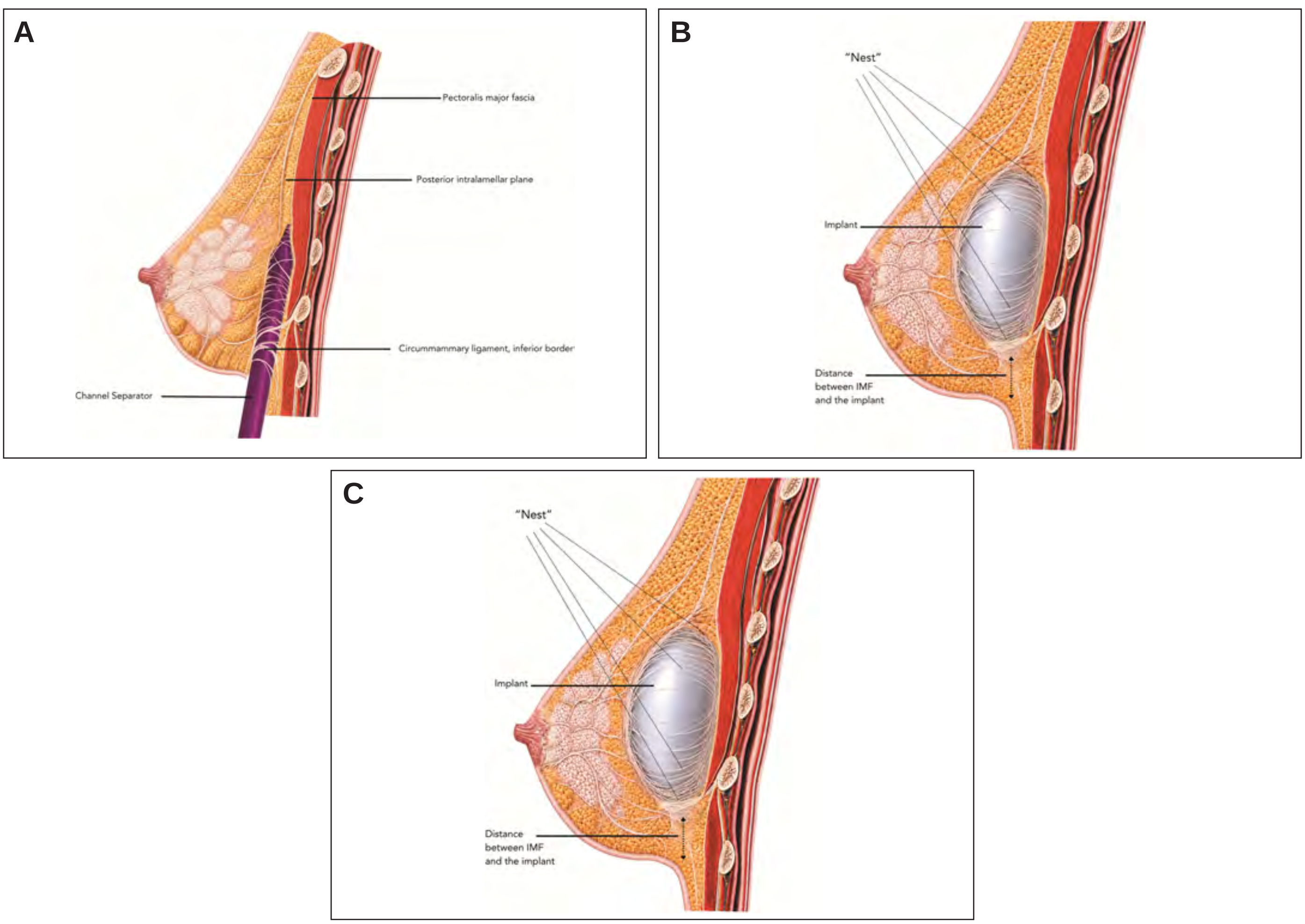


Figure 4. Sequential illustration of posterior intralamellar pocket creation and implant placement through the inframammary fold approach: (A) 3-dimensional tunneling within the posterior intralamellar plane; (B) balloon-assisted expansion of the posterior intralamellar space, enabling controlled nesting; and (C) precise implant positioning and integration through controlled nesting. Superomedial pocket positioning is demonstrated by the offset distance between the inframammary fold and the implant, which is not situated directly above the fold but instead supported by the circummammary ligament acting as a structural sling (dashed arrow). The "nest" concept, emphasizing the surrounding ligamentous and soft-tissue framework that stabilizes and supports the implant, is illustrated in (C). Property of Establishment Labs. All rights reserved, 2026. Reproduced with permission.

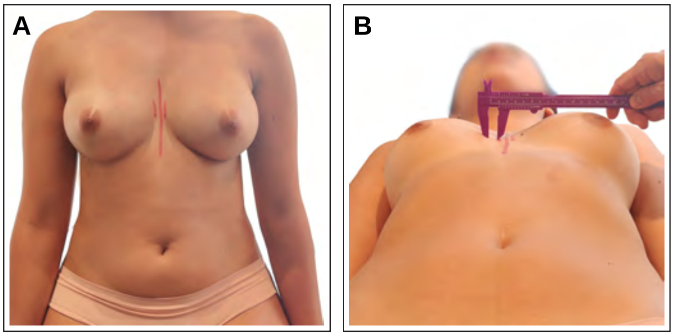


Figure 5. Postoperative lateral displacement evaluation methodology of a 23-year-old female patient following mia breast enhancement with motiva SmoothSilk Ergonomix2 diamond 165 cc at 12 months. Measurement (A) Sitting, Measurement, (B) Supine.

introduced via indirect deployment using a no-touch technique. Detailed descriptions of the Mia and Preservé techniques and technologies have previously been published by Chacon et al[1] and Randquist et al.[2]

Breast Stability Analysis

Breast stability, defined as the degree of lateral breast displacement, was assessed by measuring the distance from the midline to the medial border of the breast in the standing position and repeating the measurement in the supine position. The difference between these measurements was used as an indicator of breast mobility and lateralization (Figure 5, Supplemental Figures 1-6, and Video 1, available online at https://doi.org/10.1093/asj/sjag110).

Statistical Analysis of Outcomes

Morphometric breast parameters were analyzed, including angular measurements (upper, lower, medial, and lateral), breast volume, nipple projection, and stability. All variables were assessed preoperatively and postoperatively, resulting in a longitudinal design with intra-subject e.

Change scores (Δ) were calculated as the difference between postoperative and preoperative values, allowing each patient to serve as her own control and minimizing inter-patient variability. Descriptive statistics were used to summarize all variables. A P-value < .05 was considered statistically significant.

RESULTS

Patient demographics are summarized in Table 1. One hundred eleven female patients were included in the study and completed the 12-month postoperative follow-up, of these 37 (33%) underwent breast augmentation using the Mia system, while with the Preservé system 48 patients (43%) underwent a primary breast augmentation and 26 patients (24%) a primary mastopexy.

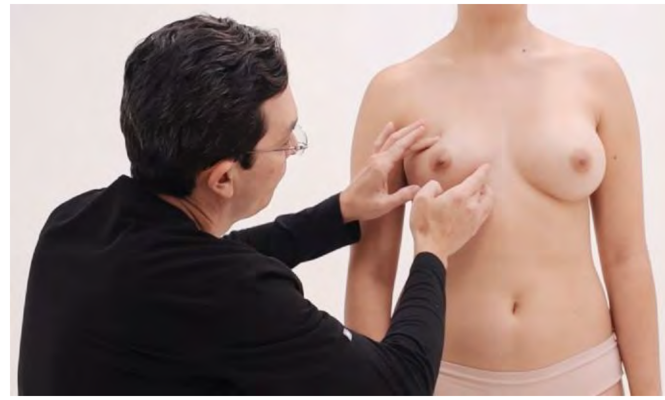
The mean age at the time of surgery was 35.8 years. Mean body mass index was 22.85 kg/m^2, consistent with a normal range. Mean breast base width was 11.58 cm. Regarding implant type, 55% of procedures utilized Ergonomix2 implants (Motiva, Establishment Labs, Alajuela, Costa Rica), while 45% used Ergonomix implants.

Safety Outcomes

Overall complication rates were low across the study cohort and occurred exclusively in the mastopexy cohort. Five patients (4.5%) experienced at least one postoperative complication. The most common events were cellulitis and suture dehiscence, each occurring in 2 patients. Epidermolysis was observed in 1 patient. All complications were managed conservatively or with minor interventions, with no cases requiring implant removal or reoperation.

Capsular contracture was absent. At the 12-month follow-up, 98.2% of patients were classified as Baker grade I and 1.8% as Baker grade II. No cases of Baker grade III or IV capsular contracture were observed. There were no cases of implant rupture. No postoperative loss of nipple sensation was reported.

Patient satisfaction scores were high across all evaluated groups. Mean patient-reported satisfaction was 4.74. Surgeon-reported satisfaction demonstrated a slightly higher mean score of 4.91, while independent clinical staff evaluation resulted in a mean score of 4.94.



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Geometric Morphologic Analysis (GMA-BA)

Volumetric and Projection Analysis

Baseline breast volume and projection differed among the study groups, reflecting distinct native breast morphologies. Patients undergoing augmentation–mastopexy demonstrated the highest preoperative breast volume and projection, with mean volumes of 360 cc in the right breast and 369 cc in the left breast, and a mean projection of 5.45 cm.

In contrast, patients undergoing primary augmentation exhibited lower baseline volumes. In the Mia group, mean preoperative volume was 246 cc on the right and 253 cc on the left, with a mean projection of 4.90 cm. In the Preservé group, mean volumes were 262 cc (right) and 265 cc (left), with a mean projection of 4.75 cm.

Implant selection reflected these baseline differences. Despite having the greatest native breast volume, the mastopexy cohort received the smallest implants, with a mean implant volume of 129.7 cc and mean implant projection of 2.35 cm. The Mia group received implants with a mean volume of 134.8 cc and higher projection (3.5 cm), whereas the Preservé group received the largest implants, with a mean volume of 155 cc and intermediate projection values (2.5 cm).

Postoperatively, total breast volume increased across all groups. In the mastopexy cohort, mean postoperative volumes reached 473 cc in the right breast and 518 cc in the left breast, with mean projection increasing to 6.30 cm. In the Mia group, postoperative volumes measured 418 cc (right) and 413 cc (left), with mean projection of 6.05 cm. In the Preservé group, mean postoperative volumes were 433 cc in the right breast and 438 cc in the left breast, with a mean projection of 6.00 cm.

Table 1. Patient Demographics and Surgery Characteristics

	Mia (*n* = 37) mean, range	Preserve Aug (*n* = 48) mean, range	Preserve Aug-mastopexy (*n* = 26) mean, range
Age, y	36 (23-49)	34 (21-64)	39 (21-64)
BMI, kg/m^2	22.7 (17-27.6)	22.5 (16.5-28.6)	23.7 (19.4-30.5)
Breast base width, cm	11.4 (10.5-12.5)	11.8 (9.5-13.7)	11.4 (10.5-12.5)
Implant type			
Ergonomix	0	23	22
Ergonomix2	0	25	4
Ergonomix2 Diamond	37	0	0
Implant size, cc			
100-125	11	2	15
125-140	17	10	8
155-160	5	16	2
165-175	4	20	1
Implant projection			
Mini	36	41	25
Demi	1	6	1
Full	0	1	0

Table 2. Volumetric and Projection Analysis by Procedure

Parameter	Mia (*n* = 37)	Preservé Aug (*n* = 48)	Preservé aug-mastopexy (*n* = 26)
Preexisting volume (right, cc)	246	262	360
Preexisting volume (left, cc)	253	265	369
Preoperative projection (cm)	4.90	4.75	5.45
Mean implant volume (cc)	134.8	155	129.7
Mean implant projection (cm)	3.50	2.50	2.35
Postoperative volume (right, cc)	418	433	473
Postoperative volume (left, cc)	413	438	518
Postoperative projection (cm)	6.05	6.00	6.30

Despite variation in native breast morphology and implant size, postoperative volumetric and projection outcomes converged into a relatively narrow and comparable range across all groups, Table 2.

Geometrical Analysis

Breast Angular Analysis

A consistent increase in the upper breast angle was observed across all procedures and on both sides (Figure 6). In the mastopexy group, the mean upper angle increased from 17.5° (right) and 17.85° (left) preoperatively to 22.15° and 22.10°, respectively. In the Mia group, mean values increased from 18.10° (right) and 17.70° (left) to 21.95° and 20.85°. In the Preservé group, the upper angle increased from 18.6° bilaterally to 22.20° bilaterally.

The mastopexy cohort demonstrated the greatest mean increase in upper angle (approximately 4.5-4.9°), followed by the Mia and Preservé groups (approximately 3.3-3.7°). An increase in the upper angle was observed in more than 97% of patients across all groups, indicating a highly consistent directional effect. Variability remained moderate (standard deviation approximately 1.4-2.2°), suggesting controlled and reproducible angular changes (Supplemental Figure 1).

Medial angle analysis demonstrated distinct patterns among procedures. In the mastopexy group, mean medial angle increased modestly from 65.85° (right) and 65.25° (left) to 69.45° and 68.05°, respectively. In contrast, more substantial increases were observed in the augmentation groups. In the Mia cohort, medial angles increased from 52.70° (right) and 50.90° (left) to 68.30° and 66.95°, respectively. Similarly, the Preservé group demonstrated increases from 53.65° (right) and 54.15° (left) to 68.00° and 68.75° (Supplemental Figure 2).

While preoperative medial angle values were relatively comparable across procedures, postoperative increases were markedly greater in the Mia and Preservé groups, indicating a stronger medial filling and cleavage-enhancing effect. Variability remained stable across cohorts, supporting consistent volume distribution patterns without significant heterogeneity.

A consistent increase in lateral breast angle was observed across all procedures. In the mastopexy group, mean lateral angle values increased from 60.05° (right) and 57.57° (left) preoperatively to 66.06° and 60.35°, respectively. In the Mia group, lateral angles increased from 54.44° (right) and 51.49° (left) to 63.17° and 59.77°. Similarly, in the Preservé group, increases were observed from 53.75° (right)

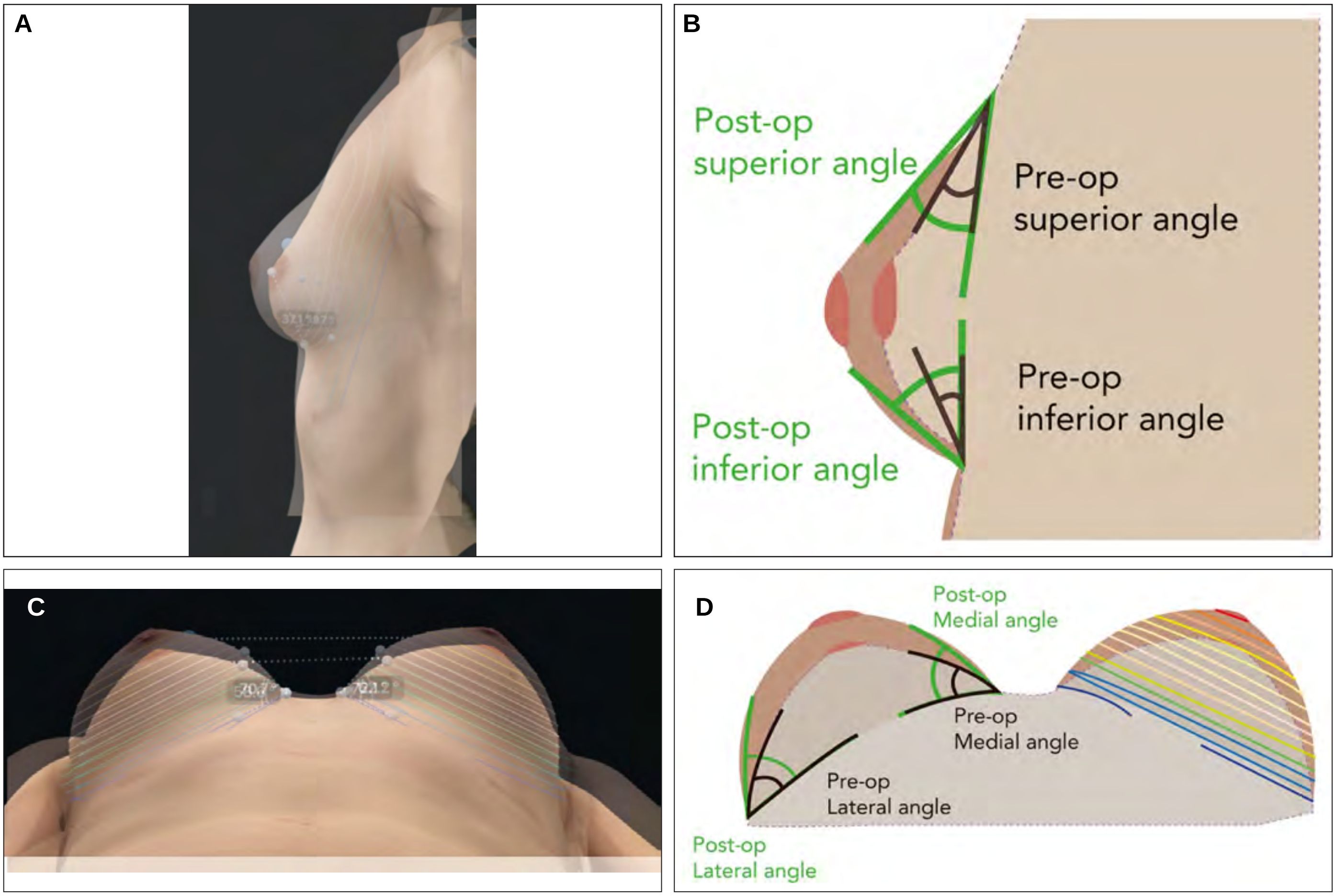

Figure 6. Three-dimensional imaging analysis in lateral (A) and coronal (C) views, shown as superimposed preoperative and postoperative images. Graphical representations illustrate the geometric assessment of superior, inferior, medial, and lateral breast angles in lateral (B) and coronal (D) views, comparing preoperative (black lines and angles) and postoperative (green lines and angles) measurements. Breast topography is also shown (lines on the left breast, coronal view). Property of Establishment Labs. All rights reserved, 2026. Reproduced with permission.

and 53.09° (left) to 61.28° and 59.94°. Both mean and median values increased consistently across all cohorts, indicating a global and controlled redistribution rather than changes driven by isolated outliers (Supplemental Figure 3).

As anticipated based on the predefined 3D marking strategy, the distinct surgical objectives, and the preoperative characteristics of each cohort, inferior angle behavior differed by procedure. These differences were particularly evident in the mastopexy cohort, where changes in the axis were intentionally minimized to align with the surgical goal of breast lift. In the augmentation–mastopexy group, the inferior angle decreased from 56.85° (right) and 55.35° (left) preoperatively to 48.25° and 46.95°, respectively, consistent with elevation and tightening of the lower pole. In contrast, primary augmentation procedures demonstrated an increase in the inferior angle. In the Mia group, mean values increased from 42.70° bilaterally to 51.85° on the right and 50.35° on the left. Similarly, the Preservé group showed an increase from 42.55° (right) and 40.25° (left) to 47.50° and 47.75°, respectively. These findings reflect controlled lower-pole expansion driven by geometric volume redistribution rather than inferior displacement.

Thoracic Angular Analysis

Preoperative thoracic analysis demonstrated a consistent asymmetry between hemithoraces, with a mean angle of 31.3° on the right and 27.61° on the left.

Tissue Distribution Analysis (HRUS)

Preoperative HRUS assessment demonstrated a heterogeneous distribution of breast tissue thickness across all analyzed regions. In the superomedial quadrant, mean tissue thickness measured from the skin to the superficial fascia of the pectoralis major muscle was 0.89 cm on the right breast and 0.98 cm on the left. Greater tissue thickness was observed in the central (retroareolar) region, with mean values of 1.44 cm on the right and 1.41 cm on the left. The inferolateral quadrant exhibited the greatest tissue thickness, measuring 1.97 cm on the right and 1.96 cm on the left. This consistent gradient of tissue distribution reflects a relative superomedial tissue deficiency and inferolateral predominance across the study cohort.

Topographic Analysis of Maximal Projection

Topographic breast analysis demonstrated a strong correspondence between nipple position and the point of maximal projection (PMP). Preoperatively, the nipple coincided with the PMP in 90.99% of right breasts and 91.89% of left breasts. Postoperatively, using the same topographic assessment method, nipple–PMP alignment increased to 95.45% on the right side and 96.36% on the left side. This postoperative increase indicates preservation of nipple alignment relative to maximal projection despite selective and frequently decentralized implant positioning (Supplemental Figure 4).

Video 2. Watch now at http://academic.oup.com/asj/articlelookup/doi/10.1093/asj/sjag110

Breast Stability

Preoperative values demonstrated relatively homogeneous distributions across all procedures, with median values close to 1.0 cm, indicating comparable baseline stability among groups. The mastopexy cohort showed slightly higher mean values preoperatively, suggesting greater initial lateral displacement compared to the Mia and Preservé groups.

Postoperatively, a consistent reduction in displacement was observed across all procedures, as evidenced by decreases in both mean and median values. This reduction was more pronounced in the mastopexy group, whereas the Mia and Preservé groups demonstrated more moderate changes. Standard deviation values remained relatively stable across preoperative and postoperative measurements, indicating that variability did not change substantially following the intervention (Supplemental Figures 1-6 and Video 2, available online at https://doi.org/10.1093/asj/sjag110). Figure 7 and the supplemental figures present representative patient examples for each procedure— Preserve, Mia, and Preserve Mastopexy, respectively—showing preoperative and 1year postoperative images, with additional longitudinal data and 3D analyses provided in the supplemental figures.

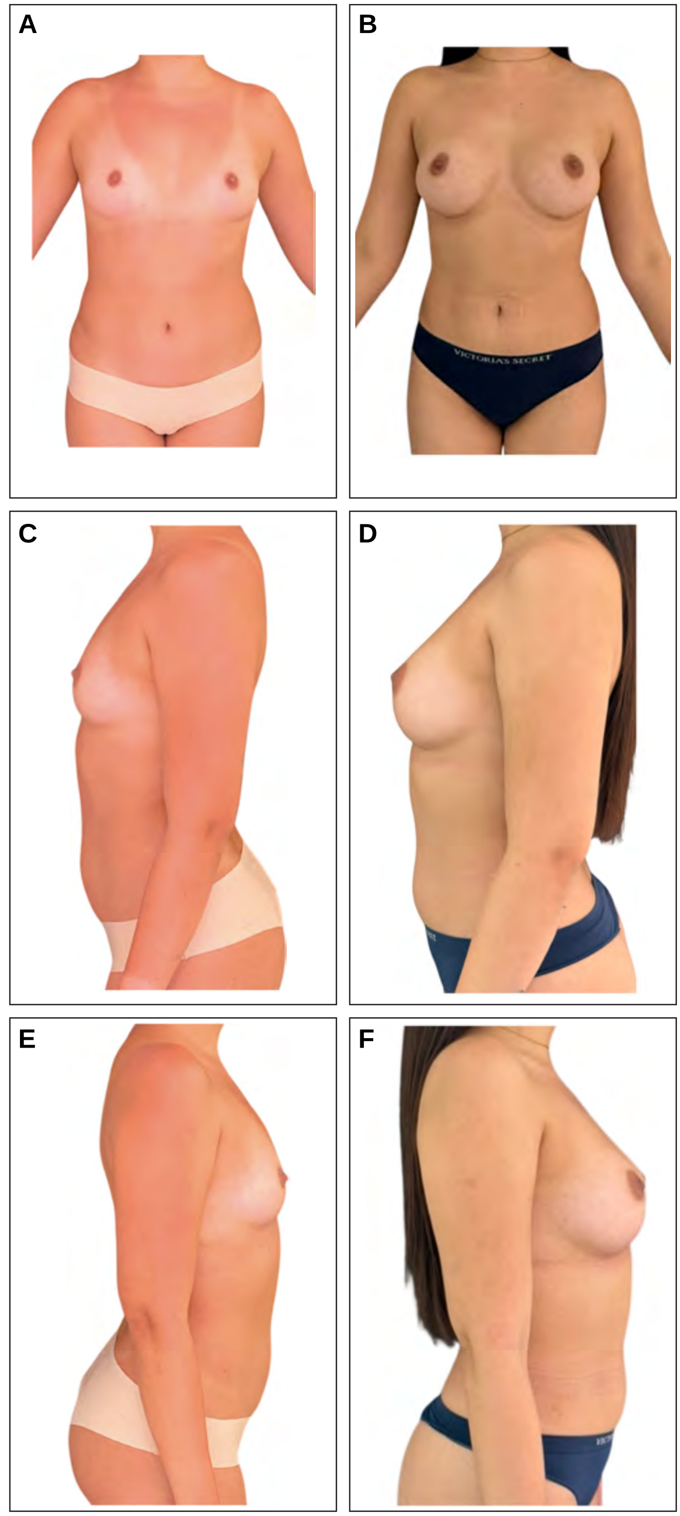

Figure 7. Preoperative images (frontal [A], left lateral [C], right lateral [E]) and 1-year postoperative images following the preserve procedure (frontal [B], left lateral [D], right lateral [F]) of a 29-year-old female patient treated with a 165 cc SmoothSilk Ergonomix2 Mini implant.

DISCUSSION

Breast augmentation and augmentation–mastopexy have historically been guided by well-established and highly effective principles. Traditional planning relies on implant selection based on breast base width, central positioning of the implant's highest point of projection beneath the nipple–areola complex (NAC), and adjustment of the IMF relative to implant dimensions. These concepts have consistently yielded predictable and reproducible outcomes and continue to form the foundation of modern breast surgery.

However, this paradigm inherently assumes that aesthetic optimization of the breast can be achieved primarily through implant selection and centralized pocket positioning, with implant volume serving as the principal determinant of the outcome. It also presumes that the implant pocket can be created by dissecting breast tissues in 2 dimensions, width and height. Such an approach may not fully account for the intrinsic variability of the native breast or for the complex interaction between breast morphology and the underlying thoracic framework, both of which significantly influence aesthetic outcomes.

The present study introduces a tissue preservation-based approach grounded in a detailed analysis of the native breast anatomy. Rather than proposing a universally superior technique, this strategy represents an alternative tailored to a specific and evolving patient population. The integration of refined anatomical knowledge, particularly of ligamentous architecture and the prepectoral posterior intralamellar plane, with technologies that facilitate controlled 3-dimensional space creation allows precise implant placement within a preserved tissue envelope, promoting integration with native tissue.

The low rate of adverse events observed in this case series was primarily limited to perioperative and procedure-related complications.

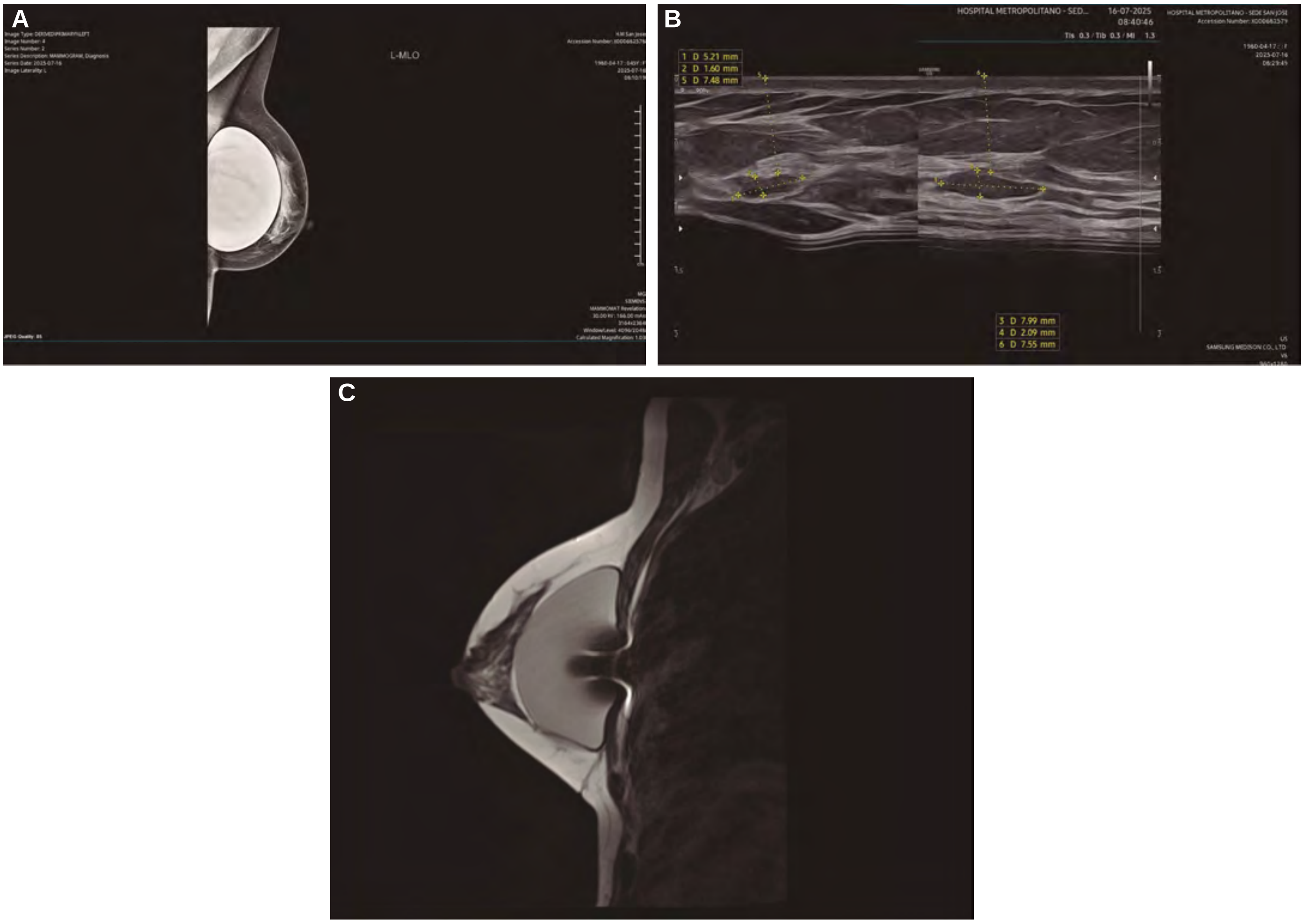

Figure 8. Images show a 45-year-old female patient who underwent a Preservé primary breast augmentation. Her breast screening program including a mammogram (A), high-resolution breast ultrasound (B) and a breast MRI with contrast (C) demonstrate a correct implant placement within the posterior intralamellar plane behind the mammary parenchyma. Property of Establishment Labs. All rights reserved, 2026. Reproduced with permission.

Predefined safety endpoints traditionally associated with implant devices were essentially negligible. Capsular contracture and other implant surface related events are expected to remain low with 4-micron surface implants, which have been shown to promote minimal fibrotic encapsulation.[11] The multifactorial pathogenesis of capsular contracture may also be influenced by technical factors, including inadequate bleeding control or breaches in aseptic technique.[12,13]

Given the absence of direct visualization of the implant pocket when using this tissue-preserving technique, hemostasis and bleeding control may represent a concern for early adopters. To date, however, no intraoperative bleeding events have been observed. Tumescent infiltration combined with epinephrine has proven effective in controlling bleeding[14] as well as the mechanical effect of the balloon on surrounding breast tissues. A waiting period of approximately 10 minutes is advisable, as the peak vasoconstrictive effect of adrenaline occurs during this interval following infiltration.[15] In addition, the compressive effect generated by balloon expansion further enhances hemostasis.[16]

Beyond optimized surgical techniques, a mechanistic perspective provides additional insight into the principles underlying the BTP approach. This paradigm emphasizes pocket formation through radial tissue balloon-assisted displacement, facilitated by hydrodissection. Such a strategy may limit early direct vessel disruption, potentially reduce intraoperative bleeding and contribute to improved operative control.

Alongside these technical and mechanistic considerations, implant-specific properties may further influence the durability and quality of postoperative outcomes. Ergonomic implants were developed with an emphasis on adaptability, incorporating a viscoelastic gel whose distribution varies according to patient position.[17-19] This behavior is attributed to the interaction between the gel and the implant shell, mediated by material crosslinking. In addition, the implant's 4-μm surface is designed to favor the formation of a well-structured periprosthetic capsule, most commonly corresponding to a Baker grade I capsule.[11] Over time, such a capsular environment may contribute to the preservation of the implant's intrinsic mechanical characteristics, allowing its soft behavior to more closely approximate that of native breast tissue.[3,17,20,21] These properties are considered relevant within the context of the BTP approach. Another important consideration involves the characteristics of the implant pocket and the subsequent relationship between the implant, the glandular tissue, and the pectoralis muscle. Pocket expansion is intended to occur within the posterior lamella, a fibroadipose layer located posterior to the gland. At this stage, technology design assumes particular importance, and breast imaging studies play a critical role in assessing the spatial relationship between the implant and surrounding breast structures. Implant placement is achieved without the use of electrocautery and without full direct visualization or extensive tissue manipulation, as the instruments function sequentially to achieve precise positioning.

In one patient from the primary augmentation cohort who underwent postoperative breast screening following the Preservé procedure, imaging revealed a BI-RADS 3 assessment. This finding allowed evaluation of implant placement and its interaction with breast tissue. As demonstrated in Figure 8, no breast tissue was identified posterior to the implant, confirming accurate confinement of the implant within the intended posterior intralamellar plane. Additionally, Figure 8A, C demonstrate that the implant is positioned slightly above the IMF, occupying a more cranial location than typically observed with traditional techniques, in which the implant tends to rest directly at the IMF. In Figure 8C, the implant is shown to be decentralized and medialized in relation to the NAC.

The safety outcomes observed in this study appear to be the result of a synergistic combination of distinct planning strategies and minimally invasive surgical tools that collectively enable a departure from conventional breast augmentation approaches. Within this surgical framework, the integration of 3D imaging and HRUS analysis during both the preoperative and postoperative phases allows the native breast to be interpreted not as a homogeneous volume, but as a geometric system defined by volume, projection, tissue distribution, and its relationship to thoracic morphology.

Ultrasound analysis revealed a consistent pattern of preexisting regional tissue distribution, characterized by relative tissue deficiency in the superomedial region and increased volume in the inferolateral quadrant of the breast. This nonuniform distribution provides a structural explanation for common aesthetic deficiencies and frequently expressed patient concerns, such as limited upper-pole fullness and suboptimal medial contour.

Three-dimensional geometric analysis further demonstrated that optimal aesthetic outcomes were achieved through targeted and frequently decentralized implant positioning. This was evidenced by a consistent postoperative increase in the upper and medial angular measurements, corresponding to improved upper-pole filling and enhanced cleavage, respectively (Figure 6). These findings indicate that the procedural objectives were met despite the use of relatively small implant volumes, as the postoperative angular increase is significant in the 4 measurements. Moreover, postoperative topographic analysis evaluating the relationship between the nipple–areola complex (NAC) and the point of maximal breast projection showed that, despite non-centralized implant placement, NAC alignment was preserved in >95% of cases. This observation suggests that surgical outcomes are not primarily determined by absolute implant size, but rather by the efficiency with which volume is re-distributed. Accordingly, breast augmentation may be more accurately conceptualized as a process of geometric redistribution rather than simple volumetric expansion.

The 1-year follow-up analysis supports the concept of volumetric efficiency, which appears to be associated with controlled lateral expansion and the absence of implant lateralization. Angular changes were observed predominantly in the superomedial quadrants rather than in the lateral regions. Stability testing further demonstrated that, despite the additional weight introduced by the implant, lateral breast displacement did not differ significantly between the preoperative condition and the 12-month postoperative evaluation, which are consistent with previous assessments at 3 years.[1]

Collectively, these findings suggest that implant placement within the intralamellar plane—combined with selective pocket positioning, most commonly in the superomedial direction, and controlled pocket creation—facilitates the formation of a supportive tissue environment, described as a “nest,” around the implant. This structure is created through balloon-guided tissue elongation rather than conventional blunt or sharp dissection, resulting in radial redistribution of a cushion-like layer of breast tissue positioned more superior from the IMF than in traditional techniques. In conventional approaches, pocket dissection begins directly at the inferior border of the circumammary ligament (or IMF), potentially creating an area of structural weakness. Conceptually, the proposed method redefines the inframammary approach, shifting from a caudal-to-cephalic dissection to a controlled cephalic-to-caudal pocket formation. This tissue configuration may offer an additional protective factor against inferior implant malposition and reduces the need for scaffold and soft tissue support (Supplemental Figures and Video 2).

Postoperative analysis further demonstrated preservation of biomechanical stability, as reflected by low complication rates and a predominance of Baker I capsular outcomes in 98.2% of evaluations. These findings suggest that preservation of fascial planes, ligamentous structures, and overall tissue integrity contributes to a stable and biologically favorable implant–tissue interface.

Limitations

This study has limitations inherent to its retrospective design. The reliance on advanced imaging technologies may limit generalizability in certain clinical settings. In addition, follow-up was limited to 12 months, and longer-term outcomes remain to be evaluated. Further prospective studies are needed to validate the reproducibility of this geometric framework and to assess its applicability across broader patient populations, including those undergoing conventional breast augmentation techniques.

CONCLUSIONS

The planning and surgical approach described in this study represents a shift toward precision-based breast tissue preservation augmentation with minimally invasive surgical tools. Despite the conceptual complexity underlying this approach, its clinical execution remains straightforward, reproducible, and efficient. By combining volumetric, topographic, and angular analyses to enable selective pocket creation and tailored implant positioning, the native breast can be interpreted as a map of regional geometric deficiencies rather than as a uniform volume. This strategy allows targeted redistribution of existing breast tissues to achieve defined aesthetic objectives without reliance on disproportionately large implants so that implant volume is focused where is needed and no implant volume is placed unnecessarily in areas of the breast with adequate preexisting breast volume. The tissue-preserving technique demonstrated a favorable safety profile and enabled accurate implant placement within the intended anatomical plane. Moreover, elongation of fibroadipose structures and controlled tissue redistribution—along with preservation of the lower pole from traditional dissection—may contribute to improved biomechanical stability and support the potential for durable, long-term outcomes.

Supplemental Material

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