

Surgical Masculinization of the Breast: Clinical Classification and Surgical Procedures

Lazaro Cardenas-Camarena¹  · Carlos Dorado² · Maria Teresa Guerrero³ · Rosa Nava²



Received: 20 June 2016 / Accepted: 31 October 2016 / Published online: 24 March 2017
© Springer Science+Business Media New York and International Society of Aesthetic Plastic Surgery 2017

Abstract

Introduction Aesthetic breast area improvements for gynecomastia and gender dysphoria patients who seek a more masculine appearance have increased recently. We present our clinical experience in breast masculinization and a classification for these patients.

Methods and Materials From July 2003 to May 2014, 68 patients seeking a more masculine thorax underwent surgery. They were divided into five groups depending on three factors: excess fatty tissue, breast tissue, and skin. A specific surgical treatment was assigned according to each group. The surgical treatments included thoracic liposuction, subcutaneous mastectomy, periareolar skin resection in one or two stages, and mastectomy with a nipple areola complex graft. The evaluation was performed 6 months after surgery to determine the degree of satisfaction and presence of complications.

Results Surgery was performed on a total of 68 patients, 45 male and 22 female, with ages ranging from 18 to 49 years, and an average age of 33 years. Liposuction alone was performed on five patients; subcutaneous mastectomy was performed on eight patients; subcutaneous mastectomy

combined with liposuction was performed on 27 patients; periareolar skin resection was performed on 11 patients; and mastectomy with NAC free grafts was performed on 16 patients. The surgical procedure satisfied 94% of the patients, with very few complications.

Conclusions All patients who wish to obtain a masculine breast shape should be treated with only one objective regardless patient's gender: to obtain a masculine thorax. We recommend a simple mammary gland classification for determining the best surgical treatment for these patients.

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 · Male breast surgical treatment · Breast masculinization

Introduction

Mammary gland overgrowth management in males goes back to 625–690 BC, where Paulas Aeginata performed a mammary gland resection with a losange type incision. [1] In 1946, Webster suggested a semicircular intra-areolar incision to achieve a gland resection without large scars [2]. Morselli combined this procedure with liposuction to reduce the glandular size and achieve even smaller incisions [3]. Gynecomastia is the growth of mammary glands in men, and it is considered to be relatively frequent during adolescence [4]. There are reports of a 50–70% gynecomastia frequency, and it is more frequently bilateral. Gynecomastia occurs bilaterally in 25–75% of patients

✉ Lazaro Cardenas-Camarena
drlazaro@drlazarocardenas.com

¹ Division of Plastic Surgery, INNOVARE Cirugia Plástica Especializada, Jalisco Institute of Reconstructive Surgery “Dr. José Guerrerosantos”, Zapopan, Jalisco, Mexico

² Division of Plastic Surgery, Jalisco Institute of Reconstructive Surgery “Dr. José Guerrerosantos”, Guadalajara, Jalisco, Mexico

³ Private Practice at INNOVARE, Cirugía Plástica Especializada, Zapopan 45019, Jalisco, Mexico

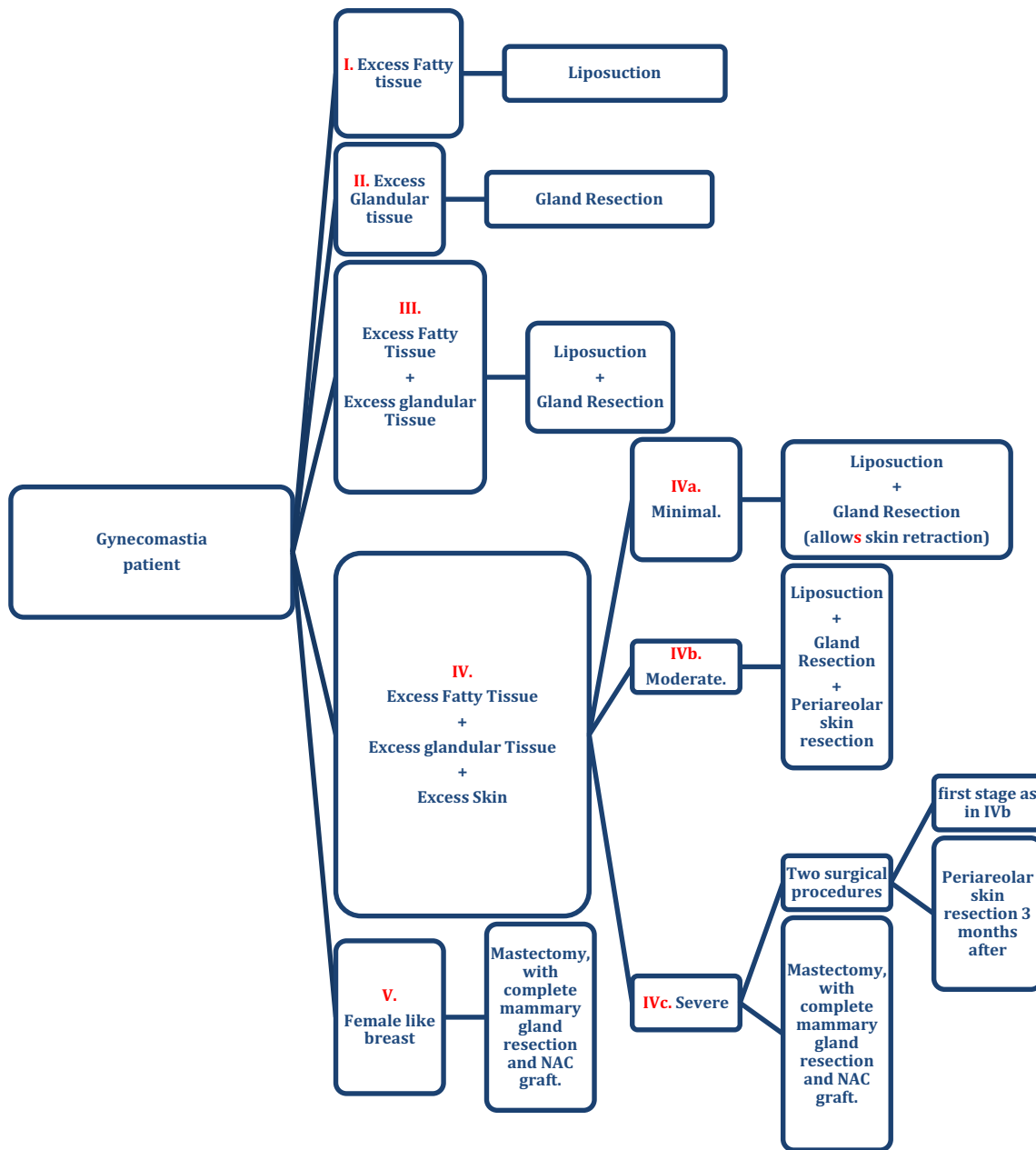


Fig. 1 An algorithm for patient evaluations and treatments

with this disease [5]. Subcutaneous mastectomy is the most common procedure performed in these cases [6, 7]. Although gynecomastia correction is a procedure that has increased in recent years [4], there are currently also gender dysphoria patients who want to transform their female breasts into a masculine thorax. There are also male patients, in whom mammary gland development completely replicates the female mammary gland, suggesting an important hormonal factor. In these cases, the surgical procedure is similar to that used in female patients with gender dysphoria.

In the present study, we report our 10 year experience of treating gynecomastia patients and gender dysphoria patients requesting thorax masculinization. The surgical options were the same in both cases according to the mammary gland morphological characteristics and not patient gender. Based on this, we introduce a combined classification to achieve mammary gland masculinization. We evaluated surgical results, including an adequate nipple areola complex, the scar type and quality, and postsurgical complications.

Methods and Materials

All patients seeking mammary gland masculinization, from January 2003 through December 2015, were included in this study. All of the patients underwent a physical examination to determine the morphological gland type and choose the surgical procedure. The selected technique was based on the mammary gland anatomy description, which was based on a classification that is mentioned later in this article. We took a complete medical history of all patients, including their pre-surgical lab results, which consisted of complete hemograms and coagulation times. An endocrinological profile was performed to discard hormonal problems. A precise physical examination was performed to search for the presence of tumors. The patients with probable neoplastic processes were excluded.

The surgical procedure was performed under sedation anesthesia and local or sedation and regional anesthesia, depending on the breast characteristics of each patient. For very large breasts, especially those in group 5, sedation and regional anesthesia was preferred. Follow-ups were conducted over a minimum of six months, whereby the surgical procedure satisfaction degree was evaluated. Specifically, the patients rated their perceived results as bad, regular, good, or excellent using a questionnaire. They were basically asked to evaluate two aspects: scar quality and whether they had a male mammary gland shape.

Statistical analyses were conducted by determining the frequency, range, and percentages of each variable (Fig. 1).

Mammary Gland Classification

We classified the mammary glands into 5 groups by taking three anatomical characteristics into consideration, which thus helped determine the proper treatment. These characteristics included the amounts of fatty tissue, mammary gland tissue, and excess skin.

Group 1 Patients who presented with only excess fat (Figs. 2, 3)

These subjects had localized excess breast fat and were strictly considered to have pseudo gynecomastia.

Group 2 Patients who presented with only excess glandular tissue (Figs. 4, 5)

The mammary gland size was exclusively secondary to the excess glandular tissue, without excess fat. The difference between this group and the previous group was determined with physical examination.

Group 3 Patients with excess fat and glandular tissue (Figs. 6, 7)



Fig. 2, 3 Group 1, Case 1: male patient with 6 months after surgery

These patients can be thin or with any degree of overweight.

Group 4 Patients with excess fat, excess skin, and a small amount of glandular tissue

In these patients, a subdivision was conducted according to the amount of excess skin:

- (a) **Minimal excess skin:** These patients were usually thin or had a history of weight loss (Figs. 8, 9). These breasts were similar to the Group 3 breasts but with a little more excess skin; therefore, the treatments were similar.
- (b) **Moderate excess skin:** These patients were thin and had some degree of obesity or a history of weight loss. They had a moderate amount of excess skin and a small amount of mammary gland tissue that was evident during their physical examinations (Figs. 10, 11, 12 and 13).
- (c) **Significant excess skin:** These were mainly overweight or obese patients, or they were patients with a history of massive weight loss. A significant amount



Fig. 4, 5 Case 2, Group 2: male patient who presented with only excess glandular tissue, without excess fat, treated only with breast gland resection. 8 months after surgery

of excess skin, which simulated a female breast, but with a small amount of mammary gland tissue was observed in these patients (Figs. 14, 15 and 16).

Group 5 A mammary gland with complete female characteristics, excess skin, mammary gland, and fatty tissues (Figs. 17, 18).

Any of these groups could present with excess fat in the regions adjacent to the breast, especially in the axillary or lateral thorax regions. In these cases, additional treatment was implemented in these areas.

The Surgical Procedures Performed

The following surgical procedures were performed according to group:



Fig. 6, 7 Case 3, Group 3: male patient who presented a combination of excess fat and glandular tissue. The surgery consisted of a combination of liposuction and breast tissue resection. 6 months of follow-up

Group 1 Only liposuction was performed on the patients who presented with only excess fat. Preoperatively, with the patient standing, the treatment area was marked. Infiltration of the area was performed with the superwet technique, in a 1.3 to 1 ratio. This meant 1.3 L of solution was infiltrated for each liter that was aspirated. The infiltrated solution consisted of 1000 cc of 0.9% saline with 1 mg of epinephrine. If the surgery was performed with sedation and local anesthesia, we added 500 mg of lidocaine to the solution. Two incisions were made in the breast area, one in the superior portion of the axillary crease and another in the inferior portion of the breast at the mammary midline and infra mammary crease intersection. Liposuction was completed in a crossing fashion with 3 mm cannulas.



Fig. 8, 9 Case 4, Group 4a: male patient with excess fat, breast tissue, and skin. The excess skin is minimal and was treated only with liposuction and gland resection, allowing the skin to retract. 1 year after surgery

Additionally, drainage was left in for 1–2 days through the lower liposuction incision. Examples of patients in this group are shown in Figs. 2 and 3.

Group 2 Only patients with excess glandular tissue underwent mammary tissue resections through an infra-areolar incision. The mammary gland was marked preoperatively, and only this area was infiltrated with a solution that consisted of 300 cc of isotonic saline solution, 500 mg of lidocaine, and 1 mg of epinephrine. It was possible to perform this resection through the male areola, which measures approximately 18–25 mm. In these patients, it was important to be careful with two aspects during the mammary gland resection. The first aspect involved preserving the 1–2 cm subcutaneous layer that is attached to the skin in the region where the gland was resected,



Fig. 10, 11 Case 5, Group 4b: female patient who requested thorax masculinization. She was a bodybuilder. She was treated with liposuction, breast tissue resection, and peri areolar skin resection. 2 years after surgery

specifically under the nipple areola complex. Second, in some patients, it was necessary to use the peripheral fatty tissue to fill and obliterate the defect that was made after the gland resection. The fatty tissue under the areola, where the mammary gland was, is attached to the middle area to avoid any dead space. These maneuvers prevent retraction



Fig. 12, 13 Case 5, Group 4b: female patient. Surgery consisted of liposuction, breast tissue resection, and peri areolar skin resection in the same surgical procedure. 24 months after surgery

and depression of the surgical site, which is a common result in this procedure. In these patients, we did not consider it necessary to routinely leave drains due to the limited amount of solution that was infiltrated. Examples of this patient group are shown in Figs. 4 and 5.

Group 3 In patients with excess fat and glandular tissue, a combination of the two previous techniques was performed. The areas that needed to be liposuctioned and the

mammary gland resection were marked preoperatively. The first stage was to perform liposuction with the previously described technique. Subsequently, an infra-areolar incision was performed to resect the glandular tissue as described above. Drains were left as described previously. Examples of this patient group are in Figs. 6 and 7.

Group 4 In these patients, in whom excess skin, fat, and glandular tissue coexisted, the evaluation parameter for the surgical procedure choice was the degree of excess skin.

Minimal

In patients with minimal excess skin, we performed the procedure as described in the group 3 patients and left excess skin for compensation and to allow for a secondary skin retraction after the procedure. This option was discussed with the patients to avoid a larger scar. Obviously, the quality of the patient's skin was an important feature in the result (Figs. 8, 9).

Moderate

In patients who presented with a moderate amount of excess skin, the objective was to eliminate this excess. For this reason, we performed a periareolar resection. With this technique, it was not advisable to perform an extensive subcutaneous undermining as described with the glandular resection. For this reason, we performed only liposuction and excess skin resections with the periareolar incision. With the liposuction procedures, we attempted to make a skin flap as thin as possible to cover the mammary gland. Preoperatively, we marked the mammary gland as if we were to perform a periareolar technique, whereby the mammary midline and infra mammary sulcus were marked. Areola size was determined using an areola marker of 2 cm in diameter. We marked the superior limit where the new areola limit would be, as well as the inferior limit according to the infra mammary crease distance. The superior limit of the areola was left 17–18 cm from the sternal manubrium, and the inferior limit was left 2–3 cm from the infra mammary sulcus. Between these two marks, we limited the amount of resected tissue. If the periareolar tissue that needed to be resected was over 4 cm, we considered it to be a severe case (type 4C), and the procedure that is described next was necessary. Examples of this patient group are in Figs. 10, 11, 12 and 13.

Severe

In these patients, the objective was to resect the maximum amount of skin; however, it was not possible to perform this in one stage, due to the amount of skin that needed to be



◀**Fig. 14–16** Case 6, Group 4c: Male patient after significant weight loss. The surgery consisted of liposuction, skin, and breast gland resection. The procedure was done in two surgical stages with skin periareolar resection in each surgery. Patient is seen 6 months after the first surgical procedure and 1 month after the second surgery

removed. Conducting this procedure in one stage can produce contour and scarring irregularities as well as anti-aesthetic skin wrinkling. For this reason, we performed this procedure in two stages, both of which were performed with the technique described previously for the moderate cases, with 3 or more months between the procedures, depending on the characteristics of each case. These patients can also be treated with the procedure described for the group 5 patients; however, we initially offered this technique because it leaves limited scarring, even though it has the disadvantage of involving two surgical procedures. Examples of this patient group are shown in Figs. 14, 15 and 16.

Group 5 When the mammary gland had broad female characteristics, with abundant mammary gland tissue, skin, and fat, a mastectomy was employed with a free nipple areola complex graft (Figs. 17, 18). Notably, this technique was modified to produce a masculine thorax and not performed exactly as a female breast procedure. In these cases, we marked the new nipple areola complex position in a more lateral position than that of a female breast, which was 12–13 cm from the midsternal line. This was performed after the mammary resection, using an areola marker of 2 cm in diameter. Preoperatively, the infra mammary sulcus was marked, and we determined the skin and tissue quantity that needed to be resected with the “pinch” test. In many cases, due to the mammary gland volume, the incisions were joined at the midline to form one common scar through the thorax (Fig. 19).

We started the surgery by harvesting the graft that would create a new nipple areola complex, taking only the amount of tissue that was necessary. In these patients, the nipple areola complex was usually larger than in regular male thoraxes; thus, we prepared the skin for its conformation. At the end of the surgery, the nipple areola complex was put in its final position with male nipple characteristics. An incision was performed along the infra mammary crease to reach the pectoralis muscle fascia. The undermining was performed in a cephalic direction up to the resection limits that were marked preoperatively preserving the fascia. With a caudal traction of the dissected tissue, we verified the amount to be eliminated and ensured we did not over-resect or leave a wound with closure tension. The cut was made perpendicular to the thorax. It is important to emphasize the fact that the dissection must be limited to the planned resection area and to never continue the dissection superior or inferior to the marked areas. The objective of



Fig. 17, 18 Case 7, Group 5: female patient with gender dysphoria who wanted thorax masculinization. The surgery consisted of mastectomy, with complete mammary gland resection and nipple areola complex graft. Nine months of follow-up. This was one of the patients that presented a hypertrophic scar

this was to minimize morbidity from seroma formation or flap devascularization. After the mastectomy and the wound closure, which was performed in three layers, we marked the new nipple areola complex position using an areola marker of 2 cm in diameter, which was 2–3 cm over the mastectomy wound and 12–13 cm from the midsternal line. We sutured the nipple areola complex and left a tie-over to put pressure over the graft and to facilitate its integration. If, after finishing the surgery, the overlying tissues were thick, then we performed liposuction until we achieved the desired shape (Fig. 20). There was no risk of affecting the vascularity in these tissues with liposuction because there was no undermining or dissection during the surgery. Many of these patients required liposuction in the areas adjacent to the surgical site; therefore, we performed this during the surgical procedure. Examples of this patient group are shown in Figs. 17, 18, 19, and 20.



Fig. 19 Mammary gland to be resected during surgery

We present an algorithm for the evaluation and treatment of these patients according to the descriptions mentioned in the previous sections (Fig. 1).

Results

In the period between January 2003 and December 2015, 68 patients who required mammary gland improvements to achieve a masculine thorax underwent surgery. A total of 46 (67.6%) were male and 22 (32.3%) were female, and they were between the ages of 18 and 49, with an average age of 33. Five (7.3%) patients corresponded to group 1; eight (11.76%) patients corresponded to group 2; and 27 (39.71%) patients corresponded to group 3. Twelve (17.3%) patients were operated on in group 4, from which 5 (7.35%) were in subgroup a; 5 (7.35%) were in subgroup b; and 2 (2.94%) were in subgroup c. Sixteen (23.53%) patients were included in group 5 (Table 1).

Two hematomas were observed that did not require a surgical treatment, and both were group 3 cases. No infections were observed. No nipple areola complex malpositions occurred. Superficial necrosis in one nipple from group 4b, and six hypertrophic scars were noted, in which one was observed in group 4c, and 5 hypertrophic horizontal scars were observed in group 5.

Eighty-two percent of the patients reported excellent results, 12% reported good results, and 6% reported regular results. No patient reported a bad result. Good results instead of excellent results were referred in some cases, mainly due to excess fat in some areas of the breast. Regular results were due to anti-aesthetic scarring, especially hypertrophic scars (Table 2).



Fig. 20 Central and lateral areas treated with liposuction after resection of the mammary gland

Table 1 Patients according to group

Group	Male	Female	Total	%
1	5	0	5	7.35
2	8	0	8	11.76
3	26	1	27	39.71
4A	3	2	5	7.35
4B	2	3	5	7.35
4C	1	1	2	2.94
5	1	15	16	23.53
Total	46	22	68	100
%	67.65	32.35		

Table 2 Patient satisfaction according to group

Group	Total of patients	Excellent results	Good results	Regular results	Bad results
1	5	5	0	0	0
2	8	8	0	0	0
3	27	26	1	0	0
4A	5	4	1	0	0
4B	5	4	1	0	0
4C	2	1	1	0	0
5	16	8	4	4	0
Total	68	56	8	4	0

Discussion

The increased male mammary gland surgery rate is evident from the statistics of the American Society for Aesthetic Plastic Surgery (ASAPS), which showed that surgery to correct gynecomastia has increased 103.6% from 1997 to 2013. This surgery ranked as the fourth most common surgery after liposuction, rhinoplasty and blepharoplasty

[4]. The majority of male mammary gland disorders can pass mostly unnoticed; however, approximately 30% of men have mammary gland palpations [8].

The etiology of gynecomastia is multifactorial, and a specific cause is not known. Multiple factors are involved in its process, such as hormonal factors. Recent studies have demonstrated the role of estrogenic stimulation on mammary glandular tissue [9]. Although gynecomastia in puberty evolves toward spontaneous regression in up to 90% of cases, sometimes this does not occur [10]. Over the years, there have been different surgical approaches for its treatment [1–3]. Recently, Rohrich et al. described the use of ultrasound-assisted liposuction to treat gynecomastia with very satisfactory results [11]. Additionally, endoscopy procedures were described to minimize scars [12]. Even when gynecomastia treatment is totally focused on achieving an improvement in the male mammary gland, there is currently an increasing group of patients with the desire for gender reassignment, which includes thorax masculinization. In our study, female patients who asked for thorax masculinization represented 32.8% of the cohort, which represented almost a third of the total patients operated on. This is why we consider that mammary gland treatment for masculine thorax achievement must not be based on the patient's chromosomal gender but rather on the morphological characteristics of the mammary gland. Although it is true that the mammary gland is fully developed in a genetically female patient, it is also true that gynecomastia can have a totally female appearance that is secondary to hormonal stimuli. In our study, 2 male patients had breasts that were morphologically female. This is why the result must be always achieved to obtain a masculine thorax. In group 5 patients, in whom a long horizontal incision was made to conduct the total mastectomy, the hypertrophic scar rate was nearly 33%. Unfortunately, the surgery type and area predisposed the patient to this type of scar. It is very important that patients with large breasts in whom this technique is to be used are informed of the possibility of developing unsightly scars. The patient informed of this possibility will be satisfied despite bad scars. Anyway, it is highly recommended to implement preventive measures, such as pressotherapy, silicon dressings, and, in extreme cases, steroid injections.

Currently, the plastic surgeon must be trained and prepared to treat all types of patients who wish to obtain a male breast. Fortunately, in the case of gynecomastia, health insurance covers the surgery; however, in the case of gender dysphoria, surgery is not covered. So plastic surgeons should know how to treat a patient requiring masculinization of the mammary gland. The mistake of trying to use a breast reduction technique and to preserve the nipple areola complex flaps in gender dysphoria patients

seeking breast masculinization is common. This is not indicated in these patients because it will always leave a remnant of glandular tissue, and the desired objectives will not be met. Hage and Kesteren [6] defined the principles for a male appearance in a female thorax, where they noted that excess dermoglandular tissue must be resected; the nipple areola complex must be repositioned; and scarring should be minimized as much as possible.

We feel that performing liposuction is an essential treatment in the breast masculinization process, and we do not perform liposuction in only those cases in which there is only glandular excess (group 2). Therefore, we performed liposuction on almost 90% of our patients to achieve the desired results. This differs from what Monstrey et al. [13] state. They state that liposuction produces irregularities, skin flap thinning, and anti-aesthetic results; however, in our experience, liposuction is fundamental for improving surface regularity and smoothness. Simon [14] uses a classification for gynecomastia that is different from the one we propose. They do not take fatty tissue into consideration. Additionally, Rohrich et al. used a classification based on the amount of glandular tissue and the mammary ptosis degree [10]. Our classification is not exclusively for gynecomastia. It can be utilized for any mammary gland that requires masculinization, and its use enables us to determine the type of surgery that needs to be performed.

Conclusions

Achieving a male mammary gland is no longer exclusive for gynecomastia patients. It is also available for female patients who want to obtain a masculine thorax. We feel that all patients who wish to obtain a masculine mammary gland should be treated with a single common objective: to achieve a masculine thorax. On this basis, we propose a mammary gland alteration classification for determining the surgical treatment that should be performed. This classification is based on the fatty tissue, glandular tissue, and skin excess levels, without considering the gender of the patient. With this classification, it is easier to determine

the surgical procedure that needs to be performed in male and gender dysphoria patients who seek to achieve the same objective.

Compliance with Ethical Standards

Conflict of Interest The authors have no conflict of interest to declare in relation to the content of this article.

References

1. Fruhstorfer BH, Malata CM (2003) A systematic approach to the surgical treatment of gynecomastia. *Br J Plast Surg* 56(3): 237–246
2. Webster JP (1946) Mastectomy for gynecomastia through a semicircular intra-areolar incision. *Ann Surg* 124(3):557–573
3. Morselli PG (1996) “Pull-through”: a new technique for breast reduction in gynecomastia. *Plast Reconstr Surg* 97(2):450–454
4. ASAPS statistics. Cosmetic Surgery National Data Bank. Statistics 2012
5. Nydick M, Bustos J, Dale JH Jr, Rawson RW (1961) Gynecomastia in adolescent boys. *JAMA* 178(4):449–454
6. Hage JJ, Kesteren PJM (1995) Chest-wall contouring in female-to-male transsexuals: basic considerations and review of the literature. *Plast Reconstr Surg* 96:386
7. Carlson HE (1980) Gynecomastia. *N Engl J Med* 303(14): 795–799
8. Pensler JM, Silverman BL, Sanghavi J et al (2000) Estrogen and progesterone receptors in gynecomastia. *Plast Reconstr Surg* 106(5):1011–1013
9. Bannayan GA, Hajdu SI (1972) Gynecomastia: clinicopathologic study of 351 cases. *Am J Clin Pathol* 57(4):431–437
10. Rohrich RJ, Ha RY, Kenkel JM, Adams WP Jr (2003) Classification and management of gynecomastia: defining the role of ultrasound-assisted liposuction. *Plast Reconstr Surg* 111(2): 909–923 **discussion 924–5**
11. Lemaine V, Cayci C, Simmons PS, Petty P (2013) Gynecomastia in adolescent males. *Semin Plast Surg* 27(1):56–61
12. Adekunle A, Malata CM (2012) Gynecomastia: evolving paradigm of management and comparison of techniques. *Plast Reconstr Surg* 129(2):366e–367e
13. Monstrey S, Selvaggi G, Ceulemans P, Monstrey S, Van Landuyt K, Bowman C, Blondeel P, Hamdi M, De Cuypere G (2008) Chest-wall contouring surgery in female-to-male transsexuals: a new algorithm. *Plast Reconstr Surg* 121(3):849–859
14. Simon BE, Hoffman S, Kahn S (1973) Classification and surgical correction of gynecomastia. *Plast Reconstr Surg* 51(1):48–52