Urethral Reconstruction Using Colonic Mucosa Graft for Complex Strictures

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Purpose: We investigated the long-term outcome of urethral reconstruction using colonic mucosa grafts for long segment, complex urethral strictures. Another aim was to identify clinical factors impacting long-term outcomes.

Materials and Methods: We retrospectively reviewed the records of 36 consecutive patients with a mean age of 39.8 years (range 17 to 70) who underwent colonic mucosal graft urethroplasty for long segment, complex urethral stricture from October 2000 to November 2006. Patients were evaluated postoperatively at scheduled office visits at our institution and/or by telephone interview. Successful repair was defined as normal voiding without any postoperative procedure such as dilation.

Results: Urethral reconstruction with done with colonic mucosa grafts 10 to 20 cm long (mean 15.1). One patient was lost to followup. Mean followup in the remaining cases was 53.6 months (range 26 to 94). Outcomes were successful in 30 of 35 patients (85.7%). Complications, specifically meatal stenosis, bulbar or bulbomembranous urethral stenosis and proximal anastomotic site stricture, developed in 5 patients (13.3%).

Conclusions: Colonic mucosa graft urethroplasty is a feasible procedure for complex urethral strictures. The most common complications are meatal stenosis and stenosis at the anastomosis.

Key Words: urethra, urethral stricture, colon, transplants, mucous membrane

TREATMENT for complex anterior urethral strictures, extensive strictures involving more than 1 urethral segment and panurethral strictures is challenging. The surgical approach must address urothelial scarring and fibrosis of the surrounding corpus spongiosum. Numerous substitution urethroplasty techniques have been described[1–5] but there is no universally accepted graft material for primary urethral substitution or reconstruction after multiple failed attempts.

In 2004 we reported the initial outcomes of colonic mucosa graft urethroplasty in 16 patients at a mean followup of 15.8 months.[1] The procedure was successful in 93.75% of patients. The current study provides long-term followup in patients with long segment, complex urethral strictures treated with colonic mucosa graft urethroplasty. Another aim was to identify clinical variables impacting the long-term outcome of this procedure.

MATERIALS AND METHODS

From 2000 to 2006, 36 consecutive patients with a mean age of 39.8 years (range 17 to 70) underwent colonic mucosal graft urethroplasty. Preoperative evaluation included clinical history, physical examination, urine culture, post-void re-

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sidual urine measurement, uroflowmetry, and retrograde and voiding cystourethrography. Stricture etiology was posttraumatic in 15 patients (41.67%), iatrogenic in 9 (25%), infectious in 3 (8.33%), secondary to balanitis xerotica obliterans in 4 (11.1%), secondary to failed hypospadias repair in 4 (11.1%) and unknown in 1 (2.8%). Stricture was diagnosed an average of 4.25 years (range 1.5 to 40) before patient presentation at our institution. Patients underwent an average of 2.7 (range 1 to 6) prior unsuccessful repairs and/or urethral dilations.

Of the 36 patients 26 underwent prior suprapubic cystostomy and 1 underwent perineal urethrostomy with a maximum flow of 28 ml per second. In 9 patients who presented with strangury due to a severe urethral stricture uroflowmetry showed a urinary peak flow of 1 to 4.2 ml per second. Retrograde urethrogram revealed multiple urethral strictures and a pseudopath, a severe, long segment urethral stricture or an irregular beaded stricture in the anterior urethra (fig. 1, *A*).

Surgical Technique

All cases were performed by a single surgeon (YMX) using a technique originally described in 2004.[1] Full-thickness colonic mucosal grafts 11 to 21 cm long and 3 to 3.5 cm wide were tubularized over an 18Fr to 22Fr fenestrated or fluted silicone tube with interrupted 5-zero polyglactin sutures to create the neourethra (fig. 1, *B*). End-to-end anastomosis was performed between the native urethra and the neourethra with interrupted 5-zero polyglactin sutures in 21 patients. In the remaining 15 patients 1 end of the neourethra was anastomosed to the proximal native urethra and the other end was pulled through the glanular tunnel to form the new meatus (fig. 1, *C*).

Postoperative Management and Followup

Suprapubic catheterization was used for bladder drainage and the urethral silicone stent was left indwelling for 4 weeks. A half-tube drain in the perineal area remained indwelling for 2 to 4 days. All patients were evaluated with retrograde and voiding urethrography, and uroflowmetry at catheter removal to assess voiding status. When cystourethrography confirmed no evidence of stricture or fistula, the suprapubic cystostomy tube was removed. The first followup visit was 1 month after suprapubic catheter removal. Most patients underwent urethrography and uroflowmetry 3 to 4 months later (fig. 1, *D*). Several patients evaluated by urethroscopy postoperatively were advised to be followed at 2 to 3-year intervals. Most patients were evaluated by urethrography and uroflowmetry at 3 to 6-month intervals. Voiding status was also assessed during patient interviews at followup appointments or by telephone interview. When obstructive symptoms developed or the peak flow rate deteriorated to less than 15 ml per second, urethrography and urethroscopy were repeated. Successful reconstruction was defined as normal voiding without any postoperative procedures such as dilation.

RESULTS

Urethral reconstruction was performed using 11 to 21 cm colonic mucosa grafts. One patient was lost to followup. Mean followup in the remaining patients was 53.6 months (range 26 to 94). The procedure was successful in 30 of 35 patients (85.7%). The 5 patients in whom the procedure was not successful had recurrent stricture.

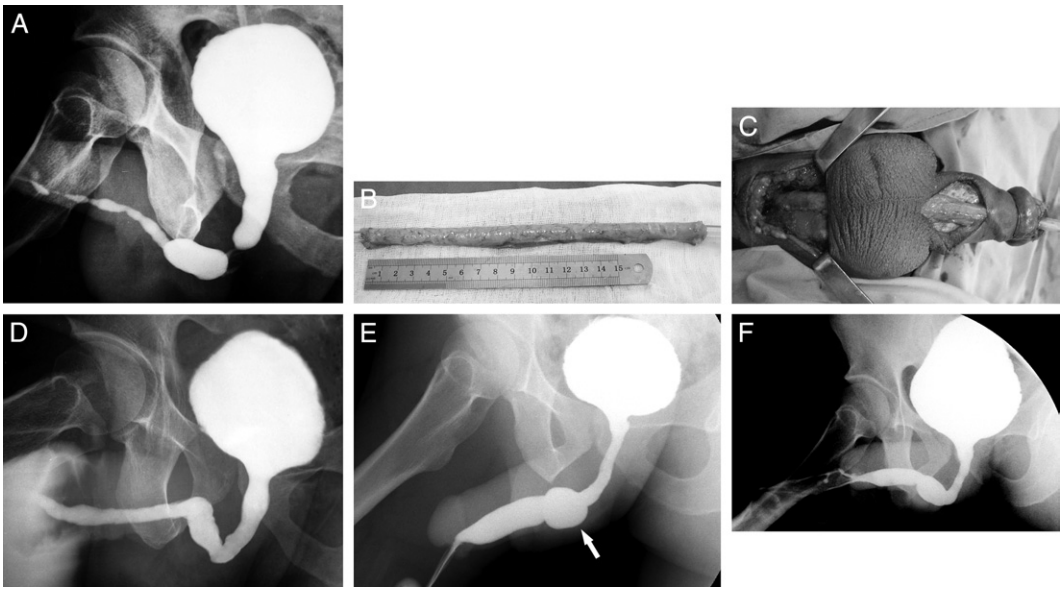

Figure 1. *A*, voiding retrograde urethrogram shows multiple anterior urethral strictures. *B*, colonic mucosa graft was tubularized over 22Fr fenestrated silicone tube. *C*, urethra was reconstructed with colonic mucosa from meatus to membranous urethra. *D*, voiding cystogram shows patent neourethra with wide lumen 3 months postoperatively. Peak flow was 24.8 ml per second. *E*, voiding cystogram reveals small penile urethral diverticulum (arrow) 2 years postoperatively. Peak flow was 28.6 ml per second. *F*, voiding cystogram shows no diverticulum 2 months after meatoplasty. Peak flow was 37.8 ml per second.