Severe Gynaecomastia Treatment with VASER Liposuction and Spring Suspension Sutures in Modified Webster Mastectomy

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Abstract

Background: Gynaecomastia is a common and often distressing condition in men. Treatment options of pronounced male breast hyperplasia are often limited to breast amputation. However, this approach typically leaves conspicuous scars that negate patient satisfaction for a successful otherwise improvement of chest contours.

Objective: To examine if a combining surgical methods can give satisfactory results with less scarring for patients with a severe gynaecomastia. The study focused on outcomes of patients who had a treatment combining ultrasound-assisted liposuction (UAL) with a periareolar glandular and skin excision (Webster mastectomy) and a suspension thread mastopexy.

Methods: A retrospective study was conducted of 63 consecutive gynaecomastia patients who underwent this combination surgery at the author’s clinic.

Only patients with severe grades of gynaecomastia (above IIB) and who had no previous surgery were enrolled in the study. Patients had their outcomes assessed after 12 months to give their scars a chance to mature. For each patient, parameters such as age, severity of the condition, reasons for surgery, and post-surgical patient satisfaction and adverse events were recorded. Men evaluated their chest perception in various life situations using a Breast Evaluation Questionnaire (BEQ). They used the same tool before and after their surgery. Their total score of BEQ prior and following their treatment was compared.

A panel of independent observers used a Visual Analogue Score (VAS) to rate outcomes of the surgery from patient photographs before and after their treatment.

Results: All 63 men treated using this technique suffered grades IIB to IV gynaecomastia. 41 patients attended their assessment after 12 months following their surgery.

Men in the sample group were most likely to be aged 26-35 years old and have grade IIB gynaecomastia. Most of them cited psychological distress, embarrassment and low self-esteem as reasons to undergo this surgery. On average, patients were seen 18 months after their treatment, and they reported a high satisfaction rate of their outcomes. Their BEQ scores improved significantly after the surgery. No major adverse effects were recorded. Furthermore, independent observers evaluated the treatment outcomes as significant improvements in chest contours of the participants.

Keywords: Gynecomastia; Male breast enlargement; Surgery.

Introduction

Gynaecomastia is unilateral or bilateral abnormal, non-malignant enlargement of male breast. It is a common condition and has a significant psychological impact on men. However, the National Health Service (NHS) in the UK considers it a mere cosmetic defect and, as such, does not offer treatment.

In severe forms, gynaecomastia outwardly resembles female breasts. However, there is no lobular mammary architecture necessary for lactation [1]. Diagnosis of gynaecomastia implies the presence of proliferated glandular ducts with hyperplasia of intraductal epithelium and surrounding fibrotic stromal connective tissue.

Pseudo-gynaecomastia describes male breast enlargement due to localized fat accumulation. This is commonly seen in obese men, whereas gynaecomastia made of only glandular tissue, is observed in thin or athletic men. However, the most frequent presentation is a mixed glandular-adipose or more precisely fibro-glandular-adipose hypertrophy.

The commonly used Simon and Rohrich classifications [2, 3] of gynaecomastia are based on degree and type of soft tissue surplus. The
severity progresses from I (mild) to grade IV (most severe). Surgery choice is based on how pronounced is the condition.

Milder forms of gynaecomastia, ranging from I to IIA would require a simple excision or liposuction and sometimes both.

The more pronounced cases are often more challenging and often fail to produce satisfactory outcomes. In addition to removing excess fat and glandular deposits, a surgeon has to solve a problem of excess skin envelope and elevate a sagging nipple-areola complex (NAC), and therefore he or she requires performing a type of mastopexy. In addition patients with severe gynaecomastia often have lateral chest wall soft tissue and skin excess, which also need to be addressed.

A combination of surgical techniques serves best to deal with severe cases of gynaecomastia. The excessive scarring seen with most excision and lifting methods has prompted surgeons to explore a combination of more sophisticated techniques. One of these is described below and the author used it to treat 63 patients in her practice over three years.

**Surgical technique**

This method is derived from the Webster concept [4], which removes glandular tissue through a small semicircular trans-areolar incision. The mastectomy is performed in single or multiple block glandular-fibrous tissue excisions, leaving a crater shaped defect with tapering edges towards the surrounding soft tissue layers of the chest wall. The restoration of the tissue plane is obtained by suturing the opposing edges of the crater defect. The NAC then relies on the subdermal plexus.

For its blood supply, similarly to a modified circumareolar excision technique as described by Botta [5]. The resulting scar is normally well hidden by the areola to normal skin transition when wound edges are approximated. However, Webster’s method, suitable for mild to moderate gynaecomastia cases, does not address excess skin or ptosis.

In cases of severe gynaecomastia grades IIB to IV, performing a thorough liposuction with Vibration Amplified Sound Energy at Resonance (VASER, Solta Medical, Hayward, CA, USA) for debulking, sculpting and skin retraction reduces the volume of soft tissue excess, and makes the condition similar to milder grades of gynaecomastia.

Good tumescent technique is required; on average 1000ml of Klein solution is used on each side of the chest. The Vaser machine is operated in pulse mode at 40-70% with the choice of the probe depending on the density of fibro-fatty layer.

Probes with fewer rings and with smaller diameters are used for cases with more fibrous tissue.

After emulsifying the retro-areolar tissue mound, the probe goes across the chest to reduce the overall fat layer on the chest wall. Care should be taken to leave enough subdermal adipose and soft tissue intact immediately below and above the NAC area to preserve the blood supply. This can be confirmed with a manual pinch test and ultrasound imaging control.

Specific attention should be paid to the delineation of the lateral borders of the pectoralis major muscle, sternal notch and pre-sternal area to dislodge fat obscuring these aesthetic landmarks. A lower setting of Vaser energy output should be used for this; often it can be as low as 20-40%. A flattening of the retro-areolar mound and a reduced resistance to the probe with softening of the tissues indicates the end points of emulsification. Palpation should find an almost gel consistency in contrast to the previously hard subdermal layers.

Fat is then aspirated, using various diameters cannula: larger for rapid debulking and thinner and curved ones for fine sculpting and finishing. A 3mm cannula with openings on one single side (commonly known as a ghost cannula) is used for outlining muscle contours. The cannula holes are oriented facing downwards away from the dermis. The same cannula can be used without aspiration for single passes in a plane close to the dermis of the upper chest quadrants. This maneuver is used to get maximum dermal irritation and subsequent retraction with a mini-mum impact on the capillary plexus.

The completion of liposculpting is confirmed by final sweep and pinch tests used to compare the symmetry of both sides and for a final check of contours.

Skin excess is removed by lifting off a de-epithelized skin flap along the upper areolar border (upper semi-circumareolar, a ‘hallow’ or wide crescent shape). The mastectomy is performed via a curved incision in the de-epithelized area about one centimeter from the margin of the NAC. The dermo-glandular flap bearing the NAC must have a minimum of 3cm thickness to prevent a sunken appearance (often called a ’saucer deformity’) and to preserve the subdermal plexus. The glandular and fibrous tissue core is resected in one single block and sent for a histological examination. Smaller blocks of the remaining fibrous and glandular tissue are removed in a tapering fashion, aiming also to address periaxillary deposits. The latter can be removed via this access if there is no significant fibro-adipose hypertrophy or skin surplus extending to the lateral chest wall. Otherwise the resection has to be performed through an additional crescent incision at the apex of the axilla.

The caudal margin of the crater tissue defect is brought vertically up with the suspension threads, which are fixed to the chest wall (pectoralis fascia) at the level of the 2nd rib or manubrium-sternal angle. For lifting the lower margin and facilitating its suspension and fixation, a deep subcutaneous 5-6 cm wide tunnel is made by dissecting cephalically all the way to the pectoralis fascia level, up in the midclavicle-nipple line. Using a dual end long tracking needle with the attached suspension thread, a large bite is made through the caudal margin of the defect and its underlying fascia. The thread is then tracked up in the tunnel and fixed at the upper anchoring point to the fascia. The thread loop is then pulled and tied up under tension; the lower margin of the crater therefore can be elevated and approximated with its upper counterpart.

The second and third loops can be inserted and fixed laterally and medially to the central anchoring point for additional support. Polydioxanone sutures (PDS) size 2 are then used to approximate the edges and to completely obliterate the crater defect. Large bites of the PDS suture are made to support the superficial fascia system (SFS) and to pull both the lateral chest wall skin and subdermal tissue plane along the outer border of the pectoralis margin. This can help to emphasize the muscle edges. The dermal flap with the NAC is then elevated without any tension as the suspended underlying soft tissues bear the main gravitational downwards pull. The NAC flap is sutured to the upper border of the crescent incision with overlapping of the de-epithelized dermal flap margins. Evenly spaced buried mattress PDS 3 sutures are used to approximate the edges. As the wound lengths at its upper and lower borders are not equal in length, the horizontally oriented inverted mattress sutures are used on the cephalic margin, and vertically oriented buried mattress sutures are placed on the caudal margin of the wound. To reduce pleating effects, sutures are spaced at the 9, 10:30, 12, 13:30, and 15 o’clock positions. A running intradermal Monocryl 5 suture is used to finish closure of the skin, with care taken to make the wound at the upper border of the areolar as smooth as possible.

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A similar broad crescent dermal excision flap can address the excessive soft tissue and skin on the lateral chest wall. The base of the crescent is positioned along the axillary fossa at its anterior-posterior axis; the outer curved edge of the flap is oriented caudally on the lateral chest wall. A careful planning and marking should estimate the necessary amount of skin to excise to close it without tension. The technique is, in fact a modified upper-lateral body lift. A dermal crescent is lifted off the de-epithelized flap. An incision closer to the axillary margin is made though the de-epithelized area, leaving a one-centimeter margin for subsequent overlapping.

Surplus fibrous, connective tissue and residual fat from the side of the chest wall are trimmed off under a direct vision. A deep subdermal tunnel 4-5cm wide and 15-20cm long is made on the lateral chest wall by a blunt dissection along the deep fascia. The suspension threads are tracked down along the tunnel and fixed with a large bite of the fascia. The serratus anterior fascia at the medial wall of the axilla is used to anchor the thread at the cephalic border. The thread is tied up under tension. Two additional loops are tracked and fixed anterior and posterior to the central anchoring points at the axilla. This gives additional suspension.

The white crescent area is a de-epithelized dermal flap. The yellow area represents flaps lifted off for mastectomy access. Yellow dotted lines outline the extent of the glandular-fibrous tissue resection. Red, brown and purple lines illustrate track lines for the Spring suspension threads.

PDS 2 inverted vertical and horizontal mattress sutures are used to approximate the wound edges. A running intradermal PDS 5 suture closes the skin. Drains might be placed as required. Wounds are covered with a tape; additional vertically positioned tapes are also applied to support the chest wall. A compression vest must be worn for six weeks.

**Suspension device**

Various suspension threads are available on the aesthetic market, but most are not suitable for body lifting. Spring Body suspension threads by the Spring Thread (ST®, 1st Surgi Concept, Tourcoing, France) are most useful due to the strong Polyester core, thick silicone outer layer, and 24 convergent 3D cogs per centimeter (Figures 2 and 3). The silicone coat allows the implanted threads to integrate easily in soft tissues. Their elastic structure and good tensile strength are ideal for body lifting, allowing sufficient tissue mobility while providing good support. A thinner version of the thread is used for facial surgery.

**Methods**

A collection of 63 patients with pronounced gynaecomastia (grades IIB to IV on Simon –Rohrich classification scale) and who had no previous treatments agreed to participate. Milder cases and those, requiring a revision surgery were excluded.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation.
(Medical Research Council, UK) and with the Helsinki Declaration of 1975, as revised in 2008. Informed consent was obtained from all patients for being included in the study.

Patient motivations for the surgery and the satisfaction with their chest appearance were recorded pre-operatively using a modified Breast Evaluation Questionnaire (BEQ) [6].

After a sufficient time for scars to mature, all patients were contacted and invited for a review 12 months after their surgery. Men had their scars, long-term results and complications evaluated, and they had post-treatment satisfaction levels recorded. This time BEQ also included additional questions about patient’s subjective perception of the surgery outcomes.

A cohort of 48 (76%) men e-mailed back the questionnaire, and 41 (65%) attended face to face appointments. This latter group comprised this study’s sample.

Medical notes of the participants were summarized to compile any recorded adverse effects. Standard photos including front, side and oblique views, were taken for comparison with pre-operative images. Patients were asked to review their photos, and then to fill in again the adapted BEQ. Scores were then compared with those derived from answers received by the same patients before their attendance.

Three independent reviewers, all experienced gynaecomastia surgeons, who took no part in the surgery, were asked to view the photos and score the clinical and aesthetic treatment goals for each patient. These scores were compiled and analyzed.

Results

Patient sample distribution

<table>
<thead>
<tr>
<th>Age</th>
<th>19-25</th>
<th>26-35</th>
<th>36-45</th>
<th>46-55</th>
<th>&gt;56years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>9</td>
<td>19</td>
<td>8</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

A subset of 8 men, aged 19-35 reported taking anabolic steroids, but all claimed that their gynaecomastia was present beforehand. Three patients aged 46-55 had used Finesteride for thinning of hair. One man over 55 years of age was using a calcium channel blocker for hypertension. All patients, however, were certain, that their gynaecomastia was pre-existing.

All of the patients had ultrasonography to confirm gynaecomastia before the surgery, of which 17 patients (41%) were of grade IIB, 13 (32%) were classified as grade III, and 11 (27%) with grade IV.

Motivations for having surgery are routinely gathered from all patient undergoing treatment and this is done regardless of the grade of gynaecomastia. For the sample group in question, the most common cited reasons were emotional distress and embarrassment [Figure 4].

Core samples from all 41 patients were sent for histology and reported as ‘gynaecomastia with predominantly glandular-fibrous hyperplasia’ (38 patients) and ‘gynaecomastia with fibro-adipose hypertrophy’ (3 patients).

Breast Evaluation Questionnaire

This validated tool for measuring levels of satisfaction and perception of quality of life after breast surgery was originally designed for female patients and later adapted for men [6, 7]. Patients are asked to answer each category of questions using a 5-point Likert scale (1=very dissatisfied, 2=dissatisfied, 3=neither dissatisfied or satisfied, 4=satisfied, 5=very satisfied). To begin, each patient was asked to grade their discomfort/dissatisfaction with their breast/chest size in intimate, social and professional settings. Then they were asked to score the degree of discomfort/dissatisfaction with their breast/chest shape and appearance when dressed and undressed in the following situations: alone, in front of their partner, other men, women, and health professionals. Finally, they were asked to score the overall satisfaction level for themselves and their partner.

The BEQ answers given by men before surgery were compared to those reported after, but before reviewing their pre- and post-operative photos. This comparison was repeated with the BEQ data from the men after having compared their photos.

Many of the men remarked, that they had forgotten what they had looked like prior to surgery, and that the appreciation of their journey had become somewhat blunted over time.

Prior to reviewing before and after photos, 73% of the patients report being satisfied with their surgical outcomes, and 22% very satisfied. Only a small number of men (5%) could not say if they were satisfied or dissatisfied with the results of their surgery. No patients reported being dissatisfied. Overall levels of satisfaction increased after the review of photos to 83% reporting being very satisfied and 17% as being satisfied [Figure 5]. Respondent satisfaction levels in various life settings also increased dramatically [Figure 6].

Specific subjective evaluation

In the post-treatment version of the BEQ men were also asked to score their post-operative chest contour, symmetry, flatness, scars, skin numbness/discomfort, NAC size and shape [Figure 7].
Again, the data shows that patients’ perception of their surgery outcomes changed significantly after viewing their photographs. Applying a t-test to this subjective data indicates that the means of the two scenarios are different with a significance of $p<0.05$.

**Objective evaluation**

Three observers, all experienced gynaecomastia surgeons, independently viewed patient photographs taken before the surgery and at the time of the last review. The same operator took all photographs in the standard anterior-posterior, lateral and oblique view.

The observers marked patient chest contour and symmetry; noted NAC shape, position and nipple projection; and the need for surgery. In addition the observers evaluated the quality of post surgical scars, evaluating scar pigmentation, vascularity, acceptability and level of comfort for the observer. A Visual Analog Scale (VAS) was used for all parameters [Table 3].

The mean scores for each category were calculated based on the ratings of all three observers from before and after treatment evaluations. The data was tabulated [Table 4] and compared using a one-way ANOVA test to establish its validity [8, 9].

From the scores is apparent that chest contours before the surgery were not so good at 2.9 on the 10-point scale and this improved to 7.3 after the surgery. Chest symmetry had a reasonable score of 6.8 even before the surgery, but this increased to 9.8 after it. NAC characteristics and the nipple projection were all at quite low on the scale (3 to 3.1)

Table 3: Visual Analog Scale (VAS) for observer evaluation.

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest contour</td>
<td>Least</td>
<td>Most</td>
</tr>
<tr>
<td>Chest Symmetry</td>
<td>Least</td>
<td>Most</td>
</tr>
<tr>
<td>NAC shape</td>
<td>Least</td>
<td>Most</td>
</tr>
<tr>
<td>NAC position</td>
<td>Least</td>
<td>Most</td>
</tr>
<tr>
<td>Nipple projection</td>
<td>Least</td>
<td>Most</td>
</tr>
<tr>
<td>Need for surgery</td>
<td>Strong need</td>
<td>No need</td>
</tr>
<tr>
<td>SCAR</td>
<td>Significant</td>
<td>None</td>
</tr>
<tr>
<td>Vascularity</td>
<td>Significant</td>
<td>None</td>
</tr>
<tr>
<td>Acceptability</td>
<td>Least</td>
<td>Most</td>
</tr>
<tr>
<td>Observer comfort</td>
<td>Least</td>
<td>Most</td>
</tr>
</tbody>
</table>

Table 4: Independent observer average evaluation scores.

<table>
<thead>
<tr>
<th></th>
<th>Mean score before surgery</th>
<th>Mean score after surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest contour</td>
<td>2.9</td>
<td>7.3</td>
</tr>
<tr>
<td>Chest symmetry</td>
<td>6.8</td>
<td>9.8</td>
</tr>
<tr>
<td>NAC shape</td>
<td>3.0</td>
<td>7.0</td>
</tr>
<tr>
<td>NAC position</td>
<td>3.0</td>
<td>9.1</td>
</tr>
<tr>
<td>Nipple projection</td>
<td>3.1</td>
<td>9.1</td>
</tr>
<tr>
<td>Need for surgery</td>
<td>1.1</td>
<td>9.3</td>
</tr>
</tbody>
</table>

Table 5: ANOVA test results

Data summary

<table>
<thead>
<tr>
<th>Groups</th>
<th>Number</th>
<th>Mean</th>
<th>Standard Deviation (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before surgery</td>
<td>6</td>
<td>3.3167</td>
<td>1.8691</td>
</tr>
<tr>
<td>After surgery</td>
<td>6</td>
<td>8.6</td>
<td>1.1559</td>
</tr>
</tbody>
</table>

to start with, but increased to 7 to 9.1 levels afterwards. The need for the primary surgery was very strong (1.1), but there was not much requirement for a revision surgery (9.3).

The Analysis of Variance (ANOVA) test [Table 5] demonstrates an F-statistic value of 34.67744, with a p-value of 0.0002, which means that the post-operative results of this technique for treating gynaecomastia show significant improvement.
Using VAS as a methodology of evaluating scars from photographs [10], the study demonstrated that on average the residual pigmentation differences of scarred areas from the surrounding skin after this surgical technique was at 8.9 on the scale. Vascularity was less noticeable with the mean score of 9.8, and this is not surprising, as redness of scars tend to fade away with time. The observers were of the opinion that the scars were of an acceptable appearance, and they would have been comfortable with those for themselves. The mean score for each of these two parameters was 9.3.

**Post-operative complications**

Information regarding any adverse effects and post-surgery complications were gathered from the medical records. One participant with Fitzpatrick skin type V developed a hypertrophic scar (representing 2.4% of the study group), and another with skin type VI had a keloid formation (again 2.4%). Both men were right-handed and developed the scars on their right side, possibly due to more traction of the surrounding scar area. They had the scars excised and 15 Units of Botulinum toxin A was injected immediately around the sutured wounds [11-13]. The scar revision in both cases took place at about 12 months after the original surgery. An additional injection of 5-fluorouracil (5-FU) with added Triamcinolone [13] was given into the immature scars around 4 weeks after the revision. They both responded well to treatment, and showed good improvement when reviewed six months after the last intervention.

Furthermore, one patient developed a lump behind the left nipple around 4 months after the original surgery, and he was referred to a breast clinic to rule out a malignancy. After a deep tissue plane nodular scar formation was diagnosed this was injected with 5FU and Triamcinolone with a resolution of the fibrosis [13] after a few weeks.

One man, who had an additional trans-axillary excision of soft tissue from the lateral chest wall, had a partial wound dehiscence. This was due to a mild wound infection 2 weeks after the surgery. The wound swab culture had Candida growth and he responded well to antifungals. His wound healed without a significant scarring.

Finally, one man had a minor saucer deformity on one side. He opted against correcting it as he was very happy with his results.

No other complications or adverse effects were noted.

**Case studies**

The patients shown here all had the same operative technique described in this study, and they had various amounts of glandular tissue and fat removed. All had three suspension Spring thread loops for the tissue support (modified male mastopexy) on each side.

**Discussion**

**Prevalence, causation and diagnosis**

Gynaecomastia is a common condition with a prevalence of about 32-65% amongst men [14,15]. The higher rates are seen especially in men in their late 50s. This is believed to be due to falling levels of testosterone synthesis and the increasing aromatization of adrenal and
Transient breast enlargement is seen in a majority of newborns and adolescent boys. Residual high levels of maternal hormones cause the symptom in the neonatal group and the onset of puberty and androgens surge is a culprit for the latter population. Two thirds of boys experience breast enlargement, but gynaecomastia persists in only 10% [15] of those after the age of 17.

Recreational drugs such as marihuana, amphetamines and heroine; and body building preparations, such as anabolic steroids, could be the explanation for a new onset of gynaecomastia in young athletic men.

Other pharmaceutical agents are well known to provoke gynaecomastia. This includes those with anti-androgenic actions (such as cimetidine, spironolactone, and finasteride), 5-alpha reductase inhibitors (used for hair loss), ketoconazole (and other antifungal imidazoles), and Gonadotropin Releasing Hormone (GnRH) antagonists (commonly used for prostate cancer). In addition, anti-hypertensive calcium channel blockers and anti-retroviral drugs used to treat human immunodeficiency virus (HIV) can potentially cause gynaecomastia as a side effect. Additional diseases that can trigger gynaecomastia are those associated with hypogonadism (Kleinfelter syndrome), estrogen increase (liver cirrhosis) and hormonal abnormalities (thyrotoxicosis, adrenal or testicular tumors).

However, for a majority of patients, no causation can be identified, and the condition is referred to as idiopathic.

Diagnosis is made clinically by examining the patient and taking a detailed medical history. For asymptomatic and adolescent onset of gynaecomastia, it is reasonable to simply record observations, and to recommend reevaluation in 6 months. However, further investigation is indicated if the lump behind the nipple is larger than 5cm in diameter, painful, growing, of new onset or of unknown duration. If there are signs of malignancy (lymphadenopathy, hard fixed tissues) urgent referral to a breast cancer clinic is required.

Both mammography and ultrasound scans can confirm the diagnosis of gynaecomastia and have been found of comparable usefulness [16]. Blood tests for liver function, thyroid function, total testosterone, dehydroepiandrosterone (DHEA), estrogen and luteinizing hormones (LH) are recommended as a part of investigations.

Choice of surgical intervention based on severity

Gynaecomastia treatment will be influenced by the severity of the condition and the prevalent tissue mix comprising the breasts.

Earlier grading of gynaecomastia was based on surgical excision methods and nipple repositioning [14, 17]. However, currently the most popular clinical classifications are by Simon and Rohrich.

Simon based his grading on volume of tissue excess and skin redundancy [2]:

- Grade I with small enlargement and no skin excess
- Grade IIA with moderate enlargement and no skin excess
- Grade IIB with moderate enlargement and extra skin
- Grade III with marked enlargement and extra skin.

Gynaecomastia of grade I, therefore, is amenable to treatment with liposuction or glandular excision alone, and grade IIA often requires a combination of both. Grades II B and III primarily require mastectomy with or without nipple areolar complex repositioning (a modified pedicle lift or a free graft), and the trimming of dermal excess.

Rohrich’s version additionally describes predominant fibrotic or glandular tissue excess and the presence of breast ptosis (3):

- Grade I with minimal hypertrophy (<250g of breast tissue) and without ptosis I A - primarily glandular IB – primarily fibrous.
- Grade II with moderate hypertrophy (250-500g of breast tissue) and without ptosis IIA – primarily glandular IIB – primarily fibrous.
- Grade III with severe hypertrophy (>500g of breast tissue) and with ptosis grade I (glandular or fibrous).
- Grade IV with severe hypertrophy and grade II or III breast ptosis (glandular or fibrous).

Ultrasound assisted liposuction (UAL) alone is recommended for fibrous types of gynaecomastia grades I and II. Glandular types can be addressed either by UAL or a simple excision. For severe grades III and IV, Rohrich recommends treating with UAL and staged excision.

Monarca et al. [18] proposed to expand on Simon-Rohrich’s classifications taking into account the overall chest shape and the presence of a sternal notch. This approach incorporates aesthetic treatment goals, for example achieving a more trapezoidal masculine chest shape and emphasizing chest muscular insertions. These latter requirements are achieved with liposculpting techniques.

Possible surgical solutions for the treatment goals of gynaecomastia and the associated drawbacks are described in Table 1.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Potential solution</th>
<th>Indications</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excess of adipose tissue</td>
<td>Liposuction, AL Direct fat resection</td>
<td>Pseudogynaecomastia (lipodystrophy) Mixed fibro-glandular-adipose gynaecomastia</td>
<td>Residual skin laxity Uneven contours Does not address fibro-glandular hyperplasia</td>
</tr>
<tr>
<td>Excess of fibroglandular tissue</td>
<td>Direct excision mastectomy, via trans-areolar semicircular (Webster technique) incision Through a transverse scar mastectomy and a free nipple graft Via an oblique ellipse excision and bipedicled flap With Wise pattern reduction mammoplasty Via circumareolar (doughnut) excision</td>
<td>Gynaecomastia grades I –II Gynaecomastia grades IIB, III and IV with or without: Lateral fibro-adipose tissue excess Ptosis Excess skin Gynaecomastia grades IIA, B-III</td>
<td>Relatively limited access and does not ad- dress excess skin or ptosis Excessive scarring Higher risk of nipple necrosis or sensitivity loss Coning of residual tissue Inverted T scars Circumareolar scar with corrugated, pleated appearance, scar widening, does not address extension of the problem to the lateral chest wall, permanent purse string suture</td>
</tr>
<tr>
<td>Skin excess</td>
<td>Removal of excess skin by: Transverse scar mastectomy and a free nipple graft Oblique ellipse excision and bipedicled flap Wise pattern reduction mammoplasty Circumareolar (doughnut) excision Periareolar (broad crescent) excision Dermal tightening using devices and technologies BodyTite (RAL) Vaser (UAL) Laser (LAL) Renuvion (J-plasma skin tightening)</td>
<td>Gynaecomastia grades IIB, III and IV Gynaecomastia grades IIA, B-III Concomitant use of a device for liposuction and dermal tightening</td>
<td>Excessive scarring Higher risk of nipple necrosis or sensitivity loss Coning of residual tissue Inverted T scars Circumareolar scar with corrugated, pleated appearance. Scar widening. Does not address extension of the problem to the lateral chest wall. Permanent purse string suture in situ</td>
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<tr>
<td>Ptosis</td>
<td>Mastopexy: Circumvertical (Lollipop Lift) Anchor lift (Inverted T Wise pattern) Circumareolar (doughnut) lift Periareolar (broad crescent) lift Periareolar lift with suspension sutures support Mastectomy: Transverse scar with a free nipple graft Oblique ellipse excision and bipedicled dermal and areolar flaps</td>
<td>Mild, moderate ptosis Pronounced ptosis Mild to moderate ptosis Moderate to severe ptosis Severe ptosis and excess soft tissue Severe ptosis and excess soft tissue</td>
<td>Noticeable scars Scar widening. Corrugated, pleated scar appearance. Permanent purse string suture in situ As above, but a half of the circumfererence As above and potential incompetence of the anchoring suturesPermanent sutures in situ Extensive and noticeable scars, nipple necrosis and sensation loss risks are higher</td>
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Gynaecomastia treatment goals and current operative techniques

Current trends in using technology enhanced liposuction devices have completely changed body-contouring techniques [19, 20]. In gynaecomastia surgery, UAL (especially third generation devices such as Vaser) has gained popularity with an impressive record of efficacy in safely treating the condition [21] while achieving good aesthetic outcomes and skin retraction [22, 23].

Although some authors found UAL to be effective on its own [22-25], a direct resection of glandular-fibrous tissue and skin excess with repositioning the NAC is required in severe gynaecomastia cases.

Furthermore, lateral chest wall fibro-adipose hypertrophy and excess skin need to be addressed simultaneously. These are often seen in patients with higher grades of gynaecomastia or after massive weight loss. This type of case needs to be addressed by a combination of surgical techniques. The excessive scarring seen with most excision and lifting methods has prompted surgeons to explore a combination of more sophisticated techniques.

Pronounced gynaecomastia is becoming more common. This would seem to be due to increasing rates of obesity and to environmental factors [26]. The affected men are often distressed and embarrassed by the problem, which leads to their feelings of social isolation and psychological morbidity. The sample of patients reviewed in study was not an exception from this pattern, as most of the participants stated that it was the feeling of low self-esteem, shame and psychosocial distress caused them to opt for surgery.

Indeed patients were prepared to accept the risks of the surgery, including noticeable scars, nipple deformities, sensitivity changes, and even NAC necrosis and loss to achieve an overall flatter chest contour.

Whatever surgical approach is adopted the objective is to restore normal male chest contours by removing the deformity with a minimum scarring; preserving the viability of the nipple and areola; and avoiding over- and under-excision. It is widely reported that poor cosmetic results are more likely for cases of severe gynaecomastia, regardless of the technique employed [27-30].

Colombo-Benkmann et al. reviewed complications such as skin retraction, hypertrophic scars, hypoesthesia, and skin redundancy after different surgical approaches in treating gynaecomastia. The above listed complications were seen in 53% of patients [31] and more often in grade III gynaecomastia. Revision was needed in 34.8% of patients. Each incision approach had its own problems. Nevertheless, 86% of patients were satisfied with surgical results.

The technique proposed by colleagues Tashkandi et al. [32] (one stage mastectomy with circumareolar skin reduction with de-epithelization) left all 24 patients with residual redundant skin. Although leading to noticeable scars, the authors still advocated a simple mastectomy with a free nipple grafting if men had breast ptosis or tubular deformity.

Lanitis et al. [33] found that any grade of gynaecomastia can be treated by circumareolar incision for better cosmetic outcomes. This study recommended that severe forms be treated by circumareolar ‘Benelli’ technique [34] with a purse string suture for good results. The reported revision rate in a high-grade gynaecomastia was 22.5%. The author still recommended inverted T (anchor) approach if breast ptosis was present.

The method described in this study involving a single stage combined operative methodology demonstrated that debulking and sculpting the chest with UAL (VASER) produces a significant reduction of the tissue volume needing to be excised. A subsequent modified Webster type mastectomy via an upper crescent incision (semi-circumareolar wide crescent skin flap, resembling a ‘hallow’ above the areola) and tissue suspension (‘modified male mastopexy’) with the use of spring threads adequately reduced the residual deformity, dermal surplus, and tissue laxity as well as ptosis. The rate of revision was low, at 4.8%, and other complications proved to be low in comparison to previous reports (approximately 12.1%). Furthermore, in this study only 7.2% of scars required additional treatments to improve appearance. Most importantly, the results were sustained after a fair passage of time, and the satisfaction levels of patients remained high.

Note that patient selection for this type of surgery still has to be a primary priority. Men should be well informed about the risks and counseled appropriately. Using examples of unfavorable outcomes can

<table>
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<tr>
<th>Reduction of the areolar diameter</th>
<th>Circumferential reduction</th>
<th>Used in circumareolar excision</th>
<th>Circumferential scar</th>
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<tbody>
<tr>
<td>Cone segmental (apple pie) resection</td>
<td>Can be used as a stand alone procedure</td>
<td>UAL alone or in conjunction with excision</td>
<td>Anchor shaped scar</td>
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<tr>
<td>UAL</td>
<td></td>
<td></td>
<td>Less predictable retraction</td>
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<tr>
<th>Pre-axillary or upper lateral thoracic wall (mid-axillary) fibro-adipose hypertrophy</th>
<th>Transverse scar with a free nipple graft Oblique ellipse or L shape excision and bipedicled flap</th>
<th>Gynaecomastia grades II to IV with Lateral extensions (rolls)</th>
<th>Extensive and noticeable scars, nipple necrosis and sensation loss risks are higher</th>
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<tr>
<td>Upper semi-periareolar (broad crescent) and lateral upper body (periaxillary broad crescent) lift with suspension sutures</td>
<td>Gynaecomastia grades II to IV with lateral extensions (rolls)</td>
<td>Scar widening. Corrugated, pleated scar appearance.</td>
<td>Potential incompetence of the anchoring sutures Permanent sutures</td>
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</table>
be useful to gauge a patient’s reaction for the case when risks do materialize. Men’s expectations should be managed and all patients should be screened for indications of Body Dimorphic Disorder (BDD).

As a poor scarring can negatively affect the appreciation of the results of the surgery, it is paramount to assess each candidate for this risk. The author has been using a scarring risk tool[13] she developed [Table 6]. This system helps communicate to patients the likelihood of noticeable (or poor) scarring. It can also be used as a basis for advising why surgery may not be feasible. For example, if a patient’s risk for keloid and other pathological scars is high and this is not appreciated, this may be a sufficiently good reason for the surgeon to strongly advise against the procedure.

Like with most previous studies, men in this cohort felt well satisfied with their flatter chest contours. Their levels of appreciation of the results seem to increase further after viewing their own pre- and post-operative photos. This is invaluable for patient education and expectations management when trying to explain the residual contour irregularities, skin laxity or scars after the surgery.

Although this study used not a very large sample of patients, the response rate and the number of participants were just sufficient to conduct a statistical analysis.

There was no a control group due to clinical and ethical considerations. This was a limitation of this study and did not allow to reach a meaningful conclusions. The same surgeon performed all cases over a number of years. It still remains to be seen if this surgical approach in dealing with severe cases of gynaecomastia can be successfully reproduced by other gynaecomastia surgeons.

**Conclusion**

The method described in this paper consists of Vaser liposuction, breast tissue removal, and suspension threads to support the deep tissue plane.

As discussed, it is quite difficult to perform statistically valid studies in cosmetic surgery because of ethical issues. That said, the results of this study compare well with others cited in the medical literature. Both complications and revision rates were significantly lower, and, importantly, using the patient perception evaluation questionnaire seemed to indicate high levels of satisfaction.

For these reasons, this described approach seems to be a promising treatment option for severe grades of gynaecomastia, and could be quite useful in guiding choices surgeons discuss with their patients. This surgical technique can be particularly pertinent for cases of gynaecomastia with ptosis and when longer scars are not acceptable for patients.

**Declaration of conflict of interests or financial inducements**

None to declare.

<table>
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<th>Table 6: Each of the rows is scored from 1 to 5, and the cumulative value computed. A score of 5 or below is indicative of low risk for unfavorable scarring and low probability of patient distress with a scar. Scores 6-10 indicate medium risk, scores 11-15 predict high risk, and scores 16-20 very high risk.</th>
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<tr>
<td>4</td>
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<tr>
<td>Medical Risks</td>
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<tr>
<td>Fitzpatrick Skin type and Constitutional Tendencies</td>
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<tr>
<td>Lifestyle</td>
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<tr>
<td>Psychological Assessment and Patient Expectations</td>
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</table>
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