Indian Journal of Surgery (April 2023) 85(2):420–426
https://doi.org/10.1007/s12262-022-03442-z

SURGICAL TECHNIQUES AND INNOVATIONS

Combined Traditional Lipoaspiration and Modified "Pull-Through" Technique for the Treatment of Gynecomastia: Our Experience

Francesco Romeo[1] · Gianluigi Lago[2] · Tatiana Di Cesare[3] · Tiziano Neri[4] · Daniele Cavaniglia[4] · Sabrina Rea[4] · Andrea Liverani[4]

Received: 10 February 2022 / Accepted: 6 May 2022 / Published online: 19 May 2022

Abstract
Gynecomastia is a unilateral or bilateral enlargement of male breast. Many surgical techniques have been proposed depending on the type and severity of the breast deformity. According to the classification by Simon et al., we introduced a modified pull-through technique suitable for I, II, and III grade. With this method, we achieved a good aesthetic result with minimally invasive surgery and at the same time, we obtained complete en bloc removal of the breast gland. From January 2010 to March 2018, 32 gynecomastia patients (ranging from I to III grade of Simon's classification) were enrolled. Eighteen patients underwent a combined treatment with traditional suction-assisted lipoplasty and en bloc removal of the gland. The other 14 patients were treated with different modalities. Follow-up was performed every week in the first month, then monthly for 3 months, at 6 and 12 months post-op. We obtained complete en bloc removal of gland with satisfactory breast contour for all of the patients; no nipple retraction or altered pigmentation of the skin was observed. Only one patient reported temporary nipple-areola complex (NAC) deformity. Our technique has proven to be successful in the removal of the entire gland en bloc. It respects the anatomical planes and it ensures excellent aesthetic results with minimal complication rate.

Keywords Pull-through · Gynecomastia · Male breast · Aesthetic result

Introduction

Gynecomastia is a unilateral or bilateral increase of male breast. Although this is often a benign condition, it might cause psychosocial difficulties. In male subjects, feminization of the chest appearance deeply affects self-esteem with negative implications in sexual relationships. Gynecomastia is a very common condition with prevalence between 32 and 65%, although many cases could not be clinically evident or distressing for the patient. According to the patient's age, we have a physiologic gynecomastia arising at birth (prevalence of 60–90%), in puberty (50–65%), and in old age (30–50%) [1].

There are three patterns of pathological gynecomastia: glandular or true gynecomastia (caused by estrogen and androgen stimulus on glandular growing), fatty-glandular (mixed gynecomastia), and simple fatty gynecomastia [2–5]. The morphology of this condition might be extremely variable, ranging from minimal areolar protrusion to massive volume enlargement with severe skin excess. Several classifications of gynecomastia have been published and validated in the literature [2]. The severity of this pathological condition is based on clinical examination measuring the volume of the gland and the degree of ptosis, if present. Currently, the most widely used classification is that introduced by Simon in 1973 which describes three different grades of gynecomastia [6]: grade I: small visible breast enlargement, no skin excess; grade IIA: moderate breast enlargement without skin excess; grade IIB: moderate breast enlargement with extra skin; and grade III: considerable breast enlargement with marked skin redundancy.

✉ Francesco Romeo
fran.romeo@libero.it

✉ Gianluigi Lago
gianluigi.lago@gmail.com

1 Studio Romeo, Corso Vittorio Emanuele II n. 18, 00186 Rome, Italy

2 Ausl Piacenza–Plastic Surgery Unit, Via G. Taverna 49, 29121 Piacenza, Italy

3 O.U.S. Department of Emergency Surgery, Policlinico Tor Vergata Hospital, 81 Viale Oxford, 00133 Rome, Italy

4 Department of General Surgery, Regina Apostolorum Hospital, Via S. Francesco d'Assisi 50, 00041 Albano Laziale, Italy

Many surgical techniques have been proposed depending on the type and severity of the condition, ranging from simple lipoaspiration to complex reconstructive techniques similar to female breast reduction [7–9]. In this study, we introduce a modified "pull-through" technique combined with traditional liposuction for the treatment of gynecomastia from grades I to III, according to Simon's classification.

The surgical technique described below represents a safe and reliable option for the treatment of gynecomastia without the use of expensive ultrasonic or power-assisted liposuction devices. In addition, our technique variant with the resection of the gland "en bloc" under direct observation facilitates the procedure also for the young surgeons with limited experience in the field of breast surgery.

Patients and Methods

From January 2010 to March 2018, 32 patients underwent gynecomastia repair. The mean patient age was 29.3 years (range: 13–78 years; SD: 17.8). The severity of gynecomastia was graded according to the scale described by Simon et al. (3) (Chart 1). One patient presented grade I (3.1%), 14 patients grade IIA (43.7%), 12 patients grade IIB (37.5%), and 5 patients grade III (15.6%) (Figs. 1, 2, 3 and 4). Twenty patients had glandular gynecomastia (62.5%) whereas 12 patients had fatty disease (37.5%). Twenty-four patients had bilateral gynecomastia (75%) and 8 patients had a unilateral disease (25%). In our experience, 18 out of 24 patients were treated with traditional liposuction and en bloc gland removal, as described below.

The mean patient age of this group was 26.3 years (range: 13–64 years; SD 14.3). One patient belonged to grade I (5.5%), 10 patients to grade IIA (55.5%), 6 patients to grade IIB (33.5%), and one patient to grade III (5.5%). Four patients had a fatty gynecomastia (22.3%) and 14 patients had a glandular disease (77.7%). All patients were screened with preoperative examinations to evaluate their clinical status and they underwent breast ultrasound and endocrine evaluation.

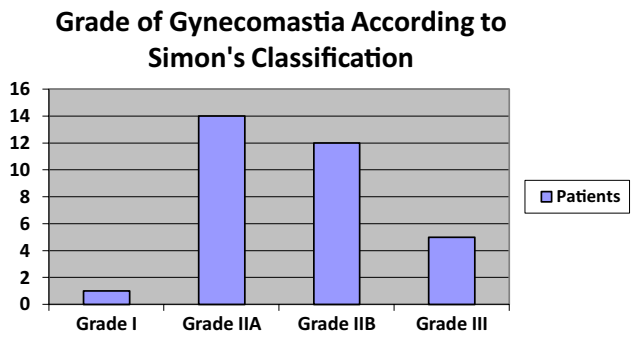

Chart 1 Grade of gynecomastia according to Simon's classification

Patients were regularly evaluated for follow-up. The first examination was usually scheduled 7 days after the operation while the second visit was usually scheduled according to the patient need during the first month post-op. However, our preferred schedule for post-op examination was once a week for the first month. All patients were then re-evaluated at 1, 6, and 12 months post-op to assess the final result.

Every post-operative examination was completed with frontal and lateral view pictures of the patient in order to document surgical outcome and for medico-legal issues.

Surgical Technique

The procedure is carried out under general anesthesia. Preoperative antibiotic prophylaxis is administered to all the patients with Cefazolin 2 g ev in order to prevent surgical site infection (in case of penicillin allergy, we used Clindamicin 600 mg ev). Preoperative drawing is performed in orthostatic position and it is verified in supine position. We evaluate both the extension of the lip aspiration and the region of the incisions for the introduction of the cannula (a medial cannula in latero-sternal side and another one along the anterior axillary line, both at the inframammary fold). We then proceed with infiltration of about 250 ml of Klein's tumescent solution in each side. Here, we provide the formula of the solution used in our technique: 1000 cc normal saline, 20 ml of 2% lidocaine, 1 ml of adrenaline (1 mg/1 ml), and 10 mEq of sodium bicarbonate. The temperature of the solution is about 20–25 °C and the volume is within an interval ranging from 150 to 500 ml. We wait about 15 min to achieve a vasoconstrictor effect and we proceed with the liposuction. We perform liposuction using a duck's beak, single-, or double-hole, 3 mm cannulas. The liposuction is performed aggressively in the supra-fascial, intermediate, and subdermal layers. Single- or double-hole cannulas are specifically used to isolate the gland from the fatty component, while the duck's beak cannula is used to separate the nipple-areola complex (Fig. 5). Once the expected liposuction is obtained and the gland is isolated, the skin is incised with a 1 cm inferior periareolar access along the Langer's lines. At this point, the gland is grasped though the periareolar access and removed en bloc. In order to achieve an optimal result, no residual glandular tissue is left underneath the NAC. In the presence of a large gland, performing a "squeezing" maneuver might be helpful for the surgeon. Once removed, the glandular tissue is sent for histology in order to rule out malignancy.

We suture the periareolar incisions with 4–0 monofilament intradermal reabsorbable stitches and we apply

Fig. 1 **1A–1E** Grade I glandular gynecomastia. Preoperative pictures of a 22 years old patient. **2A–2E** Photographs 6 months after surgery

Fig. 2 **1A–1E** Grade IIA glandular gynecomastia. Preoperative pictures of a 25 years old patient. **2A–2E** Photographs 4 months after surgery. **3A–3E** Photographs 11 months after surgery

Steri-strips. The incisions for the introduction of the cannulas are also sutured and over the surgical area, we apply a 1 cm thick polyurethane foam (Reston™ 3 M) and above, we put a compressive garment. The polyurethane foam is removed at fifth post-operative day (range 4–7 post-operative day).

As previously mentioned, follow-up is performed every week in the first month, then monthly for 3 months. Last patient evaluations are scheduled at 6 and 12 months post-op. Figure 5 illustrates some details of the surgical procedure (Fig. 6).

Results

We obtained complete gland removal in all the patients who underwent this surgical procedure. We reported no cases of NAC retraction, nor hypo/hyperpigmentation of the skin. Only one patient complained of temporary tendency of NAC warp (5.5%). This adverse event was corrected with outward massage starting fifteenth days after surgery, with complete resolution in about 30 days. In our experience, we had no temporary or permanent deficit of NAC's sensitivity. No general complications

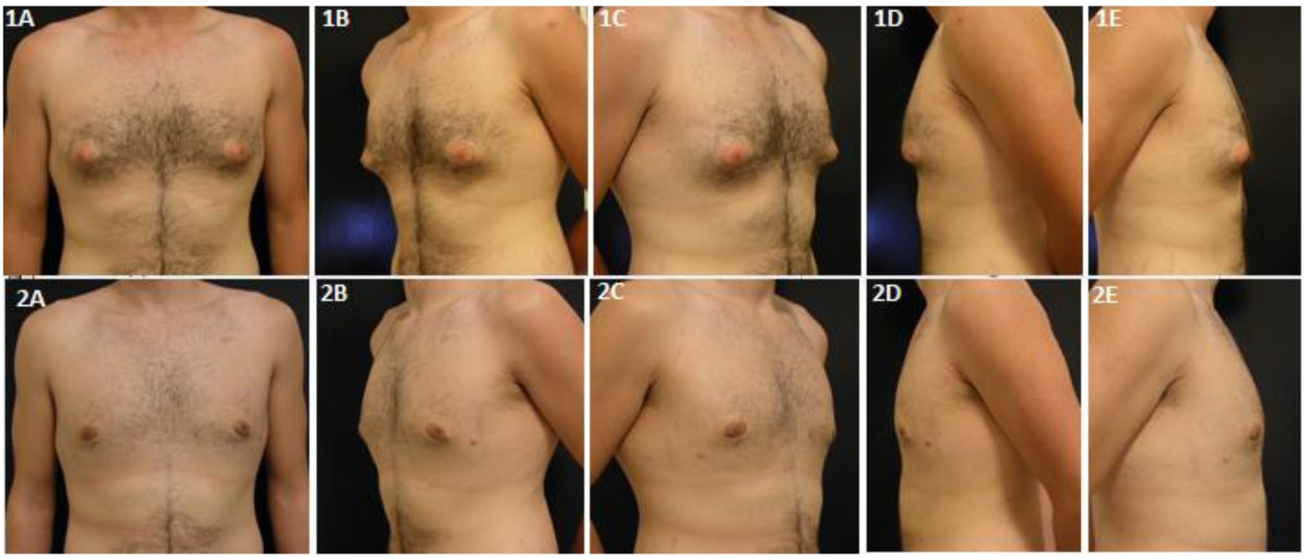

Fig. 3 **1A**–**1E** Grade IIB glandular gynecomastia. Preoperative pictures of a 22 years old patient. **2A**–**2E** Photographs 1 month after surgery

of the surgical site such as seroma, hematoma, and infection have been observed. During follow-up examination at 6 and 12 months, we did not report the presence of long-term complications like keloid or hypertrophic scar formation.

Discussion

A successful liposculpture, on shallow, medium, and deep plans, reduces the risk of redundant tissue removal that would lead to the deformation of both of the NAC and the

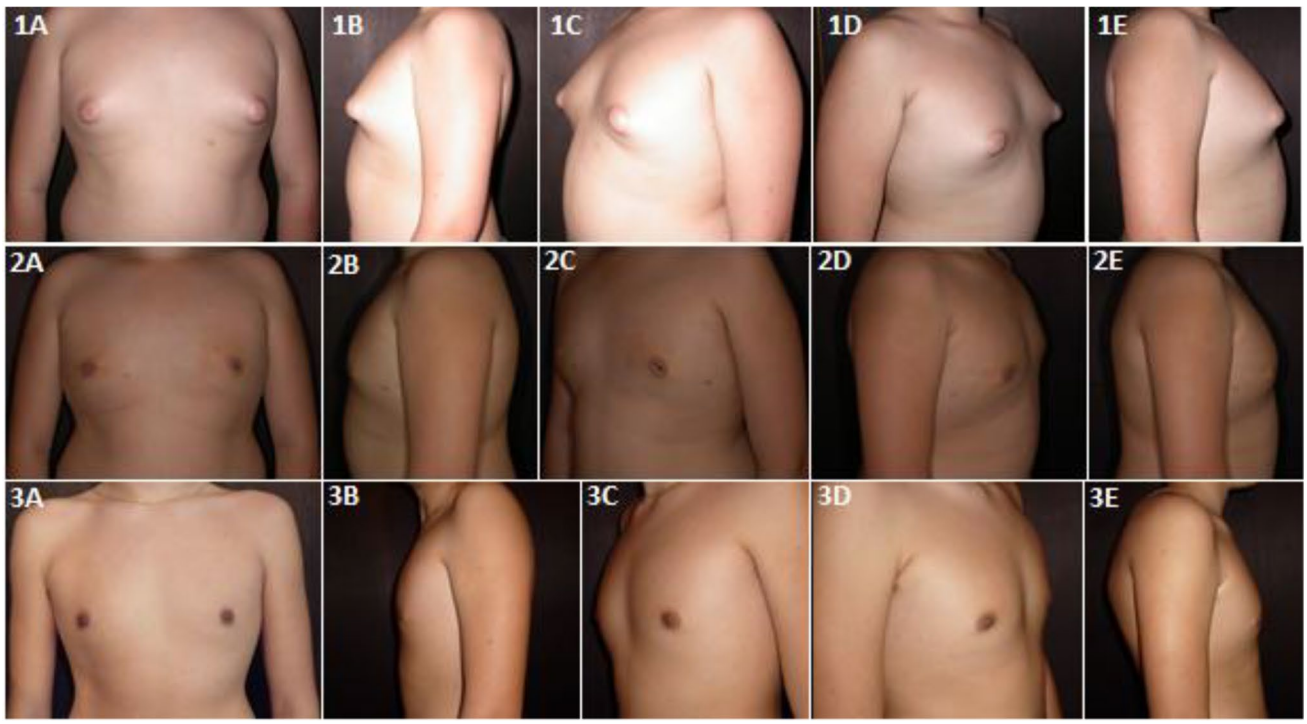

Fig. 4 **1A**–**1E** Grade III glandular gynecomastia, a tuberose breast. Preoperative pictures of a 13 years old patient. **2A**–**2E** Photographs 1 month after surgery. **3A**–**3E** Photographs 5 years after surgery. The new shape of the breast appears proportionate for this young patient

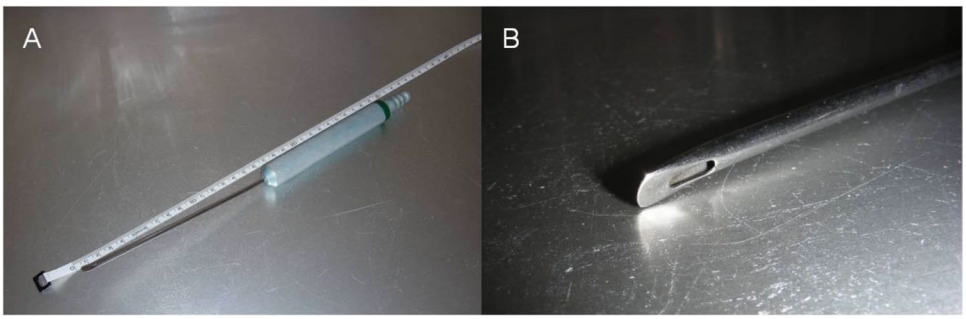

Fig. 5 **A**–**B** Duck's beak cannula for lipoaspiration and atraumatic gland dissection

breast shape. In the literature, surgical accesses for gland removal are described with transverse areolar incisions by Pitanguy [10], recently modified by Durani and McCulley [11] in a form similar to the "reverse omega." The skin incision in the periareolar area facilitates gland removal which can be achieved en bloc and under direct visualization. In the traditional "pull-through" technique, the gland is excised through mini-accesses used for liposuction. Although this could minimize scar visibility [12], it does not allow effortless removal of the whole gland en bloc and the tissue is usually sliced into irregular fragments.

It is important to determine the correct plane of dissection (subcutaneous and supra-fascial) to perform a total en bloc mammectomy without leaving residual parenchyma. Moreover, the removal of adipose tissue by mean of liposuction must be very accurate and complete in order to achieve a pleasant breast contour. In addition, an extensive lipoaspiration will isolate the gland, facilitating its excision.

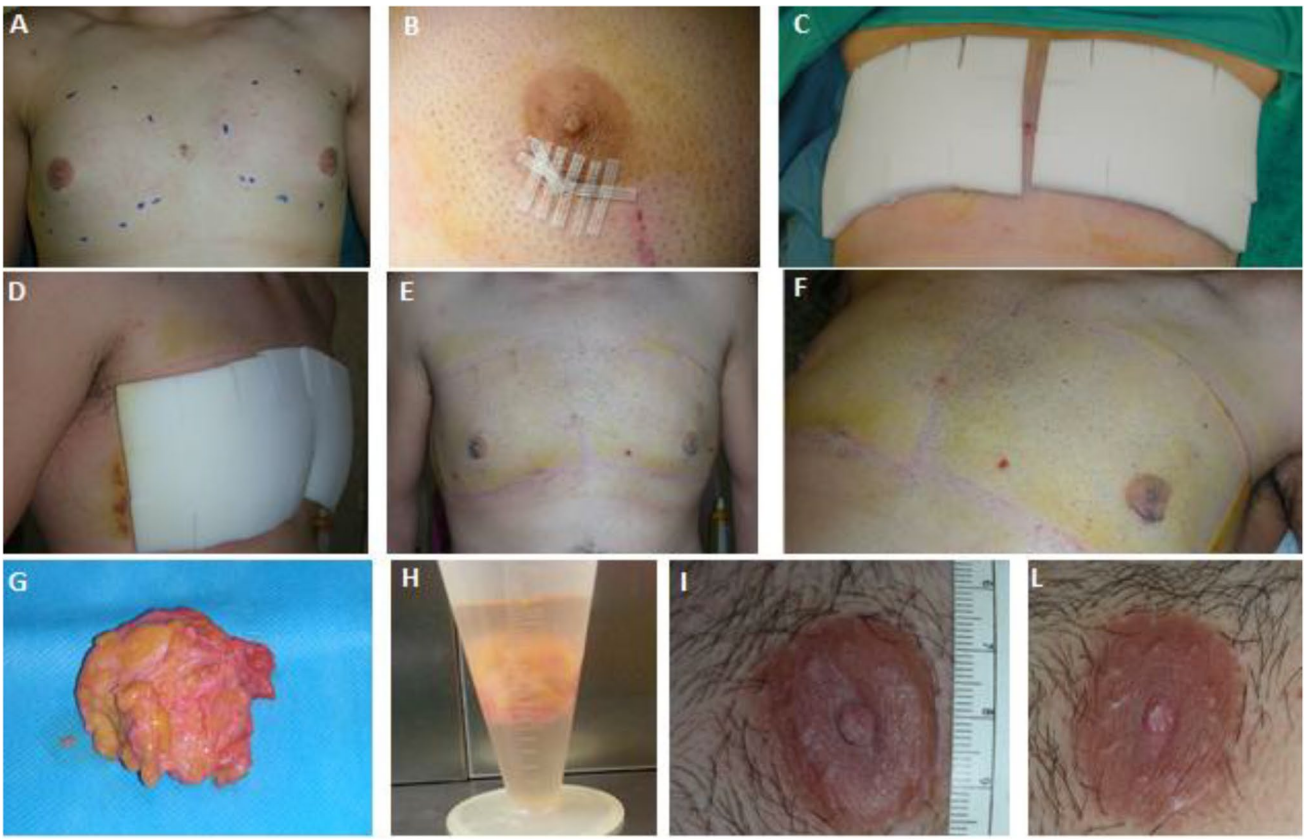

Fig. 6 **A** Preoperative marker with the limit to be achieved by liposuction and the inferior periareolar access. **B** Steri-strip on the small surgical scar. **C** Application of polyurethane foam at the end of surgery with skin cleansed (Reston 3 M™). It remains in place about 4–7 days after surgery. **D** Minimum blood effusion around the polyurethane foam 5 days after surgery. **E/F** No bruising after the removal of the polyurethane foam applied over the liposuction area. **G** Mammary gland removed en bloc with minimal presence of surrounding fat. **H** Volumetric measurement of the gland. **I** Surgical scar in a grade IIA case of small size (about 1 cm), and 4 months after surgery, the areola appears slightly edematous. **L** Definitive scar and appearance of the areola in a grade IIA case, 11 months after surgery

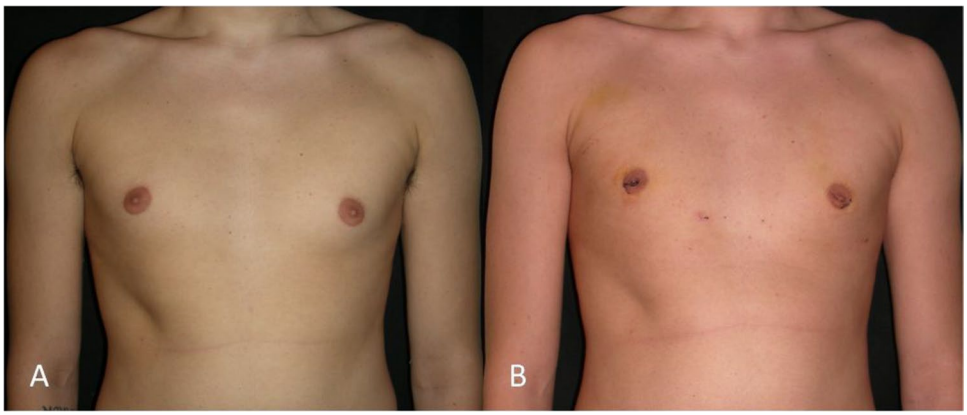

Fig. 7 **A** Preoperative picture of grade IIA gynecomastia in a 22 years old patient. **B** Post-operative picture of the same patient 2 weeks after surgery. Drainages where placed asymmetrically: anterior axillary line on the left side and medial inframammary fold on the right side

We repeat once more that lipoaspiration should be performed also in the subdermal layer to obtain a certain grade of skin retraction. This is certainly beneficial in patient presenting with grade III gynecomastia, in which skin resection could be avoided if we are able to achieve satisfactory skin tightening.

The periareolar incision is placed at the border of the areola with breast skin, or at its close proximity. This incision is localized exactly on Langer's lines. This access hides the scars and it allows the control on dissection's planes. It also enables the control of possible bleeding under direct vision. In addition, with this technique, the use of optical devices (endoscopes) is not necessary.

No general complications of the surgical site such as seroma, hematoma, and infection have been observed. Here, we highlight the importance of the used of compressive garments in the immediate post-operative period and poliuretane foam (Reston™ 3 M) which has been a milestone in our clinical experience.

Moreover, our patients did not present hypertrophic scar or keloid formation, which are probably the most feared complications in the long term. The predisposition to pathological scarring is genetically determined with dark skinned individuals more prone to this type of complication. In our study, all patients presented Fitzpatrick skin type 2 or 3 with low probability to develop keloid scars, but in case of patients with higher skin phototype, we recommend to discuss preoperatively the possibility to develop pathological scars.

In the last decades, lipoaspiration has become a widely used technique with different indications in plastic surgery, both for aesthetic and reconstructive procedures. Hammond et al. [13] proposed the use of ultrasonic lipoaspiration for the treatment of gynecomastia, while Lista et al. [14, 15] reported satisfactory outcomes with power-assisted liposuction (PAL). The aim of such techniques was to speed up fat removal while reducing the surgeon's physical effort.

Bracaglia et al. [16] in 2004 reported their positive experience with the use of traditional suction-assisted liposuction for the treatment of gynecomastia. They achieved good skin retraction even in patients with marked skin redundancy (grade III — Simon's classification). Gland removal was obtained after lipoaspiration, with slightly modified "pull-through" technique originally described by Morselli in 1996 [17].

Moreover, other authors proposed endoscopic mastectomy for the treatment of gynecomastia with good aesthetic outcome. With this approach, scars were visible only at the entry points of the trocars, usually placed on the lateral chest wall or on the anterior axillary line [18, 19].

Our results confirm that it is possible to achieve a satisfactory outcome without the need of energy-based liposuction devices. Such technology could certainly assist the surgeon in performing an effortless procedure [20] but it could not be always available in the operatory room, especially in General Surgery/Thoracic/Breast Surgery Units. Moreover, it is important to consider that traditional liposuction is also significantly less expensive than power-assisted techniques.

According to our experience, the proposed technique is more suitable for patients with mild to moderate gynecomastia. These patients correspond to grades IIA and IIB (Simon's classification), although in selected cases, it could be applied also for grades I and III. In our study, 10 out of 12 patients belonged either to grade IIA or IIB. In the remaining two cases (one patient belonging to grade I and one patient to grade III), we carefully discussed with the patients alternative surgical options that could be more suitable for them.

Our choice is also in line with Cordova and Moschella's classification [2] which provides surgical indications according to the morphological characteristics of the patients. More specifically, the main parameter to be considered is the relationship between the NAC and the inframammary fold. They suggest the combination of lipoaspiration with skin-sparing adenectomy in patients presenting glandular hypertrophy and NAC above the inframammary fold. These patients usually belong to grades IIA and IIB, thus confirming our surgical indications for the present technique.

Another important issue is the location of skin incision for the introduction of the cannula. In the preoperative evaluation, patients are informed that there will be a scar at the entry point for the cannula. Although this is usually small, it might be visible enough to cause patient's dissatisfaction. In order to mitigate this problem, we prefer to place the incision in a different location for each side (e.g., anterior axillary line on one side and medial-inferior inframammary fold on the contralateral side). We noticed that the patients often appreciate this choice as the asymmetrical scars might resemble accidental skin lesions and do not represent the hallmark of surgery (Fig. 7).

Conclusions

Our technique has proven effective in the removal of the entire gland en bloc. With this technique, the gland can be directed. It is a safe technique because it respects the anatomical planes and it ensures excellent aesthetic results, with stable outcome in the long term.

We found no significant complications, both in the short and long term. Our technique prevents the NAC ischemia and reduces the risk of hypopigmentation, retraction, transient, or permanent reduction of sensitivity and necrosis.

The use of traditional liposuction helps to reduce operative costs. The rapidity of the technique and the results pose this surgical technique as a feasible option in the treatment of moderate to severe gynecomastia.

Declarations

Conflict of Interest The authors declare no competing interests.

References

1. Muneer A, Laghari ZH, Shaikh AR, Laghari QA (2009) Gynecomastia: management in a developing country. J Ayub Med Coll Abbottabad 21(3):7–11
2. Cordova A, Moschella F (2008) Algorithm for clinical evaluation and surgical treatment of gynecomastia. J Plast Reconstr Aesthet Surg 61(1):41–9
3. Cuhaci N, Polat SB, Evranos B, Ersoy R, Cakir B (2014) Gynecomastia: clinical evaluation and management. Indian J Endocrinol Metab 18(2):150–8
4. Baumann K (2018) Gynecomastia—conservative and surgical management. Breast Care (Basel) 13(6):419–424
5. Longheu A, Medas F, Corrias F, Farris S, Tatti A, Pisano G, Erdas E, Calò PG (2016) Surgical management of gynecomastia: experience of a general surgery center. G Chir Jul-Aug 37(4):150–154
6. Simon BE, Hoffman S, Kahn S (1973) Classification and surgical correction of gynecomastia. Plast Reconstr Surg 51:48–56
7. Fruhstorfer BH, Malata CM (2003) A systematic approach to the surgical treatment of gynaecomastia. Br J Plast Surg 56(3):237–246
8. Brown RH, Chang DK, Siy R, Friedman J (2015) Trends in the surgical correction of gynecomastia. Semin Plast Surg 29(2):122–30
9. Holzmer SW, Lewis PG, Landau MJ, Hill ME (2020) Surgical management of gynecomastia: a comprehensive review of the literature. Plast Reconstr Surg Glob Open 8(10):e3161
10. Pitanguy I (1966) Transareolar incision for gynecomastia. Plast Reconstr Surg 38(5):414–419
11. Durani P, McCulley SJ (2007) Transareolar and H-incisions for the surgical treatment of gynecomastia. Plast Reconstr Surg 119(4):1387–1388
12 Atiyeh BS, Chahine F, El-Khatib A, Janom H, Papazian N (2015) Gynecomastia: simultaneous subcutaneous mastectomy and areolar reduction with minimal inconspicuous scarring. Aesthetic Plast Surg 39(6):916–21
13. Hammond DC, Arnold JF, Simon AM, Capraro PA (2003) Combined use of ultrasonic liposuction with the pull-through technique for the treatment of gynecomastia. Plast Reconstr Surg 112(3):891–5
14 Lista F, Ahmad J (2008) Power-assisted liposuction and the pull-through technique for the treatment of gynecomastia. Plast Reconstr Surg 121(3):740–7
15 Ramon Y, Fodor L, Peled IJ, Eldor L, Egozi D, Ullmann Y (2005) Multimodality gynecomastia repair by cross-chest power-assisted superficial liposuction combined with endoscopic-assisted pull-through excision. Ann Plast Surg 55(6):591–4
16. Bracaglia R, Fortunato R, Gentileschi S, Seccia A, Farallo E (2004) Our experience with the so-called pull-through technique combined with liposuction for management of gynecomastia. Ann Plast Surg 53(1):22–26
17. Morselli PG (1996) "Pull-through": a new technique for breast reduction in gynecomastia. Plast Reconstr Surg 97(2):450–454
18. Varlet F, Raia-Barjat T, Bustangi N, Vermersch S, Scalabre A (2019) Treatment of gynecomastia by endoscopic subcutaneous mastectomy in adolescents. J Laparoendosc Adv Surg Tech A 29(8):1073–1076
19. Jian C, Limin Wu, Lin L, Liu W, Zheng Z, Yang C (2020) Single-port endoscopic mastectomy via the lateral chest approach for the treatment of grade II gynecomastia. Medicine (Baltimore) 99(22):e20100
20. Scuderi N, Tenna S, Spalvieri C, De Gado F (2005) Power-assisted lipoplasty versus traditional suction-assisted lipoplasty: comparative evaluation and analysis of output. Aesthetic Plast Surg Jan-Feb 29(1):49–52