Intermediate Outcomes After Female Urethral Reconstruction: Graft vs Flap

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OBJECTIVE To evaluate the outcomes of women after urethral reconstruction with a vaginal flap urethroplasty (VFU) or dorsal buccal mucosal graft (BMG).

METHODS We retrospectively identified 10 women undergoing urethral reconstruction between February 2007 and October 2012. All patients had evidence of urethral stricture on cystoscopy and/or urodynamic study indicating bladder outlet obstruction. Recurrent stricture was defined using the same criteria. Follow-up included urethral calibration (>16F), symptom assessment, voiding cystourethrogram, and cystoscopy when there was difficulty voiding or symptoms recurred.

RESULTS Mean age was 49 years (range, 32-74). The indication for urethral reconstruction was urethral stricture in 9 patients. One woman had a traumatic 2-cm ventral urethral laceration associated with a pelvic fracture. Location was mid in 6 and distal in 4 women. Average stricture length was 1.25 cm (range, 0.2-2). All patients with urethral stricture had previously undergone multiple urethral dilations. There were no major postoperative complications. Two patients undergoing VFU had a recurrent stricture requiring dilation. No patients undergoing dorsal BMG had a recurrent stricture.

CONCLUSION Female urethral reconstruction, either VFU or dorsal BMG, is a safe and successful procedure that should be offered to women with urethral strictures. The dorsal BMG approach is well tolerated and results are promising, but longer-term follow-up is needed. Women should be offered urethral reconstruction as a definitive management option rather than repeated urethral dilations. UROLOGY 83: 1181–1185, 2014. © 2014 Elsevier Inc.

The diagnosis of female urethral stricture is difficult given the low incidence and variable presenting symptoms, including frequency, urgency, dysuria, hesitancy, recurrent urinary tract infections, and retention. One large study of 587 women found that 38 women (6.5%) undergoing evaluation for lower urinary tract symptoms had bladder outlet obstruction on urodynamic study, with 5 (0.8%) of these patients having urethral stricture or narrowing.[1] The difficulties in diagnosis, combined with the rarity of occurrence, make the management of female urethral strictures challenging.

Depending on the location and severity of the stricture, treatment options include observation, urethral dilation, self-catheterization, urethrotomy, and formal reconstruction. Although no specific treatment algorithm exists, urethral dilation is often the first line treatment. This, however, has been shown to have a high failure rate with one series reporting a 94% stricture recurrence rate at a mean follow-up of 2 years.[2] Available data indicate that formal urethral reconstruction has more durable outcomes. There are several described techniques used for urethral reconstruction, including the use of flaps and grafts using vaginal and buccal mucosa.

Urethral reconstruction for the treatment of female urethral stricture is a rarely performed procedure, and published data are limited to small case series. For this reason, it can be difficult to counsel women regarding treatment options and long-term outcomes. Our objective was to evaluate outcomes and complications of women undergoing urethral reconstruction with either vaginal flap urethroplasty (VFU) or dorsal buccal mucosal graft (BMG) at our institution.

METHODS

We identified women undergoing urethral reconstruction between February 2007 and October 2012 by Current Procedural Terminology code 53430. An Institutional Review Board–approved retrospective review of their medical records was performed. All procedures were performed at a single tertiary center by 4 surgeons.

All patients had symptoms consistent with obstruction, evidence of urethral stricture on cystoscopy, and 1 or more failed urethral dilations. When there was a concern for abnormal bladder function because of long standing bladder outlet

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Table 1. Patient characteristics, treatment, and follow-up

Patient	Age, y	Etiology	Symptoms	Site	Indication	Procedure	Secondary Treatment	Follow-up (mo)
1	55	Unknown	Unknown	Mid	Stricture	VFU	None	75
2	52	Unknown	Dysuria	Mid	Stricture	BMG	None	25
3	47	Unknown	Dysuria, hesitancy, retention	Distal	Stricture	VFU	Dilation at 20 mo, repeat dilation at 35 mo	39
4	61	Iatrogenic	Slow stream, hesitancy, retention	Distal	Stricture	VFU	None	70
5	42	Iatrogenic	Hesitancy, urgency	Mid	Stricture	VFU	Dilation at 34 mo, repeat dilation at 43 mo	47
6	74	Trauma	Retention, urgency	Mid	Stricture	BMG	None	36
7	46	Unknown	Dysuria, retention	Mid	Stricture	BMG	None	24
8	32	Inflammation	Retention, pelvic pressure, frequency	Mid	Stricture	BMG	None	12
9	49	Idiopathic	Retention	Distal	Stricture	VFU	None	10
10	33	Trauma	Incontinence	Distal	Urethral disruption	Island vaginal flap	None	10

BMG, buccal mucosal graft; VFU, vaginal flap urethroplasty.

Patient no. 5 had previous reconstruction with vaginal flap for cloacal malformation and hypospadias.

Patient no. 10 had pelvic fracture with vaginal laceration and urethral disruption requiring reconstruction. She also had an autologous pubovaginal sling performed at time of urethroplasty.

obstruction, urodynamics was performed. These patients demonstrated elevated detrusor pressures, low flow, and incomplete emptying. Follow-up included symptom assessment, urethral calibration (>16F), voiding cystourethrogram, and cystoscopy when there was either difficulty voiding, passing a 16F catheter, or symptoms recurred. Stricture recurrence was defined as being unable to pass a 17F flexible cystoscope at any point during follow-up.

All patients underwent either VFU (n = 6) or BMG (n = 4). Choice of procedure was individualized to each patient on the basis of location, length of stricture, and surgeon experience. Initial follow-up occurred at 2 weeks and then at 6 months and 1 year.

Surgical Technique

VFU procedures were performed by 3 surgeons and generally followed a variation of the Blandy technique described by Schwender et al.[3] Patients were placed in the dorsal lithotomy position, and a U-shaped flap was developed from the urethral meatus to the bladder neck. The ventral urethra was divided in the midline. The tip of the vaginal epithelial flap was inverted and advanced proximally along the urethrotomy and sutured along the urethral edges. The periurethral tissues were reapproximated. A Foley catheter was left in place.

For the patient with the traumatic urethral laceration, an island of vaginal wall was developed and aligned over the urethral injury site. This patient also had concomitant stress urinary incontinence and an autologous pubovaginal sling was placed at reconstruction.

All dorsal BMG procedures were performed by a single surgeon. Patients were placed in the dorsal lithotomy position. A suprapubic tube was placed under direct visualization. An incision was made anterior to the urethra approximately 180° from the 3- to 9-o'clock positions. The incision was deepened to the periurethral fascial plane and developed parallel to the urethra. Care was taken to avoid the clitoral tissues and dorsal complex. Marking sutures were placed through the urethral mucosa. An urethrotomy was made vertically down the dorsal aspect of the strictured urethra. A BMG was harvested from the patient's cheek. After maturing the graft in standard fashion, it was sewn to the dorsal aspect of the urethral edges and along the underside of the pubic symphysis periosteal tissue starting proximally out to the urethral meatus. The urethra and skin incision were reapproximated. A 14F catheter was left in place.

RESULTS

We identified 10 women undergoing urethral reconstruction. Mean age was 49 years (range, 32-74), and mean follow-up was 34 months (range, 10-75). The indication for urethral reconstruction was urethral stricture in 9 patients, and 1 patient had a traumatic 2-cm ventral urethral laceration associated with a pelvic fracture. Presenting symptoms included hesitancy, frequency, urgency, dysuria, slow stream, and/or retention (60%) as seen in Table 1.

Of the 9 patients undergoing reconstruction for stricture, location was mid in 6 (66%) and distal in 3 (33%) patients (dividing the urethra into 3 segments distal, mid and proximal 1.5 cm each). Average stricture length was 1.1 cm (range, 0.2-2). All patients with urethral stricture had previously undergone multiple urethral dilations. Stricture etiology was known to be obstetric trauma in 1, inflammatory in 1, iatrogenic in 2 patients, and idiopathic in 1 patient. It was not possible to determine the specific etiology in 4 patients because they were initially treated for several years at outside facilities. One patient had previous urethral reconstruction for cloacal malformation and hypospadias.

The patient with a traumatic urethral laceration had a concomitant autologous pubovaginal sling for stress urinary incontinence. One patient undergoing VFU had a simultaneous laparoscopic nephrectomy for an atrophic kidney and recurrent infections.