

# Chest Wall Masculinization in Female-to-Male Transsexuals

## Our Treatment Algorithm and Life Satisfaction Questionnaire

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**Abstract:** Esthetic masculinization of the chest wall is one of the first surgical steps in female-to-male transsexual (FTMTS) reassignment.

This surgical procedure is not a simple mastectomy: it is required for removal of breast tissue with glandular resection and skin excess revision, to reduce and replace the nipple-areola complex in the right location, minimizing chest wall scars. The creation of an esthetically pleasing male chest allows the patient to live at ease in the male gender role.

In this article, we present our series of 68 FTMTSs who underwent bilateral mastectomies for surgical sexual reassignment (a total of 136 mastectomies) according to our algorithm, in the period between January 2010 and December 2017. We selected 4 different operative procedures, classified as subcutaneous (“pull-through” and “concentric circular” techniques) and skin extended (“ultrathin vertical bipedicle” and free nipple graft).

We achieved a total complication rate of 6.6%, less than that reported in the literature; additional procedures for esthetic improvements were performed in 14.7% of cases. The mean patient satisfaction was approximately 4.57% of a maximal value of 5 (excellent).

To help surgeons in choosing the most appropriate FTMTS surgical technique and to reduce unfavorable results, we propose the use of our treatment algorithm in preoperative evaluation of the chest wall according to the breast volume, degree of glandular ptosis, and skin elasticity.

**Key Words:** gender dysphoria, female-to-male transsexual, chest wall masculinization, pull-through, technique

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**G**ender dysphoria, as defined in the *Diagnostic and Statistical Manual of Mental Disorders* (Fifth Edition), is characterized by symptoms of marked incongruence between one's experienced and assigned gender along with a persistent and strong desire to be of the other gender.<sup>1</sup>

As a result of their bodily dysphoria and difficulties with living in the social gender role, a significant number of transgender individuals opt for gender-confirming medical interventions.

In fact, for female-to-male transsexuals (FTMTSs) who have already undergone their physical manifestation, much of the bodily dysphoria and social difficulties with posing as masculine relate to their feminine breast.<sup>2</sup>

Despite frequent hesitance about genital surgery, studies assessing the treatment requests at clinical entry showed that all FTMTSs planned to undergo chest wall masculinization.<sup>3</sup>

This surgical procedure consists in removal of breast tissue with glandular resection and skin excess revision, appropriate reduction and

positioning of the nipple-areola complex (NAC) in the right location, and minimizing chest wall scars.

The creation of an esthetically pleasing male chest allows the patient to live at ease in the male gender role.<sup>4</sup>

Several techniques for contouring of the chest wall have been reported in the literature,<sup>5–7</sup> but most of them concern mastectomy in women with breast disease or men with gynecomastia, whereas fewer studies have focused on specific techniques of chest wall masculinization in female-to-male transgender patients.<sup>8–10</sup>

Many of the recognized techniques for gynecomastia or for women's disease are being currently used wrongly in female-to-male surgical reassignment: transsexual surgery is more complex in view of the breast dimensions, significantly greater skin excess, and more severe ptosis. In addition to these well-known conditions, the treatment can be complicated by years of breast binding and by hormonal therapy that worsens the skin quality and skin elasticity as compared with a man with gynecomastia or a woman with breast disease.

In this article, we present our algorithm designed to help choose the most appropriate techniques of female-to-male transgender chest wall masculinization according to the different clinical features.

## MATERIALS AND METHODS

Our series of 68 FTMTSs underwent bilateral mastectomies for surgical sexual reassignment (to a total of 136 mastectomies) according to our algorithm, in the period between January 2010 and December 2017.

We selected 4 different operative procedures, classified as *subcutaneous techniques* (“pull-through” [16.2%] and “concentric circular” [3.0%]) and *skin extended* (“ultrathin vertical bipedicle” [10.3%] and free nipple graft [70.5%]). The resected tissue (average weight, 291 g; range, 25–690 g) was submitted to histological evaluation: no breast cancer was found in the samples examined.

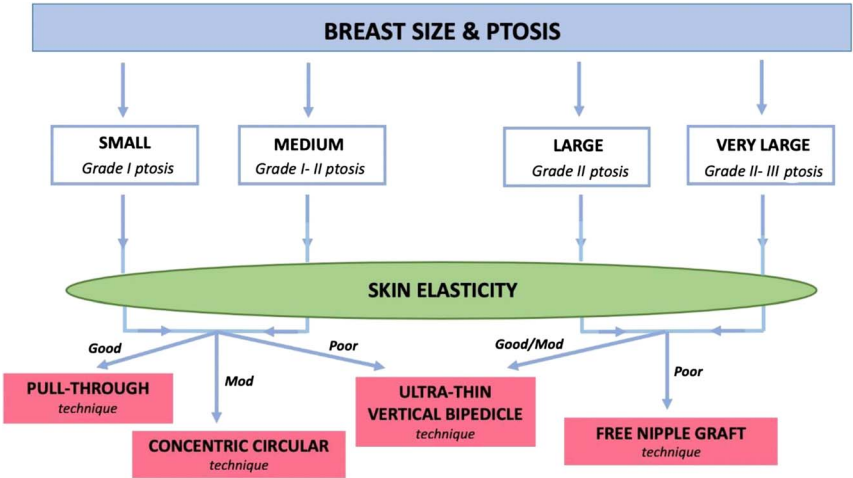
The choice of the proper technique depends on the breast volume (small, <200 g; medium, 200–350 g; large, 350–500 g; and very large, >500 g), on breast envelope and skin quality (degree of laxity/elasticity), on the dimension and position of the NAC, and on the degree of ptosis according to the Regnault classification (grade I ptosis, nipple is at or up to 1 cm below the crease; grade II ptosis, nipple at 1 to 3 cm below the crease; grade III ptosis, nipple >3 cm below the crease) taken into account by the algorithm proposed (Fig. 1).

- For small-medium breast volume, combined with good skin envelope elasticity, the *pull-through technique* is our first choice. The goal of this technique is hiding scarring, and this is a constant concern for plastic surgeons. The pull-through technique makes it possible to remove the breast parenchyma using only 2 small incisions (each approximately 12–20 mm), placed far away from the esthetic unit of the male breast.
- For similar small-medium breast volume, with less skin elasticity or “elastorhex striae,” a *concentric circular technique* is better suited.
- For a moderate-sized breast with poor skin elasticity and several elastorhex striae, or large volume breasts with no excessive laxity, we suggest the *ultrathin vertical bipedicle technique*, designed to remove skin and replace NAC.
- Large-sized breasts or ptotic glands with poor skin elasticity and a typical female appearance, according to our algorithm, require breast *glandular resection with free nipple grafting*.

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**FIGURE 1.** Algorithm of 4 different operative procedures for chest masculinization in FtM transsexuals according to breast size, g grade of ptosis, and the skin envelope elasticity (good/moderate/poor). For small-medium breast volume, combined with good skin envelope elasticity, the pull-through technique is our first choice. For similar small-medium breast volume, with less skin elasticity or elastorhex striae, the concentric circular technique is well suited. For moderate-sized breast with poor skin elasticity and several elastorhex striae, or large volume breasts with no excessive laxity, we suggest the ultrathin vertical bipedicle technique. Large-sized breasts or ptotic glands with poor skin elasticity and typical female appearance require breast glandular resection with free nipple grafting.

We collected patient demographic data (age, BMI) and surgical data (surgical procedure, operation time, hospital stay). Data collection is reported in Table 1.

Our primary outcomes were complication rate, classified as minor or major complications if surgical revision was necessary.

Our secondary outcomes were patient satisfaction in terms of secondary revisions and esthetic result after 3 months. We used a questionnaire to give an overall rating corresponding to a Likert scale from 1 to 5, with 1 being poor and 5 being excellent.

We selected 10 questions for our FtM-Q questionnaire chosen from the BREAST-Q reconstruction questionnaire designed to evaluate psychological and sexual well-being 3 months after surgical intervention (Fig. 2).

We specifically selected these questions because we believe that they best represent and bring to light the psychological aspects of patients coping with a new thorax after reconstruction.

Operative Techniques

All 68 FTMTS patients underwent chest wall masculinization at the same surgical time as laparoscopic hysterectomy and oophorectomy performed by gynecologists.

Hormonal therapy was stopped 3 weeks before surgery. Surgery required general anesthesia with complete and quick-acting muscle relaxation.

The patients were placed in a supine position, lying on the back, with both arms adducted to the trunk. Antibiotic prophylaxis was

provided at the time of anesthesia induction with a first-generation cephalosporin (cefazolin, 2 g).

A tilted bed is needed to evaluate the patient in supine and semisitting position during the placement of the NAC.

Pull-Through Technique

The pull-through technique, used for the treatment of fatty glandular gynecomastia,<sup>11,12</sup> is chosen in cases of small or medium breast gland size with good skin elasticity.

This surgical procedure is performed in 2 stages: through 2 small incisions, the first stage entails careful liposuction. The second stage is based on the removal of glandular tissue by pulling it through the same 2 incisions made for insertion of the cannula (Figs. 3, 4).

Concentric Circular Technique

The concentric circular technique is similar to that described by Davidson<sup>13</sup> in 1979 and is used for breasts with a medium-sized envelope or for smaller breasts with poor skin elasticity. The concentric incision is drawn as a circle or ellipse, enabling deepithelialization of a calculated amount of skin in the vertical and horizontal directions. Through the incision in the inferior aspect of the external circumference, glandular tissue is carefully dissected off the overlying NAC, leaving it widely based on a dermal pedicle. A permanent purse string suture is placed and set to the desired areolar diameter.

**TABLE 1.** Patient Demographic Data (Age, BMI) and Surgical Data (Surgical Procedure, Operation Time, Hospital Stay)

	Overall Collective (n = 68)	Group 1 Pull-Through Technique (n = 11)	Group 2 Concentric Circular Technique (n = 2)	Group 3 Ultrathin Vertical Bipedicle Technique (n = 7)	Group 4 Free Nipple Graft Technique (n = 48)
Age, y	33 (21–55)	31 (21–47)	31 (30–32)	32 (30–35)	34 (22–55)
BMI, kg/m <sup>2</sup>	24.8 (19.0–43.0)	21.6 (16.0–26.0)	23.4 (19.1–27.8)	25.2 (19.1–34.6)	25.6 (19.0–43)
Operation time, min	200 (67–310)	152 (67–310)	200 (160–240)	241 (200–260)	204 (155–273)
Hospital stay, d	4 (3–10)	4 (3–5)	4 (4–4)	4 (3–4)	4 (3–10)

	None of the time	A little of the time	Some of the time	Most of the time	All of the time
1. Confident in a social setting?	1	2	3	4	5
2. Accepting of your body?	1	2	3	4	5
3. Normal?	1	2	3	4	5
4. Like other men?	1	2	3	4	5
5. Attractive?	1	2	3	4	5
6. Sexually attractive when unclothed?	1	2	3	4	5
7. Comfortable/at ease during sexual activity?	1	2	3	4	5
8. Satisfied with your sex-life?	1	2	3	4	5

**FIGURE 2.** FtM-Q questionnaire. Ten questions chosen from the BREAST-Q reconstruction questionnaire for psychological and sexual well-being evaluation 3 months after surgical intervention.

Ultrathin Vertical Bipedicle Technique

Medium-sized breast glands with considerable cutaneous laxity or large-sized with good elasticity can be treated with the ultrathin vertical bipedicle technique.

This approach draws on the vertical pedicle described by McKissock<sup>14</sup> in 1972 for reduction mammoplasty. The ultrathin vertical bipedicle technique is performed by preparing this ultrathin dermal bipedicle approximately 6 to 8 cm wide with cranial and caudal irroration that guarantees nipple vitality.

After glandular resection, the ultrathin vertical bipedicle is duplicated and fixed to the pectoral muscle fascia, followed by redraping and excision of excess skin with a residual inverted T scar (Figs. 5, 6).

Free Nipple Graft Technique

The free nipple graft technique has been proposed by several authors<sup>15,16</sup> for patients with large, ptotic breasts. It is performed by harvesting the NAC as a full-thickness skin graft with a maximal diameter of 25 to 30 mm and a vertical diameter of 20 to 25 mm, followed by

glandular resection and finally grafting of the NAC into its new location on the chest wall.

An incision is placed horizontally 1 to 2 cm above the infra-mammary fold and moving upward laterally below the lateral border of the pectoralis muscle. In most such patients, liposuction may be performed laterally and medially to avoid dog ear formation and to ensure symmetric contouring.

Regarding the ideal placement of the NAC, we feel that the use of absolute measurements can be misleading. In this regard, we agree with the recommendations of many authors who position the NAC on the lateral side of the pectoralis major muscle, according to the patient's own anatomical landmarks.<sup>17,18</sup>

In our series, the height was adjusted to approximately 2 to 3 cm above the lower border of the pectoralis major; however, clinical judgment is often most important, and we always place the patient in a seated position intraoperatively to check the final nipple position (Figs. 7, 8).

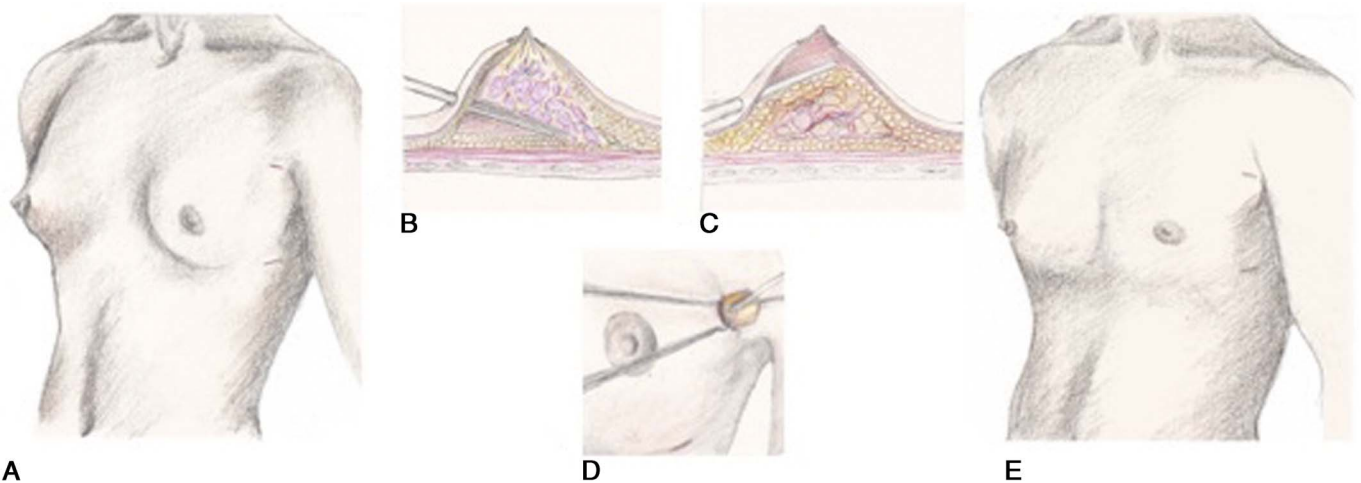
RESULTS

From January 2010 to December 2017, we performed 136 glandular resections in chest wall masculinization in 68 FTMTS patients. The mean age of the patients was 33 years (range, 21–55 years), and the mean body mass index (BMI) was 24.9 kg/m<sup>2</sup> (range, 19.0–43.0 kg/m<sup>2</sup>; Table 1).

The following chest wall masculinization techniques were used: 22 breasts (group 1, 16.2%) had a pull-through technique, 4 breasts underwent a concentric circular technique (group 2, 3.0%), 14 breasts underwent an ultrathin vertical bipedicle technique (group 3, 10.3%), and 96 breasts (group 4, 70.5%) underwent glandular resection with free nipple grafting.

The mean operation time of the chest wall masculinization procedure was 200 minutes (range, 67–310 minutes); the mean length of hospital stay was 4 days (range, 3–10 days; Table 1).

Our primary outcome was complication rate evaluation. In our series of 136 breast glandular resections for chest masculinization, we achieved a total complication rate of 6.6%, less than that reported in the literature. Partial NAC necrosis was the most frequent complication reported (5.1%), and no operative evacuation was required in any patients. Complications were divided into minor, which could be managed conservatively (9 glandular resections [6.6%]), and



**FIGURE 3.** A, Two incisions of pull-through technique for chest wall masculinization, one lateral to the anterior axillary pillar and the second on the right side of the hypothetical mammary sulcus. B, First stage entails careful liposuction to detach the glandular tissue almost completely from the inferior plane (chest wall). C, Liposuction to detach the glandular tissue almost completely from the superficial plane, to separate the parenchyma from the subcutaneous tissue. D, The second stage is based on removal of glandular tissue by pulling it through the same 2 incisions made for insertion of the cannula. E, Postoperative vision of chest wall masculinization after pull-through technique.





**FIGURE 4.** Preoperative and postoperative pictures of FTMTS who underwent chest wall masculinization with pull-through technique.

major complications, where surgical revision was necessary (0 glandular resections [0%]).

Minor complications included isolated self-limiting hematoma (2 glandular resections [1.5%]) and partial NAC marginal necrosis (7 glandular resections [5.1%], 6 of group 1). Details are presented in Table 2.

Additional procedures for esthetic improvement were performed on 20 breasts (14.7%).

These were grouped as follows: scar revisions (3 breasts [2.2%] of group 4); contour corrections (14 breasts [10.2%]), including liposuction (2 cases in group 4, 2 in group 1, and 4 in group 3), skin reduction, dog ear corrections (6 cases in group 4), and fat grafting; and NAC revisions (3 breasts [2.2%]), including nipple reduction (as reported in group 1), areola reshaping (as collected in groups 2 and 4), and nipple reconstruction (Table 3).

The highest percentage of secondary operations occurred in the group undergoing chest wall masculinization with free nipple grafting technique (12/20 revisions [60%]). Further corrections were not necessary.

During the interview for a critical evaluation of their esthetic outcome, the average score for the overall result was 4.57 of 5, with 5 being

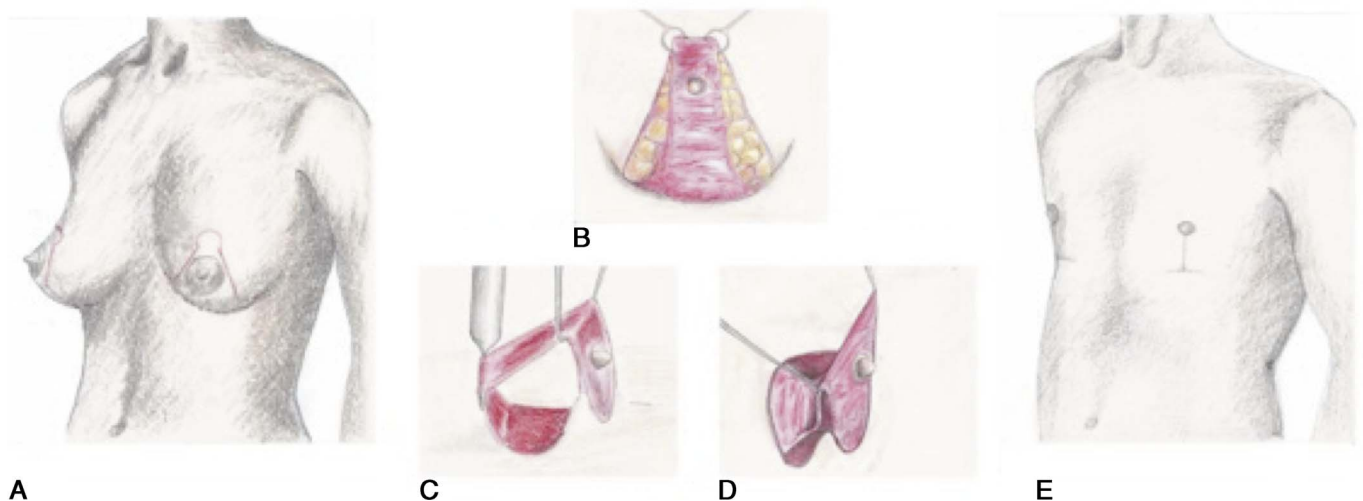
the best: 94.7% of patients rated the esthetic results as “excellent” or “very good,” recording a score of 4 to 5.

Referring to the FtoM-Q questionnaire, most of the patients were satisfied with their psychological and sexual well-being 3 months after surgical intervention, marking a score of 4 to 5 in 87% of cases (Fig. 2).

## DISCUSSION

Gender identity disorder, previously known as “transsexualism,” is the term used for individuals who show a strong and persistent cross-gender identification and persistent discomfort with their anatomical sex, as manifested by a preoccupation with getting rid of their sex characteristics, or their belief of being born in the wrong sex.<sup>19,20</sup>

Since 1978, the Harry Benjamin International Gender Dysphoria Association—in honor of Dr Harry Benjamin, one of the first physicians who made many clinicians awaken to the potential benefits of sex reassignment surgery—has played a major role in the research and treatment of gender identity disorder, publishing the *Standards of Care for Gender Dysphoric Persons*.<sup>21</sup>



**FIGURE 5.** A, Incisions as per the ultrathin vertical bipedicle technique for chest wall masculinization. B, Preparation of this ultrathin dermal bipedicle approximately 6 to 8 cm wide with cranial and caudal irrigation guaranteeing the vitality of the nipple. C, After glandular resection, the ultrathin vertical bipedicle is isolated. D, Duplication and fixation of the ultrathin vertical bipedicle to the pectoral muscle fascia. E, Postoperative vision of chest wall masculinization after ultrathin vertical bipedicle technique with residual inverted T scar.



**FIGURE 6.** Preoperative and postoperative pictures of FTMTS who underwent chest wall masculinization with ultrathin vertical bipedicle technique.

Chest wall masculinization is nowadays one of the first and most important surgical procedures requested by FTMTS; the final goal is to create an esthetically pleasing male chest wall from a female one.<sup>4</sup>

Several techniques for contouring the chest wall have been reported in the literature, but most of them concern mastectomy in women with breast disease or men with gynecomastia,<sup>22–25</sup> whereas fewer studies have focused on specific techniques of chest wall masculinization in FTMTS patients.

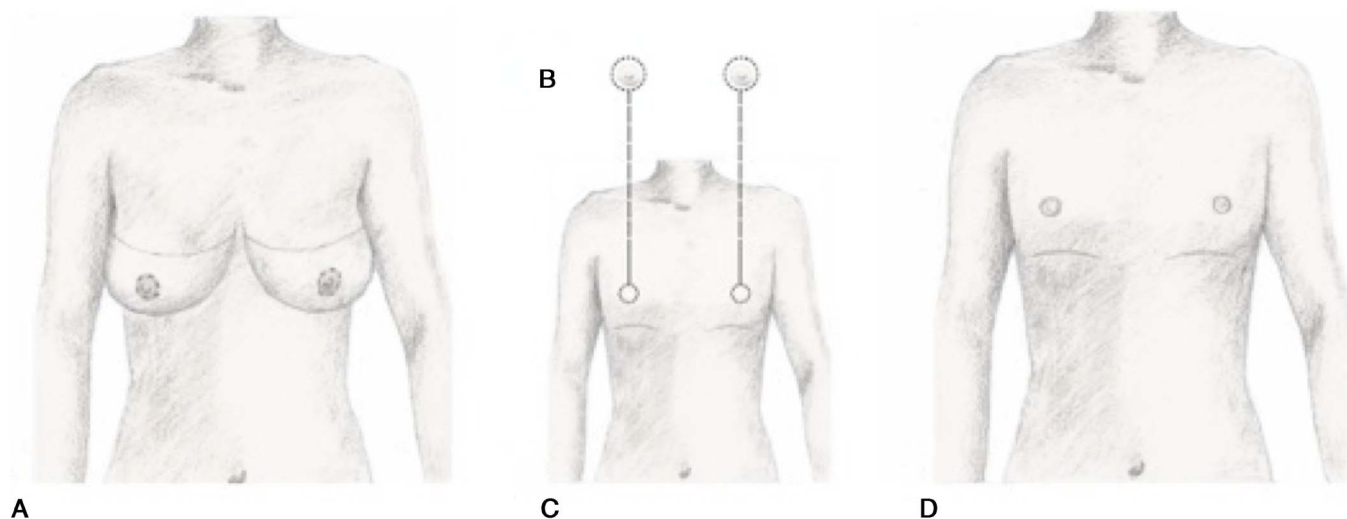
The procedures available are similar to those used in gynecomastia treatment and sometimes in female mastectomy for breast disease,<sup>26</sup> but FTMTS surgery is more complex because of the greater breast size and the various degrees of glandular ptosis. In addition to these known conditions, treatment can be complicated by years of breast binding and by hormonal therapy that worsens skin quality and skin elasticity as compared with a man with gynecomastia or a woman with breast disease. These common practices severely impact the quality of breast skin, heavily influencing the correct choice of chest

wall masculinization procedure and calling for a simple reproducible algorithm approach.

Only a few algorithmic surgical approaches have been published. In the 1990s, Hage and Bloem<sup>8</sup> introduced the “Amsterdam experience” with 3 main techniques: transareolar mastectomy combined with concentric periareolar deepithelialization in cases of minimal skin redundancy. Cases with greater breast volume or degree of ptosis were addressed with horizontal extensions adjacent to the NAC medially and laterally, whereas the largest breasts required fusiform excision with a free NAC graft.

In 2008 and 2011, Monstrey et al<sup>9</sup> proposed 5 surgical options for mastectomy depending on breast volume, skin envelope, ptosis grade, and skin elasticity: semicircular, transareolar, concentric circular, extended concentric approach, and amputation with free nipple graft.

In 2015, Wolter et al<sup>10</sup> published their algorithm based on breast volume, grade of ptosis, and skin elasticity; they proposed semicircular



**FIGURE 7.** A, Incisions as per the free nipple graft technique for chest wall masculinization (placed horizontally 1–2 cm above the inframammary fold and moving upward laterally below the lateral border of the pectoralis muscle). B, Harvesting the NAC as a full-thickness skin graft with a maximal diameter of 25 to 30 mm and a vertical diameter of 20 to 25 mm. C, After glandular resection, the NAC is positioned on the lateral side of the pectoralis major muscle, according to the patient's own anatomical landmarks (approximately 2–3 cm above the lower border of the muscle). D, Postoperative vision of chest wall masculinization after ultrathin vertical bipedicle technique with residual inverted T scar.



**FIGURE 8.** Preoperative and postoperative pictures of FTMTS who underwent chest wall masculinization with free nipple graft technique.

incision in combination with water jet–assisted liposuction, circumferential mastopexy, inferior pedicle mammaplasty, and mastectomy with free nipple grafting.

In this article, we present our algorithm based on the preoperative anatomy of the “female” breast; this clinical tool correlates with breast volume, its degree of glandular ptosis, and skin elasticity and considers the combination of them as the major determining factor in the choice of most appropriate surgical procedure for chest wall masculinization.

For breasts with a small-medium envelope and good skin elasticity, a pull-through technique is our first choice. This technique attempts to conceal the resulting surgical scars, a constant concern for plastic surgeons. The pull-through technique makes it possible to remove the breast parenchyma using only 2 small incisions of 12 to 20 mm positioned far away from the esthetic unit of the breast and confined to the lateral portion of the chest wall.

The same breast with less skin elasticity is well suited to a concentric circular technique.

This technique was first described in 1979 by Davidson<sup>13</sup> for patients with gynecomastia and later adopted by Benelli et al<sup>27</sup> in 1990 for female mammaplasties.

The advantage of this technique is the possibility of removing excess skin as well as the ability to reduce and reposition the NAC, confining the resulting scar to the areolar circumference. In our experience, we prefer the pull-through technique, when possible, to avoid periareolar incisions and to reduce visible scars, keeping the esthetic unit of the breast intact and avoiding all the complications due to areolar incision, such as abnormal scar retraction and or diastasis, keloid formation, and alteration of NAC sensitivity.

The FTMTSs dislike any result that bears a resemblance to their previous female breast.

A moderate-sized breast with poor skin elasticity or large-volume breasts with no laxity will require an ultrathin vertical bipedicle technique.

This approach is reminiscent of the vertical pedicle described by McKissock<sup>14</sup> in 1972 for reduction mammaplasty and enables us to avoid free nipple graft in large-volume breasts; it could be an option in moderate-sized breasts with poor skin elasticity where the other techniques are not possible because of unduly excess skin and laxity.

A large-sized breast with poor skin elasticity will require a breast glandular resection with free nipple grafting. The advantages of this technique are excellent exposure and rapid glandular section, areola and nipple resizing and repositioning, and flattened male chest contouring. The main disadvantages are long residual scars at the previous inframammary fold and NAC pigmentary and sensory alterations.

In our series of 136 breast glandular resections in chest masculinization, we found our complication rate (6.6%) to be less than that reported in the literature despite our small sample. Partial NAC necrosis was the most frequent complication (5.1%), and no operative evacuation was required in any patients.

Secondary revisions in 20 glandular resections (14.7%) were comparable with the data reported in the literature and were mainly required in the free nipple graft technique (group 4): this most likely correlates with the less favorable preoperative anatomy and the inherent higher degree of scarring.

The patient survey revealed a high satisfaction level with the esthetic result in all groups: 94.7% of patients rated the esthetic results as “excellent” or “very good,” and 87% of the patients were

**TABLE 2.** Complication Rate (Classified as Minor or Major Complications if Surgical Revision Was Necessary)

	Overall Collective (n = 136)	Group 1 Pull-Through Technique (n = 22)	Group 2 Concentric Circular Technique (n = 4)	Group 3 Ultrathin Vertical Bipedicle Technique (n = 14)	Group 4 Free Nipple Graft Technique (n = 96)
Major complication	0 (0%)	0	0	0	0
Full NAC necrosis	0 (0%)	0	0	0	0
Hematoma with revision	0 (0%)	0	0	0	0
Minor complication	9 (6.6%)	2	0	0	7
Partial NAC necrosis	7 (5.1%)	1	0	0	6
Hematoma without revision	2 (1.5%)	1	0	0	1

**TABLE 3.** Secondary Revisions (Scar Revisions, Contour Corrections, and NAC Revisions)

	Overall Collective (n = 136)	Group 1 Pull-Through Technique (n = 22)	Group 2 Concentric Circular Technique (n = 4)	Group 3 “Ultrathin Vertical Bipedicle” Technique (n = 14)	Group 4 Free Nipple Graft Technique (n = 96)
Secondary revisions	20 (14.7%)	3	1	4	12
Scar revision	3 (2.2%)	0	0	0	3
Contour correction	14 (10.2%)	2	0	4	8
NAC revision	3 (2.2%)	1	1	0	1

Contour corrections include liposuction, skin reduction, dog ear corrections, and fat grafting; NAC revisions include nipple reduction, areola reshaping, and nipple reconstruction.

satisfied with their psychological and sexual well-being 3 months after surgical intervention.

## CONCLUSIONS

In this article, we propose our treatment algorithm for preoperative evaluation of the chest wall when choosing the most appropriate FTMTS surgical technique, with a view to reducing unfavorable results and improving patient satisfaction. The use of this algorithm in choosing the surgical procedure allowed us to achieve a high satisfaction rate concerning psychological and sexual well-being 3 months after surgical intervention.

We believe that a careful preoperative examination is the key factor in choosing the appropriate surgical technique. The evaluation of breast size, breast envelope and skin quality (grade of laxity/elasticity), and dimension and position of NAC helps surgeons to differentiate patients undergoing subcutaneous mastectomy from patients who are candidates for a skin extended technique.

In our clinical experience, the pull-through technique, in selected cases, represents the best compromise between surgical times, low complication rate, high esthetic results, and life satisfaction.

Despite the low rate of complications and high rate of satisfaction, surgical secondary refinements are required in FTMTS skin extended procedures to achieve the best results.

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