ORIGINAL ARTICLE
Turk J Surg 2025;41(4):374-382

Proactive fat grafting from the breast area in gynecomastia surgery: Impact on the prevention of contour irregularities and patient satisfaction

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ABSTRACT

Objective: Contour irregularities are among the most significant complications that may occur after gynecomastia surgery and they can adversely affect aesthetic outcomes. This study evaluated the use of proactively harvested autologous fat grafts from the same surgical field prior to gynecomastia surgery for the treatment of intraoperative contour deformities, as well as the impact of this approach on patient satisfaction.

Material and Methods: A retrospective evaluation was conducted on 24 male patients who were diagnosed with gynecomastia between April 2023 and March 2025 through physical examination, endocrinology consultation, and breast ultrasonography, who subsequently underwent surgical treatment. Prior to surgery, autologous fat grafts were harvested from the breast area in all patients. Intraoperatively identified contour irregularities were treated with same-session fat injection using the previously harvested grafts. All patients were followed up with ultrasonography and digital photography. Additionally, patient satisfaction was assessed using BODY-Q chest module and the chest satisfaction questionnaire.

Results: Of the 24 patients, 83% (n=20) presented with pseudogynecomastia and were treated with liposuction alone, while 17% (n=4) had gynecomastia and underwent liposuction combined with gland excision. Intraoperative contour irregularities were detected in 9 patients (37.5%), in whom an average of 8 cc (interquartile range 7-10) of fat was injected. Over a mean follow-up of 12.4 months, no statistically significant difference in aesthetic satisfaction was observed between patients with and without fat grafting ($p>0.05$). Both groups reported high satisfaction, and intraoperative contour deformities were successfully corrected.

Conclusion: Proactively harvesting autologous fat from the breast tissue during gynecomastia surgery may be a safe and practical method for immediate correction of intraoperative contour irregularities. This approach avoids additional donor site morbidity and provides a readily available graft source. While satisfaction outcomes were high in all patients, larger prospective studies are needed to confirm the long-term efficacy and broader applicability of this technique.

Keywords: Fat grafting, gynecomastia, liposuction, patient satisfaction, pseudogynecomastia

INTRODUCTION

The term gynecomastia, derived from the Greek words gynec (woman) and mastos (breast), has been used since antiquity to describe male breast enlargement. Gynecomastia is characterized by benign proliferation of the glandular component of the male breast tissue. It typically arises from an imbalance between estrogen and androgen levels, resulting in a feminized breast appearance (1).

Pseudogynecomastia, also known as fatty gynecomastia, is characterized by an increase in adipose tissue in the male breast without fibroglandular proliferation. Although it is most commonly observed in obese individuals, it may also be associated with certain conditions such as neurofibromatosis Type 1 (2).

Differentiating between pseudogynecomastia and gynecomastia is critical for appropriate treatment planning. In cases of isolated adipose tissue enlargement (pseudogynecomastia), liposuction alone is usually sufficient. However, in gynecomastia where glandular tissue is also present, satisfactory outcomes often require periareolar gland excision (adenectomy) in addition to liposuction (3).

One of the most frequently encountered complications following gynecomastia surgery is contour irregularities and depressions due to excessive tissue removal. These issues can negatively affect aesthetic outcomes and reduce patient satisfaction. Autologous fat injection, with its potential to correct contour deformities, serves as a valuable tool in managing these complications (4).

Cite this article as: Ersan M, Yavuz E. Proactive fat grafting from the breast area in gynecomastia surgery: impact on the prevention of contour irregularities and patient satisfaction. *Turk J Surg.* 2025;41(4):374-382

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Received: 13.06.2025
Accepted: 16.10.2025
Epub: 22.10.2025
Publication Date: 08.12.2025

DOI: 10.47717/turkjsurg.2025.2025-6-14

Available at www.turkjsurg.com

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This study aims to describe the use of proactively harvested autologous fat grafts from the same surgical field prior to gynecomastia surgery for the treatment of intraoperative contour irregularities, and to evaluate the impact of this approach on patient satisfaction.

MATERIAL and METHODS

Study Design and Patient Population

This retrospective study was conducted on 24 male patients who were diagnosed with either gynecomastia or pseudogynecomastia and underwent surgical treatment between April 2023 and January 2025 at Yeditepe University Kozyatağı Hospital, İstanbul/Türkiye. Diagnoses were based on physical examination, endocrinology consultation, and breast ultrasonography. The study was approved by the Yeditepe University Ethics Committee under the approval number: 202310Y0668, date: 15.11.2024 and was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants. Figure 1 shows the breast ultrasonography image of a patient who presented with the complaint of feminine breast enlargement and was diagnosed with gynecomastia.

The inclusion criteria were as follows: Being between 18 and 65 years of age, having a complaint of feminine breast enlargement in both breasts for at least one year, no pharmacological or pathological cause identified during endocrinology consultation, and ultrasonographic findings consistent with gynecomastia. Patients were excluded if they had undergone previous gynecomastia surgery, had serious systemic diseases, had incomplete data, or failed to complete the follow-up period.

Surgical Technique

All surgical procedures were performed under endotracheal general anesthesia. Patients were placed in the supine position, the skin was aseptically prepared using an appropriate antiseptic solution, and sterile draping was applied. In patients diagnosed with pseudogynecomastia, bilateral liposuction was planned, while in those with gynecomastia, liposuction was combined with periareolar gland excision (adenectomy).

In all cases, two 5 mm incisions were made at the intersection of the anterior axillary line and the inframammary fold on each breast. A tumescent solution (500 mL Ringer's lactate, 40 mg of 2% lidocaine, 0.5 mL of 1:1000 epinephrine) was infiltrated through these incisions and allowed to take effect for 10 minutes.

Before initiating gynecomastia surgery, breast tissue was proactively utilized as the donor site in all patients. Autologous fat grafts were harvested using 20 mL Luer-Lock BD Plastipak syringes (Becton Dickinson, Ireland) with manual negative pressure (Figure 2). The collected adipose tissue was decanted and centrifuged at 3000 rpm for 3 minutes, then stored under sterile conditions for potential intraoperative use following gynecomastia surgery (liposuction ± adenectomy) to correct contour irregularities, if needed (5,6).

In pseudogynecomastia cases, liposuction was performed using Mercedes-type (4 mm, blunt-tip, three-hole at 120° intervals) and multi-holed basket-type (3-4 mm) cannulas. In gynecomastia cases, the procedure began with liposuction and proceeded to adenectomy. A periareolar incision was made between the 3 and 9 o'clock positions below the nipple to access the glandular tissue. Excess glandular tissue was grasped with an Allis clamp (Aesculap, Germany) and excised using electrocautery. After hemostasis was achieved, the glandular bed was approximated with 3-0 polyglactin 910 sutures, and the periareolar incision was closed intradermally using 6-0 polypropylene sutures.

Following excision, all patients were evaluated both in the supine and seated positions for symmetry, surface irregularities, and depressions (Figure 3). In cases requiring correction, the pre-harvested autologous fat grafts were injected radially using 18G

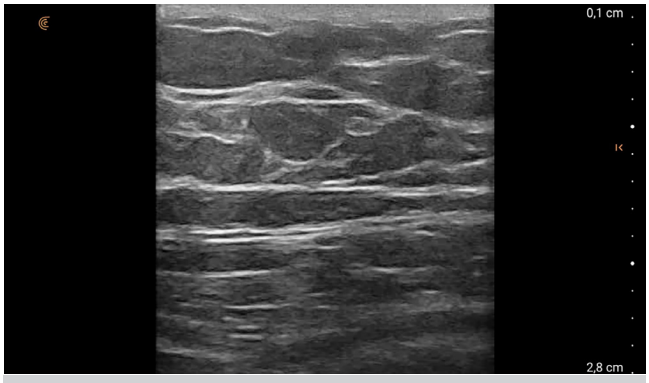

Figure 1. Breast ultrasonography of a patient presenting with complaints of female-type breast enlargement and diagnosed with gynecomastia.

Figure 2. Harvesting of fat grafts using 20 cc Luer-Lock syringes (BD Plastipak™, Becton Dickinson, Ireland).

Coleman cannulas (Tulip Medical, USA) to restore contour and ensure symmetry (Figures 4 and 5) (7,8).

Patients who underwent only liposuction did not receive surgical drains; however, those who also underwent adenectomy had one 10 French Jackson-Pratt drain (Ethicon, Johnson & Johnson, USA) placed per breast. The incisions at the anterior axillary line were closed primarily with 5-0 polypropylene sutures. Subsequently, a polyurethane compressive foam dressing (Epifoam, 3M, USA) and a three-strap compression vest were applied, marking the end of the procedure.

Postoperative Follow-up and Imaging

Patients were evaluated for hematoma on postoperative day 1. Drains were removed once the drainage volume dropped below 25 mL. All patients were discharged with prescriptions for antibiotics and anti-inflammatory medications.

Figure 3. Marking of intraoperatively detected contour irregularity with a surgical marker in a patient who underwent liposuction and periareolar gland excision.

Figure 4. Radial injection of autologous fat grafts harvested at the beginning of the operation into contour irregularities using 18G Coleman cannulas (Tulip Medical, USA).

At the first-week follow-up, the polyurethane compressive foam materials were removed, sutures at the incision sites were taken out, and patients were given wound care instructions. They were advised to continue wearing the three-strap chest compression garment until the fourth postoperative week.

During the follow-up visits at 1 week, 1 month, 3 months, 6 months, and 12 months, all patients underwent imaging with a portable high-frequency ultrasound device (Clarius L20, Clarius Mobile Health, Canada) and were photographed using a digital camera (Canon EOS 5D Mark II, Canon Inc., Tokyo, Japan).

Patient Satisfaction Assessment

Patient satisfaction was assessed between 6 months and 1 year postoperatively using the BODY-Q chest module and the chest satisfaction questionnaire (9).

Surveys were supplemented with questions about perceived contour irregularities or depressions. Participants rated their satisfaction with chest contour, symmetry, chest fullness, contour smoothness, social confidence, and overall aesthetic results on a scale from 0 (not satisfied) to 5 (very satisfied).

Statistical Analysis

Patients who did not develop intraoperative contour irregularities (and thus did not receive fat grafts) were compared with those who did (and received autologous fat grafting). Patient satisfaction survey scores between the two groups were statistically analyzed.

Data were evaluated using SPSS 29.0 (IBM, New York, USA). As satisfaction scores were obtained through ordinal scales, values were expressed as median [interquartile range (IQR)]. The Mann-Whitney U test was used for comparisons between the

Figure 5. Post-injection view of the operative field following fat grafting.

two independent groups, while Fisher's exact test was applied for categorical variables. A $p<0.05$ was considered statistically significant.

A post hoc power analysis was performed to check whether our sample size was sufficient. With 24 patients (9 in the fat grafting group and 15 in the control group), the study had enough power to detect only large differences between groups. Smaller or more subtle differences might not have been detected with this sample size.

RESULTS

Demographic and Surgical Data

No anesthesia- or surgery-related complications were observed in any of the 24 patients included in the study. The mean age of the participants was 38.34.3± years, and the mean body mass index (BMI) was calculated as 27.312.6± kg/m^2. The mean follow-up period was 12.4 months (range: 8-24 months), According to the Rohrich classification, 20% (n=5) of the patients were classified as Grade 1, 50% (n=12) as Grade 2, 25% (n=6) as Grade 3, and 5% (n=1) as Grade 4 (5).

A total of 83% (n=20) of the patients were treated with liposuction alone for pseudogynecomastia, while 17% (n=4) underwent liposuction combined with gland excision for gynecomastia.

Before the surgical procedures began, an average of 50 cc (IQR 40-60) of autologous fat graft was harvested from each patient. This proactive harvesting ensured that sufficient graft material was readily available in case contour irregularities occurred. However, only nine patients (37.5%) required intraoperative correction, and in these cases an average of 8 cc (IQR 7-10) of fat was injected into the affected areas. In the remaining patients, the harvested grafts were discarded at the end of the procedure. This explains the discrepancy between the mean harvested and injected volumes, reflecting the selective use of grafting rather than technical inefficiency.

Follow-up of the nine patients who received fat injections revealed no contour irregularities on physical examination or handheld ultrasonography (Figure 6). No volume loss or fat necrosis was detected in the injected areas (Figure 7). Furthermore, none of the patients required a second fat injection. Video 1 and Video 2 present sagittal and transverse ultrasound images, respectively, obtained at the postoperative 6-month follow-up of a patient diagnosed with gynecomastia who underwent autologous fat grafting due to intraoperative contour irregularity and received periareolar gland excision in addition to liposuction.

Satisfaction Survey Results

In the patient satisfaction survey conducted between those who received fat grafting (n=9) and those who did not (n=15), no statistically significant difference was observed between the groups ($p>0.05$). Both groups reported similarly positive feedback in terms of overall satisfaction with chest contour, perception of symmetry, chest fullness, sense of social confidence, and overall satisfaction with aesthetic outcomes. Satisfaction regarding contour smoothness was also similar between the two groups (Table 1). Figure 8A-J presents the preoperative and postoperative 1-year photographs of a patient diagnosed with pseudogynecomastia who underwent liposuction alone and received intraoperative autologous fat grafting due to contour irregularity.

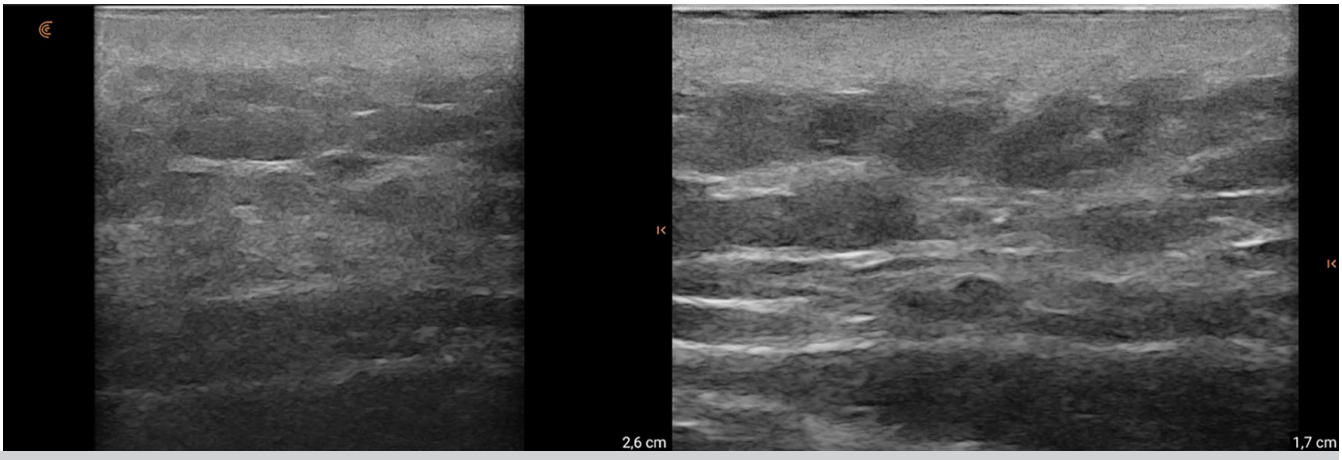

Figure 6. Postoperative ultrasonographic images of the patient at the 1st week and 1st month, obtained using a portable high-frequency ultrasound device (Clarius L20, Clarius Mobile Health, Canada). No irregularities were detected in the imaging.

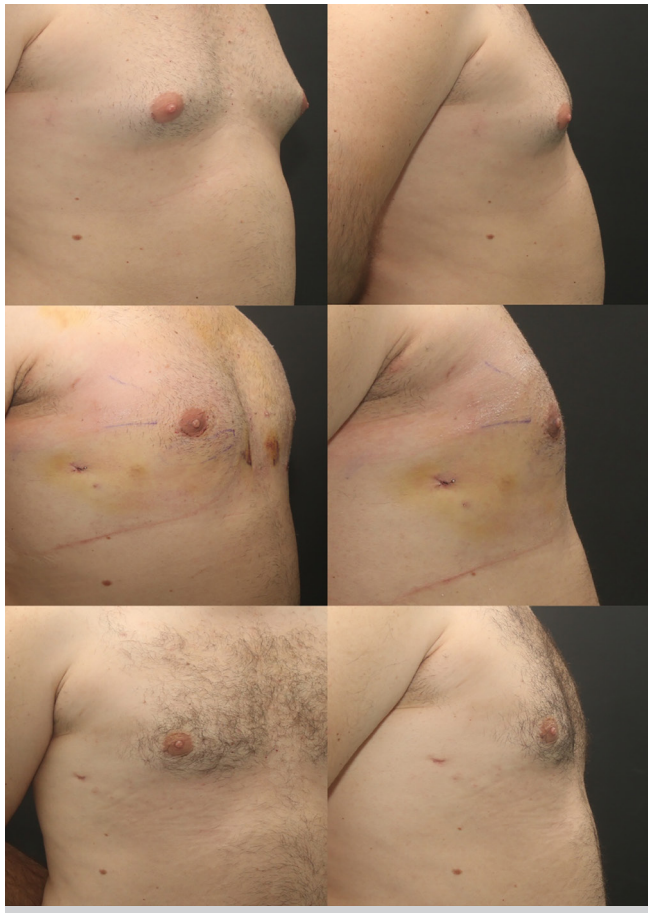

Figure 7. Clinical photographs of a patient diagnosed with gynecomastia who underwent autologous fat grafting due to intraoperative contour irregularity in addition to liposuction and periareolar gland excision.

Top row, left to right: Preoperative right oblique and right lateral views.

Middle row, left to right: Postoperative 1st week right oblique and right lateral views.

Bottom row, left to right: Postoperative 1st month right oblique and right lateral views.

The area of contour irregularity marked intraoperatively with a surgical marker is visible in the 1st-week photographs. No irregularities were observed in these areas during the 1st-week and 1st-month follow-ups.

DISCUSSION

Gynecomastia is a benign proliferation of glandular breast tissue in males, typically resulting from an imbalance between estrogen and androgen levels, and leads to a feminized breast appearance. In contrast, pseudogynecomastia is characterized by localized fat accumulation in the breast region without glandular proliferation (1,4). The reported prevalence of gynecomastia ranges between 32% and 65% (10). Autopsy data suggest a prevalence of approximately 40%, which can increase up to 80% in individuals with a BMI over 25 kg/m^2 (11,12). Bilateral involvement is observed in about 75% of cases (13).

Gynecomastia may result from physiological, pharmacological, or pathological causes. However, in approximately 25% of cases, no specific cause can be identified, and these are classified as idiopathic gynecomastia (5,14).

A systematic and comprehensive approach is essential for accurate diagnosis. The diagnostic process begins with a detailed medical history including age, onset and duration of symptoms, associated complaints, regular medications, and underlying diseases. Physical examination focuses on evaluating the breast tissue for glandular or adipose predominance, ptosis, skin excess, and any palpable masses, which aids in differentiating gynecomastia from pseudogynecomastia and detecting possible malignancy.

Ultrasonography plays a critical role in confirming the diagnosis and ruling out other conditions. In gynecomastia, ultrasound typically reveals a well-defined, hyperechoic or hypoechoic glandular tissue in the retroareolar area, while pseudogynecomastia shows only an increase in adipose tissue without glandular proliferation (15). In cases with suspicious or atypical findings, advanced imaging or biopsy may be required to exclude malignancy. Evaluation of hormonal imbalances should include endocrinology consultation and relevant laboratory testing. An accurate and reliable diagnosis of gynecomastia is achieved through the integration of clinical, radiological, and laboratory data (14,16).

Table 1. Postoperative patient satisfaction survey results

Survey item	Patients with intraoperative contour correction via fat grafting (n=9)	Control group (no fat grafting applied) (n=15)	p-value
Overall satisfaction with chest contour	4 (4-5)	5 (4-5)	0.478
Perception of symmetry	4 (4-5)	4 (4-5)	0.612
Chest fullness	4 (3-5)	4 (4-5)	0.775
Contour smoothness	4 (4-5)	5 (4-5)	0.518
Sense of social confidence	4 (4-5)	5 (4-5)	0.689
Overall satisfaction with aesthetic outcome	4 (4-5)	5 (4-5)	0.317

Figure 8A-J. Preoperative and postoperative 1-year photographs of a patient diagnosed with pseudogynecomastia who underwent only liposuction and received autologous fat grafts due to intraoperative contour irregularity. No contour irregularities are noticeable in the postoperative photographs.

Figure 8A. Preoperative frontal view.

Figure 8B. Preoperative right oblique view.

Figure 8C. Preoperative right lateral view.

Figure 8D. Preoperative left oblique view.

Figure 8E. Preoperative left lateral view.

Figure 8F. Postoperative 1-year frontal view.

Figure 8G. Postoperative 1-year right oblique view.

Figure 8H. Postoperative 1-year right lateral view.

Figure 8I. Postoperative 1-year left oblique view.

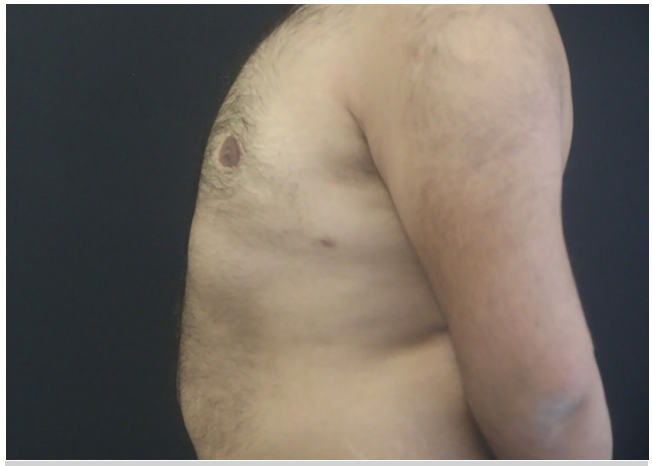

Figure 8J. Postoperative 1-year left lateral view.

The Rohrich classification, which serves as a guiding framework in determining the surgical approach to gynecomastia treatment, evaluates patients in four stages based on breast volume and the degree of ptosis. In Grade 1, breast enlargement is less than 250 grams, with no excess skin or ptosis. In Grade 2, the breast tissue ranges between 250 and 500 grams, accompanied by minimal ptosis. Grade 3 is characterized by a breast volume that may exceed 500 grams, along with mild to moderate excess skin and ptosis. In Grade 4, the condition typically involves more than 750 grams of breast tissue, significant skin redundancy, and advanced ptosis (6). This classification provides valuable guidance for the surgeon in determining the need for additional procedures, such as skin excision.

The approach to gynecomastia treatment is determined based on the underlying cause. Physiological gynecomastia typically resolves spontaneously and therefore does not require treatment; regular follow-up is usually sufficient. In cases of pharmacological gynecomastia, discontinuation of the causative medication often leads to regression of the condition (17). Pathological gynecomastia, on the other hand, necessitates treatment of the underlying disease or disorder (17,18). For idiopathic gynecomastia, initial management may involve observation and weight loss. However, if glandular proliferation persists for more than 12 months and causes aesthetic or psychosocial distress, surgical treatment is recommended, as irreversible fibrotic changes are likely to occur beyond this period (18).

The surgical treatment approach for gynecomastia is planned based on several factors, including the amount of glandular tissue, predominance of adipose tissue, and the presence of excess skin. Treatment typically involves liposuction, glandular excision, and, when necessary, skin excision. In cases of pseudogynecomastia or when glandular proliferation is minimal, liposuction alone may be sufficient (3). Classic suction-assisted liposuction is one of the most commonly used techniques. In addition, energy-assisted modalities such as ultrasound-assisted liposuction or power-assisted liposuction may be preferred in patients with dense or fibrous tissue (16,17).

In patients with a significant glandular component, liposuction alone is inadequate, and periareolar excision is performed (16). In this technique, an inferior hemiperiareolar

incision is made to access the glandular tissue through the skin and subcutaneous layers. The glandular tissue is dissected down to the pectoral fascia and excised in a manner that preserves the natural chest contour (17). Surgical treatment may be carried out in a single session combining both liposuction and gland excision. Alternatively, in selected patients, a two-stage approach may be planned: liposuction is performed in the first session, followed by excision of residual glandular tissue in a second procedure.

Postoperative complications following gynecomastia surgery include over-resection, under-resection, hematoma, seroma, infection, hypertrophic scarring, and areolar hypoesthesia (17,18). The main causes of over-resection are preoperative asymmetry of the chest anatomy, differing proportions of glandular and adipose tissue between the two breasts, and the inability to achieve perfectly symmetrical tissue removal during surgery. Over-resection may lead to crater deformities, contour irregularities, and subcutaneous adhesions, all of which can negatively affect patient satisfaction (4).

The findings of our study suggest that contour irregularities that may arise during gynecomastia surgery may be corrected with autologous fat grafting. The proactive harvest does not involve deliberately creating deformities; instead, it ensures that a sterile and readily available graft source is on hand to address irregularities if they occur, thereby preventing a decrease in patient satisfaction. Despite a minimum follow-up period of eight months, none of the patients required a second fat grafting procedure or surgical revision, further supporting the efficacy of this approach.

Several prior studies have supported the use of autologous fat grafting for correcting contour deformities after gynecomastia or breast surgery (19,20). Pilanci et al. (21) described abdominal fat harvesting during gynecomastia procedures but noted the drawback of additional donor-site morbidity. More recent research has focused on improving graft survival and donor-site efficiency. Yu et al. (22) emphasized the influence of recipient-site factors on graft viability, while Friedhofer et al. (23) compared syringe-based and device-assisted harvesting techniques, demonstrating differences in adipocyte integrity.

Meta-analyses and systematic reviews by Trotzier et al. (24) and Canizares et al. (25) identified processing and handling as critical determinants of long-term graft retention. Vyas et al. (26) analyzed biological enrichment strategies such as platelet-rich plasma and adipose-derived stem cells, while Tsekouras et al. (27) compared donor-site adipocyte viability across anatomical regions. Hoyos et al. (28) further demonstrated the role of high-definition liposculpture with autologous fat grafting for chest contouring in male patients, underscoring the aesthetic versatility of this approach. Small et al. (29) examined the influence of donor-site selection on adipocyte quality, highlighting that regional variations may affect graft longevity. Complementing these findings, Tripathy et al. (16) and Innocenti et al. (17) provided contemporary evidence on technical refinements and complication profiles in gynecomastia correction.

In contrast to these approaches, the technique described in this study may reduce the need for an additional donor site by using breast tissue itself as a graft source. This proactive, intraoperative strategy could represent a simple and cost-effective adjunct, though further controlled studies are required to evaluate long-term graft survival and donor-site reliability.

Study Limitations

This study has several limitations. The retrospective, single-center design inherently restricts the strength of the evidence, and the relatively small sample size (n=24), with only nine patients receiving fat grafting, limits the statistical power of the analysis. A post hoc power analysis indicated that the current sample size provided adequate power only to detect large differences between groups; smaller or more subtle differences in satisfaction may have gone undetected. Therefore, the lack of statistically significant differences should be interpreted with caution. In addition, the average follow-up period of 12.4 months, while sufficient to assess early outcomes, may not fully reflect long-term graft survival or contour stability. Finally, although ultrasonography was used to monitor contour and detect fat necrosis, no objective volumetric measurements were performed. Future prospective, multicenter studies with larger cohorts and longer follow-up are needed to validate the clinical utility of proactive intraoperative fat grafting in gynecomastia surgery.

In this context, our study aims to contribute to the existing gap in literature by providing evidence on the feasibility of using breast tissue as a donor site and to serve as a foundation for future research. Furthermore, in this study, fat injections performed in patients who underwent gland excision for gland-dominant gynecomastia were not evaluated as a separate subgroup from those with pseudogynecomastia treated with liposuction alone. Future studies that take these parameters into account may offer clearer insights into optimal donor site selection and the effectiveness of fat grafting strategies across different gynecomastia subtypes.

CONCLUSION

This study suggests that proactively harvesting autologous fat from the breast region during gynecomastia surgery may be a feasible and safe technique for immediate correction of intraoperative contour irregularities. Using tissue from the same operative field may reduce donor-site morbidity and provide a readily available graft source when needed. However, given the retrospective design, small sample size, and limited follow-up, these findings should be regarded as preliminary rather than

definitive. Larger prospective studies are needed to confirm long-term outcomes and further evaluate the clinical value of this approach. Within these limitations, the described technique could represent a practical adjunct to standard gynecomastia surgery.

Videos link:

Video 1: Sagittal plane breast ultrasound imaging at postoperative 6 months of a patient who underwent autologous fat grafting due to intraoperative contour irregularity.

https://youtube.com/shorts/KU8Nh6FGxkk

Video 2: Transverse plane breast ultrasound imaging at postoperative 6 months of a patient who underwent autologous fat grafting due to intraoperative contour irregularity. https://youtube.com/shorts/KjvzqCRXhXE

Ethics

Ethics Committee Approval: The study was approved by the Yeditepe University Ethics Committee under the approval number: 202310Y0668, date: 15.11.2024 and was conducted in accordance with the principles of the Declaration of Helsinki.

Informed Consent: Written informed consent was obtained from all participants.

Footnotes

Author Contributions

Concept - M.E.; Design - M.E.; Data Collection or Processing - M.E., E.Y.; Analysis or Interpretation - M.E., E.Y.; Literature Search - M.E., E.Y.; Writing - M.E., E.Y.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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