

Urethral injury in girls with fractured pelvis following blunt abdominal trauma

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Objective To review the management of major urethral injury in three girls with fractured pelvis following blunt abdominal trauma.

Patients and methods Three girls aged 5 years, 1 year and 3 years sustained major urethral injury in association with fractured pelvis following blunt abdominal trauma. Initial management was undertaken elsewhere. Two girls, with complete loss of the urethra and a closed bladder base, were managed by construction of a neourethra using a flipped anterior bladder-wall tube. The third patient with extensive perineal soft-tissue loss and rupture of the bladder neck and urethra had a modified Young-Dees-Leadbetter bladder neck reconstruction. All three had an associated vaginal injury which did not require a specific surgical procedure.

Results The two girls who underwent construction of a neourethra using a flipped anterior bladder-wall tube are continent. The first voids normally and the second is managed by clean intermittent catheterization. The patient who underwent bladder neck reconstruction is incontinent and further surgery, possibly a continent diversion, may be necessary.

Conclusion Pelvic fracture following blunt abdominal trauma in girls may be associated with major urethral injury, usually with an associated vaginal injury. Surgical ingenuity is required to repair such injuries successfully. In those with complete loss of the urethra, a flipped anterior bladder-wall tube neourethra is suitable.

Keywords Blunt abdominal trauma, fractured pelvis, girls, urethral injury

Introduction

Blunt lower abdominal trauma with pelvic fracture may be associated with posterior urethral disruption in males but female urethral injuries are considered to be rare. Antoci and Schiff [1] reported 125 female and 109 male patients with pelvic fracture including 11 girls and 15 boys below 16 years of age; 23 males suffered a ruptured urethra but there were no cases of female urethral injury. Carter and Schafer [2] reviewed 146 females with pelvic fracture with no cases of urethral injury. However, sporadic cases of urethral injury have been reported in women and also in girls. Thambi-Dorai *et al.* described 30 cases of urethral injury in girls up to 1992 but not all reported cases were included [3,4]. We report our experience with major urethral injury in three girls with fractured pelvis following blunt abdominal trauma.

Patients and methods

During the period 1989–1995, 16 patients with pelvic fracture were admitted for delayed repair of associated urethral injuries, including 13 boys with posterior

urethral disruption and three girls with urethral injury. Thirteen children were struck by a moving vehicle, two were car passengers and one fell from a height. The male patients have been reported previously [5] and the three female patients were reviewed.

Results

Case 1 was a 5-year-old girl knocked down by a car; this case has been reported previously together with a description of a technique for the construction of a female neourethra [6]. The technique, which is also termed 'rotary bladder flap' has an added advantage in that the ventral suture line obviates the risk of a recurrent urethrovaginal fistula [7]. The patient has been followed for 3 years and is continent day and night.

Case 2, a 15-month-old girl, was crushed by a reversing car and suffered a fractured pelvis and urethral and vaginal injuries which were repaired unsuccessfully. She was referred nearly 1 year later with a suprapubic cystostomy. Contrast studies showed an absent urethra and a vaginal stricture (Fig. 1). A neourethra was constructed using a flipped anterior bladder-wall tube (Fig. 2). On follow-up, she voided normally but had large urinary residual volumes and was incontinent. At 6

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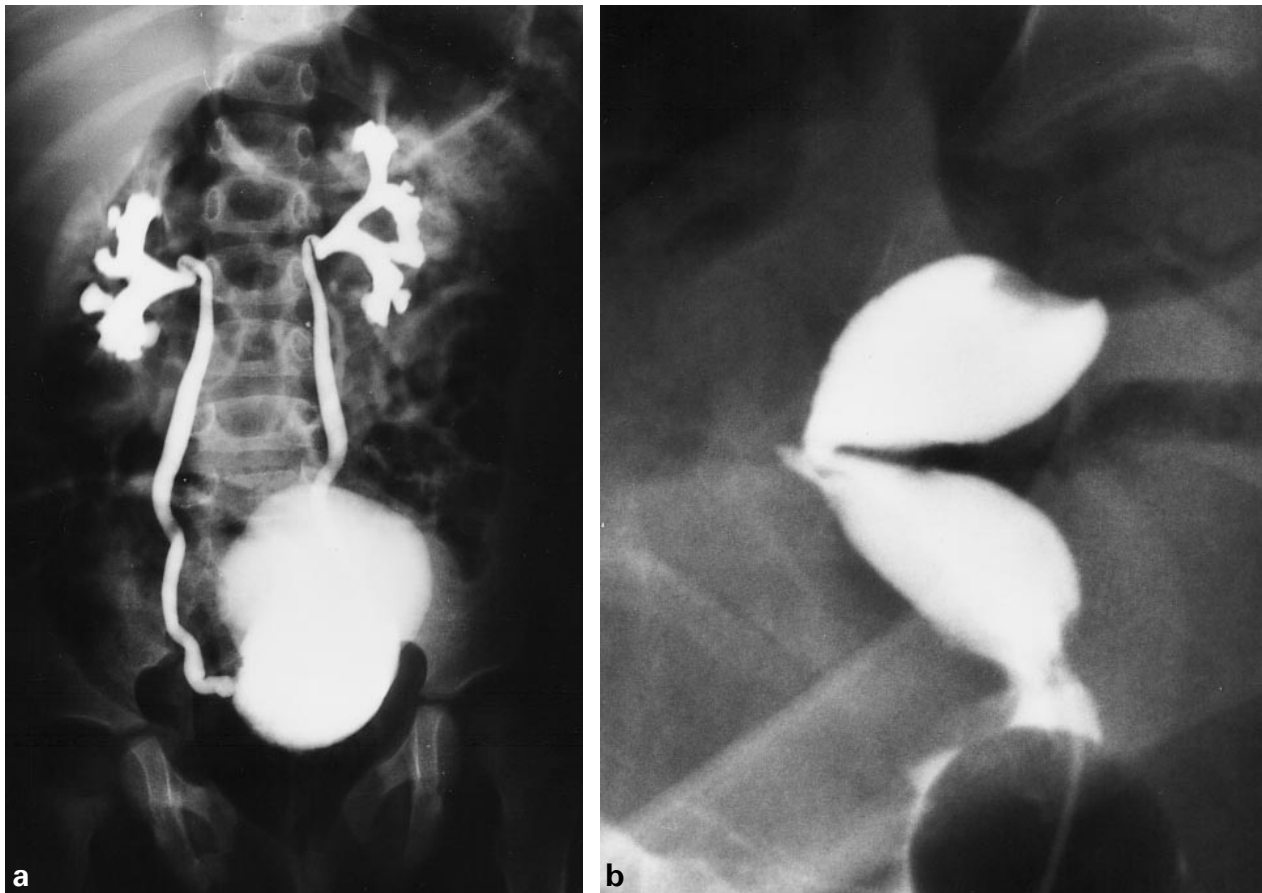


Fig. 1. **a**, Cystogram through cystostomy tube showing the completely closed bladder. The urethra was absent. **b**, A vaginogram showing severe mid-vaginal stricture.

months she was established on clean intermittent catheterization (CIC) and is continent. Thus, the neourethra is providing satisfactory sphincteric function and it is likely that eventually, she will learn to empty her bladder normally.

Case 3, a 3-year-old girl, was a front-seat passenger in a head-on vehicle accident in which her mother died; neither were wearing seat belts. She had a fractured pelvis, bladder/urethral rupture and multiple vaginal lacerations which were repaired elsewhere. In addition, she had a fractured femur and intra-abdominal injuries requiring hemicolectomy and ileostomy, which was subsequently closed. At 4 months, she had developed major perineal soft-tissue loss with total urinary incontinence, the entire urethra and bladder neck being absent. Bladder neck and urethral reconstruction were undertaken unsuccessfully and further repair was carried out using a modified Young-Dees-Leadbetter technique. Although there was some improvement in her urinary control, essentially she is still incontinent and a continent diversion may be necessary.

Discussion

Blunt lower abdominal trauma with pelvic fracture may be associated with posterior urethral disruption in boys and less commonly, urethral and vaginal injury in girls [5]. The lower incidence of urethral injury in girls is probably anatomically based, in that the female urethra is much shorter and has greater mobility [3]. Most of our patients with pelvic fracture, with both male and female urethral injury, were the result of road traffic accidents. Considering that the incidence of pelvic fractures has increased in modern city life, it is likely that the incidence of urethral injuries will also increase [4,5].

The clinical picture in girls with pelvic fracture and urethral injury is not unlike that of boys with posterior urethral disruption. There is a history of major blunt trauma from a vehicle accident or a fall from a height. Multiple injuries are common and the child is usually in severe shock. There may be abdominal wall, pelvic and perineal bruising, abdominal distention and specifically,

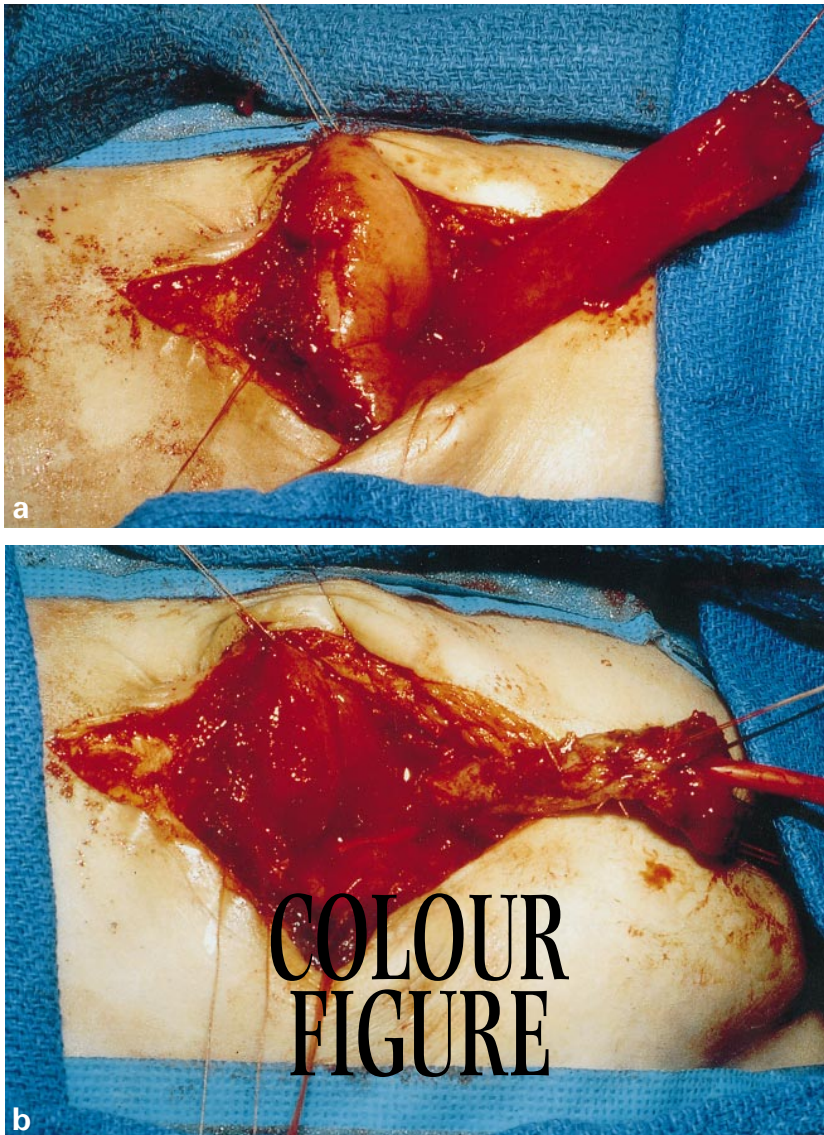


Fig. 2. Operative photographs showing the anterior bladder flap which has been flipped downwards (a) and tubularized (b).

blood at the introitus. There may be urinary retention and urethral catheterization may not be possible [3,8].

The site and severity of urethral injury in girls varies from a simple tear to transection of the urethra at any level or the entire urethra may be destroyed [6,8]. There may also be urethral avulsion proximally at the urethro-vesical junction or distally [9–11]. The bladder neck may also be involved. Invariably, there is an associated vaginal injury which may vary from a minor laceration to extensive vaginal injury, vaginal transection and urethro-vaginal communication. Thus, there is the likelihood of significant long-term 'urethral' and 'vaginal' morbidity. Multiple surgical procedures are often required, urinary incontinence may be a problem and some unfortunate girls may have to undergo hysterectomy [3,8].

The principles of the management of acute cases of urethral injury in girls follow those used in boys, appreciating that an associated vaginal injury is likely [5]. The aim is to achieve an anatomically and functionally normal or near normal urogenital tract. Apart from general resuscitative measures, a urethral catheter should be passed under sterile technique. If this is not possible, then the initial management should be by suprapubic cystostomy which is also the best option when there are other life-threatening injuries or when urological expertise is not available. Whereas primary repair of both the urethral and vaginal injury may be justified, complicated emergency reconstructive procedures should be avoided as they carry a high morbidity [8,9]. A suprapubic cystostomy followed by delayed reconstruction has (as in boys) the advantage in that a

well-planned elective surgical procedure can be performed in a stable patient by a urologist experienced in urological reconstructive surgery.

Cases 1 and 3, with complete obliteration of the urethra, were managed successfully using a flipped anterior bladder tube. In the second patient, CIC was necessary but in neither girl were specific surgical measures needed for the associated vaginal injury. However, case 3 was complex, with major perineal soft-tissue loss and a completely destroyed urethra and bladder neck. Reconstruction using the principle of the Young-Dees-Leadbetter bladder-neck reconstruction, with which we have had considerable success in patients with bladder exstrophy, was not successful [12]. However, there is some chance that this patient may improve with time, failing which we plan to perform a continent diversion. Eventually, she may also require local vaginal reconstruction.

In conclusion, girls with pelvic fracture following blunt abdominal trauma may sustain major urethral injury together with injury to the vagina. Whereas it may be possible and advisable to undertake primary urethral and vaginal repair in some cases, delayed urethral repair is recommended when there is extensive trauma, particularly when the entire urethra is damaged. For such cases, the flipped anterior bladder-wall tube is suitable.

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