Emergency in Urology

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- Compared to other surgical fields, there are relatively few Urological Emergencies.

Why the patients come to emergency?

Classification

- Non traumatic
  - Haematuria
  - Renal Colic
  - Urinary Retention
  - Acute Scrotum
  - Priapism
- Traumatic
  - **Renal Trauma**
  - **Ureteral Injury**
  - **Bladder Trauma**
  - **Urethral Injury**
  - **External Genital Injury**

Non-Traumatic Urological Emergencies

Haematuria

HAEMATURIA

Blood in the urine

Types:

- **Gross (Macroscopic, Visible, Clinical): emergency or urgent**
  1 ml of blood in 1 liter of urine is visible for the patients

- **Microscopic (non visible, not clinical)=**
  3 or more RBCS/High power, in 2 out of 3 properly collected samples (AUA).

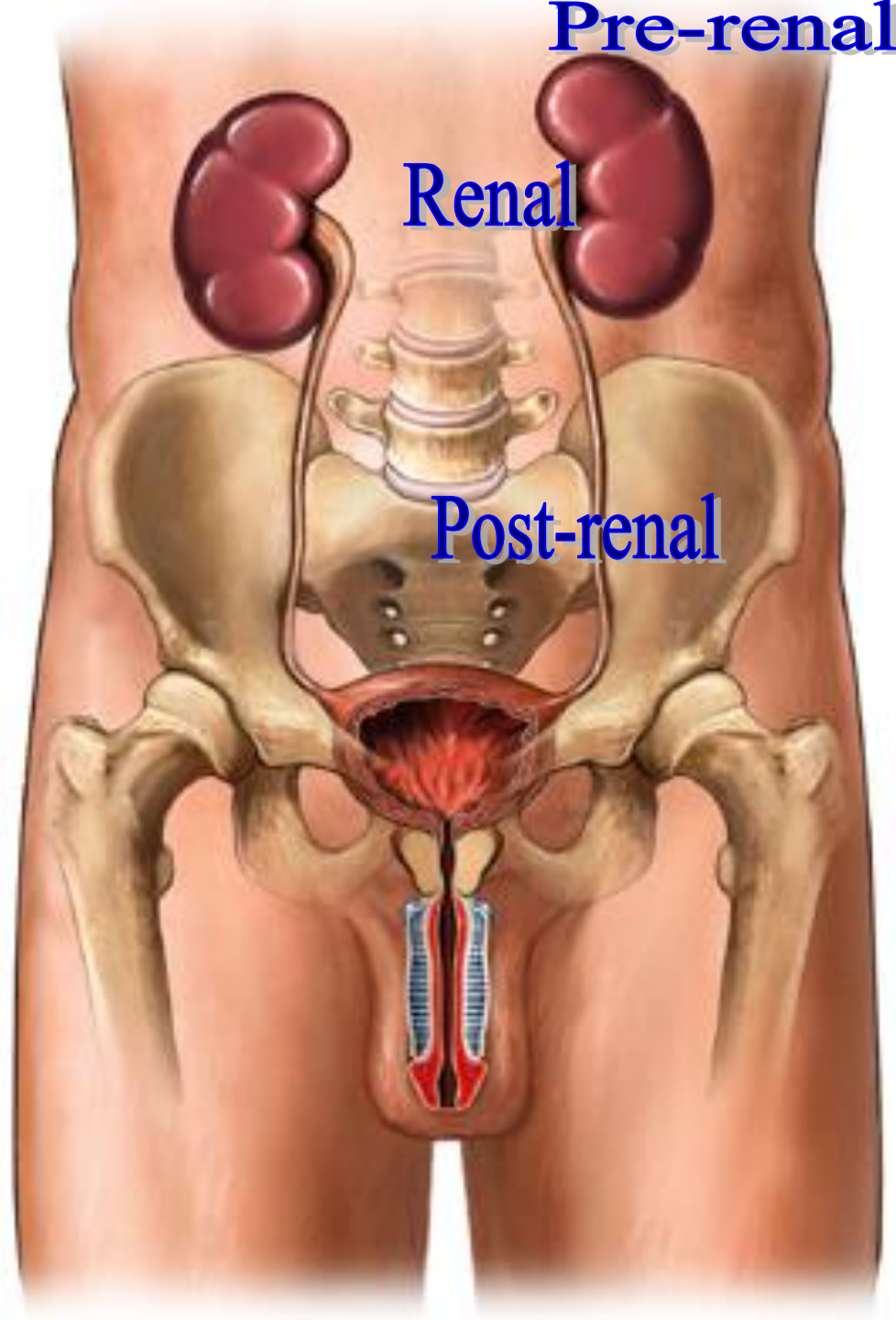
Haematuria…

Causes:

Varies according to:

- Patient Age
- Symptomatic or Asymptomatic
- The existence of risk factors for malignancy
- The type: Gross or Microscopic

Haematuria



Haematuria…

- **<u>Management:</u>**
- Gross Haematuria mandate full work up.
  - Work Up:
    - History
    - *P/E= usually no much signs*
    - *Investigations.*
    - *3 ways urethral catheter and bladder wash out for heavy bleeding.*
    - *Treat according to the cause.*

History of Haematuria

- Age
- Residency.
- Duration.
- Occupation
- Painless or painful
- Timing of haematuria
- How dark colored is the urine?
- Clots and shape of clots
- Trauma
- Bleeding from other sites
- Associated Symptoms urinary and Systemic
- History of: bleeding disorders, SC, TB, Bilharzias & stone disease.
- Family History o:f Malignancy or hematological disorders.
- Drugs
- Colored food or drinks intake.
- Smoking

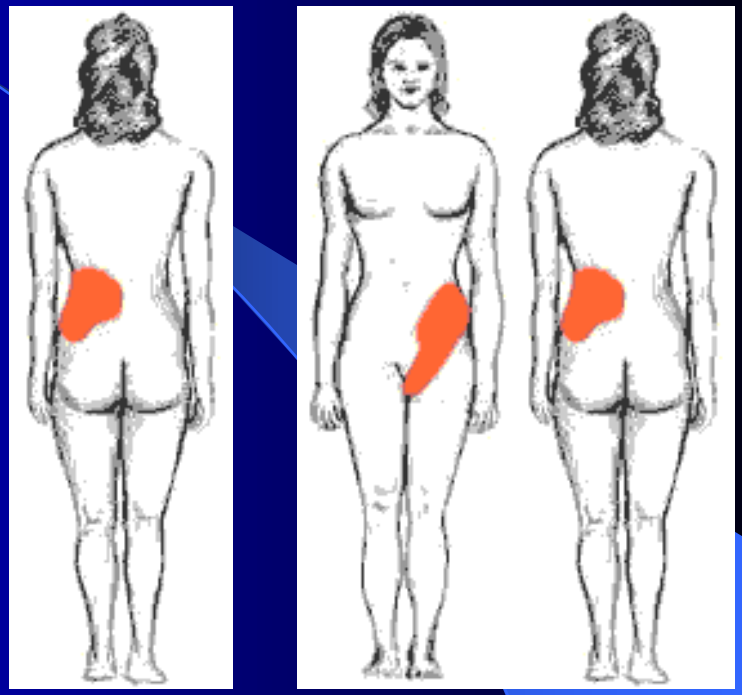
Renal Colic

Renal Colic

- The commonest urologic emergency.
- One of the commonest causes of the “Acute Abdomen”.

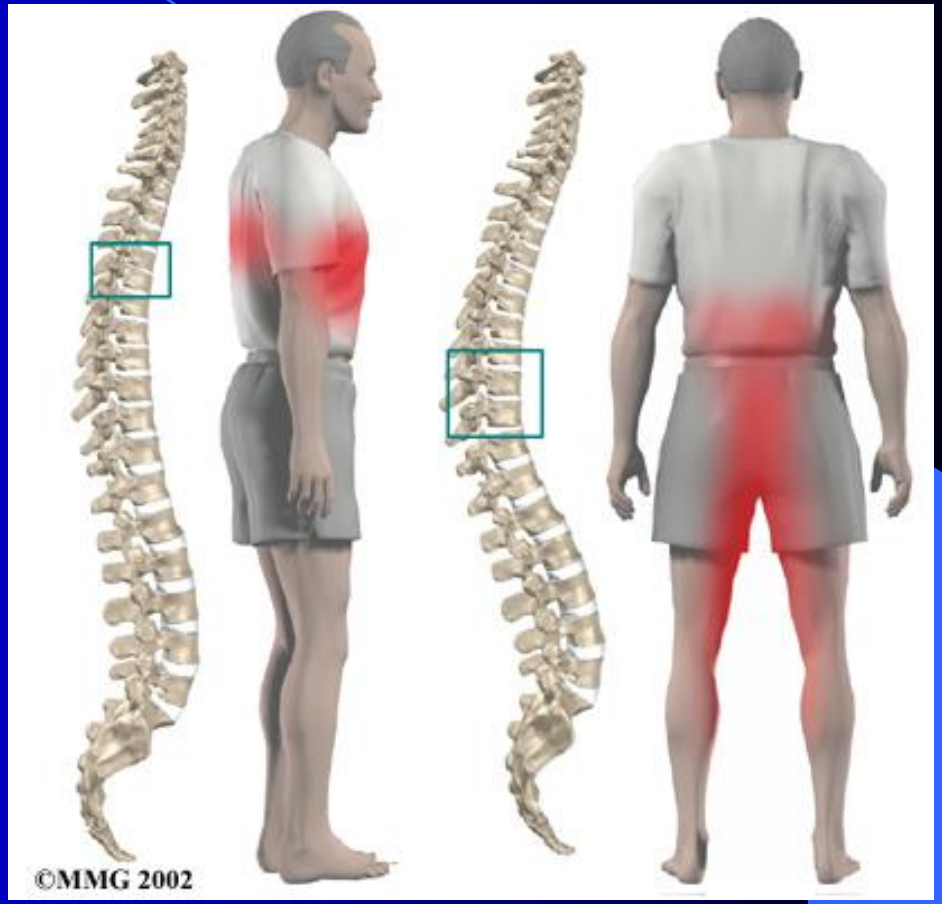
Renal Colic…

- **Pain:**
  - Severe
  - sudden onset
  - colicky in nature
  - Radiates
  - May change in location, from the flank to the groin, (the location of the pain does not provide a good indication of the position of the stone)
  - The patient cannot get comfortable, and may rolled around
  - Associated with nausea / Vomiting



Renal Colic…

- **Differential diagnosis:**
  - Radiculitis (pseudo-renal)
  - Leaking abdominal aortic aneurysms
  - Pneumonia
  - Myocardial infarction
  - Ovarian pathology (e.g., twisted ovarian cyst)
  - Acute appendicitis
  - Testicular torsion
  - Inflammatory bowel disease (Crohn's, ulcerative colitis)
  - Diverticulitis
  - Ectopic pregnancy
  - Burst peptic ulcer
  - Bowel obstruction

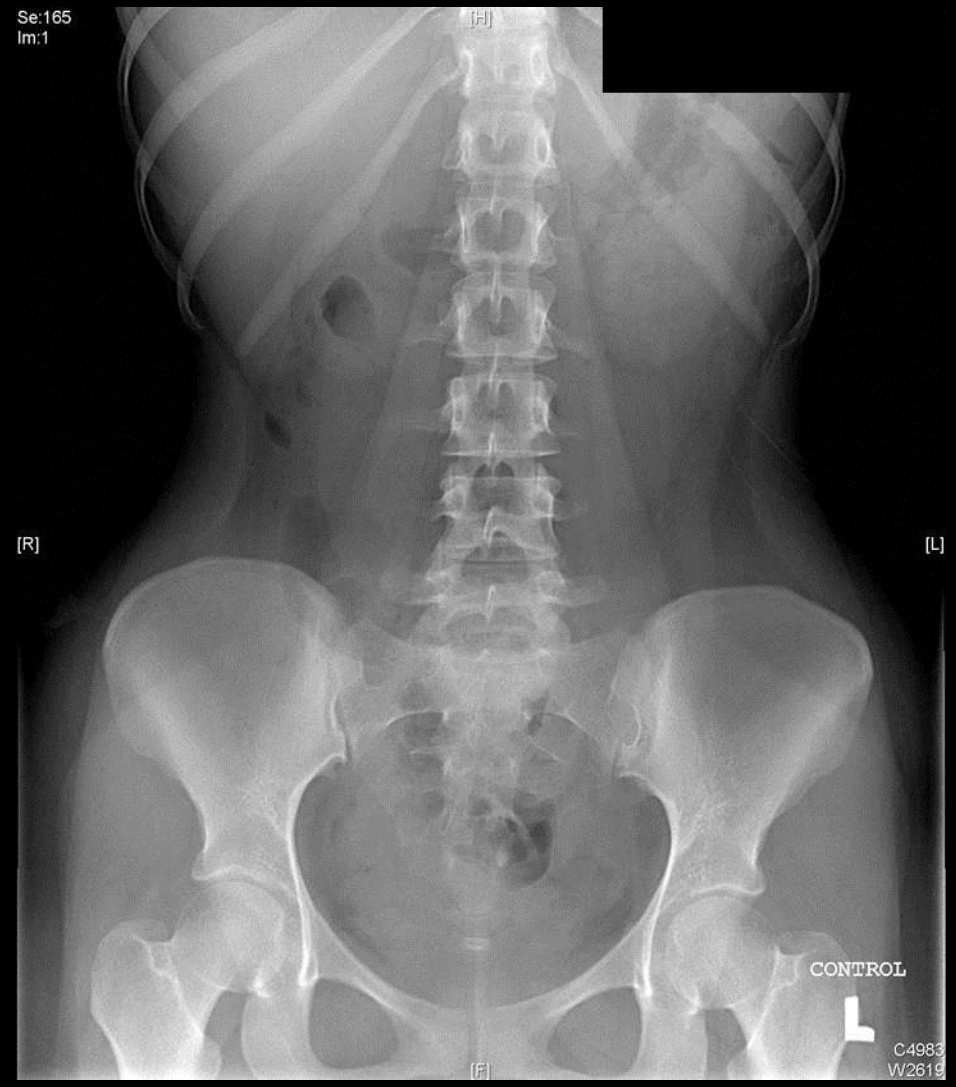


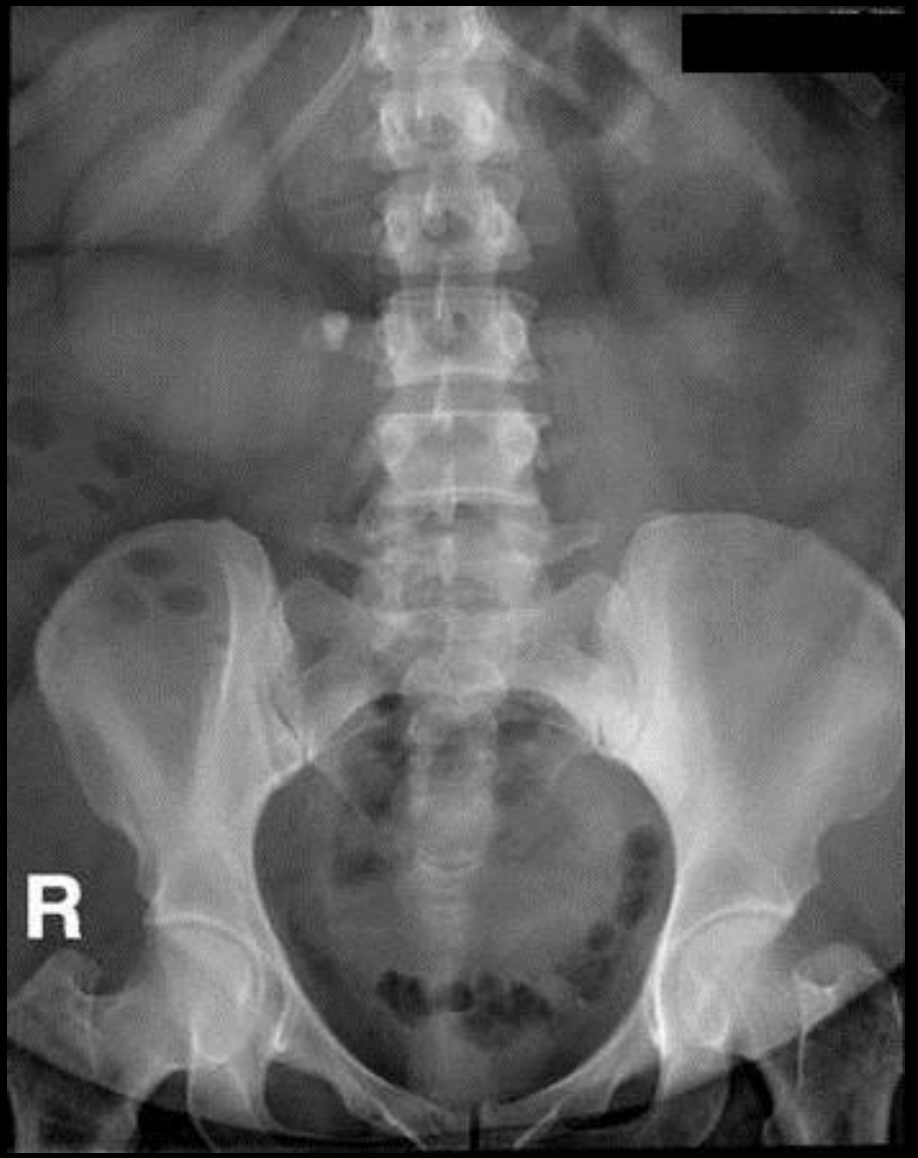
Renal Colic…

- **Work Up:**
  - History
  - Examination: patient want to move around, in an attempt to find a comfortable position.
  - +/- Fever
  - Pregnancy test
  - MSU
  - U&E

Radiological investigation :

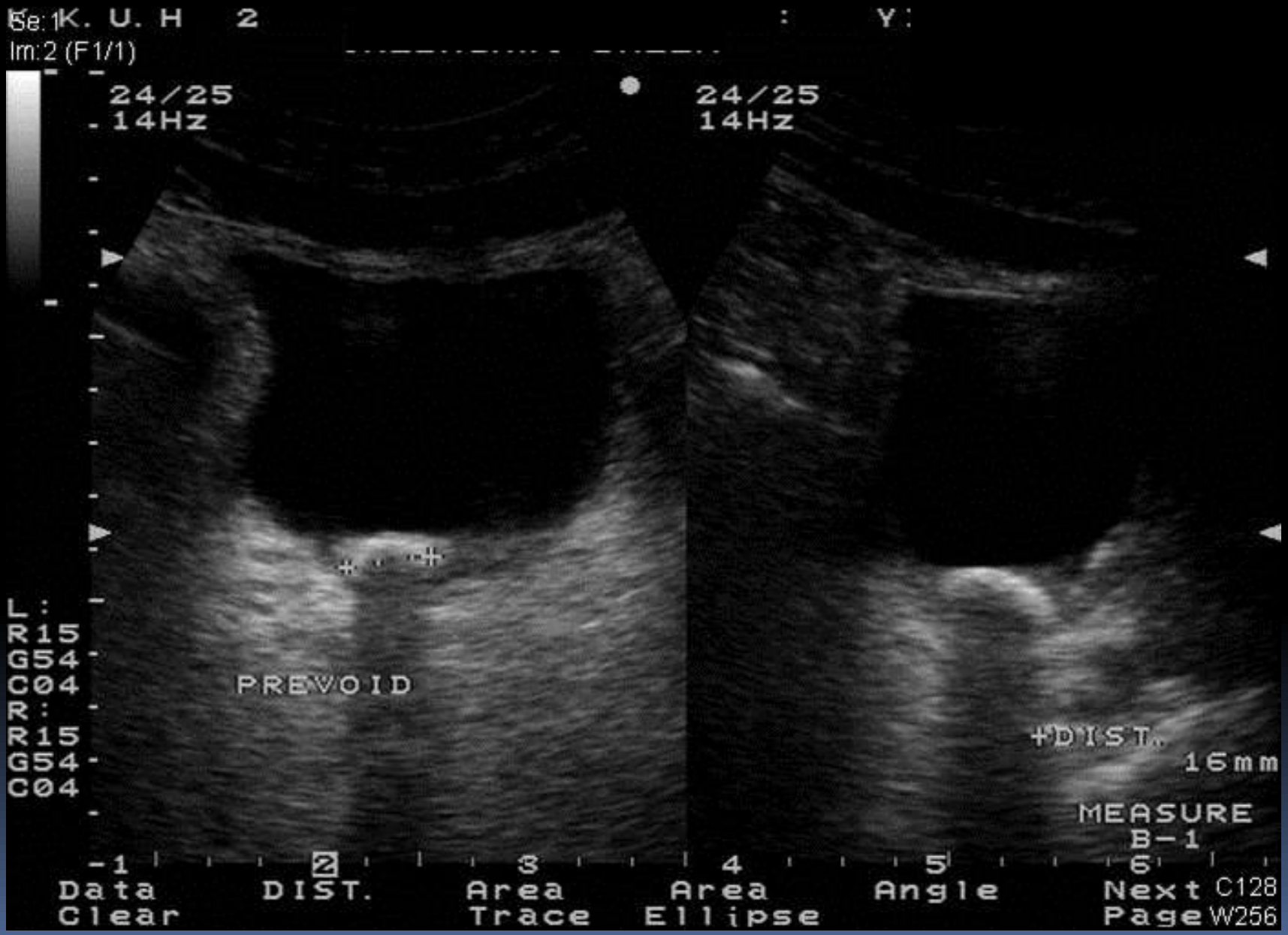
KUB



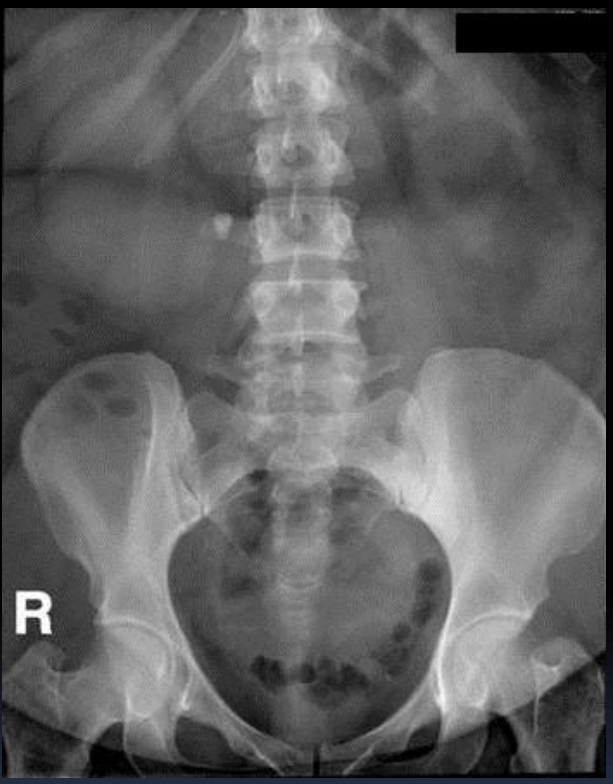


RENAL COLIC (work-up)…

RUS

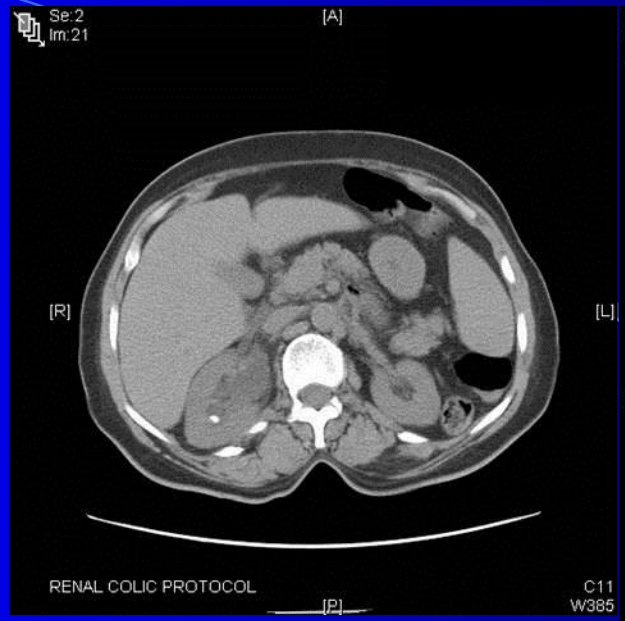


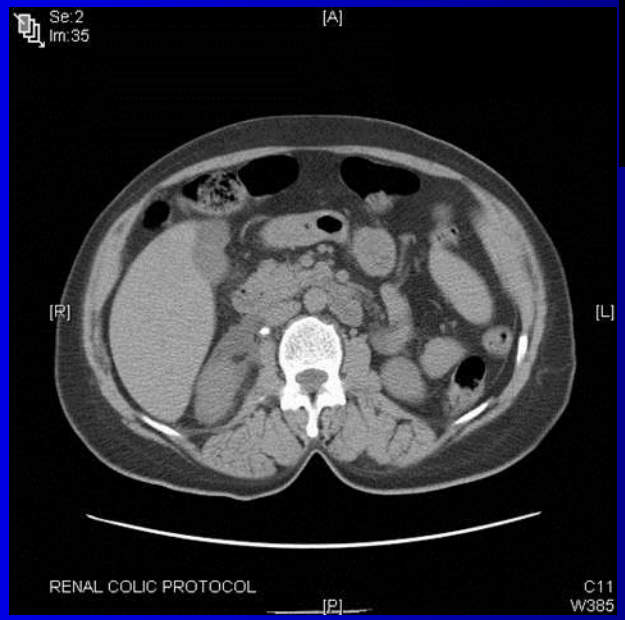
IVU



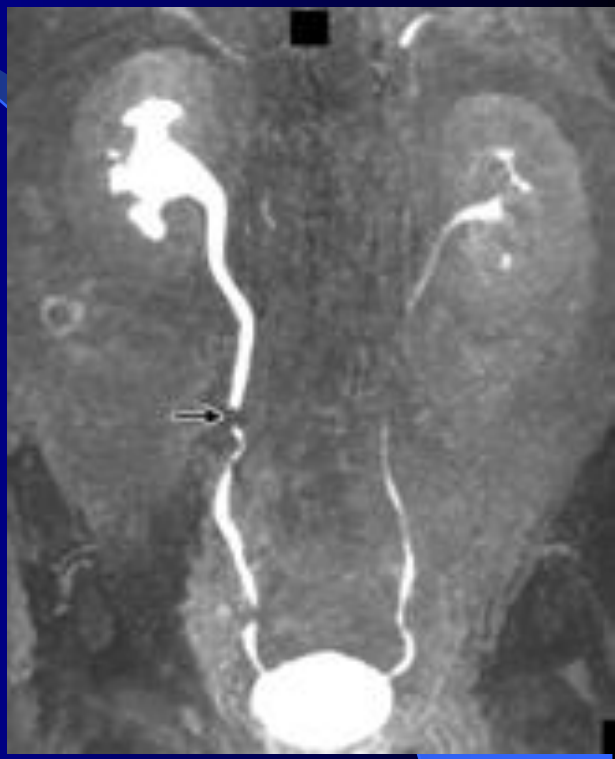
RENAL COLIC (work-up)…

- **Helical CTU**
  - *Greater specificity (95%) and sensitivity (97%)*
  - *Can identify other, non-stone causes of flank pain.*
  - *No need for contrast administration.*
  - *Faster, taking just a few minutes*
  - *the cost of CTU is almost equivalent to that of IVU*





- **MRI**
  - Very accurate way of determining whether or not a stone is present in the ureters
  - Time consuming
  - Expensive
  - Good for pregnant ladies



Renal Colic *(Management)*

- Pain relief
  - *NSAIDs*
  - *Intramuscular or intravenous injection, by mouth, or per rectum*
  - *+/- Opiate analgesics (pethidine or morphine).*
- Hyper hydration
- '**watchful waiting**' with analgesic supplements
  - *95% of stones measuring 5mm or less pass spontaneously*

Renal Colic…

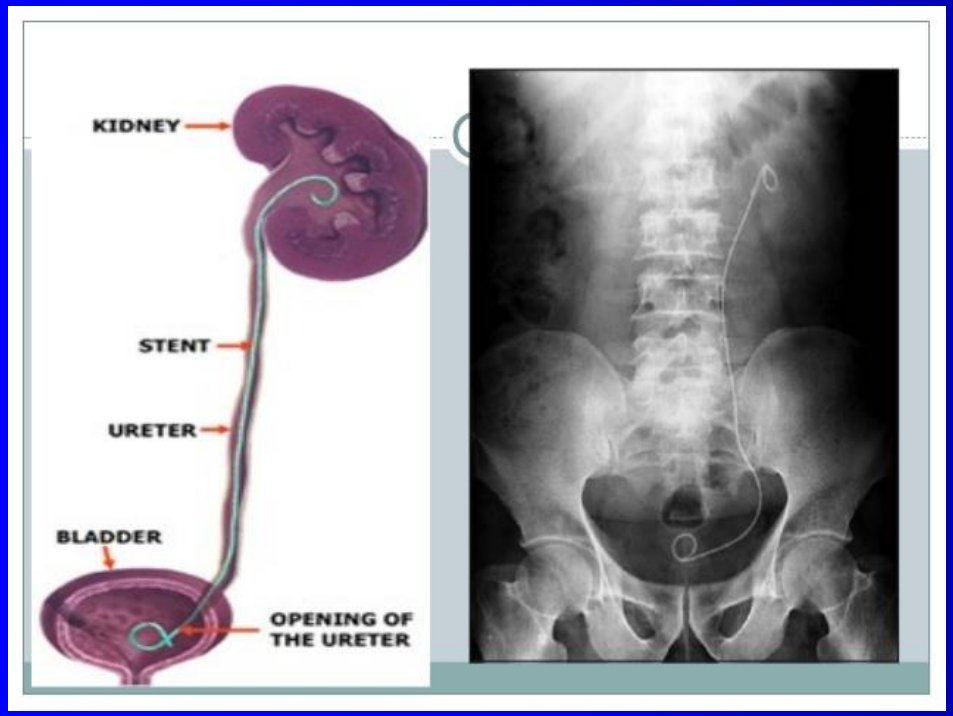
- **Indications for Intervention**

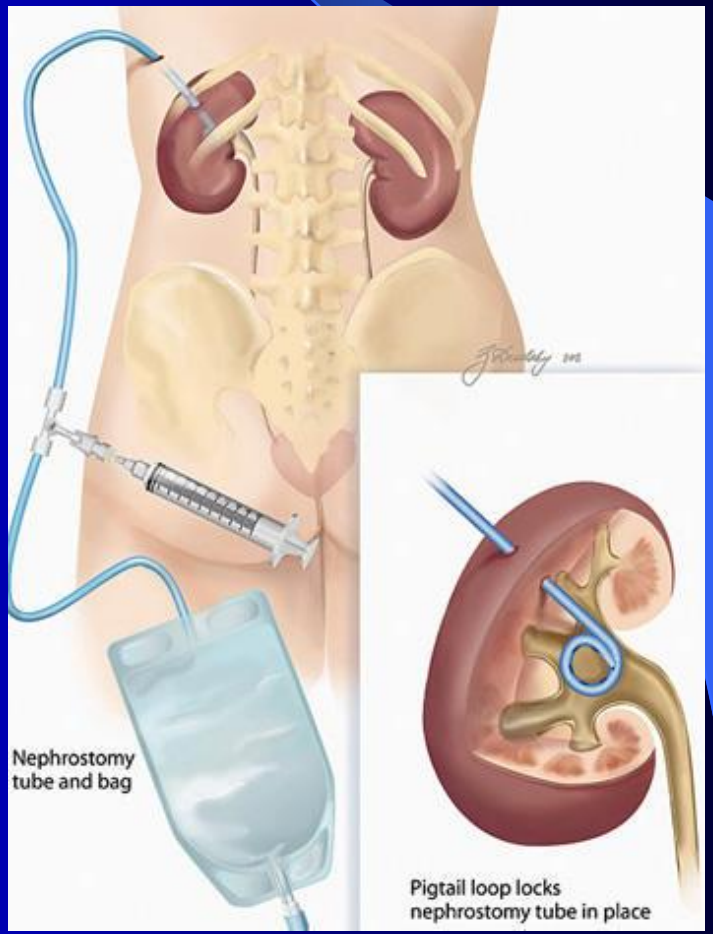
To Relieve Obstruction and/or Remove the stone

1. Pain that fails to respond to analgesics.
2. Associated fever.
3. Renal function is impaired because of the stone (solitary kidney obstructed by a stone, bilateral ureteric stones)
4. Obstruction unrelieved (not to exceed 4 weeks)
5. Personal or occupational reasons

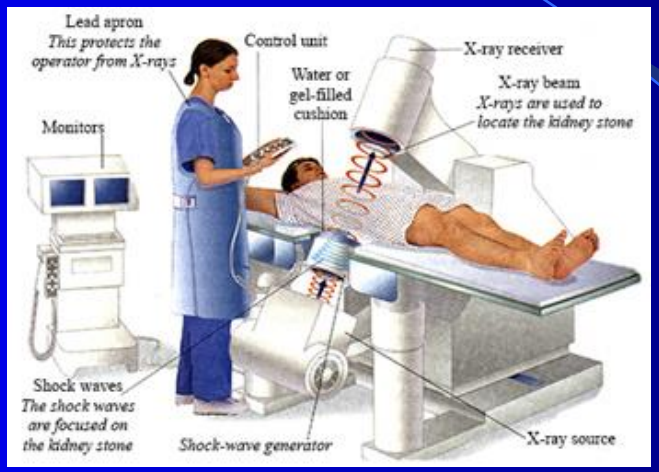
Renal Colic…

- **Surgical intervention:**
  - Temporary relief of the obstruction:
    - *Insertion of a JJ stent or percutaneous nephrostomy tube*

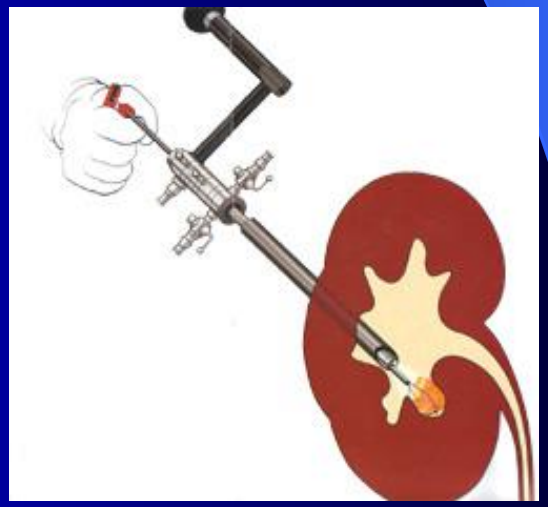




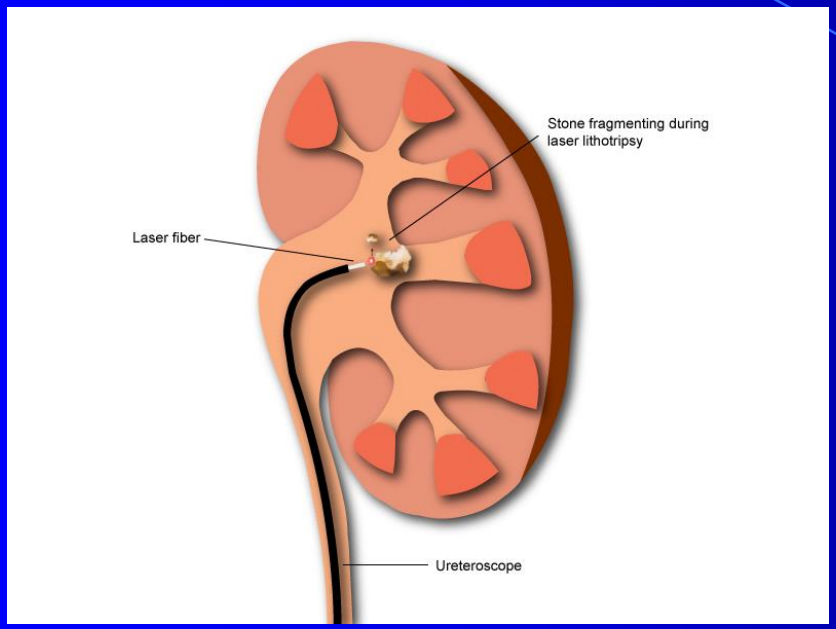
- **Definitive treatment:**
  - Extracorporeal Shockwaves Lithotripsy (ESWL).



  - percutaneous nephrolithotomy (PCNL)

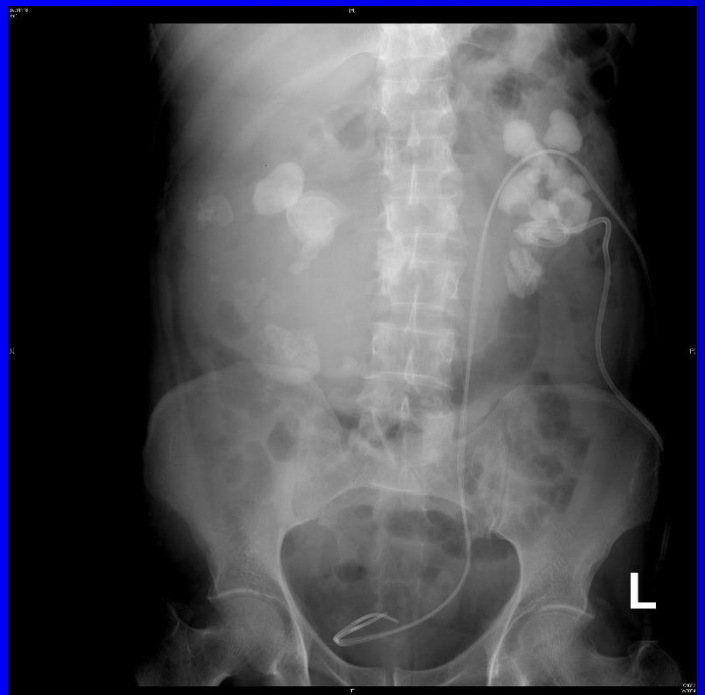


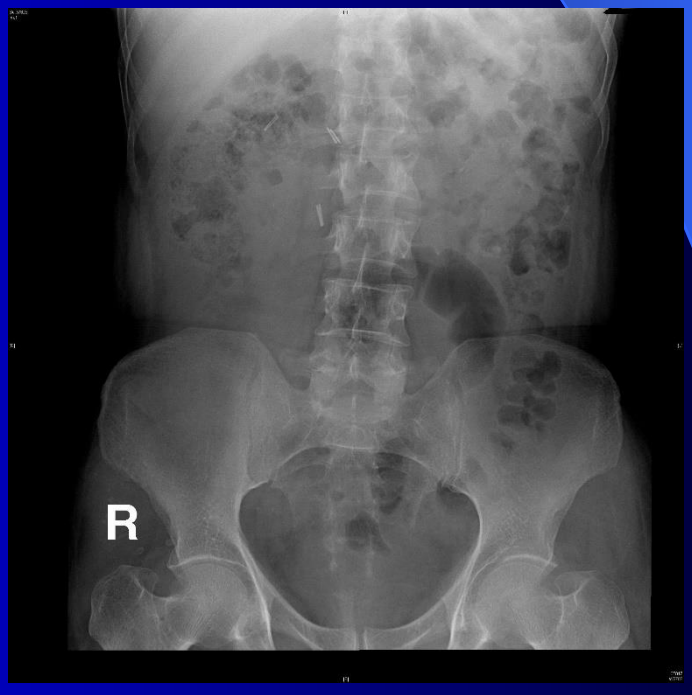
– Ureteroscopy (URS)



– Laparoscopic extraction

– Open Surgery: very limited





Urinary Retention

Urinary Retention

- Acute Urinary retention
- Chronic Urinary retention

Acute Urinary retention

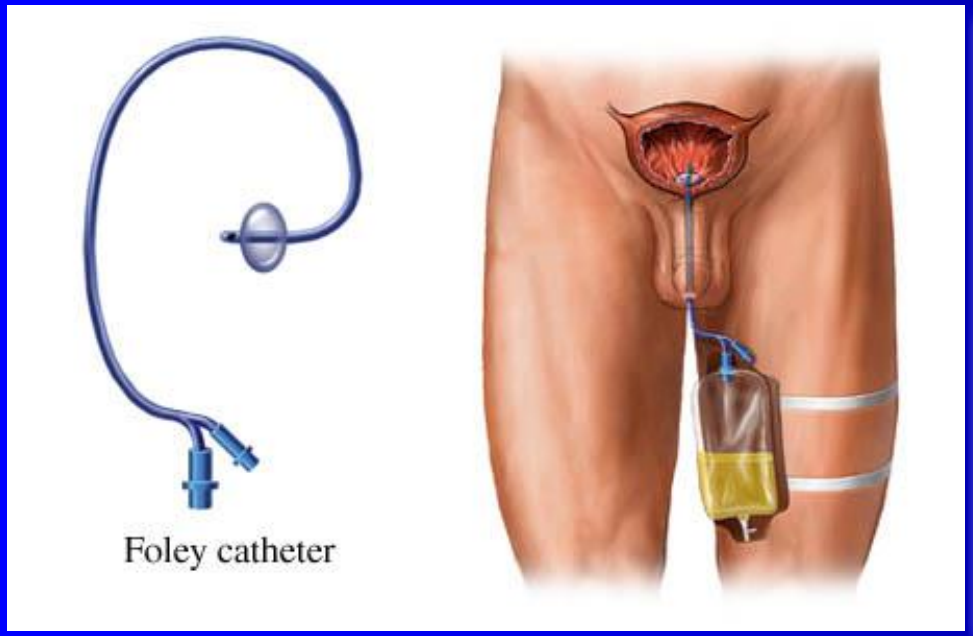
Painful inability to void, with relief of pain following drainage of the bladder by catheterization.

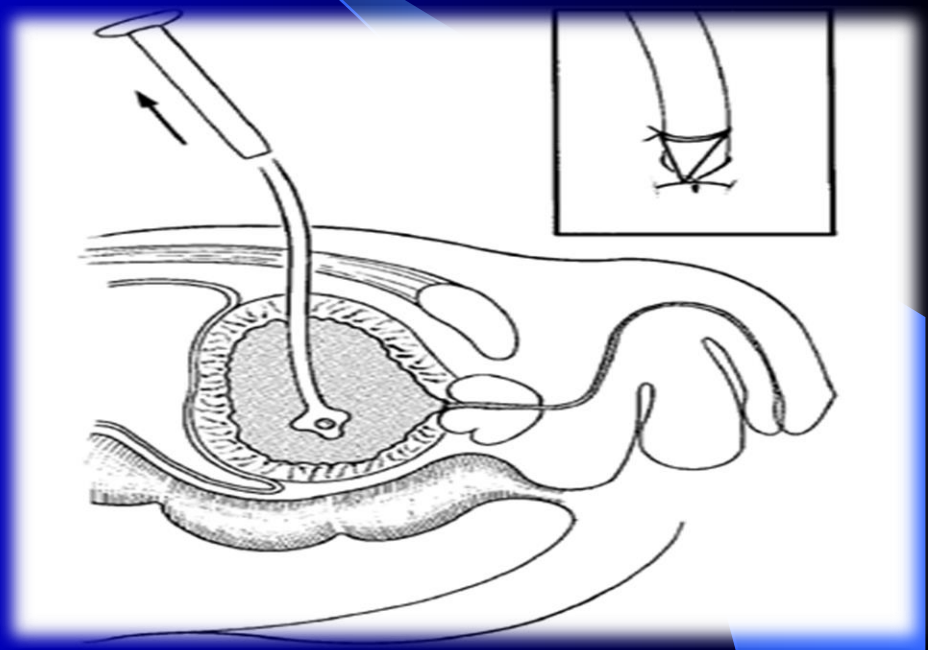
Acute Urinary retention…

- **Causes:**
  - **Men:**
    - *Benign prostatic enlargement (BPE) due to BPH*
    - *Carcinoma of the prostate*
    - *Urethral stricture*
    - *Prostatic abscess*
    - *Stones*
    - *Constipation*
  - **Women**
    - *Pelvic prolapse (cystocoele, rectocoele, uterine)*
    - *Urethral stenosis*
    - *Urethral diverticulum;*
    - *Post surgery for 'stress' incontinence*
    - *pelvic masses (e.g., ovarian masses)*

Acute Urinary retention…

- **Initial Management**
  - Urethral catheterization
  - Suprapubic catheter (SPC)





Late Management:

Treating the underlying cause

Chronic Urinary Retention

- Obstruction develops slowly, the bladder is distended (stretched) very gradually over weeks/months (Pain not a feature)
- Usually associated with
  - Reduced renal function.
  - Upper tract dilatation

Chronic urinary retention…

- **Presentation:**
  - Urinary dribbling
  - Overflow incontinence
  - Palpable Bladder
  - Symptoms of renal failure

Chronic urinary retention…

- **Management**
  - Treatment is directed to renal support.
  - Bladder drainage
  - Late treatment of cause.

Acute Scrotum

Acute Scrotum

Emergency situation requiring prompt evaluation, differential diagnosis, and potentially immediate surgical exploration

Acute Scrotum

Differential Diagnosis:

- Torsion of the spermatic cord.
- Torsion of the appendix testis
- Torsion of the appendix epididymis
- Epididymitis
- Epididymo-orchitis
- Orchitis
- Hernia
- Trauma/ insect bite
- Dermatological lesion
- Inflammatory vascultits
- Neurological (adductor tendonitis)

- **Torsion of the Spermatic cord**
  - Most serious.
- **Epididymitis.**
  - Most common

Torsion of the Spermatic cord

Torsion of the Spermatic cord

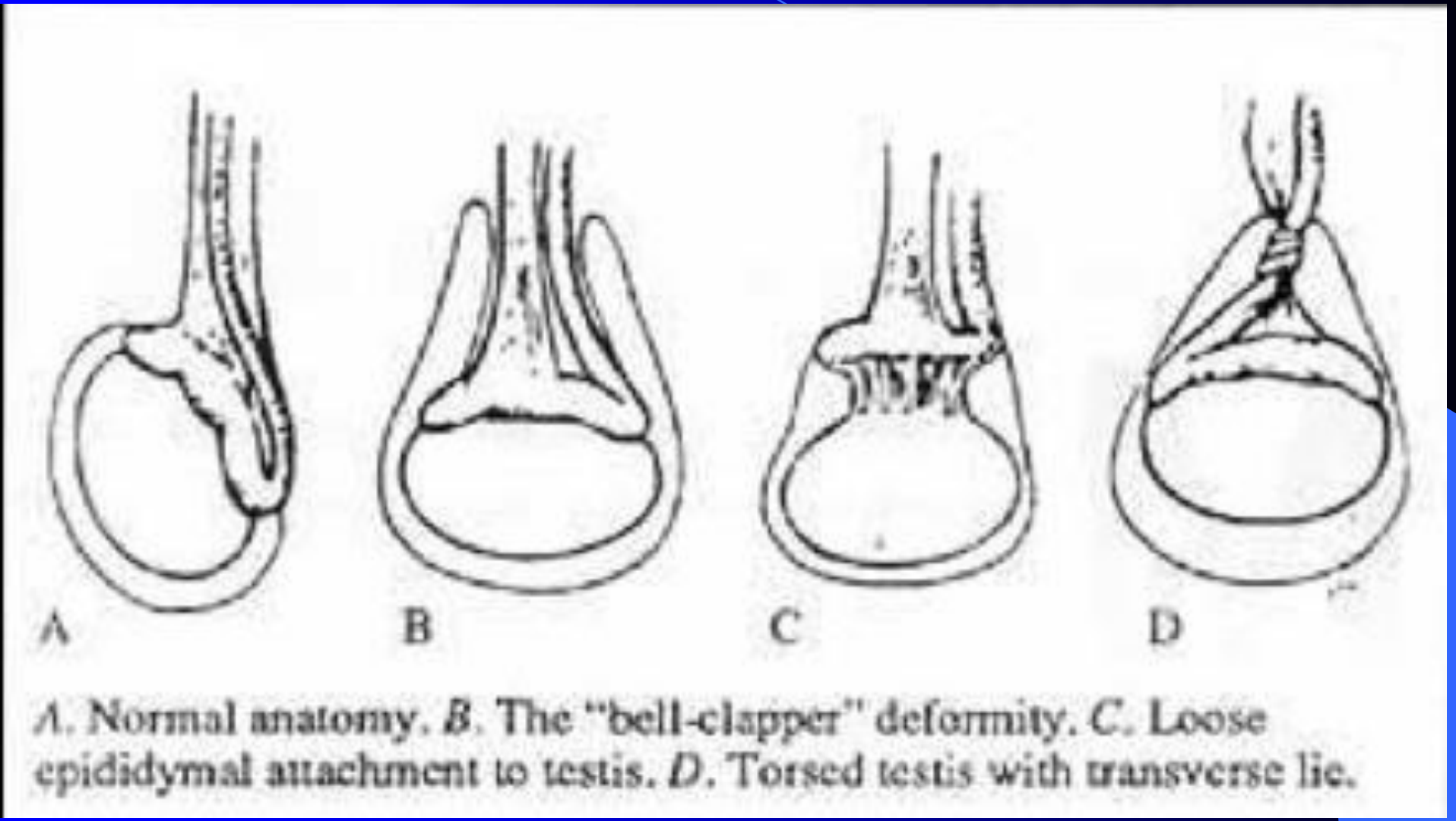
- Common among teenagers (12-18) years
- Possible in children and neonates
- Unlikely after the age of 25 years

Torsion of the Spermatic Cord

- True surgical emergency of the highest order
- Irreversible ischemic injury to the testicular parenchyma may begin as soon as 4 hours
- Testicular salvage ↓ as duration of torsion ↑

Torsion of the Spermatic Cord

Anatomical variations



A. Normal anatomy. *B*. The "bell-clapper" deformity. *C*. Loose epididymal attachment to testis. *D*. Torsed testis with transverse lie.

Torsion of the Spermatic Cord…

- **Presentation:**
  - *Acute onset of scrotal pain.*
  - Majority with history of prior episodes of severe, self-limited scrotal pain and swelling
  - Nausea/Vomiting
  - Referred to the ipsilateral lower quadrant of the abdomen.
  - Children might not complain of testicular pain
  - Dysuria and other bladder symptoms are usually absent.

Torsion of the Spermatic Cord…

- **Physical examination:**
  - The affected testis is high riding transverse orientation
  - Acute hydrocele or massive scrotal edema
  - Cremasteric reflex is absent.
  - Tender larger than other side
  - Elevation of the scrotum causes more pain

Torsion of the Spermatic Cord…

- Adjunctive tests:

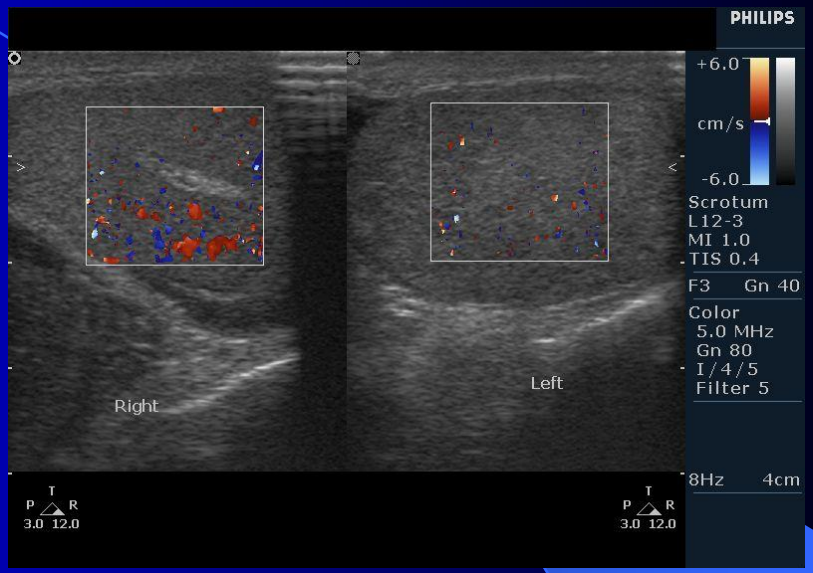
(If the diagnosis is clinically suspicious don't delay the patient for any investigations).

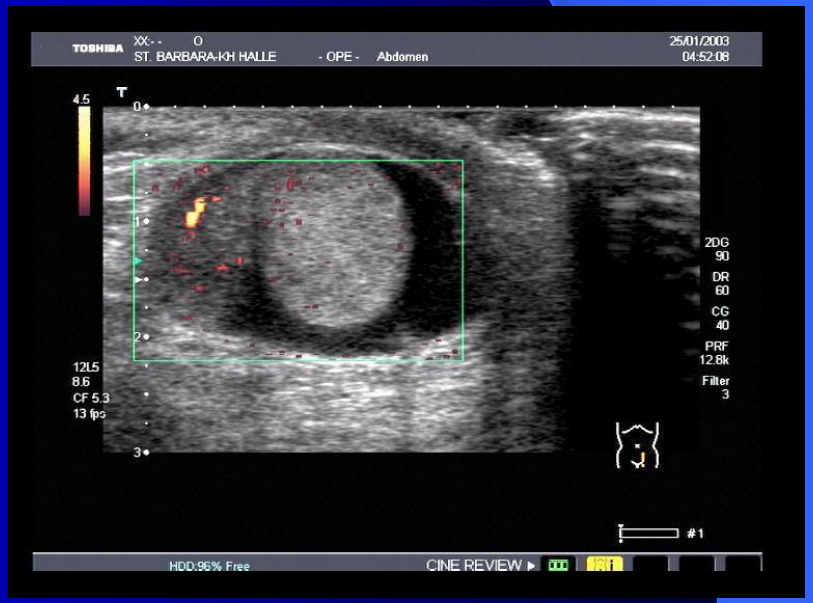
- **To aid in differential diagnosis of the acute scrotum.**
- **To confirm the absence of torsion of the cord.**
- **Doppler examination of the cord and testis**
  - **High false-positive and false- negative**

Torsion of the Spermatic Cord…

❑ Color Doppler ultrasound:

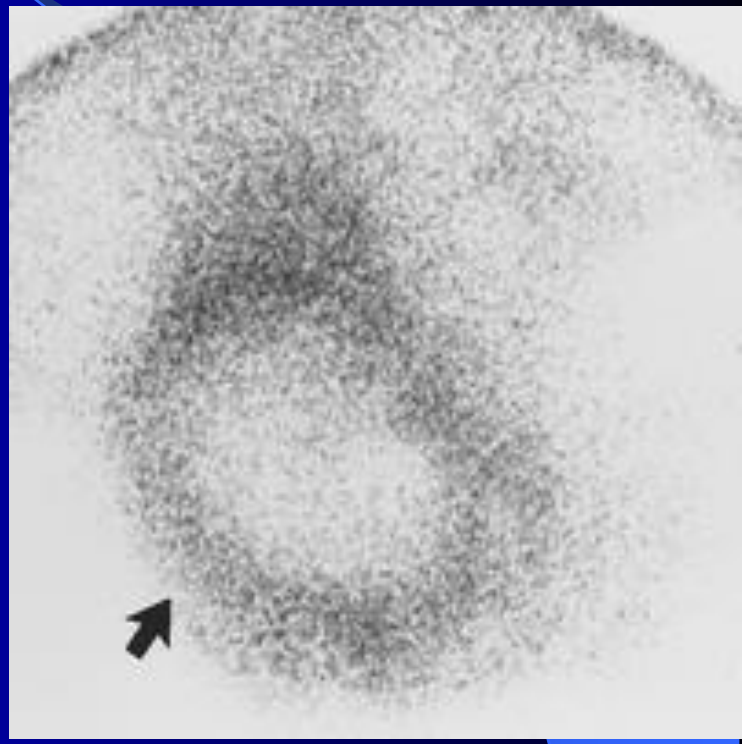
- **Assessment of anatomy and determining the presence or absence of blood flow.**
- **Sensitivity: 88.9% specificity of 98.8%**
- **Operator dependent.**



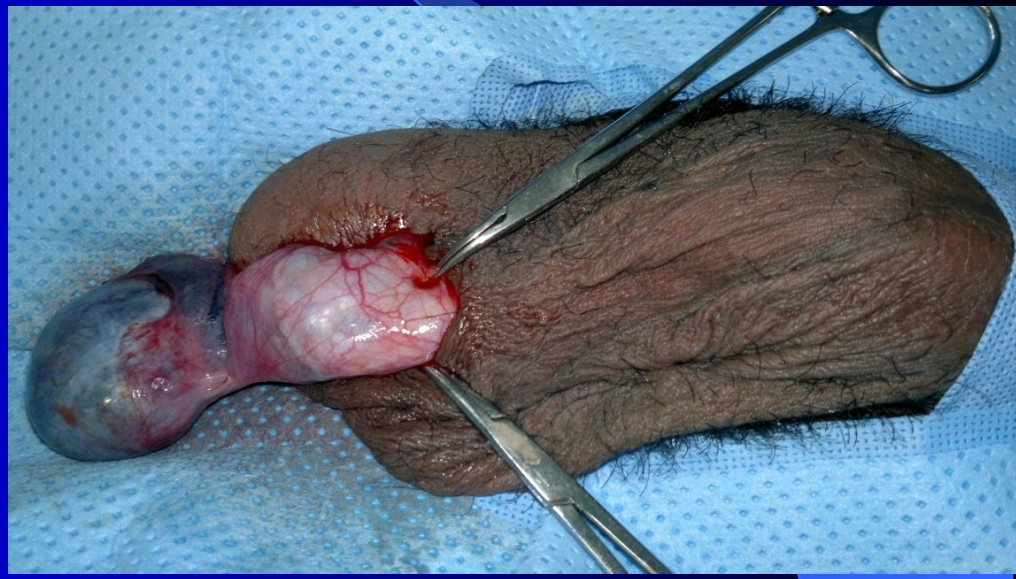


❑ Radionuclide imaging :

- Assessment of testicular blood flow.
- A sensitivity of 90%, & specificity of 89%.
- False impression from hyperemia of scrotal wall.
- Not helpful in Hydrocele and Hematoma



- **Surgical exploration:**
  - A scrotal incision
  - The affected side should be examined first
  - The cord should be detorsed.
  - Testes with marginal viability should be placed in warm and re-examined after several minutes.
  - A necrotic testis should be removed
  - If the testis is to be preserved, it should be fixed
  - The contra-lateral testis must be fixed to prevent subsequent torsion



Epididymo-orchitis

Epididymo-orchitis…

- **Presentation:**
  - Indolent process.
  - Scrotal swelling, erythema, and pain.
  - Dysuria and fever is more common
- **P/E :**
  - localized epididymal tenderness, a swollen and tender epididymis, or a massively swollen hemi-scrotum with absence of landmarks.
  - Cremasteric reflex should be present
- **Urine:**
  - pyuria, bacteriuria, or a positive urine culture

Epid.Orchitis…

- Management:
  - Bed rest for 1 to 3 days then relative restriction
  - Scrotal elevation, the use of an athletic supporter
  - parenteral antibiotic therapy should be instituted when UTI is documented or suspected.
  - Urethral instrumentation should be avoided

Priapism

Priapism

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

Priapism…

- 2 Types:
  - Ischemic (veno-occlusive, low flow) (most common)
    - Due to hematological disease, malignant infiltration of the corpora cavernosa with malignant disease, or drugs.
    - Painful
  - *Non-ischemic (arterial, high flow).*
    - *Due to perineal trauma, which creates an arterio-venous fistula.*
    - *Painless*

Priapism…

- **Causes:**
  - Primary (Idiopathic) : 30% - 50 %
  - Secondary:
    - *Drugs*
    - *Trauma*
    - *Neurological*
    - *Hematological disease*
    - *Tumors*

Priapism…

- The diagnosis:
  - Usually obvious from the history
    - Duration of erection >4 hours?
    - Is it painful or not?.
    - Previous history and treatment of priapism ?
    - Identify any predisposing factors and underlying cause

Priapism…

- Examination
  - Erect, tender penis (in low- flow)
  - Characteristically the corpora cavernosa are rigid and the glans is flaccid.
  - Abdomen for evidence of malignant disease
  - DRE: to examine the prostate and check anal tone.

Priapism…

- **Investigations:**
  - **CBC (white cell count and differential, reticulocyte count).**
  - **Hemoglobin electrophoresis for sickle cell.**
  - **Urinalysis including urine toxicology.**
  - **Blood gases taken from either corpora;**
    - **low-flow (dark blood; pH <7.25 (acidosis); pO2 <30mmHg (hypoxia); pCO2 >60mmHg (hypercapnia))**
    - **high-flow (bright red blood similar to arterial blood at room temperature; pH = 7.4; pO2 >90mmHg; pCO2 <40mmHg)**
  - **Color flow duplex ultrasonography in cavernosal arteries;**
    - ***Ischemic (inflow low or nonexistent)***
    - ***Non-ischemic (inflow normal to high).***
  - **Penile pudendal arteriography**

Priapism…

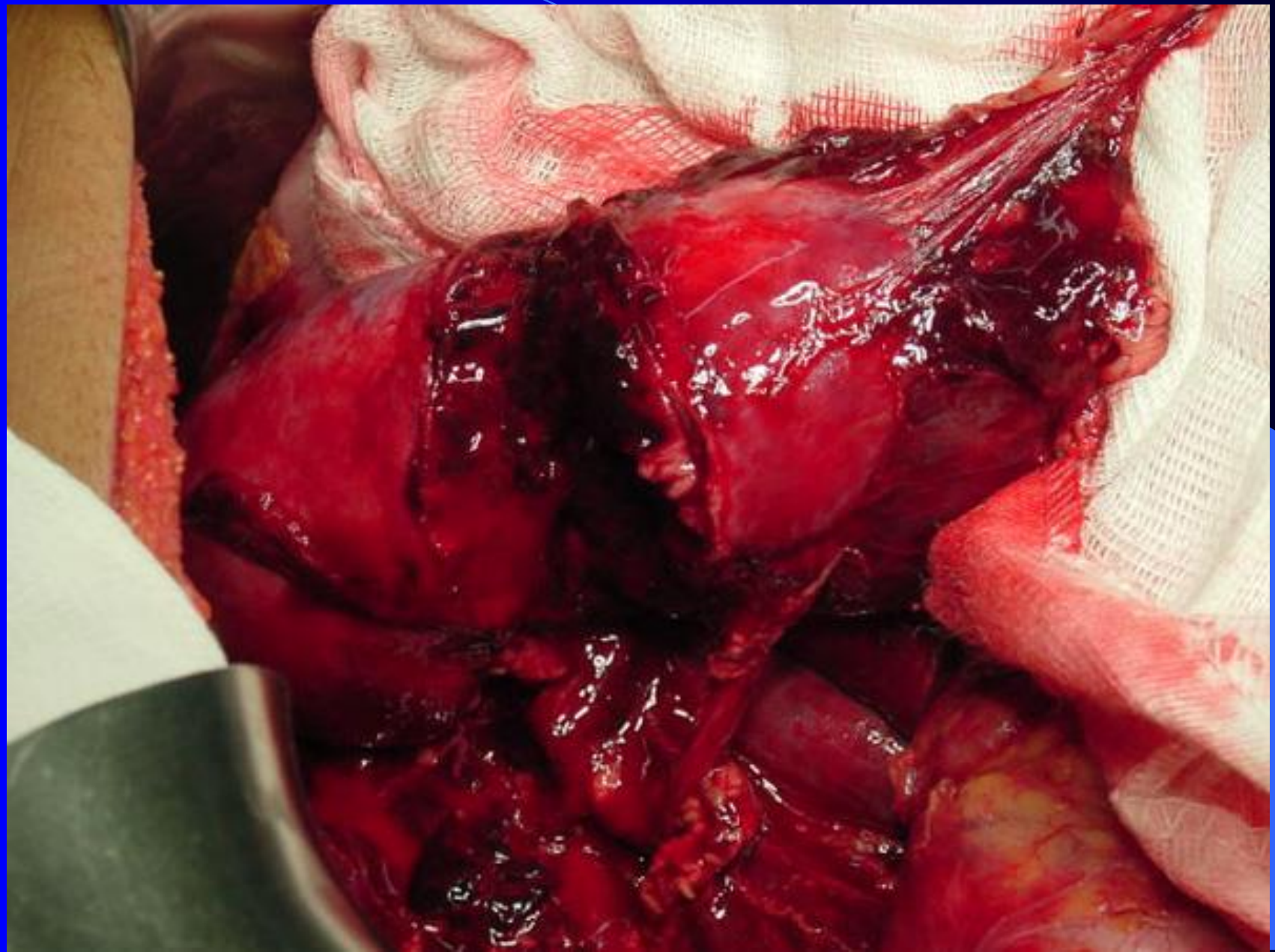
- Treatment:
  - Depends on the type of priapism.
  - Conservative treatment should first be tried
  - Medical treatment
  - Surgical treatment.
  - Treatment of underlying cause

Traumatic Urological Emergencies

- **Traumatic**

  - Renal Trauma
  - Ureteral Injury
  - Bladder Trauma
  - Urethral Injury
  - External Genital Injury

Renal Injuries



Renal Injuries

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

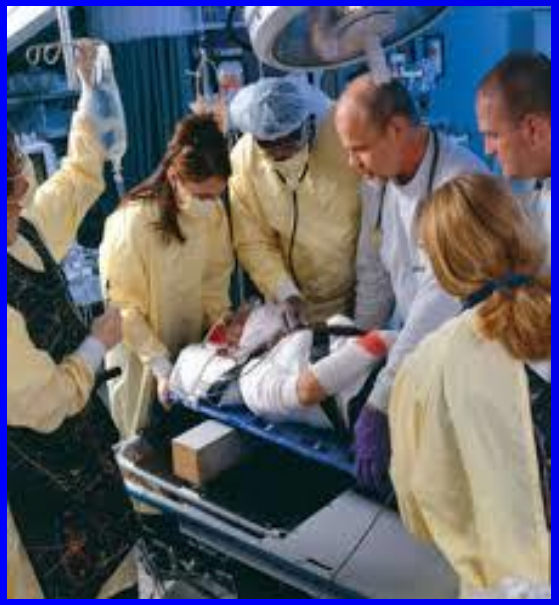
- Mechanisms and cause:
  - Blunt
    - direct blow or acceleration/ deceleration (road traffic accidents, falls from a height, fall onto flank)
  - Penetrating
    - knives, gunshots, iatrogenic, e.g., percutaneous nephrolithotomy (PCNL)

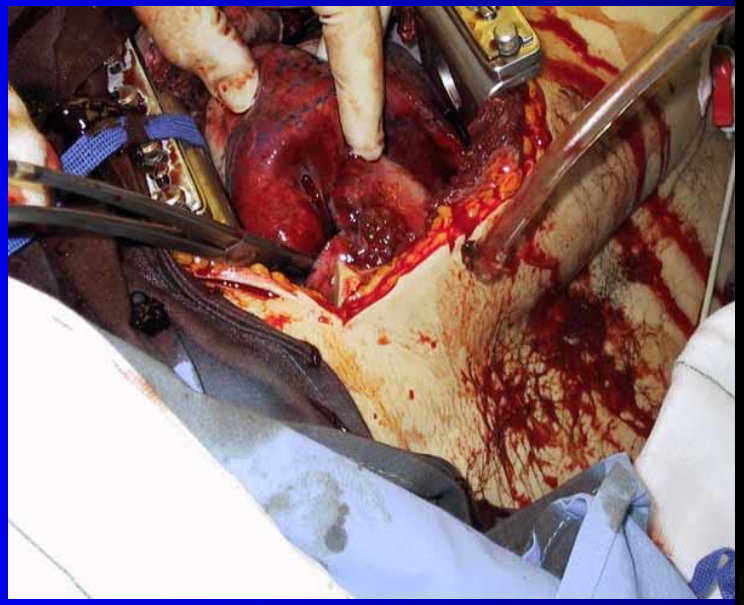
- **Indications for renal imaging:**
  - Macroscopic haematuria
  - Penetrating chest, flank, and abdominal wounds
  - Microscopic [>5 red blood cells (RBCs) per high powered field] or dipstick
  - Hypotensive patient (SBP <90mmHg)
  - A history of a rapid acceleration or deceleration
  - Any child with microscopic or dipstick haematuria who has sustained trauma

- What Imaging Study?

IVU:

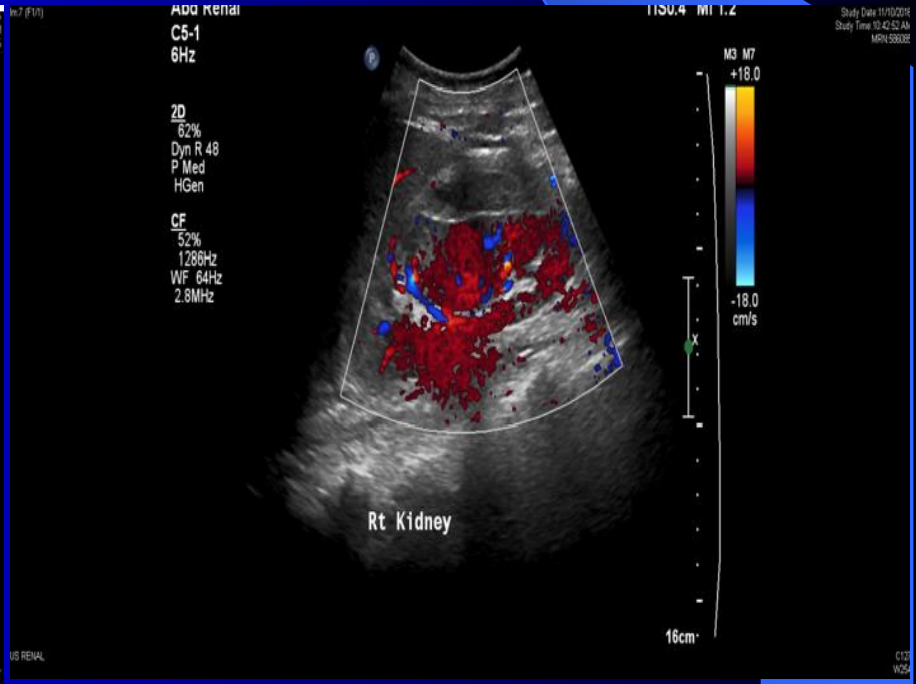
-Replaced by the contrast- enhanced CT
-On-table IVU if patient is transferred immediately to the operating theatre without having had a CT scan and a retroperitoneal hematoma is found,





Spiral non contrast CT: does not allow accurate staging

- **Renal US:**
  - **Advantages:**
    - can certainly establish the presence of two kidneys
    - the presence of a retroperitoneal hematoma
    - 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.

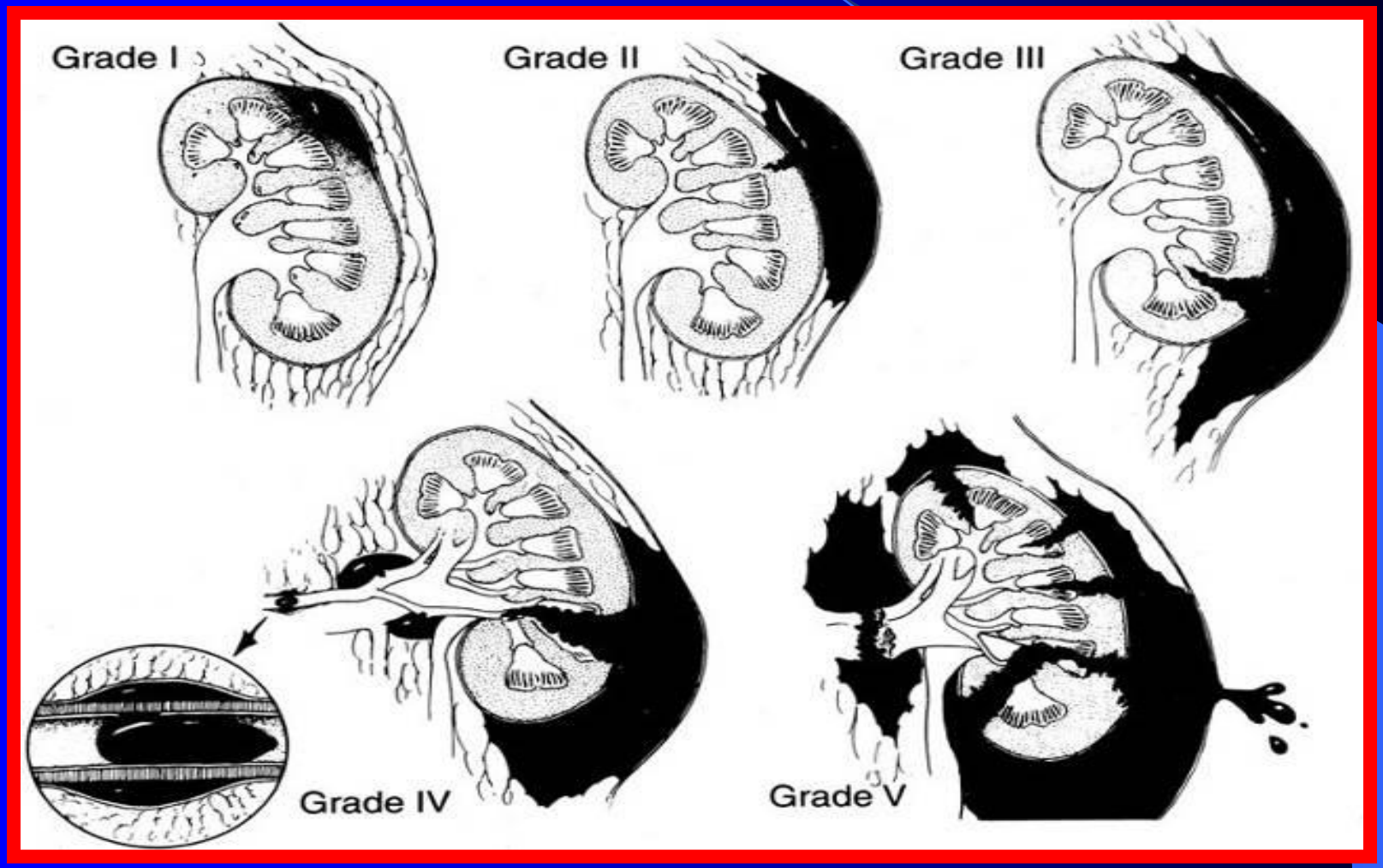


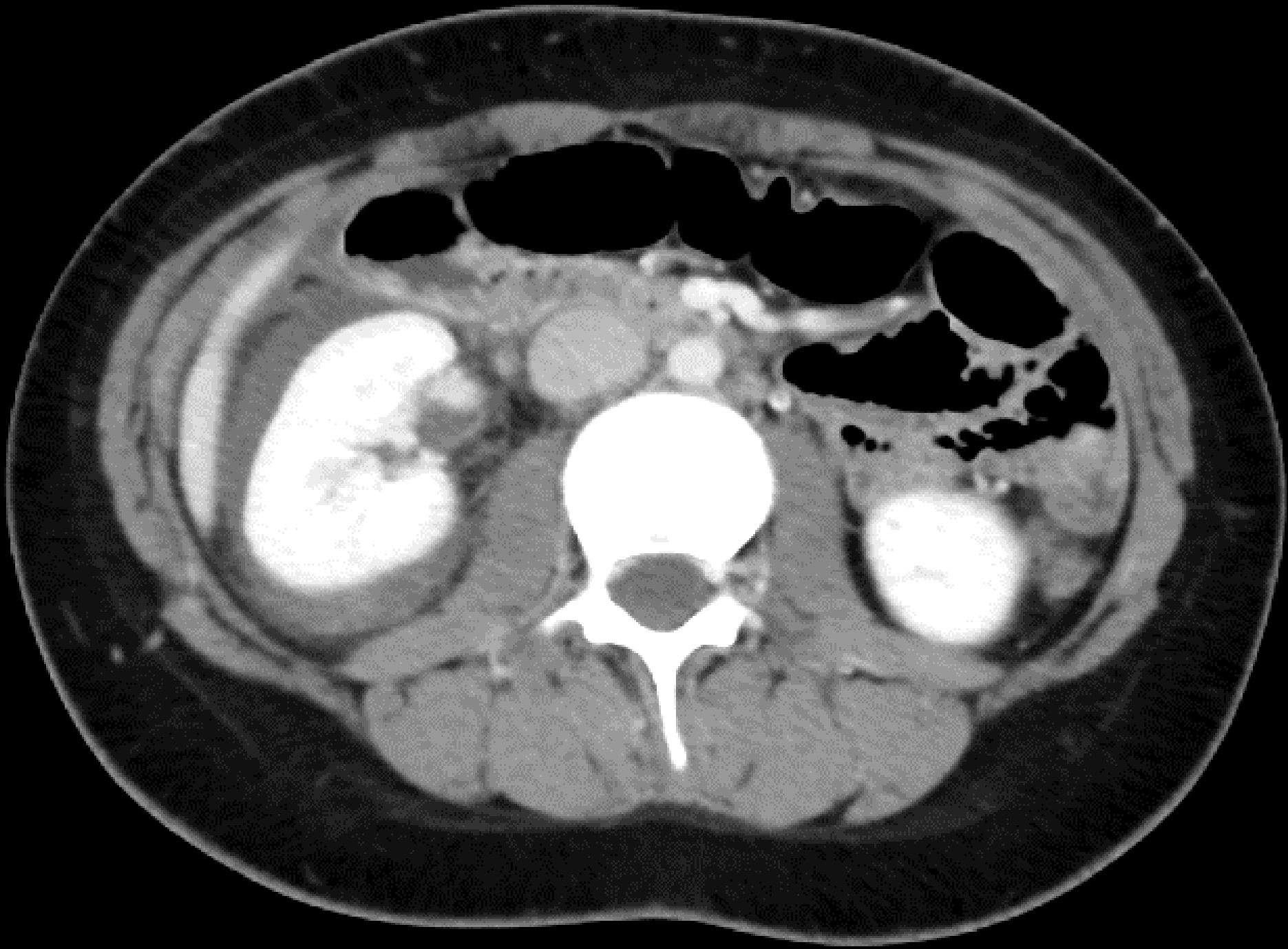
Contrast-enhanced CT:

the imaging study of choice

Accurate
Rapid
Images other intra-abdominal structures

- Staging (Grading):



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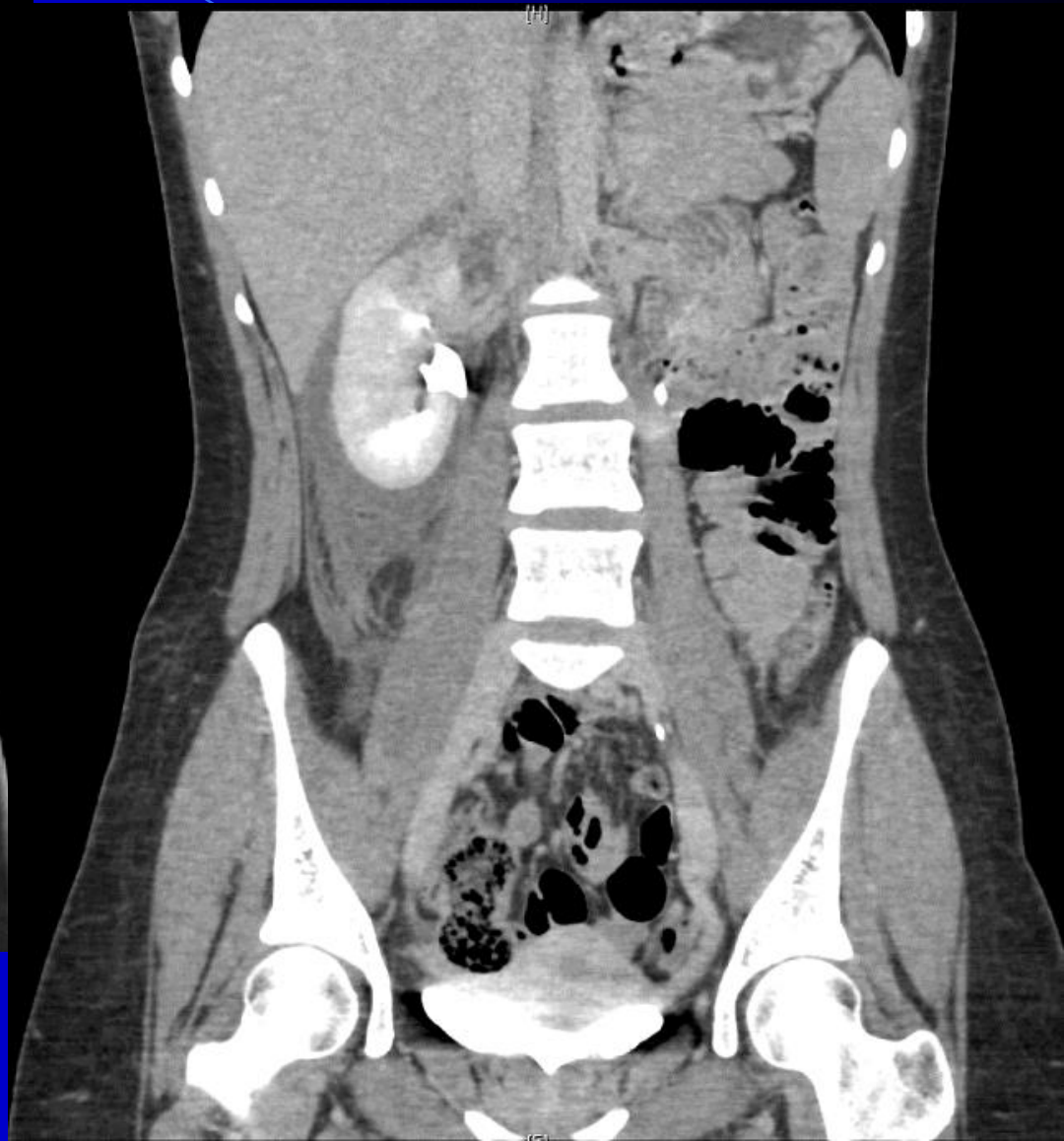
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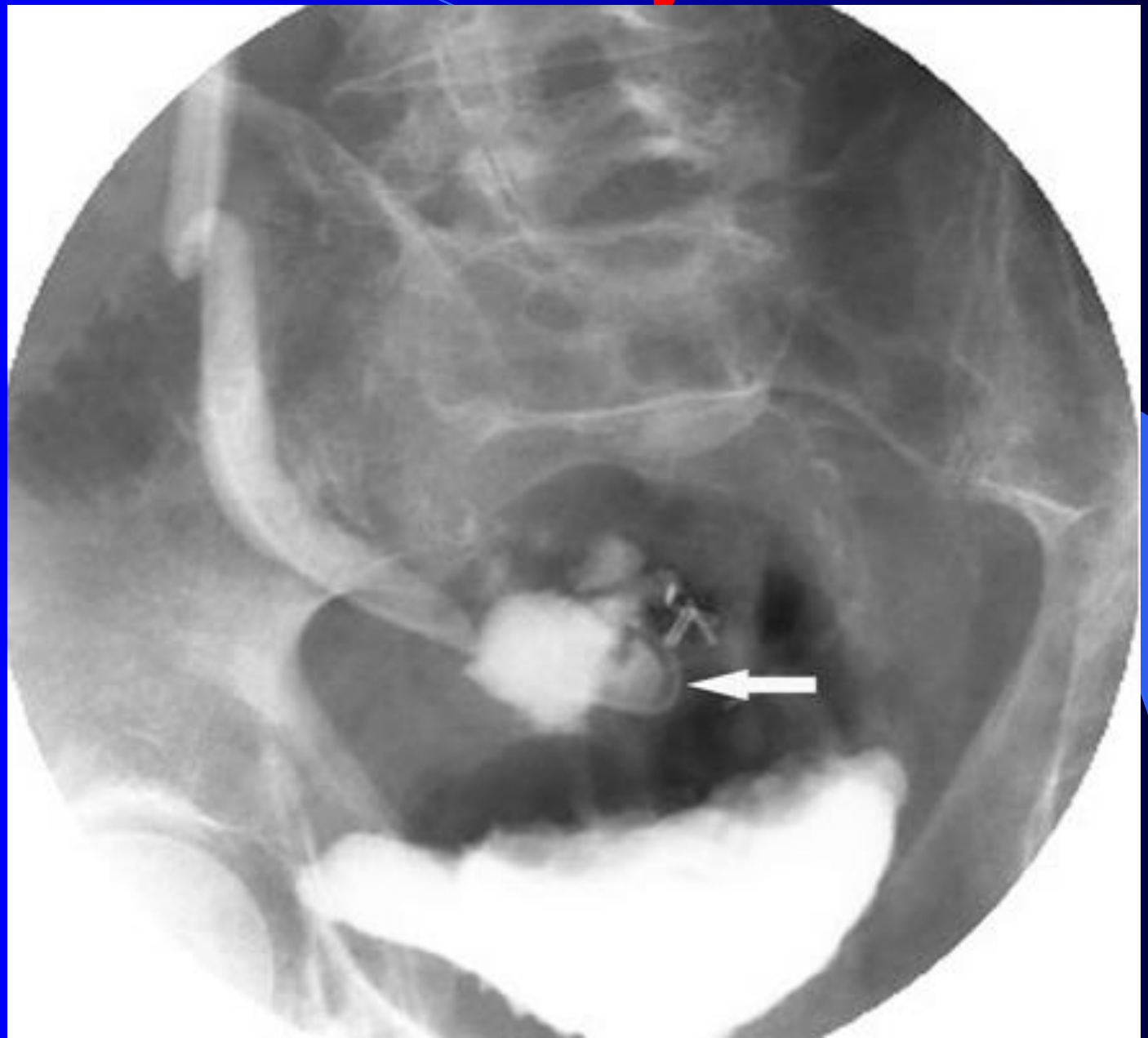
- **Management:**
  - Conservative:
    - Over 95% of blunt injuries
    - 50% of renal stab injuries and 25% of renal gunshot wounds (specialized center).
  - Include:

1. Wide Bore IV line.
2. IV antibiotics.
3. Bed rest
4. Vital signs monitoring.
5. serial CBC (HCT)
6. F/up US &/or CT.

- **Surgical exploration**:
  - Persistent bleeding (persistent tachycardia and/or hypotension failing to respond to appropriate fluid and blood replacement
  - Expanding peri-renal hematoma (again the patient will show signs of continued bleeding)
  - Pulsatile peri-renal hematoma

Ureteral Injuries



Ureteral Injuries…

- The ureters are protected from external trauma by surrounding bony structures, muscles and other organs

- Causes and Mechanisms:
  - External Trauma
  - Internal Trauma

Ureteral Injuries…

- External Trauma:
  - Rare
  - Severe force is required
  - Blunt or penetrating.
  - Blunt external trauma severe enough to injure the ureters will usually be associated with multiple other injuries
  - Knife or bullet wound to the abdomen or chest may damage the ureter, as well as other organs.

Ureteral Injuries…

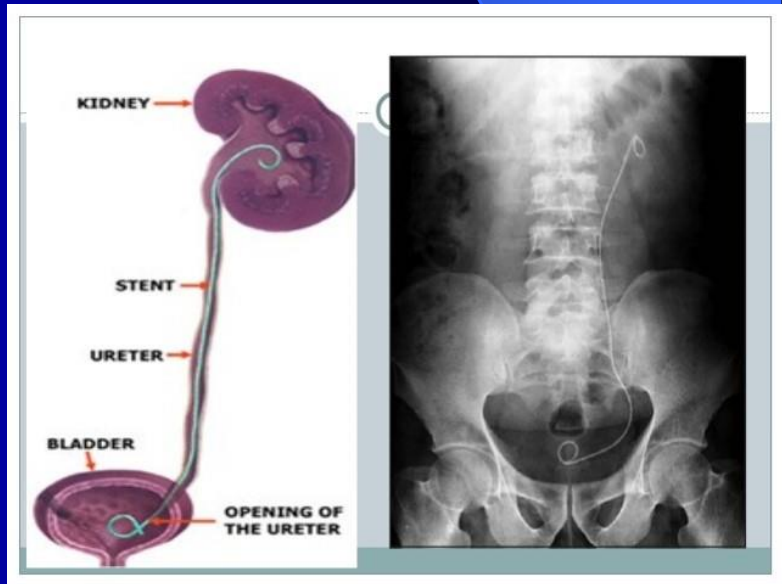
- Internal Trauma
  - Uncommon, but is more common than external trauma
  - Surgery:
    - Hysterectomy, oophorectomy, and sigmoidcolectomy
    - Caesarean section
    - Ureteroscopy
    - Aortoiliac vascular graft replacement
    - Laparoscopic
    - Orthopedic operations

Ureteral Injuries…

- **Diagnosis:**
  - Requires a high index of suspicion
  - Intra-operative:
  - Late:
    1. An ileus: the presence of urine within the peritoneal cavity
    2. Prolonged postoperative fever or overt urinary sepsis
    3. Persistent drainage of fluid from abdominal or pelvic drains, from the abdominal wound, or from the vagina.
    4. Flank pain if the ureter has been ligated
    5. An abdominal mass, representing a urinoma
    6. *Vague abdominal pain*

Ureteral Injuries…

- **Treatment options:**
  - JJ stenting
  - Primary closure of partial transaction of the ureter
  - Direct ureter to ureter anastomosis
  - Re-implantation of the ureter into the bladder using a psoas hitch or a Boari flap
  - Trans uretero-ureterostomy
  - Auto-transplantation of the kidney into the pelvis
  - Replacement of the ureter with ileum
  - Permanent cutaneous ureterostomy
  - Nephrectomy



Bladder Injuries

Bladder Injuries…

- **Causes:**
  - Iatrogenic injury
    - Transurethral resection of bladder tumor (TURBT)
    - Cystoscopic bladder biopsy
    - Transurethral resection of prostate (TURP)
    - Cystolitholapaxy
    - Caesarean section, especially as an emergency
    - Total hip replacement (very rare)

Bladder Injuries…

- Penetrating trauma to the lower abdomen or back
- Blunt pelvic trauma—in association with pelvic fracture or ‘minor’ trauma in a drunkard patient
- Rapid deceleration injury seat belt injury with full bladder in the absence of a pelvic fracture
- Spontaneous rupture after bladder augmentation

Bladder Injuries…

- **Types of Perforation:**

A) intra-peritoneal perforation

The peritoneum overlying the bladder, has been breached along with the wall the 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.

Bladder Injuries…

- **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

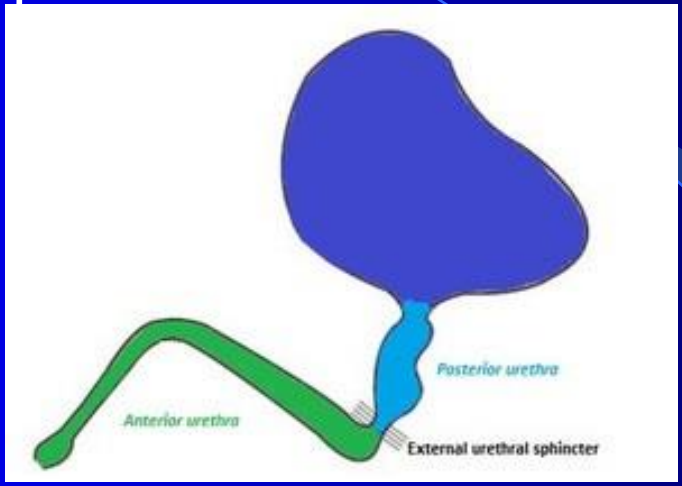
Bladder Injuries…

- **Management:**
  - **Extra-peritoneal**
    - Bladder drainage +++++
    - Open repair +
  - **Intra peritoneal**
    - open repair…why?
      - Unlikely to heal spontaneously.
      - Usually large
      - Leakage causes peritonitis
      - Associated other organ injury.

Urethral Injury

Urethral Injuries

- Anterior urethral injuries
- Posterior urethral injuries



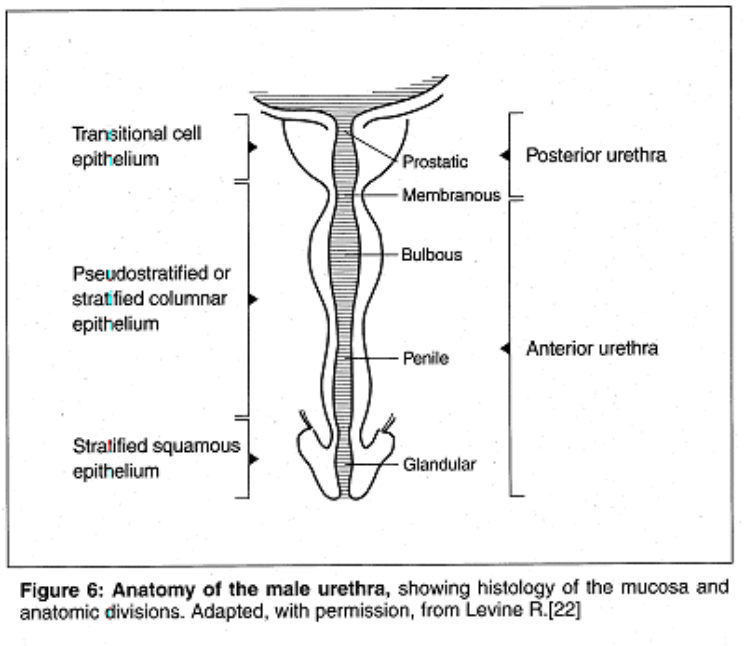
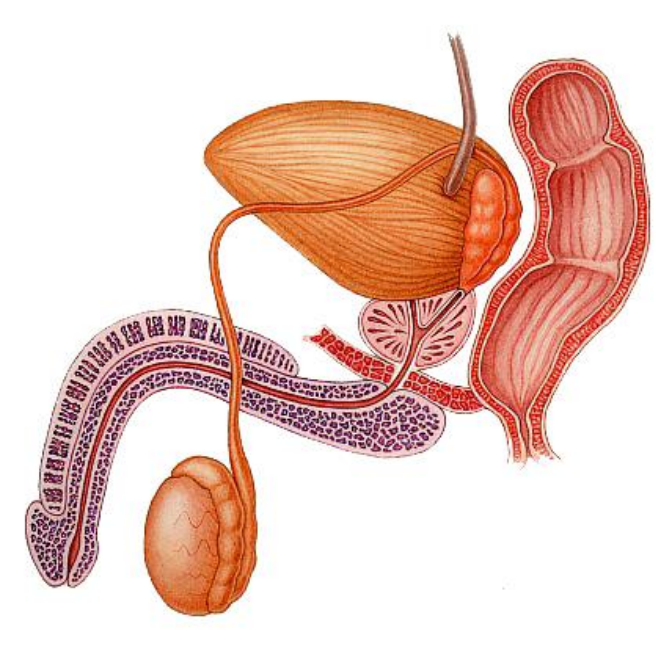
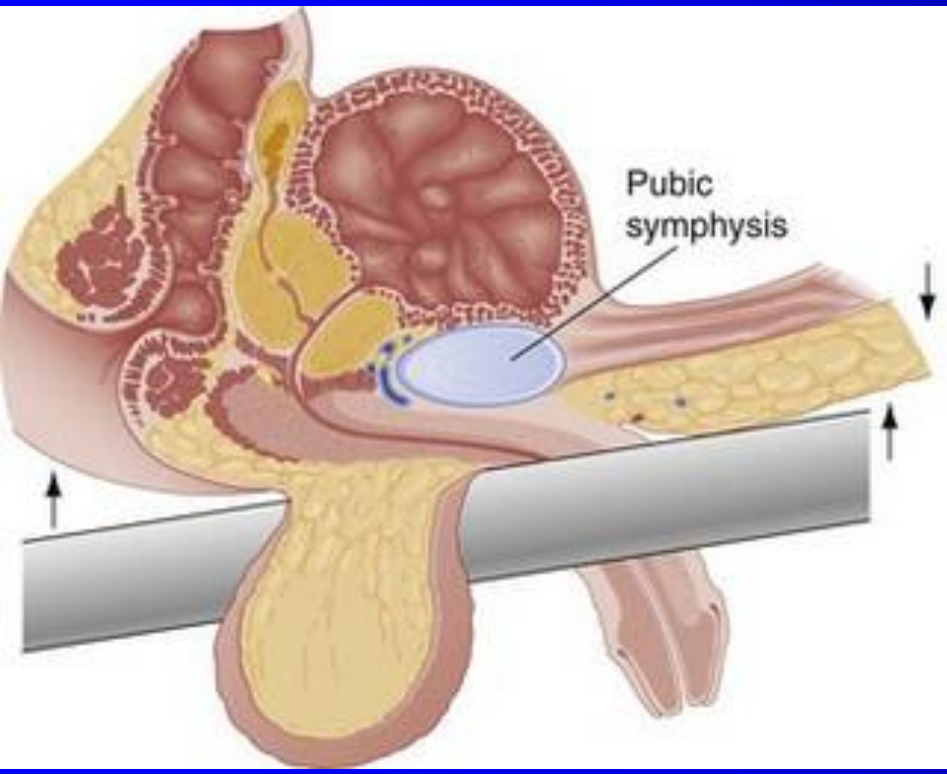


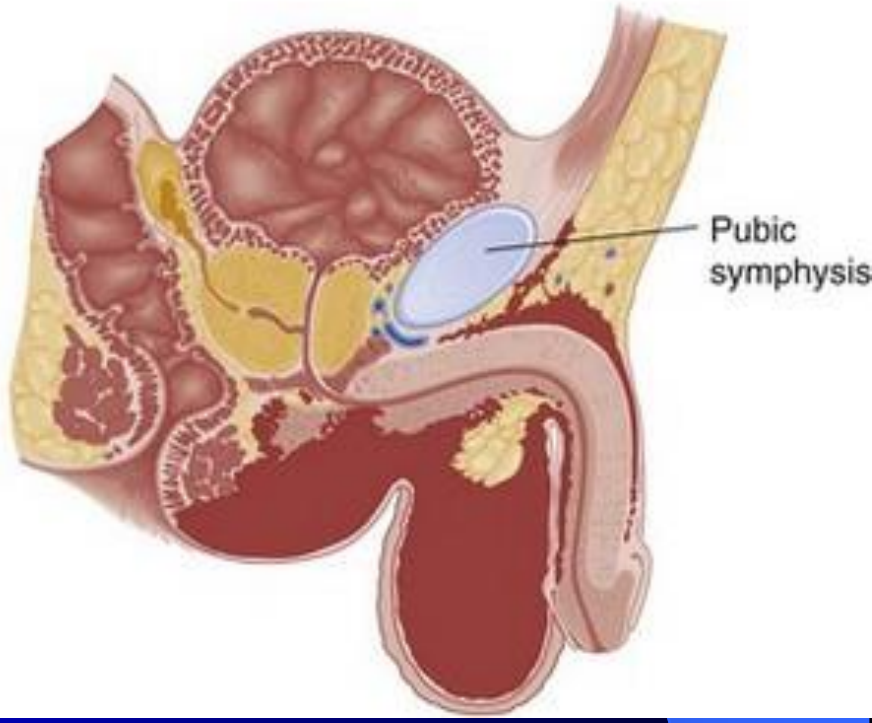
Figure 6: Anatomy of the male urethra, showing histology of the mucosa and anatomic divisions. Adapted, with permission, from Levine R.[22]



Anterior urethral injuries:

- Rare
- Mechanism:
  - The majority is a result of a straddle injury in boys or men.
  - Direct injuries to the penis
  - Penile fractures
  - Inflating a catheter balloon in the anterior urethra
  - Penetrating injuries by gunshot wounds.


Pubic
symphysis

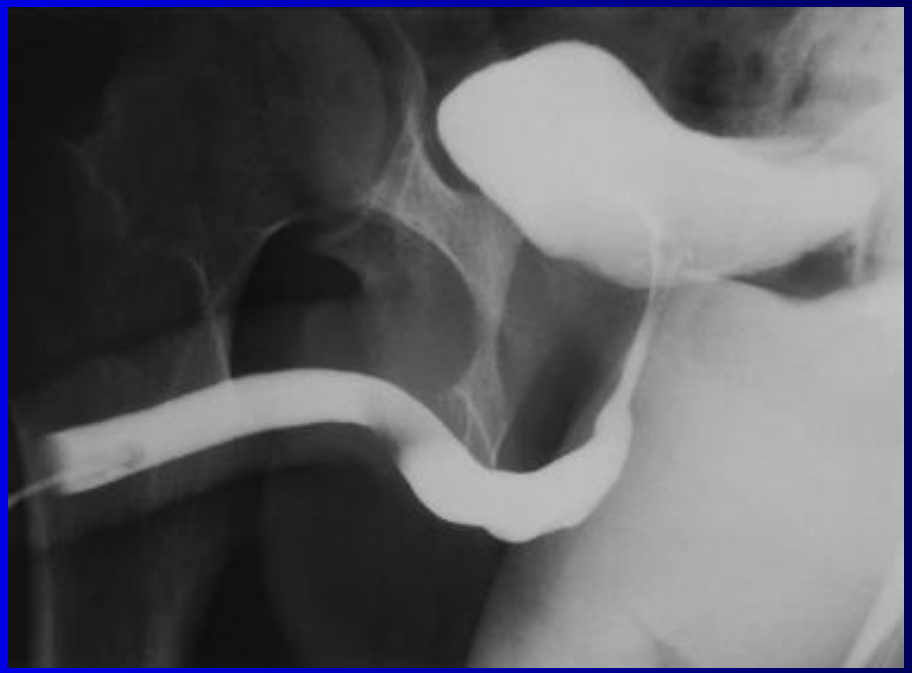

Pubic
symphysis

Anterior urethral injuries…

- **Symptoms and signs:**
  - Meatal Bleeding
  - Difficulty in passing urine
  - Frank haematuria
  - Hematoma may accumulate around the site of the rupture
  - Penile swelling

Anterior urethral injuries…

- **Diagnosis:**
  - Retrograde urethrography (Ascending urethrogram
    - Contusion: no extravasation of contrast:
    - Partial rupture : extravasation of contrast, with contrast also present in the bladder
    - Complete disruption: no filling of the posterior urethra or bladder



Anterior urethral injuries…

- **Management:**
  - Contusion
    - A small-gauge urethral catheter for one week
  - Partial Rupture of Anterior Urethra
    - No blind insertion of urethral catheterization

    (may be by using cystoscopy and guide wire)
    - Majority can be managed by suprapubic urinary diversion for one week
    - Penetrating partial disruption (e.g., knife, gunshot wound), primary (immediate) repair.

Anterior urethral injuries…

- Complete Rupture of Anterior Urethra
  - patient is unstable a suprapubic catheter.
  - patient is stable, the urethra may either be immediately repaired or a suprapubic catheter
- Penetrating Anterior Urethral Injuries
  - generally managed by surgical debridement and repair

Posterior urethral injuries

- 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

POSTERIOR URETHRAL INJURIES…

Classification of posterior urethral injuries

type I:(rare)

stretch injury with intact urethra

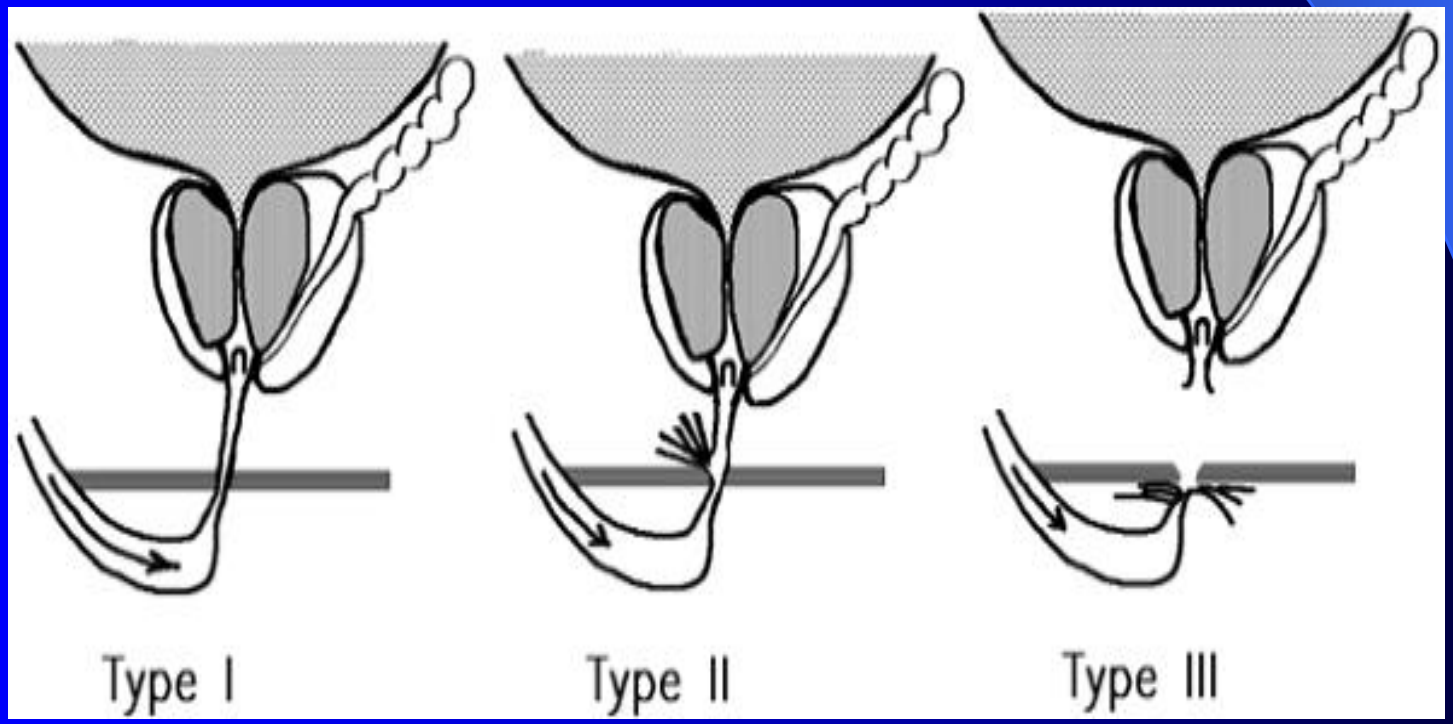
type II : (25%)

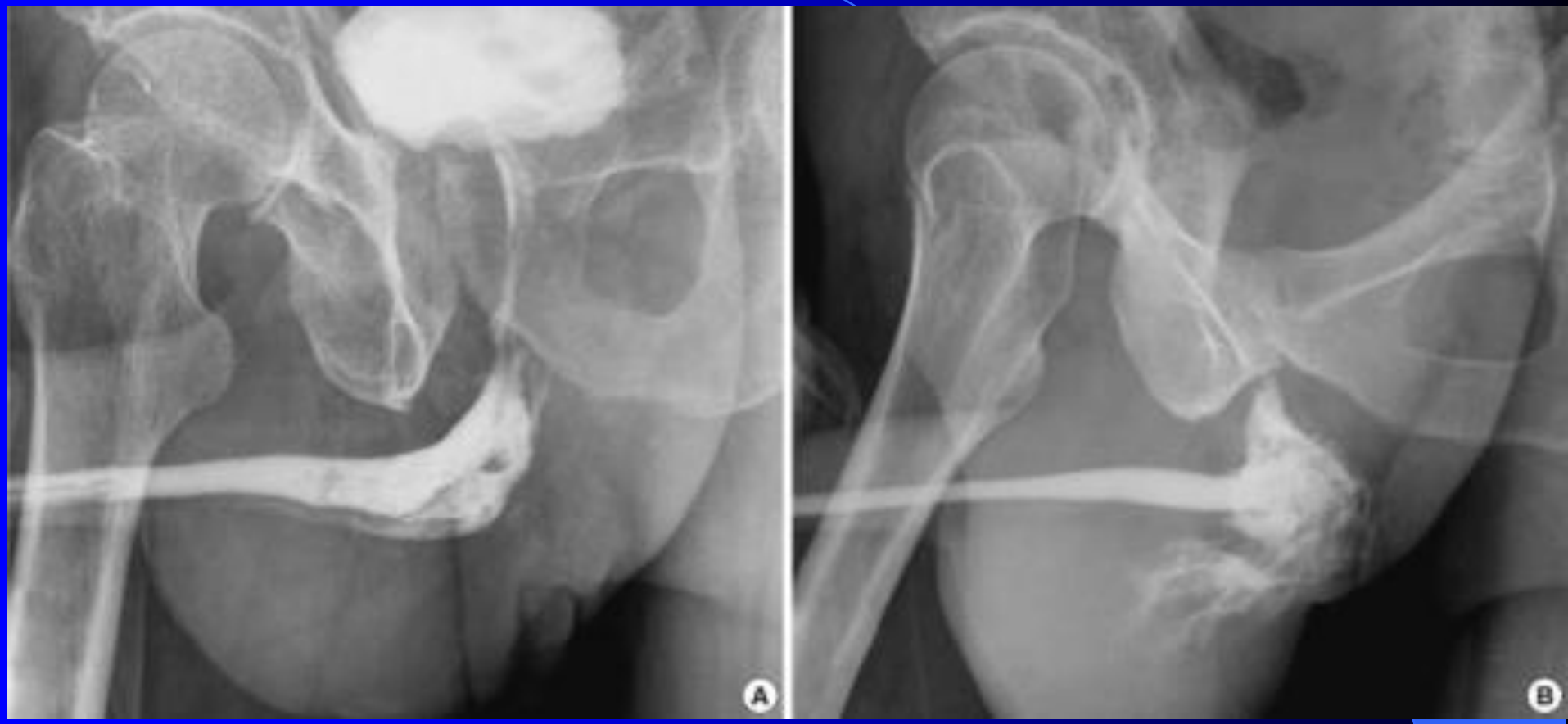
partial tear but some continuity remains)

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.




A
B

Posterior urethral injuries…

- **Management:**
  - Stretch injury (type I) and incomplete urethral tears(type II) are best treated by stenting with a urethral catheter
  - Type III
    - Patient is at varying risk of urethral stricture, urinary incontinence, and erectile dysfunction (ED)
    - Initial management with suprapubic *cystotomy and attempting primary repair at 7 to 10 days after injury.*

External Genital injuries

External Genital injuries…

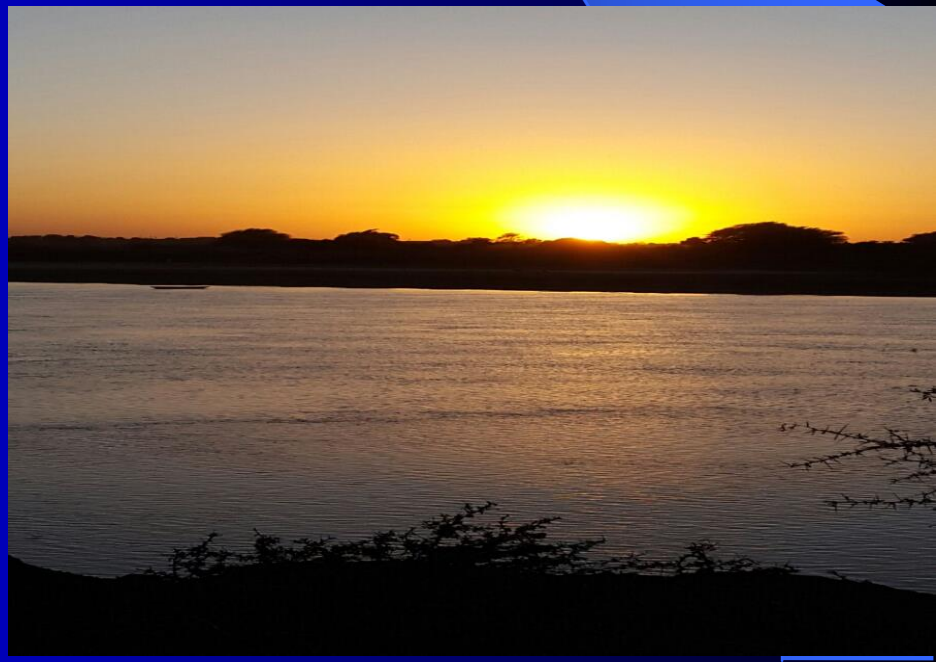
Penile Fracture

- Glans Injury
- Penile amputation and injuries

Scrotal Injuries

Female External genitalia injuries

Managed by Gynecologists unless the urethra is involved

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