

# Posterior urethral injuries in children

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**Objective** To review the results of the operative treatment of posterior urethral injuries in children.

**Patients and methods** A total of 29 children (25 boys and two girls, age range 3–14 years) with injuries to the posterior urethra were admitted to this department over 14 years. Twenty-three patients presented immediately after trauma and six were referred after unsuccessful attempt(s) at surgical repair.

**Results** Fourteen patients underwent suprapubic diversion and primary realignment over a catheter. Urethral continuity with normal urinary continence was achieved in seven of these patients. Four patients underwent a re-operation; urethral reconstruction was successful in these patients, but one patient remained incontinent. Primary realignment with anastomosis was performed in nine patients; the results were

satisfactory in six. Urethral stricture developed in all of four patients who were managed with a suprapubic cystostomy alone; a staged repair using the transpubic approach was carried out in two of them and one improved. Partial urethral tears in two patients healed with urethral catheterization alone.

**Conclusion** Primary realignment of the urethra with anastomosis and suprapubic diversion resulted in the highest rate of success for normal urethral continuity. Urethral strictures or urinary incontinence were not major problems in this group. Therefore, we recommend this approach for the initial management of urethral injuries in childhood. Transpubic urethroplasties may be reserved for secondary repair.

**Keywords** Posterior urethral injuries, children

## Introduction

The management of posterior urethral injuries in adults by realignment of the urethra with or without suture anastomosis has never gained universal acceptance. Many surgeons believe that reconstruction of the ruptured urethra a few months after the trauma is safer than an immediate operation and causes fewer complications. Posterior urethral ruptures in children have special features, so the management of such cases should be different from that of adults [1]. We present our experience in the management of 29 children with posterior urethral injuries.

## Patients and methods

The hospital records of patients with posterior urethral injury admitted to the Departments of Paediatric Surgery and Urology, Ege University Hospital, between 1980 and 1993 were reviewed retrospectively. The mean (SD, range) age at admission was 8.7 (3.4, 3–14) years and there were 27 boys and two girls. The mechanism of injury involved motor-vehicles in 23 patients, with the remaining patients having sustained deceleration injuries (four) or were traumatized by animals (two). Twenty-

three patients presented immediately after trauma and six were referred from various hospitals. Blood at the urethral meatus and inability to void were the most frequent symptoms soon after trauma (Table 1); additional injuries are also noted in Table 1.

In all patients with pelvic fracture and/or with symptoms of probable urethral injury (perineal swelling and an inability to void), retrograde urethrography was performed once the patient was stabilized. Patients with extravasation of the contrast medium with or without bladder filling were evaluated as partial or complete

**Table 1** Physical signs and symptoms, and additional trauma

Blood at the meatus	11
Scrotoperineal swelling	11
Inability to urinate	6
Haematuria	3
Open perineal wound	1
Inguinal haematoma	3
Additional trauma	
Pelvic fractures	16
Femur fractures	6
Anorectal lacerations	2
Blunt thoracic injury	1
Head injury	1
Separation of symphysis pubis	1

Accepted for publication 28 November 1995

urethral ruptures. An emergency intravenous urogram was also obtained routinely to assess the upper urinary tract in all patients.

Partial urethral disruptions were managed by catheter drainage in two patients. After a diagnosis of an incomplete urethral rupture was made by retrograde urethrography, a soft silicone urethral (Foley) catheter with no guidewire inside was gently introduced into the urethra at a single attempt.

In the initial management of patients with complete urethral disruption, one of three treatment modalities

was used, depending on the surgeon's preference; suprapubic diversion with catheter realignment of the urethra, without anastomosis, in 14 patients; primary anastomosis of the ruptured urethra in nine patients; and suprapubic cystostomy alone with delayed urethroplasty in four patients.

Follow-up ranged from 6 months to 12 years. Patients were evaluated clinically for patency, incontinence and erectile function. Uroflowmetry and early endoscopic examinations were also performed. Three patients were lost to follow-up.

Patient no.	Age, (years)	Location of rupture	Patency	Continence	Erectile* function	Complication
<i>Suprapubic diversion</i>						
1	10	BN	+	+	?	—
2	13	P	—	—	?	Stricture†
3	12	P	+	+	+	Stricture (re-anastomosis)
4	14	M	+	+	?	—
5	13	P	+	+	—	Stricture†
6	5	P	+	—	—	—
7	14	BN	+	+	—	—
8	4	M	+	+	+	Stricture (re-anastomosis)
9	11	BN	+	—	—	Stricture (re-anastomosis)
10	11	M	+	+	+	Stricture†
11	6	BN	+	+	?	Stricture (re-anastomosis)
12	13	BN	+	+	+	—
13	7	P	+	+	+	—
14	12	BN (girl)	—	—	—	Stricture
<i>Immediate primary anastomosis</i>						
1	5	BN	+	+	+	—
2	4	M	+	+	?	Stricture†
3	9	BN	+	—	—	Bladder stone removed
4	9	M	+	+	?	—
5	10	M	+	+	?	—
6	3 (girl)	BN	+	—	—	Urethrovaginal fistula
7	4	P	+	+	?	Stricture (balloon)
8	11	M	+	+	+	—
9	8	M	+	—	—	Urethroscrotal fistula (repaired)
<i>Delayed repair</i>						
1	6	BN (13)§	—	—	—	Stricture
2	5	P (12)	+	+	?	—
3	8	M (6)	+	—	?	Urethral fistula
4	5	M (4)	+	+	?	Stricture (balloon)

**Table 2** Patients managed by suprapubic diversion with catheter realignment of urethra without anastomosis, immediate primary anastomosis or delayed repair

BN, Bladder neck. P, Prostatic urethra. M, Membranous urethra. \*Erectile function could not be evaluated. †Endoscopic resection or simple dilatation. §Interval to repair, in months

## Results

Partial posterior urethral ruptures healed with no complications in two patients aged 10 and 11 years with rupture of the prostatic and membranous urethra, respectively. Urethral continuity and urinary continence were maintained in seven of the 14 patients who underwent catheter realignment without suture anastomosis and with suprapubic drainage. One patient had a patent urethra but was incontinent. Four of the remaining six patients in this group underwent a re-operation by the transpubic approach, with perineal extension where necessary. Urethral continuity was maintained in all, but one patient in this group was also incontinent. Two patients with severe strictures were lost to follow-up. The overall success rate in this group was 10 of 14, four patients having undergone the re-operation. Erectile function could only be evaluated in nine patients and in four of these had erectile failure (Table 2).

Nine patients with posterior urethral injury underwent an immediate surgical intervention with primary suture anastomosis. Urethral continuity and urinary continence was maintained in six patients and all nine were patent. Erectile function could only be evaluated in four patients, of whom two were potent. Two incontinent patients currently have a satisfactory quality of life having used clean intermittent catheterization for the last 3 and 8 years, respectively. An incontinent female patient developed a urethrovaginal fistula.

Of the four patients with delayed repair, urethral continuity and urinary continence was maintained in two; one patient had a patent urethra but was incontinent and one patient with a severe urethral stricture was lost to follow-up (Table 2).

Patency and continence rates according to the management and site of injury are presented in Tables 3 and 4.

## Discussion

Posterior urethral injuries in men are usually limited to the membranous urethra distal to the prostate, because

**Table 3** Patency and continence rates with the method of management

	Patency	Continence
Re-alignment	8/14*	7/14
Suture anastomosis	9/9*	6/9
Delayed repair	3/4	2/4
Re-operation after strictured realignment	4/4	3/4

\* $P < 0.05$  between groups (Fisher's exact test)

**Table 4** Patency, continence and erectile function according to the site of injury

	Patency	Continence	Erectile function
Bladder neck	8/10	5/10	2/4
Prostatic urethra	7/8	6/8	3/5
Membranous urethra	11/11	9/11	4/5

it is well supported proximally by the mature and firm prostatic tissue. In contrast, the small and soft prostate in children has little stabilizing effect on the posterior urethra, leaving it vulnerable [1]. Thus, injuries in children may occur anywhere along the posterior urethra, even at the bladder neck. The locations of the lesions in the present series were almost equally distributed in all anatomical sites (Table 3). Bladder neck ruptures are more frequently encountered in children than in adults.

The reported incidence of partial tears of the posterior urethra varies greatly, from 6 to 94% [2]. Partial urethral disruption can be managed by catheter drainage only; the gentle placement at one attempt of a silicone urethral catheter may be sufficient. Numerous attempts must be avoided to prevent worsening the partial tear. If placing a urethral catheter is impossible, a suprapubic cystostomy is then performed. The progress of urethral healing can be monitored by serial urethrograms. Some authors believe that suprapubic drainage in patients with partial urethral tears must be the first management of choice, because they consider that a partial tear may heal without a stricture after suprapubic drainage alone. In our limited experience with two patients, the partial posterior urethral ruptures healed over a urethral catheter, with no complications.

The main controversy in the initial management of posterior urethral injuries is centred on the complete ruptures. The aim of a rational therapy should be a continent and potent patient with no stricture. Immediate surgical exploration of a complete posterior urethral tear includes the evacuation of the peri-urethral haematoma and realignment of the ruptured urethra over a catheter or primary suture repair. Mild traction on the urethral catheter is necessary to bring the torn urethral ends in apposition [3]. Ischaemic injury to the bladder neck with the pressure of the Foley balloon has been reported in adult patients [4,5]. It is also reported that catheter traction did not coapt the urethral edges [6]. With the fear of causing dramatic bleeding and added surgical trauma to the vascular and nerve supply of the injured genital organs, which may lead to severe strictures and impotence, many surgeons avoid an immediate time-consuming operation [2,9].

The 23 children with posterior urethral injury in the present study were surgically explored immediately. During these operations there was no uncontrollable bleeding. In our experience in children, exploring the parts of the ruptured urethra was not vital. One common finding in the children with prostatic urethral ruptures was a totally crushed prostate, which was sometimes so severe that the identification of the prostatic tissue was impossible. The bladder was usually replaced in the abdominal cavity as with bladder neck disruptions. In such cases, the ends of the urethra in the prostatic tissue must be exposed, the crushed and necrotic tissues removed and a urethroplasty performed if possible. Delayed repair of such cases may be troublesome because of long gap-strictures [7]. In the present patients, primary catheter realignment without suture anastomosis caused many urethral stricture (eight of the 14 patients). Four of the patients with severe strictures needed a later operative repair. This type of immediate surgical intervention must not be the first option and every effort has to be made for a primary suture repair.

The early endoscopic evaluation of strictures is mandatory. An endoscopic urethrotomy can be performed in persistent strictures resistant to simple dilatations. After the resection of the scar tissue by a paediatric resectoscope, an indwelling silicone catheter must be left in urethra for at least 2 weeks. Urinary flow rates should be measured and urethroscopy must be performed again, if needed.

The correlation of urethral patency and continence with injury level suggested that the outcome was better for membranous urethral ruptures. The lowest rate of continence was obtained in bladder neck ruptures, as was reported by others [8]. No conclusion regarding potency could be drawn from the limited follow-up of the present patients. However, the long-term prognosis of children with this injury shows that erectile function in evaluable patients seemed to be better after rupture of the membranous urethra, although the differences were statistically insignificant (Table 3).

In conclusion, the immediate surgical intervention in children with complete posterior urethral ruptures is a safe operation that reduces the need for subsequent operations and can be managed with no severe complications. Primary realignment with suture repair has a low morbidity and relatively lower rates of incontinence

and stricture formation. Primary suture repair is recommended as a first choice if possible. Realignment the ruptured urethra over a stenting Foley catheter is the second option. The level of the urethral injury determines post-operative urinary continence and ruptures of the membranous urethra have a more favourable outcome for continence and urethral patency, regardless of the treatment method.

## References

- 1 Al-Rifaei MA, Gaafar S, Abdel-Rahman M. Management of posterior urethral strictures secondary to pelvic fractures in children. *J Urol* 1991; **145**: 353–6
- 2 Webster GD, Mathes GL, Selli C. Prostatomembranous urethral injuries: a review of the literature and a rational approach to their management. *J Urol* 1983; **130**: 898–902
- 3 Patterson DE, Barrett, Myers RP, DeWeerd JH, Hall BB, Benson RC. Primary realignment of posterior urethral injuries. *J Urol* 1983; **129**: 513–6
- 4 Coffield KS, Weems WL. Experience with management of posterior urethral injury associated with pelvic fracture. *J Urol* 1977; **117**: 722–4
- 5 Turner-Warwick R. A personal view of the immediate management of pelvis fracture urethral injuries. *Urol Clin N Amer* 1977; **4**: 111–24
- 6 Ragde H, Mc Innes GF. Transpubic repair of the severed prostatomembranous urethra. *J Urol* 1969; **101**: 335–7
- 7 Gündođdu H, Tanyel FC, Büyükpamukçu N, Hiçsönmez A. Primary realignment of posterior urethral ruptures in children. *Br J Urol* 1990; **65**: 650–2
- 8 Boone TB, Wilson WT, Husmann DA. Postpubertal genitourinary function following posterior urethral disruptions in children. *J Urol* 1992; **148**: 1232–4
- 9 Kardar AH, Sundin T, Ahmed S. Delayed management of posterior urethral disruption in children. *Br J Urol* 1995; **75**: 543–7

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