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Surgical management of primary gynaecomastia: outcomes of a peri-areolar round-block approach with absorbable barbed suture closure.

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Abstract

Background: Gynaecomastia is a common benign condition in males that may cause physical discomfort and significant psychological distress. Surgical management remains the definitive treatment for persistent disease, particularly in the presence of glandular tissue, skin excess, or ptosis. Scar quality is a key determinant of patient satisfaction, and refinement of closure techniques may influence long-term outcomes.

Methods: A retrospective analysis was conducted of 265 male patients who underwent surgical correction of primary gynaecomastia between June 2005 and December 2023 in a single private centre. Outcomes were compared with a pre-2005 cohort of 108 patients treated using braided non-absorbable sutures. Surgical management was guided by the Simon classification and included liposuction alone, liposuction with glandular excision, or combined approaches with peri-areolar round-block skin resection. From 2005 onwards, peri-areolar closure was performed using absorbable bidirectional barbed sutures. Primary outcomes were post-operative scar quality and patient-reported satisfaction at 12 months. Secondary outcomes included complication rates and the need for revision surgery.

Results: Early post-operative complications were uncommon in both cohorts. Rates of seroma, haematoma, infection, and partial nipple–areolar complex necrosis were low and comparable between groups. Scar enlargement occurred significantly less frequently in the post-2005 cohort following the introduction of barbed suture closure. Hypertrophic scarring and wound dehiscence rates were similar between cohorts. At 12 months, most patients in the post-2005 group reported satisfaction with their aesthetic outcome and scar quality, with dissatisfaction being uncommon.

Conclusions: The peri-areolar round-block approach with absorbable barbed suture closure is a safe and reproducible technique for the surgical management of primary gynaecomastia. Refinement of the closure technique was associated with improved scar-related outcomes without increased complication rates, contributing to high levels of patient satisfaction.

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Introduction

Gynaecomastia is a benign enlargement of male breast tissue that may present unilaterally or bilaterally and affects males across all age groups. While often transient in neonates and adolescents, it may persist into adulthood, where it can cause physical discomfort and significant psychological distress[1]. The condition is frequently underreported, yet its impact on body image and quality of life, particularly in younger patients, is well recognised [4].

The aetiology of gynaecomastia is multifactorial. Although most cases are idiopathic, contributing factors include obesity, pharmacological agents, anabolic steroid use, and systemic conditions such as hypogonadism, hepatic disease, renal failure, and endocrine disorders[2,3]. Management depends on patient age, symptom duration, and underlying cause. Observation may be appropriate in early cases, while medical therapy has limited efficacy in established disease and is often poorly tolerated [5,6]. Surgical treatment therefore, remains the definitive option for persistent gynaecomastia, particularly in the presence of glandular tissue, skin excess, or ptosis. A variety of surgical techniques have been described, ranging from liposuction alone to combined glandular excision and skin resection. The peri-areolar round-block technique offers controlled skin reduction with a circumareolar scar and is well suited to moderate and severe forms of gynaecomastia[7]. Scar quality remains a key determinant of patient satisfaction, and refinement of closure techniques may influence long-term outcomes. This study reports outcomes following modification of the peri-areolar round-block approach using absorbable barbed sutures, with particular emphasis on scar quality and patient-reported satisfaction.

Methods

Study design and patient selection

This retrospective study analysed outcomes of surgical treatment for primary gynaecomastia in male patients treated in a private practice setting in Algeria between June 2005 and December 2023. Outcomes from this cohort were compared with those from an earlier pre-2005 series treated using conventional braided non-absorbable sutures. Patients with a diagnosis of breast carcinoma were excluded.

Key factors in patient selection included age at presentation, onset and duration of symptoms, and the presence of associated systemic conditions involving the liver, kidneys, adrenal glands, prostate, lungs, testes, or thyroid. In some cases, gynaecomastia was identified incidentally during chest imaging performed for unrelated indications.

Clinical assessment and investigations

All patients underwent a comprehensive pre-operative assessment, including a detailed medical and family history, review of medications, and documentation of recreational drug use. Physical examination focused on breast tissue characteristics, presence of palpable masses, skin changes, nipple discharge, asymmetry, tenderness, and axillary lymphadenopathy. Testicular examination assessed for asymmetry, masses, enlargement, or atrophy.

Pseudo-gynaecomastia was differentiated from true glandular enlargement on clinical examination and, when necessary, with ultrasound imaging. Pseudo-gynaecomastia was defined as circumferential subareolar fat deposition without glandular proliferation and typically demonstrated long-term stability, for which observation was considered appropriate.Further investigations were guided by clinical findings. Patients with suspected testicular pathology underwent testicular ultrasound and serum evaluation including testosterone, luteinising hormone, oestradiol, and dehydroepiandrosterone sulphate. Thyroid abnormalities prompted thyroid function testing and ultrasound. Palpable breast masses were evaluated with mammography or ultrasound, supplemented by magnetic resonance imaging and biopsy when indicated. Patients with suspected hypogonadism underwent hormonal profiling including luteinising hormone, follicle-stimulating hormone, testosterone, oestradiol, and dehydroepiandrosterone sulphate, with karyotype analysis and adrenal imaging considered when appropriate. Renal and hepatic function tests were performed based on clinical indication.

Indications for surgical treatment

Medical therapy was considered ineffective in long-standing gynaecomastia. Pharmacological agents such as clomiphene, danazol, and

tamoxifen were reserved for acute cases, recognising their variable efficacy and potential adverse effects. When gynaecomastia had been present for less than one year and no underlying pathology was identified, observation with close follow-up was recommended. Where medication-induced gynaecomastia was suspected, discontinuation was considered in consultation with the prescribing physician.

Surgical intervention was offered when underlying causes had been addressed, and gynaecomastia persisted beyond one year, or when the condition caused significant physical or psychological distress.

Surgical classification and planning

Gynaecomastia was classified pre-operatively by a plastic surgeon according to the Simon classification system (Table 1), taking into account breast volume, skin excess, and degree of ptosis. The surgical approach was individualised accordingly.

Table1: Classification of gynaecomastia and corresponding surgical approach

Simon grade	Clinical features	Preferred surgical approach
Grade I.A	Fatty enlargement, no ptosis	Liposuction alone
Grade I.B	Glandular enlargement, no ptosis	Liposuction with glandular excision (Webster)
Grade II.A	Moderate enlargement, minimal ptosis	Liposuction with glandular excision (Webster)
Grade II.B	Moderate enlargement with skin excess	Liposuction with glandular excision (Webster or peri-areolar round-block)
Grade III	Marked enlargement with moderate ptosis	Liposuction with glandular excision (peri-areolar round-block)
Grade IV	Severe enlargement with significant ptosis	Liposuction with glandular excision and peri-areolar round-block skin resection

**Classification based on the Simon grading system. Surgical approach was individualised according to tissue composition, skin excess, and degree of ptosis.*

Patients with Grade I.A disease were treated with liposuction alone when fatty tissue predominated. For Grade I.B and higher grades, liposuction was performed initially to reduce adipose volume, followed by assessment for glandular excision. In cases of moderate to severe ptosis or significant skin excess, a peri-areolar skin resection using a round-block technique was employed.

Surgical technique: peri-areolar round-block approach with barbed suture closure

The peri-areolar round-block technique was adapted from the original Benelli method and introduced into male breast surgery at the authors' institution in the early 1990s. In 2005, the closure technique was modified by replacing braided non-absorbable sutures (Ethibond® 4/0, Ethicon) with absorbable bidirectional barbed sutures (Spiral PGA–PCL 4/0, Stratafix®, Ethicon). This modification was undertaken to eliminate knot tying and to reduce complications associated with permanent suture material, including knot palpability, suture extrusion, and local infection, while allowing more even distribution of tension along the peri-areolar closure.

Pre-operative markings were performed with the patient standing, initially with the arms at the sides and subsequently in an elevated position. The inframammary fold was outlined, and reference points were identified to guide areolar positioning and the extent of skin resection. The planned areolar diameter did not exceed 3 cm, and the limits of deepithelialisation were determined according to the degree of skin excess and the contour of the pectoralis muscle.

All procedures were performed under general anaesthesia with the patient positioned in a semi-Fowler posture. Tumescent infiltration was administered using a blunt 4 mm cannula. Deepithelialisation was carried out with preservation of a broad dermal margin. Vacuum-assisted liposuction was then performed, followed by subtotal mastectomy with preservation of a superiorly based nipple–areolar complex flap. Subdermal fat in the lower pole was intentionally preserved to minimise the risk of secondary invagination and crater deformity. Meticulous haemostasis was achieved, and closed suction drainage was maintained for up to 24 hours.

For peri-areolar closure, the areola was divided into four quadrants, and a stabilising staple was placed at the 12 o'clock position. A double-armed 2-0 polydioxanone barbed suture was used to approximate the deep dermal layer in an interlocking fashion from the 12 to the 6 o'clock position. Tension was progressively adjusted to achieve the desired areolar diameter, with the barbed configuration maintaining tissue approximation without the need for knot tying. A second double-armed 3-0 monofilament absorbable suture was used for subcuticular closure. Additional fine nylon sutures were placed selectively to correct any residual skin irregularity when required. The average time required for peri-areolar closure using the running barbed suture technique was approximately 15 minutes.

Post-operative care and outcome assessment

Post-operative dressings consisted of non-adherent gauze and moderate compression using an elastic bandage and chest garment following drain removal. Patients were reviewed regularly to assess wound healing, scar quality, and flap viability.

Primary outcomes were scar quality and patient-reported satisfaction at 12 months post-operatively. Secondary outcomes included surgical technique employed, overall complication rates, need for revision surgery, age distribution, and aetiology of gynaecomastia.

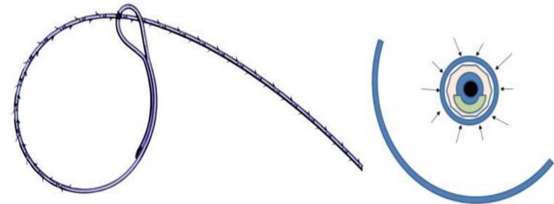
Results

Patient Characteristics and surgical approach

Between June 2005 and December 2023, 265 male patients underwent surgical correction of primary gynaecomastia. The mean duration of follow-up was 12 months, ranging from 6 to 24 months. Most patients were young adults, with the majority aged between 18 and 25 years. Bilateral gynaecomastia predominated, and most cases were classified as idiopathic.

Surgical management was determined by breast volume, tissue composition, degree of skin excess, and presence of ptosis, in accordance with the Simon classification system (Table 1). A combined approach of liposuction and glandular excision was most commonly employed. Liposuction alone was reserved for mild, fatty-predominant cases, while a peri-areolar round-block approach was increasingly adopted for moderate to severe grades with skin redundancy. The peri-areolar round-block technique using absorbable barbed sutures enabled controlled skin reduction and stable areolar positioning without the need for knot tying, as illustrated in Fig. 1.

Figure 1: Peri-areolar round-block closure with barbed suture



Post-operative outcomes and patients satisfaction

Post-operative outcomes for the post-2005 cohort were compared with those of the pre-2005 cohort (Table 2). Early surgical complications were uncommon in both groups. Partial necrosis of the nipple–areolar complex occurred in a small number of cases and was unilateral and limited in all instances. Rates of seroma, haematoma, and infection were low and did not differ significantly between cohorts.

Scar-related outcomes demonstrated a clear difference between groups. Scar enlargement occurred significantly less frequently in the post-2005 cohort, coinciding with the introduction of absorbable barbed sutures for peri-areolar closure. Rates of hypertrophic scarring and wound dehiscence were comparable between cohorts.

At 12-month follow-up, most patients in the post-2005 cohort reported satisfaction with their aesthetic outcome and scar quality. Dissatisfaction was uncommon and was most often associated with visible scarring, residual asymmetry, or contour irregularities. A representative example of post-operative outcome following peri-areolar round-block correction is shown in Fig. 2. Additional operative details and extended clinical examples are provided in the supplementary material.

Table 2: Post-operative outcomes and patient satisfaction: post-2005 vs pre-2005

Outcome	Post-2005 (n = 265)	Pre-2005 (n = 108)	p value
Early post-operative complications			
Seroma	4 (1.5%)	3 (2.7%)	0.418
Infection	1 (0.3%)	2 (1.8%)	0.202
Haematoma	2 (0.7%)	1 (0.9%)	1.000
Partial NAC necrosis	7 (2.6%)	5 (4.6%)	0.340
Scar-related outcomes			
Scar dehiscence	7 (2.6%)	3 (2.7%)	1.010
Hypertrophic scarring	15 (5.6%)	7 (6.4%)	0.950
Scar enlargement	17 (6.4%)	23 (21.2%)	<0.001
Keloid formation	0	2 (1.8%)	0.083
Patient-reported satisfaction at 12 months			
Satisfied	207 (78.0%)	79 (73.1%)	0.43
Moderately satisfied	40 (15.0%)	18 (16.6%)	0.06
Dissatisfied	18 (7.0%)	11 (10.1%)	0.37

Figure 2.: Representative pre- and post-operative outcome following peri-areolar round-block correction

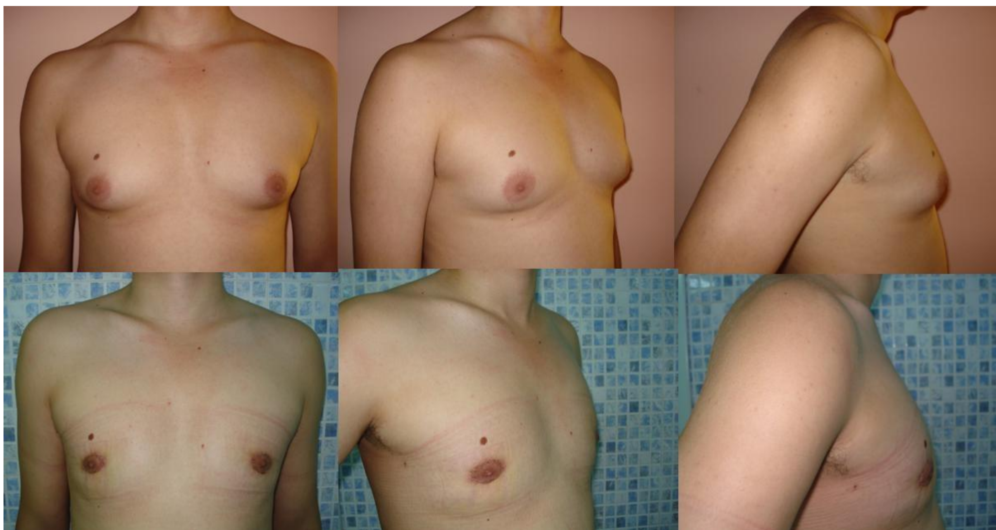
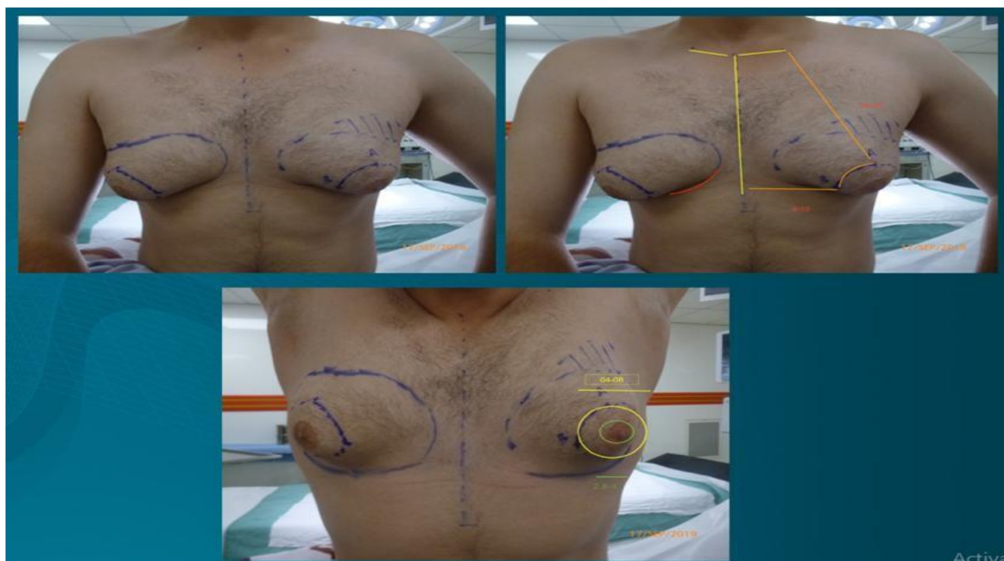


Figure 3: Pre-operative marking and skin resection planning



Discussion

This retrospective analysis of 265 patients demonstrates that surgical management of primary gynaecomastia using a peri-areolar round-block approach with absorbable barbed suture closure is associated with low complication rates, favourable scar outcomes, and high levels of patient-reported satisfaction. Comparison with a pre-2005 cohort treated using braided non-absorbable sutures suggests that refinement of the closure technique was associated with a significant reduction in scar enlargement, without an increase in early post-operative complications.

Scar quality is a critical outcome in gynaecomastia surgery, particularly in young patients for whom chest aesthetics strongly influence satisfaction. In the present series, scar-related complications were uncommon, and the need for secondary revision was limited. The observed reduction in scar enlargement following the introduction of barbed sutures may be attributable to more uniform tension distribution along the peri-areolar closure and the avoidance of permanent knot-related issues, such as palpability and extrusion, which have been reported with conventional braided sutures 11–13. Importantly, rates of hypertrophic scarring and wound dehiscence were comparable between cohorts, suggesting that the benefits were specific rather than global.

The peri-areolar round-block approach allowed controlled skin reduction while maintaining areolar position and contour, making it particularly suitable for moderate to severe grades of gynaecomastia. The staged use of liposuction followed by selective glandular excision enabled tailored tissue removal and minimised contour deformities, consistent with contemporary principles of gynaecomastia surgery 8,12. Patient satisfaction at 12 months was high, and dissatisfaction was uncommon, most often relating to residual scarring or contour irregularity rather than major complications.

Several limitations should be acknowledged. This was a single-centre, single-surgeon retrospective study, which may limit generalisability. Patient satisfaction was assessed using a non-validated subjective scale, and although follow-up was sufficient to assess scar maturation in most cases, longer-term outcomes were not evaluated. In addition, while statistical comparisons were performed, multivariate analysis was not undertaken to control for potential confounding factors.

Despite these limitations, this large consecutive series supports the peri-areolar round-block approach with absorbable barbed suture closure as a safe and reproducible technique for the surgical management of primary gynaecomastia. Refinement of closure methods appears to improve scar-related outcomes without compromising safety. Future prospective studies incorporating validated patient-reported outcome measures and standardised complication grading would be valuable in further defining the role of barbed suture closure in gynaecomastia surgery.

Conflict of interest: the authors declare no conflicts of interest.

Consent: The authors hold written consent from all patients for publication of clinical images.

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