

Chest-Wall Contouring Surgery in Female-to-Male Transsexuals: A New Algorithm

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Background: In female-to-male transsexuals, the first surgical procedure in their reassignment surgery consists of the subcutaneous mastectomy. The goals of subcutaneous mastectomy are removal of breast tissue, removal of excess skin, reduction and proper positioning of the nipple and areola, and ideally, minimization of chest-wall scars. The authors present the largest series to date of female-to-male transsexuals who have undergone subcutaneous mastectomy.

Methods: A total of 184 subcutaneous mastectomies were performed in 92 female-to-male transsexuals, using the following five techniques: semicircular, transareolar, concentric circular, extended concentric circular, and free nipple graft. The technique used depended on the breast size and envelope, the aspect and position of the nipple-areola complex, and the skin elasticity. To best meet the goals of creating a normal male thorax, the authors have developed an algorithm to aid in choosing the appropriate procedure.

Results: The overall postoperative complication rate was 12.5 percent (23 of 184 subcutaneous mastectomies), and in eight of these cases (4.3 percent), an additional operative intervention was required because of hematoma, infection, and/or wound dehiscence. Despite this low complication rate, additional procedures for improving aesthetic results were performed on 59 breasts (32.1 percent). The semicircular and concentric circular techniques produced the highest rating of the overall result by patient and surgeon, whereas the extended concentric circular technique produced the lowest rating.

Conclusions: Skin excess and skin elasticity are the key factors in choosing the appropriate technique for subcutaneous mastectomy, which is reflected in the algorithm. Although the complication rate is low and patient satisfaction is high, secondary aesthetic corrections are often indicated. (*Plast. Reconstr. Surg.* 121: 849, 2008.)

The first and arguably most important surgical procedure performed in the female-to-male transsexual is the creation of an aesthetically pleasing male chest by means of a subcutaneous mastectomy. This procedure allows the patient to live more easily in the male gender role¹⁻⁵ and facilitates the “real-life experience,” which is a prerequisite for genital surgery. Although a large body of literature exists concerning the optimal technique for performing a subcutaneous mastectomy, most of the articles have focused on women with breast disease and on men with gynecomastia, whereas fewer publications exist regarding removal of the breast in the female-to-male transsexual.

Hage and Kesteren⁵ defined the goals of the subcutaneous mastectomy in the female-to-male transsexual patient, which are the aesthetic contouring of the chest wall by removal of breast tissue and skin excess; the proper reduction and positioning of the nipple and areola; and ideally, the minimization of chest-wall scars.^{4,5} Many of the techniques for the treatment of gynecomastia have been used or modified in female-to-male transsexuals, and the methods and indications for each have been discussed in the literature.¹⁻¹¹ However, performing a subcutaneous mastectomy in a female-to-male transsexual is more difficult than in a male with gynecomastia because, in most cases, the female-to-male patient will have significantly more

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breast volume and a greater degree of skin excess and ptosis. The situation can be made more complex by poor skin quality, which we feel can be exacerbated by years of breast binding, which is commonly performed by these patients (Fig. 1). We feel that the skin quality, more specifically, the *skin elasticity*, is one of the key factors in determining the optimal technique to be used in performing the subcutaneous mastectomy, yet this specific factor has been largely neglected in the existing body of literature.

In this article, we present the largest series to date of female-to-male transsexuals who have undergone subcutaneous mastectomy. Five techniques for performing an aesthetically satisfactory subcutaneous mastectomy in the female-to-male transsexual are reviewed. Building on our 12-year experience with this procedure, we have developed an algorithm to help choose the most appropriate subcutaneous mastectomy technique.

PATIENTS AND METHODS

From May of 1991 until February of 2003, 92 female-to-male transsexual patients underwent bi-

lateral subcutaneous mastectomies (for a total of 184 subcutaneous mastectomies) at the Department of Plastic Surgery, Gent University Hospital, Gent, Belgium. Initially, a retrospective review of patient charts was undertaken to evaluate the technique used, the rate of complications, and the presence of secondary and tertiary procedures. In addition, 28 patients (30.4 percent) who did not live far from the hospital agreed to return for a more extensive long-term follow-up visit. Using a questionnaire, the overall aesthetic result of the subcutaneous mastectomy was rated by the patient and by a surgeon who did not participate in the surgery. Respondents were asked to give an overall rating corresponding to a Likert-scale from 1 to 5, with 1 being poor and 5 being excellent. The surgeon also performed a more detailed evaluation of the results that included ratings of the scarring, the nipple-areola complex, nipple aesthetics, and overall chest-wall contour.

Surgical Protocol

Parameters to be evaluated preoperatively included breast volume, degree of excess skin, nipple-areola complex size and position, and skin elasticity. The specific technique with which to perform the subcutaneous mastectomy is then chosen based on the algorithm presented in Figure 2.

According to our surgical protocol in female-to-male transsexuals, we combine the subcutaneous mastectomy procedure with a laparoscopic hysterectomy and oophorectomy in a first operation, whereas the vaginectomy, scrotoplasty, and phalloplasty with reconstruction of the fixed part of the urethra are carried out in a second stage anytime thereafter. Hormonal therapy is stopped 2 to 3 weeks before every surgical intervention.

Operative Techniques

Regardless of the technique chosen, we feel it is extremely important to preserve all of the subcutaneous fat when dissecting the glandular tissue from the flaps. This ensures thick flaps that produce a pleasing contour and do not subsequently become tethered to the chest wall. For the same reason, we preserve the pectoralis fascia and definitely do not perform liposuction at the anterior aspect of the breast. However, the judicious use of liposuction can occasionally be indicated laterally or to attain better symmetry at the end of the procedure. The inframammary fold is always released, and this is an especially important maneuver for patients with large breasts. Postoperatively,

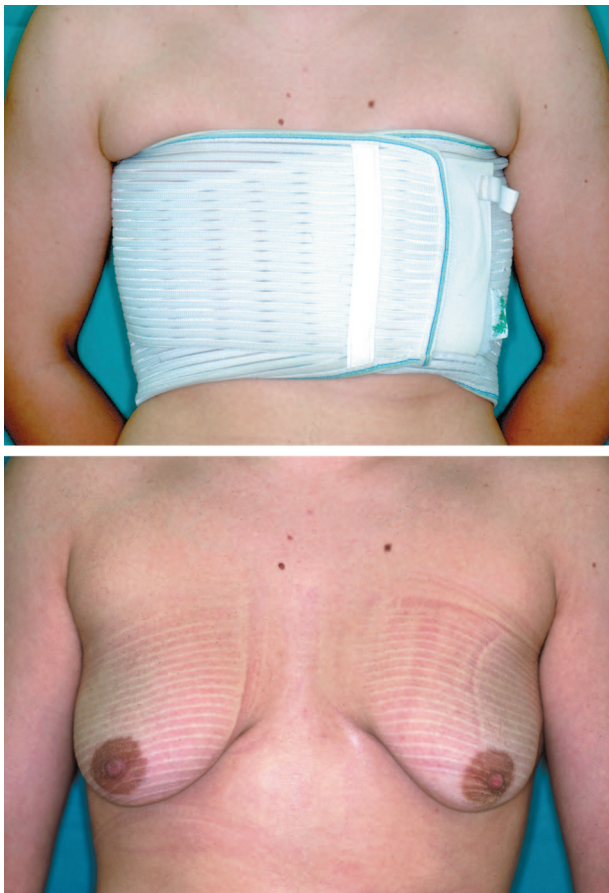


Fig. 1. Result of long-term breast binding.

S K I N E N V E L O P E

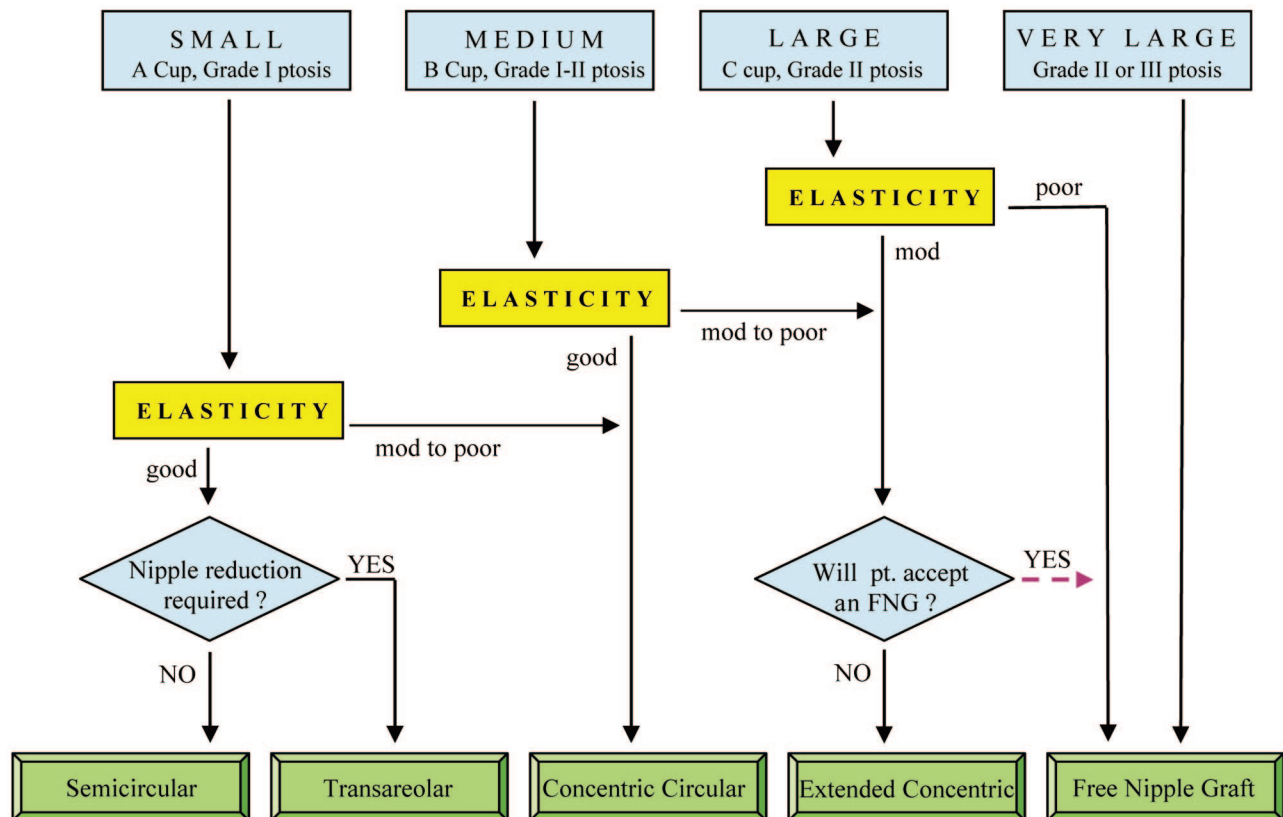


Fig. 2. Algorithm for choosing the appropriate subcutaneous mastectomy technique. *FNG*, free nipple graft.

a circumferential elastic bandage is placed around the chest wall and maintained for a total of 4 to 6 weeks.

The semicircular technique (Fig. 3) is essentially the same procedure as that described by Webster⁹ in 1946. It is useful for individuals with smaller breasts. The resulting scar will be confined to the lower half of the periphery of the areola (infra-areolar). A sufficient amount of glandular tissue should be left in situ beneath the nipple-areola complex to avoid a depression. The specific advantage of this technique is the small and well-concealed scar that is confined to the nipple-areola complex. The major drawback is the small window through which to work, making excision of breast tissue and hemostasis more challenging.

In cases of smaller breasts with large, prominent nipples, the transareolar technique (Fig. 4) is used. This is similar to that described by Pitanguy⁸ in 1966. It allows for a subtotal resection of the nipple, and the resulting scar traverses the areola horizontally and passes around the upper aspect of the nipple. The advantage of this technique is an immediate

nipple reduction at the expense of a slightly more apparent transareolar scar.

The concentric circular technique (Fig. 5) is similar to that described by Davidson⁷ in 1979. It is used for breasts with a medium-sized skin envelope (B cup) or for smaller breasts with poor skin elasticity. The concentric incision can be drawn as a circle or ellipse, enabling deepithelialization of a calculated amount of skin in the vertical and horizontal directions.⁵ Access is gained by means of an incision in the inferior aspect of the outer circle. Glandular tissue is carefully dissected off the overlying nipple-areola complex, leaving it widely based on a dermal pedicle. A permanent purse-string suture is placed and set to the desired areolar diameter (usually 25 to 30 mm). The advantages of this technique are that it allows for reduction of the areola and removal of excess skin and that the resulting scar is confined to the circumference of the areola. It also affords good exposure for glandular excision and hemostasis.

The extended concentric circular technique (Fig. 6) is similar to the concentric circular tech-

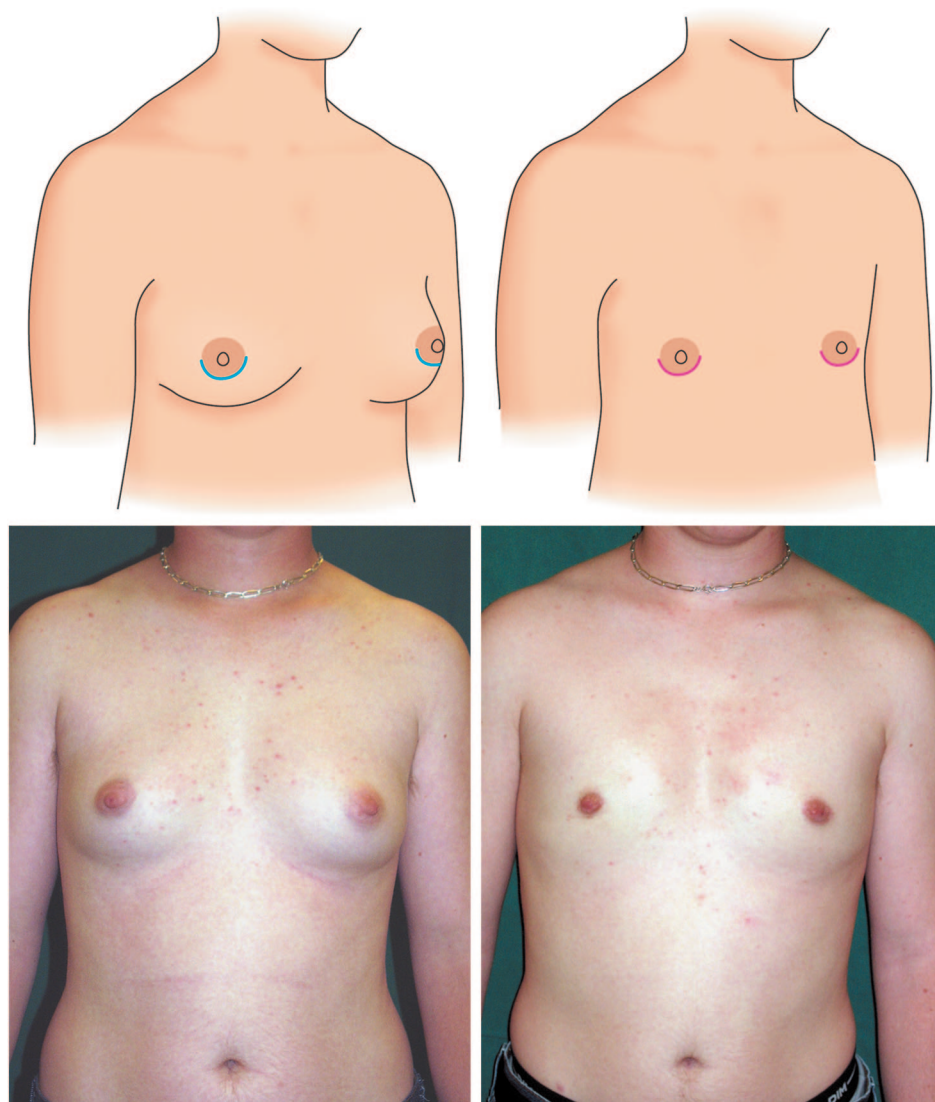


Fig. 3. Semicircular technique. (Above, left) Incisions and (above, right) scars. (Below, left) Preoperative and (below, right) postoperative photographs.

nique but includes one or two additional triangular excisions of skin and subcutaneous tissue that may be lateral, or medial and lateral. This technique is specifically useful for correcting more extensive skin excess and wrinkling produced by large differences between the inner and outer circles. The resulting scars will be around the areola, with horizontal extensions onto the breast skin, depending on the degree of excess skin.

The free nipple graft technique (Fig. 7) has been proposed by several authors for patients with large, ptotic breasts.^{1-2,12-14} It consists of harvesting the nipple-areola complex as a full-thickness skin graft with a diameter of 25 to 30 mm, followed by breast amputation, and finally grafting of the nipple-areola complex onto its new location on the

chest wall. We place the incision horizontally 1 to 2 cm above the inframammary fold and move upward laterally below the lateral border of the pectoralis muscle. In most of these patients, judicious defatting or liposuction may be performed laterally and medially to avoid dog-ear formation and to ensure symmetric contouring.

Regarding the ideal placement of the nipple-areola complex, we feel that the use of absolute measurements can be misleading. As such, we agree with the recommendations of many authors who position the nipple-areola complex according to the patient's own anatomical landmarks.^{15,16} In our series, the nipples were placed along the existing nipple line, and the height was adjusted to approximately 2 to 3 cm above the lower border

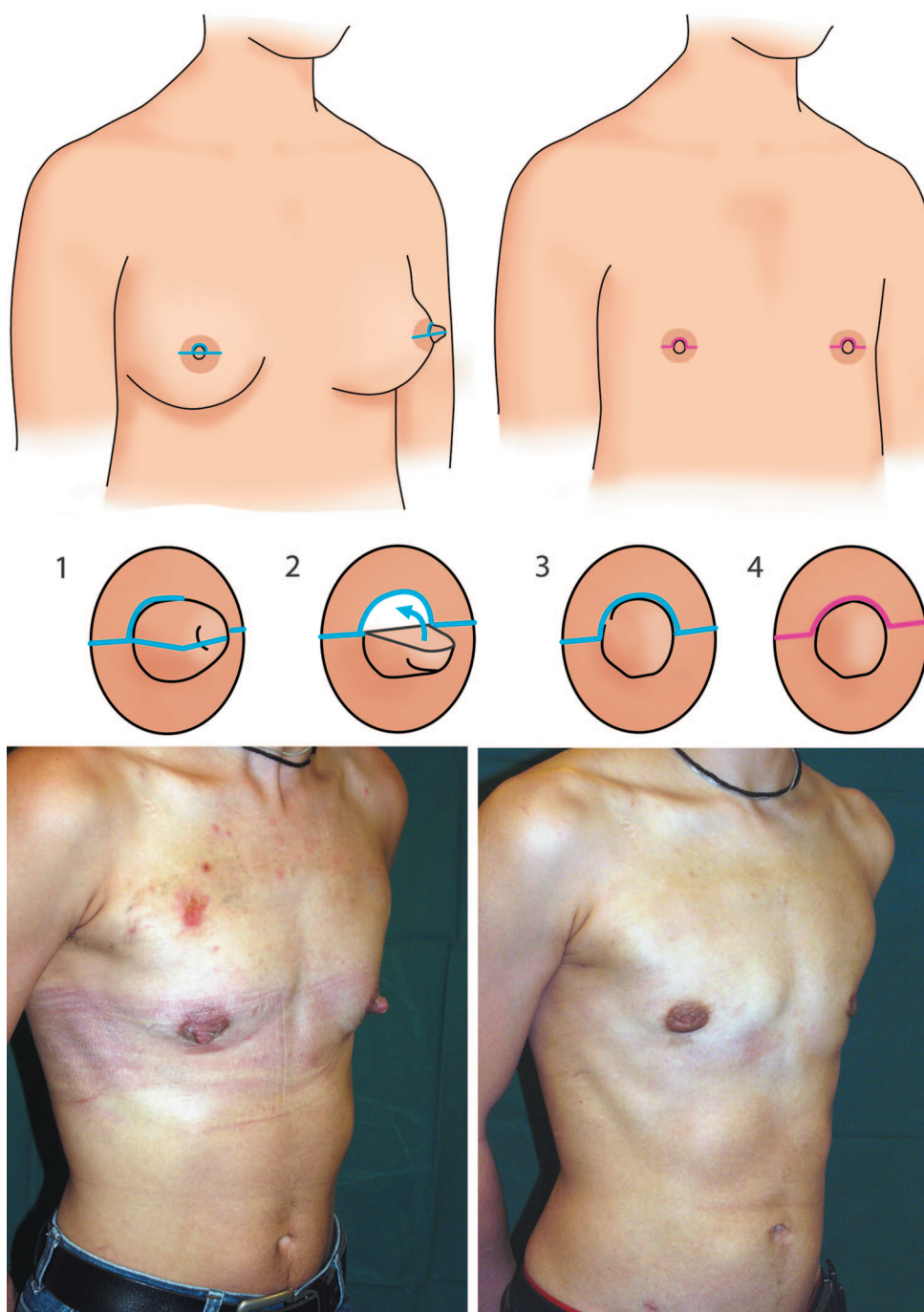


Fig. 4. Transareolar technique. (Above) Incisions and scars. (Center) Details of nipple resection. (Below, left) Preoperative and (below, right) postoperative photographs.

of the pectoralis major. Clinical judgment is often most important, however, and we always sit the patient up intraoperatively to check the final nipple position.

The advantages of the free nipple graft technique are (1) excellent exposure and more rapid resection of tissue, (2) nipple reduction, and (3)

areola resizing and repositioning. The disadvantages are the long residual scars and nipple-areola complex pigmentary and sensory changes.

Statistical Analysis

Results are summarized as frequencies with percentages or as means and ranges, depending

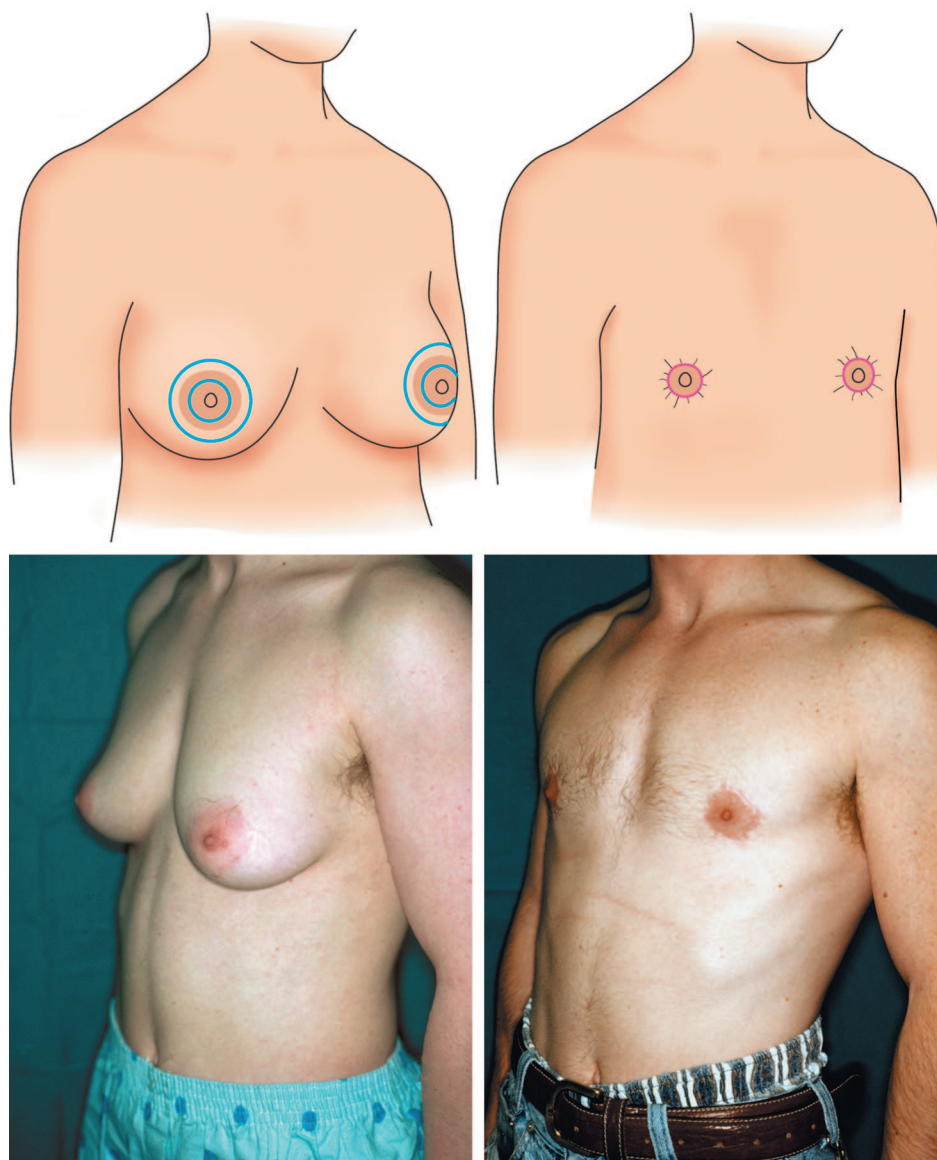


Fig. 5. Concentric circular technique. (Above) Incisions. (Below, left) Preoperative and (below, right) postoperative photographs.

on the type of variable. The chi-square (Fisher's exact test) was used in comparative analysis between techniques.

RESULTS

One hundred eighty-four subcutaneous mastectomies were performed on 92 patients between May of 1991 and February of 2003. The mean age of the patients was 31 years (range, 20 to 60 years). The following techniques were used: semicircular, 30 breasts (16.3 percent); transareolar, 10 breasts (5.5 percent); concentric circular, 70 breasts (38.1 percent); extended concentric circular, 38 breasts (20.6 percent); and free nipple graft, 36 breasts (19.5 per-

cent). The average weight of the resected tissue was 327 g (range, 55 to 1312 g).

Complications occurred in 23 of the mastectomies (12.5 percent). For the purposes of discussion, all complications were divided into minor [15 subcutaneous mastectomies (8.2 percent)], which could be managed nonoperatively; and major [eight subcutaneous mastectomies (4.3 percent)], all of which required a return to the operating room. Minor complications included isolated self-limiting hematoma [five subcutaneous mastectomies (2.75 percent)], isolated wound dehiscence [two subcutaneous mastectomies (1.1 percent)], and partial nipple-areola complex mar-

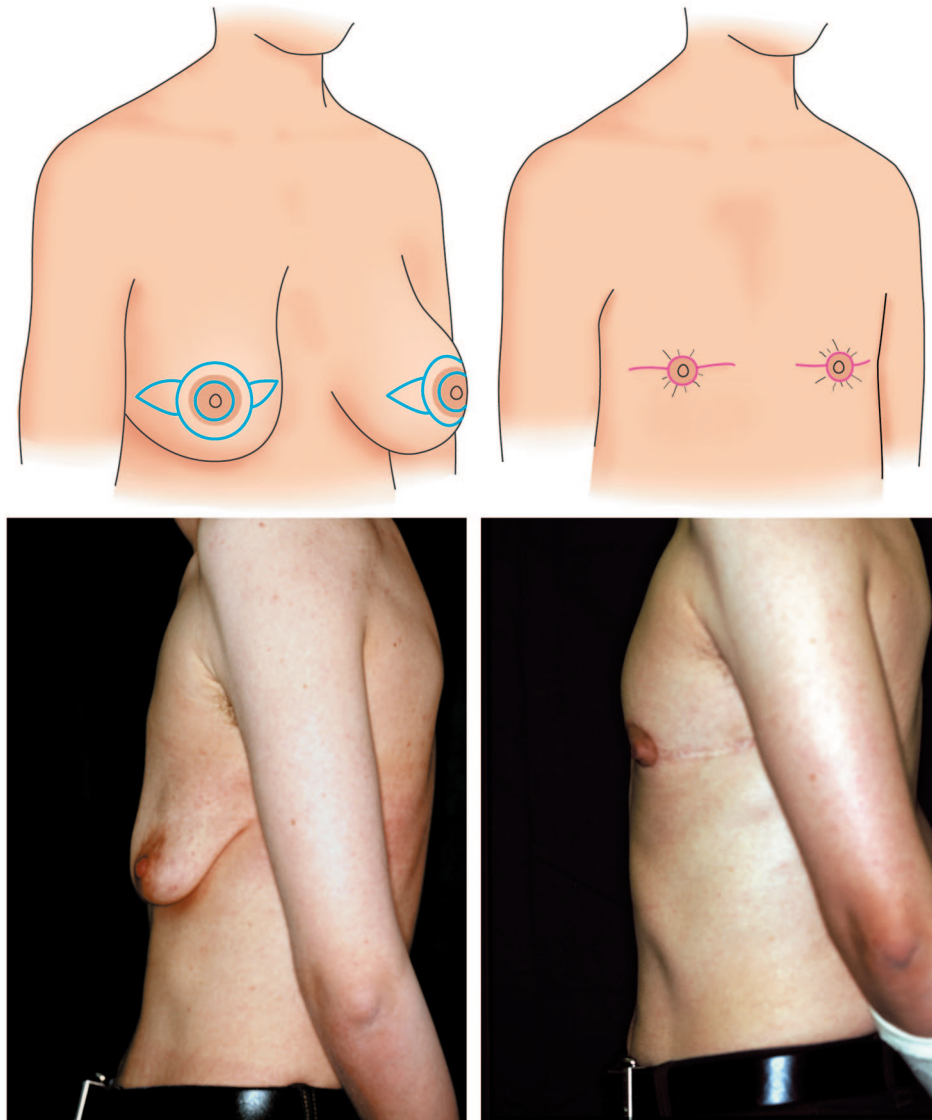


Fig. 6. Extended concentric circular technique. (Above) Incisions. (Below, left) Preoperative and (below, right) postoperative photographs.

ginal necrosis [eight subcutaneous mastectomies (4.4 percent); one was associated with hematoma]. Major complications included hematoma requiring evacuation [six subcutaneous mastectomies (3.3 percent)] and abscess formation [two subcutaneous mastectomies (1.1 percent)]. Reoperation for hematoma was found to be more frequent with the transareolar (20.0 percent) and semicircular (6.6 percent) techniques compared with the other techniques that provided greater exposure. Details are presented in Table 1.

The transareolar group included only five patients and therefore could not be used for comparative analysis between techniques: if a Fisher's exact test is performed comparing the number of

complications³ in the transareolar group to the rest of the treatment groups combined, a significant p value ($p = 0.041$) is obtained.

Additional procedures for aesthetic improvement were performed on 59 breasts (32.0 percent) at an average postoperative period of 12 months (range, 4 months to 8 years). These can be broadly grouped as follows: scar revisions [36 breasts (19.6 percent)]; contour corrections [47 breasts (25.5 percent)], including liposuction, skin reduction, dog-ear corrections, and fat grafting; and nipple-areola complex revisions [24 breasts (13.0 percent)], including nipple reduction, areola reshaping, and nipple reconstruction. Several patients required more than one aesthetic revision per-

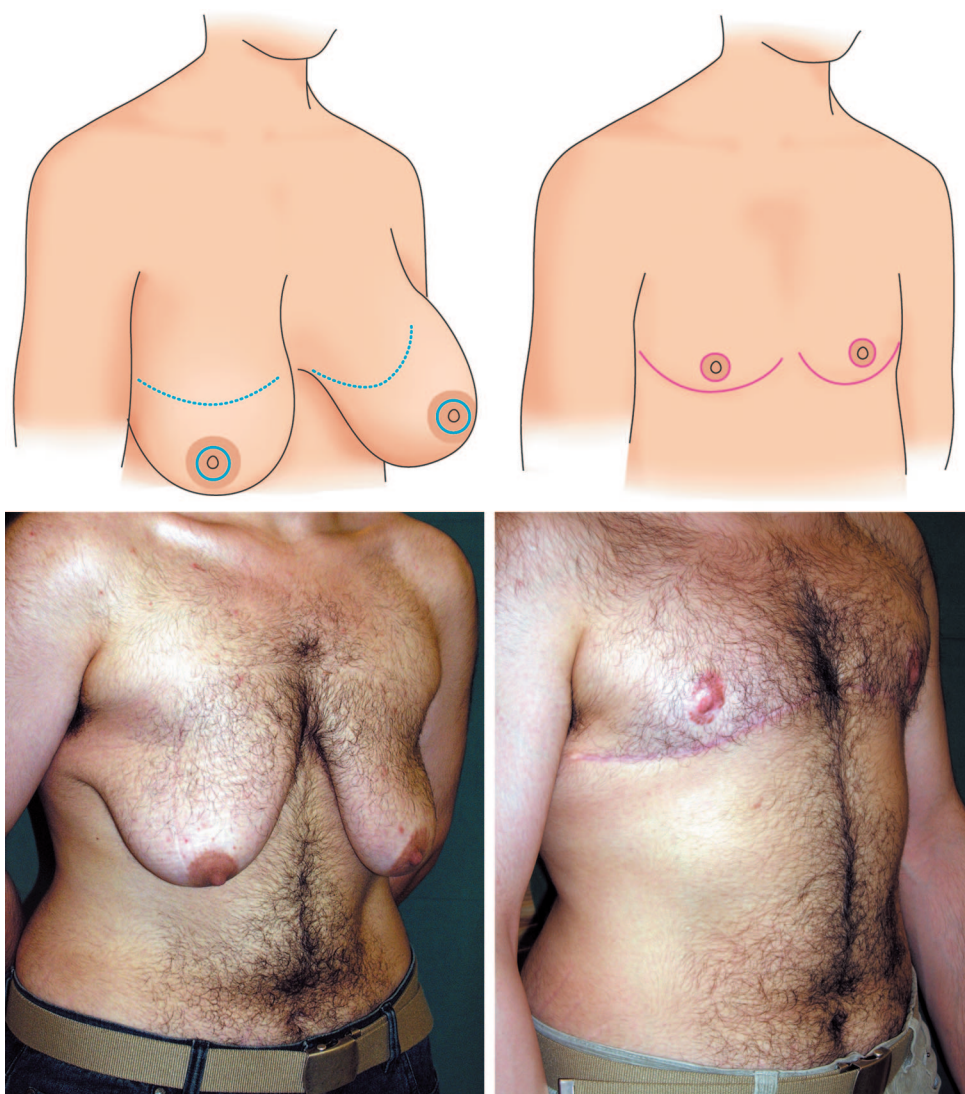


Fig. 7. Free nipple graft technique. (Above) Incisions. (Below, left) Preoperative and (below, right) postoperative photographs.

formed simultaneously. The highest percentage of secondary operations was encountered in the groups undergoing subcutaneous mastectomy using an extended concentric circular technique (60.0 percent). Tertiary procedures were performed on seven breasts (3.8 percent) and included scar revisions [seven breasts (3.8 percent)], nipple tattooing [four breasts (2.2 percent)], and liposuction [four breasts (2.2 percent)].

Twenty-eight patients (30.4 percent) who did not live far from the hospital were available for a critical evaluation of their aesthetic outcome. As rated by the patients themselves, the average score for the overall result was 4.14 of 5, with 5 being the best. The average surgeon's score was 4.3. Overall evaluation by patient and surgeon based on the technique used is presented in Table 2. Although

not evaluated formally with Semmes-Weinstein pressure testing or vibratory thresholds, the majority of patients reported reduced sensation of the nipple, which was more pronounced in patients who had larger breasts or who underwent a free nipple grafting procedure.

DISCUSSION

The subcutaneous mastectomy is usually the first and arguably the most important surgical procedure for the female-to-male transsexual. The final goal (and the challenge) of this operation is the construction of an aesthetically pleasing male chest from that of a female person. It is not similar to a mastectomy for breast disease in a female patient because the goals are very different. The procedure is usually more difficult than in a gy-

Table 1. Details by Technique: Complications and Additional Procedures

Technique	No. (%)	Weight (Range) (g)	Minor Complications (%)	Major Complications (%)	Second Operation (%)	Third Operation (%)
All	184	327	15 (8.2)	8 (4.3)	59 (32)	7 (3.8)
Semicircular	30 (16.3)	170 (70–340)	0	Hematoma in 2 (6.6)	10 [liposuction in 2, scar revision in 4, skin resection in 2, nipple reduction in 8 (these were combined differently)] (33.3)	0
Transareolar	10 (5.5)	85 (55–120)	Hematoma in 1 (10)	Hematoma in 2 (20)	2 (scar revision in 2 with nipple red in 1) (10.0)	0
Concentric circular	70 (38.1)	240 (55–600)	Dehiscence in 1, partial NAC loss in 2 (1 patient, bilateral) (4.3)	Hematoma in 1 (1.4)	20 [liposuction in 10, scar revision in 14, skin resection in 8, nipple reduction in 4, areola reshaping in 4, fat grafting in 1, tattoo in 1 (these were combined differently)] (28)	3 (liposuction in 2, scar revision in 3) (4.2)
Extended concentric circular	38 (20.6)	365 (80–880)	11 [isolated hematoma in 4, hematoma in 1 + 2 partial NAC loss (1 patient, bilateral), partial NAC loss in 4 (2 patients, bilateral)] (28.9)	2 [hematoma in 1 (not reoperated) + dehiscence + infection (abscess) (1 patient, bilateral)] (5.3)	23 [liposuction in 10, scar revision in 14, skin resection in 4, dog-ear in 6, nipple red in 3, nipple reconstruction in 1 (these were combined differently)] (60)	4 (liposuction in 2 + scar revision, scar revision in 2) (10.5)
Free nipple graft	36 (19.5)	550 (150–1312)	Dehiscence in 1 (2.7)	Hematoma in 1 (2.7)	4 [liposuction in 3 (scar revision, skin resection), nipple reduction in 2] (11.1)	0

Table 2. Overall Aesthetic Evaluation by Technique

Technique	No. of Patients Evaluated	Patient's Mean Score	Surgeon's Mean Score
Semicircular	6	4.5	4.7
Transareolar	2	4.0	4.5
Concentric circular	6	4.5	4.7
Extended concentric circular	9	3.6	3.6
Free nipple graft	5	4.3	4.3

necomastia correction because the female-to-male transsexual often has considerably more breast volume and a greater degree of ptosis with which to contend. Moreover, as confirmed by several of our patients, we are of the opinion that the common practice of breast binding severely impacts the quality of breast skin, which is a major factor for us in choosing the correct subcutaneous mastectomy procedure.

Even though the literature contains several recommendations on how best to perform a subcutaneous mastectomy in the female-to-male transsexual, there still appears to be little or no consensus.¹⁻¹¹ Moreover, we feel that the key determinant of skin elasticity has not received the emphasis that it deserves. Of course, skin excess, as reflected by the degree of ptosis, will be a major determining factor,⁴ but skin elasticity is an often-overlooked variable that can make the difference between a good and a poor aesthetic outcome, especially in inexperienced hands.

Based on our extensive experience with 184 subcutaneous mastectomies performed in 92 female-to-male transsexual patients in the past 12 years, we present our results and an algorithm for choosing the appropriate surgical technique. Depending on the preoperative anatomy of the breast, the following surgical techniques are recommended: for breasts with a small envelope and good skin elasticity, a semicircular technique is suitable. The same breast with an oversized nipple is well suited to a transareolar technique. The same breast with moderate to poor elasticity, or a breast having a larger envelope (B cup, grade 1 or 2 ptosis), will require a concentric circular technique. A moderate-sized breast (B or C cup, grade 1 or 2 ptosis) with poor skin elasticity will require an extended concentric circular technique. Finally, large-volume breasts (C cup or larger) with substantial skin excess and little or no skin elasticity will likely require a breast amputation with free nipple grafting. This is summarized in Figure 2.

As one moves to the right in the algorithm, techniques using progressively longer incisions are called

for, with an inherent increase in the residual scars. We have found that when skin elasticity is suboptimal and all other factors are equal, it is far preferable to move one step to the right in the algorithm rather than to risk a poor aesthetic outcome with wrinkled or uneven skin. Inevitably, this includes using more incisions and thus producing longer scars. This appears to be in stark contrast to the modern “short-scar” concepts so popular today in breast reduction and mastopexy. However, in our experience with this group of patients, increasing the length of the scar on a masculine-appearing chest is far preferable to puckering, wrinkling, tethering, and especially excess skin. This can be compared with the scar after an abdominoplasty procedure, where making the scar a couple of centimeters longer is far preferable to leaving an even small dog-ear at the lateral end of the scar. The female-to-male transsexual dislikes any result that bears a resemblance to their previous female breast. Of course, good skin elasticity enables the use of fewer incisions with less subsequent scarring, and can also result in less cutaneous wrinkling.

In this series of 184 subcutaneous mastectomies, we found our complication rate (12.5 percent) to be similar to that reported in the literature. Hematoma was the most frequent complication (9.8 percent), and operative evacuation was required in 6.6 percent of the patients. As expected, the frequency of hematomas decreased as one moves to the right in the algorithm, namely, in those techniques that provided better access. Some of the other complications such as nipple necrosis and abscess formation were also associated with a hematoma. This illustrates the importance of achieving good hemostasis intraoperatively because the use of drains and compression bandages, used here consistently in all cases, does not prevent the occurrence of this troublesome complication. Excluding the transareolar group (which included only five patients), the highest rate of complications by technique was seen in the extended concentric circular group (21 percent). Moreover, almost all of the nipple necrosis (75 percent) occurred using this technique.

The patients' and surgeon's overall rating of the aesthetic result also tended to decrease as one moves to the right in the algorithm, whereas the number of secondary corrections increased. This likely correlates with the less favorable preoperative anatomy and with the complexity of these procedures and the inherent higher degree of scarring. Again, the extended concentric circular technique is notable here. By technique, it had the highest revisional rate (60 percent) and the lowest overall satisfaction rating (3.6 of 5) by both patient and surgeon. Because the technique was also associated with the highest

rate of complications in our series, we now consider moving to the free nipple graft technique where a grafted nipple-areola complex is acceptable to the patient—especially in the patient with poor skin elasticity. Despite the fact that the free nipple graft technique produces a long scar beneath the new male breast, it carries with it a relatively low rate of complications (5.4 percent) and revision surgery (11.1 percent). Furthermore, the technique is less complex, and even though patient satisfaction is not the highest, it is still good (4.3 of 5). The highest patient satisfaction rating was found among the concentric circular group, and where indicated, it is an excellent choice.

CONCLUSIONS

The final outcome of a subcutaneous mastectomy in female-to-male transsexuals is highly dependent on the preoperative anatomy of the breast. Skin excess and skin elasticity are the key factors in choosing the appropriate technique, and this is reflected in our algorithm. Although the complication rate is low and patient satisfaction is high, secondary aesthetic corrections are often indicated in this patient population, which is becoming more informed and more demanding.

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