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Correction of Gynecomastia with Combination of Ultrasonic Liposuction (VASER) and Gland Excision through a Minimal Scar Incision: A Multi-Center Experience

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Abstract

Background Gynecomastia is a common condition among men, leading to psychological distress and impacting quality of life. Traditional correction techniques often result in prominent scarring, which can be a major concern for patients. This study explores the efficacy of combining VASER liposuction with gland excision through a minimal scar approach to improve aesthetic outcomes.

Methods This study retrospectively analyzed 960 patients treated between October 2009 and January 2024 at two centers located in Dubai and Riyadh. Patients were classified using Simon's grading system. The surgical procedure included VASER-assisted liposuction targeting the chest, lateral chest, and axillary fold areas, followed by gland excision through a minimal scar incision. Satisfaction was assessed using both patient- and physician-reported Visual Analogue Scale (VAS) scores. Ethical approval was obtained from the Dubai Scientific and Research Ethics Committee (DSREC) and the Institutional Review Board (IRB) at Hasan Surgery and The Clinics Riyadh KSA.

Results Patient distribution by Simon grading was: Grade I (16.7%), Grade IIA (41.7%), Grade IIB (29.2%), and Grade III (12.5%). Mean aspirated fat volume was 859.4 ml. Patient satisfaction was high, with a mean VAS score of 9.4 across all grades, and minor complications such as bruising, temporary sensory loss, and hematomas occurred in 1.7% of cases. Physician-assessed VAS scores mirrored patient satisfaction, demonstrating the reliability of the technique in achieving minimal scarring, significant skin retraction, improved contouring, and high satisfaction rates.

Conclusion Combining VASER-assisted liposuction with gland excision through a minimal scar incision is a highly effective approach for gynecomastia correction. The technique delivers superior aesthetic outcomes, minimal scarring, and high satisfaction across all grades of gynecomastia.

Further long-term studies are recommended to assess delayed recurrence.

Level of Evidence V This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Gynecomastia · Liposuction · Male breast · Gland excision · VASER liposuction · Minimally invasive surgery

Introduction

Gynecomastia, characterized by the benign proliferation of glandular breast tissue in males, is among the most common conditions affecting men across various age groups, with an estimated prevalence of up to 65% of adult males at some point during their lives [1, 2]. Although often considered benign, gynecomastia can cause significant psychological distress, social embarrassment, and diminished quality of life, particularly in younger males [3, 4]. Its etiology is multifactorial, encompassing hormonal imbalances, medication side effects, obesity, anabolic

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steroid use, and idiopathic origins in a substantial proportion of cases [5, 6].

Traditional treatment options for gynecomastia, such as direct excision of glandular tissue, liposuction, or a combination of both, often result in extensive scarring, particularly when large incisions are necessary for complete gland removal or addressing excess skin [7, 8]. Inconsistent contouring and residual skin laxity further complicate outcomes, contributing to patient dissatisfaction [9]. Surgical techniques that minimize visible scarring while achieving effective removal of both glandular and fatty tissue are therefore desirable [10, 11].

Advancements in minimally invasive procedures, such as VASER (Vibration Amplification of Sound Energy at Resonance)-assisted liposuction, have revolutionized gynecomastia correction. VASER liposuction uses ultrasonic energy to selectively emulsify fatty tissue, enabling smoother contours and enhanced skin retraction [12, 13]. When combined with gland excision through a minimal incision, this technique offers comprehensive tissue removal with minimal scarring and reduced operative trauma, making it an increasingly preferred option for gynecomastia management [14, 15].

Despite the growing adoption of these techniques, limited data exist on outcomes associated with combining VASER-assisted liposuction and gland excision through a minimal incision approach. This study evaluates the clinical outcomes, patient satisfaction, and complication rates of this combined approach in patients with varying grades of gynecomastia. By addressing both glandular and fatty components with minimal scarring, this research aims to provide an evidence-based framework for optimizing gynecomastia management [16–19].

Materials and Methods

Study Design

This is a retrospective cohort analysis of gynecomastia patients treated between October 2009 and January 2024 at centers located in Dubai and Riyadh. Data were collected from a single surgeon's clinical experience to maintain consistency in surgical technique, postoperative care, and follow-up evaluation (Tables 1, 2, 3).

Sample Size Calculation

The sample size was calculated using Raosoft® software (www.raosoft.com). Based on a population size of 750 cases of gynecomastia in the region, a 95% confidence level, and a 5% margin of error, the required sample size was 255 patients. The actual number of patients included in the study was 960, exceeding the minimum sample size requirement.

Table 1 Summary Statistics and distribution of study variables

Variable	N	Mean	SD
Amount of Aspirate (ml)	960	872.9	416.16
Patient Age (years)	960	32.9	8.81
VAS Score	960	9.4	0.73
Additional Details	*n*=960	%	
Bilateral Correction	940	97.9	
Unilateral Correction	20	2.1	

Patient Selection and Classification

Patients included in the study presented with idiopathic or steroid-induced gynecomastia. Preoperative classification was conducted using Simon's grading system. Patients were excluded if they had undergone prior gynecomastia surgery or if they had a history of malignancy. Table 4 illustrates Simon grading score distribution.

Surgical Procedure

1. Preoperative Marking

Preoperative markings were performed in a standing position. The surgical areas were marked for VASER-assisted liposuction and potential gland excision.

2. Anesthesia

Procedures were performed under intravenous sedation, general anesthesia, and local tumescent anesthesia as per patient requirement.

3. VASER-Assisted Liposuction

Incisions were made at the inframammary fold area and lateral areolar margins as shown in Fig. 1. The VASER 3.7 mm one-ring probe was inserted for approximately 5-10 minutes on each side to disrupt and emulsify the fat and glandular tissues as shown in sketch of Fig. 2. In some patients, 2mm small lateral wall stab incision is made to address the lateral wall bulge. Suction is done with special 3.7 or 3.0 mm VASER cannula (Fig. 3).

4. Gland Excision

A 3-4 mm lateral areolar margin incision was made for excising the glandular tissue as depicted in Fig. 4. The excision was limited to all the gland except the disk area underneath the areola to preserve nipple–areolar complex appearance and sensation.

Table 2 Comparison of study variables by operation type

Variable	Operation Type	N	Mean	SD	95% CI	*p* value
Amount of Aspirate (ml)	Bilateral Liposuction and Gland Excision	940	869.6	410.68	(− 450.1, 129.3)	0.261
	Unilateral Liposuction and Gland Excision	20	1030.0	616.95		
Patient Age (years)	Bilateral Liposuction and Gland Excision	940	32.8	8.67	(−10.2, 3.0)	0.266
	Unilateral Liposuction and Gland Excision	20	36.4	14.05		
Satisfaction (VAS Score)	Bilateral Liposuction and Gland Excision	940	9.4	0.72	(0.58, 1.06)	<0.001
	Unilateral Liposuction and Gland Excision	20	8.6	0.50		

Table 3 Comparison of study variables by country

Variable	Operation Type	n	Mean	SD	95% CI	*p* value
Amount of Aspirate (ml)	UAE	716	903.5	460.33	(869.7, 937.3)	0.001
	KSA	244	784.4	228.35	(755.6, 813.2)	
Patient Age (years)	UAE	716	33.3	8.97	(32.7, 34.0)	0.015
	KSA	244	31.5	8.26	(30.4, 32.5)	
Satisfaction (VAS Score)	UAE	716	9.4	0.75	(9.3, 9.4)	<0.001
	KSA	244	9.6	0.64	(9.5, 9.7)	

Table 4 Simon grading score distribution

Simon grade	Number of patients (*n*)	Percentage (%)
Grade I	160	16.7
Grade IIA	400	41.7
Grade IIB	280	29.2
Grade III	120	12.5

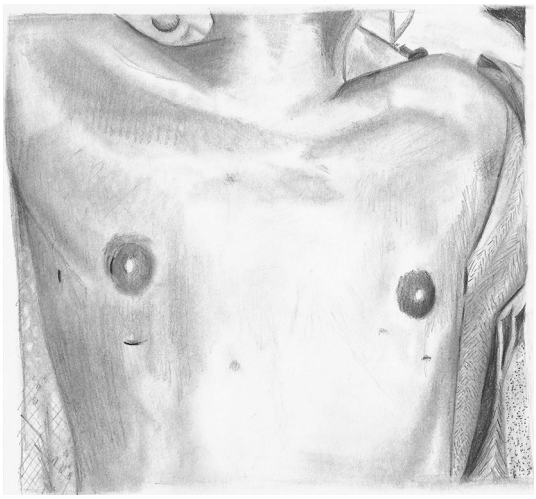

Fig. 1 Incision marking sketch. A sketch illustrating the initial incision markings for gynecomastia surgery using a minimal scar technique. The incision is positioned at the inframammary fold area and the lateral border of the areolar margin to optimize scar concealment. Occasionally, an additional lateral chest wall incision is used to address lateral chest wall bulges

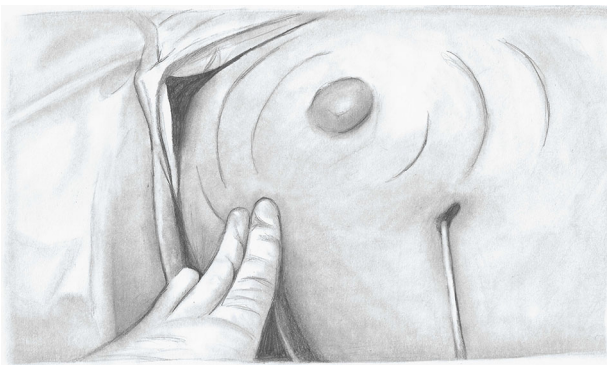

Fig. 2 VASER probe insertion sketch. This sketch demonstrates the use of VASER technology for emulsification of fatty tissue around the breast, ensuring uniform disruption and skin contraction. The probe is inserted through the small inframammary fold and lateral areolar margin incision

5. Closure

Closure was performed using interrupted prolene or subcuticular monocryl stitches, ensuring minimal scar visibility (Fig. 5).

6. Postoperative Care

Compression garments were applied postoperatively and recommended for six weeks. Patients were encouraged to resume daily activities within 2-3 days but were restricted from strenuous activities for 3-4 weeks specially push-ups or lifting heavy weights that can exert the chest area (Fig. 6).

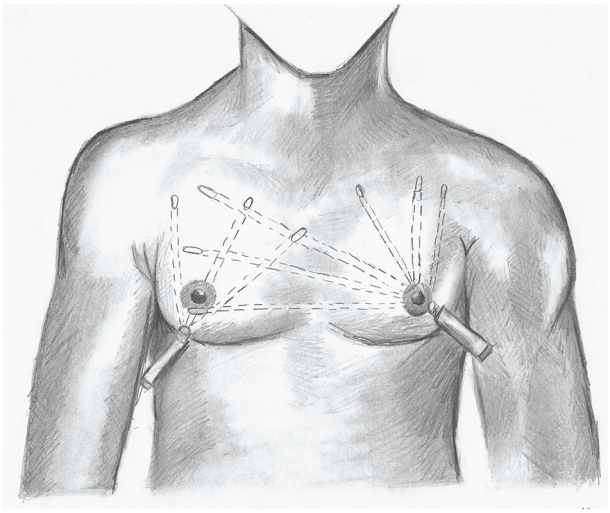

Fig. 3 Fat and glandular tissue suction sketch. A schematic representation showing the aspiration of liquefied fat and glandular tissue using a specialized cannula, achieving a contoured chest appearance

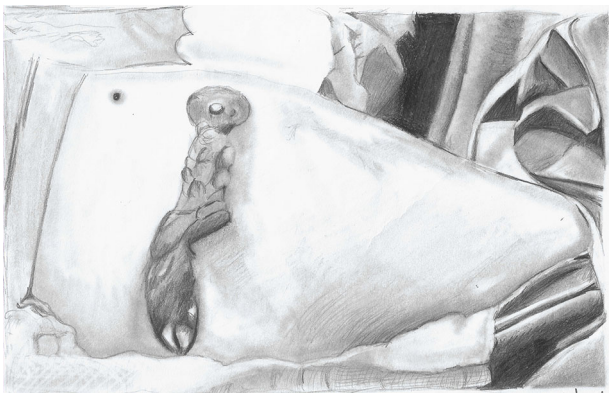

Fig. 4 Gland excision sketch. Sketch of the modified gland excision technique through a small 3-4 mm lateral areolar margin incision, preserving the nipple–areolar complex while removing excess glandular tissue

Supplementary Video Submission

A supplementary video has been prepared and submitted, demonstrating the critical steps of the procedure, including preoperative marking, incision placement, VASER liposuction application, gland excision technique, and immediate postoperative contouring outcomes. The video is intended to provide a detailed visual representation of the surgical process for clarity and reproducibility.

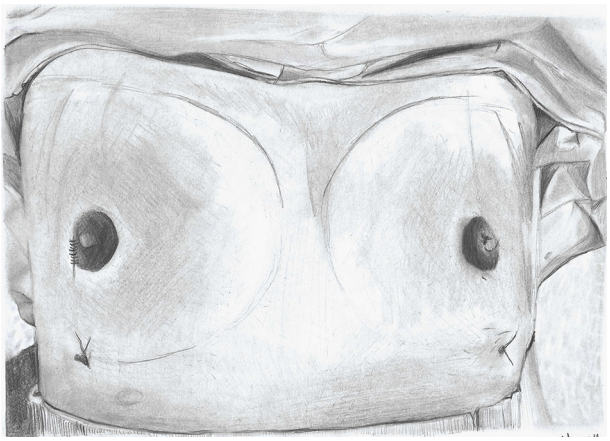

Fig. 5 Suture and closure sketch. This figure illustrates the final stage of the procedure, showing closure with subcuticular monocryl or interrupted prolene sutures to minimize scarring

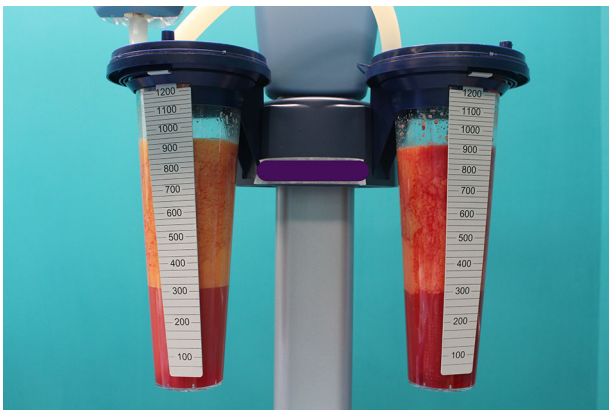

Fig. 6 Picture of fat aspirate. Intra-operative image displaying the volume of fat aspirated using the VASER liposuction technique. This image illustrates the amount of fatty tissue removed to achieve the desired chest contour

Clinical Assessment

Standardized photographic documentation was performed preoperatively, intraoperatively, and postoperatively at 1 month, 3 months, and 6 months. Clinical evaluation included assessments of chest symmetry, shape, and scar visibility. Both patient-reported and physician-assessed Visual Analogue Scale (VAS) scores were used to measure satisfaction with the surgical outcome (Figs. 7, 8, 9, 10).

- **Patient-Reported VAS:** Each patient was asked to rate their satisfaction with overall chest appearance, scar quality, and postoperative contour using a VAS ranging from 0 (no satisfaction) to 10 (complete satisfaction). This self-assessment provided insights into the subjective experience and satisfaction from the patient's perspective, focusing on aesthetic outcomes and psychological well-being.

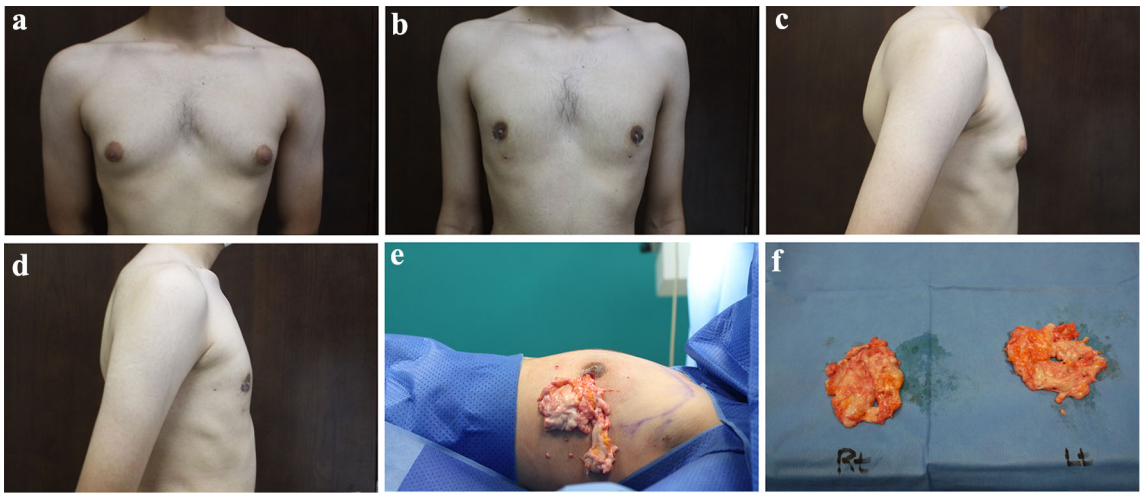

Fig. 7 **a** Preoperative front view of a 20-year-old patient weighing 60 kg, with a BMI of 19, diagnosed with true gynecomastia Grade 2A. The patient presents with prominent glandular hypertrophy and moderate adipose tissue distribution in the chest. **b** Postoperative front view at 3 months post-surgery following VASER-assisted liposuction and gland excision through a small lateral periareolar incision. Approximately 300 ml of fat was aspirated, and a significant gland was excised. The chest shows a smooth contour and well-defined appearance. **c** Preoperative lateral view demonstrating the excessive glandular tissue causing anterior chest projection and asymmetry. **d** Postoperative lateral view at 3 months post-surgery. The patient exhibits a flatter chest profile with a notable reduction in glandular prominence and minimal scarring. **e** Intra-operative image showing the large excised glandular tissue on the operating table after the surgical procedure. This demonstrates the extent of glandular hypertrophy in the patient. **f** Isolated glandular tissue specimen post-excision. The image highlights the size and consistency of the glandular tissue removed, confirming the diagnosis of true gynecomastia

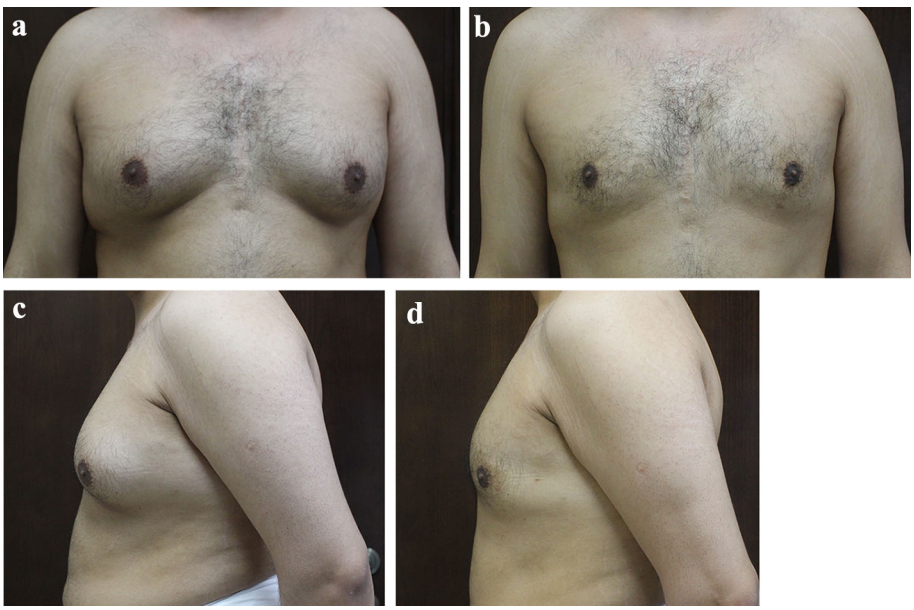

Fig. 8 **a** Preoperative front view of a patient with Grade 3 gynecomastia and an overweight profile. **b** Postoperative front view of the same patient at 6 months, showing marked improvement in chest contour and definition. **c** Preoperative lateral view illustrating excessive glandular and adipose tissue causing chest projection. **d** Postoperative lateral view at 6 months, highlighting a flatter chest profile with significant glandular and adipose reduction

- **Physician-Assessed VAS:** Concurrently, a standardized evaluation was conducted by the operating surgeon using the same VAS scale. The surgeon assessed symmetry, scar appearance, and overall contour based on clinical criteria and standardized photography. This physician-assessed VAS provided an objective measure of the surgical success and cosmetic outcome from a professional standpoint.

By incorporating both patient-reported and physician-assessed VAS scores, a comprehensive evaluation of the surgical outcome was achieved. This dual approach enabled the study to capture both subjective patient satisfaction and objective clinical success, thereby offering a

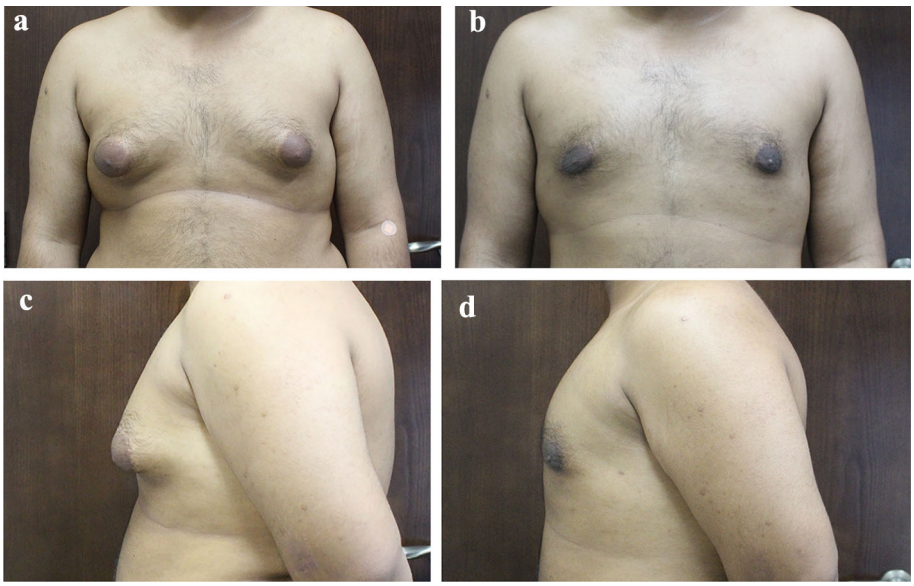

Fig. 9 **a** and **c** Preoperative front and lateral views of a patient with Grade 3 gynecomastia along with nipple–areolar complex enlargement and skin laxity. **b** and **d** Six months postoperative frontal and profile views after combined VASER liposuction and gland excision, showing improvement in chest contour, reduction in size of nipple–areolar complex, and significant skin retraction

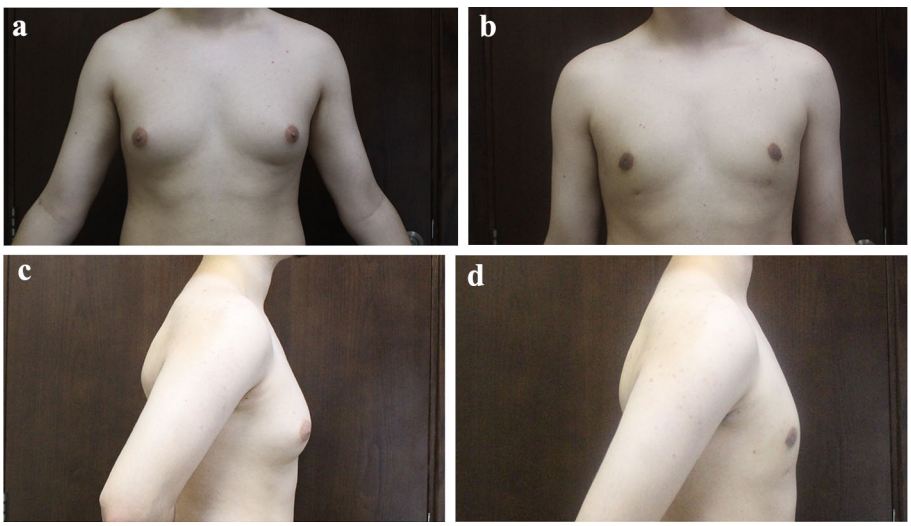

Fig. 10 **a** and **b** Frontal and lateral views of a 20-year-old male, 72 kg, BMI 22, presented with Grade 2B gynecomastia. **c** and **d** Six months postoperative images of the same patient, showing consistent aesthetic results with minimal visible scarring. Approximately 900 ml of fat was removed from both sides, along with gland excision, resulting in a symmetrical chest contour

Table 5 VAS correlation with Simon grading

Simon grade	Mean patient VAS (±SD)	Mean physician VAS (±SD)
Grade I	9.6 (±0.2)	9.4 (±0.3)
Grade IIA	9.4 (±0.4)	9.2 (±0.4)
Grade IIB	9.2 (±0.4)	9.0 (±0.5)
Grade III	8.9 (±0.5)	8.6 (±0.6)

holistic view of the effectiveness of the combined VASER-assisted liposuction and gland excision technique in gynecomastia correction. Table 5 shows the VAS correlation with Simon grading.

Statistical Analysis

Descriptive statistics were used to summarize patient demographics and outcomes. Data analysis was performed using SPSS version 20.0 (IBM Corp., Armonk, NY). Independent t tests and ANOVA were used to assess differences between groups. A p value of <0.05 was considered statistically significant (Figs. 11, 12).

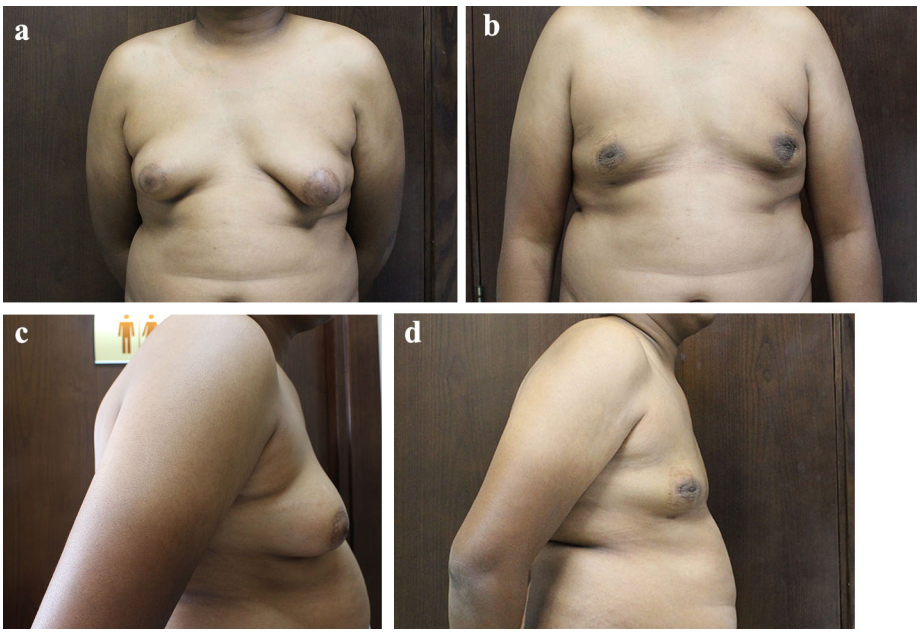

Fig. 11 **a** Preoperative front view of a 36-year-old male, BMI 29, with Grade 3 gynecomastia characterized by prominent glandular tissue, skin laxity, and lateral chest wall bulges. **b** Postoperative front view at 3 months following VASER-assisted liposuction and gland excision, demonstrating improved chest contour, significant glandular reduction, and excellent skin retraction. **c** Preoperative lateral view showing severe chest projection and adipose tissue accumulation. **d** Postoperative lateral view at 3 months, highlighting a flatter chest profile, improved contour, and minimal scarring

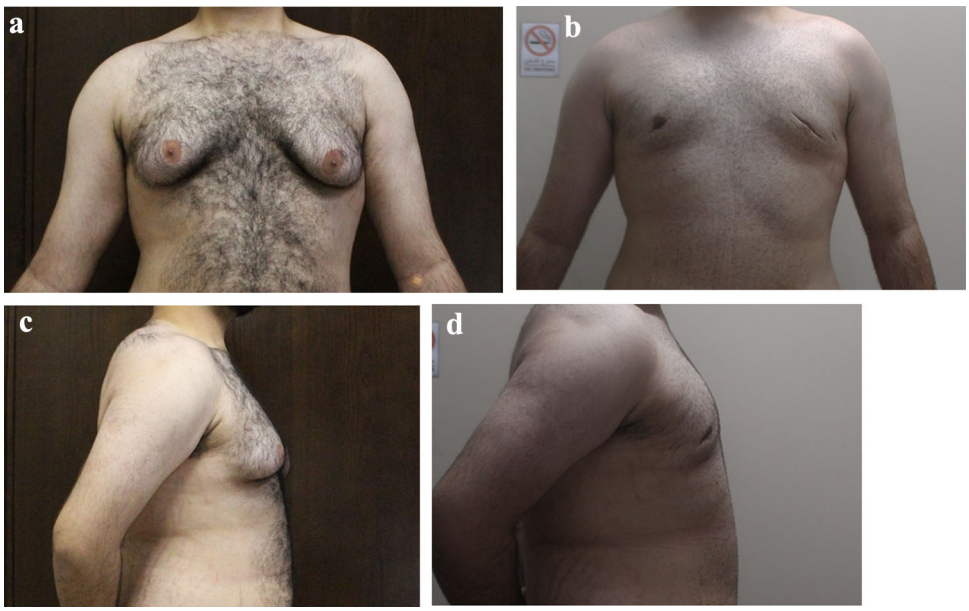

Fig. 12 **a** Preoperative front view of a 20-year-old male, BMI 28, presenting with Grade 3 gynecomastia, including severe glandular hypertrophy and skin redundancy. **b** Postoperative front view at 1 month following VASER-assisted liposuction and gland excision, showing enhanced chest definition, glandular reduction, and notable skin contraction. **c** Preoperative lateral view illustrating significant anterior chest projection and nipple–areolar complex enlargement. **d** Postoperative lateral view at 1 month, displaying a well-contoured chest, reduced projection, and effective skin retraction with minimal scarring

Results

Patient Demographics

The study group consisted of 960 patients with a mean age of 32.9 years (SD = 8.83). Of these, 940 patients presented with bilateral gynecomastia, while 20 patients presented with unilateral gynecomastia. Approximately 70% of the cases were idiopathic, and 30% were associated with steroid or supplement use.

Simon Grading Distribution

The cohort was classified using Simon grading, with the following distribution: Grade I (16.7%), Grade IIA (41.7%), Grade IIB (29.2%), and Grade III (12.5%). Satisfaction scores and outcomes were evaluated across these subgroups, with high satisfaction reported even in patients with Grade III gynecomastia. The combined approach demonstrated effectiveness across all severities, achieving superior aesthetic outcomes while addressing both glandular and fatty tissue components.

Aspirate Volume

The mean aspirate volume was 859.4 ml (SD = 416.06). There were no significant differences in aspirate volumes between patients with bilateral and unilateral gynecomastia ($p = 0.261$).

Figure 6 illustrates two canisters, each containing approximately 1000 ml of aspirated fat, collected from both sides of the chest.

Patient Satisfaction

Patient satisfaction was notably high, with a mean VAS score of 9.4 (SD = 0.73). Table 6 shows physician-assessed VAS distribution. Satisfaction scores were consistent across different age groups and severity grades, reflecting the efficacy of the combined VASER liposuction and gland excision technique. However, a slight but statistically significant difference was observed between satisfaction scores in patients from different geographic regions (UAE vs. KSA) ($p < 0.001$).

Table 6 Physician-assessed VAS distribution

VAS score	Number of patient (n)	Percentage (%)
9–10	720	75
8–8.9	200	20.8
7–7.9	40	4.2

Complication Rates

Minor complications were observed in 16 patients (1.7%). Two patients developed hematomas within 8 hours postoperatively, requiring drainage and additional monitoring. Other complications included prominent postoperative scarring in one patient, wound separation in one patient, and temporary nipple sensory loss in two patients. One case of under-correction was noted and successfully revised at six months postoperatively. No major complications or infections were reported.

Discussion

Our study demonstrates high patient satisfaction and favorable aesthetic outcomes using the combined VASER-assisted liposuction and gland excision technique for gynecomastia correction. Patient satisfaction, as measured by the Visual Analogue Scale (VAS), was consistently high across all Simon grades. Grade I patients reported the highest scores (mean VAS: 9.6), while Grade III patients reported slightly lower scores (mean VAS: 8.9), reflecting the increased complexity of severe cases. These findings align with Rohrich et al. [1], who emphasized the importance of achieving smooth contouring and minimizing scarring to enhance patient satisfaction.

VASER-assisted liposuction offers unique advantages due to its ability to selectively emulsify fatty tissue while preserving surrounding structures, leading to improved contouring and enhanced skin retraction. These characteristics are particularly beneficial in addressing advanced cases of Grade III gynecomastia, where significant skin laxity and glandular hypertrophy often pose challenges. The selective emulsification property of VASER, as noted by Ouf et al. [22], allows for better gland disruption and smoother fat removal, facilitating good outcomes in complex cases.

The combination of VASER-assisted liposuction with gland excision addresses both glandular and fatty components, minimizing the risk of residual tissue and visible scarring. This dual approach aligns with findings by Hurwitz et al. [2] and Lista et al. [3], who reported high satisfaction and superior aesthetic outcomes with techniques that effectively combine glandular resection and contouring. The ability to achieve minimal scarring is further supported by studies from Cigna et al. [5] and Lee et al. [10], who highlighted the importance of scar-minimizing approaches in gynecomastia correction.

The psychosocial benefits of gynecomastia correction are equally significant. By achieving a flatter, more masculine chest profile, patients experience marked improvements in self-esteem and quality of life, consistent with findings from Goel et al. [20] and Zangari et al. [21]. These results underscore the holistic value of gynecomastia surgery, extending beyond physical outcomes to positively impact mental well-being.

Regarding complications, our study reported a low rate of minor complications (1.7%), including hematomas, temporary sensory loss, and bruising. These rates are consistent with findings from Kim et al. [12] and Abdelrahman et al. [13], who observed fewer complications with minimally invasive techniques. The enhanced skin retraction observed, particularly in advanced cases, reflects the efficacy of combining VASER liposuction with modern technologies, as reported by Ouf et al. (24).

While techniques like the "pull-through" method described by Lista et al. [3] have been effective in specific cases, the addition of VASER technology in our approach provides an edge in achieving superior skin tightening and smoother transitions. Moreover, the ability to treat adjacent areas such as the lateral chest wall and axillary regions contributes to the comprehensive outcomes achievable with this technique [23].

Study Limitations

While the results of this study are promising, certain limitations should be acknowledged. The absence of a control group or split study design precludes direct comparison with other surgical methods, such as traditional liposuction or open gland excision. Future studies incorporating a randomized control design could provide further validation of the technique's advantages over conventional approaches [20, 22].

This study was conducted by a single surgeon across two centers, which, while ensuring consistency in technique, may introduce observer bias and limit the generalizability of the findings to other surgeons or institutions. Additionally, while this study included a substantial number of advanced Grade III gynecomastia cases, the follow-up duration for some patients was relatively short. Longer-term follow-up is necessary to assess the durability of skin retraction and contour improvements over time [22, 23].

Despite these limitations, this study builds on existing literature by demonstrating that the combined VASER-assisted liposuction and gland excision technique is a reliable, reproducible, and patient-centric approach for gynecomastia correction. By integrating this minimally invasive technique with meticulous surgical planning, we achieved high patient satisfaction, low complication rates, and optimal aesthetic outcomes, advancing the field of gynecomastia surgery [6, 16, 22].

Conclusion

In conclusion, our study highlights the efficacy of combining VASER-assisted liposuction with gland excision for the surgical correction of gynecomastia, achieving high patient satisfaction, superior aesthetic outcomes, and minimal complications. This technique offers a comprehensive solution by effectively addressing both the fatty and glandular components of gynecomastia while minimizing visible scarring, sensory changes, and the need for extensive skin resections.

While the limitations of this approach in extreme Grade III cases, such as residual puffy NACs and significant skin excess, must be acknowledged, our findings emphasize the enhanced skin retraction and contour improvement achieved with VASER technology. This is particularly significant in challenging cases where skin excision can often be avoided. Additionally, this study validates the technique's value in comparison with traditional liposuction and glandular excision, offering a minimally invasive option with consistently favorable outcomes.

The supplementary video further enhances the educational value of this study by providing a clear demonstration of the procedure, highlighting its reproducibility and technical nuances. By addressing reviewer concerns and integrating practical insights, this paper reinforces the utility of this combined technique as a high standard for gynecomastia correction, contributing to the growing body of evidence supporting minimally invasive, patient-centric approaches in aesthetic plastic surgery.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s00266-025-04801-3.

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Author Contributions Additionally, I extend my gratitude to Ms. Ayesha Hasan Ali for her contribution toward creating the procedural sketches used in this study.

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Declarations

Conflict of interest The author declares that he has no conflicts of interest to disclose.

Human and Animal Rights Ethical approval for this study was obtained from the Dubai Scientific and Research Ethics Committee (DSREC), the Institutional Review Board (IRB) at Hasan Surgery and The Clinics Riyadh KSA. All procedures involving human subjects adhered to the standards set forth in the 1964 Helsinki Declaration and subsequent amendments.

Informed Consent For this type of study, informed consent is not required.

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