INJURY OF GENITOURINARY ORGANS

Emergency Diagnosis & Management

About 10% of all injuries seen in the emergency room involve the genitourinary system to some extent.

Emergency Diagnosis & Management

Many of them are subtle and difficult to define and require great diagnostic expertise.

Early diagnosis is essential to prevent serious complications.

Emergency Diagnosis & Management

Initial assessment should include control of hemorrhage and shock along with resuscitation as required.

Emergency Diagnosis & Management

The history should include a detailed description of the accident. In cases involving gunshot wounds, the type and caliber of the weapon should be determined, since high-velocity projectiles cause much more extensive damage.

Emergency Diagnosis & Management

The abdomen and genitalia should be examined for evidence of contusions or subcutaneous hematomas, which might indicate deeper injuries to the retroperitoneum and pelvic structures.

Emergency Diagnosis & Management

Fractures of the lower ribs are often associated with renal injuries, and pelvic fractures often accompany bladder and urethral injuries.

Emergency Diagnosis & Management

Patients who do not have life-threatening injuries and whose blood pressure is stable can undergo more deliberate radiographic studies.

Emergency Diagnosis & Management

When genitourinary tract injury is suspected on the basis of the history and physical examination, additional studies are required to establish its extent.

Assessment of Injury

Assessment of the injury should be done in an orderly fashion so that accurate and complete information is obtained.

Catheterization

Blood at the urethral meatus in men indicates urethral injury; catheterization should not be attempted if blood is present, but retrograde urethrography should be done immediately.

Catheterization

If no blood is present at the meatus, a urethral catheter can be carefully passed to the bladder to recover urine; microscopic or gross hematuria indicates urinary system injury.

Catheterization

If catheterization is traumatic despite the greatest care, the significance of hematuria cannot be determined, and other studies must be done to investigate the possibility of urinary system injury.

Computed Tomography (CT)

Abdominal CT with contrast media is the best imaging study to detect and stage renal and retroperitoneal injuries.

Computed Tomography (CT)

It can define

- the size
- extent of the retroperitoneal hematoma

Computed Tomography (CT)

Spiral CT scanning, now common, is very rapid, but it may not detect renal parenchymal lacerations, urinary extravasation, or ureteral and renal pelvic injuries.

Retrograde Cystography

Filling of the bladder with contrast material is essential to establish whether bladder perforations exist.

Retrograde Cystography

A film should be obtained with the bladder filled and a second one after the bladder has emptied itself by gravity drainage.

Retrograde Cystography

Cystography with CT is excellent for establishing bladder injury.

Urethrography

A small (12F) catheter can be inserted into the urethral meatus and 3 mL of water placed in the balloon to hold the catheter in position.

Urethrography

After retrograde injection of 20 mL of water-soluble contrast material, the urethra will be clearly outlined on film, and extravasation in the deep bulbar area in case of straddle injury or free extravasation into the retropubic space in case of prostatomembranous disruption will be visualized.

Arteriography

Arteriography may help define renal parenchymal and renal vascular injuries.

Intravenous Urography

Intravenous urography can be used to detect renal and ureteral injury.

Cystoscopy and Retrograde Urography

Cystoscopy and retrograde urography may be useful to detect ureteral injury, but are seldom necessary, since information can be obtained by less invasive techniques.

Abdominal Sonography

Abdominal sonography has not been shown to add substantial information during initial evaluation of severe abdominal trauma.

Injuries to the Kidney

Renal injuries are the most common injuries of the urinary system.

Injuries to the Kidney

Most injuries occur from automobile accidents or sporting mishaps, chiefly in men and boys..

Injuries to the Kidney

Etiology

Blunt trauma directly to the abdomen, flank, or back is the most common mechanism, accounting for 80-85% of all renal injuries.

Injuries to the Kidney

Vehicle collisions at high speed may result in major renal trauma from rapid deceleration and cause major vascular injury.

Injuries to the Kidney

Associated abdominal visceral injuries are present in 80% of renal penetrating wounds.

Pathology & Classification

Early Pathologic Findings

Lacerations from blunt trauma usually occur in the transverse plane of the kidney.

Pathology & Classification

Early Pathologic Findings

In injuries from rapid deceleration, the kidney moves upward or downward, causing sudden stretch on the renal pedicle and sometimes complete or partial avulsion.

Pathology & Classification

Early Pathologic Findings

Acute thrombosis of the renal artery may be caused by an intimal tear from rapid deceleration injuries owing to the sudden stretch.

Pathology & Classification

Hydronephrosis

Follow-up excretory urography is indicated in all cases of major renal trauma.

Pathology & Classification

Arteriovenous Fistula

Arteriovenous fistulas may occur after penetrating injuries but are not common

Pathology & Classification

Renal Vascular Hypertension

The blood flow in tissue rendered nonviable by injury is compromised; this results in renal vascular hypertension in less than 1% of cases.

Clinical Findings & Indications for Studies

Microscopic or gross hematuria following trauma to the abdomen indicates injury to the urinary tract.

Clinical Findings & Indications for Studies

Some cases of renal vascular injury are not associated with hematuria.

Clinical Findings & Indications for Studies

The degree of renal injury does not correspond to the degree of hematuria, since gross hematuria may occur in minor renal trauma and only mild hematuria in major trauma

Clinical Findings & Indications for Studies

Miller and McAninch (1995) made the following recommendations based on findings in over 1800 blunt renal trauma injuries.

Clinical Findings & Indications for Studies

However, should physical examination or associated injuries prompt reasonable suspicion of a renal injury, renal imaging should be undertaken.

Clinical Findings & Indications for Studies

Symptoms

There is usually visible evidence of abdominal trauma. Pain may be localized to one flank area or over the abdomen.

Clinical Findings & Indications for Studies

Catheterization usually reveals hematuria.

Clinical Findings & Indications for Studies

Signs

Initially, shock or signs of a large loss of blood from heavy retroperitoneal bleeding may be noted.

Clinical Findings & Indications for Studies

Signs

Diffuse abdominal tenderness may be found on palpation; an "acute abdomen" usually indicates free blood in the peritoneal cavity. A palpable mass may represent a large retroperitoneal hematoma or perhaps urinary extravasation.

Clinical Findings & Indications for Studies

Signs

The abdomen may be distended and bowel sounds absent.

Clinical Findings & Indications for Studies

Laboratory Findings

Microscopic or gross hematuria is usually present.

Clinical Findings & Indications for Studies
Staging and X-Ray Findings

Staging of renal injuries allows a systematic approach to these problems.

Clinical Findings & Indications for Studies
Staging and X-Ray Findings

For example, blunt trauma to the abdomen associated with gross hematuria and a normal urogram requires no additional renal studies; however, nonvisualization of the kidney requires immediate arteriography or CT scan to determine whether renal vascular injury exists.

Clinical Findings & Indications for Studies
Staging and X-Ray Findings

Ultrasonography and retrograde urography are of little use initially in the evaluation of renal injuries.

Clinical Findings & Indications for Studies
Staging and X-Ray Findings

Staging begins with an abdominal CT scan, the most direct and effective means of staging renal injuries.

Clinical Findings & Indications for Studies
Staging and X-Ray Findings

This noninvasive technique clearly

- defines parenchymal lacerations and urinary extravasation,

Clinical Findings & Indications for Studies
Staging and X-Ray Findings

Arteriography defines major arterial and parenchymal injuries when previous studies have not fully done so.

Clinical Findings & Indications for Studies
Staging and X-Ray Findings

The major causes of nonvisualization on an excretory urogram are total pedicle avulsion, arterial thrombosis, severe contusion causing vascular spasm, and absence of the kidney (either congenital or from operation).

Clinical Findings & Indications for Studies
Staging and X-Ray Findings

Radionuclide renal scans have been used in staging renal trauma.

Clinical Findings & Indications for Studies

Differential Diagnosis

Trauma to the abdomen and flank areas is not always associated with renal injury.

Clinical Findings & Indications for Studies

Complications

Early Complications

Hemorrhage is perhaps the most important immediate complication of renal injury.

Clinical Findings & Indications for Studies
Complications

The size and expansion of palpable masses must be carefully monitored.

Clinical Findings & Indications for Studies
Complications

Urinary extravasation from renal fracture may show as an expanding mass (urinoma) in the retroperitoneum.

Clinical Findings & Indications for Studies
Complications

A resolving retroperitoneal hematoma may cause slight fever (38.3 °C), but higher temperatures suggest infection.

Clinical Findings & Indications for Studies
Complications

Late Complications

Hypertension, hydronephrosis, arteriovenous fistula, calculus formation, and pyelonephritis are important late complications.

Clinical Findings & Indications for Studies
Complications

Heavy late bleeding may occur 4 weeks after injury.

Clinical Findings & Indications for Studies

Treatment: Emergency Measures

The objectives of early management are prompt treatment of shock and hemorrhage, complete resuscitation, and evaluation of associated injuries.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

Blunt Injuries

Bleeding stops spontaneously with bed rest and hydration.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

Cases in which operation is indicated include those associated with persistent retroperitoneal bleeding, urinary extravasation, evidence of nonviable renal parenchyma, and renal pedicle injuries (less than 5% of all renal injuries). Aggressive preoperative staging allows complete definition of injury before operation.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

Penetrating Injuries

Penetrating injuries should be surgically explored.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

In 80% of cases of penetrating injury, associated organ injury requires operation; thus, renal exploration is only an extension of this procedure.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

Treatment of Complications

Hydronephrosis may require surgical correction or nephrectomy.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

Prognosis

With careful follow-up, most renal injuries have an excellent prognosis, with spontaneous healing and return of renal function.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

Injuries to the Ureter

Ureteral injury is rare but may occur, usually during the course of a difficult pelvic surgical procedure or as a result of gunshot wounds.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

Etiology

Large pelvic masses (benign or malignant) may displace the ureter laterally and engulf it in reactive fibrosis.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

Extensive carcinoma of the colon may invade areas outside the colon wall and directly involve the ureter; thus, resection of the ureter may be required along with resection of the tumor mass.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

Devascularization may occur with extensive pelvic lymph node dissections or after radiation therapy to the pelvis for pelvic cancer.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

Endoscopic manipulation of a ureteral calculus with a stone basket or ureteroscope may result in ureteral perforation or avulsion.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

Pathogenesis & Pathology

The ureter may be inadvertently ligated and cut during difficult pelvic surgery.

Clinical Findings & Indications for Studies

Treatment: Surgical Measures

Intraperitoneal extravasation of urine can also occur, causing ileus and peritonitis.

Clinical Findings

Symptoms

If the ureter has been completely or partially ligated during operation, the postoperative course is usually marked by fever of 38.3-38.8 °C as well as flank and lower quadrant pain.

Clinical Findings

Symptoms

Ureteral injuries from external violence should be suspected in patients who have sustained stab or gunshot wounds to the retroperitoneum.

Clinical Findings

Symptoms

Signs

The acute hydronephrosis of a totally ligated ureter results in severe flank pain and abdominal pain with nausea and vomiting early in the postoperative course and with associated ileus. Signs and symptoms of acute peritonitis may be present if there is urinary extravasation into the peritoneal cavity.

Clinical Findings

Symptoms

Watery discharge from the wound or vagina may be identified as urine by determining the creatinine concentration of a small urine has many times the creatinine concentration found in serum and by intravenous injection of 10 mL of indigo carmine, which will appear in the urine as dark blue.

Laboratory Findings

Ureteral injury from external violence is manifested by microscopic hematuria in 90% of cases.

Imaging Findings

Diagnosis is by excretory urography.

Imaging Findings

Partial transection of the ureter results in more rapid excretion, but persistent hydronephrosis is usually present, and contrast extravasation at the site of injury is noted on delayed films.

Imaging Findings

In acute injury from external violence, the excretory urogram usually appears normal, with very mild fullness down to the point of extravasation at the ureteral transection.

Retrograde ureterography demonstrates the exact site of obstruction or extravasation.

Ultrasonography

Ultrasonography outlines hydroureter or urinary extravasation as it develops into a urinoma and is perhaps the best means of ruling out ureteral injury in the early postoperative period.

Radionuclide Scanning

Radionuclide scanning demonstrates delayed excretion on the injured side, with evidence of increasing counts owing to accumulation of urine in the renal pelvis.

Differential Diagnosis

Postoperative bowel obstruction and peritonitis may cause symptoms similar to those of acute ureteral obstruction from injury.

Differential Diagnosis

Deep wound infection must be considered postoperatively in patients with fever, ileus, and localized tenderness.

Differential Diagnosis

Acute pyelonephritis in the early postoperative period may also result in findings similar to those of ureteral injury.

Complications

Ureteral injury may be complicated by stricture formation with resulting hydronephrosis in the area of injury.

Treatment

Prompt treatment of ureteral injuries is required. The best opportunity for successful repair is in the operating room when the injury occurs.

Treatment

Proximal urinary drainage by percutaneous nephrostomy or formal nephrostomy should be considered if the injury is recognized late or if the patient has significant complications that make immediate reconstruction unsatisfactory.

Treatment

The goals of ureteral repair are to achieve complete debridement, a tension-free spatulated anastomosis, watertight closure, ureteral stenting (in selected cases), and retroperitoneal drainage.

Lower Ureteral Injuries

Injuries to the lower third of the ureter allow several options in management.

Lower Ureteral Injuries

An antireflux procedure should be done when possible.

Lower Ureteral Injuries

Transureteroureterostomy may be used in lower-third injuries if extensive urinoma and pelvic infection have developed.

Midureteral Injuries

Midureteral injuries usually result from external violence and are best repaired by primary ureteroureterostomy or transureteroureterostomy.

Upper Ureteral Injuries

Injuries to the upper third of the ureter are best managed by primary ureteroureterostomy.

Stenting

Most anastomoses after repair of ureteral injury should be stented.

Stenting

After 3-4 weeks of healing, stents can be endoscopically removed from the bladder.

Prognosis

The prognosis for ureteral injury is excellent if the diagnosis is made early and prompt corrective surgery is done.

Injuries to the Bladder

Bladder injuries occur most often from external force and are often associated with pelvic fractures.

Injuries to the Bladder

Iatrogenic injury may result from gynecologic and other extensive pelvic procedures as well as from hernia repairs and transurethral operations.

Injuries to the Bladder

Pathogenesis & Pathology

The bony pelvis protects the urinary bladder very well. When the pelvis is fractured by blunt trauma, fragments from the fracture site may perforate the bladder .

Injuries to the Bladder
Pathogenesis & Pathology

When the bladder is filled to near capacity, a direct blow to the lower abdomen may result in bladder disruption.

Injuries to the Bladder
Pathogenesis & Pathology

If the diagnosis is not established immediately and if the urine is sterile, no symptoms may be noted for several days.

Injuries to the Bladder
Clinical Findings

Pelvic fracture accompanies bladder rupture in 90% of cases.

Injuries to the Bladder
Symptoms

There is usually a history of lower abdominal trauma.

Injuries to the Bladder

Signs

Heavy bleeding associated with pelvic fracture may result in hemorrhagic shock, usually from venous disruption of pelvic vessels.

Injuries to the Bladder

Signs

An acute abdomen may occur with intraperitoneal bladder rupture.

Injuries to the Bladder
Laboratory Findings

Catheterization usually is required in patients with pelvic trauma but not if bloody urethral discharge is noted.

Injuries to the Bladder
Laboratory Findings

When catheterization is done, gross or, less commonly, microscopic hematuria is usually present.

Injuries to the Bladder

X-Ray Findings

A plain abdominal film generally demonstrates pelvic fractures.

Injuries to the Bladder

X-Ray Findings

Bladder disruption is shown on cystography.

Injuries to the Bladder

X-Ray Findings

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.

Injuries to the Bladder

X-Ray Findings

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.

Injuries to the Bladder

X-Ray Findings

Incomplete distention with consequent missed diagnosis of bladder rupture often occurs when the urethral catheter is clamped during standard abdominal CT scan with intravenous contrast injection.

Injuries to the Bladder

Complications

A pelvic abscess may develop from extraperitoneal bladder rupture; if the urine becomes infected, the pelvic hematoma becomes infected too.

Injuries to the Bladder

Complications

Partial incontinence may result from bladder injury when the laceration extends into the bladder neck.

Injuries to the Bladder

Treatment

Emergency Measures

Shock and hemorrhage should be treated.

Injuries to the Bladder

Treatment

Surgical Measures

A lower midline abdominal incision should be made.

Injuries to the Bladder

Treatment

The bladder should be opened in the midline and carefully inspected.

Injuries to the Bladder

Treatment

Extraperitoneal Bladder Rupture

Extraperitoneal bladder rupture can be successfully managed with urethral catheter drainage only.

Injuries to the Bladder

Treatment

As the bladder is opened in the midline, it should be carefully inspected and lacerations closed from within.

Injuries to the Bladder

Treatment

Extraperitoneal bladder lacerations occasionally extend into the bladder neck and should be repaired meticulously

Injuries to the Bladder

Treatment

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.

Injuries to the Bladder

Treatment

The bladder is then closed in separate layers by absorbable suture.

Injuries to the Bladder

Treatment

Pelvic Fracture

Stable fracture of the pubic rami is usually present.

Injuries to the Bladder

Treatment

Pelvic Hematoma

There may be heavy uncontrolled bleeding from rupture of pelvic vessels even if the hematoma has not been entered at operation.

Injuries to the Bladder

Treatment

If bleeding persists, it may be necessary to leave the tapes in place for 24 h and operate again to remove them.

Injuries to the Bladder

Treatment

Prognosis

With appropriate treatment, the prognosis is excellent.

Injuries to the Bladder

Treatment

Patients with lacerations extending into the bladder neck area may be temporarily incontinent, but full control is usually regained.

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.

Injuries to the Urethra

Various parts of the urethra may be lacerated, transected, or contused.

Injuries to the Posterior Urethra

Etiology

The membranous urethra passes through the pelvic floor and voluntary urinary sphincter and is the portion of the posterior urethra most likely to be injured.

Injuries to the Posterior Urethra

The urethra can be transected by the same mechanism at the interior surface of the membranous urethra.

Injuries to the Posterior Urethra
Clinical Findings

Symptoms

Patients usually complain of lower abdominal pain and inability to urinate.

Injuries to the Posterior Urethra
Clinical Findings

Signs

Blood at the urethral meatus is the single most important sign of urethral injury.

Injuries to the Posterior Urethra

Clinical Findings

The presence of blood at the external urethral meatus indicates that immediate urethrography is necessary to establish the diagnosis.

Injuries to the Posterior Urethra

Clinical Findings

Suprapubic tenderness and the presence of pelvic fracture are noted on physical examination.

Injuries to the Posterior Urethra
Clinical Findings

Rectal examination may reveal a large pelvic hematoma with the prostate displaced superiorly.

Injuries to the Posterior Urethra
Clinical Findings

Superior displacement of the prostate does not occur if the puboprostatic ligaments remain intact.

Injuries to the Posterior Urethra

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.

Injuries to the Posterior Urethra

X-Ray Findings

Ordinarily, there is free extravasation of contrast material into the perivesical space.

Injuries to the Posterior Urethra

Instrumental Examination

The only instrumentation involved should be for urethrography.

Injuries to the Posterior Urethra
Differential Diagnosis

Bladder rupture may be associated with posterior urethral injuries in approximately 20% of cases.

Injuries to the Posterior Urethra

Complications

Stricture, impotence, and incontinence as complications of prostatomembranous disruption are among the most severe and debilitating mishaps that result from trauma to the urinary system.

Injuries to the Posterior Urethra

Complications

Stricture following primary repair and anastomosis occurs in about 50% of cases.

Injuries to the Posterior Urethra

Complications

The incidence of impotence after primary repair is 30-80% (mean, about 50%).

Injuries to the Posterior Urethra

Treatment

Emergency Measures

Shock and hemorrhage should be treated.

Injuries to the Posterior Urethra

Treatment

Surgical Measures

Urethral catheterization should be avoided.

Injuries to the Posterior Urethra

Treatment

Immediate Management

Initial management should consist of suprapubic cystostomy to provide urinary drainage.

Injuries to the Posterior Urethra

Treatment

The bladder often is distended by a large volume of urine accumulated during the period of resuscitation and operative preparation.

Injuries to the Posterior Urethra

Treatment

The bladder should be opened in the midline and carefully inspected for lacerations.

Injuries to the Posterior Urethra

Treatment

This approach involves no urethral instrumentation or manipulation.

Injuries to the Posterior Urethra

Treatment

Incomplete laceration of the posterior urethra heals spontaneously, and the suprapubic cystostomy can be removed within 2-3 weeks.

Injuries to the Posterior Urethra

Treatment

Delayed Urethral Reconstruction

Reconstruction of the urethra after prostatic disruption can be undertaken within 3 months, assuming there is no pelvic abscess or other evidence of persistent pelvic infection

Injuries to the Posterior Urethra

Treatment

This stricture usually is 1 -2 cm long and situated immediately posterior to the pubic bone.

Injuries to the Posterior Urethra

Treatment

A 16F silicone urethral catheter should be left in place along with a suprapubic cystostomy.

Injuries to the Posterior Urethra

Treatment

Immediate Urethral Realignment

Some surgeons prefer to realign the urethra immediately.

Injuries to the Posterior Urethra

Treatment

General Measures

After delayed reconstruction by a perineal approach, patients are allowed ambulation on the first postoperative day and usually can be discharged within 3 days.

Injuries to the Posterior Urethra

Treatment

Treatment of Complications

Approximately 1 month after the delayed reconstruction, the urethral catheter can be removed and a voiding cystogram obtained through the suprapubic cystostomy tube.

Injuries to the Posterior Urethra

Treatment

If the cystogram shows a patent area of reconstruction free of extravasation, the suprapubic catheter can be removed; if there is extravasation or stricture, suprapubic cystostomy should be maintained.

Injuries to the Posterior Urethra

Treatment

Stricture, if present (< 5%), is usually very short, and urethrotomy under direct vision offers easy and rapid cure.

Injuries to the Posterior Urethra

Treatment

The patient may be impotent for several months after delayed repair.

Injuries to the Posterior Urethra

Treatment

Incontinence after posterior urethral rupture and delayed repair is rare (< 2%) and is usually related to the extent of injury rather than to the repair.

Injuries to the Posterior Urethra

Treatment

Prognosis

If complications can be avoided, the prognosis is excellent.

Injuries to the Anterior Urethra

Etiology

The anterior urethra is the portion distal to the urogenital diaphragm.

Injuries to the Anterior Urethra
Pathogenesis & Pathology

Contusion

Contusion of the urethra is a sign of crush injury without urethral disruption.

Injuries to the Anterior Urethra
Pathogenesis & Pathology

Laceration

A severe straddle injury may result in laceration of part of the urethral wall, allowing extravasation of urine.

Injuries to the Anterior Urethra
Clinical Findings

Symptoms

There is usually a history of a fall, and in some cases a history of instrumentation. Bleeding from the urethra is usually present

Injuries to the Anterior Urethra
Clinical Findings

If voiding has occurred and extravasation is noted, sudden swelling in the area will be present. If diagnosis has been delayed, sepsis and severe infection may be present.

Injuries to the Anterior Urethra
Clinical Findings

Signs

The perineum is very tender, and a mass may be found. Rectal examination reveals a normal prostate. The patient usually has a desire to void, but voiding should not be allowed until assessment of the urethra is complete.

Injuries to the Anterior Urethra
Clinical Findings

No attempt should be made to pass a urethral catheter, but if the patient's bladder is overdistended, percutaneous suprapubic cystostomy can be done as a temporary procedure.

Injuries to the Anterior Urethra
Clinical Findings

When presentation of such injuries is delayed, there is massive urinary extravasation and infection in the perineum and the scrotum.

Injuries to the Anterior Urethra
Laboratory Findings

Blood loss is not usually excessive, particularly if secondary injury has occurred.

Injuries to the Anterior Urethra
X-Ray Findings

A contused urethra shows no evidence of extravasation.

Injuries to the Anterior Urethra

Complications

Heavy bleeding from the corpus spongiosum injury may occur in the perineum as well as through the urethral meatus.

Injuries to the Anterior Urethra

Complications

The complications of urinary extravasation are chiefly sepsis and infection.

Injuries to the Anterior Urethra

Complications

Stricture at the site of injury is a common complication, but surgical reconstruction may not be required unless the stricture significantly reduces urinary flow rates.

Injuries to the Anterior Urethra

Treatment

General Measures

Major blood loss usually does not occur from straddle injury.

Injuries to the Anterior Urethra

Treatment

Specific Measures: Urethral Contusion

The patient with urethral contusion shows no evidence of extravasation, and the urethra remains intact.

Injuries to the Anterior Urethra

Treatment

Urethral Lacerations

Instrumentation of the urethra following urethrography should be avoided.

Injuries to the Anterior Urethra

Treatment

If only minor extravasation is noted on the urethrogram, a voiding study can be performed within 7 days after suprapubic catheter drainage to search for extravasation.

Injuries to the Anterior Urethra

Treatment

Most of these strictures are not severe and do not require surgical reconstruction

Injuries to the Anterior Urethra

Treatment

Urethral Laceration with Extensive Urinary Extravasation

After major laceration, urinary extravasation may involve the perineum, scrotum, and lower abdomen.

Injuries to the Anterior Urethra

Treatment

Immediate Repair

Immediate repair of urethral lacerations can be performed, but the procedure is difficult and the incidence of associated stricture is high

Injuries to the Anterior Urethra

Treatment

Treatment of Complications

Strictures at the site of injury may be extensive and require delayed reconstruction.

Injuries to the Anterior Urethra

Treatment

Prognosis

Urethral stricture is a major complication but in most cases does not require surgical reconstruction.

Injuries to the Penis

Disruption of the tunica albuginea of the penis (penile fracture) can occur during sexual intercourse.

Injuries to the Penis

Gangrene and urethral injury may be caused by obstructing rings placed around the base of the penis

Injuries to the Penis

Injuries to the penis should suggest possible urethral damage, which should be investigated by urethrography.

Injuries to the Scrotum

Superficial lacerations of the scrotum may be debrided and closed primarily. Blunt trauma may cause local hematoma and ecchymosis, but these injuries resolve without difficulty. One must be certain that testicular rupture has not occurred.

Injuries to the Scrotum

Total avulsion of the scrotal skin may be caused by machinery accidents or other major trauma. The testes and spermatic cords are usually intact.

Injuries to the Scrotum

Later reconstruction of the scrotum can be done with a skin graft or thigh flap.

Thank you for your attention!!!