

CONSERVATIVE MANAGEMENT PELVIC FRACTURE URETHRAL INJURY (PFUI) IN A GIRL: A CASE REPORT

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ABSTRACT

Objective: This case report aims to describe a different approach of PFUI by conservative management that resulted in good outcome. **Case(s) Presentation:** A 7-year-old girl patient was brought to the emergency department after falling from public transportation diagnosed with suspicious urethral rupture, perineal rupture grade III, vertical-shear type pelvic-ring injury, laceration wound on the right lower leg, abrasion on the medial side left lower leg and urinary retention. The patient underwent percutaneous cystostomy, pelvic bandage, a perineal debridement and repair; a cystography, percutaneous vesicolithotripsy, cystostomy and synechiaie incision. One year after the first admission it was planned for urethroplasty due to completely obliterated from antegrade and retrograde panendoscopy. **Discussion:** 8 months later urethroplasty was aborted because of an open bladder neck, a fistula at the anterior connected to the distal of the bladder neck with size of 3 mm. The patient was performed a silicon cystostomy catheter insertion for 6 weeks. At the time of evaluation, the fistula was closed, it was proven by Qmax uroflowmetry was 18ml/s with average flow: 9.8 ml/s, voiding volume: 90ml, flow time: 9s, voiding time: 9s, hesistance:1.5, and PVR:5.35 cc. **Conclusion:** In this case, it showed that conservative management could improve PFUI with satisfactory result, proved by good result of uroflowmetry. However, periodic evaluations must be carried out to follow the progress of the disease and the possibility of future complications including sexual function.

Keywords: PFUI, girl, urethral rupture.

ABSTRAK

Tujuan: Laporan kasus ini bertujuan untuk menggambarkan pendekatan PFUI yang berbeda dengan manajemen konservatif yang menghasilkan hasil yang baik. **Presentasi Kasus:** Seorang pasien perempuan berusia 7 tahun dibawa ke unit gawat darurat setelah jatuh dari transportasi umum kemudian didiagnosis dengan ruptur uretra, ruptur perineum grade III, cedera cincin panggul tipe vertical shear, luka laserasi pada kaki kanan bawah, abrasi pada sisi medial kaki kiri bawah, dan retensi urin. Pasien menjalani sistostomi perkutan, pelvic bandage dengan debridemen dan repair perineum, sistografi, vesikolitotripsi perkutan, sistostomi dan insisi sinekia. Satu tahun setelah pasien pertama kali dirawat, pasien direncanakan untuk urethroplasty karena ditemukan obliterasi dari antegrade dan retrograde panendoscopy. **Diskusi:** 8 bulan kemudian urethroplasti dibatalkan karena leher kandung kemih yang terbuka dan didapatkan fistula di anterior yang terhubung ke distal leher kandung kemih dengan ukuran 3 mm. Pasien dilakukan pemasangan kateter silikon sistostomi selama 6 minggu. Pada saat evaluasi, didapatkan fistula tertutup yang dibuktikan dengan Qmax uroflowmetry 18ml/s dengan rata-rata flow: 9.8 ml/s, volume berkemih: 90ml, flow time: 9s, durasi berkemih: 9s, hesistance:1.5, dan PVR:5.35 cc. **Simpulan:** Pada kasus ini menunjukkan manajemen konservatif meningkatkan perbaikan kondisi PFUI dengan hasil yang memuaskan dibuktikan dengan hasil uroflowmetry yang baik. Namun masih diperlukan evaluasi berkala terkait perkembangan dari PFUI dan kemungkinan terjadinya komplikasi di masa mendatang termasuk gangguan fungsi seksual.

Kata kunci : PFUI, perempuan, ruptur uretra.

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INTRODUCTION

Pelvic fracture urethral injury (PFUI) accounts for 1.6% to 25% of pelvic fractures; with a

frequency of 0.32 – 5/100.000 for males and 0.46 – 7.25/100.000 for females. The combination of urethral and bladder injuries occurs in 1-3% of patients.¹ Urethral injury in children is rare but is

usually more severe, in girls are less common because the anatomy of the urethra is short and protected behind the pubic bone. Injuries occur mainly with hip fractures and associated with laceration of the anterior vaginal wall.²

Urethral injury in children has a different characteristic, so the urologist should have different techniques to approach and treat each case individually, in order to achieve a successful reconstruction. The management of urethral injury in children especially a girl is more challenging due to limited cases and limited pediatric urologist.^{2,3}

Most cases are managed initially by general or trauma surgeons and their management is based on principles developed from treating male urethral injury. The available data are limited to very low-quality evidence in the form of case reports and case series. Consequently, there are no large series available, and thus a sound and standard policy of management has not been developed.^{3,4} Initial management is for bladder drainage with a suprapubic cystostomy, which ensures not only safe urinary diversion but also prevents extravasation of urine at the site of injury.^{1,5} Definitive management can be considered as soon as the patient is stable and the life-threatening has been treated. Anastomotic Urethroplasty is the gold standard in the management of PFUI where conservative management is still debated. The only place for endoscopic treatment of PFUI is in the acute phase of the trauma.⁶

CASE(S) PRESENTATION

A 7-year-old girl patient was brought to the emergency department after falling from public transportation. Following primary and secondary survey, the patient remained hemodynamically stable, and laboratory parameters in the blood analysis were within normal limits. A grade III perineal rupture, inadequate urethral catheter drainage, laceration on the lateral side of right lower leg and abrasion on the medial side of left lower leg

were found. On the pelvis x-ray, a fracture at the right ischium was found.

The patient was diagnosed with suspicious urethral rupture, perineal rupture grade III, vertical shear type pelvic ring injury, laceration wound on the right lower leg, abrasion on the medial side left lower leg and urinary retention. The patient managed by percutaneous cystostomy, pelvic bandage, with a perineal debridement and repair by general surgeon. During a perineal repair, there was a laceration at the left side of clitoris - labia minor and perineum with a size of 6x2cm with a muscle base, urethra, vaginal introitus, and anal sphincter were intact, then the muscle, subcutis and skin were sutured (Figure 1).



Figure 1. Debridement and repair perineal with cystostomy percutaneous. The urethra, vaginal introitus, and anal sphincter were intact, then the muscle, subcutis and skin were sutured.

After a year, patient's family complained that the patient could not feel the urge to urinate and the exit way of urine was not known. For further management of urethral rupture, a cystography was performed and it showed that the bladder was intact and there was bilateral post-fracture line on the inferior pubic ramus (Figure 2). The patient was diagnosed with PFUI on Cystostomy with Perineal Rupture grade III post-Debridement and Perineal Reconstruction.

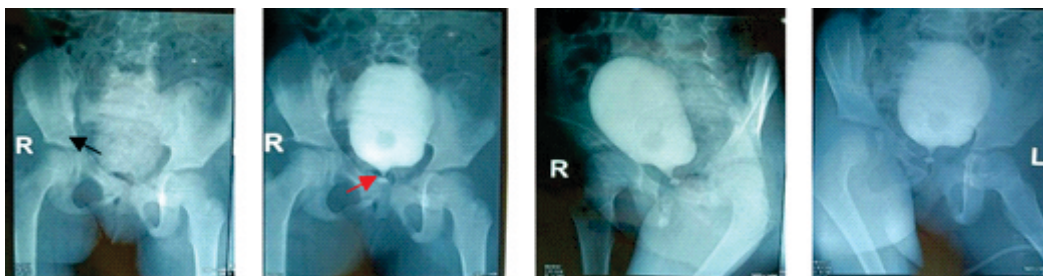


Figure 2. A fracture line (↗) and urethral rupture (↗) from cystography.

The patient has done a percutaneous vesicolithotripsy, cystostomy and synechiae incision. At the time of evaluation of external genitalia, vaginal synechiae was seen and an external urethral opening was shown after synechiae incision (Figure 3). During the antegrade panendoscopy, it showed an open bladder neck, multiple bladder stone with the largest diameter of 0.5 cm with a total obliteration in antegrade and from retrograde panendoscopy (the deep of the sheath was 2 cm and the urethra was completely obliterated). Furthermore, it was planned for urethroplasty, but due to the Covid-19 pandemic outbreak, the patient was afraid to go to the hospital and only routinely changed the cystostomy tube.

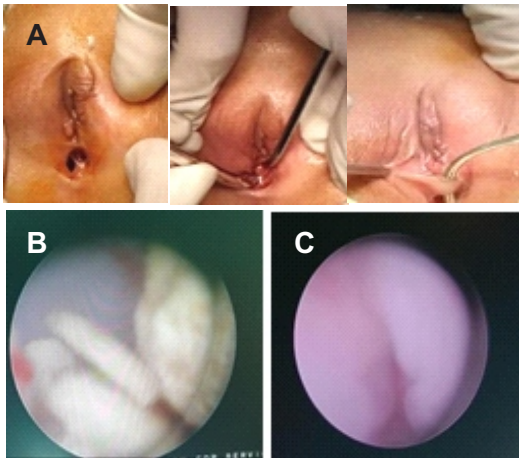


Figure 3. Synechiae incision (A), percutaneous vesicolithotripsy (B), and retrograde panendoscopy (C).

20 months after the first procedure, the patient's family reported that the patient was able to urinate through the vaginal opening when the cystostomy catheter was stuck. The patient can feel the urge to urinate and can hold it in. The patient was reevaluated with the initial goal is urethroplasty. The patient underwent an antegrade panendoscopy, an open bladder neck was found, a fistula was found distal to the bladder neck to the vagina with a size of 3 mm.

During a retrograde cystoscopy, the sheath of cystoscopy was able to reach the bladder, urethral vagina fistula was found, the bladder neck was open and the bladder was normal. Colposcopy was performed and revealed a fistula at the anterior vaginal wall. Urethroplasty was aborted and the patient performed a silicon cystostomy catheter and

a silicone urethral catheter insertion for up to 6 weeks.



Figure 4. Patient was able to urinate through the vagina

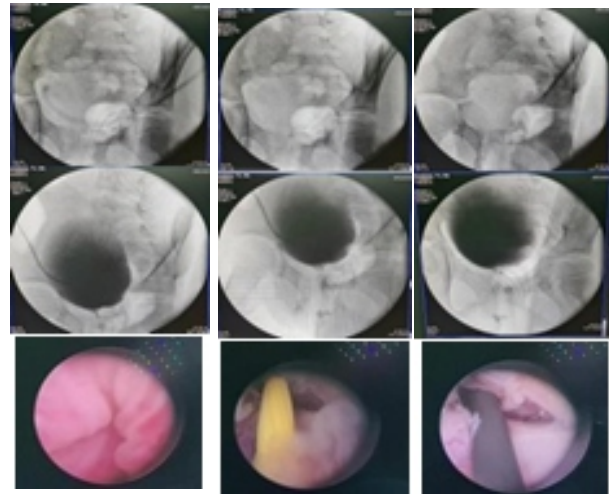


Figure 5. Cystoscopy and colposcopy procedure of the patient.

At the time of the evaluation on week 6th, it was found that the fistula had closed and the urethra was in a normal condition. It was proven by Qmax uroflowmetry was 18ml/s with average flow: 9.8 ml/s, voiding volume: 90ml, flow time: 9s, voiding time: 9s, hesistance:1.5, and PVR:5.35 cc.

DISCUSSION

The incidence of female and pediatric PFUI is less than that of males. Compared to males, female traumatic urethral injury is less common and is seen with almost 1/10th the frequency as in males. Multiple reasons have been proposed for this, including shorter length and greater inherent elasticity of female urethra and flexibility provided by the vagina. Also, pelvic fractures are less severe and more frequently stable in females and the location of female urethra behind pubic bone offers protection compared to males. Female urethral

injuries due to pelvic fracture are only 0.7% of large cases have been reported.⁶⁻⁷

Pelvic fractures are rare in children and often caused by a high-energy mechanism. Compared with that of adults, the pediatric pelvis contains more cartilage, is more elastic, and therefore can absorb a greater amount of force without fracturing. Consequently, when a child does experience a pelvic fracture, there is a much higher likelihood of morbidity and mortality.⁸ As in adult cases, the incidence of pediatric PFUI is more common in boys than girls. The frequency of urethral injury in pelvic traumas of boys range from 7.4 to 13.5% and urethral injury in girls have reported incidences of about 4-6%.^{2,9}

The pelvic fractures that lead to urethral trauma are mostly those causing disruption of the pelvic ring. Specifically, the Malgaigne's fracture (vertical pelvic fractures through ipsilateral anterior and posterior pelvis, with fracture of the sacroiliac complex or sacrum and disruption of the inferior and superior pubic rami or pubic symphysis).⁹ This is in accordance with the case where in the case the patient was diagnosed with vertical shear type pelvic ring injury which was supported by Anteroposterior Pelvis Xray (Figure 1).

The diagnosis of pelvic fracture-associated urethral injury is often difficult to make in the emergency department, particularly in female children. The reason for this is likely multifactorial. First, since urethral injury are often sustained after major trauma involving multiple organ systems, the clinician may be focused on more life-threatening injuries during the trauma resuscitation. Second, young children may not be able to adequately communicate the location of their pain, increasing the risk for an unrecognized injury. Third, the classic signs and symptoms associated with urethral injuries, such as blood at the meatus or perineal hematoma, are often absent. Fourth, standard computed tomographic scans are often not adequate to detect bladder injuries with accuracy for these injuries of only 50% to 60%. Lastly, since urethral injury is uncommon, it may not be suspected.⁸

Female PFUI is most commonly associated with vaginal laceration, pelvic circle disruption, multiple pelvic fractures, and sacral spine injury, and any female with these findings should be carefully evaluated for the presence of PFUI. Other concomitant examination findings include blood at the vaginal introitus, hematuria, urethrorrhagia, labial swelling, urinary retention, or difficulty passing a urethral catheter.^{7,10}

Retrograde urethrography (RUG) is the standard diagnostic investigation when PFUI is suspected. In an unstable patient, RUG should be postponed until the patient has been stabilized. During RUG, the location and the extent of urethral injury can be identified. A typical image for incomplete rupture shows extravasation from the urethra which occurs while the bladder is still filling. A complete rupture is suggested by massive extravasation without bladder filling. Although RUG is able to reliably identify the site of injury (anterior vs. posterior), the distinction between a complete and partial rupture is not always clear. Therefore, any proposed classification system based on RUG is not reliable. In females, the short urethra and vulvar oedema makes adequate urethrography nearly impossible.¹⁰⁻¹²

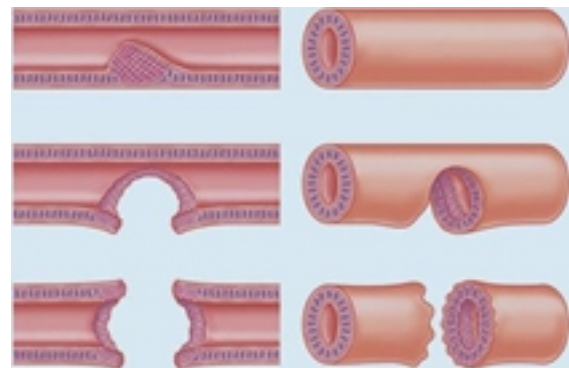


Figure 6. Types of urethral injury: contusion, partial and complete.¹¹

Colapinto and McCallum classified posterior urethral injuries into three categories based on radiological findings from retrograde urethrography:¹²

- Type 1: the membranous urethra is stretched but not severed.
- Type 2: the membranous urethra is ruptured above the urogenital diaphragm, the contrast material extravasates into the pelvic extraperitoneal space above the urogenital diaphragm.
- Type 3: the membranous urethra is ruptured and the injury extends into the bulbous urethra due to a tear in the urogenital diaphragm. Contrast material leaks above and below the urogenital diaphragm.

Goldman et al. proposed a classification of urethral injuries based on the anatomical description of traumatic urethral injuries:¹²

- (I) Posterior urethra is stretched but still intact (Colapinto-McCallum type 1)
- (II) Partial or complete pure posterior urethral injury with tear of the membranous urethra while the urogenital diaphragm is intact. Contrast medium extravasates only above the urogenital diaphragm (Colapinto-McCallum type 2).
- (III) Partial or complete anterior and posterior urethral injury with disruption of the urogenital diaphragm; contrast agent leaks above and below the urogenital diaphragm (Colapinto-McCallum type 3).
- (IV) Bladder neck injury extending into the urethra. The extravasation of contrast medium is around the bladder neck.
- (V) Bladder base injury with periurethral extravasation similar to posterior urethral injury.
- (VI) Partial or complete isolated anterior urethral injury.

Thus, the classification of Goldman et al. has retained the Colapinto-McCallum classification but with the addition of the injuries to the bladder neck, bladder base and anterior urethra, attempting to include all possible urethral injuries, bladder injuries and bladder neck injuries. It is not commonly used, probably because it is more complex. In an attempt to simplify the Goldman classification, Chapple et al. suggested the following modifications.¹²

Table 1. Chapple et al. Classification.

Anterior urethra	Posterior urethra
1. Partial disruption	1. Posterior urethra stretched but intact
	2. Partial disruption
2. Complete disruption	3. Complete disruption
	4. Complex injury involving bladder neck or rectum

American association of surgery of trauma (AAST) classification, in contrast to the Colapinto-McCallum and Goldman classifications that determine the anatomical site of injuries, the concept of partial and complete urethral wall disruption (irrespective of the site of injury) has been emphasized by the AAST scale, with the addition of the measurement of the gap of urethral separation:¹²

- (I) Contusion: blood at urethral meatus and retrograde urethrography is normal.
- (II) Stretch injury: elongation of the urethra with no extravasation on urethrography.
- (III) Partial disruption: extravasation of urethrography contrast medium at the injury site, with visualization in the bladder.
- (IV) Complete disruption: extravasation of urethrography contrast medium at the injury site with no visualization in the bladder; <2 cm of urethra separation.
- (V) Complete disruption; complete transection with >2 cm of urethral separation or extension into the prostate or vagina.

This patient has done a retrograde urethrography and the result was urethral rupture AAST Gr V (Figure 2). Initial management was resuscitating and stabilizing the patient, then identify the associated injuries. Once a urethral injury was identified in the acute setting, the first thing to do was bladder drainage for various reasons, including urine output monitoring, treatment of symptomatic urinary retention, and to minimize urinary extravasation and its sequelae like infection and fibrosis.^{2,6} The most convenient way for bladder drainage is to place an SPT into the bladder, which can be carried out either in the emergency room or during laparotomy to repair the concomitant injuries.⁹ Blind urethral catheterization before urethrography should be avoided, because the risk of infection and worsening the urethral injury, although it was not clear yet.¹³ The definitive management of female PFUI may be classified depending upon the time after trauma at which repair is undertaken as (a) Early realignment; (b) Early repair (within 7 days), and; (c) Delayed repair (after 7 days).^{7,10}

- Early realignment: This is associated with a high stricture and fistula rate.
- Early repair (less than or equal to seven days): Complication rate is the lowest with early repair; therefore, this strategy is preferred once the patient is hemodynamically stable.
- Delayed repair (greater than seven days): Delayed repair often requires complex abdominal or combined abdominal-vaginal reconstruction with elevated risk of urinary incontinence and vaginal stenosis. The approach (vaginal, abdominal or combined) for early repair depends on the location of the injury. Proximal and mid-urethral disruptions require immediate exploration and primary repair using the retropubic and

Table 2. Complication of definitive management of female PFUI. ^{7,10}

Type of repair	Stricture (%)	Fistula (%)	Incontinence (%)	Vaginal stenosis (%)	Need for permanent urinary diversion (%)
Early realignment	59	13	0	0	0
Early repair	3	6	9	0	3
Delayed repair	3	4	31	4	7

transvaginal routes, respectively, with primary suturing of the urethral ends or urethral laceration. Concomitant vaginal lacerations are repaired (two-layer closure) trans-vaginally at the same time.

In this case, at the evaluation after 20 months after traffic accident the patient's family reported that the patient was able to urinate through the vaginal opening when the cystotomy catheter was stuck. The patient can feel the urge to urinate and can hold it in. Patient underwent an antegrade panendoscopy, an open bladder neck was found, a fistula was found distal to the bladder neck to the vagina with a size of 3 mm. During a retrograde cystoscopy, the sheath of cystoscopy was able to reach the bladder, urethral vagina fistula was found, the bladder neck was open and the bladder was normal.

In developing countries, delayed repair of the fistula following a catheter drainage to allow necrotic tissue to slough and the local inflammatory responses to subside, is common. The successful closure rates from this conservative management approach is likely to be underestimated due to no surgical intervention and therefore often unreported. According to Waaldijk (Waaldijk, 2004) and Tayler-Smith et al (Tayler et al., 2011), the selected patients with a new small fistula (<2cm) for conservative management healed spontaneously. In the Waaldijk series, 264 patients (15.4%) were healed by catheter only. 14 Tayler-Smith et al showed spontaneous closure rates in four out of 35 (11%) patients.¹⁵

Spontaneous closure of the fistula was feasible and the rate was likely to be underestimated due to infrequency referred for further management. A six to eight weeks of continuous catheter drainage allowed the diversion of urination from the visceral, which allowed a spontaneous closure before epithelialization of the fistula and this was certainly worth to try in patients with vesicovaginal or urethrovaginal fistula.¹⁶ This case report has shown that urethrovaginal fistula can be treated by performing a conservative management using

cystotomy and urethral catheter. This patient showed significant improvement after a routine evaluation. It was due to the size of the fistula which was less than 3 cm so the tissue could be done a self-recovery. The insertion of catheter caused an epithelialization faster and prevented an inflammation from the tissue.

CONCLUSION

Pelvic fracture urethral injury in young girls is rare. Standard policy of management of urethral injury for female especially girls has not been developed. Reconstruction is not the only management of PFUI. In this case, the patient's PFUI developed a fistula and showed an improvement using conservative management which is proved by good result of uroflowmetry. However, periodic evaluations must still be carried out to follow the progress of the disease and the possibility of complications when the patient enters adulthood including sexual function.

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