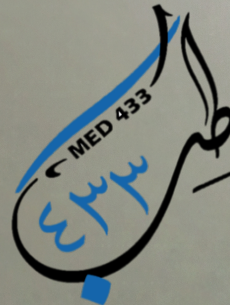


# Urological Emergencies



Surgery Team  
MED 433





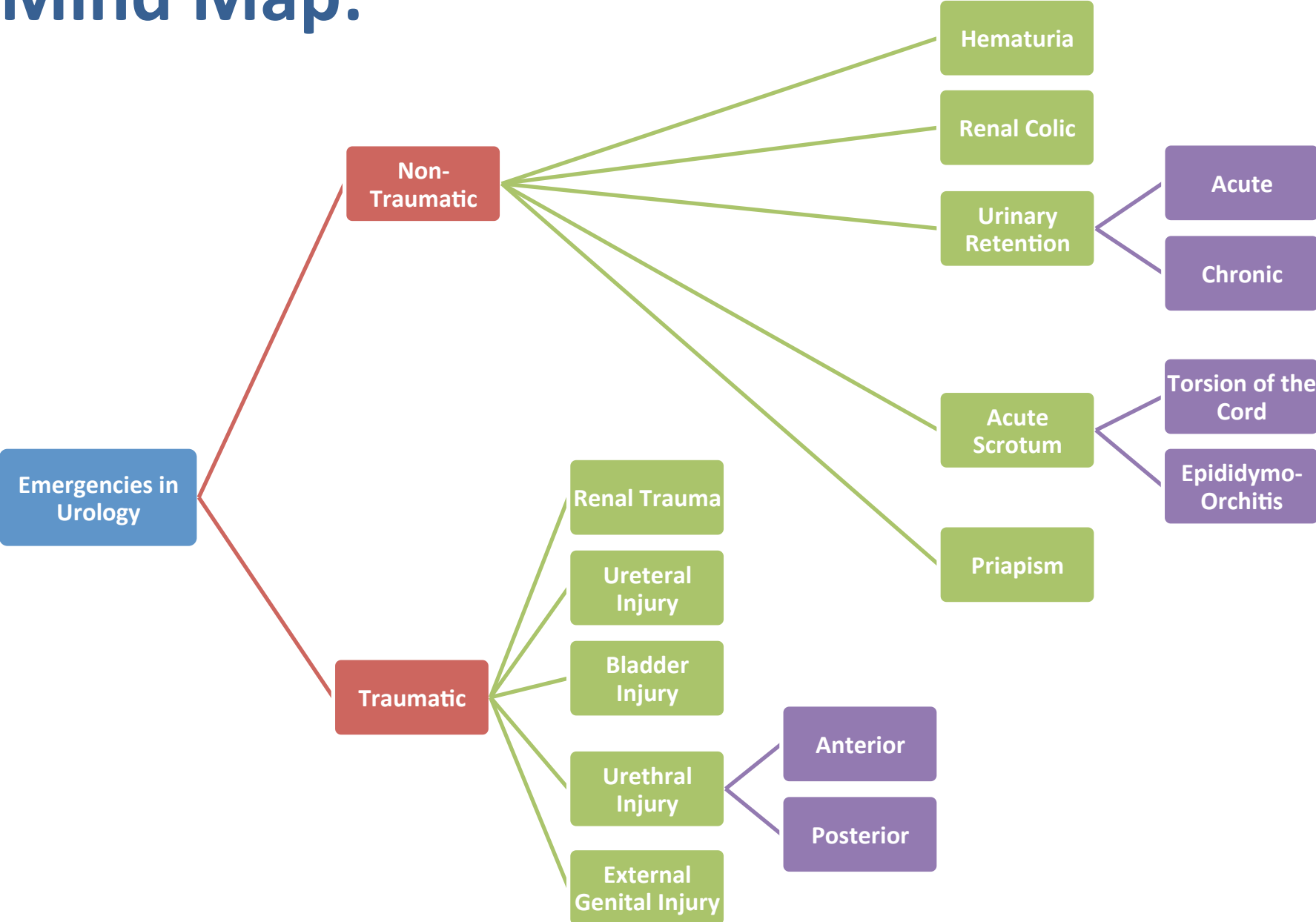
# Objectives :

- Hematuria
- **Upper Urinary Tract (Kidney And Ureter):**
  - ✓ Trauma
  - ✓ Renal and ureteric calculi
- **Lower Urinary Tract (Bladder, Prostate And Urethra):**
  - ✓ Trauma
- **External Genitalia**
  - ✓ Anatomy
  - ✓ Physiology
  - ✓ **Disorder of Erection (impotence):**
    - Priapism
    - Peyronie's disease
  - ✓ Torsion of the testis
  - ✓ Epididymo-orchitis
  - ✓ Hydrocoele
  - ✓ Cyst of the epididymis
  - ✓ Varicocoele

**Sources :** Slides, Raslan's Notebook, Principles & Practice of Surgery by: O. James Garden

**Color Index :** Slides & Raslan's | Textbook | [Doctor's Notes](#) | Extra Explanation

# Mind Map:





# 1<sup>st</sup> : Non-Traumatic Urological Emergencies



## 1- Hematuria: (Blood in the urine)

Types	Causes
<p>1. <b>Gross: (emergency) Clinically visible</b> (if 1 ml of blood is present in 1 liter of urine). Up to 40% is malignancy.</p> <p>2. <b>Microscopic: (Not an emergency)</b> Seen under microscope ( 3 or more RBC/high power field ).</p> <div data-bbox="633 258 909 525" style="border: 1px solid gray; padding: 5px; margin: 10px 0;"> <p>Gross hematuria is malignancy unless proved otherwise</p> </div>	<p>★ vary according to <b>Age, Symptoms, Risk factors, Type</b> (gross/microscopic).</p> <ol style="list-style-type: none"> <li><b>Pre renal:</b> SLE, Sickle cell disease, hemophilia, Coagulopathy, <b>Anticoagulants</b> (Warfarine)</li> <li><b>Renal:</b> Tumors, renal stasis, stone, TB, Glumerulonephritis.</li> <li><b>Post Renal:</b> Tumors (bladder or ureter), Bilharzias, prostate pathology, urethral stricture, urethral polyp/tumor.</li> </ol>

History	Management
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<ul style="list-style-type: none"> <li><b>Age:</b> <b>Children=</b> Urithral Carcinoma, glomerular origin, con genital urinary tract abnormality. <b>Adult=</b> Transitional Cell Carcinoma.</li> <li><b>Residency:</b> Bilharzias is common in Jizan</li> <li><b>Duration.</b></li> <li><b>Occupation:</b> Painting &amp; Tires factories use aniline dye → Transitional cell carcinoma</li> <li><b>Pain:</b> <b>1- Painless:</b> Transitional cell carcinoma (<b>Smoking is greatest risk factor</b>) <b>2- Painful:</b> Stones, UTI, Trauma.</li> <li><b>Timing:</b> <ol style="list-style-type: none"> <li><b>Initial:</b> urethra, prostate.</li> <li><b>Terminal:</b> bladder neck or trigone (Because at end of micturition bladder squeezed causing bleeding)</li> <li><b>Total:</b> rest of the bladder and upper tract</li> </ol> </li> <li><b>Drugs and Food (Drugs:</b> Rifampicine, Phenazopyridine... <b>Food:</b> beetroot) → </li> <li><b>Family history</b> of malignancy or hematological disease</li> <li><b>Associated urinary and other systemic symptoms,</b></li> <li><b>Amount of bleeding, Clots and shape, trauma and history of bleeding from other sites</b></li> </ul> <div data-bbox="1375 905 1580 1110" style="border: 1px solid gray; padding: 5px; margin: 10px 0;"> <p>What can cause gross hematuria with a dipstick negative for blood? <i>Think:</i> Anthocyanin dye in beets and berries, pyridium, rifampin, porphyria, some food colorings.</p> </div>	<ol style="list-style-type: none"> <li>Full work up.</li> <li>History.</li> <li>Examination.</li> <li><b>3 Way Urethral Catheter:</b> to wash out heavy bleeding.</li> <li><b>Threat underlying cause.</b></li> </ol> 
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# 2- Renal Colic

History	<ul style="list-style-type: none"> <li>Sudden severe colicky* pain, radiate from flank to groin.</li> <li>Associated with <b>Nausea &amp; Vomiting</b></li> <li>Pain is reduced by analgesia (NSAID)</li> <li>Patient is uncomfortable and rolling around (try to find position to reduce pain but can't. opposite to appendicitis, where patient is calm –because movement increase pain-)</li> </ul> <ul style="list-style-type: none"> <li>• <b>Commonest urological emergency</b></li> <li>• <b>Commonest DDX associated with acute abdomen</b></li> </ul>	
Differential Diagnosis	<ul style="list-style-type: none"> <li>• <b>Radiculitis</b> : Musculoskeletal pain due to irritation of intervertebral nerve roots. Radiate to lower limbs.</li> <li>• <b>Chest : Pneumonia, MI.</b></li> <li>• <b>Abdominal</b> : Aortic aneurysm rupture, appendicitis, IBD, bowel obstruction...</li> <li>• <b>Pelvic</b> : Ectopic pregnancy, ovarian pathology.</li> <li>• <b>Testicular torsion.</b></li> </ul>	
Investigations	<ul style="list-style-type: none"> <li>• <b>History &amp; Examination.</b> (Fever : Indicate super-infection)</li> <li>• <b>Pregnancy test</b> (to exclude ectopic pregnancy)</li> <li>• <b>Mid-stream urine</b> (Check for hematuria &amp; urine analysis)</li> <li>• <b>CT without contrast is the modality of choice</b> (High specificity 95% &amp; sensitivity 97%, detect all kinds of stones)</li> <li>• <b>Intravenous Urogram (IVP).</b> • <b>KUB</b> (Kidney-Ureter-Bladder X-ray).</li> <li>• <b>Ultrasound.</b></li> <li>• <b>MRI</b> (Very accurate in stones, but expensive/Time-consuming. <b>Used in case the patient is pregnant</b>)</li> </ul>	
Management	<b>Medical:</b>	<b>Surgical:</b>
	<ul style="list-style-type: none"> <li>• <b>Pain relief:</b> NSAID *Voltaren* preferably suppository. ± Morphine.</li> <li>• <b>Hyper hydration</b> *IV / water* (95% of stones &lt;5 mm will pass on their own)</li> </ul>	<p><b>Indication Of Surgery:</b></p> <ul style="list-style-type: none"> <li>• Relieve obstruction.</li> <li>• Pain failed to respond to analgesic</li> <li>• Associated fever (Risk of pyelonephritis)</li> <li>• Impaired renal function because of stone.</li> <li>• Obstruction unrelieved (for &gt;4 weeks)</li> <li>• Personal and occupational reasons (Doctor or pilot)</li> </ul> <p><b>Types Of Surgical Interventions:</b></p> <ul style="list-style-type: none"> <li>★ <b>Temporary Relieve Of Obstruction:</b></li> <li><b>1. JJ Stent</b> (from renal pelvis to bladder)</li> <li><b>2. Percutaneous Nephrostomy Tube.</b></li> <li>★ <b>Definitive Treatment:</b></li> <li><b>3. Extracorporeal ShockWave Lithotripsy (ESWL)</b></li> <li><b>4. Percutaneous Nephrolithotomy (PNCL)</b></li> <li><b>5. Uretroscope</b></li> <li><b>6. Laparoscopic or open surgery</b></li> </ul>

\*Colicky pain: is a characteristic pain of hollow viscus organs (muscular organs that have a lumen inside e.g. colon, ureter, bile duct..). When obstruction occur, this organs increase contractions trying to relief obstruction causing relapsing-remitting pain (increased and decreased repeatedly)

# 3- Urinary Retention

## Acute Retention

## Chronic Retention

- Painful inability to pass urine, with relief of pain following drainage of the bladder by catheterization.
- (Men>Women)

- Obstruction develops slowly and the bladder is distended very gradually over weeks/months (**Painless**)
- Can be associated with: **Impaired Renal Function, Hydronephrosis.**

### Causes

<p><b>Men:</b></p> <ul style="list-style-type: none"> <li>• Benign Prostatic Hypertrophy (BPH) <b>*Commonest cause*</b> (usually in men &gt; 40 years )</li> <li>• Carcinoma and abscess of the prostate.</li> <li>• Urethral stricture</li> </ul>
<p><b>Women (rare):</b></p> <ul style="list-style-type: none"> <li>• Pelvic organ prolapsed (cystocele, rectocele, uterine prolapse)</li> <li>• Urethral stricture or diverticulum</li> <li>• Post surgery for stress incontinence</li> <li>• Pelvis masses (e.g. Ovarian mass)</li> </ul>

### Presentation

- **Urinary dribbling.**
- **Overflow incontinence** (due to increased pressure inside the bladder)
- Palpable bladder with no pain.



### Management

- ★ **Initially..** to relieve the pain:
  - **Urethral Catheterization** (using 3 ways, or Foley's catheter)
  - Supra-pubic catheter (used if urethral catheter can't be assessed)
- ★ **Definitive treatment: Treat underlying cause**

- More difficult than acute retention (because the cause could be neurological)
- Renal support and treat electrolyte imbalance.
- **Bladder drainage in a slow rate** to avoid sudden decompression (can cause Hematuria)
- **Treatment of the underlying cause.**

# 4- Acute Scrotum (A.K.A Scrotal or Testicular pain)

- Torsion of the cord can occur where the visceral layer of the Tunica Vaginalis completely covers the testis so that it lies suspended within the parietal layer
- Emergency situation need fast evaluation, deferential diagnosis, and potential **immediate surgical exploration**.

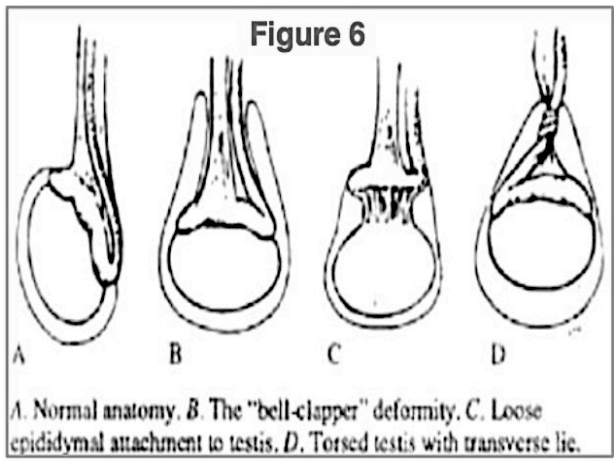
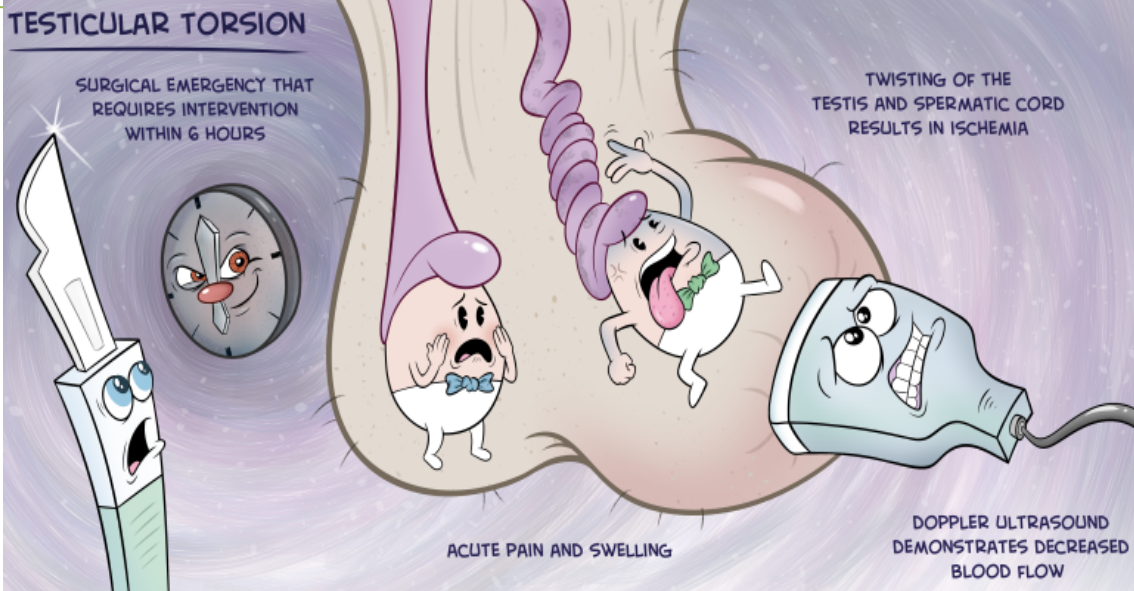
( Another differentials, Just go through them)

- Box 1**
- Torsion of the spermatic cord
  - Torsion of the appendix testis
  - Epididymitis
  - Epididymo-orchitis
  - Inguinal hernia
  - Communicating hydrocele
  - Hydrocele
  - Hydrocele of the cord
  - Trauma/insect bite
  - Dermatologic lesion
  - Inflammatory vasculitis (Henoch-Schonlein purpura)
  - Idiopathic scrotal edema
  - Tumor
  - Spermatocele
  - Non-urogenital pathology e.g. adductor tendinitis

- ★ **Differential diagnosis:** These two are the commonest, we will take them in details:
  1. **Torsion Of Spermatic Cord** (commonest in early puberty and the most serious)
  2. **Epididymitis** (commonest cause in adult)

## A) Torsion Of The Spermatic Cord

- **Commonest in teenagers (12-18 years old)**, possible in children, unlikely to occur after the age of 25 years
- Torsion is more common in patients with **anatomical abnormalities** (see Figure 6 )
- ★ **Pathophysiology:** Twisting of spermatic cord → Occlusion of venous return → Swelling and Blockage of arterial supply → Ischemia.
- Testicular parenchyma will develop irreversible ischemia injury as soon as **6 hours**.
- As duration of torsion is increased, possibility of testicular salvage decrease.
- **Surgical emergency of the highest order** – if the clinical suspicion is high, No need to do any investigation, take the patient to the OR for surgical exploration immediately.





## A) Torsion Of The Spermatic Cord

### Presentation

- **Acute onset of scrotal pain**, sharp and severe, may be intermittent due to torsion and de-torsion (rod twist then come back to normal spontaneously)
- History of prior episode of severe self-limited scrotal pain or history of minor trauma.
- Pain referred to lower **Ipsilateral Quadrant Of Abdomen**.
- Nausea and vomiting (with abdominal pain could be the only presentation in children) → **child with this symptoms, always do genital examination.**
- Dysuria and other bladder symptoms are absent (unlike Epididymo-orchitis)

### Physical Examination

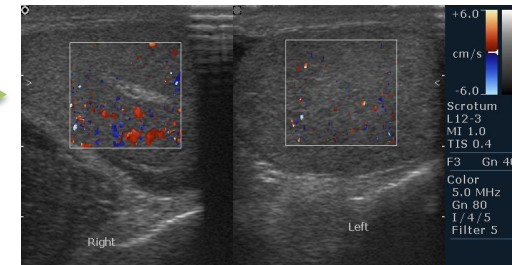
- Affected testis is higher and lying transverse (Twisting elevate the testis).
- Acute swelling and scrotal edema. (it is usually too tender to palpate)
- **Absent Cremasteric Reflex** (most accurate sign of torsion)
- Testis is **tender and larger**.
- **Elevation of the scrotum causes more pain** (unlike Epididymo-orchitis)



- Usually we don't need investigations if there is high clinical suspicion, **send the patient to the OR immediately for surgical exploration.**
- Tests are usually used to **confirm the absence of torsion:**

### Investigations

1. **Color Doppler Ultrasound:** →
  - **Investigation of choice.**
  - Assess the anatomy and determining the presence or absence of blood flow.
2. **Radionuclide Imaging:**
  - Assesses testicular blood flow and function.
  - False impression from hyperemia of scrotal wall.
3. **Surgical Exploration:**
  - **Diagnostic and therapeutic**, a scrotal incision is done and the affected site is examined → if torsion is exist, untwist the testis and fix it to the scrotum → also, fix the contralateral testis (Because it's prone to torsion)



## B) Epididymo-Orchitis:

Epididymitis was also detailed in "Adult Urinary Track Disorders".



- **Inflammation of the epididymis and testis.** The spermatic cord is also often thickened (**Funiculitis**).
- **Common in KSA** (can be a manifestation of Brucella).
- Indolent process with gradual increase in severity with time (unlike torsion, which is sudden).
- Scrotal swelling, erythema and pain. Commonly With **Fever and Dysuria**.
- The usual cause of Epididymo-orchitis is **bacterial spread**, either from infected urine (UTI) or from Gonococcal urethritis (STDs).

### Physical Examination

- **Swollen epididymis** or massive swollen Hemi-scrotum, with **localized tenderness**.
- Cremasteric reflex is **present**.
- Less pain when testis is elevated
- ★ **Urine Analysis:** Bacteruria and WBCs.

} **opposite to torsion of the spermatic cord**

### Management

- **Bed rest for 1-3 days**, with scrotal elevation by using athletic supporter.
- parenteral antibiotic therapy should be instituted **when UTI is documented or suspected**.
- Avoid urethral instrumentation (to reduce risk of more infection).



Very useful comparison between Torsion and Epididymo-Orchitis:

	Epididymitis	Torsion
<b>Onset</b>	Gradual	Acute
<b>Phren sign (relief of pain with scrotal elevation)</b>	+	-
<b>Urinary symptoms</b>	+	-
<b>Cremasteric reflex</b>	+	-
<b>Urinalysis</b>	Pyuria	Normal
<b>Diagnosis</b>	Ultrasound	Clinical/Ultrasound
<b>Treatment</b>	Antibiotics	Surgery

# 5- Priapism:

Persistent erection of the penis for more than 4 hours that is **not related or accompanied by sexual desire.**

## Causes and Types

1. **Primary:** Idiopathic (30-50%).
2. **Secondary:**
  - A. **Ischemic: (Veno-occlusive, low flow) -Most Common-** (see the box below)
    - **Painful**
    - ★ **Pathophysiology:** thrombosis of penile venous system causing congestion and engorgement of penis which lead to persistent erection.
    - ★ **Causes:** hematological diseases (**Sickle cell**), malignancy infiltrating corpora, drugs like prostaglandin injection. (Self intra-corporal injections are the commonest cause)
  - B. **Non-Ischemic: (Arterial, high flow)**
    - **Painless**
    - ★ **Pathophysiology:** trauma leading to arterio-venous fistula which fill the corpora.

## Diagnosis

- **Obvious from the history!**
  - Erection for >4 hours? painful or not? predisposing factors?
- **Examination:**
  - Tender penis? (low flow type), abdominal exam for evidence of malignancy.
  - Characteristically, **corpora cavernosa are rigid and glans is flaccid.**
  - Digital Rectal Exam, to examine prostate and **check for anal tone** (Neurological assessment)

## Investigations

- CBC, Hemoglobin Electrophoresis (for sickle cell), Urine Analysis.
- **Blood Gases Taken From Either Corpora:** (Low flow: dark blood, pH: <7.25) (High flow: Bright blood, pH: >7.4)
- **Color Doppler:** (Ischemic: low blood flow)(Non-Ischemic: High blood flow)
- **Penile Pudendal Arteriography:** in cases of trauma

## Treatment

- Depend on cause :**Treat underlying cause**
- ✓ **Conservative:** should first be tried.
  - ✓ **Medical:** Intra-cavernosal injections of **Vasoconstrictors** (phenylephrine), bicarbonate, cold enema.
  - ✓ **Surgery:** aspiration and saline wash of corpora

- Penis is inflated with arterial blood during erection, and drained by veins that keep the erection constant and reasonable.
- If veins occluded in **Veno-occlusive** type, penis will be congested with blood that can't be drained through veins → erection persist.
- In **Arterial** type, arteriovenous fistula is made through trauma → arterial blood is filling both arteries and veins, so both arteries and veins are filling penis without drainage → erection persist



## 6. Hydrocoele

- **Definition:** fluid collects in the Tunica Vaginalis, resulting in an enlarged but painless scrotum.
- This is a common condition, especially in older men.
- **On Examination** of the scrotum, a normal spermatic cord can be palpated above a smooth oval swelling. Typically, an idiopathic hydrocoele transilluminates.
- If there is any doubt about the diagnosis, then an ultrasound should be performed.
- **Management:**
  - **Surgical Excision** and eversion (**Jaboulay's procedure**) is associated with a much lower recurrence rate.
  - If the hydrocoele fluid becomes infected, incision and drainage of the pus is necessary.

## 8. Varicocoele

- **Definition:** The veins of the pampiniform plexus are dilated and tortuous, producing a swelling in the line of the spermatic cord that resembles a 'bag of worms'
- It is more common on the left side.
- In some men, varicocoele is associated with infertility
- **Management :**
  - ligation of the spermatic vein, which may be done surgically (open or laparoscopically) at the internal inguinal ring.
  - Alternatively, the feeding veins can be obliterated radiologically by means of coil embolization.

## 7. Cyst Of The Epididymis

- **Definition:** Cysts in the epididymis arise from diverticula of the vasa efferentia.
- Epididymal cysts are almost always multiple and, therefore, **nodular on palpation**; they are located above and behind the testis, which is palpably separate from the cysts, and always transilluminate brightly.
- **Management:**
  - It is best to leave these cysts alone unless increasing size warrants excision. Careful dissection is needed to remove the cyst completely.
  - Often several other little cysts are present which, if not removed, will eventually increase in size and produce a so-called recurrence.
  - Bilateral operations can result in sterility

## 9. Peyronie's Disease

- **Definition:** This is the occurrence of a hard fibrous plaque (or plaques) in the wall of a corpus cavernosum, causing curvature of the penis.
- **Causes :** The cause is obscure but is possibly related to trauma, leading to the formation of hard scar tissue.
- **Clinical Features:** pain during intercourse.
- **Management:**
  - cortisone injections, vitamins and radiotherapy
  - Excision of the plaque and replacement by a dermal patch graft, or excision of a wedge of tissue on the convex (opposite) border of the penis, may be effective

# 2<sup>nd</sup> :Traumatic Urological Emergencies



## 1- Renal Injuries

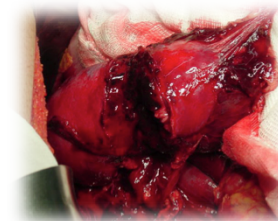
- The kidneys relatively protected from traumatic injuries.
- Considerable degree of force is usually required to injure a kidney.

### Mechanisms And Causes

1. **Blunt** : Direct blow or acceleration / deceleration (Road Traffic Accidents, falls from a height, fall onto flank)
2. **Penetrating** : Knives, gunshots or iatrogenic (e.g., Percutaneous NephroLithotomy “PCNL”)

### Indications For Renal Imaging

1. Macroscopic haematuria.
2. Penetrating chest, flank, and abdominal wounds
3. Microscopic [ $>5$  red blood cells (RBCs) per high powered field] or dipstick
4. Hypotensive patient (SBP  $<90$ mmHg)
5. A history of a rapid acceleration or deceleration
6. Any child with microscopic (even  $< 5$  RBC) or dipstick haematuria who has sustained trauma



#### 1- IVU

- **Replaced by the contrast-enhanced CT.**
- **On-table IVU:** if patient is transferred immediately to the operating theatre without having had a CT scan and a retroperitoneal hematoma is found.
- done to see if the other kidney is functioning and/or exists because the injured kidney might have to be removed

#### 2- Renal US

- ✓ **Advantages :**
  1. Can certainly establish the presence of two kidneys
  2. The presence of a retroperitoneal hematoma
  3. Power Doppler can identify the presence of blood flow in the renal vessels
- ✗ **Disadvantages :** Cannot accurately identify parenchymal tears, collecting system injuries, or extravasations of urine until a later stage when a urine collection has had time to accumulate.

#### 3- Contrast-Enhanced CT

- **the study of choice.**
- Accurate, rapid, images other intra-abdominal structures.

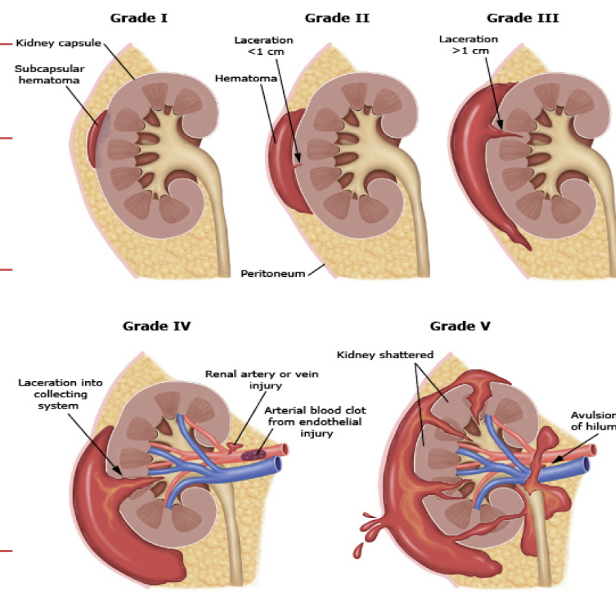
#### 4- Spiral Non-Contrast CT

does not allow accurate staging

# Cont.. Renal Injuries

## Renal Trauma Grading

Grade I	Non-enlarging subcapsular perirenal hematoma, and no laceration
Grade II	Superficial (cortical) laceration <1 cm depth + non-expanding perirenal hematoma
Grade III	Deep (cortical + medullary) laceration >1 cm without extension into the renal pelvis or collecting system (no evidence of urine extravasation)
Grade IV	laceration extends to renal collecting system or urinary extravasation vascular: injury to main renal artery or vein with contained hemorrhage segmental infarctions without associated lacerations expanding subcapsular hematomas compressing the kidney
Grade V	Shattered kidney completely



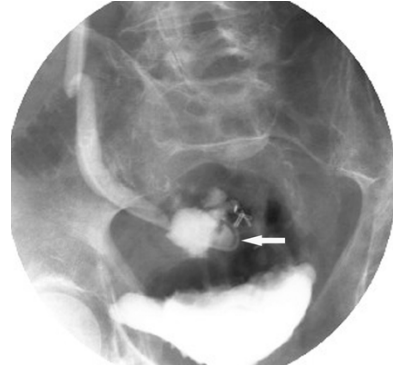
## Management

<p style="text-align: center;"><b>Conservative :</b></p> <ul style="list-style-type: none"> <li>• Over 95% of blunt injuries.</li> <li>• 50% of renal stab injuries and 25% of renal gunshot wounds (need specialized center).</li> <li>★ <b>Include :</b> <ul style="list-style-type: none"> <li>✓ Wide Bore IV line.</li> <li>✓ IV antibiotics.</li> <li>✓ Bed rest</li> <li>✓ Vital signs monitoring</li> <li>✓ Serial CBC and (HCT)</li> <li>✓ Follow up US &amp;/or CT.</li> </ul> </li> </ul>	<p style="text-align: center;"><b>Surgical exploration (indications for surgery) :</b></p> <ul style="list-style-type: none"> <li>• <b>Persistent Bleeding:</b> (persistent tachycardia and/or hypotension failing to respond to appropriate fluid and blood replacement)</li> <li>• <b>Expanding Perirenal Hematoma:</b> (again the patient will show signs of continued bleeding)</li> <li>• <b>Pulsatile Perirenal Hematoma.</b></li> </ul>
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## 2- Ureteral Injuries

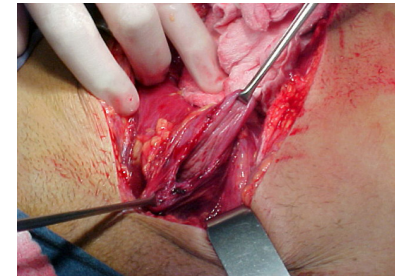
The ureters are protected from external trauma by surrounding bony structures, muscles and other organs therefore their injury is rare.

	External Trauma:	Internal Trauma:
<b>Mechanisms And Causes</b>	<ul style="list-style-type: none"><li>• Rare (severe force is required)</li><li>★ <b>Blunt Or Penetrating:</b></li><li>1. <b>Blunt</b> external trauma severe enough to injure the ureters will usually be associated with multiple other injuries.</li><li>2. <b>Penetrating:</b> Knife or bullet wound to the abdomen or chest may damage the ureter, as well as other organs.</li></ul>	<ul style="list-style-type: none"><li>• Uncommon, but is more common than external trauma</li><li>★ <b>Iatrogenic (due to surgeries) :</b></li><li>1. Hysterectomy.</li><li>2. Oophorectomy (removal of the ovaries)</li><li>3. Sigmoidcolectomy.</li><li>4. Uertscopy.</li><li>5. Cesarean Section.</li><li>6. Orthopedic operations.</li></ul>
<b>Diagnosis</b>	<ul style="list-style-type: none"><li>• Requires a high index of suspicion.</li><li>• Usually intra-operative detection of injury.</li><li>• <b>Late (these are suggestive of ureter injuries):</b><ol style="list-style-type: none"><li>1. <b>An ileus:</b> the presence of urine within the peritoneal cavity.</li><li>2. Prolonged postoperative fever or overt urinary sepsis.</li><li>3. Persistent drainage of fluid from abdominal or pelvic drains, from the abdominal wound, or from the vagina.</li><li>4. Flank pain if the ureter has been ligated.</li><li>5. An abdominal mass, representing a urinoma.</li><li>6. Vague abdominal pain.</li></ol></li></ul>	
<b>Treatment</b>	<ul style="list-style-type: none"><li>• JJ stenting.</li><li>• Primary closure of partial transaction of the ureter.</li><li>• Direct ureter to ureter anastomosis.</li><li>• Re-implantation of the ureter into the bladder using a psoas hitch or a Boari flap.</li><li>• Trans uretero-ureterostomy.</li><li>• Auto-transplantation of the kidney into the pelvis.</li><li>• Replacement of the ureter with ileum.</li><li>• Permanent cutaneous ureterostomy.</li></ul>	<ul style="list-style-type: none"><li>• Nephrectomy.</li></ul>

# 3- Bladder Injuries

## Causes

- **Iatrogenic injury :**
  1. Transurethral resection of bladder tumor (TURBT)
  2. Cystoscopic bladder biopsy.
  3. Transurethral resection of prostate (TURP).
  4. Cystolitholapaxy (break up and removal of bladder stones).
  5. **Caesarean Section, especially as an emergency.**
  6. Total hip replacement (very rare)
- **Penetrating Trauma:** to the lower abdomen or back.
- **Blunt Pelvic Trauma:** in association with pelvic fracture or 'minor' trauma in patient who has been drinking alcohol
- Rapid deceleration injury seat belt injury with full bladder in the absence of a pelvic fracture.
- Spontaneous rupture after **Bladder Augmentation** (= an operation performed to increase the size of the bladder)

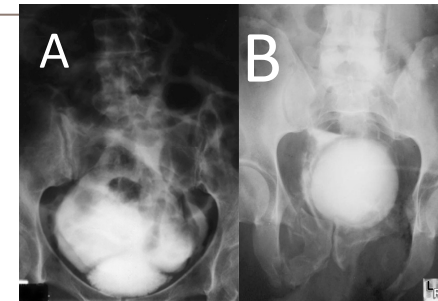


## Types of Perforation

- A) **Intra-Peritoneal Perforation:** The peritoneum overlying the bladder, has been breached along with the wall of the bladder, allowing urine to escape into the peritoneal cavity.
- B) **Extra-Peritoneal Perforation:** The peritoneum is intact and urine escapes into the space around the bladder, but not into the peritoneal cavity.

## Presentation

- Recognized intra-operatively.
- **The classic triad of symptoms and signs that are suggestive of a bladder rupture**
  1. Suprapubic pain and tenderness.
  2. Difficulty or inability in passing urine.
  3. Haematuria.



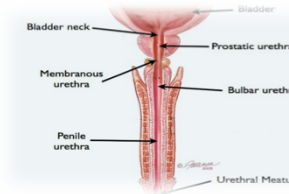
## Management

- **Extra-Peritoneal:**
  1. **Bladder Drainage**
  2. Open repair.
- **Intra-Peritoneal : Open repair.** Why? Because it's unlikely to heal spontaneously, Usually large, Leakage causes peritonitis, Associated other organ injury.

# 4- Urethral Injury

## ★ Two Categories :

1. **Anterior (bulbar and penile) urethral injuries:** (Rare).
2. **Posterior (membranous and prostatic) urethral injuries.**



**Blood at the urethral meatus is virtually diagnostic for urethral injury and demands early retrograde urethrogram before Foley placement.**

## A) Anterior Urethral Injury

<p><b>Mechanism</b></p>	<ul style="list-style-type: none"> <li>• The majority is a result of a straddle injury in boys or men (jumping while legs are apart).</li> <li>• Direct injuries to the penis.</li> <li>• Penile fractures.</li> <li>• Inflating a catheter balloon in the anterior urethra.</li> <li>• Penetrating injuries by gunshot wounds.</li> </ul>	
<p><b>Symptoms and signs</b></p>	<ul style="list-style-type: none"> <li>- Blood at the end of the penis.</li> <li>- Difficulty in passing urine.</li> <li>- Frank hematuria.</li> <li>- Hematoma may accumulate around the site of the rupture.</li> <li>- Penile swelling.</li> </ul>	<p><b>Retrograde urethrography*</b></p> <ul style="list-style-type: none"> <li>• Less filling means greater damage</li> </ul> <p><b>A.Contusion:</b> no extravasation of contrast.</p> <p><b>B.Partial rupture:</b> extravasation of contrast, with contrast also present in the bladder.</p> <p><b>C.Complete Disruption:</b> no filling of the posterior urethra or bladder.</p>
<p><b>Management</b></p>	<ol style="list-style-type: none"> <li>1- <b>Contusion: Do nothing</b>, place a small-gauge urethral catheter for one week.</li> <li>2- <b>Partial Rupture of Anterior Urethra:</b> <ul style="list-style-type: none"> <li>• <b>No blind insertion of urethral catheterization</b> (may be by using cystoscopy and guide wire)</li> <li>• Majority can be managed by supra-pubic urinary diversion for one week.</li> <li>• <b>Penetrating partial disruption</b> (e.g., knife, gunshot wound) → immediate repair.</li> </ul> </li> <li>3- <b>Complete Rupture of Anterior Urethra:</b> <ul style="list-style-type: none"> <li>• <b>Unstable patient:</b> a suprapubic catheter.</li> <li>• <b>Stable patient:</b> the urethra may either be immediately repaired or a suprapubic catheter</li> </ul> </li> </ol> <p>❖ <b>Penetrating Anterior Urethral Injuries:</b> generally managed by surgical debridement and repair</p>	<p><b>Diagnosis</b></p> <p>*Retrograde urethrogram: contrast is injected through the urethra using a catheter and images are taken.</p>



## B) Posterior Urethral Injury

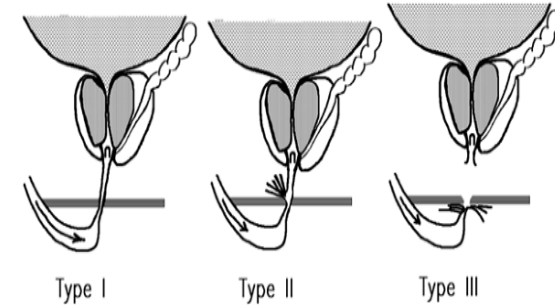
- Great majority of posterior urethral injuries occur in association with pelvic fractures.
- 10% to 20% have an associated bladder rupture.

### Signs

- Blood at the meatus, gross hematuria, and perineal or scrotal bruising.
- High-riding prostate when examining by digital rectal exam.

### Classification

- **Type I** : (rare )
  - Stretch injury with intact urethra
- **Type II** : (25%)
  - Partial tear (but some continuity remains)
- **Type III** : (75%)
  - Complete tear (with no evidence of continuity)



- ♀ **In women**, partial rupture at the anterior position is the most common urethral injury associated with pelvic fracture.

### Management

- **Stretch injury (type I) and incomplete urethral tears (type II)** :

-Best treated by stenting with a urethral catheter

- **Type III** :

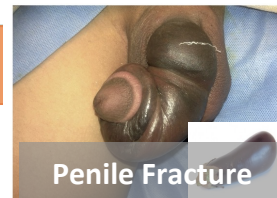
-Patient is at risk of urethral stricture, urinary incontinence, and erectile dysfunction (ED)  
 -Initial management with supra-pubic cystostomy and attempting primary repair at 7 to 10 days after injury



### 5- External Genital Injuries :

#### Male External Genitalia Injuries

<b>Penile Fractures</b>	during sexual intercourse
<b>Glans Injury</b>	during circumcision
<b>Penile Amputation</b>	suspect psychotic patients or crime!) or injury



#### Female External Genitalia Injuries

In sports, crime or during vaginal labor (they are managed by Gynecologists unless the urethra is involved)



# Summary

- Hematuria could painless or painful, painless usually due to transitional cell carcinoma and painless due to stones or UTI.
- Helical CT is the modality of choice in renal colic.
- The most common cause of acute urinary retention in men is benign prostatic enlargement.
- Cremasteric reflex is absent in torsion of the cord and present in Epididymo-orchitis.
- The diagnosis in anterior urethral injuries is done by Retrograde Urethrography.
- The classic history of testicular torsion is acute onset of scrotal pain usually after vigorous activity or minor trauma.



# MCQs

1. Which one of these is a common cause of ischemic priapism?

- sickle cell disease
- Idiopathic
- Trauma

2. A 62-year-old man presents with the increased need to urinate frequently during the night and difficulty initiating the urinary stream, what is the most likely diagnosis?

- Testicular torsion
- Benign prostatic hypertrophy
- Epididymo-orchitis

3. Which one of the following is an indication for a surgical intervention in ureteric stones?

- Gross hematuria
- If the stone is 6 millimeter in diameter
- Impaired renal function due to obstruction

# Thank You..

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