

Gender Identity Disorder: General Overview and Surgical Treatment for Vaginoplasty in Male-to-Female Transsexuals

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Learning Objectives: After studying this article, the participant should be able to discuss: 1. The terminology related to male-to-female gender dysphoria. 2. The different theories regarding cause, epidemiology, and treatment of gender dysphoria. 3. The surgical goals of sex reassignment surgery in male-to-female transsexualism. 4. The surgical techniques available for sex reassignment surgery in male-to-female transsexualism.

Background: Gender identity disorder (previously “transsexualism”) is the term used for individuals who show a strong and persistent cross-gender identification and a persistent discomfort with their anatomical sex, as manifested by a preoccupation with getting rid of one’s sex characteristics, or the belief of being born in the wrong sex. Since 1978, the Harry Benjamin International Gender Dysphoria Association (in honor of Dr. Harry Benjamin, one of the first physicians who made many clinicians aware of 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*.

Methods: The authors performed an overview of the terminology related to male-to-female gender identity disorder; the different theories regarding cause, epidemiology, and treatment; the goals expected; and the surgical technique available for sex reassignment surgery in male-to-female transsexualism.

Results: Surgical techniques available for sex reassignment surgery in male-to-female trans-

sexualism, with advantages and disadvantages offered by each technique, are reviewed. Other feminizing nongenital operative interventions are also examined.

Conclusions: This review describes recent etiopathogenetic theories and actual guidelines on the treatment of the gender identity disorder in male-to-female transsexuals; the penile-scrotal skin flap technique is considered the state of the art for vaginoplasty in male-to-female transsexuals, whereas other techniques (rectosigmoid flap, local flaps, and isolated skin grafts) should be considered only in secondary cases. As techniques in vaginoplasty become more refined, more emphasis is being placed on aesthetic outcomes by both surgeons and patients. (*Plast. Reconstr. Surg.* 116: 135e, 2005.)

HISTORY AND NOMENCLATURE

The term “transsexual” first appeared in the scientific literature in the work of Hirschfeld in 1923.¹ In his work, there was no distinction between the terms “transvestitism,” “homosexuality,” “transgenderism,” or “transsexualism.” Not until the 1940s was the term “transsexual”

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used in its modern sense; that is, to denote individuals who desire to live permanently in the gender role of the opposite sex and who want to undergo sex-reassignment surgery.² The transsexual's desire for sex reassignment surgery originates from an experienced discrepancy between one's sex of assignment and one's basic sense of self as a man or a woman (gender identity).

In 1966, the influential book by Harry Benjamin, *The Transsexual Phenomenon*,³ made many clinicians aware of the potential benefits of sex reassignment surgery.⁴ As a result, a flood of studies on transsexualism were conducted dealing mainly with cause, classification, diagnosis, and possible treatments (psychological, hormonal, and surgical).

In 1973, the diagnosis of "gender dysphoria syndrome" was introduced by Fisk⁵ to define the distress resulting from conflicting gender identity and sex of assignment. The diagnosis of the term "transsexualism" first appeared in the widely used psychiatric manual *Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition* in 1980.⁶ However, in the most recent version (the 4th edition), the term transsexualism was abandoned because it was often criticized for implying a "sexual" disorder as opposed to an "identity" disorder. It was, therefore, replaced by the term gender identity disorder. This is currently used for individuals who show a strong and persistent cross-gender identification and a persistent discomfort with their anatomical sex, as manifested by a preoccupation with getting rid of one's sex characteristics or the belief of being born in the wrong sex.⁷

Transvestites, in contrast, are less gender dysphoric, or experience this distress only periodically. They have a preference for cross-dressing but have no desire to change their biological sex. Homosexuality is not considered an identity or a sexual disorder. It refers to an individual's sexual preference for members of the same sex.⁷

In this CME article, a general overview on gender identity disorder is presented, and the surgical techniques available for sex reassignment surgery are illustrated and updated with recent technical refinements. This is based on the most recent and important reviews by various specialists on different aspects of gender identity disorder, including those by Cohen-Kettenis et al.⁴ and Michel et al.⁸ on etiopathogenesis, and by Karim et al.⁹ on surgical techniques.

EPIDEMIOLOGY

When gender identity disorder first came to the attention of professionals, clinical perspectives were largely focused on how to identify candidates for sex reassignment surgery. As the field matured, professionals recognized that some persons with bona fide gender identity disorder neither desired nor were candidates for sex reassignment surgery.¹⁰ This became problematic in epidemiologic studies. The *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition* regrouped different results from different investigations and therefore reported an average prevalence of 1 in 12,000 biological men and 1 in 100,000 biological women.^{8,11}

The difference between men and women varied depending on the time period, the country, and the study. In the majority of the studies, there are more men than women among sex-change applicants, with the average ratio being 1:3 (women to men).⁸ Several hypotheses exist to explain this ratio. Psychoanalysts argue that the development of gender identity is more vulnerable in boys, whereas sociologists emphasize that women can more easily express their masculinity without sex change than men can express their femininity.¹²

CAUSE

Sexologists in the biological and social sciences have devoted considerable attention to identifying the determinants of psychosexual differentiation. There are those who argue that these determinants are predominantly psychological and sociological, whereas others emphasize a biological cause. There are still others who advocate integrative or interactionist analyses, such as a "biopsychological" perspective.¹³

Psychological theories can be placed into two distinct categories: one that conceives of transsexualism as the result of a nonconflicting process where gender identity is precociously fixed between the ages of 2 and 4, and one that considers transsexualism a conflicting process where gender identity is not fixed and continues to remain ambiguous throughout development.⁸ The majority of these theories were published in the 1970s. Today, pediatric psychiatrists are conducting research on the effect of the environment (e.g., family, school, and society) on children affected by gender identity disorder; however, these are progressing slowly.¹³

The majority of the studies looking into biological factors in transsexual subjects fall within one of three areas of research.^{4,8} The first consists of gender identity disorders in subjects with perinatal hormonal abnormalities. This includes atypical hormonal environments, like congenital adrenal hyperplasia, resistance to androgens, or even exogenous hormonal impregnation, such as absorption of diethylstilbestrol treatment during pregnancy. The second is alteration of gonadotrophin secretion. The third is sexual morphological differentiation of the brain.⁸

Studies advocating a sexual morphological differentiation of the brain are relatively new compared with psychological perspectives. In 1995, it was shown that the volume of the central subdivision of the bed nucleus of the stria terminalis, a brain area that is essential for sexual behavior, is larger in men than in women. Moreover, a female-sized central subdivision of the bed nucleus of the stria terminalis was found in male-to-female transsexuals.¹⁴ The size of the central subdivision of the bed nucleus of the stria terminalis was not influenced by sex hormones in adulthood and was independent of sexual orientation.¹⁴ This study was later confirmed by Kruijver et al.,¹⁵ who also found that the number of neurons in the limbic nucleus of a male-to-female transsexual was found to be in the male range. These findings clearly support the paradigm that sexual differentiation of the brain and genitals may go in opposite directions in transsexuals and point to a neurobiological basis of gender identity disorders.¹⁵

In the most recent article by Swaab et al., the authors concluded that “functional sex differences in reproduction, gender, and sexual orientation and in the incidence of neurological and psychiatric diseases are presumed to be based on structural and functional differences in the hypothalamus and other limbic structures. Factors influencing gender [identity], i.e., the feeling of being male or female, are prenatal hormones and compounds that change the levels of these hormones, such as anticonvulsants, while the influence of postnatal social factors is controversial.” They also claimed that the period of overt sexual differentiation of the human hypothalamus occurs between approximately 4 years of age and adulthood—much later than is generally presumed, although the late sexual differentiation may, of course, be based on processes that have

already been programmed in midpregnancy or during the neonatal period. A replication of these data is certainly necessary and the mechanisms causing sexual differentiation of hypothalamic nuclei, the prenatal and postnatal factors influencing this process, and the exact functional consequences await further elucidation.¹⁶

HARRY BENJAMIN INTERNATIONAL GENDER
DYSPHORIA ASSOCIATION GUIDELINES FOR
DIAGNOSIS AND TREATMENT

In 1978, the Harry Benjamin International Gender Dysphoria Association was founded. The Association has always played a major role in the research and treatment of transsexualism, and, in 1979, the first version of the *Standards of Care for Gender Dysphoric Persons* was drafted. Currently, professionals involved in gender dysphoria use the sixth version of this publication, which is intended to provide flexible directions for the treatment of persons with gender identity disorders. The major purpose of the book is to articulate the Harry Benjamin International Gender Dysphoria Association’s professional consensus about the psychiatric, psychological, medical, and surgical management of gender identity disorders.

The general goal of psychotherapeutic, hormonal, or surgical therapy for persons with gender identity disorders is lasting personal comfort with one’s own gender and to maximize overall psychological well-being and self-fulfillment.¹⁰ The *Standards of Care* advocate a diagnostic phase in two stages. The first stage consists of establishing a diagnosis based on precise and commonly accepted criteria as set out in the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition*.

The goals of the diagnostic phase, which can last from 6 to 12 months, are as follows: to define the exact form and tenacity of gender dysphoria, including an assessment of its severity and the degree of transsexual conviction; to detect those individuals who fulfill the requirements of a transsexual diagnosis and who, as a last resort, would benefit from sex reassignment surgery; and to give information concerning treatment, including both the possibilities and the limitations of surgery.^{8,10} During the diagnostic phase, patients who are found to have other psychiatric abnormalities, such as psychotic syndromes, addiction problems, perversions, or biological perturbations (i.e., intersexual states and endocrine disorders), are ex-

cluded from the protocol and managed in an appropriate alternative manner.

The second stage, or the “real-life test” (also called “real-life experience”), confronts the subject with the everyday reality that he or she will meet once the sex-reassignment process has been completely successful. During the real-life test, the subject takes on the role of the desired sex in everyday activities, both social and professional. Many patients may need to learn a more feminine demeanor. This period may last between 12 and 18 months, and supportive psychotherapy is often necessary in this period.

Once the diagnosis of gender identity disorder is ascertained, an endocrinologist confirms the absence of absolute contraindications to hormonal therapy; reviews risks, side effects, and complications; and then follows the patients while on a course of medical treatment. Hormonal treatments differ slightly from one center to another⁸; however, many centers, including ours, find it useful to begin hormonal therapy during the real-life test. This is done both for practical reasons and because it can be useful diagnostically. Generally, in the male-to-female transsexual, a reversible chemical castration is obtained first with the use of medications that suppress one’s own sex hormones (suppressive phase). One year later, patients start using hormones of the opposite sex (substitution phase). The results of hormonal therapy vary among patients, but generally it brings about changes to secondary sex characteristics, including a more gynecoid pattern of fat distribution and variable breast development. Surgery is deferred until at least 1 year after starting hormonal treatment and at least 2 years after the first psychological consultation.

SURGICAL TECHNIQUES FOR VAGINOPLASTY

As affirmed by Karim et al.,⁹ the goal of genital reassignment surgery in male-to-female transsexuals is “to create a perineogenital complex as feminine in appearance and function as possible and free of poorly healed areas, scars, and neuromas. The urethra should be shortened in such a way that the direction of the urinary stream is downward in the sitting position and it should be free of stenosis or fistulas. The neovagina should, ideally, be lined with moist, elastic, and hairless epithelium. Its depth should be at least 10 cm and its diameter 30 mm. The sensation should be sufficient to provide satisfactory erogenous stimulus during

sexual intercourse. Ideally, all these requirements should be met without major surgical intervention necessitating long and distressful postoperative treatment, and addressing them should not create new lesions or donor area malfunction.”

The first case of sex reassignment surgery was reported by Abraham as early as 1931. Later, many reports followed, demonstrating an evolution of techniques. Orchidectomy, amputation of the penis, creation of the neovaginal cavity, lining of this cavity and reconstruction of a urethral meatus and, finally, construction of the labia and clitoris may be identified as the five major steps in all of these techniques. Although the surgical techniques for vaginoplasty have evolved significantly, it must be stressed that both medical and surgical treatment are rarely perfect. Revisional surgery is sometimes required to optimize aesthetic results, most patients require lubrication for sexual intercourse, and, of course, pregnancy is not possible.

Vaginoplasty

Methods to line the neovagina in male-to-female transsexuals may be classified into five categories: (1) application of nongenital skin grafts, (2) penile skin grafts, (3) penile-scrotal skin flaps, (4) nongenital skin flaps, and (5) pedicled intestinal transplants.⁹

Nongenital skin grafts. In 1931, Abraham reported that in his patient a penectomy was performed 9 years after castration.¹⁷ Subsequently, the lining of a neovagina was created with a skin graft draped inside-out over a sponge in accordance with the technique first published by Abbe¹⁸ and later popularized by McIndoe and Banister.¹⁹ Likewise, Skoog reported experience with a nongenital split skin graft to line the neovagina in 24 three-stage vaginoplasties performed between 1968 and 1976.²⁰ He also described using “abdominally pedicled” penile skin to widen the neovaginal introitus. Laub and Fisk reported the first series (50 transsexuals) in whom a split skin graft pulled over a perforated plastic mold was applied in a one-stage vaginoplasty; they also used the scrotal and penile skin to imitate the labia majora and minora.²¹ More recently, the use of a full-thickness skin graft harvested simultaneously from the region of an abdominoplasty has also been described.²²

The advantages of nongenital skin grafts are that they are a simple one-stage surgical procedure, they create a sufficiently deep and wide

vagina, they are non-hair-bearing, and they carry a low risk of complications. The disadvantages include the residual scar in the donor area, the presence of a circular scar at the introitus of the vagina (when no introital flaps are used),²³ the tendency of the skin graft to shrink (postoperatively, daily dilation is required), suboptimal sensation, and, as is true with all skin-lined neovaginas, the absence of any natural lubrication.²⁴

Penile skin as graft. In 1956, Fogh-Andersen was the first to report the use of a full-thickness skin graft harvested from the penile skin to line the neovagina.²⁵ He fixed the skin on a mold according to McIndoe's principle of vaginal reconstruction in cases of congenital aplasia.¹⁹ This technique has the following advantages: it uses hairless skin; it is a one-stage procedure; donor scars are inconspicuous; there is no traction on the abdominal pedicle and, thus, the penile skin will remain where applied without causing a skin fold that can obstruct the dorsal part of the neovaginal introitus²⁶; and full-thickness skin grafts undergo less contraction postoperatively compared with split-thickness skin grafts.²⁴

Still, these patients are also required to use a dilator for several months postoperatively,²⁶ and, because grafts have a greater tendency to shrink than flaps, the flap-to-graft conversion of penile skin seems unjustified. Moreover, only a limited amount of penile skin is available.⁹

Penile-scrotal skin flaps. In 1957, Gillies and Millard reported the use of penile skin as a pedicled flap for vaginoplasty in male-to-female transsexuals.²⁷ Later, several modifications of this technique were described. These can be classified into the following three groups²⁸:

1. The inverted penile skin may be used solely on an abdominal pedicle as an inside-out skin tube^{27,29}; this penile skin flap may be augmented with a small triangular scrotal skin flap to "break" the circular introitus.^{9,30} Variations of this technique are used by most surgeons who perform sex reassignment surgery in male-to-female transsexuals.
2. The pedicled penile skin tube may be split open to form a rectangular flap that is augmented by a rectangular, posteriorly pedicled scrotal skin flap comparable in size.³¹
3. The inverted penile skin tube may be applied based on an inferior pedicle.³² Recently, Perovic et al. described a modifica-

tion of the technique where a long, vascularized urethral flap is harvested and embedded in the penile skin-tube flap.³³ They also described the suspension of the neovagina to the sacrospinous ligament to prevent vaginal prolapse,³³ a complication that is rarely, if ever, experienced by others.³⁴

The advantages of penile skin flaps consist of the following: these flaps demonstrate less tendency to contract²⁴; inadvertent damage to the rectum may be more easily corrected because it is immediately covered with vascularized tissue²⁶; local innervation is provided; and the flap is virtually hairless. Although flaps have much less tendency to contract than grafts, these patients are still required to use a dilator postoperatively during the first 6 months. The disadvantages of penile skin flaps are that a limited amount of penile skin may be available³⁵ and that this technique usually results in a widening of the anterior commissure, which can leave the clitoris more exposed.^{26,30}

Combining an abdominally pedicled penile skin flap with a posteriorly based scrotal skin flap will produce an ideal anatomically located introitus and favorable dimensions of the neovagina.³⁵ However, this technique will introduce hair-bearing scrotal skin as the posterior lining of the vagina if no preoperative de-epilation has been performed. Moreover, it leads to a transverse appearance of the vaginal introitus if a wide flap is used³⁶ and it provides little or no inherent lubrication.

Several refinements of the vaginoplasty with the inverted penile-scrotal skin flap technique were described by Karim et al. in 1995²⁶ and Selvaggi et al. in 2003.³⁴ These include preoperative bowel preparation; the use of a drape with a rectal condom; blunt dissection of the vaginal cavity; and the use of a double silicone prosthesis to create and maintain a vaginal cavity of adequate dimension.

To consistently obtain a long and wide vagina, they recommend dissecting a wide and deep pocket during surgery. In addition, they advise using a full-thickness skin graft from the scrotum or abdomen when the amount of penile skin is considered insufficient to line the neovagina. Finally, to further improve functional and aesthetic outcomes, they advise near-complete resection of the corpus spongiosum, eversion of the urethral mucosa, construction of the clitoral prepuce and labia mi-

nora [see Clitorolabioplasty (Vulvoplasty), below] and, if necessary, a commissuroplasty later.

Postoperatively, patients remain in bed with the dilator firmly in place. After 5 days, the dilator is removed and patients are allowed to ambulate. The neovaginal cavity is cleansed with an Isobetadine solution (Centrum Technische Orthopedie, Wetteren, Belgium) on a daily basis. One day later, the urethral catheter is removed. Patients are discharged home on the seventh or eighth postoperative day and in the interim are taught how to clean and maintain the neovagina. This consists of removing the dilator daily for 15 to 30 minutes and irrigating with Isobetadine. The period of time that the dilator remains out is gradually increased over the next 3 to 6 months. Later on, if the patient is having regular sexual intercourse, no further dilation is required; otherwise, routine dilation should continue once or twice per week.

Nongenital skin flaps. In 1980, Cairns and De Villiers reported the use of a medial thigh flap for vaginoplasties in four transsexuals who had previously undergone penile skin inversion vaginoplasty with inadequate result.³⁷ Huang³⁸ used two inguinopudendal flaps, which were sutured to each other in the midline and then to the penile flap to form a single large flap. Even now, 8 years after the first review of Karim et al.,⁹ the use of distant free flaps for vaginoplasties in transsexuals has never been reported.

The advantages of using nongenital flaps include less risk of contraction and a reduced period of postoperative dilation. Its drawbacks are donor-site morbidity and scarring, technical complexity (in some cases the flaps are unreliable³⁹), and the fact that they tend to be bulky compared with genital skin flaps. This added bulk may decrease the functional dimensions of the neovagina, which can be particularly disadvantageous in male-to-female transsexuals because the male pubic arch is less wide than its female counterpart.⁹ Again, these flaps have no natural lubrication. Karim et al. feel that nongenital skin flaps should be reserved as alternatives in secondary operations, where a pedicled intestinal transplant is still their method of choice.⁹

Pedicled intestinal transplant. The first reported use of an intestinal transplant for vaginoplasty in a nontranssexual patient was provided by Sneguireff in 1892 using the rectum⁴⁰

and Baldwin in 1904 using the ileum.⁴¹ However, the technique of colocolpoptosis was first used in transsexuals only in 1974, when Markland and Hastings used both cecum and sigmoid transplants.⁴² To date, Laub et al. have reported the largest single series on the use of rectosigmoid colon to create a neovagina in male transsexuals.⁴³ They concluded that this method results in a functional neovagina, with a low incidence of surgical complications.⁴³ Later, modifications to further improve the surgical outcome were described.⁴⁴ For example, the use of at least one inverted triangular skin flap was used to break up the circular introitus scar.⁴⁴⁻⁴⁶ More recently, the use of a laparoscopically harvested portion of sigmoid colon has also been described.⁴⁷

The advantages of using a rectosigmoid transplant are its length and a texture and appearance similar to a natural vagina.^{48,49} In addition, it is the only method that provides a vaginal lining with natural lubrication.^{43,48} The production of mucus, however, may lead to excessive discharge.⁴⁶ Although the neovaginal length is usually regarded as an advantage, it can also lead to stasis and dehydration of mucus in the deepest portion of the vagina.⁹ Further disadvantages of this technique are the need for additional abdominal surgery and occasional disappointing long-term results. Complications such as diversion colitis (inflammation that occurs in the bypassed colonic tissue related to diversion of the fecal stream), ulcerative colitis, peritonitis, intestinal obstruction, junctional neuroma, adenocarcinoma, introital stenosis, mucocele, and constipation have been reported to occur.^{46,49} Furthermore, the colonic mucosa is more vulnerable and thus more accessible to sexually transmitted diseases including human immunodeficiency virus infection.⁵⁰

Kim et al. recently presented their experience with the rectosigmoid vaginoplasty and concluded that it is the best choice for transsexual patients who have previously undergone penectomy and orchidectomy. They feel it is also the best technique for patients with an unfavorable previous vaginoplasty, for those with short vaginal length after cervical cancer surgery, and for patients with congenital vaginal atresia.⁴⁹

Clitorolabioplasty (Vulvoplasty)

Although in the last century efforts were focused predominantly on finding a method for construction of the vagina, in the last 15 years both patients and surgeons have been increasingly concerned with the aesthetic result of the labial complex (vulvoplasty) and on the clitoris, which should provide adequate erogenous sensation. The creation of the labia majora is dependent on the use of either a penile flap or graft and the amount of the scrotal skin remaining after resection. Usually, creating aesthetically acceptable labia majora is not a problem. However, secondary corrections may be needed^{34,51} because changes in appearance may occur during the first year.⁵¹ A common secondary correction is the re-creation of the anterior commissure covering the neoclitoris, which is often excessively exposed when a pedicled penile skin flap is used.³⁴ This commissuroplasty is usually performed with simple excision of intervening tissue or with a double opposing Z-plasty.^{34,51}

Little has been written specifically about the labia minora. Perovic et al. described using the base of the penile skin to form the labia minora, which are then sutured to the de-epithelialized area of the neoclitoris; thus, the neoclitoris is hooded with labia minora.³³

The first description of the construction of a neoclitoris was by Brown in 1976. He described the creation of a functional clitoris using the reduced glans, which remained attached to its dorsal penile neurovascular pedicle.^{52,53} The high percentage of clitoral necrosis (33 percent) reported by Brown himself provoked some authors to look for new techniques. These have included the following: a free composite graft of the tip of the penile glans to cover the shortened dorsal neurovascular bundle; a small bud of corpus cavernosum covered by penile skin; and the corpus spongiosum as the vascular pedicle of the neoclitoris, preserving the glans.⁵⁴⁻⁵⁷

Today, most surgeons performing clitoroplasty in transsexual patients use the dorsal portion of the glans penis with the dorsal neurovascular pedicle⁵⁸⁻⁶⁴ as described by Eldh.⁶⁰ The complications described by Brown^{52,53} are rarely encountered.⁶⁴ Secondary corrections in clitoral size and position are occasionally required.^{34,51}

Selvaggi et al. describe using the penile urethra to construct the region between the ure-

thral opening and the neoclitoris.³⁴ The urethra is incised longitudinally along its ventral aspect, folded open, and sutured just inferior to the neoclitoris. In this way, a natural appearance is produced, both in color and in texture. Construction of the labia minora and clitoral prepuce is accomplished with the use of the thin inner layer of penile foreskin that is harvested in continuity with the glans flap (Figs. 1 through 5).

The clitoris, its prepuce, and the labia minora remain among the most difficult structures to construct. Although we have come a long way, the ideal clitorolabioplasty resembling the biological female in every aspect has not yet been achieved.

NONGENITAL OPERATIVE INTERVENTIONS

Other feminizing nongenital operative interventions consist of breast augmentation, facial feminizing surgery (e.g., chin reduction, malar augmentation, rhinoplasty, supraorbital bar reduction), body contouring (liposuction and fat redistribution), and chondrolaryngoplasty and voice change surgery (pitch-raising surgery). Specific indications and timing for these procedures vary from patient to patient. Some patients want to ameliorate the feminine aspects of their face, body, and voice completely, whereas others point out a few specific concerns and desire correction of these alone.

A normal feminine breast volume is rarely obtained by hormonal therapy alone, and as such, breast augmentation is required in the majority of the patients, even after years of hormonal therapy. Breast augmentation, when requested by the patients, is usually performed at the time of the vaginoplasty procedure (approximately 75 percent of the cases in our center).

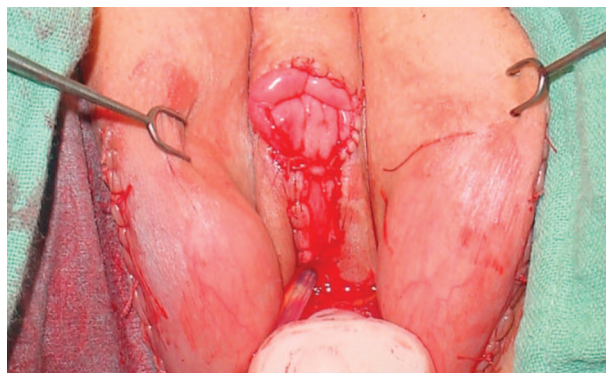


FIG. 1. Close-up of the clitoris and labia minora, just after surgery.



FIG. 2. Vaginoplasty; general overview, 3 weeks after surgery.



FIG. 3. Close-up of the clitoris and labia minora, 3 weeks after surgery.

Facial feminizing surgery is usually performed at an earlier time than the vaginoplasty, and it is requested by increasing num-



FIG. 4. Vaginoplasty; general overview, 6 weeks after surgery.

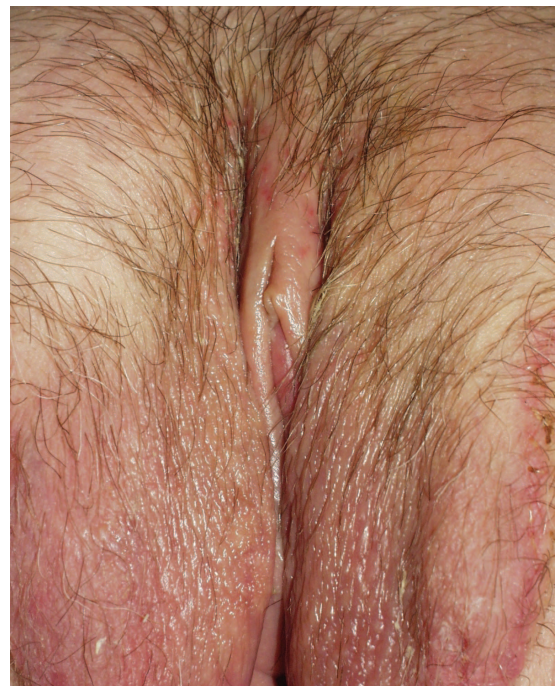


FIG. 5. Close-up of the clitoris and labia minora, 6 weeks after surgery.

bers of patients because it can facilitate the real-life test. If necessary, small corrections or minor facial aesthetic procedures can be performed in combination with the vaginoplasty and/or breast augmentation.

Voice surgery (pitch-raising or “phonosurgery”) is reserved for those patients who have

had little success with voice therapy and coaching. It is performed by an ear, nose, and throat surgeon, usually under local anesthesia to facilitate checking the pitch of the voice intraoperatively. It usually follows the other gender reassignment procedures because intubation should be avoided for 6 months after the voice operation.

Because the larynx of the male patient can differ in size from that of the female patient,⁶⁵ chondrolaryngoplasty may be requested by some patients. This consists of the reduction of a prominent thyroid cartilage, or "Adam's apple." Although this may be performed at the same time as voice surgery, most patients undergo chondrolaryngoplasty without voice surgery. Generally, the personal choice in feminizing nongenital interventions is fundamental, but it is made in conjunction with the gender team and with regard to the standards of care.

CONCLUSIONS

Gender identity disorder is a condition that many physicians and plastic surgeons know little about. Patients are often misunderstood and avoided by both physicians and society. In this article, a general overview on the etiopathogenesis and standards of care of gender identity disorder are presented. A review of surgical management is presented together with current refined techniques.

The penile-scrotal skin flap technique is considered the state of the art for vaginoplasty in male-to-female transsexuals, and other techniques (rectosigmoid flap, local flaps, and isolated skin grafts) should only be considered in secondary cases. As techniques in vaginoplasty become more refined, more emphasis is being placed on aesthetic outcomes by both surgeons and patients. It must be stressed that surgical treatment is never perfect. Revisional surgery is sometimes required, almost all patients require lubrication for sexual intercourse, and pregnancy is not possible. In addition, other feminizing (nongenital) operative interventions are often requested by these patients.

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REFERENCES

- Hirschfeld, M. The intersexual state (in German). *Jahrb. sex Zwischenstufen*. 23: 3, 1923.
- Cauldwell, D. C. Psychopathia transsexualis. *Sexology* 16: 274, 1949.
- Benjamin, H. *The Transsexual Phenomenon*. New York: Julian Press, 1966.
- Cohen-Kettenis, P. T., and Gooren, L. J. Transsexualism: A review of etiology, diagnosis and treatment. *J. Psychosom. Res.* 46: 315, 1999.
- Fisk, N. M. Gender dysphoria syndrome (the how, what and why of a disease). In D. R. Laub and P. P. Gandy (Eds.), *Proceedings of the Second Interdisciplinary Symposium on Gender Dysphoria Syndrome*. Stanford, California: Division of Reconstructive and Rehabilitation Surgery, Stanford University Medical Center, 1973.
- Diagnostic and Statistical Manual of Mental Disorders*, 3rd Ed. Washington, D.C.: American Psychiatric Association, 1980.
- Diagnostic and Statistical Manual of Mental Disorders*, 4th Ed. Washington, D.C.: American Psychiatric Association, 1995.
- Michel, A., Mormont, C., and Legros, J. J. A psychoendocrinological overview of transsexualism. *Eur. J. Endocrinol.* 145: 365, 2001.
- Karim, R. B., Hage, J. J., and Mulder, J. W. Neovaginoplasty in male transsexuals: Review of surgical techniques and recommendations regarding their eligibility. *Ann. Plast. Surg.* 37: 669, 1996.
- The Harry Benjamin International Gender Dysphoria Association's Standards of Care for Gender Identity Disorders, Sixth Version.
- Bakker, A., Van Kesteren, P., Gooren, L., and Bezemer, P. The prevalence of transsexualism in the Netherlands. *Acta Psychiatr. Scand.* 87: 237, 1993.
- Hartmann, U., and Becker, H. In: *Störungen der Geschlechtsidentität: Ursachen, Verlauf, Therapie*. New York: Springer-Verlag, 2002. P. 16.
- Zucker, K. J., and Bradley, S. J. In: *Gender Identity Disorder and Psychosexual Problems in Children and Adolescents*. New York: The Guilford Press, 1995.
- Zhou, J. N., Hofman, M. A., Gooren, L. J., and Swaab, D. F. A sex difference in the human brain and its relation to transsexuality. *Nature* 378: 68, 1995.
- Kruijver, F. P., Zhou, J. N., Pool, C. W., Hofman, M. A., Gooren, L. J., and Swaab, D. F. Male-to-female transsexuals have female neuron numbers in a limbic nucleus. *J. Clin. Endocrinol. Metab.* 85: 2034, 2000.
- Swaab, D. F., Chun, W. C., Kruijver, F. P., Hofman, M. A., Ishuina, T. A. Sexual differentiation of the human hypothalamus. *Adv. Exp. Med. Biol.* 511: 75, 2002.
- Abraham, F. Genitalumwandlung an zwei männlichen Transvestiten. *Sexwiss. Sexpol.* 18: 223, 1931.
- Abbe, R. New method of creating a vagina in a case of congenital absence. *Med. Rec.* 54: 836, 1898.
- McIndoe, A. H., and Banister, J. B. An operation for the cure of congenital absence of the vagina. *J. Obstet. Gynaecol.* 45: 490, 1938.
- Ohlsen, L., and Vendug, S. Skoog's technique for reconstructing female genitalia in the male transsexual developed in 24 operated cases. *Chir. Plast.* 6: 1, 1981.
- Laub, D. R., and Fisk, N. A rehabilitation program for gender dysphoria syndrome in surgical sex change. *Plast. Reconstr. Surg.* 53: 388, 1974.
- Hage, J. J., and Karim, R. B. Abdominoplastic secondary full-thickness skin graft vaginoplasty for male-to-female transsexuals. *Plast. Reconstr. Surg.* 101: 1512, 1998.

23. Hage, J. J. The use of a tissue expander as a vaginal stent in vagina reconstruction. *Br. J. Obstet. Gynaecol.* 102: 1020, 1995.
24. McGregor, I. A. *Fundamental Techniques of Plastic Surgery and Their Surgical Applications*, 8th Ed. Edinburgh: Churchill Livingstone, 1989. Pp. 39–63.
25. Fogh-Andersen, P. Transsexualism: An attempt at surgical management. *Scand. J. Plast. Reconstr. Surg.* 3: 61, 1969.
26. Karim, R. B., Hage, J. J., Bouman, F. G., de Ruyter, R., and van Kesteren, P. J. M. Refinements of pre, intra, and post-operative care to prevent complications of vaginoplasty in male transsexuals. *Ann. Plast. Surg.* 35: 279, 1995.
27. Gillies, H., and Millard, R. D., Jr. Genitalia. In: *The Principles of Art of Plastic Surgery*. London: Butterworth, 1957. Pp. 368–388.
28. Bouman, F. G. Vaginoplasty, with abdominally pedicled penis skin in male-to-female transsexuals. In W. Eicher, F. Kubli, and V. Herms (Eds.), *Plastic Surgery in the Sexually Handicapped*. Berlin: Springer-Verlag, 1989. Pp. 7–90.
29. Eicher, W. The inverted penis skin technique in male-to-female transsexuals. In: W. Eicher, F. Kubli, and V. Herms (Eds.), *Plastic Surgery in the Sexually Handicapped*. Berlin: Springer-Verlag, 1989. Pp. 91–112.
30. Bouman, F. G. Sex reassignment surgery in male to female transsexuals. *Ann. Plast. Surg.* 21: 526, 1988.
31. Jones, H. W., Jr., Schrimmer, H. K., and Hoopes, J. E. A sex conversion operation in males with transsexualism. *Am. J. Obstet. Gynecol.* 10: 101, 1968.
32. Edgerton, M. T., and Bull, J. Surgical construction of the vagina and labia in male transsexuals. *Plast. Reconstr. Surg.* 46: 529, 1970.
33. Perovic, S. V., Stanojevic, D. S., and Djordjevic, M. L. Vaginoplasty in male transsexuals using penile skin and a urethral flap. *B.J.U. Int.* 86: 843, 2000.
34. Selvaggi, G., Monstrey, S., Ceulemans, P., Hamdi, M., Van Landuyt, K., and Blondeel, P. Vaginoplasties for MTF transsexualism: Tricks and refinements. Presented at the 15th Annual Meeting of the EURAPS, Genoa, Italy, May 27–29, 2004.
35. van Noort, D. E., and Nicolai, E. J. P. A. Comparison of two methods of vagina reconstruction in transsexuals. *Plast. Reconstr. Surg.* 91: 1308, 1993.
36. Turner, U. G., Edlich, R. F., and Edgerton, M. T. Male transsexualism: A review of genital surgical reconstruction. *Am. J. Obstet. Gynecol.* 132: 119, 1978.
37. Cairns, T. S., and De Villiers, W. Vaginoplasty. *S. Afr. Med. J.* 57: 50, 1980.
38. Huang, T. T. Twenty years of experience in managing gender dysphoric patients: I. Surgical management of male transsexuals. *Plast. Reconstr. Surg.* 96: 921, 1995.
39. Wee, J. T., and Joseph, V. T. A new technique of vaginal reconstruction using neurovascular pudendal-thigh flaps: A preliminary report. *Plast. Reconstr. Surg.* 83: 701, 1989.
40. Sneguireff, W. F. Zwei Falle von Restitutio Vaginae per Transplantationen. *Ani. Recti. Zentralbl. Gynakol.* 28: 772, 1904.
41. Baldwin, J. F. The formation of an artificial vagina by intestinal transplantation. *Ann. Surg.* 40: 398, 1904.
42. Markland, C., and Hastings, D. Vaginal reconstruction using cecal and sigmoid bowel segments in transsexual patients. *J. Urol.* 111: 217, 1974.
43. Laub, D. R., Sr., Laub D. R., Jr., Lebovic, G. S., and van Maasdam, J. Follow up on safety, efficacy and erotic aspects of the rectosigmoid neocolporrhaphy. In D. R. Laub and C. C. Wheeler (Eds.), *Abstract of the XIIIth Symposium on Gender Dysphoria*, New York City, October 21–24, 1993. Palo Alto, Calif.: Harry Benjamin International Gender Dysphoria Association, 1993. P. 15.
44. Karim, R. B., Hage, J. J., and Cuesta, M. A. Rectosigmoid neocolpopoiesis for male-to-female transsexuals: Amsterdam experience. *Ann. Plast. Surg.* 36: 388, 1996.
45. Hage, J. J. The use of tissue expander as a vaginal stent in vagina reconstruction. *Br. J. Obstet. Gynaecol.* 102: 1020, 1995.
46. Hage, J. J., Karim, R. B., Asscheman, H., Bloemena, E., and Cuesta, M. A. Unfavorable longterm results of rectosigmoid neocolpopoiesis. *Plast. Reconstr. Surg.* 95: 842, 1995.
47. Wedler, V., Meuli-Simmen, C., Guggenheim, M., Schneller-Gustafsson, M., and Kunzi, W. Laparoscopic technique for secondary vaginoplasty in male to female transsexuals using a modified vascularized pedicled sigmoid. *Gynecol. Obstet. Invest.* 57: 181, 2004. Epub 2004 Jan. 29.
48. Dalton, J. R. Use of sigmoid colon in sex reassignment operations. *Urology* 17: 223, 1981.
49. Kim, S. K., Park, J. H., Lee, K. C., Park, J. M., Kim J. T., and Kim, M. C. Long-term results in patients after rectosigmoid vaginoplasty. *Plast. Reconstr. Surg.* 112: 143, 2003.
50. Hage, J. J., and Laub, D. R. Debate: Penile inversion versus rectosigmoid vaginoplasty. Presented at the XIV Harry Benjamin International Gender Dysphoria Symposium, Kloster Irsee, Bavaria, Germany, September 8, 1995.
51. Hage, J. J., Goedkoop, A. Y., Karim, R. B., and Kanhai, R. C. Secondary corrections of the vulva in male-to-female transsexuals. *Plast. Reconstr. Surg.* 106: 350, 2000.
52. Brown, J. Creation of a functional clitoris and aesthetically pleasing introitus in sex conversion. In: D. Marchac and J. T. Hueston (Eds.), *Transactions of the Sixth International Congress of Plastic and Reconstructive Surgery*. Paris: Masson, 1976. Pp. 654–655.
53. Brown, J. A single stage operative technique for castration, vaginal construction and perineoplasty in transsexuals (Discussion). *Arch. Sex. Behav.* 4: 313, 1978.
54. Hage, J. J., Karim, R. B., Bloem, J. J., Suliman, H. M., and van Alphen, M. Sculpturing the neoclitoris in vaginoplasty for male-to-female transsexuals. *Plast. Reconstr. Surg.* 93: 358, 1994.
55. Malloy, T. R., Noone, R. B., and Morgan, A. J. Experience with the 1-stage surgical approach for constructing female genitalia in male transsexuals. *J. Urol.* 116: 335, 1976.
56. Meyer, R., and Kesselring, U. K. One-stage reconstruction of the vagina with penile skin as an island flap in male transsexuals. *Plast. Reconstr. Surg.* 66: 401, 1980.
57. Rubin, S. O. A method of preserving the glans penis as a clitoris in sex conversion operations in male transsexuals. *Scand. J. Urol. Nephrol.* 14: 215, 1980.
58. von Szalay, L. Construction of the neo-clitoris in male-to-female transsexuals. *Handchir. Mikrochir. Plast. Chir.* 22: 277, 1990.

59. Fang, R. H., Chen, C. F., and Ma, S. A new method for clitoroplasty in male-to-female sex reassignment surgery. *Plast. Reconstr. Surg.* 89: 679, 1992.
60. Eldh, J. Construction of a neovagina with preservation of the glans penis as a clitoris in male transsexuals. *Plast. Reconstr. Surg.* 91: 895, 1993.
61. Rubin, S. O. Sex-reassignment surgery male-to-female: Review, own results and report of a new technique using the glans penis as a pseudoclitoris. *Scand. J. Urol. Nephrol. Suppl.* 154: 1, 1993.
62. Rehman, J., and Melman, A. Formation of neoclitoris from glans penis by reduction glansplasty with preservation of neurovascular bundle in male-to-female gender surgery: Functional and cosmetic outcome. *J. Urol.* 161: 200, 1999.
63. Hage, J. J., and Karim, R. B. Sensate pedicled neoclitoroplasty for male transsexuals: Amsterdam experience in the first 60 patients. *Ann. Plast. Surg.* 36: 621, 1996.
64. Selvaggi, G., Monstrey, S., Hoebeke, P., et al. Genital sensitivity in sex reassignment surgery. Presented at the XVIII Harry Benjamin International Symposium on Gender Dysphoria, Gent, Belgium, September 10–14, 2003.
65. Wolfort, F. G., Dejerine, E. S., Ramos, D. J., and Parry, R. G. Chondrolaryngoplasty for appearance. *Plast. Reconstr. Surg.* 86: 464, 1990.