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Urology

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Lower Urinary Tract Injuries

Introduction:

Genitourinary trauma is a common finding in the patient with multi-trauma. About 10% of all traumas primarily involve the genitourinary (GU) system, while another 10% to 15% of patients with abdominal trauma have concurrent GU injuries. The organs involved include the kidneys, bladder, ureters, urethra, penis, and scrotum. Female genital trauma is usually due to childbirth, female circumcision, or sexual assault.

For any patient arriving in the ED, the first priority is assessing and stabilizing the ABCs – airway, breathing, and circulation – during the primary survey, along with maintaining cervical spine immobilization. The purpose of the primary survey is to identify and treat any life-threatening problems. These issues must be addressed definitively prior to assessing the rest of the patient's injuries in the secondary survey. The purpose of the secondary survey is to identify and treat all injuries.

Bladder Injury

Overview:

Bladder injuries are caused by blunt or penetrating trauma. The probability of bladder injury varies according to the degree of bladder distention; therefore, a full bladder is more likely to become injured than an empty one.

Relevant Anatomy:

The adult bladder is located in the anterior pelvis. The dome of the bladder is covered by peritoneum. The type of extravasation (intraperitoneal or extraperitoneal) depends upon the location of the laceration and its relationship with the peritoneal reflection. If the perforation is above the peritoneal reflection, the extravasation is intraperitoneal. If the injury is below the peritoneal reflection, the extravasation is extraperitoneal.

Aetiology:

1. Blunt trauma: direct blow or deceleration injury. May be associated with pelvic fractures. The propensity of the bladder for injury depends on the degree of distension.
2. Penetrating Injury: Gunshot or stab. Often associated with injury to the pelvic organs.
3. Obstetric Trauma: Prolonged labour or assisted delivery due to compression of the bladder. Caeserian section injury may also occur.
4. Gynecologic Trauma: during a vaginal or abdominal hysterectomy.
5. Urologic Trauma: Perforation of the bladder during a bladder biopsy, cystolitholapaxy, transurethral resection of the prostate (TURP), or transurethral resection of a bladder tumor (TURBT) is not uncommon.
6. Orthopedic Trauma: Orthopedic pins and screws can commonly perforate the urinary bladder, particularly during internal fixation of pelvic fractures.

Clinical Features of Bladder Injury:

Patients with signs and symptoms suggestive of a bladder injury have a history typical for pelvic trauma, eg. car accident or gunshot wound. Clinical signs of bladder injury are relatively nonspecific; however, a triad of gross hematuria, suprapubic pain or tenderness and difficulty or inability to void is often present.

Suprapubic pain is present in most of the patients; however the patient may be still able to void. Hematuria is the hallmark of bladder injury and is present in almost all cases. It is usually gross but may, in some cases, be microscopic.

Examination:

1. Abdominal examination may reveal distension, guarding and tenderness.
2. Absent bowel sounds and signs of peritoneal irritation in intraperitoneal rupture.
3. DRE to assess for rectal injury and, in males, to assess the prostate position. The finding of "high riding" or elevated prostate suggests associated urethral disruption.
4. Palpation of the bony pelvis may reveal abnormal mobility suggesting fracture.
5. Presence of blood at the external urethral meatus suggests associated urethral injury and necessates a retrograde urethrogram.

Investigations:

1. Retrograde Urethrography: Blood at the urethral meatus is an absolute indication for retrograde urethrography. Bladder injury may be associated with urethral injury which has to be excluded prior to inserting a Foley's catheter.
2. CT Scan: This is often the first test performed in patients with blunt abdominal trauma. Once urethral injury has been excluded, a Foley's catheter can be inserted and contrast injected in the bladder to reveal the presence of bladder inury.
3. Cystography: It is the standard study to diagnose bladder injury.
4. Other investigations that are required in the context of the trauma case.

Treatment:

Follow the basic trauma protocol and stabilize the patient. Administer broad-spectrum antibiotics, and obtain a surgical informed consent, if possible.

Medical Therapy: Most extraperitoneal ruptures can be managed safely with simple catheter drainage (ie, urethral or suprapubic). Virtually all extraperitoneal bladder injuries heal within 3 weeks.

Surgical Therapy:

- Intraperitoneal Rupture: Most, if not all, intraperitoneal bladder ruptures require surgical exploration. These injuries do not heal with prolonged catheterization alone. All gunshot wounds to the lower abdomen ***should be explored***.
- Extraperitoneal Rupture: Bladders with extensive extraperitoneal extravasation are often repaired surgically.

Early surgical intervention decreases the length of hospitalization and potential complications, while promoting early recovery.

Complications:

Potential complications of bladder surgery include:

- Urinary extravasation
- Wound dehiscence
- Hemorrhage
- Pelvic infection
- Small-capacity bladder
- De novo urge incontinence

Urethral Trauma

Trauma to the male urethra must be efficiently diagnosed and effectively treated to prevent serious long-term sequelae. Most urethral injuries are associated with well-defined events, including major blunt trauma such as caused by motor vehicle collisions or falls. Penetrating injuries in the area of the urethra may also cause urethral trauma. Straddle injuries may cause both short- and long-term problems. Iatrogenic injury to the urethra from traumatic catheter placement, transurethral procedures, or dilation is not uncommon.

Anatomy:

The male urethra is composed of two main parts, the posterior urethra which further includes the prostatic and membranous urethra and the anterior urethra which includes the bulbar and penile urethra.

Anterior (Bulbar) Urethral Injuries

Diagnosis:

- There is a history of a blow to the perineum, usually due to a fall astride on a projecting object.
- Painful micturition or inability to void.
- Hematuria.
- Signs include
    - urinary retention
    - blood at the external urethral meatus
    - perineal hematoma and swelling. This hematoma is typically "butterfly" in shape and may extend to the abdomen.

Any patient with a history suggestive of a urethral injury or any clinical indicator of urethral trauma should undergo retrograde urethrography to assess the location and degree of the injury.

Grades of Urethral Injury:

1. Contusion: blood at the urethral meatus, normal urethrogram.
2. Partial disruption: extravasation of contrast at injury site with contrast visualized in the bladder
3. Complete disruption: extravasation of contrast at injury site without bladder visualization.

Management of Anterior Urethral Injuries:

1. Contusion: transurethral catheter for 7 – 10 days with antibiotics and analgesics.
2. Urethral Disruption (Partial and Complete): Blind passage of urethral catheter is *strongly contraindicated.* Urinary diversion via suprapubic cystostomy is done. Six weeks later, a retrograde urethrogram is obtained to assess the condition and decide for the appropriate reconstructive procedure, usually performed 8 – 12 weeks after the injury.
3. Immediate surgical repair of the anterior urethra may be indicated for penetrating injuries.

Outcome: Potential complications of anterior urethral injuries include stricture, infection, fistula. Early diagnosis, prompt urinary diversion coupled with judicious use of antibiotics, and the appropriate urethral reconstruction can decrease their incidence.

Posterior Urethral Injuries:

Injuries to the posterior urethra occur almost exclusively with pelvic fractures. The shearing forces of the accident will result in disruption of the prostato-membranous junction.

Diagnosis: Posterior urethral injuries should be suspected in cases of pelvic fractures associated with bleeding at the external meatus. Other signs and symptoms include haematuria, pain on urination, and inability to void.

Any patient suspected to have a urethral injury should undergo a retrograde urethrography.

Plain abdominal X ray may reveal the pelvic fracture. Other investigations may be needed according to the general context and suspected injuries.

Management: The initial approach to the management of posterior urethral injuries depends on the patient's overall condition. Most patients with pelvic fracture have significant coexisting trauma (abdomen, chest, head, long bones) and therefore immediate consideration should be given to resuscitative measures and treatment of these associated injuries.

As with anterior urethral injuries, posterior urethral contusions can be managed with transurethral catheterization alone. A suprapubic urinary diversion is needed for urethral disruption. After the patient has adequately recovered from the associated injuries and the urethral injury has stabilized, the urethra can be evaluated radiographically and the appropriate reconstructive procedure planned.

Sometimes, primary surgical realignment may be attempted in order to decrease the likelihood of subsequent stricture formation and the need for delayed open urethral reconstruction.

Outcomes:

The complications of posterior urethral injury may be devastating.

1. Erectile dysfunction.
2. Urinary incontinence.
3. Urethral stricture.