Metaidoioplasty: An Alternative Phalloplasty Technique in Transsexuals

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The various techniques for phalloplasty in female-to-male transsexuals produce results that are more or less acceptable, both aesthetically and functionally. However, all these techniques will lead to extensive scarring of the donor area.

Metaidoioplasty uses the clitoris, overdeveloped by hormonal treatment, to construct a microphallus in a way comparable to the correction of chordae and lengthening urethra in male pseudohermaphrodites and in cases of severe hypospadias. It will not leave any scars outside the genital area.

My experience in 32 female-to-male transsexuals is presented. At best, metaidoioplasty will provide a small phallus, if at all, capable of sexual penetration. Still, I consider it to be a method of choice in cases where the clitoris seems large enough to provide a phallus that will satisfy the patient. (Plast. Reconstr. Surg. 97: 161, 1996.)

Although there has been gradual improvement in phalloplasty techniques, as a rule, the use of pedicled and free flaps to construct a neophallus in female-to-male transsexuals results in extensive scarring of the donor area. Of course, the donor area may be chosen in such a way as to prevent obvious scarring. From this point of view, the extended groin flap is superior to any epigastric flap, while the upperarm flap is superior to the forearm flap.

Recently, Sadoye et al. further enhanced camouflaging the donor site disfigurement by introducing the fibula osteocutaneous free flaps for phalloplasty. However, laborious techniques such as pretransfer tissue expansion or postoperative correction of the donor area may still be indicated.

In keeping with Gillie’s commandment to place what is normal into a normal position and retain it there, the penis may be substituted by clitoral enlargement and urethral transfer in female-to-male transsexuals. Clitoris and penis are homologues, as are the scrotum and labia majora, even though located in a different position. Androgen treatment stimulates growth of the clitoris, in some patients to the point where this organ can suffice as a phallus. An overdeveloped clitoris may be distinguished from an underdeveloped penis or even a severe hypospadias. Still, in comparison with the severe hypospadias patient, the female external genitalia have more tissue available for surgical construction of a masculine phallus.

Durfee and Rowland were the first to report surgical penile substitution employing the clitoris in female-to-male transsexuals. The techniques have since been refined, and Laub et al. defined this surgical transformation as metoidioplasty, the term being derived from the Greek. In compliance with the Anglo-American spelling, we prefer metaidoioplasty, meta- being the prefix denoting the concept of change, as in metamorphosis and metagenesis, aidoio being an archaic combining form relating to the genitals, and -plasty being the suffix derived from plastos meaning “shaping or the result thereof,” as of a surgical procedure. Eicher prefers Klitospenoid when referring to the clitoris being transformed into a penis-like structure. Applying metaidoioplasty, scarring will be inconspicuously restricted to the external genital region. Furthermore, it is essentially a one-stage procedure producing a neophallus with all functions of a penis, albeit a micropenis but ending as a cul-du-sac at the base of the neopenis and hence not enabling the patient to void while standing. Although he did suggest constructing the fixed, perineal part of the neourethra, Laub did not do so in the same surgical session. On the other hand, Bouman performed a sort of metaidoioplasty in which the urethra was lengthened to reach the tip of the clitoris by use of the anterior vaginal flap. However, in his technique, the clitoris was not released and transposed as much as in Laub’s technique.

Gilbert et al. reported release of the clitoris provided with the penile part of the neourethra in combination with lengthening of the fixed part of the urethra. For this, they only used local labial skin flaps. Likewise, Eicher lengthens the urethra to enable the patient to void while standing, but he appears not to release the chordae. Both Gilbert et al. and Eicher do not employ the anterior vaginal wall flap to enforce the urethronourethral junction.

Since December of 1991, metadoioplasty applying a urethra lengthening according to Bouman and a release of the clitoris according to Laub is being performed in our hospital, combining the superior aspects of both techniques (Fig. 1). In order to further prevent urinary fistulas, a modification of the technique to construct the penile part of the neourethra has been introduced. In this paper the experience of our team is presented and our results are discussed.
PATIENTS AND METHODS

From December of 1991 to March of 1994, 20 female-to-male transsexuals underwent metaidoiplasty in our hospital. The indications for gender-confirming surgery were agreed on by the Amsterdam gender dysphoria team. At the time of operation, the average age of patients was 34 years (range 20 to 52 years). The patients had been on hormonal treatment for 211 to 146 months prior to surgery (mean 55 months). Follow-up in this series of 20 ranged from 6 to 36 months (mean 22 months) and is still increasing.

From March to December of 1994, metaidoiplasty was performed in 12 additional patients, among them one in Barcelona, Spain (courtesy of Dr. M. Th. Pesqueira) and one in Johannesburg, South Africa (courtesy of Dr. M. Fayman). The results in these patients are not included in this study because of restricted follow up.

Operative Technique

All patients are operated on under general anesthesia in the lithotomy position. An antibiotic prophylaxis for 24 hours, starting just before operation with 1500 mg cefuroxim sodium (Zinacef) and 500 mg metronidazole, is given. An indwelling catheter is inserted. After injection of the anterior and lateral parts of the vaginal wall with lidocaine 0.5% and 1:200,000 epinephrine, a caudally based pedicled flap is raised from the anterior vaginal wall. The length of this flap is devised in such a way that the flap will reach beyond the base of the clitoris. Its length varies from 5 to 7.5 cm; its width is 2 to 3 cm. The base of its pedicle envelops the dorsal half of the urethral orifice. The flap contains the muscularis layer of the ventral vaginal wall but no part of the urethral wall or bladder sphincter muscle. This vaginal flap will serve as the lining of the pars fixa of the neourethra. After the flap is raised, the donor area is sutured, thereby narrowing the vagina.

FIG. 1. Metaidoiplasty applying a urethra lengthening by use of the anterior vaginal flap according to Bouman and a release of the clitoris according to Laub combines the superior aspects of both techniques.
In order to release the clitoral shaft by resection of the chordae, the vestibular skin between the meatus and clitoris is incised in a W-like fashion (Fig. 2). The vestibular skin incisions are to be continuous with the parallel incisions on the anterior aspect of the vaginal wall. One limb of this W is extended toward the future urethral meatus at the tip of the clitoris, while the other limb is extended laterally and upward to include the medial surface of the right minor labium. For this, the medial and lateral surfaces of this labium are separated. In this way, a medially pedicled vestibular-labial skin flap is fashioned at least 3 cm wide. To allow the clitoris to be transposed abdominally, the dorsal edge of the left minor labium is released (Figs. 2 and 3). The midline vestibular skin is undermined toward the clitoris, hence exposing the chordae. In the female clitoris, these chordae represent the conjoined continuation of both labial spongy corpora toward the clitoris. These structures are resected, baring the ventral aspect of both corpora cavernosa well down in between both crura, but without severing the corpora and their neurovascular supply (Fig. 4). Now that the phallus is stretched the vaginal mucosa and vestibular skin flaps may be sutured in a watertight fashion rolled onto the catheter (Fig. 5). Both flaps are anastomosed in a beveled or even interdigitating fashion to avoid stricture. 18

FIG. 3. To allow the clitoris to be transposed abdominally, the dorsal edge of the left minor labium is released.
FIG. 4. After separating the medial and lateral surfaces of the right labium, the vestibular skin is undermined toward the glans, hence exposing the chordae. These are resected, baring the ventral aspect of both corpora cavernosa. The anterior vaginal wall flap has been raised and brought out.

To cover and strengthen the neourethra thus created, the medial aspect of the left minor labium is de-epithelialized and sutured to cover the pendulous part of the neourethra (Fig. 6). In this way, this external labial flap suture line does not overlie the internal urethral suture line. The lateral surface of the right labium is used to cover the perineal, fixed part of the neourethra. Extra attention is given to dorsally suture the labial flap to the inferior margin of vaginal mucosa in order to prevent secondary fistulas of the otherwise exposed part of the posterior urethral wall. The ventral edge of this labial skin flap is sutured to the dorsal edge of the left labial skin flap covering the pars pendulans urethrae (Fig. 7).

We then fill the bladder through the catheter and perform a suprapubic cystostomy. The urethral catheter is subsequently removed or left in situ for 24 hours as a stent only. The suprapubic catheter will be left in position for 7 days.

In 18 of these patients the metadoioplasty was combined with construction of a bifid scrotum in which testicular prostheses were implanted, hence effecting the dorsal transposition of the labia majora by bilateral V-Y advancement much the same as is done in the correction of the “transposed” labioscrotum in cases of genital ambiguity.\textsuperscript{5,19,20} (Fig. 8).
FIG. 5. Now that the phallus is stretched, the vaginal mucosa and vestibular skin flaps may be sutured in a watertight fashion rolled onto the catheter. Both flaps are anastomosed in a beveled fashion to avoid stricture.

RESULTS AND COMPLICATIONS

The average stay in hospital in this series was 11 days (range 10 to 21 days). The direct postoperative course was complicated by severe hematoma in one patient. Because of this, the entire vaginal flap was lost. It is our first such loss in some 100 vaginal flaps used so far. Another patient had to be taken back to the operating room on the second day postoperatively for vaginal bleeding. After ligation, recovery was quick even though it was complicated by a urethrovaginal fistula and a urethrocutaneous fistula. Urethrovaginal fistulas were encountered in two more patients. They are felt to be caused by dehydration of the posterior urethral wall now, that we take the pedicle of the anterior vaginal wall flap even further down to the original, female urethral orifice.\textsuperscript{15} Hence the importance of precision closure of the vaginal mucosa over this posterior wall cannot be stressed enough.
FIG. 6. To cover and strengthen the neourethra thus created, the medial aspect of the left minor labium is deepithelialized and sutured to cover the pendulous part of the neourethra in such a way that the external suture line will not overlie the internal suture line. The lateral surface of the right labium is used to cover the perineal, fixed part of the neourethra.

Stricture of the mucocutaneous junction halfway down the neourethra was seen in three patients early in this series and is felt to represent insufficient beveling of the suture line. This technical imperfection could be treated conservatively in all patients. For this, we have successfully employed an Entrac 30 French urethral balloon dilatation catheter (AMS –Benelux, Zavetem, Belgium). Hence, although metaidoioplasty represents a one-stage procedure essentially, again, we have to conclude that phalloplasty for female-to-male transsexuals can hardly be completed in one step. However short-term, the results in the additional 12 patients operated on since March of 1994 confirm the reality of a "learning curve."

A urethrocutaneous fistula at the base of the phallus was observed in four patients. These fistulas probably arise from the overlap of the suture line joining both external labial flaps all the neourethral mucocutaneous junction. Extra attention is now given to keeping these two as far apart as possible. All fistulas could be dealt with by secondary surgery.
FIG. 7. Extra attention should be given to dorsally suture die labial flap to the inferior margin of vaginal mucosa in order to prevent secondary fistula of the otherwise exposed part of the vaginal flap. The ventral edge of this labial skin flap is sutured to the dorsal edge of the left labial skin flap covering the pars pendulans urethrae.

Apart from a satisfactory sexual life, a useful objective criterion for neophallic function is the ability to void standing up through the opened lily. This is claimed to be possible by 10 of our patients. It is surprising how short a penis can be used to accomplish this task, especially if the patient is provided with adequate tuition and uses knickers and trousers with wide enough openings. If the neophallus is not long enough, the patient often produces an external prosthesis to augment his urethral length.

FIG. 8. The metaidioioplasty may be combined with the construction of a bifid scrotum in which testicular protheses are implanted, effecting a dorsal transposition of the labia majora by bilateral V-Y advancement.

It is more difficult to get away with an abnormal appearance; only a few males with a klitoripenoid feel confident to change or shower in public (Figs. 9 and 10).
DISCUSSION

When seeking gender-confirming surgery, female-to-male transsexuals should be offered a multiplicity of phalloplasty techniques to choose from in accordance with their individual desiderata and body habitus.\textsuperscript{23,24} Of these, only free-flap techniques ensuring at least tactile sensitivity and metaidoioplasty seem to address the ideal requirements of phalloplasty in the best possible way.\textsuperscript{8} Microsurgical procedures have to be supplemented by implantation of a stiffener in order to allow for sexual intercourse, while metaidoioplasty provides a small phallus hardly, if at all, capable of penetration. However, unlike metaidoioplasty, free-flap phalloplasty techniques will result in extensive scarring of the donor area unless laborious techniques such as tissue expansion are used. Moreover, free or pedicled flap phalloplasty remains feasible even after a metaidoioplasty has been performed. For these reasons, we consider metaidoioplasty to be a method of choice in cases where the clitoris seems large enough to provide a phallus that will satisfy the patient.\textsuperscript{14,21}

Preoperatively, it is possible to give some indication of the expected length of the klitorispenoid. The dimensions may vary from half that of the little finger to that of a full thumb. Extra length may be suggested by liposuction of the pubic region and V-Y advancement of the skin at the dorsal base of the micropenis.\textsuperscript{20} No operation has yet been devised to make the corpora of the truly small penis longer, although it has been suggested that this may be done with dermal grafts.\textsuperscript{25} Still, a very small penis is compatible with the otherwise normal male role.\textsuperscript{22}

![FIG. 9. Result of metaidoioplasty and scrotum construction in a slim, 30-year-old female transsexual who had been on hormonal treatment for 6 years. (Left) Preoperatively. (Right) Postoperatively.](image)

![FIG. 10. Result in an adipose, 31-year-old female transsexual after 2.5 years of hormonal treatment. (Left) Preoperatively (Right) Postoperatively.](image)
CONCLUSIONS

Metaiodioplasty substitutes the penis by clitoral enlargement and urethral lengthening in female-to-male transsexuals. Although it represents a one-stage procedure essentially, even with this technique, phalloplasty for female-to-male transsexuals can hardly be completed in one step. More comprehensive techniques, such as free or pedicled flap phalloplasties, remain feasible even after a metaiodioplasty has been performed. We consider metaiodioplasty to be a method of choice in cases where the clitoris seems large enough to provide a phallus that will satisfy the patient.

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