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DORSAL FREE GRAFT URETHROPLASTY FOR URETHRAL STRICTURE BY VENTRAL SAGITTAL URETHROTOMY APPROACH

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ABSTRACT

Objectives. To explore the feasibility of applying a dorsal free graft to treat urethral stricture by the ventral sagittal urethrotomy approach without mobilizing the urethra.

Methods. Twelve patients with long or multiple strictures of the anterior urethra were treated by a dorsal free full-thickness preputial or buccal mucosa graft. The urethra was not separated from the corporal bodies and was opened in the midline over the stricture. The floor of the urethra was incised, and an elliptical raw area was created over the tunica on which a free full-thickness graft of preputial or buccal mucosa was secured. The urethra was retubularized in one stage.

Results. After a follow-up of 8 to 40 months, one recurrence developed and required dilation.

Conclusions. The ventral sagittal urethrotomy approach for dorsal free graft urethroplasty is not only feasible and successful, but is easy to perform. UROLOGY **58:** 657–659, 2001. © 2001, Elsevier Science Inc.

Although many urethral strictures can be controlled or cured with treatment by dilation, internal optical urethrotomy, or end-to-end spatulated anastomosis, some strictures, especially long strictures, penile urethral strictures, and multiple strictures, require substitution urethroplasty. Traditionally, vascularized local skin flaps have been the most popular form of substitution urethroplasty in single-stage or staged procedures, but these are prone to late complications because of ballooning and diverticula formation, causing stasis of urine and leading to skin excoriation.[1] Free grafts of full-thickness penile or preputial skin used as ventral patch or tube have been in vogue for several decades, but are prone to shrinkage, leading to repeated stricture or diverticulum formation. Buccal mucosa used as above has recently become popular because of the ease of harvesting but has the same drawback.[2] Recently, dorsal free graft urethroplasty by mobilizing the urethra and incising the stricture dorsally[3,4] has gained popularity, as the graft on the corporal bodies prevents ballooning. We describe a technique of laying open the stricture ventrally and then incising the urethra dorsally without mobilizing it to expose the tunica albuginea for free skin or buccal mucosa graft followed by retubularization of the urethra, with good results in long and multiple strictures in one stage.

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MATERIAL AND METHODS

Twelve patients, ranging in age from 16 to 54 years (mean 42) with strictures ranging from 2 to 10 cm (mean 6) underwent surgery between January 1998 and September 2000. The cause of the strictures was inflammatory in 5, iatrogenic in 4, and traumatic in 3 cases; all patients had undergone one or more procedures before referral for urethroplasty. Two had a suprapubic cystostomy in place. Nine patients had undergone blind dilations earlier. Six had previously undergone optical internal urethrotomy; two of these had failed end-to-end anastomosis and dilations. Patients with balanitis xerotica obliterans (BXO), periurethral abscess, or urinary fistulas were excluded.

The urethra was exposed at the site of the stricture. No attempt was made to mobilize the urethra or dissect the bulbospongiosus muscle and Buck's fascia. The urethra was slit open ventrally over a bougie and the stricture was laid open for about 1 to 2 cm both proximally and distally into the healthy urethra. The full thickness of the dorsal urethra was then incised in the mid-line for about 1 to 2 cm both proximally and

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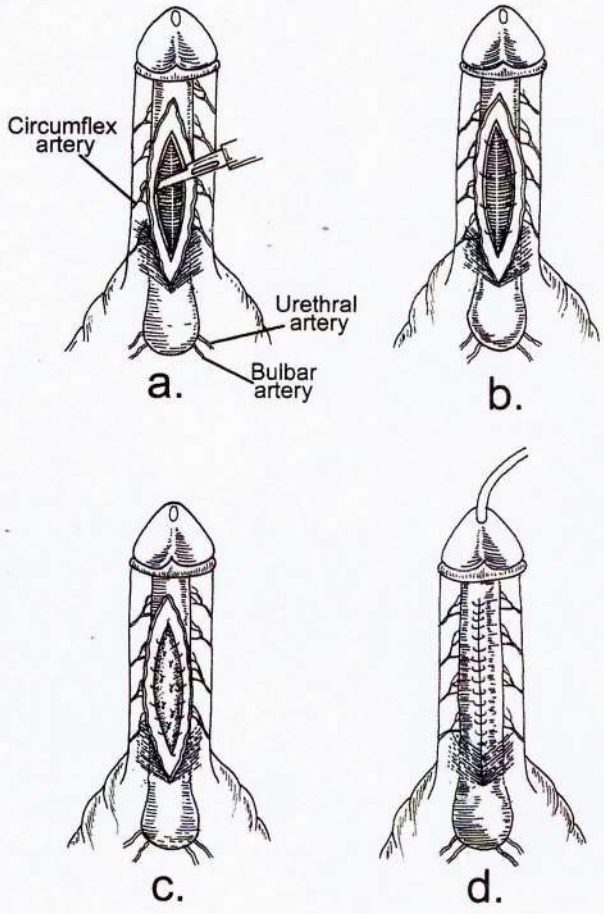

FIGURE 1. *(a) Separation of margins of dorsal urethrotomy from corporal bodies. (b) Securing of free margins to tunica albuginea. (c) Fixation of dorsal free graft. (d) Retubularization of urethra.*

distally into the healthy urethra. The margins of the incised dorsal urethra were dissected from the tunica albuginea by sharp dissection with the edge of a scalpel blade, without lifting the two halves of the bisected urethra (Fig. 1a). This provides an adequate elliptical raw area up to 2 cm over the tunica albuginea between the incised dorsal edges of the urethra. The incised dorsal free margins of the urethra are anchored by interrupted sutures to the tunica albuginea using 5-0 polyglactin (Fig. 1b). In 10 patients full-thickness free grafts were harvested from the inner prepuce, and in 2 patients from the buccal mucosa, and placed over the raw area of the incised dorsal urethra and anchored by 5-0 chromic catgut sutures to the edges of the incised dorsal urethra, incorporating the underlying tunica albuginea. The graft was further anchored to the underlying tunica albuginea at several points to prevent dead space using 5-0 chromic catgut (Fig. 1c). The urethra was retubularized by continuous 4-0 chromic catgut sutures over a 14F Foley catheter (Figs. 1d and 2). A pressure dressing was applied, leaving a drain in place.

The catheter was removed after 3 weeks. Urethral calibration and urethrography were performed in all cases and urethroscopy in 4 patients 4 weeks after catheter removal. All patients were examined again in June 2001, 8 to 40 months after surgery, when the urine flow was observed and uroflowmetry and urethral calibration were performed. Self-catheterization was not advised.

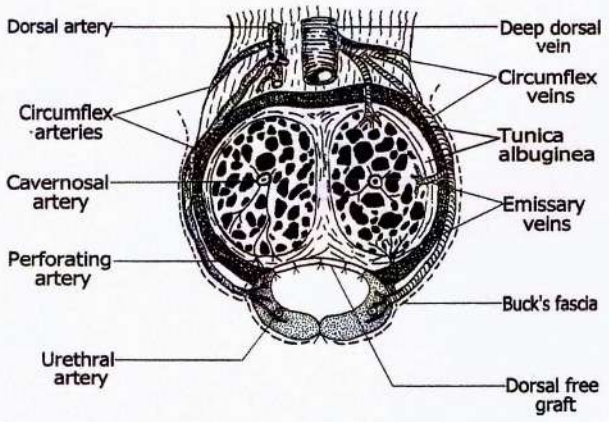

FIGURE 2. *Cross-section of penis showing arterial supply of urethra on right and venous drainage on left, along with dorsal free graft and retubularized urethra.*

RESULTS

In our series, 12 cases of long and multiple urethral strictures ranging from 2 to 10 cm (mean 6) were operated on between January 1998 and September 2000 with follow-up of 8 to 40 months (mean 26). Urethroscopy was done in 4 cases and showed good take-up of the graft. Urethrography revealed a normal caliber urethra in all cases 7 to 8 weeks after surgery. One patient developed a hematoma, which was evacuated on the second postoperative day. The wound healed well. One patient developed a temporary fistula that healed spontaneously after 2 weeks of additional catheterization. One patient developed a repeated stricture, which was controlled by dilations done three times in 1 year; the patient was voiding normally at the last follow-up visit. No patients had urinary obstructive symptoms. The calibrations and uroflowmetry done 8 to 40 months after surgery confirmed a normal diameter of the urethra with a uroflow rate of more than 15 mL/s. Of these, 11 patients had a follow-up of more than 1 year. One patient with a long penile stricture who had some chordee before surgery developed significant chordee after surgery, which had to be treated by dorsal plication. The patient was fully satisfied.

COMMENT

Substitution urethroplasty is the mainstay of treatment for long urethral strictures, anterior strictures, and multiple urethral strictures. Free skin, a mucous membrane graft, and vascularized graft from the genital area have been used for decades.[1] A free graft when used as a patch ventrally or as a tube is easy to perform but is without support of the spongiosa ventrally, leading to pooling of urine, ballooning, and repeated stricturing and

making these less reliable in the long term. Free extragenital full-thickness or partial-thickness skin grafts fare the worst.[5] Even buccal mucosa grafts used as ventral patch or tube have the same problem. It was believed that a vascularized genital skin flap in one or two stages would fare well because of having its own blood supply. With long-term follow-up, however, we have found that a large percentage develop repeated stricture, and many develop pressure diverticula and stones. A vascularized inner preputial or penile skin island when used as a patch ventrally or as a tube has the same fate because of ballooning and pooling of urine,[6] especially in proximal anterior urethral strictures.

The recent introduction of a technique that places the free graft dorsally over the tunica after mobilizing the strictured urethra and a dorsal stricturotomy has found favor. It eliminates the outpouching and ballooning of the graft, because it is supported by corporal bodies.[3] With the present approach, because the urethra is not mobilized, even long urethral strictures can be managed, and the approach is easy. The two halves of the urethra derive their blood supply from the circumflex and perforating vessels[7,8] (Fig. 1a, 2), which are severed if the urethra is mobilized. Before embarking on one-stage dorsal free graft repair using this technique, we had performed five two-stage procedures. In the first stage, the dorsal free graft was applied, but the urethra was not retubularized, and the margins of the urethra were stitched to the penile or scrotal skin margins. Adequate space (up to 2 cm) could be created for a dorsal free graft without lifting the two halves of urethra from the corpora, and no harm came to the two halves of the urethra by way of avascular changes because the blood supply from the circumflex and perforating arteries is adequate. The urethra was retubularized in the second stage. Moreover, the graft is easily sized and trimmed to accurately fit the elliptical raw area on the tunica of the corporal bodies (Fig. 2), and hence the urethra is of uniform lumen and pooling of semen, urine, and postvoid dribbling is minimized. The width of the normal urethra, as well as the grafted strictured urethra, is uniform. However, the strictured area of the urethra after a dorsal urethral graft is not as elastic as the normal urethra.

That dorsal free grafts of full-thickness preputial skin or buccal mucosa are taken up well and that the mechanical support of the corpora obviates urethrocele or diverticula formation have been shown before. The present study only suggests an alternative approach to apply the free graft. It is easier to perform because the scarred urethra is not mobilized. The patient who required dorsal plication had had a full-length penile urethral stricture with marked spongiofibrosis and mild chordee preoperatively. Although the result was good after dorsal plication, it may be advisable to excise the urethra and replace it with a skin tube in two stages if the prepuce is not available for a one-stage procedure. Cases of BXO were excluded from this study because in such cases we use buccal mucosa in two stages. Patients with periurethral abscess and fistula also are treated with staged procedures.

CONCLUSIONS

The ventral sagittal urethrotomy approach for dorsal free graft urethroplasty can be used with advantage in long and multiple strictures of the anterior urethra. It is easy to perform because the urethra is not mobilized. The sizing of the graft is accurate and hence pooling of urine and semen is minimized. The risk to the blood supply of the two halves of the bivalved urethra is less because it derives adequate blood supply from the corpora and from the circumflex arteries.

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