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Management of Male Urethral Emergencies

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Abstract

Introduction: We provide an overview of the terminology, anatomical considerations, pathophysiology, diagnostic evaluation and contemporary management strategies of male urethral emergencies.
Methods: We reviewed the literature, including the latest EAU (European Association of Urology) guidelines.
Results: Iatrogenic injuries are the most common cause of urethral injuries. Traumatic injuries are contusion, stretch or partial or complete injury of the anterior and/or posterior urethra. Blunt injuries are most frequently treated initially with suprapubic urinary drainage and, if necessary, subsequent urethroplasty. Early realignment is controversial and can be attempted in stable patients. Except in rare cases most pelvic fracture urethral injuries are treated with delayed anastomotic urethroplasty. For other injuries such as contusions, depending on the length and localization of the fibrotic gap end-to-end anastomosis or augmented urethroplasty is performed. Penetrating or open injuries are variably managed by initial urinary diversion or wound débridement, hematoma evacuation and, if possible, primary urethral anastomosis.
Conclusions: Primary repair of fractured penis is recommended and immediate primary repair is especially important for suspected associated urethral injury.

Key Words: urethra, wounds and injuries, emergencies, male, iatrogenic disease

Abbreviations and Acronyms Q1

CT = computerized tomography

PFUI = pelvic fracture related urethral injury

RUG = retrograde urethrography

VCUG = voiding cystourethrography

Anatomy

The most important consideration in the treatment of urethral injuries is the anatomical location affected. Each segment requires different treatment approaches. Optimal management is further refined by the type of injury.

The urogenital diaphragm divides the male urethra into a posterior and an anterior part. The posterior part begins at the bladder neck and includes the prostatic (3 to 4 cm) and membranous (1 to 2 cm) urethra. The anterior part includes the bulbar and penile urethra (pars pendulans, approximately 15 cm) ending with the navicular fossa and external urethral orifice. The penoscrotal junction further divides the urethra into a bulbar and a penile portion. The urethra is particularly vulnerable to deceleration trauma in the region of the urogenital diaphragm. Here the prostate apex is fixed to the anterior pelvic ring by anterior puboprostatic ligamentous structures and the bulbar urethra is without any structural support from the cavernous bodies.[1,2] Anatomical proximity to the rectum, bladder neck and bladder may cause associated injuries to these structures.

Epidemiology

Iatrogenic Trauma

The most common cause of urethral trauma is iatrogenic, mostly due to catheterization, instrumentation or surgery.[3,4] In the United States more than 4 million patients undergo transurethral catheterization and approximately 30 million catheters are inserted per year.[5] Catheter induced complications range from minor bacterial infections and minimal mucosal

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erosion up to severe mechanical trauma with urethral damage or perforation. Urethral trauma during catheterization and/or prolonged catheterization may be responsible for up to 32% of urethral strictures with the bulbar urethra mostly affected. Atraumatic catheterization with a 16Fr or smaller silicone coated latex catheter is associated with fewer urethral complications.[3,5]

In certain cases transurethral instrumentation during endoscopy (ie urethrotomy or transurethral resection of the bladder/prostate) can be associated with iatrogenic urethral trauma. Iatrogenic trauma and subsequent (especially meatal) stricture formation after endoscopy are thought to result from a discrepancy between the diameters of the urethra and the endoscope. Other factors that may have a part are insufficient lubrication of the scope resulting in high friction during endoscopy and urethral ischemia, especially during long cystoscopic procedures. Furthermore, direct mucosal trauma during interventions or electrical dispersion in the urethra (eg during monopolar resection) may increase the risk of stricture formation.[6,7]

External Blunt Trauma

Of all traumatic injuries to the urethra 90% occur after external blunt force trauma, eg during motor vehicle accidents (with or without pelvic fracture), after straddle trauma (falling astride a blunt object such as bicycle handlebars or the top of a fence) or other direct trauma to the perineum. These injury patterns mostly affect the anterior urethra directly (eg by compressing the bulbar urethra between the blunt object and parts of the bony pelvis after direct trauma). PFUIs are thought to mostly occur from distraction forces moving the fractured pelvic bones and, thus, the urethra apart with 20% thought to be posterior (ie proximal to the sphincter) and the rest anterior.[8] Penile fractures are also classified as blunt trauma and they are discussed separately.

Penetrating Trauma

Penetrating or open trauma results from gunshot wounds, stab wounds, dog bites, external impalement or penile amputation. This injury pattern is also more often associated with injuries of the anterior (penile and bulbar) urethra rather than the posterior urethra. It can be accompanied by penile, testicular and rectal injuries.

Pelvic Fracture Related Urethral Injuries

The accepted nomenclature in 2014 requires the use of PFUI to describe urethral injuries resulting from pelvic bone fracture. The older use of the term posterior urethral injuries/strictures has been abandoned for several reasons, at least partly because up to 80% of these injuries in fact involve the anterior urethra distal to the sphincter.[8] Therefore, pelvic fractures are the most common noniatrogenic cause of urethral injury with associated urethral injuries in up to 19% of men and 6% of woman with pelvic fractures.[9] Depending on the intensity of the deceleration trauma (eg during motor vehicle accidents or falls from great height) the urethra is exposed to different shear forces, leading to different extents of PFUI. PFUIs most commonly occur in combination with unstable pelvic fractures involving diastasis of the sacroiliac joint(s) and/or pubic symphysis.[9]

Other Types of Urethral Injuries

Although rare, injuries due to constriction bands (fig. 1), penile clamps, penile rings or piercings, or after exotic sexual practices (eg involving foreign bodies directly placed in the urethra or indirectly injuring the urethra after vaginal and rectal insertion) should not be underestimated. In men ischemic damage due to cardiac bypass surgery is not infrequent and can result in extensive urethral strictures.[10] [Fig]

Terminology and Classification

Before addressing the management of urethral injuries definitions and nomenclatures should be outlined. Urethral injuries are divided into several categories depending on the cause (eg iatrogenic, inflammatory or traumatic). Depending on the injury pattern urethral injuries can be further classified into

Figure 1. Ventral urethral necrosis induced by constricting band.