The Efficacy of Primary Interventional Urethral Realignment for the Treatment of Traumatic Urethral Injuries

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ABSTRACT

Purpose: To evaluate the efficacy of primary interventional urethral realignment (PIUR) in patients with traumatic urethral injuries.

Materials and Methods: This retrospective study included 13 patients with traumatic urethral injuries who were treated with PIUR between September 2008 and February 2014. All 13 patients were men with the mean age of 56.3 years. Technical success rate of PIUR, time to PIUR, required procedure time, length of hospital stay, duration of urethral catheterization, and complications after PIUR were investigated.

Results: PIUR was technically successful in 12 of 13 patients (92.3%). The mean time from trauma to PIUR was 44 hours (range, 1–240 h). The mean procedure time was 20.2 minutes (range, 3–90 min). The median length of hospital stay was 15 days (range, 1–60 d). The mean duration of urethral catheterization after PIUR was 25 days (range, 9–65 d). There were no immediate complications related to PIUR, although 6 of 12 patients developed symptomatic urethral stricture after PIUR. The mean time to stricture development after PIUR was 4.3 months (range, 2–12 mo). Of the 6 patients, 2 were treated with endoscopic internal urethrotomy, and 4 were treated with interventional radiologic urethral balloon dilation.

Conclusions: PIUR can be safe and effective for patients with traumatic urethral injuries. However, symptomatic stricture formation occurred in one-half of the successful realignment procedures.

ABBREVIATION

PIUR = primary interventional urethral realignment

Traumatic urethral injuries result from iatrogenic, blunt, or penetrating trauma and can be described as contusion, incomplete disruption, or complete disruption (1,2). Several classifications of urethral injuries have been identified with respect to the anatomic site (3–5). Different injury locations have different injury mechanisms, management strategies, associated injuries, and complications.

After all of the life-threatening associated injuries are appropriately addressed, initial management of urethral injury should provide drainage of the bladder (6). Definitive management of urethral injury depends on the site, type, and extent of the injury. No specific therapy is required for patients with an anterior urethral contusion. Incomplete or complete disruption of the anterior urethra is typically treated by suprapubic diversion, although primary repair is recommended when there is an associated penile fracture or penetrating injury (6). There are three options for management of posterior urethral injury: (*i*) primary surgical repair, (*ii*) suprapubic cystostomy with delayed urethroplasty, and (*iii*) primary endoscopic realignment of the urethral end (1,7,8).

After primary radiologic realignment was first described by Clark et al in 1992 (9), Londergan et al (10) reported six patients with severe traumatic urethral injuries treated successfully with early fluoroscopic realignment. They affirmed that radiologic realignment may be a safe and

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None of the authors have identified a conflict of interest.

J Vasc Interv Radiol 2016; 27:226–231

http://dx.doi.org/10.1016/j.jvir.2015.08.006

effective treatment option for traumatic urethral injuries. However, there are few follow-up studies regarding the use of primary interventional urethral realignment (PIUR) because most reports on urethral realignment use endoscopic techniques to treat urethral injuries. The purpose of the present study was to evaluate the efficacy of PIUR in patients with traumatic urethral injuries.

MATERIALS AND METHODS

Patients

Institutional review board approval was obtained for this study, and informed consent was waived because of its retrospective nature. From September 2008 to February 2014, 13 male patients with traumatic urethral injuries who were treated with PIUR were enrolled in this retrospective study. Patient age ranged from 34 to 81 years (mean, 56.3 y; SD, 14.9 y). Patient demographics, mechanism and type of urethral injury, technical success rate of PIUR, time to PIUR, required procedure time, length of hospital stay, duration of urethral catheterization, and complications after PIUR were assessed.

PIUR Procedures

All procedures were performed by two interventional radiologists (S.H.K., with 11 y of interventional experience, and M.S.L, with 4 y of interventional experience). Patients were placed supine on the fluoroscopy table in the intervention suite. A 5-F catheter (KMP; Cook, Inc, Bloomington, Indiana) was inserted into the anterior urethra, and 5 mL of 2% lidocaine was injected through the catheter for local anesthesia. A retrograde urethrogram was performed by injecting 10 mL of 50% diluted contrast medium (BONOREX; CMS, Seoul, Korea) with normal saline through the catheter to assess the urethral injury.

Retrograde PIUR (Fig 1a–c) was performed as follows: Under fluoroscopic guidance, a 0.035-inch angled guide wire (Radifocus Glidewire; Terumo, Tokyo, Japan) was loaded onto the 5-F catheter (KMP) and manipulated until it passed through the site of the urethral injury. The guide wire then was navigated to reach the entrance of the bladder neck; the 5-F catheter was advanced over the guide wire into the bladder, and the wire was removed. Contrast medium was injected through the catheter to confirm that the catheter tip was accurately inserted into the bladder. A 0.035-inch, stiff-type, angled guide wire (Radifocus Glide) was passed through the catheter and coiled into the bladder. After the 5-F catheter was removed, a 12-F or 14-F pigtail catheter (Cook, Inc) or 14-F Foley catheter was inserted into the bladder over the stiff guide wire.

If the retrograde PIUR failed to realign the urethra, an antegrade PIUR (Fig 2a, b) was performed from the suprapubic route. A suprapubic cystostomy was performed during the procedure (patient 3), and then an 8-F sheath (Terumo) was inserted into the bladder via the suprapubic route. The 0.035-inch guide wire, which was loaded on the 5-F catheter, was passed through the sheath until it reached the bladder. The guide wire was navigated to pass through the site of the urethral injury and to reach the external urethral orifice. Then a 12-F or 14-F pigtail or a 14-F Foley catheter was placed transurethrally over the wire, and the guide wire was pulled out of the external urethral orifice.

If either the retrograde or the antegrade PIUR failed, a rendezvous procedure (Fig 3a–c) was performed as follows: Under fluoroscopic guidance, a 10-mm snare (Amplatz GooseNeck Snare; ev3, Inc, Plymouth, Minnesota) was placed through the anterior urethra catheter to grasp the 0.035-inch guide wire that was placed through the preexisting suprapubic cystostomy. If the procedure was successful, a catheter was left in place as described previously.

In the initial patients, a 12-F or 14-F pigtail catheter was used for PIUR because it was essential the catheter be placed over the guide wire preventing additional

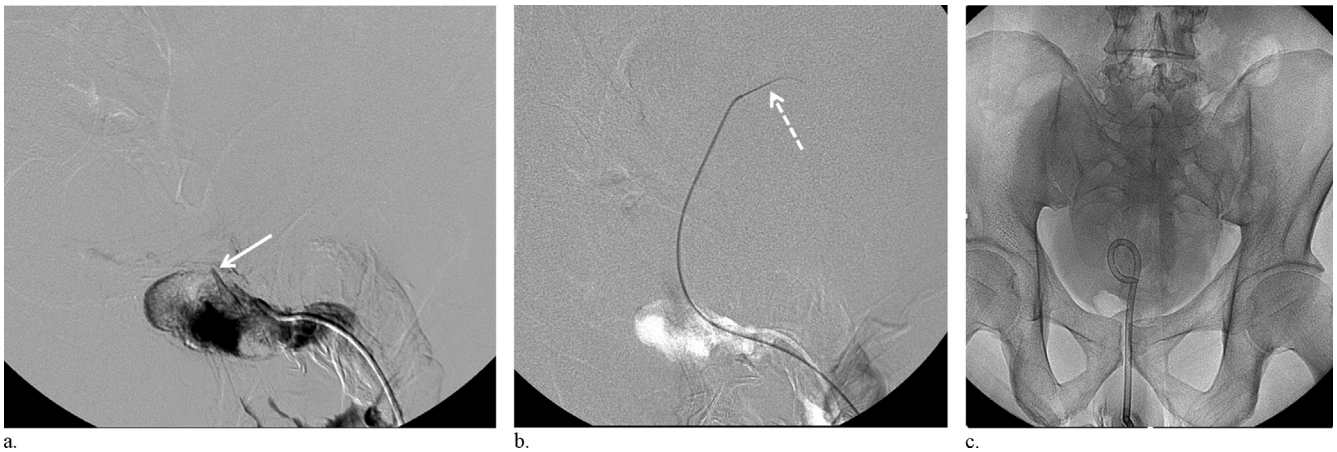

Figure 1. Retrograde PIUR. **(a)** Retrograde urethrogram in a 48-year-old man shows complete anterior urethral disruption without filling of the proximal urethra and urinary bladder. The end of the disrupted urethra has a beak appearance (arrow). **(b)** Supported by the 5-F catheter, a guide wire (arrow) was passed into the tip of the beak and then reached the entrance of the bladder neck. **(c)** A 14-F pigtail catheter was inserted into the bladder over the guide wire.