

# Delayed Retropubic Urethroplasty of Completely Transected Urethra Associated With Pelvic Fracture in Girls

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**Introduction:** The objective of the present study was to evaluate the results and the complications of delayed retropubic urethroplasty of completely transected urethra associated with pelvic fracture in girls.

**Materials and Methods:** From 2002 to 2008, a total of 7 girls with complete urethral disruption after pelvic fracture were referred to our center and all of them underwent delayed retropubic urethroplasty with end-to-end anastomosis of the urethra.

**Results:** Seven female patients with a median age of 6 years old underwent delayed end-to-end anastomosis. The median time to surgery was 6 months from the trauma. Voiding was normal after catheter removal in all of the patients. The median follow-up was 36 months. Three patients had mild stress urinary incontinence after catheter removal.

**Conclusion:** There are some different strategies for management of complete urethral avulsion in females who have sustained pelvic fracture, including early realignment, bladder flaps, and end-to-end anastomosis. The strategy of delayed end-to-end anastomosis urethroplasty with retropubic approach is sound and produces acceptable results. The use of flexible cystoscope and omental flap is effective in achieving continence after urethroplasty in such cases.

*Keywords: pelvic bones, bone fractures, female, urethra, urologic surgical procedures, urinary incontinence*

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## INTRODUCTION

Most severe urethral injuries, both in children and adults, occur in males after pelvic fracture.<sup>(1)</sup> Among female patients with pelvic fracture, concomitant urethral injury is rather rare. Short length, greater mobility (male membranous urethra, unlike female urethra, is relatively fixed to the pelvic bones), and protection by the bony arch protects the urethra in women and girls against injury during pelvic fracture.<sup>(2)</sup> Trauma to the female urethra is a poorly understood entity that has been reported only

sporadically in the literature. Trauma to the female urethra is estimated to occur in 4.6% to 6.0% of pelvic fractures,<sup>(3,4)</sup> and it has been reported more frequently in children than adults.<sup>(5,6)</sup>

There are not any established guidelines for the management of ruptured female urethra in either adults or children.<sup>(1)</sup> While some surgeons prefer a staged repair, which includes temporary urinary diversion with suprapubic cystostomy and delayed definitive repair after several months, others

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recommend initial definitive repair, except for cases of extensive urethral destruction, when complex reconstructive procedures are needed.<sup>(2,7)</sup> However, since female urethral injury is rare, there is a paucity of data about the outcome of different management strategies in the literature; therefore, a consensus has not been established whether a 2-stage or a 1-stage management is preferred. Herein, we report our experience with delayed end-to-end anastomosis in 7 young girls with complete distraction defect of the urethra after an injury associated with pelvic fracture.

## MATERIALS AND METHODS

From 2002 to 2008, we had 7 young girls with urethral injury after pelvic fracture referred to our center. We had briefly reported 5 of them previously.<sup>(8)</sup> The median patients' age at the time of injury was 6 years (range, 4 to 13). All of the patients had complete disruption of the urethra after pelvic fracture and had suprapubic catheter. Six patients had pelvic fracture due to car accident and 1 patient after falling down. One of the patients had undergone splenectomy after car accident. A 13-year-old girl had vaginal disruption and hydrometrocolpus after pelvic fracture. She had undergone a prior urethroplasty that had failed. The patients underwent delayed end-to-end anastomosis urethroplasty, about 6 month (5 to 7 months) after the injuries.

After incision on the suprapubic area, while the patient was secure in the lithotomy position, the bladder neck was released and, as we reported in male patients previously,<sup>(9)</sup> fibrous tissue around the proximal urethra was removed under the guide of a flexible cystoscope. Then, the distal end of the urethra was identified, and after removal

of fibrotic tissue, end-to-end anastomosis with 6 absorbable (3-0) vicryl sutures was performed. In 2 girls—one with noncompetent bladder neck and another with a history of vaginal injuries—we released the omentum and wrapped it around the bladder neck. To release the omentum, the patient underwent midline laparotomy, followed by the release of the omentum on its blood supply. Then, the bladder neck was dissected at the suprapubic region, urethroplasty was performed, and the omental flap was wrapped around the bladder neck. In 1 case, there was no proximal urethra and there was only 1 small dimple on flexible cystoscopy. Therefore, we incised the bladder at the dimple site under the visual guide of the flexible cystoscope and anastomized the distal urethra to the bladder (not to the obvious bladder neck).

After 3 weeks, we removed the urethral catheter, followed by removal of the suprapubic catheter the next week, after making sure there were no voiding problems. We followed our patients at 2 weeks, 1 month, and every 2 months for 6 months, and every 6 months thereafter, by cystoscopy. The mean follow-up period was 36 months (range, 8 to 48 months).

## RESULTS

Seven girls with a median age of 6 years (range, 4 to 13 years) underwent delayed end-to-end anastomosis following urethral injury. The median delay time was 6 months from trauma (Table). During the operation, the lengths of fibrotic tissue between the distal and proximal urethra was 1 cm to 2.5 cm, and after removal of fibrotic tissue, we had enough lengths of the urethra for end-to-end anastomosis. In 1 case,

Characteristics of Girls With Urethral Injuries Who Underwent Delayed Urethroplasty

Patient	Age	Condition	Delay, mo	Fibrous Gap, cm	Result	Follow-up, mo
1	4	Complete urethral disruption	6	2.0	Normal voiding	48
2	7	Complete urethral disruption	6	1.5	Mild stress incontinence (transient)	36
3	6	Complete urethral disruption	7	1.0	Mild stress incontinence (transient)	48
4	9	Complete urethral disruption	5	2.5	Mild stress incontinence (transient)	48
5	5	Complete urethral disruption + splenectomy	6	1.5	Normal voiding	32
6	6	Complete urethral disruption	7	2.0	Normal voiding	8
7	13	Complete urethral disruption + vaginal disruption	6	2.0	Urethrovaginal fistula treated by continuous bladder drainage	32

there was no proximal urethra and there was only a dimple on flexible cystoscope at the bladder neck region. We incised the bladder at the dimple site and anastomosed the distal urethra to the bladder. The patient was continent later presumably because of the external sphincter mechanism. We did not use bladder flap in our cases. One patient had been undergone a previous urethroplasty which had been failed.

The median follow-up period was 36 months (range, 8 to 48 months). Voiding was normal after catheter removal in all of the patients. Three patients had mild stress urinary incontinence after catheter removal that was treated using the Kegel exercise and medical treatment. Other patients were continent. In one case, in which the patient had vaginal injury, urethrovaginal fistula developed after urethroplasty. We managed it by antibiotic therapy and placement an indwelling Foley catheter. The fistula was healed by continuous drainage after 2 months, and we removed the catheter.

## DISCUSSION

Urethral injuries both in adults and children usually occur in males and are associated with pelvic fractures.<sup>(1,10-12)</sup> In a review of the literature through 1964, we did not find any case report.<sup>(13)</sup> However, it is now believed that female urethral rupture occurs in 4.6% to 6.0% of pelvic fractures, more frequently in children than adults.<sup>(3,5,6)</sup> The true incidence of injuries to female urethra in pelvic fracture remains unclear. Overall, with a ratio of 1.5:1, pelvic fractures are more common in females than in males.<sup>(13,4)</sup> One would expect, therefore, that urethral injury would be common in females. Orkin's review of pelvic fractures<sup>(4)</sup> showed an incidence of 6%, while Perry and Husmann<sup>(14)</sup> found an incidence of 4.6% for urethral injury in females among 130 pelvic fractures. This disagrees with the reports by Carter and Schafer<sup>(15)</sup> and Antoci and Schiff<sup>(16)</sup> who found no urethral injuries in their series. Other case reports and case series usually include one or two cases only. Most reported cases of urethral injuries in the literature, so far, have been in young girls.<sup>(11,17-20)</sup> rather than adults.<sup>(13,17,18,21)</sup> This would suggest that either adults are less

susceptible to this injury,<sup>(19)</sup> or that adults tend to die more commonly from associated injuries.<sup>(13,14)</sup>

Three types of female urethral injury may result from traumatic fracture of the pelvis: simple urethral contusion, complete or partial transection, and urethral injury.<sup>(4,13,22)</sup> In girls, the most prevalent type of injury seems to be complete rupture of the urethra, which may occur at any level along the urethral course.<sup>(13,20,23)</sup> In our series, all of the patients had complete urethral disruption. Since our patients were referred to us from other centers, we cannot evaluate the prevalence of different types of urethral injuries. In Venn and colleagues' series of 12 patients with urethral injuries, 9 suffered from vaginal injuries and 4 had rectal injuries.<sup>(13)</sup> Podesta and Jordan reported associated vaginal injury in 87% of their patients. The injuries in Podesta and Jordan's studies varied from partial disruption of the anterior vaginal wall, at the site of the urethral distraction defect, to circumferential vaginal rupture.<sup>(22)</sup> In our series, 1 patient had undergone splenectomy at the time of trauma and 1 had vaginal injury.

The best management strategy for acute urethral disruption in females remained controversial. The debate mostly is between those who favor immediate repair versus those who advocate initial urinary diversion and delayed surgical reconstruction.<sup>(5,14,19,24,25)</sup> In addition, some authors recommend realignment of the separated urethral ends over a urethral catheter, to avoid tissue dissection or suture placement in the traumatized area.<sup>(22,23,26)</sup> Interestingly, when Waterhouse and Gross performed primary realignment, according to the method described by Banks,<sup>(26,27)</sup> in 2 girls with complete urethral avulsion at the site of the bladder neck, bladder neck stricture developed in both cases, requiring a repeat surgical procedure.

Satisfactory urinary control was attained in 5 out of 7 patients in Podesta and Jordan's series using a delayed repair strategy. In those series, 1 patient had complete incontinence and another patient had diurnal mild stress incontinence.<sup>(22)</sup> In Venn and colleagues' report of the 5 patients with avulsion type injury, who underwent reconstruction, 2 required implantation of an artificial urinary sphincter and 1 underwent a

rectal fascial sling procedure. All the patients in Venn and colleagues' report were continent 1 to 13 years after the surgery.<sup>(13)</sup> In our series, 3 patients had mild stress urinary incontinence and were managed by Kegel exercise plus medical treatment. The remainders of the patients in our series were completely continent. Reasons for high rate of continence in our patients may be the use of flexible cystoscope to guide proper anatomy and the use of omental flap in 2 cases. There was 1 patient who developed urethrovaginal fistula after end-to-end urethroplasty. This patient was successfully managed with conservative management.

## CONCLUSION

In cases of complete urethral avulsion in females who have sustained pelvic fracture, the strategy of delayed end-to-end anastomosis urethroplasty with retropubic approach is sound and produces acceptable results. The use of flexible cystoscope and omental flap is effective in saving continence after urethroplasty in such cases.

## CONFLICT OF INTEREST

None declared.

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