Early repair of traumatic injury to the posterior urethra: a case report and literature review

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ABSTRACT

Pelvic fractures are the main cause of posterior urethral trauma and they occur in men (10%) and women (6%). Urinary incontinence, erectile dysfunction, and urethral stricture are the principal complications. Cystotomy is the initial treatment and the criterion standard is late reconstruction in total urethral disruption three months after injury. However, a case of early repair due to associated orthopedic injuries is presented herein. The aim of this article is to describe the early treatment of injuries to the posterior urethra as a new treatment option.

A 21-year-old man was brought to the hospital for injuries received in an automobile accident in which he had been thrown from the vehicle. He presented with a fractured pelvis and clavicle, as well as craniofacial fractures. The patient was initially treated by the Urology Service with realignment and transurethral catheterization (TUC). He then underwent osteosynthesis of the pelvic fracture, and disruption of the posterior urethra was identified for which single-layer primary repair with TUC for

RESUMEN

Las fracturas pélvicas son la principal causa de trauma uretral posterior, estas ocurren en hombres (10%) y mujeres (6%). La incontinencia urinaria, disfunción eréctil y estenosis de uretra representan las principales complicaciones. La cistotomía es el tratamiento inicial, y el estándar de oro es la reconstrucción tardía en disrupción uretral total a los tres meses de la lesión. Sin embargo, se presenta un caso de reparación temprana obligada por lesiones ortopédicas asociadas. El objetivo es describir el tratamiento temprano de lesiones uretrales posteriores, como nueva opción de tratamiento.

Se presenta masculino 21 años, quien acudió por accidente automovilístico con proyección fuera del vehículo, presentaba fractura de pelvis, clavícula, y fracturas craniofaciales. Fue manejado inicialmente por Servicio de Urología, mediante realineación y sonda uretral (STU), posteriormente fue llevado a osteosíntesis de fractura pélvica, encontrándose disrupción uretral posterior, se decidió la reparación primaria en un plano con STU
four weeks was performed. The patient had satisfactory progression in the postoperative evaluation, with no evidence of stricture in studies using a contrast agent, and is currently asymptomatic, continent, and his sexual function has been preserved.

Approach and management include suspicion and adequate physical examination, external urinary diversion, and primary closure delayed for 12 weeks, which is considered “standard treatment”. Today, early primary repair has been a topic of discussion and is associated with higher success rates. The urologist must be skilled in the techniques of approach and primary repair so that complications and sequelae are prevented in these patients.

**Keywords:** Urethral stricture, posterior urethra, early treatment, Mexico.

**INTRODUCTION**

Pelvic fractures, whether open or closed, are the principal cause of traumatic urethral lesions; urethral lesions occur in 10-15% of men and in 6% of women presenting with pelvic fractures. Because the posterior urethra is fixed to the urogenital diaphragm, the bulbomembranous junction is the area most vulnerable to injury in pelvic fractures.¹

Urinary incontinence, erectile dysfunction, and the development of complex urethral strictures are the main complications in pelvic trauma with posterior urethral injury. The majority of cases involve young patients and these complications directly affect patient quality of life.² In such injuries, a high degree of suspicion is required in the evaluation of patients with the antecedent of perineal or pelvic trauma. A thorough medical history must be carried out, detailing the kinematics of the trauma, along with adequate physical examination that includes a basic neuoroatomic examination and precise, confirmational diagnostic studies, so that there is opportune diagnosis and treatment.³ Initial treatment in this type of patient consists of external urinary diversion, preferably through a suprapubic catheter, to aid the cicatrization process by means of a lower urinary tract diversion.⁴

The aim of the present case is to present a patient with posterior urethral trauma that received early management with primary anastomosis and to provide a review of the literature.

**CASE PRESENTATION**

The patient is a 21-year-old man, actively serving in the military, with no important previous medical pathologies, and a 7-day progression of injuries from an automobile accident. He presented with nose fractures, left orbital bone fracture, and Tile type B pelvic fracture (Figures 1 and 2) that was treated with external fixation of the pelvis (Figure 3). He also had L2 and L5 transverse apophysis fractures, fracture of the mid-third of the clavicle, pneumothorax, loss of a portion of the scalp, grade II traumatic brain injury, frontal parenchymal hemorrhage, type II urethral injury, and contained scrotal hematoma. The patient was initially treated at a secondary care hospital with early endoscopic urethral realignment and external urinary diversion by means of a transurethral Foley catheter. Two weeks after the accident he was referred to our hospital for pelvic trauma management that consisted of reduction and osteosynthesis of the pelvis. During the surgical procedure, disruption of the posterior urethra was observed, visualized through the catheter in the surgical field, and so our service was consulted. The decision was made to carry out primary repair of the membranous urethral injury through primary anastomosis with separate Monocryl 2-0 sutures at the 1, 3, 5, 7, 9, and 11 o’clock positions plus external urinary diversion with cystotomy for four weeks.
RESULTS

A case is presented of early repair with primary end-to-end anastomosis with single layer multifilament absorbable suture (Monocryl 2-0) in a type II injury (Stanford-Goldman classification) (Table 1) that was performed 15 days after injury and posterior to early urethral alignment (Figures 4 to 6). The patient progressed satisfactorily and was managed with the vacuum-assisted closer (VAC™) system for 4 weeks with secondary closure of the pelvic cavity, and urethral stenting with an 18 F silastic bladder catheter. He received integral management from the physical rehabilitation service for pelvic member mobilization and from the psychiatry service for depression and post-traumatic stress. Four weeks after early primary repair of the posterior urethra, retrograde urethrography was done that showed adequate contrast material passage through the anterior and posterior urethral portions, respectively, with no contrast material extravasation. Micturition cystography showed spontaneous, synergic, and complete micturition with no contrast material leakage (Figures 6 to 8).

Doppler penile ultrasound was done at the 3-month postoperative evaluation and there was adequate vascular conservation with the vasoactive drug, alprostadil (300 mcg). Current treatment with the PDE5 inhibitor, tadalafil (5 mg every 24 hours), produced erection of 3/5 rigidity. Functional evaluation of the lower urinary tract was carried out with control micturition cystography, retrograde urethrography, and then with urodynamics studies, all of which were within normal parameters. Doppler penile ultrasound at 6 months of 5PDE treatment showed improvement in vascular resistance and in conservation, and there was progressive improvement in the quality and strength of erections, with the patient only complaining of moderate pain.

DISCUSSION

Lower genitourinary tract injuries secondary to pelvic fractures are included in urologic traumatic pathology and have a lower incidence than injuries in the upper tract. However, adequate approach from the beginning of treatment is mandatory for all urologists because these first actions are reflected in the presentation of the
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Table 1. Stanford-Goldman blunt urethral trauma classification, injury description and comparison with Colapinto and McCallum classification.

<table>
<thead>
<tr>
<th>Stanford-Goldman classification type</th>
<th>Description</th>
<th>Colapinto and McCallum classification type</th>
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<tr>
<td>I</td>
<td>Intact but stretched posterior urethra</td>
<td>I</td>
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<tr>
<td>II</td>
<td>Partial or complete pure posterior urethral injury with membranous urethral tear above the urogenital diaphragm</td>
<td>II</td>
</tr>
<tr>
<td>III</td>
<td>Partial or complete combined anterior-posterior injury with disruption of the urogenital diaphragm</td>
<td>III</td>
</tr>
<tr>
<td>IV</td>
<td>Bladder neck injury extending into the urethra</td>
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<tr>
<td>IVa</td>
<td>Injury at the base of the bladder with periurethral extravasation simulating a true type IV urethral injury</td>
<td>-</td>
</tr>
<tr>
<td>V</td>
<td>Partial or complete anterior urethral injury</td>
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Figure 4. Posterior urethral injury. Intraoperative photograph showing the Van Buren dilator emerging from the posterior urethra (membranous) toward the pelvic cavity and the extreme proximal urethra, from where the Foley catheter that is used for early endoscopic realignment, emerges. The complete section of the posterior urethra is emphasized.

Figure 5. A) Early membranous urethral anastomosis. Reference suture material for approximating the proximal and caudal urethral ends is observed. B) Early end-to-end anastomosis union. The bladder is observed at the bottom of the photograph and the symphysis pubis at the upper edge.

Innumerable complications in polytraumatized patients, later resulting in diminished quality of life. By beginning early definitive treatment we are providing the patient with a new approach alternative and a reduction in the period of convalescence considered to be normal in patients undergoing delayed repair (more than 12 weeks). Up to the present, results have been excellent and the known complications of this pathology have not presented.

The classification proposed by Stanford-Goldman categorizes blunt urethral injuries as type I: posterior urethra intact but stretched (Colapinto and McCallum type I); type II: partial or complete pure posterior urethral injury with tear of the membranous urethra above the urogenital diaphragm (Colapinto y McCallum type II); type III: partial or complete combined anterior-posterior injury with disruption of the urogenital diaphragm (Colapinto and McCallum type III); type IV: bladder neck injury extending into the urethra; type IVa: injury at the base of the bladder with periurethral extravasation simulating a true type IV urethral injury; and type V: partial or complete anterior urethral injury (Table 1).

The attempt at primary urethral realignment through transurethral catheter (TUC) placement can be carried out in stable patients and maintained for four to six weeks, after which the cystotomy catheter is kept, due to the high incidence of posterior urethral stricture despite type I urethral realignment. Urethral disruption
with TUC placement rarely cicatrizes without stricture, but likewise 96% of patients managed with cystotomy without TUC develop complete stricture that then requires posterior urethroplasty. The criterion standard of treatment is late reconstruction in injuries that condition a lack of total urethral continuity and it is performed three months after the injury occurred, in order for it to have “stabilized”.¹

In an effort to reduce the abovementioned complications, the principles of initial evaluation and the options of early management should be applied by all persons involved in the care of the polytraumatized patient. Initial treatments and their results for improved long-term outcome are still controversial. Early primary alignment appears to reduce stricture rates and enables late reconstructions to be carried out with less difficulty than diversion with cystostomy alone.⁶

Treatment with early endoscopic urethral realignment has been reported to reduce costs by 50% compared with late urethrotomy, while reducing the frequency of internal urethrotomies 2.5 times ± 1.3 in a 2-year follow-up period.⁷

Mouraviev reported the results of 191 retrospectively analyzed patients, finding stricture in 49% of the patients treated with early urethral realignment and in 100% of the patients treated with cystotomy. Erectile dysfunction and incontinence rates were also lower in patients that underwent early approach (33 vs 42.1% and 17 vs 24.9%, respectively). Likewise, the author found that the reintervention rate was much lower in the patients that underwent early realignment (1.7 vs 3%, respectively). These results suggest a new treatment criterion, especially in patients whose injuries are detected early on and in whom primary repair is technically possible, given that we can guarantee greater surgical treatment effectiveness, compared with that of delayed management carried out after the inflammatory process is over and remodeling is finished.

## CONCLUSIONS

As described in the international literature and seen in our hospital, blunt posterior urethral trauma is principally associated with pelvic fractures and mainly in young patients. A multidisciplinary approach to these patients is imperative because these injuries are often disguised. Their management consists of external urinary diversion, as well as primary closure delayed for 12 weeks that is considered “standard management”. However, there is an ongoing debate regarding this approach and that of early primary repair. The latter has been associated with higher success rates in posterior urethral injuries when compared with delayed closure. Mastery of both the early and delayed primary repair techniques is fundamental in relation to the urologist’s surgical skill, because the consequences of inadequate surgical management of posterior urethral injuries result in potentially catastrophic complications that directly affect patient quality of life in terms of continence and sexual function.

## REFERENCES