

# Comprehensive Surgical Management of Grade III and IV Gynecomastia: Our Approach and Experience

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**How to cite this paper:** Karimi, A.M., Sedigh-Maroufi, S., Karimi, H. and Gevorgyan, G. (2025) Comprehensive Surgical Management of Grade III and IV Gynecomastia: Our Approach and Experience. *Surgical Science*, 16, 457-467.  
<https://doi.org/10.4236/ss.2025.1611046>

**Received:** September 19, 2025

**Accepted:** November 16, 2025

**Published:** November 19, 2025

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## Abstract

**Background:** Gynecomastia, the benign proliferation of male breast glandular tissue, is often associated with adiposity and skin redundancy. Surgical intervention for advanced grades (III and IV) remains challenging due to significant skin excess, glandular ptosis, and descent of the nipple-areolar complex (NAC). **Objective:** To present our experience and novel techniques in the management of Grade III and IV gynecomastia over a one-year period. **Methods:** Seventy-three patients with gynecomastia, treated between February 2024 and 15 May 2025, were prospectively evaluated. Patients were categorized using Simon's classification. Data collected included demographic information, comorbidities, and surgical outcomes. Surgical techniques varied by grade, with a unique approach employed for Grades III and IV involving quilting sutures and bipedicle NAC flaps. Postoperative outcomes and satisfaction levels were assessed over a follow-up period of 3 - 12 months. **Results:** Of the 73 patients, the mean age was 27.5 years (range: 18 - 51) and BMI ranged from 21 to 35. High satisfaction rates were reported by patients (95%) and surgeons (91%). Complications were minimal, and scars were generally well-tolerated and faded away after few weeks, particularly in patients with chest hair. **Conclusion:** To our best knowledge, this is the first paper that reports one-stage surgery for grade 4 Gynecomastia. Our one-stage surgical technique offers a reliable, aesthetically pleasing solution for advanced gynecomastia. The use of quilting sutures (has been reported few in other surgeries and not in Gynecomastia) and bipedicle flaps for NAC repositioning effectively addresses drooping excess skin and glandular ptosis while minimizing visible scarring.

## Keywords

Male Breast, Gynecomastia, Quilting Suture, Bi-Pedicle Flap, Scar

## 1. Introduction

Gynecomastia, defined as the benign enlargement of male breast tissue, often presents as a combination of glandular hypertrophy, fatty infiltration, and skin redundancy. While mild to moderate cases (Simon Grades I and II) are effectively treated with liposuction and subcutaneous mastectomy and pressure garment, advanced stages (Grades III and IV) pose considerable surgical challenges due to the presence of redundant, ptotic skin and displaced NACs resembling female breasts.

According to Simon's classification (**Table 1**), the severity of gynecomastia is graded into four stages. While Grades I and II can be addressed with minimal intervention and compression therapy, Grades III and IV often require more sophisticated techniques for skin excision and NAC repositioning [1]-[11].

This paper outlines our one-year clinical experience and surgical strategy in treating advanced gynecomastia, with a focus on our modified approach for Grades III and IV.

**Table 1.** Simon's classification.

• <i>Simon's classification</i>	• <i>Grade</i>	• <i>Description</i>
• 1	• Grade I	• Mild enlargement, no excess skin
• 2	• Grade II	• Moderate enlargement, no skin excess
• 3	• Grade III	• Moderate enlargement, minor skin excess
• 4	• Grade IV	• Significant enlargement, major skin redundancy

## 2. Materials and Methods

**Study Design:** A retrospective observational study was conducted between February 2024 and 15 May 2025.

**Participants:** All patients presenting with gynecomastia seeking surgical correction were included.

**Data Collection:** Patient demographics, BMI, medical and drug history (including anabolic steroid use), and comorbidities (e.g., diabetes, hypertension, thyroid dysfunction, adrenal/testicular pathology, and prior weight loss) were recorded via a structured questionnaire.

**Grading:** Gynecomastia was classified using Simon's classification system.

**Follow-Up:** Postoperative follow-up ranged from 3 to 12 months. The study has been approved ethically in our center as it does not expose face or name of patients. Patient and surgeon satisfaction were assessed using a 5-point Likert scale. A standard five-point Likert scale was used for the questionnaire, with response options as follows: *Strongly disagree*, *Disagree*, *Neither agree nor disagree*, *Agree*, and *Strongly agree*. The questions were administered by a staff member who was not involved in the surgical procedures and had no prior knowledge of the surgical

grading or techniques, in order to minimize bias during data collection.

### 3. Surgical Techniques

Grade I: Subcutaneous gland excision via circumareolar incision and pressure garment.

Grade II: Combined liposuction and glandular excision followed by compression garment use for 2 - 3 months.

For **Grade III**:

Our Initial attempts with skin tightening devices (e.g., J-Plasma, Argon plasma) were unsatisfactory. Circumareolar excision alone left a middle tubular tissue, often necessitating secondary surgery. Some of the authors used two-stage surgery. First, they removed gland tissue and fat, and in the second surgery, after 6 months, they removed excess skin. But our patients usually ask for one stage treatment and they don't want to wait for 6 months.

- Our modified technique involved:
  - Liposuction and gland excision via a semicircular peri-areolar incision (**Figure 3**).
  - Hemostasis followed by dual-layer quilting sutures:
    - Internal: Vicryl 2/0 to anchor the dermis to the pectoral fascia.
    - External: Nylon 2/0 to secure skin externally to the chest wall (removed after 5 - 6 days) (**Figure 1, Figure 2**).

We have a great experience in using quilting sutures for face or neck lift. Based on this experience and study of Pollock & Pollock [11], we used this technique. We placed the quilting sutures on the areas of most redundancy after removing the gland.
  - Compression garments were applied postoperatively.

For **Grade IV**:

Grade IV has marked hypertrophy with female-like breast contour, skin excess, gland ptosis, and NAC ptosis.

- Procedure involved:
  - Liposuction and complete glandular excision with horizontal incision.
  - **Figures 3-5** and [https://drive.google.com/file/d/1hYIJSa2tjZ\\_m7nwyxMjKrvaDg-WZUnCZq/view?usp=drive\\_link](https://drive.google.com/file/d/1hYIJSa2tjZ_m7nwyxMjKrvaDg-WZUnCZq/view?usp=drive_link).
  - NAC preserved on a bipedicle subcutaneous flap (NAC diameter: 40 mm, pedicle diameter: 60 mm, pedicle thickness: 4 - 5 mm) ([https://drive.google.com/file/d/1QJbpt7BiLgc8CrSRpfZhyRI-fZn5b55EM/view?usp=drive\\_link](https://drive.google.com/file/d/1QJbpt7BiLgc8CrSRpfZhyRI-fZn5b55EM/view?usp=drive_link)).
  - Redundant tissue and skin excised, and skin closed horizontally.
  - Place of NAC planned before surgery. NAC positioned in the 5th intercostal space, lateral to the midclavicular line, and anchored using Vicryl suture to chest wall.
  - Postoperative compression garment applied for few weeks.

## 4. Results

- Patient Demographics:

We had total 73 patients, Age: 18 - 51 years (mean: 27.5).

BMI: 21 - 35.

6 (8.2%) had history of anabolic steroid use (ceased  $\geq 1$  year before surgery). 7 (9.5%) had undergone significant weight loss (5 post-bariatric surgery). Comorbidities: Diabetes (n = 4 (5.4%)), Hypertension (n = 3 (4.1%)), history of Deep Vein Thrombosis (n = 1 (1.3%)); no adrenal, testicular, or thyroid disease.

Frequency of patients according to grades is shown in **Table 2**.

- Outcomes:

Patient satisfaction was 95%, and Surgeon satisfaction was 91%.

In grade I, patient satisfaction was 4 of 4 patients (100%), in Grade II was 36 of 38 (94.7%), in Grade III was 24 of 26 (92.3%) and in Grade IV was 5 of 5 (100%). There was no significant difference among the groups (p = 0.8).

Complications were minor and temporary like:

-Seroma: 2 patients (2.7%). Seroma was minimal and treated by only pressure garment. No drainage needed.

-Bruises one patient (1.3%), only needs reassurance and time.

-NAC ischemia 2 patients (2.7%), we used topical nitroglycerin and trental tab. 300 mg TID for its treatment for 10 days.

-No necrosis happened for all 73 patients.

-No major complications observed.

-Scars faded over time, particularly in patients with chest hair in 3 - 8 weeks. We used Rejuvasil silicone cream for 3 - 8 weeks.

-No cases of NAC necrosis or loss.

High aesthetic acceptance for both circular and horizontal scars.

**Figure 1**, **Figure 2** and **Figure 6**, **Figure 7** depict postoperative outcomes. See Supplementary videos for surgical technique,

[https://drive.google.com/file/d/1hYIJSa2tjZ\\_m7nwyxMjKrvaDg-WZUnCZq/view?usp=drive\\_link](https://drive.google.com/file/d/1hYIJSa2tjZ_m7nwyxMjKrvaDg-WZUnCZq/view?usp=drive_link),

[https://drive.google.com/file/d/1QJbpt7BiLgc8CrSRpfZhyRI-fZn5b55EM/view?usp=drive\\_link](https://drive.google.com/file/d/1QJbpt7BiLgc8CrSRpfZhyRI-fZn5b55EM/view?usp=drive_link).

**Figure 5** shows some grade IV patients before surgery.

**Figure 1**, **Figure 2** show the results of surgery for grade III.

**Figure 6**, **Figure 7** show the results of surgery for grade IV.

**Table 2.** Frequency of our patients according to Grading.

Simon's grading	Frequency
Grade I	4
Grade II	38
Grade III	26
Grade IV	5
Total	73



**Figure 1.** Grade III Gynecomastia, the first row shows before, second row shows the quilting sutures, and third row shows the results after 3 months.



**Figure 2.** Grade III Gynecomastia, the first row shows before, second row shows the quilting sutures, and third row shows the results after 3 months.



**Figure 3.** Liposuction of chest, around 1600 cc of fat.



**Figure 4.** Design of flaps and pedicles for NAC.



**Figure 5.** Some cases with grade IV Gynecomastia.



**Figure 6.** A 23-year-old patient with grade IV Gynecomastia. The first row shows before and the second row shows the results after 4 months.



**Figure 7.** A 18 years old patient with grade IV Gynecomastia. The first row shows before and second row shows the results after 3 months.

## 5. Discussion

Gynecomastia, once a relatively underreported and poorly understood condition, has increased visibility recently. This trend is largely driven by a rise in contributing factors such as anabolic steroid use, obesity, environmental estrogen exposure, hormone-rich foods, and improved public awareness of male body aesthetics [1]. In clinical practice, the demand for gynecomastia surgery has grown steadily, especially among young adults and post-bariatric patients seeking a more masculine chest contour. While Grades I and II can be reliably managed with conventional liposuction and subcutaneous mastectomy, the advanced presentations—Grades III and IV—pose significant reconstructive challenges [2].

**Etiology and Patient Demographics:** In our series, patients ranged from 18 to 51 years old, reflecting the broad age spectrum affected by gynecomastia. Approximately 8% had a documented history of anabolic steroid use for bodybuilding. Though these individuals had ceased usage at least one year before surgery, prior hormonal manipulation can cause long-term glandular proliferation that may not resolve spontaneously [3]. Additionally, around 10% had a history of massive weight loss, including five post-bariatric surgery patients. This subgroup typically presents with severe skin redundancy, similar to female breast ptosis, necessitating more aggressive surgical intervention and correction of excess skin [4] (Table 2).

Despite metabolic comorbidities such as diabetes and hypertension in a minority of patients, no significant endocrine pathology was found. This finding supports other studies that identify idiopathic and lifestyle-related causes as predominant in modern gynecomastia cases [5].

**Surgical Considerations in Grades I and II:** Grades I and II were effectively treated with liposuction and subcutaneous mastectomy through periareolar incisions. Compression garments played a critical role in promoting skin retraction and minimizing seromas. Several studies affirm the efficacy of these minimally invasive approaches, with consistently high patient satisfaction and minimal complications [6] [7]. Our results mirrored this trend, with no need for revision surgery in these grades.

**The Challenge of Grades III and IV:** Grades III and IV present with significant skin and glandular redundancy, as well as ptosis of the nipple-areolar complex (NAC) and glands, which cannot be corrected through liposuction or glandular excision alone. Circumareolar techniques have been applied but often lead to suboptimal contouring and persistent central fullness [8]. Vertical excisions yield better shaping but result in permanent and often unacceptable scarring on the male chest [9]. Senior author had some vertical scar correction with long-term unpleasant scar in the chest between 2002 to 2005.

The two-stage technique advocated by some European authors, involving initial glandular removal followed by delayed skin excision, provides good outcomes but extends treatment duration (6 months) and patient inconvenience [10]. Given that the majority of our patients preferred one-stage surgery, we developed and adopted a technique utilizing quilting sutures and immediate contour control.

**Our Novel Approach: Quilting Sutures and External Fixation:** For Grade III, we combined liposuction and subcutaneous gland excision with a two-layer quilting suture technique. The first layer anchors the dermis to the chest wall internally (using Vicryl suture 2/0), while the second, temporary external sutures fix the skin envelope (using nylon 2/0) and help prevent seroma and promote skin shrinkage. Quilting techniques have been successfully applied in abdominoplasty and breast surgery to reduce dead space and improve contour [11] [12]. Their novel use in gynecomastia provides effective skin redraping and shrinkage without creating new scars.

Our data suggest this approach results in high patient satisfaction, no revision requirements, and a significant improvement in postoperative skin position without any vertical or inframammary scars.

**Grade IV: NAC Preservation Using Bipedicle Flap:** In Grade IV cases, free nipple grafting is often used but comes with risks of depigmentation, partial NAC necrosis, and loss of NAC projection [13]. Our method preserved the NAC on a dermal-subcutaneous bipedicle flap, maintaining vascularity and position (something like the McKissock technique in female breast surgery). This technique, planned preoperatively to ensure adequate pedicle width, thickness and orientation, allowed for anatomical NAC placement at the fifth intercostal space, just lateral to the midclavicular line, and restored a masculine contour. Horizontal scars were well concealed and faded over time, especially in patients with hairy chest, consistent with the literature on male chest contouring post-bariatric surgery [14].

**Complications and Safety:** Across our entire cohort, we observed no major complications such as major hematoma, seroma, or wound dehiscence. The use of quilting sutures likely contributed to reduced dead space and minimized fluid accumulation. Scar hypertrophy was not encountered, possibly due to careful external suture removal and adherence to postoperative compression protocols [6] [7].

There were no asymmetries that persisted and did not necessitate revision. These results underscore the safety and reproducibility of our technique when performed by experienced hands.

In comparison to literature, our outcomes are consistent or superior in terms of patient satisfaction and scar minimization. For example, Rohrich *et al.* [6] report similar success using staged techniques and vertical excisions but acknowledge patient dissatisfaction with visible scarring [15]-[17].

Other studies have attempted to use radiofrequency-assisted liposuction or helium plasma devices for skin contraction, with mixed results [14]-[16]. In our hands, these devices did not provide sufficient shrinkage in Grade III or IV cases to be considered a standalone solution.

The key strength of our method lies in avoiding vertical scars while achieving stable NAC positioning and a natural masculine chest shape in one stage. Literature remains limited on such approaches, underscoring the novelty and clinical relevance of our findings. *To our best knowledge this is first paper that report one-stage surgery for grade 4 Gynecomastia. Our one-stage surgical technique offers a reliable, aesthetically pleasing solution for advanced gynecomastia. The use of*

*quilting sutures has been reported few in other surgeries and not Gynecomastia. This has a novelty in the literature too.*

Our contribution lies in bridging the gap between aggressive tissue excision and scarless outcomes using controlled, mechanical fixation of the skin envelope. While long-term follow-up is still ongoing, preliminary (one year) results strongly support the durability of the results.

**Patient Perspective and Satisfaction:** Patient satisfaction is perhaps the most important metric in aesthetic surgery. In this study, 95% of patients rated their results as good or excellent, citing natural contour, improved self-confidence, and minimal visible scarring. This is particularly meaningful given the emotional and psychological distress that often accompanies gynecomastia in men.

Many patients reported improved body image and comfort during activities like swimming, gym workouts, and wearing fitted clothing. Such improvements in quality of life reinforce the value of offering advanced surgical solutions for higher-grade gynecomastia.

**Comparison with Conventional Methods:**

-Circumareolar and Concentric Circle Techniques:

Rohrich *et al.* [5] proposed a classification-based treatment algorithm for gynecomastia, recommending the use of a periareolar incision with or without skin excision for higher grades. However, several subsequent studies, including Hammond [10] and Courtiss and Goldwyn [8], reported limitations such as residual central chest fullness, visible periareolar scarring, and skin redundancy, particularly in patients with poor skin tone. In contrast, our use of quilting sutures anchors the dermal envelope to the pectoral fascia, effectively eliminating dead space and facilitating skin redraping, while avoiding central bulges.

-Vertical and Free NAC Grafting Approaches:

Hidalgo *et al.* [12] and Gusenoff *et al.* [14] advocated for vertical or inverted-T skin resections combined with free NAC grafting, especially in massive weight loss patients. While these methods allow for significant skin removal and NAC repositioning, drawbacks include loss of NAC sensation, depigmentation, and graft failure risks. Our bipedicle NAC flap technique preserves subdermal vascularity, ensuring high viability, sustained pigmentation, and adequate projection, even in Grade IV cases.

-Liposuction-Based Techniques:

Minimally invasive approaches, including ultrasound-assisted liposuction (UAL) as described by Zocchi [10] and power-assisted liposuction (PAL) by Lista and Ahmad [6], offer good contouring for Grades I-IIb. However, their application in Grade III-IV remains limited. In our cohort, isolated liposuction was ineffective for skin retraction and contour correction in advanced cases, necessitating tissue excision and NAC transposition.

#### Advantages of Our Technique

##### 1. Preservation of NAC Vascularity and Pigmentation:

Unlike free NAC grafting, our bipedicle flap preserves deep dermal and subcutaneous vascular networks, maintaining pigmentation and projection. We

encountered no cases of partial or total NAC necrosis.

#### 2. Improved Skin Contraction and Reduced Seroma Formation:

Internal quilting sutures between the dermis and pectoral fascia promote adherence and reduce shearing. This mimics the effectiveness of progressive tension sutures in abdominoplasty (Pollock & Pollock [11]) and helps minimize dead space. Our seroma rate was <3%, without requiring drains.

#### 3. Reduced Scar Visibility:

Horizontal scars placed along natural chest lines fade over time, especially in hirsute patients. Unlike vertical or anchor-shaped scars, these were well tolerated and often unnoticeable by 6 - 8 weeks postoperatively.

#### 4. Single-Stage Surgery with Short Recovery:

Our approach avoids the need for staged procedures. This is particularly beneficial for young and working-age patients, reducing time off work and increasing cost-effectiveness.

### Clinical Relevance and Patient Selection

The success of our method depends on careful patient selection. Ideal candidates for our bipedicle NAC flap are patients with:

- Severe ptosis (NAC below IMF).
- Moderate-to-severe skin excess.
- Reasonable skin elasticity and healing capacity.

In our cohort, patients with hirsute chests and thicker skin experienced faster scar concealment. In contrast, patients with massive weight loss and thin, atrophic skin (n = 2) required extended garment use and had slower dermal adherence, although overall satisfaction remained high.

## 6. Limitations

This is a single-center, non-randomized study with relatively short-term follow-up (3 - 12 months). Long-term evaluation of NAC position, pigmentation, and sensation will further validate the safety and reproducibility of this technique. We acknowledge that we had a very small Grade IV sample (n = 5), absence of a control group, and the short term ( $\leq 12$  month) follow-up. Although this follow-up is suitable for checking the NAC viability or necrosis and evaluation of fading scar. Additionally, objective measures such as 3D surface scanning and validated aesthetic scoring tools could strengthen future studies.

## 7. Conclusion

Advanced gynecomastia presents a significant surgical challenge due to the excess of skin and glandular tissue and the descent of the NAC. Our single-stage technique employing quilting sutures for Grade III and bipedicle flap NAC repositioning for Grade IV demonstrates excellent cosmetic and functional outcomes with minimal scarring. These methods provide an effective and aesthetically favorable alternative to multi-stage surgeries and should be considered in the management of severe gynecomastia.

## Conflicts of Interest

There are no conflicts of interest among the authors.

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