

Do Histologic Changes in the Skin-Lined Neovagina of Male-to-Female Transsexuals Really Occur?

Judith J. M. L. Dekker, MD,* J. Joris Hage, MD, PhD,§ Refaat B. Karim, MD, PhD,‡
and Elisabeth Bloemena, MD, PhD†

Abstract: Controversy exists on whether or not the epidermal keratinizing squamous epithelium of skin grafts and flaps applied to line a neovagina changes histologically to a nonkeratinizing mucosal type squamous epithelium after vaginoplasty in male-to-female transsexuals. To end this discussion, the aim of this study was to objectify the short-term and long-term histologic aspect of this neovaginal epithelial lining.

Biopsies were taken from the epithelium lining of the neovagina of 9 male-to-female transsexuals, from the moment of vaginoplasty up to 14 years after. These were stained with hematoxylin-eosin and periodic acid–Schiff stain for histologic comparison to normal vaginal biopsies. Because no changes that might have been induced by local influences or hormonal therapy were found, we concluded that short-term and long-term changes in the histologic aspect of inverted skin flaps do not occur after penile and scrotal skin vaginoplasty in male-to-female transsexuals.

Key Words: transsexuals, vaginoplasty, skin flaps, histology, hormone treatment

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The main differences between the epidermis and the mucosa of the vagina is the absence of the stratum corneum and the complete absence of hair follicles, sebaceous glands, sweat glands, and pigment in the latter.^{1,2} Another characteristic of normal vaginal squamous epithelium is the presence of large amounts of glycogen, whereas that of normal skin has little to none (Fig. 1).²

Since McIndoe³ popularized the use of skin grafts to line the vaginal vault in patients with vaginal aplasia in the

1930s, controversy exists on whether^{4–9} or not^{1,10–15} the epidermal keratinizing squamous epithelium changes histologically to a nonkeratinizing mucosal type squamous epithelium. When, subsequently, skin flaps and myocutaneous flaps were used for such vaginoplasty, this controversy continued,^{1,2,9,16,17} and the same applied to the penile-skin flap-inversion vaginoplasty in male-to-female transsexuals that was introduced in 1950s.^{18,19} Some authors claimed that the aspect of the penile skin over the years changed to that of vaginal mucosa,^{20–23} whereas others refuted such change.^{24,25} Furthermore, the continuation and extent of hair growth on the scrotal skin flap that is used in combination with the penile skin to add to the vaginal width^{25–28} is subject to controversy.^{20,23,27,29–31} To try to end the discussion on possible changes after combined penile and scrotal skin inversion vaginoplasty, the aim of this study was to objectify the short-term and long-term histologic aspect of the neovaginal epithelial lining in transsexuals.

MATERIALS AND METHODS

Biopsies were taken from the epithelium lining of the neovagina of 9 male-to-female transsexuals (Table 1). Their mean age at the time of biopsy was 41 years (range, 27–47 years), and they had been treated hormonally for a mean of 7.0 years (range, 1.8–15.8 years). In 2 subjects, the biopsies were obtained during vaginoplasty, whereas vaginoplasty had been performed 8 months to 14 years previous to biopsy (mean, 5.8 years) in the remaining 7. In each patient, 1 biopsy was taken at the right lateral wall of the neovagina that corresponded with the inverted penile skin flap. Additionally, 1 biopsy was taken in the median of the neovagina dorsally, corresponding with the triangular dorsal scrotal skin flap that was added to the neovaginal lining during vaginoplasty.²⁸ All biopsies were fixed in 10% buffered neutral formaldehyde and stained with hematoxylin-eosin for microscopical examination by a pathologist (E.B.) who was not involved in the patient's treatment. Additional periodic acid–Schiff stain was done to demonstrate the amount of epithelial glycogen.

RESULTS

Macroscopic Aspect of the Neovaginal Skin Lining

In both patients in whom the biopsies were obtained at the time of vaginoplasty (Table 1; patients A and B), the

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From the *Department of Gynecology and Obstetrics and †Department of Pathology, VU University Medical Center, Amsterdam, The Netherlands; §Department of Plastic and Reconstructive Surgery, Antoni van Leeuwenhoek Hospital, Amsterdam, The Netherlands; and the ‡Department of Plastic and Reconstructive Surgery, OLVG Hospital, Amsterdam, The Netherlands.

Reprints: Dr. J. J. Hage, Department of Plastic and Reconstructive Surgery, Antoni van Leeuwenhoek Hospital, Plesmanlaan 121, NL-1066 CX Amsterdam, The Netherlands. E-mail: J.JorisHage@inter.nl.net.

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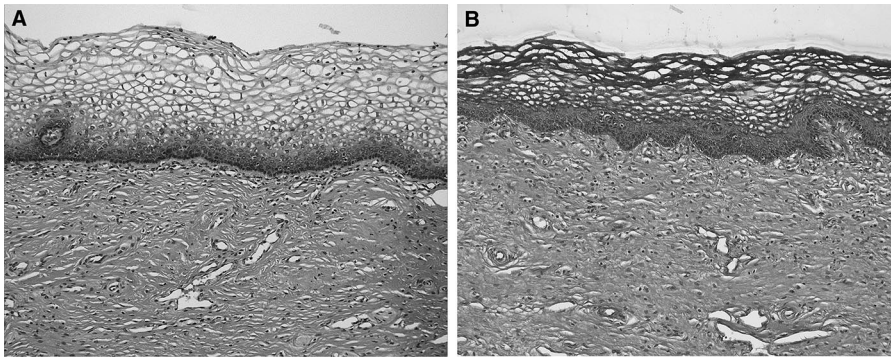


FIGURE 1. Normal female vagina, lined with squamous epithelium, containing large amounts of glycogen, HE-stain (A) and PAS stain (B).

TABLE 1. Age, Years of Hormonal Therapy (Hormones), Years Since Vaginoplasty (Time Lapse), Reason for Surgery (Indication), and Macroscopic Aspect of the Neovaginal Skin Lining (Appearance) at the Time of Biopsy of the Neovaginal Epithelium in 9 Male-to-Female Transsexuals

Pt	Age	Hormones	Time Lapse	Indication	Appearance
A	36	2.6	0	Vaginoplasty	Normal, dry skin
B	46	1.8	0	Vaginoplasty	Normal, dry skin
C	45	7.2	0.7	Correction vulva	Red, dry dermatitis
D	38	2.5	1.1	Vaginal granuloma	Normal, dry skin
E	46	3.9	1.2	Correction vulva	Normal, dry skin
F	27	6.7	4.9	Correction vulva	Wet dermatitis/mucosal
G	46	11.2	9.2	Correction vulva	Normal, dry skin
H	33	11.4	9.8	Correction vulva	Wet dermatitis/mucosal
I	47	15.8	13.6	Correction vulva	Normal, dry skin

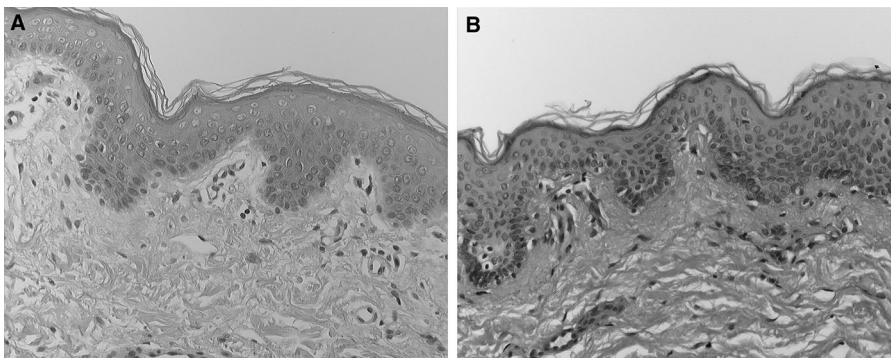


FIGURE 2. Neovagina, lined with squamous epithelium with an epidermal appearance with a normal basket weave horn layer and very little glycogen, HE stain (A) and PAS stain (B).

penile and scrotal skin flaps appeared macroscopically as normal skin, not as mucosa. No changes that might possibly have been induced by hormonal therapy were obvious.

The same held for 4 additional patients in whom the biopsies were obtained from 1.1 years to 13.6 years after vaginoplasty (patients D, E, G, and I), except for the scrotal skin flap that appeared less rugged than normal scrotal skin does. Scrotal skin hair growth was obvious in all patients, but the hairs were less coarse than those of normal scrotal skin.

The skin of one patient (C) had the reddish appearance of dry dermatitis, while the neovaginal epithelium in the 2 remaining patients (F and H) had a reddish, wet appearance associated with eczematous dermatitis or, even, mucosa.

Microscopic Aspect of the Neovaginal Skin Lining

In both patients in whom the biopsies were obtained at the time of vaginoplasty (patients A and B), the microscopic aspect of the skin of the penile and scrotal flaps was as normal keratinized squamous epithelium, and no glycogen was demonstrated (Fig. 2). Hairs were included in the scrotal skin biopsies (Table 2).

Microscopically normal skin was also observed in the biopsies of 3 out of the 4 patients without macroscopic changes of the skin (patients D, E, and G), whereas a slight, nonspecific inflammation of the skin was seen in the fourth (patient I). Hairs were found in only 2 of the scrotal

TABLE 2. Histologic Observations (Microscopy) as Compared to the Macroscopic Aspect of the Neovaginal Skin Lining (Macroscopy) in 9 Male-to-Female Transsexuals

Pt	Macroscopy	Microscopy
A	Normal, dry skin	Normal keratinizing skin, normal hair
B	Normal, dry skin	Normal keratinizing skin, normal hair
C	Red, dry dermatitis	Normal keratinizing skin with hair, chronic dermal inflammation
D	Normal, dry skin	Parakeratinizing skin with hair, acanthosis of scrotal skin
E	Normal, dry skin	Normal keratinizing skin, normal hair
F	Wet, mucosal	Chronically inflamed skin with focal keratinization
G	Normal, dry skin	Normal keratinizing skin, no hairs
H	Wet, mucosal	Normal skin with hardly any keratin layer, no hairs
I	Normal, dry skin	Slightly, nonspecifically inflamed skin, no hairs

skin flap biopsies. No glycogen was observed in the epithelium in any of the biopsies.

The dry reddish skin of patient C showed normal keratinizing squamous epithelium with hair and a chronic dermal inflammation (Fig. 3), while the neovaginal epithelium in the 2 remaining patients (F and H) respectively showed eczematous changes with focal parakeratotic keratinization (Fig. 4) and normal skin with hardly any keratinization. Still, no glycogen typical of mucosa or loss of keratinization was present in these biopsies.

FIGURE 3. Chronically inflamed neovagina with acanthosis and orthokeratotic hyperkeratosis of the squamous epithelium and inflammatory cells in the dermis. Also, dermally, a hair is present. HE stain (A), PAS stain (B).

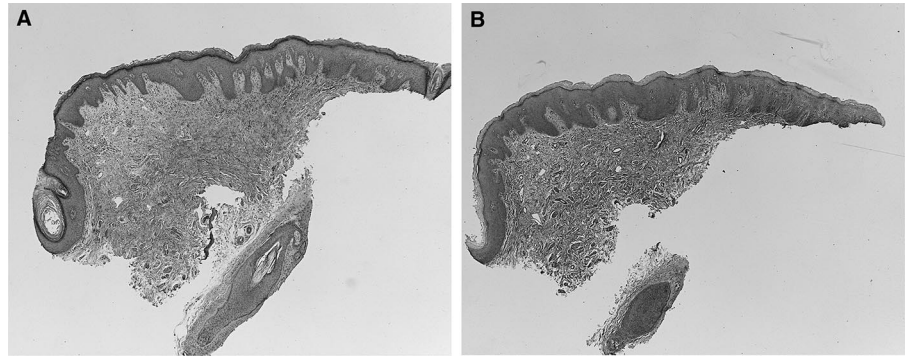
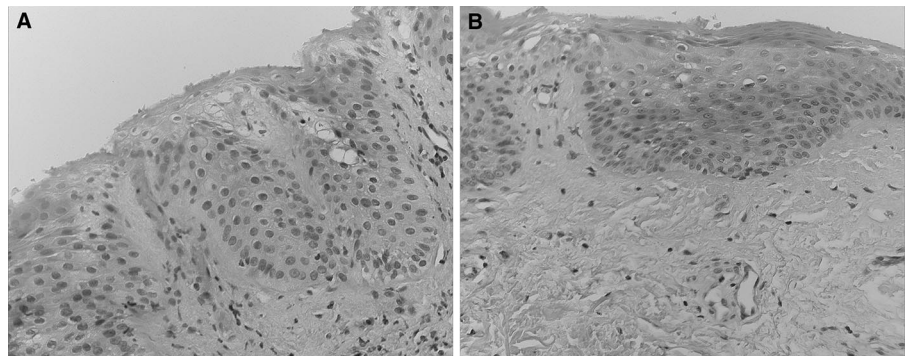


FIGURE 4. Eczematous changes of the squamous epithelium, with acanthosis, spongiosis with small vesicles (A), and focal parakeratosis (B). Some dermal and epidermal inflammatory cells are present, ie, lymphocytes (A) and eosinophils (B).



DISCUSSION

We found the histologic aspect and epithelial glycogen content of the inverted penile and scrotal skin of the neovaginal epithelial lining in male-to-female transsexuals to be normal skin at the time of vaginoplasty and not to change afterward.

Still, in some patients the gross appearance may resemble that of vaginal mucosa,⁷ and a natural moistness of the neovagina has also been noted.²¹ Keratinization may vary widely and has been alleged to depend on more than the period of time extended after vaginoplasty.¹ As such, estrogen treatment^{20,21} and the lack of friction¹ is felt to cause a reduction or, even, a loss of keratin. Contrary to this, others feel that friction by regular intercourse induced a reduction of the keratin layer and a very notable improvement in the quality and texture of the new vaginal epithelium.³ Unlike suggested by Turner et al,²⁰ we found the neovaginal skin lining not to take on the microscopic appearance of vaginal mucosa under estrogen influence but, instead, found that the macroscopic appearance may well be explained by the presence of an eczematous dermatitis that developed in the inverted skin when this dries insufficiently after bathing or voiding.

Like the alleged change in neovaginal epithelium, the continuation and extent of hair growth on intravaginal skin flaps is subject to controversy.³² We found normal hair growth to continue. Again, estrogen therapy and friction were suggested by some authors to influence the number or aspect of these hairs.²⁶ The observation that changes of epithelium and friction causes spontaneous remission of vaginal hair growth after vaginoplasty, however, is not commonly shared,

and some authors even reported increasing hair growth after vaginoplasty.²⁵

Finally, our observations on glycogen production contradict those of Hatch,¹⁶ who found the skin lining of the neovagina reconstructed after simple or radical vaginectomy to produce glycogen after it had matured. Still, unlike ours, his patients were native women. Based on our short-term and long-term observations, we conclude that this and other changes in the histologic aspect of skin flaps do not occur after penile and scrotal skin inversion vaginoplasty in male-to-female transsexuals.

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