ROYAL BELGIAN SOCIETY FOR PLASTIC SURGERY

Composite Breast Remodeling After Implant Removal by Tissue Recruitment and Loops Fixation With Power-Assisted Liposuction and Lipofilling (PALLL)

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Abstract

Background: An increasing number of women wish breast implant removal whilst maintaining an acceptable projection and form were possible.

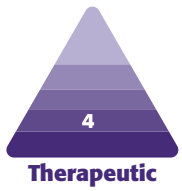
Objectives: The authors propose a technique to remodel the breast after implant removal utilizing internal suture loops to project the breast, recruit abdominal and axillary tissue cranially and medially, and provide a matrix for lipofilling.

Methods: A prospective analysis was performed of consecutive patients undergoing implant extraction followed by power-assisted liposuction loops and lipofilling. Patient characteristics were measured. The aesthetic results were evaluated by 2 independent raters. Patient-reported satisfaction was measured by standardized questionnaires.

Results: Implants in 52 patients with an average age of 55 and body mass index of 23.7 were extracted followed by breast remodeling. A total of 73% of patients had implants for aesthetic reasons, 41% were smokers, and 43% of the reconstruction cases received radiotherapy. A total of 28% had implant extraction for rupture, 58% for capsular contracture, and 14% due to pain and migration. The average volume of the implants removed was 292 cc, followed by an average lipofilling of 223 cc, yielding a ratio of 0.76 to 1. The average tissue recruited by loops was 82.5 cc. Independent raters measured 79% of results as good, 13% as acceptable, and 8% as requiring improvement; 80% of patients were satisfied to very satisfied.

Conclusions: The authors propose implant extraction followed by power-assisted liposuction loops and lipofilling can provide footprint definition, sustained projection, and high patient satisfaction. Moreover, the recruitment of a vascularized adipo-cutaneous flap by loops allows a reduced ratio of fat grafting to implant volume.

Level of Evidence: 4



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Autologous fat grafting in breast surgery has increased significantly in the last decade.[1] Appreciation of the principles of recipient site preparation, fat preparation, and fat transfer has helped surgeons to deliver more targeted and safer fat grafting with fewer complications.[2-4]

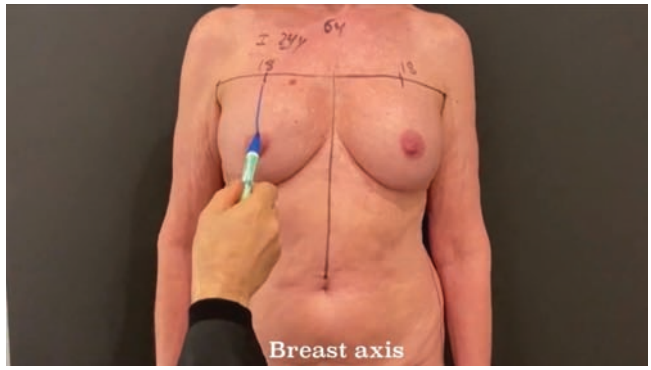
The utilization of fat grafting for breast remodeling after implant extraction has been a topic of interest in recent years. In 2015, the senior author (M.A.) published an approach for large-volume fat grafting immediately following implant removal based on the principle that the tissue of implanted breasts is already expanded and has room for the insertion of grafts.[5] We found that power-assisted transfer of autologous fat to the breast improves the ability of the recipient site to receive the graft and allows for implant removal and fat grafting in a single session. The study noted that this approach was suitable for patients who desire a natural-appearing breast similar in volume to their previous implant.

In this article, we present a refinement to our previous technique with the utilization of the Abboud double-loop principle in line with what is described by Roger Khouri,[6] who pioneered the modern utilization of loops in our field. Although one is able to achieve acceptable aesthetic results with refined lipofilling techniques, it is imperative to understand that there is limited control due to transitional body fill over the boundaries for fat injection, especially in large and flat breasts. In addition, achieving adequate projection can be a challenge (Supplemental Figures 1 and 2), and to replace the implant volume, one would require nearly double the injected fat taking into account fat resorption. With the Abboud double-loop principle, we propose a method to redefine the breast footprint, recruit surrounding tissue for shape and volume, provide ample projection, and achieve a sustained, aesthetically pleasing result without the utilization of an implant. Employing the principle of power-assisted liposuction and lipofilling[4,5,7,8] with the addition of loops (PALLL),[9,10] we aim to perform composite breast remodeling with recruited tissue through the utilization of loops and fat grafting.

METHODS

Indications

A prospective study was performed of consecutive patients who underwent implant removal followed by PALLL between January 2015 and March 2019. Ideal candidates for PALLL following implant extraction were patients who requested natural breasts with a similar or slightly less volume than they had with their implants and patients who wanted implant removal due to aesthetic concerns, capsular contracture, pain, and/or implant rupture.



Video 1. Preoperative Markings: This video shows how the preoperative markings are drawn with the patient in standing position, and in supine position prior to the surgery. Watch now at http://academic.oup.com/asj/article-lookup/doi/10.1093/asj/sjaa327

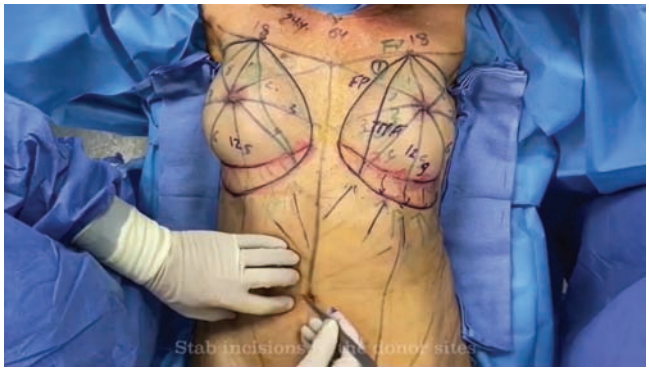
Because all patients underwent surgery in a private practice, approval from an institutional review board or ethics committee was not obtained. The study adhered to the principles set forth in the Declaration of Helsinki, and all of the patients gave informed consent.

Surgical Technique

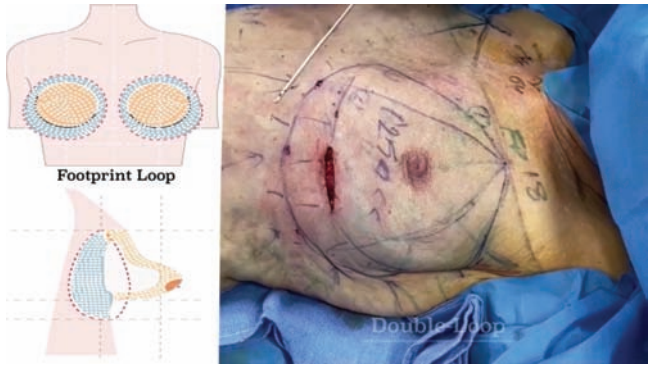
Pretreatment, a thorough clinical assessment is performed including history and examination. Patients who smoke are told to quit at least 4 weeks before the intervention. All patients are requested to have imaging before the procedure; ultrasound and mammography are performed and/or magnetic resonance imaging (MRI) in cases of rupture and pain.

On the day of the procedure (Videos 1-3), markings are performed dividing the breast into 8 zones defined by the 4 breast axes (horizontal, vertical, and 2 diagonal axes) to guide lipofilling. Following this, the new footprint is marked at an average of 8 cm below the nipple-areola complex (NAC). Similarly, the lateral boundary of the footprint is placed between the anterior and midaxillary line depending on the amount of tissue recruitment needed. The latter depends on the existing breast size, implant volume, and the patient's wish for postimplant extraction breast volume. This is followed by marking the path for the triangular loop to define the inframammary fold (IMF) (Figure 1).

During the procedure, the patient is kept in the supine position. A power-assisted liposuction system (Lipomatic Eva SP, Euromi SA, Verviers, Belgium) is initially utilized for infiltration on the machine's infiltration mode employing 5 mL of Exacyl (tranexamic acid) 0.5 g/5 mL associated with epinephrine 1:100,000 per liter of normal saline utilizing a 3-mm multiple-hole cannula.[11] This is followed by fat harvesting at the thighs, flanks, and/or abdomen with a



Video 2. Surgical Technique—Part 1: This video shows the first steps of the surgery, including the incisions, infiltration, undermining, liposuction, implant removal, and capsulotomy. Watch now at http://academic.oup.com/asj/article-lookup/doi/10.1093/asj/sjaa327



Video 3. Surgical Technique—Part 2: This video shows the following steps of this surgery, including the placement of the double loops, lipofilling, and peroperative views of the final breast. Watch now at http://academic.oup.com/asj/article-lookup/doi/10.1093/asj/sjaa327

3-mm multiple-hole cannula attached to a handpiece and set to 3000 rpm and 0.78 atm. Lipoaspirate is collected into a closed system, then decanted, and the remaining fat solution is transferred into sterile 60-mL syringes. While the fat is being prepared, implant removal is performed through a 4-cm incision in the IMF re-utilizing the old incision. In case there is no previous incision in the IMF, an incision is made 1 cm above the lower boundary of the desired breast footprint. Capsulotomy is performed for all capsules by electrocautery to allow the capsule to glide once the loops are passed, and a capsulectomy is performed for severe capsular contracture. In the next stages, with the passage of loops and tightening, a capsulorrhaphy is performed employing the double-loop principle to cause an internal retraction of the capsule.

Following implant removal, multidirectional tunnelization is performed initially in the plane between the skin and the gland and then in the plane between the gland and the fascia through access points at the lower inner and outer quadrants of the breast. Extensive tunnelization and detachment are also performed of the surrounding abdominal and axillary tissue beyond the to-be recruited area to allow tension-free recruitment of tissue into the breast with loops. Through the inframammary incision, further undermining is performed employing electrocautery of the abdominal and axillary tissue from its adhering deep plane to liberate the tissue attachments and allow tension-free recruitment of tissue.

Hereafter, surrounding tissue is recruited as a vascularized flap of adipose tissue and skin by utilization of a suture double loop passed after both the footprint and triangular markings are created; it is therefore termed a "double loop." The passage of the loop is performed using a fine 3-mm cannula, thereby redefining the breast footprint and fixing the new IMF. This is inserted through an incision at the inferomedial boundary of the footprint and passed laterally to an incision between the anterior and midaxillary line, which may vary depending on the amount of lateral tissue required to be recruited. The cannula is then passed superiorly as per the footprint curve, with the superior incision being at the level of the angle of Louis (second costal cartilage) on the central axis of the breast. The loop is pulled through its origin at the medial incision again. The loop is passed in the subcutaneous plane in the lower quadrants and deep in the parenchyma as it passes cephalad. This is performed twice, lifting the breast up, redefining the footprint, and recruiting abdominal and axillary tissue. The amount of pull and traction required on the suture as it is knotted is according to the footprint desired for the final result. One should avoid pulling too hard on the loop and avoid passing this in muscle to prevent postoperative pain.

The breast cavity is further remodeled by a second triangular loop that is passed as per the markings, with incisions following 2 lines drawn medially and laterally 45 degrees to the central axis of the breast. This is passed medially to laterally and then pulled superiorly and pulled back through the medial incision again. The loop is passed in the breast parenchyma. This is also performed twice, and it reinforces the definition of the new IMF, allows more projection, defines a boundary for fat grafting to prevent a wide and flat breast, and promotes a projected, well-shaped breast. Skin puckering formed due to passage of loops and tightening is relieved by utilization of a crochet.

For the double loop, we currently utilize nonabsorbable sutures (Filapeau 2, Péters Surgical, France). Where required, according to NAC ptosis, this is followed by an elevation of the NAC employing a number 0 V-Loc (Medtronic, USA) absorbable suture. Skin detachment by tunnelization from the breast parenchyma is verified by passing the

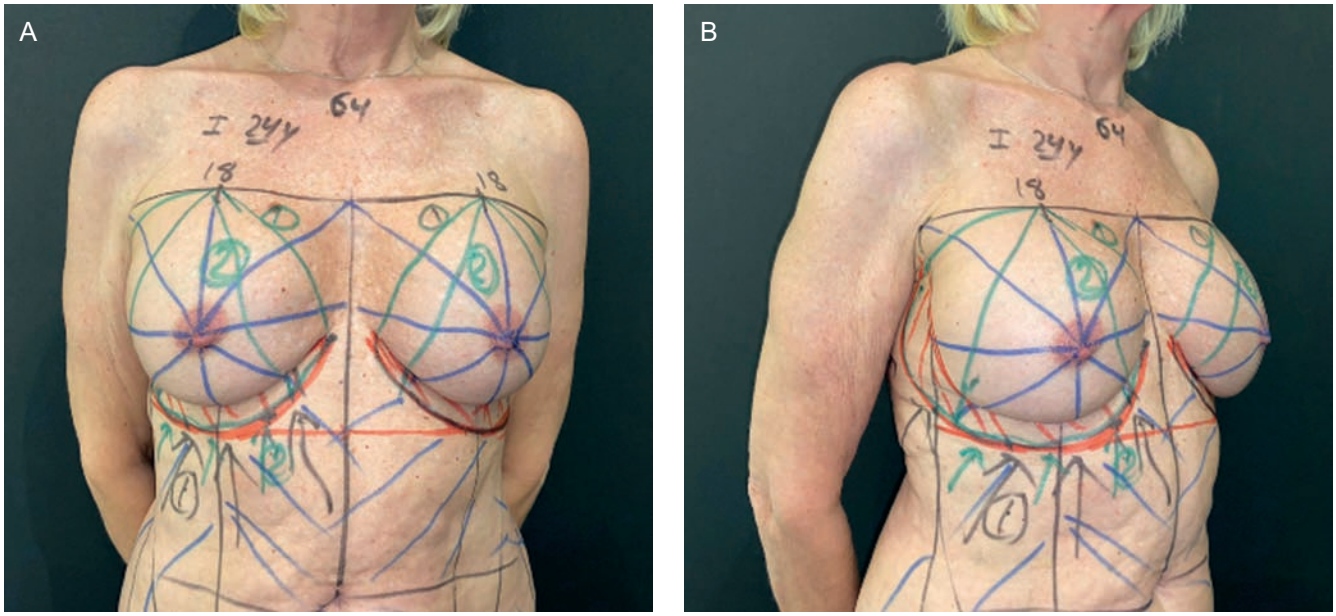


Figure 1. Markings performed for cases of implant extraction and power-assisted lipofilling on this 64-year-old female patient. Each breast is divided into 8 zones. These zones are measured and matched between the breasts for symmetry. The green markings represent the footprint loop (1) and the triangular inframammary fold loop (2). The red markings represent the zone of abdominal and axillary tissue to be recruited to provide inferior and lateral breast shape and volume. (A) Pretreatment frontal view with arms in resting position. (B) Pretreatment oblique view with arms in resting position.

cannula over the area where the 0 V-Loc loop will be passed. The loop is then passed circumferentially around the areola to reduce areola size and then cephalad along the breast axis, after which it is pulled up until the desired NAC elevation has been achieved.

Using the Lipomatic system, which is now disconnected from the suction, fat grafting is performed in a multiplanar fashion through a customized, V-shaped, 3-hole cannula (3-mm diameter), enabling simultaneous vibration at the recipient site.

After this, the cavity is rinsed with diluted Iso-Betadine solution to remove any remaining fat lobules in the capsule. This is followed by closure of the IMF incision utilizing V-Loc 3/0 in a deep and superficial plane. The stab incisions employed for liposuction, lipofilling, and passage of loops are closed with a 5/0 nylon thread.

As the final step, we utilize the handpiece of the power-assisted liposuction system to perform external vibration. A gauze soaked in Hacdil-S cleaning solution (Mölnlycke Health Care AB, Göeteborg, Sweden) is emptied onto the breast. This then allows frictionless external vibration over the breast to promote further diffusion and equal distribution of fat lobules.

Posttreatment Care

Patients were hospitalized for 1 day, after which they were generally discharged. Drains were only inserted in early cases and were removed 24 hours postoperatively. Patients were advised to wear loose, non-compressible bras for 2 months to prevent pressure on the breasts. Photographs were taken pretreatment and at regular follow-up in frontal, oblique, right lateral, and left lateral views with the arms elevated and in a resting position. Patients were advised to maintain a stable weight throughout the follow-up.

Independent Rater and Patient-Reported Outcomes

Two independent raters evaluated the patients before treatment with the most recent posttreatment photograph and rated them as good, acceptable, or requiring improvement. Additionally, patients were given an anonymous paper questionnaire by a secretary not involved in the study pre- and posttreatment to assess their satisfaction with the outcome and their quality of life. The questionnaire was identical to the one in the 2015 study and was completed by the patient in the waiting room.

Imaging

Before and after treatment, the patients were evaluated clinically and radiographically to identify implant rupture, capsular contracture, and other complications. A total of 16 patients (31%) received an MRI pretreatment for rupture and significant pain and thus received an MRI posttreatment

Table 1. Patient Demographics

Patient characteristics	Incidence (%)
Patients, no.	52
Implants removed, no.	94
Average age, y	55 (range 32-72)
Average BMI, kg/m^2	23.7 (range 18-32)
Average follow-up, mo	23 (range 12-54)
Indication for original implant	
Aesthetic (augmentation)	73% (38 patients)
Implants, no.	76 (all bilateral)
Reconstruction (cancer)	27% (14 patients)
Implants, no.	28 (10 unilateral, 4 bilateral)
Indication for implant removal and PALLL	
Capsular contracture grade II or above	58%
Rupture	28%
Aesthetic remodeling	14%
Smoking (active)	41%
Radiotherapy (in reconstructive cases)	43%

BMI, body mass index; PALLL, power-assisted liposuction and lipofilling with addition of loops.

Table 2. Operative Data

Procedure characteristics	Incidence (%)
Procedure time (knife to skin till closure), min	58 (range 44-87)
Unilateral (10 patients)	47 (range 44-58)
Bilateral (42 patients)	61 (range 54-87)
Average size of implant removed, cc	292 (range 200-485)
Average amount of fat grafting, cc	223 (range 55-350)
Graft-to-implant ratio	0.76:1
Type of suture footprint	
Nonabsorbable	67% (35 patients)
Absorbable sutures	33% (17 patients)
Use of suture (V-loc 0) for NAC elevation	17%

NAC, nipple-areola complex.

also. The remaining patients received a breast ultrasound pre- and posttreatment.

Measurement of Tissues to Be Recruited

To estimate the volume advanced from the upper abdomen and the lateral thorax, we measured the dimensions of the crescent and copied it on a plastic film. The mean area was calculated on AutoCAD (San Rafael, CA). Mean skin thickness was estimated on ultrasound. The mean volume was obtained by multiplying the mean area with the mean skin thickness.

RESULTS

Patient Characteristics

A total of 52 patients with an average age of 55 (range 32-72), an average body mass index of 23.7 (range 18-32), and an average follow-up of 23 months (range 12-54 months) were included in the study. Among these patients, 73% of them (38 of 52) had implants for augmentation, whereas 27% (14 of 52) had implants for reconstruction. Also, 41% of all patients were smokers and 43% of reconstructive cases received prior radiotherapy. In addition, 28% of the patients underwent implant removal for rupture, 58% for capsular contracture grade II or above, and 14% for aesthetic remodeling (Table 1).

Procedure Characteristics: Length/Volume Inserted, Removed/Type of Suture

All procedures were performed in 1 stage and by 1 surgeon (M.A.) and comprised of implant removal followed by PALLL for breast remodeling. The procedure time was on average 58 minutes (range 44-87 minutes) from incision until closure with procedures being longer in 8 patients where partial posterior capsulectomy was needed in the case of high-grade contracture (with or without rupture). We recommend removing the entire capsule when ALCL with thick capsules and chronic seroma is suspected. No such cases were involved in our series. These efficient operating times were possible due to operator experience, identical operation steps, a well-trained team providing assistance, and preparation of all required material preoperatively. On average, 292 cc of implant size was removed (range 200-485 cc) and 223 cc of fat was injected (range 55-350 cc), yielding a graft-to-implant ratio of 0.76:1. In 67% of cases, nonabsorbable sutures (Filapeau 2, Péters Surgical, France) were utilized for the double loop. In the other 33% (mainly early cases), absorbable sutures such

Figure 2. An example of this female patient's journey. Age at implant removal: 53 years. (A, D, G) Pretreatment photographs before receiving breast implants 15 years ago. (B, E, H) Photographs with breast implants 1 day before removal and remodeling with loops and lipofilling. (C, F, I) Results after 18 months following implant removal and remodeling with loops and lipofilling. The implants removed were 300 cc on each side, followed by remodeling with the Abboud double-loop (power-assisted liposuction and lipofilling with the addition of loops) principle and 230 cc lipofilling on the right side (ratio 0.76:1) and 180 cc (ratio 0.60 to 1) on the left. Frontal view with arms in resting position ([A] pre-implant, [B] with implants, [C] with loops and lipofilling). Right oblique view with arms in resting position ([D] pre-implant, [E] with implants, [F] with loops and lipofilling). Left oblique view with arms in resting position ([G] pre-implant, [H] with implants, [I] with loops and lipofilling). Two independent raters reviewed the result as good and acceptable, respectively.

as V-Loc 0 (Medtronic, USA) were employed. In 17%, further NAC elevation was required intraoperatively, for which V-Loc 0 was utilized (Table 2).

Outcomes

Two independent raters evaluated the posttreatment photographs from the most recent follow-up compared with the pretreatment photographs (Figures 2-5). One rater valued 85% of results to be good, 15% acceptable, and none requiring improvement. A second rater valued 73% of results as good, 11% acceptable, and 16% requiring improvement. In total, 79% of the results were valued as good, 13% acceptable, and 8% requiring improvement.

Patient-reported outcomes showed that 4 of 5 (81%) patients reported being satisfied or very satisfied globally, with improved patient-reported outcomes for breast size, form, position, cleavage, clothed appearance, scars, nipple sensation, and global satisfaction; the most significant improvement occurred in nipple sensation (by 40%). We are in the process of objectively quantifying the improvement in breast sensation as a result of the regenerative effects of fat grafting; at the same time, we believe that the removal of implants and the re-appreciation of a natural feel by patients as a result of fat grafting may have helped in their perceived sensation of the breast and nipple. There was no change in unclothed appearance. Amelioration in body image clothed, body image unclothed, self-esteem, comfort during intimacy, comfort during physical activity, and general well-being was also perceived, with the most significant being in body image clothed (by 27%) and in comfort during intimacy (by 18%) (Table 3; Appendix A).

Complications

Two patients experienced a reaction against absorbable loop thread in early cases and developed a small granuloma at the site of the knot (ie, medial incision at the breast, unilateral). This was relatively benign and painless and did not require any intervention. Two patients experienced small cystic masses on imaging, which again did not require another procedure. There were no infections and no hematomas.

Further Procedures

Further procedures were required in 3 of 38 aesthetic cases (all 3 cases with absorbable loops). These were performed at least 6 months later, and new non-absorbable loops were inserted to benefit from the tensile strength that the new suture loop would provide to aid in maintaining projection. Eleven of the 14 reconstruction cases required further lipofilling to increase volume and shape.

Imaging Findings

A total of 16 patients had comparative MRI images to assess in detail what happens to the capsule after capsulorrhaphy with the utilization of the double loop. We noted that in 13 patients, the capsule had collapsed and formed scar tissue in the form of an inverted T (Supplemental Figures 3, 4), reflecting that the capsule was adhering together. In the other 3 patients, liquid remained in the capsule. Assessment of the MRI images posttreatment showed that it was difficult to distinguish between the recruited volume by utilization of the adipocutaneous flap by loops and the fat that was grafted. Although it was a positive finding, this made it challenging to accurately calculate the amount of fat that was resorbed radiologically; however, we did not see much loss of volume in our patients clinically.

Ultrasound imaging was performed to assess for steatonecrosis, masses, and lumps. Two patients had cystic masses; however, fortunately, no suspicious lumps were noted.

Assessment of Recruited Area

This was calculated clinically and radiologically on the basis of the pre-operative markings and thickness on ultrasound. Confirmation of thickness was determined with ultrasound. On average, an area of 55 cm^2 was recruited with an average thickness of 1.5 cm. This yielded an average tissue recruitment of 82.5 cc to add to the breast volume, which would have normally required approximately 150 cc fat grafting to achieve, taking into account reabsorption rates. Besides, the action of the double loop was able to provide inferior and lateral breast zone shape by recruiting abdominal and axillary tissue into the breast.

DISCUSSION

Our results show that the reconstruction of breasts following extraction of implants with lipofilling utilizing the double-loop principle provides aesthetically favorable results with limited complications. Patients are pleased with the natural feel of their breasts, breast shape, and projection.

We are confronted by 3 main issues with fat grafting in breast tissue. The first is the issue of fat resorption. Second is the unpredictable movement of injected fat; this remains a form of liquid augmentation, and, as a result, large-volume fat grafting is limited by the native breast tissue and is unable to reverse ptosis. And finally, we note the loss of projection due to undefined fat grafting.

Implant removal followed by breast reconstruction with fat grafting has been described by Khouri et al,[12-16] Del Vecchio,[12,17,18] and the senior author (M.A.).[5] Khouri

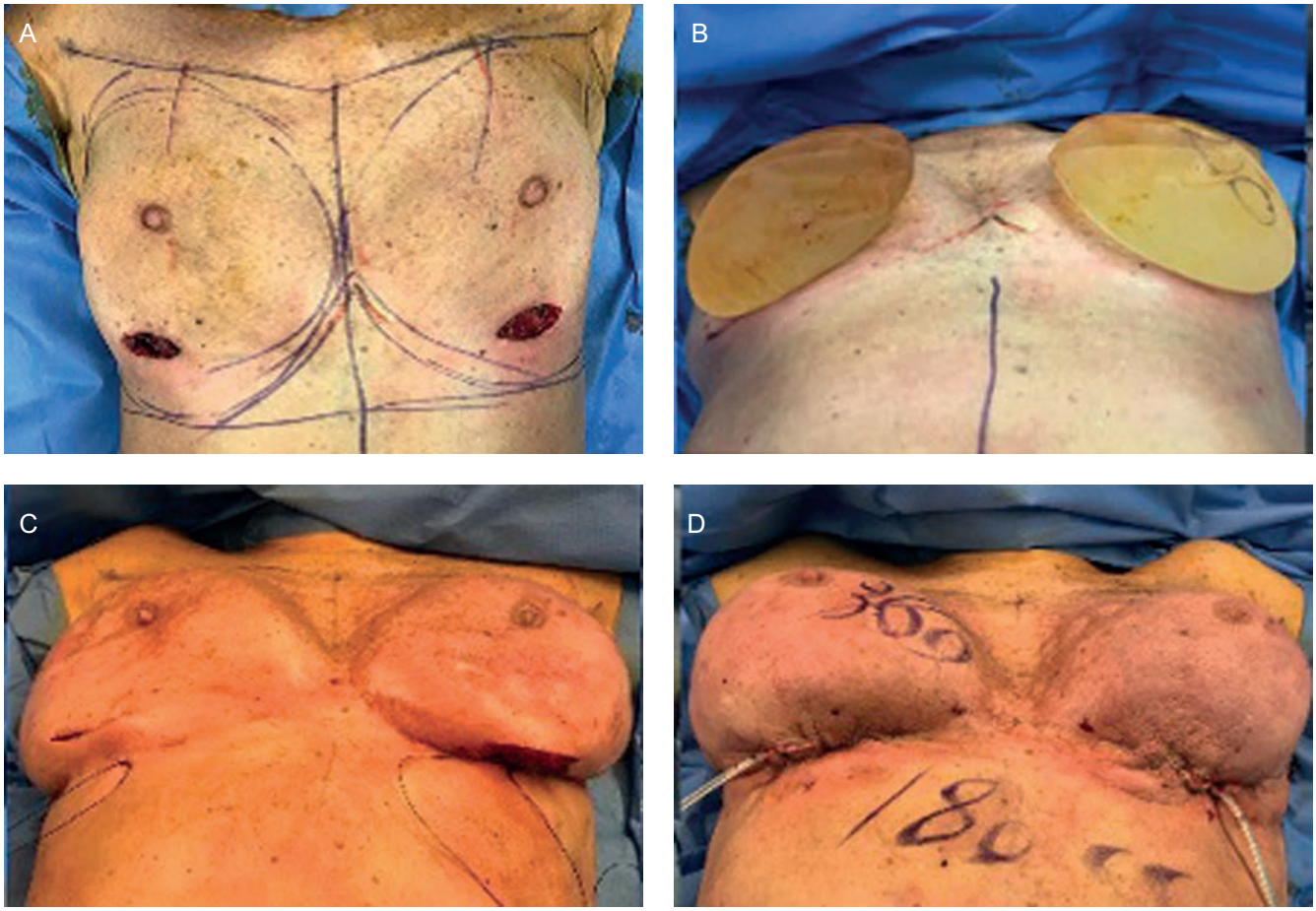


Figure 3. Here is the case of this 53-year-old female patient. (A) Breasts following implant removal; (B) following implant removal but with the implants on top of the breasts, which are now flat; and (C) status with loops but before fat grafting. Note how the breast shape and projection are already visible with the recruited tissue by loops (C) and then finally on the right (D) with both loops and fat grafting to perfect the result. All photographs (A-D) were taken intraoperatively in the same operative session with the patient in the supine position.

et al[12-16] described 94 patients in whom they performed an implant-to-fat conversion with a 1.4:1 ratio of fat to implant. In these patients, the implant capsules were scored percutaneously and hypothesized to collapse without the utilization of drains. He found that the graft retention percentage was lower (64% vs 79.8%) in implant-to-fat exchange compared with first-time reconstruction patients who had been pre-expanded with BRAVA and as such had a large, edematous, and well-vascularized breast before graft placement.[14] Del Vecchio[18] utilized the BRAVA principle for pre-expansion followed by first-stage fat injection in the subcutaneous space over the existing implant that was still in place, which was followed by second-stage fat injection at the time of implant removal. He advocated against the injection of fat into the implant pocket because it would be unlikely to survive, and described injection into the subcutaneous "third" space to create new borders of the breast footprint utilizing preferential fill, independent of the underlying pocket; as such, no capsule procedures were performed.[18] The BRAVA principle as described by Khouri,[13] Del Vecchio,[18] and Uda and colleagues[19,20] utilizes the principle of pre-expansion of the breast, allowing the creation of a vascularized matrix and is theorized to reduce fat resorption.

To improve fat resorption rates, Stillaert et al[2] published their experience with temporary expander insertion and serial fat grafting. The authors found satisfactory results and proposed that migration and resorption rate can be better controlled by the creation of a well-vascularized capsule with distinct boundaries in vivo as a result of expander placement.[2] They found a mean reconstructed volume of 386 mL in 5 patients who had an MRI after 9 months. They had injected a total of 644 mL of fat per breast, giving nearly 60% retention. Encouraging findings were also noted by Manconi and colleagues[21] in 2017 in a case series of 12 patients for whom a similar principle of expander utilization and extraction were employed.

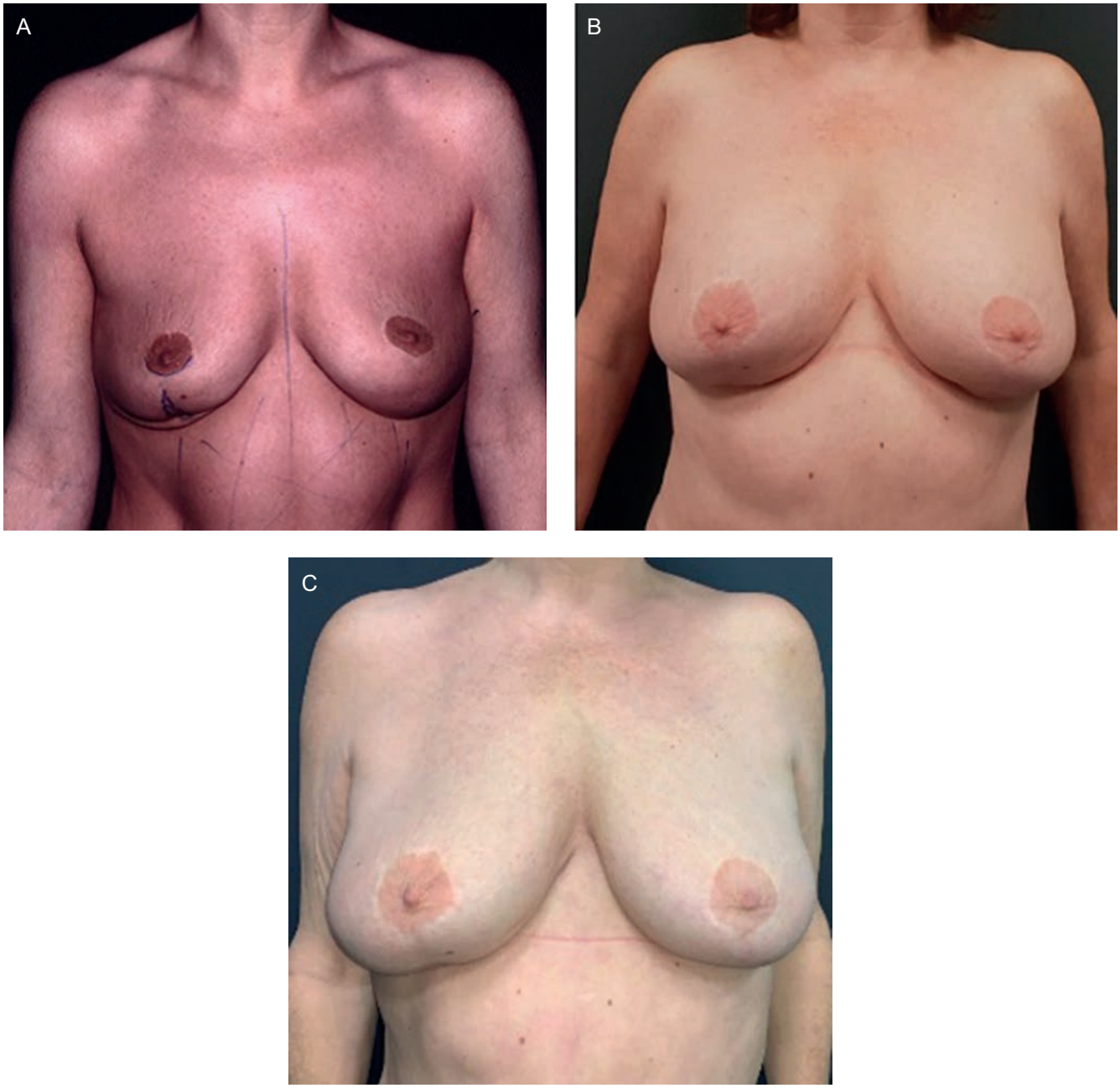


Figure 4. An example of this 48-year-old female patient for whom an additional V-Loc 0 suture was utilized to reposition the nipple-areola complex (NAC). (A) Pre-implant. (B) With implants of 300 cc on the right and 150 cc on the left. (C) After implant removal and remodeling with fat grafting of 270 cc on the right (ratio 0.9 to 1) and 55 cc on the left (ratio 0.36 to 1) and loops including a V-Loc 0 NAC loop, alongside a Filapeau 2 non-absorbable suture for the double loop. Frontal view with arms in resting position ([A], pre-implant; [B], with implants; [C], with loops and lipofilling). Photograph (A) is taken before implant placement 12 years ago. Photograph (B) is taken before implant removal. Photograph (C) is taken 16 months after loops and lipofilling (power-assisted liposuction and lipofilling with the addition of loops). Two independent raters reviewed the result as good and good, respectively.

Staying with the topic of resorption, we perform tunnelization to allow dissociation of the gland from the skin and the underlying fascia from the gland. This allows matrix modeling and prepares the area for targeted fat grafting. Fat grafting is performed employing a power-assisted Lipomatic handpiece, which allows simultaneous vibration, tunnelization, and grafting of the recipient site to aid fat transfer[4] and prevent coalescence of fat lobules.

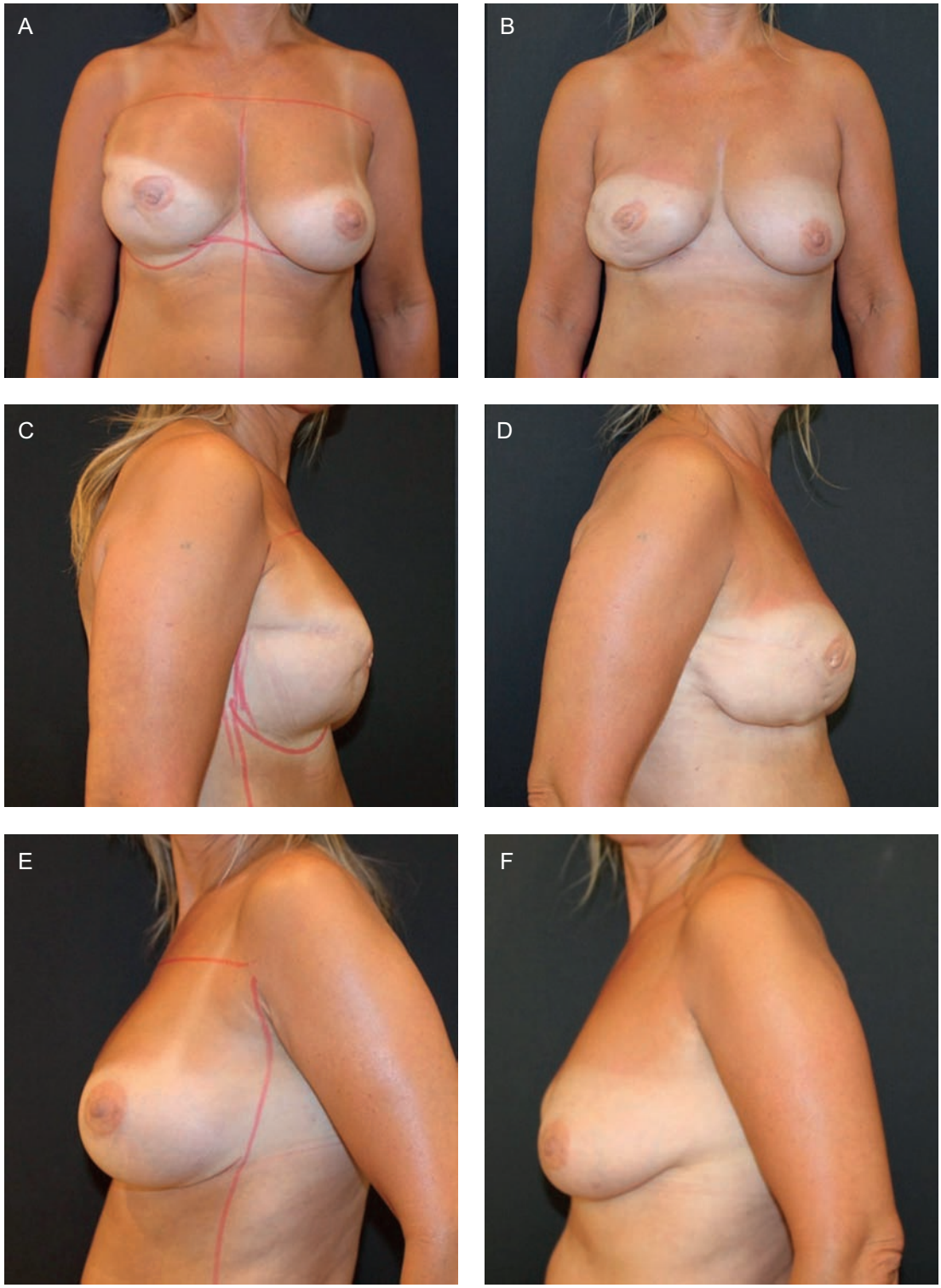


Figure 5. (A, C, E) An example of this 43-year-old female patient who had a right-side implant following mastectomy and a left-side implant for symmetrization. (B, D, F) Implant removal for rupture was performed (right: 485 cc, left: 250 cc), followed by fat grafting of 380 cc (ratio 0.78:1) on the right and 80 cc on the left (ratio 0.32:1) utilizing the double-loop technique (power-assisted liposuction and lipofilling with the addition of loops). Frontal view with arms in resting position ([A] with implants, [B] with loops and lipofilling). Right lateral view with arms in resting position ([C] with implants, [D] with loops and lipofilling). Left lateral view with arms in resting position ([E] with implants, [F] with loops and lipofilling). Photographs A, C, and E were taken prior to implant removal. Photographs B, D, and F were taken 18 months after loops and lipofilling (power-assisted liposuction and lipofilling with the addition of loops). Two independent raters reviewed the result as average and average, respectively.

Table 3. Results of the Satisfaction Questionnaire

Patient-reported outcomes		
Characteristics	Improvement, %	Patients satisfied or very satisfied, %
Breast size	16	81
Breast form	12.5	63
Breast position	17.5	69
Cleavage	9.5	75
Appearance, clothed	16.3	81
Appearance, unclothed	0	44
Scars	5	56
Pain	4.9	69
Nipple sensation	40.3	56
Global satisfaction	15	80
Body image, clothed	26.8	81
Body image, unclothed	13.9	50
Self-esteem	9.8	69
Comfort during intimacy	18.4	63
Comfort during physical activity	10.5	56
Breast apt for lifestyle and age	9.5	75
General well-being	14.2	75

External vibration is performed at the end to aid fat diffusion. In 2015, our technique showed a 40.6% resorption rate.[5] Because we employed the same technique for fat grafting, we expect this to be similar. Also, the recipient site in this series for grafting was larger because it consisted of both the native breast and the recruited tissue. As such, fat grafting was performed over a larger surface, with increased diffusion of fat lobules. Concurrently, reduced volumes of fat were grafted because a large amount of the required volume for remodeling was provided by the recruited tissue. Both of these factors further prevented coalescence of fat lobules, which would hypothetically increase survival.

The utilization of sutures to complement fat grafting in breasts has been described by colleagues around the world. Roger Khouri[6] pioneered the utilization of loops in our field and described an intradermal purse-string suture to resuspend abdominally recruited tissue below the IMF. Hamdi et al[22] described a percutaneous purse-string suture over the breast footprint to define the IMF and the breast footprint, which starts laterally and ends medially. A similar technique has been described by Visconti and Salgarello,[23] who utilized a dual-anchor barbed cog thread at the IMF. Our technique is different because it involves a more comprehensive utilization of threads: a double-loop technique is utilized compared with a single-pass technique, whether limited to the IMF or not, as described by the other authors. Moreover, it is utilized in cases of fat grafting after implant removal in 1 stage. This double-loop technique allows the recruitment of tissue lying inferiorly (abdomen) and laterally (axilla) toward the breast and redefinition and diminution of the footprint and provides adequate projected tissue ready for grafting. This can be visualized as a vascularized internal sliding flap of adipose tissue and skin. Tissue recruitment brings more volume to the breast, also described by other authors.[6,24] This not only allows more recipient tissue for fat grafting, enabling better diffusion of fat grafting, but it also decreased the volume of required fat grafting; the ratio in our study was 0.76 to 1, which is in stark contrast to the ratio of 1.5 to 1 in our 2015 study without the utilization of loops (Figure 3).[13] Additionally, in our technique, we utilize extensive tunnelization and detachment of the breast gland, which allows matrix modeling, and of the surrounding abdominal and axillary tissue, which allows recruitment. This remains the cornerstone of our technique. For the double loop, we now prefer employing Filapeau 2 (Péters Surgical, France) for the high tensile strength and the long reel of 250 cm of thread, which gives us sufficient length for the double loop.

For the capsule, we perform a capsulotomy followed by a capsulorrhaphy at the level of the footprint with loops. This allows us to effectuate an internal retraction of the capsule with shrinking of the cavity, reduce the breast footprint, and increase the projection. This might cause a descent of the NAC, which we correct utilizing a V-Loc suture mounting the NAC upwards (Figure 4), as explained above. The V-Loc suture for the NAC can also be employed to decrease areola diameter and correct asymmetries.

Our technique discusses how best to target fat grafting following implant extraction, which is unique. Extraction of the implant often leads to a large breast footprint. Besides, fat grafting is limited to the native breast parenchyma and is restricted in its ability to improve projection. With the utilization of our double-loop technique, we enable an internal lift of the breast and recruitment of surrounding tissue as a vascularized adipo-cutaneous flap. This allows fat grafting in a larger surface allowing diffusion of fat lobules and at the same time decreases the volume of fat grafting. What is more, with our technique, a true tightening of the breast footprint is achieved with an increase in the breast projection with fat grafting. This

prevents a wide and flat breast and allows projected and aesthetic-appearing breasts. And finally, the loop principle can be utilized in indications of aesthetic and reconstructive cases (Figure 5).

Limitations of our study are the small sample size, the lack of a control group or randomization, and that these are the results of only 1 surgeon. Nonetheless, we have performed a comprehensive study of a novel principle providing aesthetic outcomes after implant extraction.

In summary, our technique consists of the following major principles: (1) subcutaneous tunnelization with the Lipomatic machine of the breast gland and the surrounding abdominal and axillary tissue, releasing the subcutaneous attachments to allow remodeling of the breast matrix and to recruit surrounding tissue; (2) recruitment of abdominal and axillary tissue as a vascularized adipo-cutaneous flap utilizing the Abboud-double loop to delineate the footprint, allow projection, provide increased recipient tissue for fat grafting while decreasing fat-grafting volume requirements; and (3) moderate-volume fat grafting with simultaneous vibration and tunnelization of the large recipient site of native and recruited tissue to optimize the diffusion of fat and prevent coalescence of fat lobules. We must underline that extensive experience is required in tissue modeling and fat grafting for this procedure to be successful. And in reconstructive cases, further refinement in a second stage may be needed.

CONCLUSIONS

We propose that implant extraction followed by moderate-volume fat grafting with the utilization of the Abboud double-loop principle can provide footprint definition, tissue recruitment, sustained projection, and decreased fat-grafting requirements. It can yield an aesthetically pleasing, reliable result with high patient satisfaction and a low complication rate.

Supplemental Material

This article contains supplemental material located online at www.aestheticsurgeryjournal.com.

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