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Review

Treatment of posterior urethral distractions defects following pelvic fracture

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Received 15 February 2017; received in revised form 27 May 2017; accepted 27 June 2017

KEYWORDS

Posterior urethral;
Distractions defects;
Pelvic fracture

Abstract Posterior urethral injuries typically arise in the context of a pelvic fracture. Retrograde urethrography is the preferred diagnostic test in trauma patients with pelvic fracture where a posterior urethral rupture is suspected. Pelvic fractures however preclude the adequate positioning of the patient on the X-ray table on admission and CT scan with intravenous contrast and delayed films is generally performed first. Suprapubic bladder catheter placement under ultrasound guidance should be performed whenever a posterior urethral disruption is suspected. Early diagnosis and proper acute management decrease the associated complications, such as strictures, urinary incontinence and erectile dysfunction. The correct and appropriate initial treatment of associated urethral rupture is critical to the proper healing of the injury. Placing of a suprapubic cystostomy on admission and delayed anastomotic urethroplasty after 3–6 months continues to be the gold standard of treatment. In this paper, we provide a comprehensive review of the literature with a special emphasis on the various treatments available: open or endoscopic primary realignment, immediate or delayed urethroplasty after suprapubic cystostomy, and delayed optical urethrotomy.

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1. Introduction

1.1. Etiological and anatomical considerations

The male urethra is divided into an anterior and a posterior portion through the urogenital diaphragm. The posterior urethra comprises the prostatic urethra and the membranous urethra.

Posterior urethral injuries frequently arise in the context of a pelvic fracture, typically after injuries due to traffic collisions, being crushed, or falling. Overall, the posterior

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Peer review under responsibility of Second Military Medical University.

<https://doi.org/10.1016/j.ajur.2017.12.004>

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Please cite this article in press as: Ríos E, Martínez-Piñeiro L, Treatment of posterior urethral distractions defects following pelvic fracture, Asian Journal of Urology (2017), <https://doi.org/10.1016/j.ajur.2017.12.004>

urethra in men is affected in 3.5%–19% of pelvic fractures. The posterior urethra in women is rarely affected (0%–6%), except by contusions or lacerations by bone fragments [1].

Classically it was thought that in cases of deceleration or crushing, the forces that fracture the bones of the pelvis are transmitted to the prostatomembranous junction, causing an alteration between the anterior urethra and the prostatic apex [2]. Studies performed in cadaver by Mouraviev and Santucci [3] have demonstrated that in the majority of cases the urethral lesions arise distal to the external urinary sphincter.

The possibility of an anastomotic reconstruction of a posterior urethral rupture assuring a good urinary continence depends on the sphincter integrity at the bladder neck, as both the internal sphincter at the bladder neck and the external sphincter in the membranous urethra are capable of independently ensuring urinary continence [4].

For the correct treatment of pelvic fractures, the surgeon should have a clear concept of pelvic stability. The degree of pelvic instability depends on the existence of dislocation and displacement of the sacroiliac joint as well as the fracture of the pubic rami.

Pelvic fractures can be divided into two main groups: stable fractures and unstable fractures. In a stable pelvic fracture, the urethral injury can occur when the four pelvic rami are broken (butterfly fracture) (Fig. 1) and the bone fragment is displaced in a posterior direction with the prostate, which is attached to the pubic bone. This displacement is capable of shearing the membranous urethra, affecting, in most cases, the external sphincter.

Unstable pelvic fractures that affect the anterior pelvic girdle and the sacroiliac joint, ilium, or sacrum can cause injuries of the posterior urethra due to bone fragments or, more commonly, as a result of the distortion of the pelvic bones during trauma. This bone displacement causes lateral movements that displace the membranous urethra and puboprostatic ligaments in opposite directions.

Unstable diametric pelvic fractures or bilateral fractures of the ischiopubic rami (known as butterfly fractures) are the most likely to cause posterior urethral injuries, as is common in the case of butterfly fractures with diastasis of the sacroiliac joint (Table 1) [1,5].

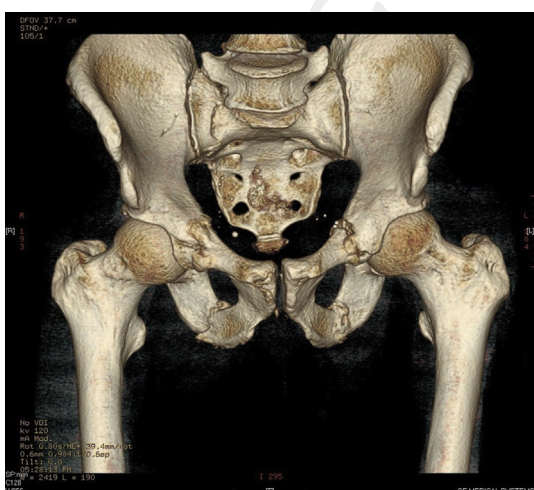


Figure 1 Butterfly fracture.

Table 1 Probability of urethral injury by type of fracture.

Type of fracture	Probability
Single ramus	0.64
Ipsilateral rami	0.76
Malgaigne (ramus and ipsilateral sacroiliac)	3.40
Butterfly	3.85
Butterfly and sacroiliac	24.02

Posterior urethral injuries may vary from a simple mucosal laceration (25%) to a partial (25%) or complete (50%) rupture. The most severe injuries occur as a result of prostate-urethral displacement, secondary progressive fibrosis, and separation of the urethral ends [1].

Urethral injuries alone are not considered to be a vital emergency, with the exception of their frequent association with pelvic fractures and the effects of such fractures on other organs, which occurs in 27% of cases. Initially, the management of associated injuries is often more important than the urethral injury [6].

1.2. Clinical and diagnostic considerations

The first step in the initial management of urethral trauma should be to stabilise the patient and evaluate any associated injuries, especially those that are life-threatening.

The presence of haematuria, blood at the urethral meatus, or urethrorrhagia is associated with urethral injuries. In these cases, acute urinary retention, perineal haematoma, or swelling by extravasation of urine is common [5,7].

Retrograde urethrography is considered the diagnostic test of choice for the evaluation of posterior urethral injuries, facilitating their proper subsequent management. Pelvic fractures however preclude the adequate positioning of the patient on the X-ray table on admission and CT scan with intravenous contrast and delayed films is generally performed first. Suprapubic bladder catheter placement under ultrasound guidance should be performed whenever a posterior urethral disruption is suspected. Catheter placement permits urine diversion and allows the physician to perform a combined urethrography (anterograde and retrograde) at a later point in time, which can help to determine the location, severity, and extent of the injury (Fig. 2). Nevertheless, if the posterior urethra is not visualised correctly, an MRI scan of the posterior urethra or anterograde endoscopy through the suprapubic route can be performed at a later stage in order to plan urethral reconstruction [5,7].

2. Treatment of posterior urethral injuries

A key concept is the distinction between posterior urethral stricture and posterior urethral rupture secondary to pelvic fracture, as the surgical management of each is distinctly different. In urethral stricture, the urethral spongy tissue is continuous; in posterior urethral rupture, a separation exists between the apex of the prostate or the membranous

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