

INJURIES TO THE BLADDER

- *Bladder injuries occur most often from external force and are often associated with pelvic fractures.
- *About 15% of all pelvic fractures are associated with concomitant bladder or urethral injuries.
- *Iatrogenic injury may result from gynecologic and other extensive pelvic procedures as well as from hernia repairs and transurethral operations.

Pathogenesis & Pathology

- When the pelvis is fractured by blunt trauma, fragments from the fracture site may perforate the bladder.
- These perforations usually result in extraperitoneal rupture.
- If the urine is infected, extraperitoneal bladder perforations may result in deep pelvic abscess and severe pelvic inflammation.

- When the bladder is filled to near capacity, a direct blow to the lower abdomen may result in bladder disruption(**intraperitoneal**).
- Since the reflection of the pelvic peritoneum covers the dome of the bladder, a linear laceration will allow urine to flow into the abdominal cavity.
- If the urine is infected, immediate peritonitis and acute abdomen will develop.

Clinical Findings

- Pelvic fracture accompanies bladder rupture in 90% of cases.
- The diagnosis of pelvic fracture can be made initially in the emergency room.
- **A. SYMPTOMS:** There is usually a history of lower abdominal trauma. Blunt injury is the usual cause.

- Patients ordinarily are unable to urinate, but when spontaneous voiding occurs, gross hematuria is usually present.
- Most patients complain of pelvic or lower abdominal pain.

- **B. SIGNS:** Heavy bleeding associated with pelvic fracture may result in hemorrhagic shock, usually from venous disruption of pelvic vessels.
- Evidence of external injury from a gunshot or stab wound in the lower abdomen.
- Tenderness of the suprapubic area and lower abdomen.

- An acute abdomen may occur with intraperitoneal bladder rupture.
- On rectal examination, landmarks may be indistinct because of a large pelvic hematoma.

C. LABORATORY FINDINGS

- Catheterization usually is required in patients with pelvic trauma but **not if bloody urethral discharge is noted.**
- Bloody urethral discharge indicates urethral injury, and a **urethrogram** is necessary before catheterization.
- When catheterization is done, gross or, less commonly, microscopic **hematuria** is usually present.

- Urine taken from the bladder at the initial catheterization should be cultured to determine whether infection is present.

D. X-RAY FINDINGS:

A plain abdominal film generally demonstrates pelvic fractures.

- There may be haziness over the lower abdomen from blood and urine extravasation.

- Bladder disruption is shown on cystography. The bladder should be filled with 300 mL of contrast material and a plain film of the lower abdomen obtained.
- The drainage film is extremely important, because it demonstrates areas of extraperitoneal extravasation of blood and urine that may not appear on the filling film.

- With intraperitoneal extravasation, free contrast medium is visualized in the abdomen.
- CT cystography is an excellent method for detecting bladder rupture; however, retrograde filling of the bladder with 300 mL of contrast medium is necessary to distend the bladder completely.

Complications

- A pelvic abscess may develop from extraperitoneal bladder rupture.
- Intraperitoneal bladder rupture with extravasation of urine into the abdominal cavity causes delayed peritonitis.
- Partial incontinence may result from bladder injury when the laceration extends into the bladder neck.

Treatment

A. EMERGENCY MEASURES: Shock and hemorrhage should be treated.

B. SURGICAL MEASURES:

- * A lower midline abdominal incision should be made.
- * Pelvic hematoma, which is usually lateral, should be avoided.

- Entering the pelvic hematoma can result in increased bleeding from release of tamponade and in infection of the hematoma, with subsequent pelvic abscess.
- The bladder should be opened in the midline and carefully inspected.
- After repair, a suprapubic cystostomy tube is usually left in place to ensure complete urinary drainage and control of bleeding.

- **1. Extraperitoneal bladder rupture:**
- Extraperitoneal bladder rupture can be successfully managed with urethral catheter drainage only. (Typically 10 days will provide adequate healing time).
- As the bladder is opened in the midline, it should be carefully inspected and lacerations closed from within.

- **2. Intraperitoneal rupture:**
- Intraperitoneal bladder ruptures should be repaired via a transperitoneal approach after careful transvesical inspection and closure of any other perforations.
- The peritoneum must be closed carefully over the area of injury.
- All extravasated fluid from the peritoneal cavity should be removed before closure.

- 3. Pelvic fracture:** Stable fracture of the pubic rami, the patient can be ambulatory within 4–5 days without damage or difficulty.
- Unstable pelvic fractures requiring external fixation.
 - **4. Pelvic hematoma:** At exploration and bladder repair, packing the pelvis with laparotomy tapes often controls the problem.
 - If bleeding persists, it may be necessary to leave the tapes in place for 24 hours and operate again to remove them. Embolization of pelvic vessels with Gelfoam or skeletal muscle under angiographic control is useful in controlling persistent pelvic bleeding.

Indications of immediate repair of bladder injury

- 1-Intraperitoneal injury from external trauma.
- 2-Penetrating or iatrogenic nonurologic injury.
- 3-Inadequate bladder drainage or clots in urine.
- 4-Bladder neck injury.
- 5-Rectal or vaginal injury.
- 6-Open pelvic fracture.
- 7-Bone fragments projecting into bladder.

- **Prognosis:** With appropriate treatment, the prognosis is excellent. The suprapubic cystostomy tube can be removed within 10 days, and the patient can usually void normally.
- At the time of discharge, urine culture should be performed to determine whether catheter-associated infection requires further treatment.

INJURIES TO THE URETHRA

- Urethral injuries are uncommon and occur most often in men, usually associated with pelvic fractures or straddle type falls. They are rare in women.
- The urethra can be separated into 2 broad anatomic divisions:
 - the posterior urethra: consisting of the prostatic and membranous portions, and:
 - the anterior urethra: consisting of the bulbous and pendulous portions.

INJURIES TO THE POSTERIOR URETHRA

- **Etiology:** The membranous urethra is the portion of the posterior urethra most likely to be injured.
- When pelvic fractures occur from blunt trauma, the membranous urethra is sheared from the prostatic apex at the prostatomembranous junction.

Clinical Findings

- **SYMPTOMS:** Patients usually complain of lower abdominal pain and inability to urinate.
- **SINGS:** Blood at the urethral meatus is the single most important sign of urethral injury.
- pass a urethral catheter may result in infection of the periprostatic and perivesical hematoma and conversion of an incomplete laceration to a complete one.
- The presence of blood at the external urethral meatus indicates that immediate urethrography is necessary to establish the diagnosis.

- Suprapubic tenderness and the presence of pelvic fracture are noted on physical examination.
- Perineal or suprapubic contusions are often noted.
- Rectal examination may reveal a large pelvic hematoma with the prostate displaced superiorly.

- Superior displacement of the prostate does not occur if the puboprostatic ligaments remain intact.
- Partial disruption of the membranous urethra (currently 10% of cases) is not accompanied by prostatic displacement.

X-RAY FINDINGS

- Fractures of the bony pelvis are usually present.
- A urethrogram (using 20–30 mL of water-soluble contrast material) shows the site of extravasation at the prostatomembranous junction.
- **INSTRUMENTAL EXAMINATION:** Catheterization or urethroscopy should not be done, because these procedures pose an increased risk of hematoma, infection, and further damage to partial urethral disruptions.

Differential Diagnosis

- Bladder rupture may be associated with posterior urethral injuries in approximately 20% of cases.
- Cystography cannot be done preoperatively, since a urethral catheter should not be passed.

Complications

- Stricture, impotence, and incontinence as complications of prostatic membranous disruption.
- These complications will decrease if suprapubic drainage with delayed urethral reconstruction are done.

Treatment

- **A. EMERGENCY MEASURES:** Shock and hemorrhage should be treated.
- **B. SURGICAL MEASURES:** Urethral catheterization should be avoided.
- 1. **Immediate management:** consist of suprapubic cystostomy to provide urinary drainage. A midline lower abdominal incision should be made, with care being taken to avoid the large pelvic hematoma.

- **2. Delayed urethral reconstruction:**
- Reconstruction of the urethra after prostatic disruption can be undertaken within 3 months.
- The preferred approach is a single-stage reconstruction of the urethral rupture defect with direct excision of the strictured area and anastomosis of the bulbous urethra directly to the apex of the prostate.

- **TREATMENT OF COMPLICATIONS:**
- Approximately 1 month after the delayed reconstruction, the urethral catheter can be removed and voiding cystogram obtained through the suprapubic cystostomy tube.
- **Prognosis:** If complications can be avoided, the prognosis is excellent. Urinary infections ultimately resolve with appropriate management.

INJURIES TO THE ANTERIOR URETHRA

- **Etiology:**Self-instrumentation or iatrogenic instrumentation may cause partial disruption.
- **Pathogenesis & Pathology:**
- **A. CONTUSION:**Contusion of the urethra is a sign of crush injury without urethral disruption. Perineal hematoma usually resolves without complications.

- **B. LACERATION:** If the extravasation is unrecognized, it may extend into the scrotum, along the penile shaft, and up to the abdominal wall. It is limited only by Colles' fascia and often results in sepsis, infection, and serious morbidity.

- **Clinical Findings:**
- **A. SYMPTOMS:** Bleeding from the urethra is usually present.
- There is local pain into the perineum and sometimes massive perineal hematoma. If voiding has occurred and extravasation is noted.

- **B. SIGNS:**The perineum is very tender; a mass may be found, as may blood at the urethral meatus. Rectal examination reveals a normal prostate.
- When presentation of such injuries is delayed, there is massive urinary extravasation and infection in the perineum and the scrotum.
- The lower abdominal wall may also be involved. The skin is usually swollen and discolored.

LABORATORY FINDINGS

- Blood loss is not usually excessive, particularly if secondary injury has occurred. The white count may be elevated with infection.

X-RAY FINDINGS

- A urethrogram, with instillation of 15–20 mL of water-soluble contrast material, demonstrates extravasation and the location of injury.
- A contused urethra shows no evidence of extravasation.

- **Complications:** Heavy bleeding from the corpus spongiosum.
- Pressure applied to the perineum over the site of the injury usually controls bleeding.
- If hemorrhage cannot be controlled, immediate operation is required.
- The complications of urinary extravasation are chiefly sepsis and infection.

Treatment

- **A. GENERAL MEASURES:** If heavy bleeding does occur, local pressure for control, followed by resuscitation, is required.
- **B. SPECIFIC MEASURES:**
 - **1. Urethral contusion:** intact. After urethrography, the patient is allowed to void; and if the voiding occurs normally, without pain or bleeding, no additional treatment is necessary. If bleeding persists, urethral catheter drainage can be done.

- **2. Urethral lacerations:**Instrumentation of the urethra following urethrography should be avoided.
- Percutaneous cystostomy may also be used in such injuries.
- **3. Urethral laceration with extensive urinary extravasation:**Suprapubic cystostomy for urinary diversion is required. Infection and abscess formation are common and require antibiotic therapy

- **C. TREATMENT OF COMPLICATIONS:**Strictures at the site of injury may be extensive and require delayed reconstruction.