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Autologous fat decantation for transplantation in composite breast augmentation

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ABSTRACT

Objective. To evaluate the effectiveness and safety of hybrid breast augmentation technique.

Material and methods. Twelve patients with breast hypotrophy who underwent primary augmentation mammoplasty combined with autologous fat transplantation between November 2021 and October 2023 were included in the study. Mean age of patients was 33.7±5.7 (range 23-41) years. Hybrid breast augmentation method modified by the authors was used for composite breast augmentation.

Results. There were no postoperative complications, and adverse events occurred in 8.3% of patients (oil cysts 3-5 mm without necessary treatment). Intermammary distance decreased from 6.00 [4.00; 6.00] cm to 2.50 [2.00; 3.00] cm ($p<0.001$). High satisfaction with aesthetic results was achieved in all patients. Scores of four modules of the BREAST-Q questionnaire in 6 months after surgery were as follows: psychosocial well-being was 80.0; sexual well-being was 73.0; satisfaction with breasts was 82.5; physical well-being was 16.5. Mean surgery time was 1 hour and 35 minutes.

Conclusion. The proposed method of hybrid breast augmentation is an effective and safe surgical technique saving a larger volume of graft, reducing donor site damage, shortening surgery timer and rehabilitation period.

Keywords: *augmentation mammoplasty, autologous fat transplantation, intramammary distance, adipose tissue transplantation, hybrid breast augmentation.*

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Introduction

The number of aesthetic surgeries is growing every year worldwide. Breast augmentation is one of the five most common surgeries [1]. Despite multiple breast augmentation methods and available experience, choosing the optimal surgical technique for stable long-term results and minimal risk of complications is still an urgent issue. Implant selection is based on individual parameters and patient expectations. However, it is extremely difficult to achieve the desired natural effect, especially in patients with deficiency of subcutaneous fat and/or breast asymmetry.

Codner M.A. et al. [2] analyzed their own 15-year experience and made the following conclusions. Redo surgeries were necessary in 14.2% of patients within a year after primary breast augmentation with implants, capsular contracture grade III—IV developed in 8.2% of patients by the 6th year, and dissatisfaction with breast rippling was observed in 7.1% of cases.

More and more plastic surgeons prefer autologous adipose tissue transplantation as minimally invasive, safe and effective correction of breast deformities and lesions. Combination of this method with implants in breast augmentation is also possible. Ri C. et al. [3] found high popularity of autologous adipose tissue transplantation to improve aesthetic results and patient satisfaction.

Autologous fat graft has some advantages, including lack of immunogenicity, simplicity of procedure, low cost and availability. At the same time, searching for optimal method of adipose tissue preparation for specific purposes is still relevant.

The purpose of the study was to evaluate the effectiveness and safety of hybrid breast augmentation technique.

Material and methods

We retrospectively analyzed the results of augmentation mammoplasty combined with autologous adipose tissue transplantation over a 2-year period (2021—2023). Inclusion criteria: 1) wide intermammary distance (⩾4 cm);

2) breast hypotrophy; 3) asthenic body type; 4) body mass index (BMI) <24.9 kg/m².

The study included 12 patients aged 33.7±5.7 years (range 23—41). Mean BMI was 20.87±2.21 kg/m². All patients underwent primary breast augmentation with implants and original technique of lipofilling. Patients were followed-up and examined after 1, 6 and 12 postoperative months. All patients underwent preoperative examination, including MRI-based assessment of soft tissue thickness in intermammary space. Repeated examination was conducted 12 months after surgery. Ultrasound was used to assess postoperative changes 6 months after surgery.

Patient satisfaction was assessed using the BREAST-Q Version 2.0 questionnaire before surgery and 6 months later.

Statistical analysis was performed using StatTech v. 4.2.7 software (StatTech LLC, Russia). Quantitative indicators were assessed using the Shapiro-Wilk test. Categorical data were described using percentages. The Wilcoxon test was used to compare quantitative indicators.

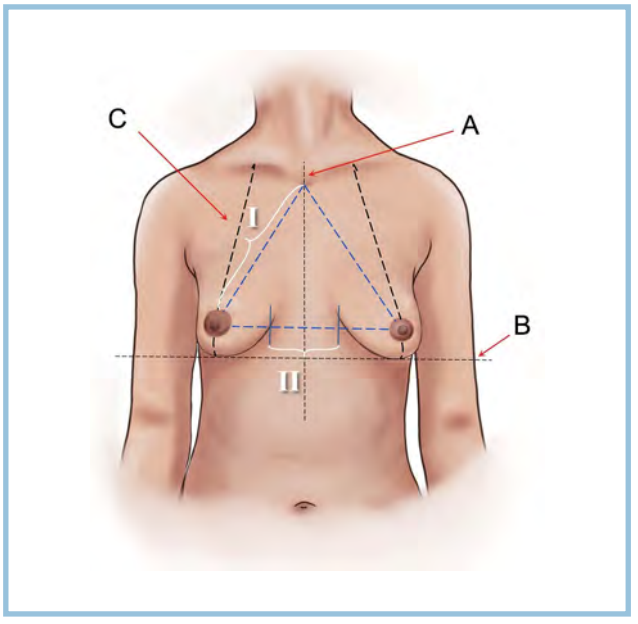


Fig. 1. **Preoperative marking.**
A — anterior midline; B — inframammary fold line; C — midclavicular (nipple) line. I — distance between jugular notch and both nipples; II — distance between medial borders of both mammary glands at the level of inter-nipple line.

Marking of anatomical landmarks

Preoperative anthropometric measurements were performed in standing position. We marked anterior midline, right and left midclavicular lines, inframammary folds, boundaries of the nipple-alveolar complex and visual boundaries of medial poles of mammary glands. The donor areas (anterior abdominal surface, flanks, outer and inner thighs, inner knee) for liposuction with predominant layer of adipose tissue were determined. We measured the distance from jugular notch to both nipples, as well as the distance between medial borders of both mammary glands at the level of the inter-nipple line **(Fig. 1)**.

Surgical technique

Surgery was performed under general anesthesia. Various breast implants were inserted using standard technique under the pectoralis major muscle in dual plane recess.

Adipose tissue harvesting

Before liposuction, the donor areas (anterior abdominal surface, flanks, outer and inner thighs, inner knee) were infiltrated with a modified Klein's solution (NaCl 0.9% + adrenaline 1:200000, 1 ml per 1 cm³ of scheduled adipose tissue volume). After infiltration, we incised skin using blade No. 11.

A 4-mm cannula was installed on autoclavable handle with motion range of 3 mm and 4000 cycles per minute. After that, we inserted this cannula into incision. Adipose tissue aspiration was performed using vibration liposuction device under constant negative pressure — 250 mm Hg.

Adipose tissue was decanted in special 1-liter lipofilling container for 15 minutes. After that, we washed passive fat using sterile saline solution. Volume of saline solution and adipose tissue was the same.

Subsequent separation of liquid fraction of lipoaspirate occurred in vertically installed 50-ml syringes for 10 minutes. Adipose tissue was collected in syringes through a system for infusions. After 10 minutes, liquid fraction was removed from syringes, and fat transplant was transferred to 10-ml syringes using three-way infusion tap. We performed decantation and washing until lipoaspirate color became pale yellow. Total tissue processing time was no more than 30 minutes.

Finally, we obtained autologous fat transplant cleared of lipid inclusions, destroyed cells and blood cells.

This method ensures minimal damage to adipocytes and stromal cells of adipose tissue, as well as minimizes cellular stress while maintaining high regenerative potential of biomaterial for transplantation.

Injection of lipotransplant into recipient area

We filled intermammary space with fat transplant extending the injection area up to 4 cm onto mammary glands along medial contour. To introduce fat tissue, we used 2 mm long skin punctures. Cannula insertion point is 1.5 cm below inframammary fold and 4 cm lateral from anterior midline **(Fig. 2)**.

Autologous fat tissue was injected using special 1.2-mm cannulas with uniform distribution in recipient zone.

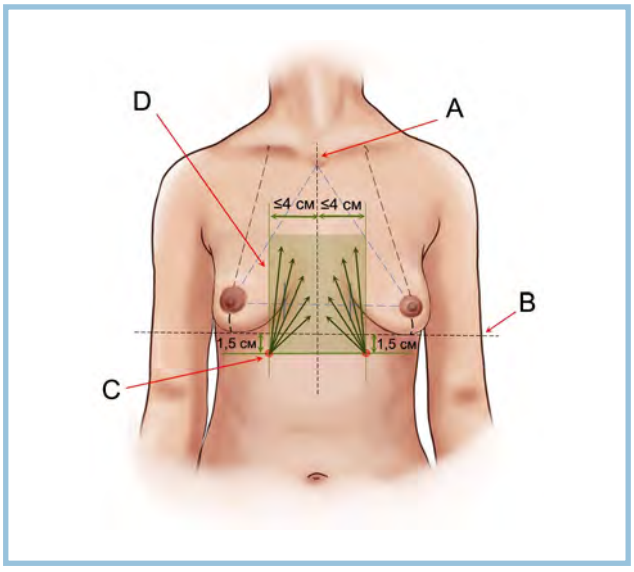


Fig. 2. **Lipospirate injection scheme.**
A — anterior midline; B — inframammary fold line; C — cannula insertion point; D — filling area.

Filling was continued until new breast contour and target intermammary distance reduction. To avoid boluses, we injected lipotransplant under continuous movement of cannula. A small amount of fat tissue appropriate to tunnel size was injected uniformly during each pass. Lipotransplant volume injected per procedure varied from 60 to 100 ml depending on recipient zone capacity.

Results

In all cases, we obtained high satisfaction with aesthetic result. BREAST-Q scores are presented in **Table**.

The distance between the medial edges of the mammary glands at the level of the nipple line decreased from 6.00 [4.00—6.00] to 2.50 [2.00—3.00] cm (p<0.001).

MRI after 12 months revealed subcutaneous fat layer thickening, smooth and clear edges of implants.

Breast ultrasound after 6 postoperative months revealed single fatty cysts (diameter 3—5 mm) with clear contours in 8.3% of patients. These cysts did not cause discomfort, and treatment was not required. There were no postoperative complications including implant displacement, tissue necrosis and surgical site infection. In all cases, postoperative period was uneventful. Patients were discharged in 2 days after surgery.

Case report

We present a 38-year-old patient (height 161 cm, body weight 50 kg, BMI 19.3 kg/cm^2). Preoperative BREAST-Q scores: psychological well-being — 46; sexual well-being — 54; satisfaction with breasts — 52; physical well-being — 10.

Augmentation mammoplasty combined with autologous adipose tissue transplantation was performed. Wide anatomical Mentor implants 330 ml were installed through periareolar approach. Fat graft volume was 80 ml. Donor zones were medial knees. Distance between medial edges of mammary glands decreased from 6 to 3 cm **(Fig. 3)**.

Breast ultrasound after 6 postoperative months revealed single fatty cysts 3—5 mm with clear contours (BI-RADS 1-2). These cysts were not palpable and did not cause any discomfort. MRI revealed thickening of subcutaneous fat layer within the sternum from 4.09 to 8.25 mm, medial edges of implant — from 5.99 to 10.4 mm and from 6.2 to 12.0 mm **(Fig. 4)**. Postoperative BREAST-Q scores: psychological well-being — 100; sexual well-being — 78; satisfaction with breasts — 77; physical well-being — 52.

Discussion

Yoshimura K. et al. [4] described autologous fat transplantation as one of the promising methods for soft tissue augmentation due to no complications associated with reaction to foreign materials. Delay E. et al. [5] described complications in 17.2% of cases after autologous adipose tissue transplantation with indurations (33.3%), persistent pain (25%) and hematomas (16.4%) as the most common ones.

Auclair E. et al. [6] first described the effectiveness of composite breast augmentation in 3-year study. The authors used mammography and quantitative three-dimensional visualization of mammary glands for preoperative and postoperative assessment. Aspirated adipose tissue was prepared using centrifugation at 3000 rpm for 3 minutes. Kerfant N. et al. [7] described a similar method for preparing lipoaspirate in 156 patients. They filled inner and upper slopes of mammary glands.

BREAST-Q scores

Item	Scores				p
	before surgery		after surgery		
	Me	Q_1—Q_3	Me	Q_1—Q_3	
Psychosocial well-being	47.00	46.75—51.00	80.00	77.00—89.00	<0.001*
Sexual well-being	52.50	48.00—55.00	73.00	73.00—88.00	<0.001*
Satisfaction with breasts	55.00	52.00—59.00	82.50	79.25—88.75	<0.001*
Physical well-being	10.00	0.00—38.00	16.50	7.00—21.25	0.788

Note. * — significant differences (p<0.05).

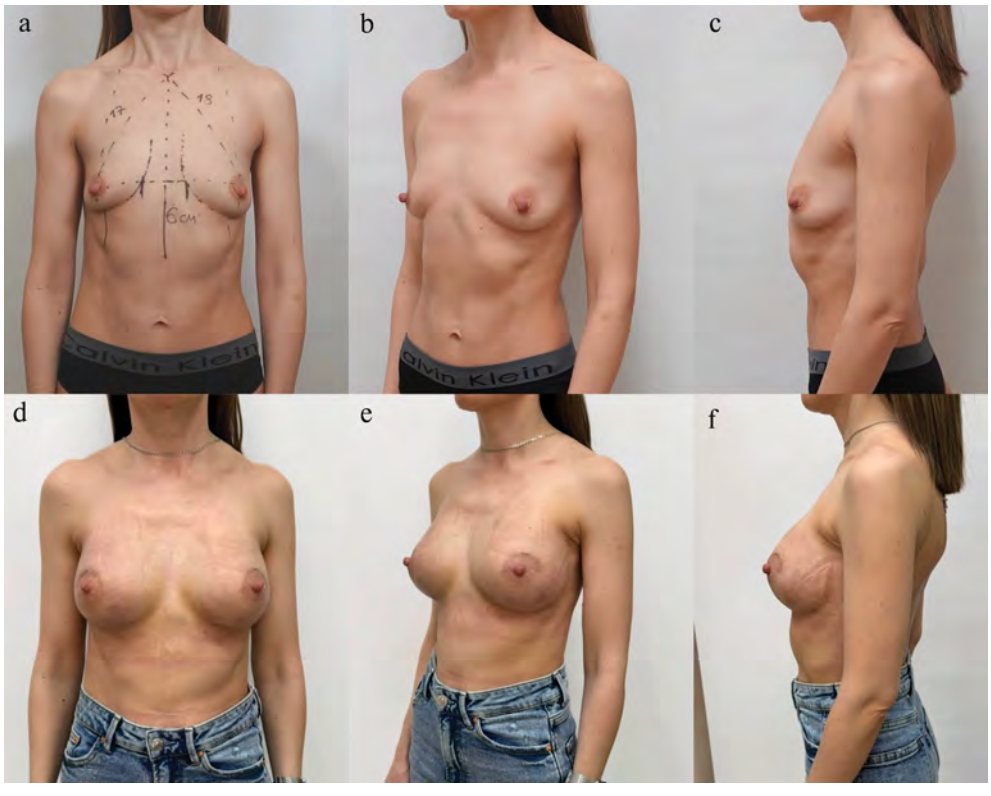


Fig. 3. **Preoperative and postoperative images.**
a — preoperative marking (front view); b — three-quarter view before surgery; c — lateral view before surgery; d, e, f — 6 months after augmentation mammoplasty combined with autologous adipose tissue transplantation (front view, three-quarter view, lateral view).

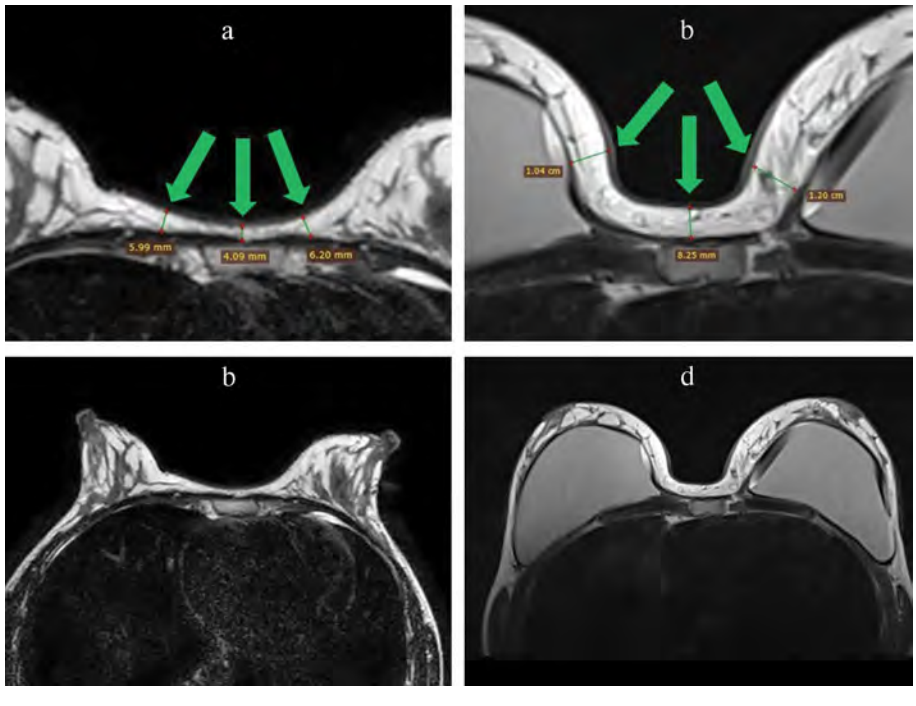


Fig. 4. **MRI.**
a, c — before surgery; b, d — 6 months after surgery.

Bravo F.G. et al. [8] indicated the effectiveness of autologous fat tissue for intermammary distance reduction, attractive and natural anterior chest wall and breast morphology.

Combination of augmentation mammoplasty and autologous fat tissue transplantation compensates soft tissue deficit in medial and upper parts of the implant and provides high aesthetic results. This method combines the advantages of implants and lipofilling, as well as prevents retromuscular placement of implant in patients with small thickness of subcutaneous fat.

Various methods of lipoaspirate processing are used in clinical practice. Choice of certain method in each case is based on many factors, such as necessary tissue augmentation, characteristics of recipient zone, physical properties and cellular composition of transplant, as well as donor zone capacity.

Serra-Mestre J.M. et al. [9] demonstrated the effectiveness of decantation in composite breast augmentation. At the same time, decantation may be optimal in hybrid breast augmentation due to safe procedure with low morbidity, better aesthetic results, tissue augmentation and natural effect. In recent study, Vasiliev V.S. identified sedimentation as the most optimal method for processing of large volumes of adipose tissue. This method minimally traumatizes adipocytes and reduces concentration of free triglycerides. The likelihood of accumulations decreases due to watery consistency. This allows more uniform distribution of lipotransplant in soft tissues [10].

Our study confirms the effectiveness and safety of hybrid augmentation technique.

Conclusion

Implants combined with autologous adipose tissue transplantation are highly effective and safe to achieve patient satisfaction with results of breast augmentation. Autologous fat transplantation eliminates subcutaneous fat deficiency of inner and upper slopes of mammary glands and, as a result, avoids contouring and rippling of implants. Hybrid breast augmentation is safe, effective, technically accessible and easily reproducible procedure.

No conflict of interests to declare.

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