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Commentary

Commentary on: Application of embryonic equivalents in male-to-female sex reassignment surgery

COMMENTARY

Vaginoplasty is the surgical procedure carried out to construct or reconstruct the vagina. The indications may be, in cases of male-to-female transsexuals (transwomen), congenital absence (Mayer–Rokitansky–Küster–Hauser [MRKH] syndrome etc.), malignancy, trauma, infections etc. Goldwyn[1] in an extensive review described attempts to form a vagina from Hippocratic times (460–370 BC) to 1970s. Nearly all procedures for creation of the vagina (except dilatation techniques) involve a perineal incision between urethra and anus, dissection through central tendon and Denonvilliers' fascia, beyond seminal vesicle and prostate through to the rectovesical pouch peritoneum at a depth of 7.5 cm from anorectal junction, which is then stripped away from anterior rectum to attain a depth of 12–14 cm. Intruding few medial levator ani fibres (pubococcygeus/puborectalis) are divided to increase neovaginal dimensions.

There are fundamental differences in vaginoplasty as carried out in cases of transwomen versus biologic females. In biological females, often the pudendal organs are present and have been used by many authors as donor tissue for neovaginal lining, while transsexuals have available scrotal and penile tissue for the formation of these structures. While in biologic females, the pelvis is of adequate dimensions with much greater space in the rectovesical area and in transwomen, who are biologic males, this is just a septum. Fang *et al*.[2] studied the inter-ischiopubic ramic distance in 18 male and 10 female cadavers. This was only 3.95 ± 0.25 cm in males and 5.2 ± 0.36 cm in females, at empiric level of the vaginal canal, which is 3 cm from the inferior border of pubic symphysis. This may result in bony compression of the neovagina in transwomen, ventrolaterally, even if an adequately roomy and long cavity is created, thus resulting in vault narrowing, and may be a cause of sexual dissatisfaction. This finding would also suggest that vaginoplasty in transwomen should employ thinnest possible flaps or linings.

Except dilatation, traction and balloon techniques, the main difference between vaginoplasty techniques consists in the type of tissue lining the neovaginal cavity. Various authors have used lining material as diverse as split thickness skin graft, full thickness skin graft, buccal mucosal graft, amnion, dermal substitutes and penile/ scrotal/ perineal/ urethral flaps. Labial flaps, non genital skin flaps, peritoneal pouch and bladder mucosal flaps have also been used, especially in cases of congenital absence of vagina. Intestinal segment flaps have been used since a long time, for vaginoplasty, the commonest being sigmoid. The two common procedures as practiced today are penile inversion vaginoplasty and sigmoid vaginoplasty. There are many variants of penile inversion vaginoplasty, which include the use of only penile skin flap, penile skin flap supplemented with urethral/scrotal/ perineal flaps [Figure 1] or extended by scrotal skin grafts. Some authors use penile skin flap only for pudendal reconstruction and line the entire neovaginal cavity with scrotal skin graft (Kunaporn personal communication).

Another method for vaginoplasty is the tissue engineered vaginoplasty, as demonstrated by Dessy *et al*.[3] in transwomen and Raya-Rivera *et al*.[4] in patients with MRKH syndrome. In this procedure, an oral mucosal/vaginal mucosal/vulvar biopsy is taken and epithelial and smooth muscle cells are isolated, cultured and seeded on inner and outer surfaces of a biodegradable scaffold. This seeded scaffold is then placed in the dissected neovaginal cavity. Alternately, the gauze pieces carrying bioengineered mucosa are placed in the dissected cavity and retained with the help of inflatable stent. Using this procedure spares the entire dissected penile skin flap in transwomen for refinement in reconstructing the pudendal organs such as clitoral hood, labia minora and vestibular lining, and hence, this may well become the procedure of choice, once the tissue culture techniques are widely available.

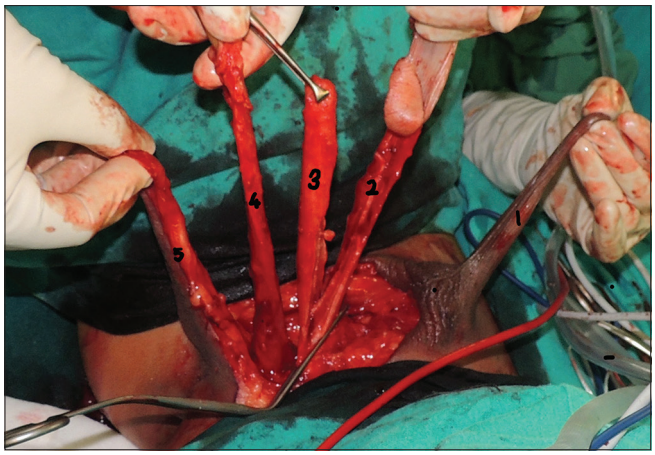

Figure 1: Penis disassembled into its components, before construction of female organs. (1) Penile skin tube, to be used for part of anterior vaginal wall, (2) glans and part of prepuce, dissected on dorsal NV bundle, to be trimmed and used for construction of neoclitoris and clitoral hood, (3) dissected bilateral corpora, to be debrided, (4) urethra and corpus spongiosum, to be largely trimmed and (5) perineoscrotal flap, to be used for posterior, and part of anterior vaginal wall

Figure 3: Long-term result of penile skin-flap vaginoplasty. There is wide separation of anterior labia, with no formation of anterior labial commissure

Figure 2: Normal female pudendal anatomy. Notice the normal anterior commissure

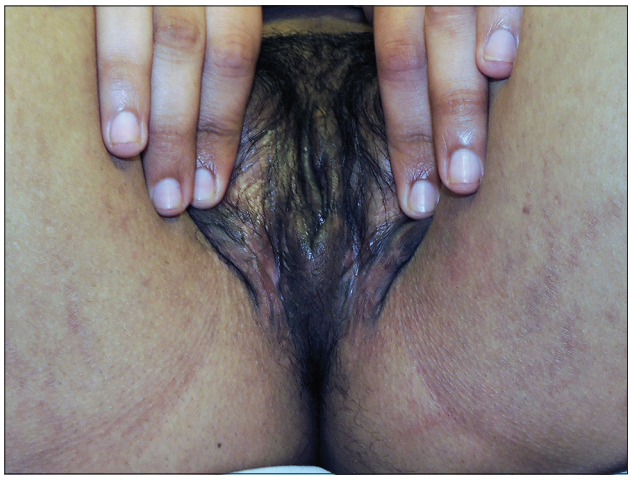

Figure 4: Same case as Figure 3. Neolabia minora, clitoris and clitoral hood can be seen

Authors of 'Application of embryonic equivalents in male-to-female sex reassignment surgery' (MFEEbSRS) have described their version of penile inversion vaginoplasty. There are several interesting facets in this paper. The first is the name of the paper itself. Authors have tabulated the embryonic equivalents in males and females, and the male structures used by them to reconstruct the corresponding female structure. However, the use of these male structures to recreate their embryonic equivalent is not new and has been described with various modifications by various authors. For example, penile skin tube to create vaginal lining has been described as early as 1957 by Gillies and Millard,[5] and with modifications, by others.[6-13] Similarly, many authors[14-17] have described neoclitoroplasties, based on dorsal neurovascular bundle. Soli *et al*.[18] included dorsal corporal tunica albuginea as a protective layer underneath, to avoid injuring the neurovascular bundle during dissection.

Unlike the authors of MFEEbSRS, most authors[8,13,19,20] radically shorten the corporal crura up to the pubic bones or ischiopubic rami, to prevent the painful engorgement of these structures, which may occur during sexual intercourse, thus causing dyspareunia and hence do not recommend mounting the dorsal neurovascular bundle-based neoclitoris on conjoined corporal stumps. The use of distal bulbar urethra to form neourethral meatus, and scrotal flaps for reconstructing labia majora, is also a routine procedure in feminising genitoplasty. Author's technique for creation of neoclitoral hood by medialisation of unfurled penile skin may be considered slightly different from the Reed[21] technique. Most authors also use small

flaps to offset a circular contracture at neourethral meatus, as MFEEbSRS authors have demonstrated. As far as neovaginal vault fixation is concerned, some authors use modified Stamey procedure and some of them use sacrospinous ligament fixation. The authors of MFEEbSRS describe fixation to levatores prostate, the most medial fibres of levator ani, lying adjacent to neovaginal apex, with good result (no prolapse in their series).

Finally, any technique in which anteriorly based penile skin flap is used to construct vagina, labia minora, clitoral hood and vestibule suffers from inherent defect of a wide gap between neolabia majora anteriorly, to accommodate the penile skin tube pedicle [Figures 2-4]. This necessitates a secondary procedure of crown plasty for correction and to recreate normal feminine pudendal anatomy.

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Conflicts of interest
There are no conflicts of interest.

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