

Temporary external skin plication: a helpful new technique in gynecomastia surgery

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Abstract. – OBJECTIVE: The aim of this study was to elucidate the external temporary skin plication (ETSP) technique in gynecomastia surgery and evaluate its role in mitigating complications and enhancing cosmetic outcomes.

PATIENTS AND METHODS: This study was conducted on patients diagnosed with gynecomastia, explicitly falling under Rohrich Grades IIB and III, with dermal quality being a crucial determinant. Between September 2018 and November 2021, surgical interventions were performed on 96 qualifying patients by the senior author. The operative protocol consisted of ultrasonic and suction-assisted liposuction, supplemented by lateral periareolar piecemeal gland excision. Within the cohort, 42 patients were subjected to the novel ETSP technique. In contrast, the remaining 54 patients underwent standard treatment, serving as the control group for subsequent comparative assessment.

RESULTS: One patient required revisions for contour irregularities, while partial nipple necrosis was observed in two patients but healed without surgical intervention. However, saucer-like deformity and total nipple necrosis were not observed in our series. The overall complication rate in our series was 19%, with 9.5% of cases requiring revision. In our control group, the overall complication rate in our series was found to be 22%, with 13% of cases requiring revision.

CONCLUSIONS: ETSP provides a homogeneous spread of the excess skin and greatly reduces or eliminates the amount of skin fold formation. ETSP reduces the need for possible skin excision and reduces visible scars and incisions, and it helps improve the results of skin-protective surgeries that are widespread today.

Key Words:

Breast ptosis, Gynecomastia surgery, Male breast, Skin sparing technique, Skin plication.

Introduction

Gynecomastia refers to the benign enlargement of male breast tissue, characterized by an augmentation in both fatty and glandular components. Studies¹⁻⁶ suggest an incidence ranging between 32% and 65%. The etiology of gynecomastia can be stratified into five categories: idiopathic, physiologic, oncologic, pathologic, and pharmacologic, with idiopathic occurrences being predominant⁷⁻⁹. While gynecomastia typically manifests bilaterally, there is a 25-30% likelihood of unilateral presentation or asymmetrical development.

Physiological gynecomastia frequently manifests during puberty and persists into adulthood. While pathological gynecomastia has varied origins, most cases are deemed idiopathic or non-attributable. Histopathological examinations distinguish them into florid and non-florid types^{10,11}. Gynecomastia evolves in two distinct phases: the florid phase and, after typically 12 months, the fibrous phase. Once fibrosis and hyalinization affect the periductal tissue and adjacent stroma, the condition becomes irreversible, rendering glandular hypertrophy unresponsive to medical interventions¹². By this stage, gland tissues remain refractory to medical treatments¹³. In such cases, surgical intervention is generally considered the standard treatment¹⁴. In 1973, Simon et al¹⁵ proposed a clinical grading system for gynecomastia, which remains in prevalent use today.

Gynecomastia surgery can be assessed through three critical facets: removal of the enlarged gland, reduction of excess fat, and elimination of surplus skin¹⁶. Several surgical strategies are available, including mastectomy *via* peri-areolar or trans-areolar incisions, diverse liposuction methods, reduction mammoplasty (employing inferior or superior pedicle techniques), and nip-

ple-areolar complex (NAC) transposition utilizing a range of scar and pedicle techniques¹⁷⁻¹⁹. Alternative approaches such as liposuction and ultrasonic liposuction (UL) are recommended by some authors^{20,21} for all gynecomastia stages irrespective of fibrous state. Minimally invasive procedures like liposuction-assisted minimal incision surgery are favored due to their association with fewer complications, expedited recovery, and superior aesthetic results²². However, this technique may not always yield successful outcomes in patients presenting with significant skin redundancy.

Gynecomastia surgery poses risks of both early and late complications. Early postoperative issues encompass hematoma, seroma, infection, and nipple necrosis. In contrast, delayed complications might involve residual breast tissue, hypertrophic or keloid scars, sensory alterations, asymmetry, and contour disparities such as overcorrection or under-correction. Individuals presenting with pronounced gynecomastia and compromised skin elasticity are predisposed to contour anomalies, peri-areolar transverse wrinkling, and conspicuous scarring. Consequently, a myriad of plastic surgeons are innovating techniques aiming to adeptly address severe gynecomastia while minimizing discernible scars.

In this study, we selected patients classified as Rohrich Grade II B (characterized by moderate hypertrophy with 250-500 g of breast tissue, devoid of ptosis) and Grade III (defined by severe hypertrophy, with breast tissue exceeding 500 g and accompanied by grade I ptosis of either glandular or fibrous gynecomastia) (Table I). The surgical interventions involved liposuction, ultrasonic liposuction, and lateral peri-areolar gland

excision. We also incorporated the novel auxiliary method known as External Temporary Skin Plication (ETSP). Our objective was to evaluate the efficacy of the ETSP technique in minimizing complications and enhancing aesthetic outcomes.

Patients and Methods

Before surgery, every patient underwent a comprehensive physical assessment to ascertain the morphological gland type and to identify the optimal surgical strategy. Additionally, a questionnaire was distributed to collect data encompassing demographics, general medical history, family and drug history, motivations for surgery, surgical outcomes, complications, and other pertinent surgical details.

Comprehensive medical records for each patient were procured, encompassing pre-operative laboratory data that included complete blood counts and coagulation profiles. An endocrinological assessment was undertaken to eliminate potential hormonal issues, resulting in three patients being omitted from the study. Furthermore, a thorough physical evaluation and ultrasonography were conducted to detect potential tumors. Subsequently, one patient exhibiting potential neoplastic signs was also excluded from the study.

Gynecomastia patients with Rohrich Grade IIB and Grade III were evaluated according to their skin quality. Glandular tissue and fat tissue were determined by pinch test as described by Rohrich et al²¹.

Upon the exclusion of patients classified as Rohrich Grade IA to IIA and Grade IV, 96 patients fitting the specified criteria were operated

Table I. Rohrich gynecomastia classification²¹.

Grade*	Description
Grade I	Minimal hypertrophy (< 250 g of breast tissue) without ptosis
I A	Primary glandular
I B	Primary fibrous
Grade II	Moderate hypertrophy (250-500 g of breast tissue) without ptosis
II A	Primary glandular
II B	Primary fibrous
Grade III	Severe hypertrophy (> 500 g of breast tissue) with grade I ptosis Glandular or fibrous
Grade IV	Severe hypertrophy (> 500 g of breast tissue) with grade II or III ptosis Glandular or fibrous

*21. Rohrich RJ, Ha RY, Kenkel JM, Adams WP Jr. Classification and management of gynecomastia: defining the role of ultrasound-assisted liposuction. *Plast Reconstr Surg* 2003; 111: 909-923; 924-925.

Table II. Our modified approach to Rohrich Grade IIB and Grade III gynecomastia patients using ultrasound-assisted liposuction +/- Gland excision +/- ETSP technique.

Rohrich Grade ²¹	Procedure	Number of patients
I A	Ultrasound-assisted liposuction	
I B	Ultrasound-assisted liposuction +/- Gland excision	
II A	Ultrasound-assisted liposuction +/- Gland excision	
II B	Ultrasound-assisted liposuction +/- Gland excision	20
II B	Ultrasound-assisted liposuction +/- Gland excision +ETSP*	18
III	Ultrasound-assisted liposuction +/- Gland excision	34
III	Ultrasound-assisted liposuction +/- Gland excision +ETSP*	24
IV	Free NAC** or Inferior pedicle method	

*External Temporary Skin Plication. **Nipple Areola Complex.

on by the senior author from September 2018 to November 2021. Patients were educated about the ETSP technique, its potential advantages, and possible risks. A written informed consent was secured from each participant. Surgical challenges, such as bleeding, anatomical irregularities, anesthetic inadequacies, and atypical drug use, were documented. The ETSP technique continued until an adequate patient count was achieved. The operations encompassed 38 Grade IIB patients and 58 Grade III patients. Of this cohort, 42 underwent procedures using ultrasound-assisted liposuction with or without gland excision, supplemented by the ETSP technique (Table II). Postoperative monitoring identified immediate issues such as pain, fever, and bleeding. Pain intensity was quantified using the Visual Analogue Scale (VAS), which ranged from 0 (indicating “no pain”) to 10 (representing “exceptional pain”). For evaluation purposes, photographs of patients were taken from five perspectives, with follow-ups scheduled for the 5th day, 15th day, 1st month, 6th month, and 1-year post-operation. At the one-year postoperative time, patients were invited to complete a satisfaction questionnaire. Satisfaction was gauged using a scale akin to the pain scoring system, where a score of “0” indicated no satisfaction, while a score of “10” denoted utmost satisfaction with the surgical outcome.

Postoperative evaluations encompassed assessments of sensory alterations such as numbness and hypoesthesia, alterations in breast size, restricted mobility, limited physical activity, status of auxiliary fat and presence of excess or sagging skin, chest wall asymmetry, surgical scar dimensions, presence of complete or partial areolar necrosis. Additionally, patients’ reluctance or discomfort in public spaces was noted as a significant postoperative concern.

Surgical Procedure

All patients underwent ultrasonic liposuction and near-total glandular excision while under general anesthesia. A lateral peri-areolar incision of 1-2 cm was employed for the gland excision, and care was taken to prevent inverted nipple deformity during the piecemeal excision. A distinct incision on the anterior axillary line served as the entry point for liposuction. We employed a 2-point cross liposuction approach to ensure consistency in the procedure. To optimize outcomes, we incorporated inframammary fold (IMF) removal, comprehensive mobilization and balanced fat liposuction (Figure 1). Additionally, liposuction was executed beneath the abdominal skin to enhance skin redistribution. For consenting patients in this group, the ETSP technique was applied post-closure of all incisions (Figure 2). Postoperative drains were not utilized. Post-surgery, patients wore two corsets: an athletic one for 30 days and an external band for 5 days.

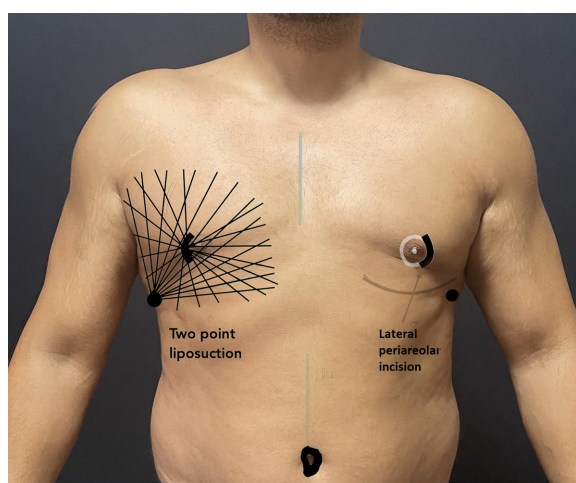


Figure 1. Two-point liposuction point and directions, lateral peri-areolar incision for gland excision.

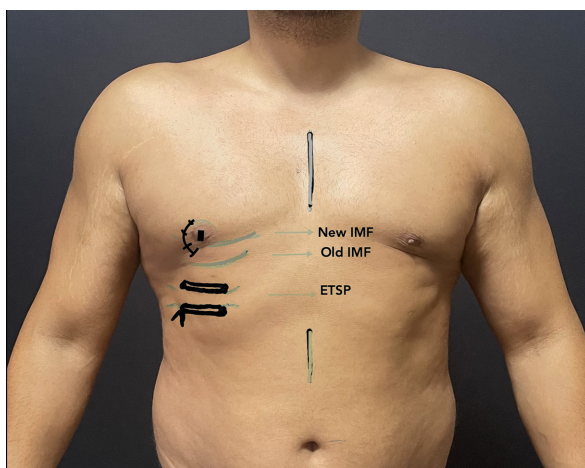


Figure 2. It is seen that the applied ETSP is positioned according to the IMF, whose location is changed after liposuction. IMF: Inframammary fold, ETSP: External temporary skin plication.

ETSP Technique

A skin plication was made 1 cm below the old IMF, 4-5 cm wide and 6-8 cm long on a vertical projection from the middle of the areola (Figure 3). 1-0 round polypropylene (Prolene, Ethicon) and intravenous set hose were used (Appendix 1). Application time required 4 minutes on average.

Statistical Analysis

Data was analyzed using SPSS 22.0 for Windows (IBM Corp., Armonk, NY, USA).



Figure 3. The view of the patient on the operating table who underwent ETSP.

The study aimed to make a retrospective comparison between two clinical methodologies. Initially, all patient charts were reviewed to ensure informed consent for research use. Subsequently, patients consenting to researcher visits were evaluated for any acute or chronic surgical complications and queried about their satisfaction level. The Student's *t*-test was applied for parametric data analysis, whereas the Mann-Whitney U test was used for non-parametric data. Statistical significance was determined using a 95% confidence interval, and any group differences with a *p*-value < 0.05 were considered significant. Rigorous measures were in place to ensure the secure handling of personal data by the primary researchers, emphasizing patient confidentiality.

Results

The mean operation time stood at 70 minutes, with patients being monitored for an average span of 12 months, ranging between 6 and 34 months. The majority of the patients (72%) were released on the operation day itself. To enhance comfort and manage pain, the subsequent 27 patients were discharged the following day. External Temporary Skin Plication (ETSP) sutures were extracted during the outpatient visit on the fifth-day post-surgery. After the removal of ETSP sutures, skin rolls would usually subside within 30 minutes, but edema resulting from ETSP would persist for an average of 7 to 10 days.

In the group where ETSP was performed, one patient developed a significant unilateral hematoma on the right side, necessitating bedside drainage. Two others exhibited minor hematomas that did not warrant evacuation. Moderate transverse folding was observed in two individuals. A peri-areolar skin excision (Benelli technique) was proposed as a corrective measure for both. While one patient opted against this procedure, the other proceeded with the recommended revision. Notably, no aesthetic complications linked to the plication technique were identified. Additionally, a separate patient needed revisions due to contour discrepancies. Partial nipple necrosis was detected in two patients, though it naturally resolved without the need for further surgical intervention. Importantly, there were no reported instances of saucer-like deformities or complete nipple necrosis in our study (Figures 4-5).



Figure 4. A 37-year-old patient with Grade II B gynecomastia, who underwent ultrasound-assisted liposuction and gland excision with a short lateral peri-areolar incision combined with ETSP helper technique. Before (*upper row*) and after and 12th month (*lower row*) images which were seen from 5 angles.



Figure 5. A 42-year-old patient with Grade III gynecomastia who underwent ultrasound-assisted liposuction and gland excision with a short lateral peri-areolar incision combined with ETSP helper technique. Before (*upper row*) and after 12th month (*lower row*) images which were seen from 5 angles.

In our study, the total complication rate stood at 19%, with 9.5% of these cases necessitating revision surgery (Table III). In the group not treated with ETSP, one patient developed a local infection attributed to suboptimal wound care. Another patient needed a bedside drain, and one presented with a seroma that was managed with aspiration. Two individuals exhibited moderate transverse folding, which was addressed using the Benelli procedure. Three patients showcased contour irregularities. In this control group, the complication rate reached 22%, and 13% of these

cases underwent revision. Without ETSP, patients reported an average satisfaction score of 8.2 ± 1.254 out of 10. Conversely, those treated with ETSP reported an average score of 8.6 ± 1.083 . A statistical analysis revealed significant differences in satisfaction between the two groups ($p < 0.05$).

Discussion

Statistics from the American Society for Aesthetic Plastic Surgery (ASAPS)²³ indicate a ris-

ing trend in men opting for gynecomastia surgery each year. It now ranks as the fourth most sought-after cosmetic procedure, trailing only liposuction, rhinoplasty, and blepharoplasty^{23,24}. Specifically, among male cosmetic surgeries, gynecomastia correction is second in popularity, with liposuction taking the lead.

Gynecomastia presents as a multifaceted condition demanding a collaborative approach across fields such as endocrinology, surgery, oncology, and psychology for diagnosis and treatment. Even though surgery is often the preferred method of treatment, determining the optimal technique remains a challenge²⁵. There are several surgical approaches available, each with the goal of achieving a masculine chest appearance while minimizing visible scarring. When choosing a technique, it is essential to consider factors such as the position of the nipple-areolar complex in relation to the inframammary fold, the amount of excess skin present, and the ratio of glandular to fatty tissue. Evaluating skin elasticity and signs of skin sagging is vital since they can steer the decision on surgical methods¹⁶. In deploying the ETSP technique, we prioritize both skin elasticity and excess skin (Table II). This technique's essence lies in relocating the surplus breast skin and anchoring it beneath the IMF, enabling the skin to adjust gradually while reducing slackness. Our observations suggest that conducting liposuction in the abdominal region prior to the ETSP procedure facilitates skin adjustment, leading to fewer contour irregularities compared to our control group.

The Webster operation technique, characterized by its semicircular incision and breast tissue removal, was the predominant treatment for gynecomastia until the emergence of successful and reliable liposuction methods^{19,21,26-28}. We adapted this by introducing a lateral peri-areolar incision, measuring 1-2 cm, for glandular extraction. We

observed that this modification leaves a less visible mark. While earlier research predominantly recommended gland tissue surgical removal, recent studies^{4,21,28} emphasize the merits of liposuction alone, noting its impressive aesthetic results and reduced complication rates. The synergy of liposuction with glandular excision through a peri-areolar incision or pull-through approach is endorsed by current literature^{10,29}. Several liposuction methods have been identified as effective gynecomastia treatments, either standalone or in tandem with glandular excision. These encompass syringe liposuction, axillary, peri-areolar or sternal incision liposuction, power-assisted liposuction, ultrasonic liposuction, laser-assisted liposuction and cross-chest liposuction³⁰⁻³⁵.

For advanced gynecomastia cases characterized by ptosis and excessive skin, several methods are employed. These include reduction mammoplasty with free NAC transplantation, modified breast-reduction techniques such as I- or T-shaped patterns and subcutaneous mastectomy with skin reduction, adopting strategies like the "Benelli type," "inverted T," or lateral wedge resection^{4,13,36}. However, these approaches have, at times, led to disappointing outcomes due to visible residual scars and nipple deformities^{11,30}. Literature^{17,26,28} suggests that breast amputation with free nipple graft or the Wise pattern breast reduction offers ideal results for cases with pronounced skin excess and significant ptosis. While these techniques can effectively address the condition, they often result in prominent chest scars. A lengthy horizontal incision, used in total mastectomy and free NAC, had a 33% rate of hypertrophic scarring³⁷. Many high-grade gynecomastia treatments involving skin removal have shown subpar aesthetic results⁴. Consequently, an initial skin-sparing procedure is advocated for both high

Table III. Complications and revisions of external temporary skin plication and standard technique.

Complication	Patients with ETSP n: 42	Patients without ETSP n: 54
Infection	0	1 (Cured using Drugs)
Large Hematoma	1 (Placed Bedside Drain)	1 (Placed Bedside Drain)
Limited Hematoma	2 (Not required)	1 (Not required)
Seroma	0	1 (Aspiration Required)
Moderate Transverse Folding	2 (Benelli procedure, 1 refused)	2 (Benelli procedure)
Contour Irregularities	1 (Surgical Correction)	3 (Surgical Correction)
Total Nipple Necrosis	0	0
Partial Nipple Necrosis	2 (No intervention required)	3 (No intervention required)
Saucer-like deformity	0	0

Table IV. Main and helper techniques in gynecomastia surgery.

Main techniques	Helper Techniques
Liposuction Peri-areolar and remote glandular excision Reduction mammoplasty	Liposuction Ultrasound assisted Liposuction Laser assisted Liposuction Radio frequency assisted Liposuction Equalization with basket canula IMF elimination Two point cross Liposuction External Temporary Skin Plication

and low-grade gynecomastia, echoing findings from prior research¹¹. Complementary procedures might be essential to enhance the effectiveness of skin-sparing treatments.

While utilizing a large, curved needle might appear daunting, the technique can be simplified by using straight needles. Furthermore, with proper technique and care, the risk of accidental needle punctures to the practitioner can be significantly reduced.

Combining the ETSP technique with skin-protective techniques and auxiliary techniques in selected cases can lead to a cosmetically acceptable outcome. One such supplementary method is the external temporary skin plication. This technique augments skin tension over the post-surgical pectoral muscle fascia, reducing skin creases beneath the corset and promoting even tension distribution. Commonly, any skin fold that does form resolves within the first five days, with the plication sutures typically removed on day five. These sutures produce temporary tissue rolls, resulting in four minor scars beneath each breast. These scars are comparable in size to those from drain incisions. We advocate for the application of topical wound healing agents and silicone gels starting the day after plication suture removal. In our experience, these scars fade considerably by the end of the first year.

We propose categorizing the techniques employed in gynecomastia surgery into primary and supplementary techniques (Table IV). Primary techniques encompass liposuction, glandular excision procedures, and reduction mastopexy methods. Supplementary techniques include laser-assisted liposuction, ultrasonic liposuction, radiofrequency-assisted liposuction, equalization, and IMF elimination, with the ETSP (as defined by the authors) also falling under this category. Notably, liposuction serves a dual role, functioning as both a primary and supplementary technique.

Zocchi³⁸ highlights the utility of ultrasonic liposuction (UL) in treating gynecomastia, a perspective further elaborated upon by Rohrich et al³⁹ and Gingrass⁴⁰. Compared to standard aspiration-assisted liposuction, ultrasonic liposuction offers several advantages when addressing gynecomastia. It not only effectively removes dense adipose tissue within the fibrous parenchymal structure of the male breast, but also results in reduced bruising. Moreover, UL eases the physical demands on the surgeon during large-volume procedures and facilitates more precise contouring of the outcome^{41,42}.

Ultrasonic liposuction, when adeptly executed, has the capability to smooth the edges of the treated area and mitigate inframammary creases⁴. It can also enhance skin contractility, which is an advantage for addressing skin surplus in severe gynecomastia cases^{4,29,38}. It has been used as a solo treatment for patients with pseudo-gynecomastia without glandular enlargement or signs, but skin redundancy recovery is often inadequate⁴³. Given that breast density is a significant risk factor for breast cancer⁴⁴, breast size reduction could have ancillary benefits. The ETSP technique, when combined with ultrasonic liposuction, has yielded favorable outcomes in specific instances. The integration of surgical adjunct techniques like IMF elimination, equalization liposuction, 2-point cross liposuction and skin-contracting superficial liposuction, paired with the strategic use of compression corsets, can address or ameliorate potential contouring issues. Though promising results have been noted, a broader investigation with a more extensive patient series is warranted.

Conclusions

The ETSP technique shows that by employing auxiliary methods, one can achieve desirable cosmetic outcomes without resorting to skin excision,

thereby diminishing the likelihood of revision procedures. ETSP evenly distributes excess skin, substantially reducing or even eradicating skin fold development. This method lessens the potential necessity for skin excision, subsequently minimizing the appearance of scarring from incisions.

Conflict of Interest

The authors declare that they have no conflict of interests.

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Ethics Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. This study was approved by Arel University Memorial Bahcelievler Ethical Committee as study number AU-MB#108.

Informed Consent

Written informed consent form was obtained from the patients.

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No funding was received.

Authors' Contribution

H.C. designed and performed the operations. A.E. and H.C. derived the models and analyzed the data. A.E. wrote the manuscript in consultation with H.C.

Availability of Data and Materials

Materials are available upon request.

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