ORIGINAL ARTICLE

Autologous Fat Grafting for Breast Augmentation in Patients After Implant Removal

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Introduction: *Patients diagnosed with symptomatic capsular contracture or with safety concerns for the implant are often reluctant to accept the operation of implant exchange, choosing instead removal without exchange or taking other options to rebuild their breasts. These patients may benefit from augmenting the overlying soft tissue of the breasts with autologous fat grafting (AFG) after removing the prosthesis if the aesthetic appearance of their breasts is an issue. A retrospective analysis of patients receiving AFG for breast augmentation after implant removal was performed. The outcomes in these patients were compared with those of the patients receiving AFG for breast augmentation as their first breast surgery during the same period.*

Materials and Methods: *Between March 2011 and November 2013, 27 patients receiving AFG after breast implant removal (BIR) were assigned to group A and 325 patients who underwent AFG for breast augmentation without preexisting implant by the same surgeon were assigned to group B. Objective evaluation was made by measuring the change in the difference of breast circumference (BCD) and breast thickness measured by ultrasonography taken before and after the treatment. Aesthetic evaluation was performed using a 5-point Likert-type scale for patient satisfaction and comparing preoperative and postoperative digital photographs for physician satisfaction.*

Results: *Relative to group B, patients in group A were older and had higher complication rates, including infection, fat necrosis, indurations, and calcifications ($P < .05$). The changes in BCD and breast thickness between the 2 groups were of no clinical significance. The reoperation rate in group A was significantly higher ($P < .05$).*

Conclusions: *The number of postoperative complications of AFG for breast augmentation was found to be higher in patients after BIR. The optimal timing of AFG in the patients after BIR should be further studied if 2-stage augmentation with fat grafting is to be performed. Reoperation with fat grafting to the breasts should be considered if patients expect to have the original volume of their breasts restored.*

Breast augmentation with implants was the most commonly performed cosmetic surgical procedure in 2012 and the second most common surgical procedure in 2013 according to data obtained from the American Society for Aesthetic Plastic Surgery.[1] Despite obvious progress that has been made over the past decades, implant-related complications following breast augmentation continue to challenge cosmetic surgeons.[2,3]

Studies reveal that the longer the implants are in place, the greater the accumulative risk of developing implant-related problems such as capsular contracture, implant rupture, breast discomfort, and/or psychological problems.[4–7]

Moreover, the pressure resulted from the implant volume can lead to thinning of the soft tissue of the breasts and atrophy of the pectoral muscles in the long term. Aging is another precipitating factor of soft-tissue thinning in the patients with a long history of breast implantation. In addition, excessive upper pole

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fullness and wide breast cleavage can make these patients' breasts look unnatural.[8]

As a result, removal of a breast implant is indicated either due to symptomatic contracture, implant rupture, safety concern, or the patient's desire to correct the unnatural appearance.[9]

Once patients have been diagnosed with the above impressions and they have decided to undergo implant removal, they are often reluctant to accept the implant exchange operation because of concerns about the implants.[10] Autologous fat grafting (AFG) can restore the aesthetically pleasing contours of the breast when patients are dissatisfied with the appearance of their breasts after implant explantation.[9]

No previous study appears to have addressed the long-term outcomes of patients receiving AFG for breast augmentation after implant removal. A retrospective analysis of patients receiving AFG for breast augmentation after implant removal was performed in this study. The outcomes of these patients were compared with those of patients receiving fat grafting for breast augmentation as their first breast surgery by the same surgeon during the same period.

Materials and Methods

The study was approved by the Institutional Review Board at the Genesis Clinic and is in compliance with the Declaration of Helsinki. We retrospectively reviewed the charts of 388 consecutive patients who underwent AFG for breast augmentation for various indications between March 2011 and November 2013. All surgical procedures were performed by the author. All patients provided written informed consent and had been advised of the potential complications of AFG for breast augmentation. All patients promised to conduct routine follow-up and undergo routine ultrasonography after treatment.

Of the 388 patients who underwent AFG for breast augmentation, 33 (8.5%) patients received this procedure after removal of breast implants. Indications for breast implant removal (BIR) included Baker III and IV capsular contracture with the associated deformity and pain, physical or psychological discomfort, and safety concerns regarding the implant. After exclusion of patients with inadequate follow-up time (<12 months), including those lost to follow-up, 27 patients were enrolled in the study and were assigned to group A. During the same period, 355 patients without previous breast surgery received fat grafting for indications such as correction of congenital asymmetry of the breasts, augmentation following breast cancer removal, and cosmetic augmentation. After exclusion, there were 326 patients assigned to group B. Comparison of complications and effectiveness of the surgical procedures between the 2 groups was performed.

Physical examination and breast ultrasonography were performed routinely at 3-, 6-, and 12-month follow-up visits to determine potential complications including infection, fat necrosis, indurations, and/or calcification after treatment.

Clinical data on all postoperative complications were collected throughout follow-up for all patients. If a mass was palpable during routine physical examination or observed with ultrasonography, magnetic resonance imaging (MRI) was performed for further evaluation.

Aesthetic assessment was performed using preoperative and postoperative digital photographs with frontal, lateral, and bilateral oblique views for each patient. Follow-up photographs were taken at each return visit after completion of the treatment. For the evaluation of aesthetic outcomes, a questionnaire was used to assess each patient's satisfaction and graded according to a 5-point scale as *very satisfied* (5), *satisfied* (4), *fair* (3), *unsatisfied* (2), and *very unsatisfied* (1). The results of physician satisfaction were obtained by an independent physician who did not participate in the medical care of the patients. According to the photographs taken preoperatively and postoperatively, the results were also graded as *very good* (5), *good* (4), *fair* (3), *poor* (2), and *very poor* (1). Categories for patient self-evaluation and physician assessment included breast size, shape, symmetry, and proportion to the body. A final combined score (maximum of 20 points, minimum of 4 points) was calculated for each patient, and the 12-month results were included.

Objective evaluation was made by measuring the change in the difference of breast circumference (BCD) and breast thickness taken before and after the treatment. The BCD was defined as chest circumference at the nipple minus chest circumference at the inframammary fold. Ultrasonography was performed in all patients before treatment and at postoperative follow-up visits. After complete examination of the breasts, measurements of the thickness at the 3- and 9-o'clock direction on the areolar margin of both breasts were recorded. The 4 anchoring points of thickness measurement were defined as L3, L9, R3, and R9. The change in breast thickness at 12 months was recorded and compared.

Implant Removal

For patients in group A, who presented for implant removal due to various reasons, the procedure was performed under intravenous sedation. The breast implant was removed via periareolar, transaxillary, or inframammary fold approaches after the injection of local anesthetic solution (1 mL epinephrine in 100 mL 1% lidocaine). Capsulectomy was performed only in cases of old, calcified, and contracted capsules. Owing to the inevitable surgical trauma and bleeding, which are unfavorable to the survival of a fat graft, we implemented 2-stage operations. Almost all of the patients underwent fat grafting for breast augmentation several weeks after implant removal.

Harvesting of Adipose Tissue

Fat was harvested from potential donor sites including thighs, hips, flanks, abdomen, and calves under intravenous sedation and local tumescent anesthesia. Each harvest site was infiltrated with 150 to 300 mL of tumescent anesthetic (1000 mL of lactated Ringer's solution, 30 mL of 2% lidocaine, and 1 mL of 1:1000 epinephrine) 10 to 15 minutes before liposuction was initiated. Adipose tissue was harvested with a 3- or 4-mm aspiration cannula attached to a low-pressure suction machine set at −400 to −500 mm Hg.

Preparation of Fat Graft Enriched With Stromal Vascular Fraction

A portion of harvested fat (100 mL) was mixed with 1% type I collagenase (100 mg in 100 mL of normal saline solution) and transferred to a shaking incubator (Beauty Cell multi-station [NB-803MS]; N-BIOTEK, Seoul, Korea) at 37°C (200 rpm). The mixture was shaken for at least 30 minutes to dissolve the adipose tissue.

The collagenase-dissolved fat was centrifuged at 800*g* for 5 minutes to isolate the stromal vascular fraction (SVF) in a cone tube. The cone tube resulted in 4 distinct layers of content after centrifugation, with the uppermost layer comprising lysed fat and oil, the second layer consisting of collagenase solution, and the bottom layer containing red blood cells. The third layer, which appeared between the collagenase solution and red blood cell layer, was the collection of SVF containing adipocyte-derived stem cells (Figure 1).

During the process of isolation, the remaining fat was centrifuged at 800*g* for 4 minutes in preparation for grafting. After removal of the free oil and blood components, the fat was combined with the isolated SVF and transferred to 10-mL BD syringes (Becton Dickenson, Franklin Lakes, NJ) and connected to a 14-gauge, 15-cm, single-hole cannula ready for injection.

Figure 1. *Preparation of stromal vascular fraction (SVF)–enriched fat graft. One hundred milliliters of the harvested fat was mixed with 1% type I collagenase (100 mg in 100 mL of normal saline) and transferred to a shaking incubator, and it was shaken for 30 minutes to dissolve the adipose tissue. (A) After centrifugation, the resulting cone tube showed 4 distinct layers of content. The thin, turbid, grayish layer near the bottom after washing was the collection of SVF. (B) Appearance of the remaining harvested fat after centrifugation and enriched with SVF ready for injection.*

Delivery of the SVF-Enriched Fat Graft

With the patient in a supine position, injections were performed in a fanning pattern through the entries made at the inframammary fold and medial areolar margin. The fat was injected into subcutaneous, subglandular, supramuscular, and/or intramuscular layers. Care was taken not to inject fat into the implant pocket, which can be done by using the "solid injection" technique, as described by the author in a previous article.[11]

Statistical Analysis

All data were analyzed with SPSS software, version 22.0 (IBM Company, Chicago, Ill). Statistical significance was defined as $P < .05$

Results

Demographics

The mean age of the patients was 39.1 years (range, 27–50 years) for group A and 34.0 years (range, 18–57 years) for group B. The difference was statistically significant, which indicates that most patients who underwent AFG after implant removal were significantly older than those who underwent it without previous breast surgery. The mean body mass index was 19.9 (SD, 1.9) in group A and 20.0 (SD, 2.8) in

group B. The difference was not statistically significant. Patients in group A underwent BIR due to capsular contracture (Baker III–IV, n = 14, 51.9%), physical and/or psychological discomfort (n = 10, 37.0%), and personal safety concern (n = 3, 11.1%; Table 1). The mean follow-up time was 27.1 months (SD, 10.8) in group A and 28.8 months (SD, 11.8) in group B with the difference not significant.

Change in BCD and Breast Thickness

The mean pretreatment BCD was 7.7 cm (SD, 2.5) in group A and 7.6 cm (SD, 3.1) in group B. The mean posttreatment BCD was 10.7 cm (SD, 3.3) in group A and 11.4 cm (SD, 3.8) in group B. The mean operative change in BCD was 3.0 cm (SD, 1.8) for group A and 3.5 cm (SD, 2.2) for group B. The mean volume of fat grafted to each breast was 247.0 mL (SD, 32.2) in group A and 250.9 mL (SD, 39.1) in group B. Breast thickness was measured with ultrasonography at 4 anchoring points before and after treatment. The mean breast thickness change was 14.6 mm (SD, 3.3) in group A and 17.8 mm (SD, 6.9) in group B. These differences between both groups were not significant (Table 2).

Aesthetic Outcomes

The results of patient satisfaction and physician satisfaction in group A were 16.3 (SD, 1.2) and 16.7 (SD, 1.6). In group B, the results were 17.2 (SD, 1.9) and 17.4 (SD, 2.0). The difference between groups was not significant.

Postoperative Complications

Complications included recipient site infection, fat necrosis, and small areas of induration (with or without calcification). The overall complication rate was 22.2% (6 of 27) in group A and 7.1% (23 of 326) in group B. The complication rate in group A was significantly higher than in group B ($P < .05$; Table 3).

Reoperation Rate

The reoperation rate in group A was 41% (11 of 27 cases) and 12.9% (42 of 326 cases) in group B. The difference was clinically significant ($P < .05$).

Discussion

Breast augmentation with implants remains a commonly performed cosmetic surgical procedure. Nonetheless, studies reveal that the longer the implants are in place, the greater the accumulative risk of developing implant-associated problems.[4–7] Once complications develop, removal of the breast implant might be required to exclude the risk of recurrent problems apart from various treatment options.[12,13]

Patients who were diagnosed with capsular contracture, implant rupture, or physical/psychological discomfort of the implants would often prefer implant removal without exchange or pursuing other options to rebuild their breasts.[10] Autologous fat grafting can restore the aesthetically pleasing shape of the breasts when patients are dissatisfied with the appearance of their breasts after implant explantation.[9]

However, the implant removal procedure can result in tissue trauma and bleeding in the breasts, no matter how careful a surgeon performs it. To elucidate the impact of implant removal on the outcomes of the patients receiving AFG, we compared 2 groups of the patients operated by the same surgeon within the same period instead of studying them separately.

In 2012, Del Vecchio[9] described his technique of simultaneous implant exchange with fat grafting after BIR in a case report. Preoperative pre-expansion of the patient's breasts with Brava (Brava, Inc, Miami, Fla) was applied by using negative pressure generated by the device for 2 weeks. The fat graft was then injected into the breasts, with the amount of injected fat being 2-fold the volume of the breast implant. Del Vecchio advocated that the reconstructed breasts could be as large as the pretreatment ones.[9]

However, the positive effect of pre-expansion remains unclear, and the process of pre-expansion is time-consuming and requires significant effort on the part of the patient.[14] Moreover, there was no report in the case study of long-term outcomes to identify potential complications or the effectiveness of this procedure.

Removal of a breast implant can be performed via periareolar, transaxillary, or inframammary fold approaches. Surgical intervention over these areas inevitably results in tissue trauma and bleeding, which can compromise the survival of the grafted fat.[15] Furthermore, incision wounds limit fat transplantation in the immediate area because of the inevitable egress of fat in tandem with elevated intramammary pressure after fat injection. Transplanting fat successfully beneath the areolar incision and inside the tract at the tail of Spence is unlikely to be successful.[9] To reduce the potential complications in AFG and to overcome the issues involved in the use of the Brava system, we

Table 1. Demographic Analysis and Related Management of the Patients in Group A*

Patient No.	Age, y	Body Mass Index	Indication for Implant Removal	Capsule Surgery	Time Interval Between Explantation and Second Surgery, d	Complications
1	28	18.9	Physical and/or psychological discomfort		21	
2	44	19.1	Baker IV CC	Capsulectomy, periareolar approach	19	
3	39	21.3	Physical and/or psychological discomfort		58	
4	45	19.3	Baker IV CC	Capsulectomy, inframammary fold approach	24	
5	34	17.5	Safety concern		41	
6	47	24.2	Physical and/or psychological discomfort		26	Induration and/or calcification
7	41	20.9	Baker III CC		40	
8	37	17.8	Baker III CC		21	
9	41	21.1	Physical and/or psychological discomfort		27	Induration and/or calcification
10	33	21.3	Baker III CC		48	
11	47	20.2	Baker III CC		19	Induration and/or calcification
12	33	18.8	Safety concern		16	Induration and/or calcification
13	40	19.8	Physical and/or psychological discomfort		15	
14	43	22.5	Baker III CC		54	
15	34	18.4	Physical and/or psychological discomfort		25	
16	40	22.7	Baker III CC		21	
17	37	19.6	Baker III CC		24	
18	36	18.1	Baker III CC		9	Induration and/or calcification
19	31	15.6	Physical and/or psychological discomfort		77	
20	44	19.7	Physical and/or psychological discomfort		29	
21	41	18.3	Baker III CC		23	
22	46	22.1	Physical and/or psychological discomfort		0	Fat necrosis
23	41	20.5	Physical and/or psychological discomfort		23	
24	27	22.5	Safety concern		14	
25	50	20.4	Baker III CC		28	
26	49	18.8	Baker III CC		30	
27	28	18	Baker III CC		42	

*CC indicates capsular contracture.

Table 2. Patient Data

Characteristic	Group A, Mean (SD)	Group B, Mean (SD)	*P* Value (by *t* Test)
n	27	326	
Age, y	39.1 (6.5)	34.0 (7.6)	$P < .05$ (.001)
Body mass index	19.9 (1.9)	20.0 (2.8)	NS
Volume of fat injected into each breast, mL	247.0 (32.2)	250.9 (39.1)	NS
Follow-up time, mo	27.1 (10.8)	28.8 (11.8)	NS
Change in BCD, cm	3.0 (1.8)	3.5 (2.2)	NS
Change in breast thickness, mm	14.6 (3.3)	17.8 (6.9)	NS
Patient satisfaction	16.3 (1.2)	17.2 (1.9)	NS
Physician satisfaction	16.7 (1.6)	17.4 (2.0)	NS

*NS indicates not significant; BCD, difference in breast circumference.

implemented 2-stage operations with fat grafting for those patients who did not desire implant exchange after BIR. Most of the patients received AFG more than 2 weeks after BIR, when the operated tissue had healed.

The use of cell-assisted lipotransfer had been validated in both animal and human studies to increase the viability and vascularity of the grafted fat while reducing the occurrence of cystic necrosis and calcification.[16] To our knowledge, no published controlled studies have addressed the issue of dose correlation of SVF cells, which is beyond the scope of the present article. There are published studies suggesting that human adipocyte-derived stem cells could stimulate metastasis of breast tumor in animal studies.[17] In human studies, the results were not conclusive. In their published article, Bielli et al[18] mentioned that it remained unclear whether grafted or resident adipocyte-derived stem cells may increase the risk of cancer development or recurrence. Preliminary follow-up studies seem to support the efficacy and safety of SVF enrichment and the additional benefit from the combined use of autologous platelet-derived growth factors during breast reconstruction procedures.[18] Actually, data concerning the role of adipocyte-derived stem cells on breast cancer progression are contrasting, although no clear evidence speaking against their use exists. In our opinion, before the appearance of more experimental and clinical data on stem cell–enhanced fat grafting addressing surgical promise and oncological concerns, the criteria for patient selection undergoing cell-assisted fat grafting for aesthetic or reconstructive reasons should be based on their individual breast cancer risk.[19]

Avoidance of injecting fat into the implant pocket is important during operative augmentation by AFG. Digital insertion into the implant pocket as guidance to avoid careless injection has been described elsewhere.[20] However, this method involves enlargement of the entry point to allow finger insertion and results in broader tissue trauma. We can easily prevent unintentional injection into the implant pocket by using the solid injection technique, described in an article previously published by the author.[11] In this technique, the operator uses his or her nondominant hand to feel the tip of the injecting cannula and help guide the injection. The fat is injected only on withdrawal, when the operator feels solid feedback while advancing the cannula. No injection is performed when the operator feels empty feedback from the cannula, which means that the tip is inside the pocket. In a study published in 2013, the postoperative complication rate was 2.2%, which was relatively low as compared with that in the literature.[11,21]

Literature reviews show that the complications rate after fat grafting to the breasts is about 10% to 16.7%.[22,23] In the current study, the complication rate in group A was significantly higher than in group B (22.2% to 7.1%), suggesting that tissue trauma and bleeding are unfavorable to the survival of grafted fat. In addition, the compressed pectoralis muscle and thin overlying skin of the breast limit the volume of fat to be injected without resulting in high interstitial pressure. This in turn leads to fat necrosis, induration, and calcification. Most patients in group A received AFG for breast augmentation 2 weeks after their BIR, when the operated tissue had healed. In our experience, it appears that a longer duration of healing after BIR was beneficial to the reduction of postoperative complications. To elucidate the optimal timing in AFG for the patients after BIR, further study with more patients is mandated.

Table 3. Number of Complications and Reoperation After Autologous Fat Grafting to the Breasts

Complication	Group A (n = 27)	Group B (n = 326)	*P* Value (by Chi-Square Test)
Fat necrosis	1	3	
Infection	0	2	
Induration and/or calcification	5	18	
Others	0	0	
Total, No. (%)	6 (22.2)	23 (7.1)	<.05 (.017)
Reoperation, No. (%)	11 (41)	42 (12.9)	<.05 (.001)

Potential complications at donor sites existed when extensive liposuction was performed in very thin women. It is not easy to perform breast augmentation by AFG in these patients because their fat layer is thin and the space in the breasts is limited. To harvest adequate amounts of aspirates, we recommend performing liposuction from additional areas of the body. For example, 1200 mL of aspirate could be harvested from the inner, post, and lateral thighs in normal-weight patients. For underweight patients, this amount of aspirate should be harvested from the abdomen, calves, or upper arms, besides the aforementioned areas. In addition, the surgeon's technique is important for minimizing donor site deformities. Fortunately, our patients seldom suffered from uneven surfaces and/or other major donor site complications.[21]

Although calcifications are poorly characterized with ultrasound, they can be recognized as echogenic foci, particularly when in a mass. Macro-calcifications will attenuate the acoustic beam and cause posterior acoustic shadowing as in other parts of the body. Micro-calcifications situated in fat are less conspicuous than those present in a mass. However, micro-calcifications embedded in an induration are well depicted. The punctate, hyperechoic foci will be conspicuous in a hypoechoic nodule.[24] In recent years, advanced radiologic screening techniques have made it easier for radiologists to distinguish between the changes associated with benign necrosis of fat and changes associated with cancer. Knowledge of the appearance of the breast on ultrasonography and the evolution of patterns of fat necrosis in patients who have undergone AFG is mandatory in the evaluation of post-lipofilling breast lesions.[25] To date, no study has definitively demonstrated the benefits of routine MRI screening of the breasts taking both economy and efficiency into considerations.[26] In other words, ultrasonography remains the first-line examination for regular follow-up of breast patients as it is cheaper, faster, and easily accessible. An MRI is used in the case of remaining doubt at ultrasonography.[27]

In demographic analysis, the mean age in group A was significantly higher than that in group B. This reflected that most patients in group A received breast implant surgery in their early adulthood and supported the studies suggesting that the longer the implants are in place, the greater the risk of developing contracture and other related problems.[4–7] The low body mass index in both groups indicated that all the women had thin breast tissue and that in group A, that worsened the appearance of the implants.

Inadequate breast lining always limits the selection of prosthetic size and often leads to an unnatural postoperative appearance, with abrupt beginnings and ends. In these patients, AFG can rebuild the soft-tissue volume of the breasts. In addition, the preferential filling quality of fat is beneficial to reestablish natural transitional zones and breast cleavage (Figure 2). According to the author's previous study, women with lower body mass index or those who are underweight could benefit from AFG for breast augmentation and achieve similar effectiveness as compared with women of normal weight.[17]

Three-dimensional imaging and MRI-based volumetric analysis are better ways to evaluate breast volume. However, despite the improvements made in recent years in fat graft harvesting and delivery, effective methods for evaluation of the overall graft survival remain limited.[28] Although MRI-based breast volumetric evaluation is regarded as most accurate, the results in the assessment of breast volume by using MRI can be different if different software programs are adopted. [31] Illouz et al[25] even advocated that quantitative evidence of clinical fat survivability and predictability of volume restoration does not exist, yet reports of patient satisfaction with this procedure are plenty. We used BCD to evaluate the results of the increase in breast size because it is the most feasible method in office-based practice, although it is not the most accurate method. Yoshimura et al[23] claimed that an increase of 4 to 8 cm in BCD appeared to correspond to the 100- to 200-mL increase in the volume

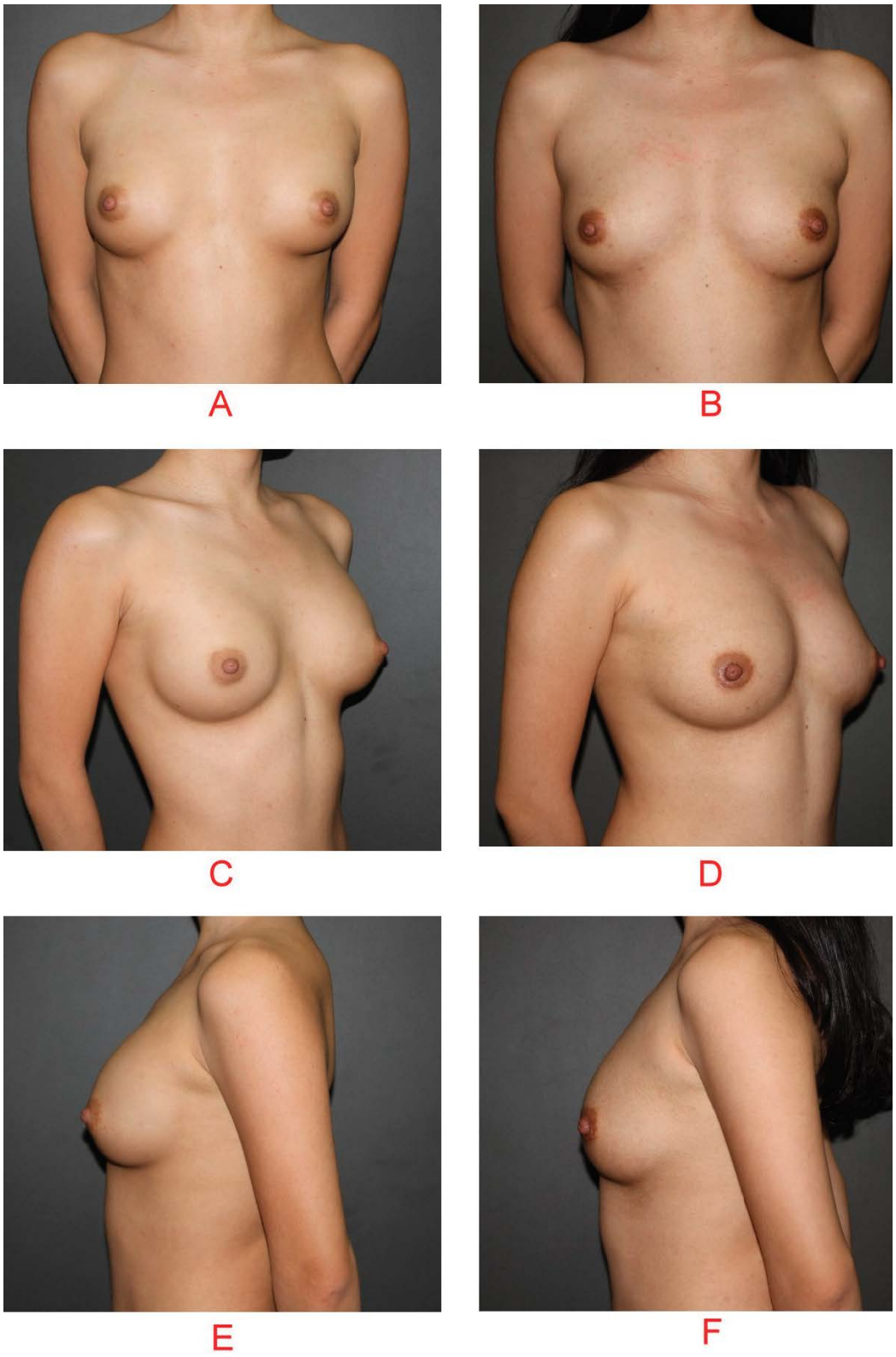

Figure 2. *Patient 1: Pretreatment views with the existing implants (A, C, E) and posttreatment views at 17 months after exchanging the implants with autologous fat grafting (AFG) to the breasts (B, D, F). This 28-year-old woman presented to our clinic with chief complaints of excessive upper pole fullness and wide cleavage gap 2 years after saline implant of 230 mL. An AFG of 250 mL in each breast was performed in 1 session. Note the improvement of breast cleavage and upper pole fullness. However, the projection of her breasts was not as good as with the implant.*

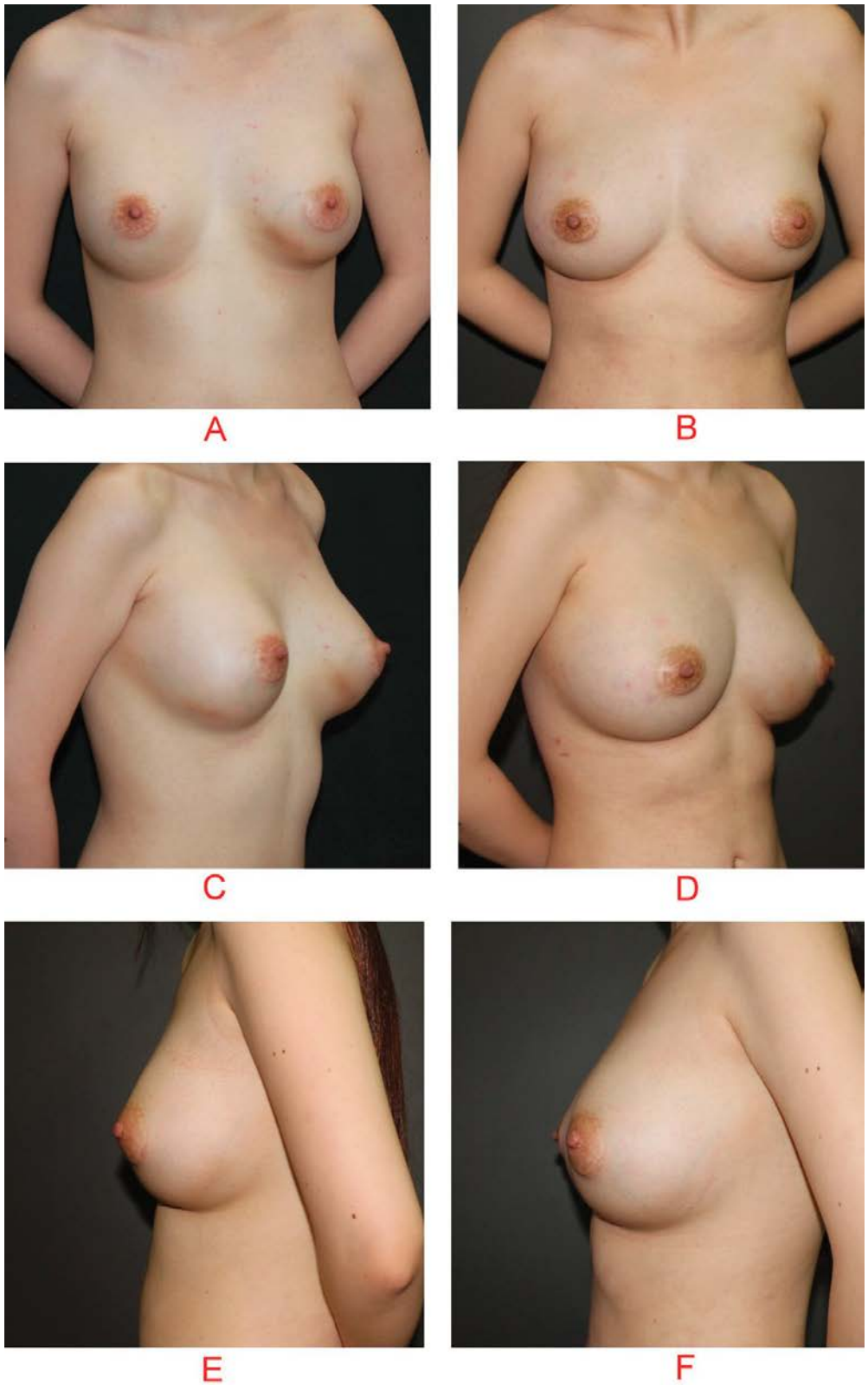

Figure 3. *Patient 2: Pretreatment views with the existing implants (A, C, E) and posttreatment views 14 months after 2 sessions of autologous fat grafting (AFG) to the breasts (B, D, F). This 27-year-old woman presented to our clinic with the chief complaints of asymmetry of both breasts and tenderness at inferior pole of the left breast developed 3 years after saline implantation. Note the excessive upper pole fullness and wide cleavage gap with the existing implants and skin hyperpigmentation at inferior pole of the left breast. The first session with AFG 300 mL to the right breast and 260 mL to the left breast was performed. The second session with AFG 280 mL to the right breast and 210 mL to the left breast was performed 3 months thereafter. Note the disappearance of skin hyperpigmentation and the improvement in volume and symmetry of both breasts after 2 sessions of AFG treatment.*

of each breast mound, which was partially confirmed by their preliminary evaluation using a 3-dimensional quantitative measurement system.

The subjective satisfaction scorings between the 2 groups were also not statistically significant. Although a number of articles validated the use of the BREAST-Q for critical assessment of outcomes in breast surgery,[24–37] we did not use the BREAST-Q scoring for several reasons. First, its developers caution that the BREAST-Q scales are not considered valid for patient groups that were not represented in the development process. This limitation apparently extends to patients who underwent breast augmentation after explantation for complications.[33] Second, 3 scales used to evaluate patients' satisfaction (satisfaction with breasts, psychosocial well-being, sexual well-being) are not supposed to fully respond the actual condition because of the conservative attitudes about breast surgeries in Asian women. They tend to regard breast augmentation as a privacy and are unwilling to admit the fact of having received this procedure, let alone talk about it in public, especially when it is related to their sexual lives. Instead, we used a 5-point Likert-type scale that has been validated by Netscher and his colleagues in published articles to assess patient outcomes because of its simplicity and reproducibility, although less information about psychosocial and sexual lives could be provided.[38,39]

The reoperation rate in group A was 41%, much higher than that (12.9%) in group B. This can be explained by 2 facts. First, although the patients in group A received explantation for a variety of reasons, they wished to restore the fullness of the upper pole of their breasts and hoped to establish a full and narrow breast cleavage. Most patients expected to have their breasts augmented to the pre-explantation volume instead of operated for simple correction of the deflated, ptotic consequences after explantation. Second, AFG into the overlying breast subcutaneous tissue can hardly reestablish soft-tissue volume sufficient to approximate pre-exchange breast volume in 1 session. In our experience, AFG can augment the breasts to the pre-explantation size, sometimes even larger (Figure 3).

Conclusion

Postoperative complication rates in AFG for breast augmentation were found to be higher in patients after implant removal, although 2-stage operation was used to avoid the unfavorable factors resulting from surgical trauma and bleeding during BIR. The optimal timing of AFG in patients after BIR should be further studied if 2-stage augmentation with fat grafting is to be performed. Reoperation with fat grafting to the breasts should be considered if patients expect to have the original volume of their breasts restored.

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