Congenital Anomalies of The Genitourinary Tract

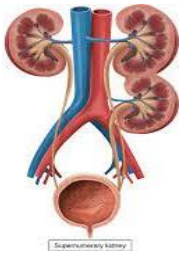
- Classification of anomalies:
  - Kidney Anomalies.
  - Ureteral Anomalies.
  - Bladder And Urethral Anomalies.
  - Penis Anomalies.
  - Undescended Testis (UDT).

Kidney Anomalies

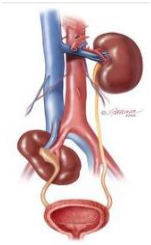
1. Anomalies of Number.
2. Anomalies of Position and Fusion.
3. Renal Cystic Diseases.
4. Anomalies of Rotation.
5. Renal Dysplasia.

- Anomalies of Number:
  - **Renal Agenesis:**
    - Is the Absence of renal tissue.
    - Unilateral or bilateral.
    - Absence of the ipsilateral hemitrigone is usually diagnostic of unilateral renal agenesis.
    - Unilateral renal agenesis may be an isolated congenital malformation or associated with other anomalies.

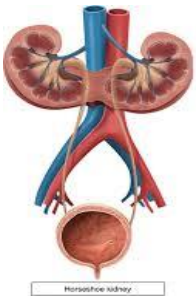
  - **Supernumerary kidney:**
    - Is kidney in addition to two kidneys.
    - Also known as accessory kidney.
    - It may or may not be fused to the other kidney.



- Anomalies of Rotation:
  - **Malrotation:**
    - Occurs around the vertical axis.
    - With persistent anterior position of the renal pelvis being the most common type.
    - It may be unilateral or bilateral.
- Anomalies of Position & Fusion
  - **Pelvic kidney:**
    - Is the most recognizable ectopic kidney.
    - Lying extra peritoneally in the iliac fossa.
    - Incidence of 1 in 1000.
    - Usually occurs in males on the left side.



  - **Crossed Renal Ectopia:**
    - The crossed kidney lying inferiorly.
    - The ueteral orifices are located normally.
  - **Horseshoe Kidney:**
    - Is the most common type of fusion.
    - 90% fused at the lower poles by an isthmus.
    - This passes in front of the aorta, just below the origin of the inferior mesenteric artery at the level of L4.
    - One third of patients remain asymptomatic.



- Others may present with symptoms of:
  - ✓ Hydronephrosis [UPJ obstruction].
  - ✓ Infection.
  - ✓ Stones.

N.B:

-The position of the kidneys, normally on the posterior abdominal wall.

-May vary according to the site at which their embryological ascent from the pelvis was arrested.

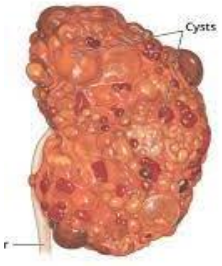
❖ Renal Dysplasia:

- Is a form of abnormal renal morphogenesis.
- Characterized histologically by primitive ducts and cartilage.

❖ Renal Cystic Disease:

- Most renal cysts are congenital and arise from dilated obstructed collecting ducts.
- Many different classification schemes have been advanced.

➢ Autosomal Recessive Polycystic Kidney Disease:



- Is a rare autosomal recessive with no sex predilection.
- The kidneys contain many tiny cysts, so their shape is preserved.
- Other features:
  - ✓ Hypertension.
  - ✓ Pulmonary hypoplasia.
  - ✓ Congenital hepatic fibrosis.

➢ Autosomal Dominant Polycystic Kidney Disease:

- Is an inherited multisystem disorder.
- Characterized by renal and extra renal fluid-filled cyst formation.
- Considered the fourth leading cause of end stage renal disease.
- The kidney shape is distorted by multiple cysts of varying size, imaged best with ultrasound or CT scans.
- **This condition is characterized by:**
  - ✓ Diffuse bilateral progressive cystic degeneration of the kidneys.
  - ✓ Hypertension.
  - ✓ Progressive renal failure.
  - ✓ Death around age 50.

- **Cardinal clinical findings are:**
  - ✓ Positive family history.
  - ✓ Flank masses.
  - ✓ Hypertension.
  - ✓ Renal failure.
- **Treatment:**
  - ✓ Medical management of renal failure with eventual dialysis.
  - ✓ Renal transplantation.

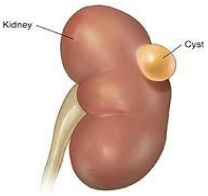
➢ Multicystic Dysplastic kidney (MCDK):

- It is a form of renal dysplasia.
- **Characterized by being:**
  - ✓ Multiple.
  - ✓ Non communicating.

- ✓ Cysts of varying size.
- ✓ Separated by dysplastic parenchyma.

- Characterized by absence of a normal pelvicalyceal system.
- It is the most common cause of abdominal mass in the neonatal period and is the most common cystic malformation of the kidney in infancy.

➢ **Simple Cysts (Retention Cysts):**

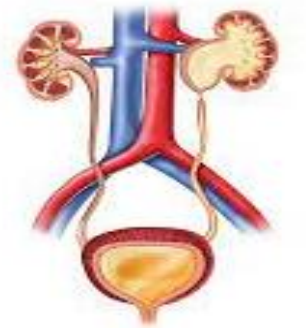


- The most common cystic lesions of the kidney.
- May be solitary or multiple.
- Unilateral or bilateral.
- **<u>They present clinically as:</u>**
  - ✓ Abdominal mass.
  - ✓ Incidental finding on US or CT scan.
  - ✓ They seldom cause symptoms or require treatment.

Ureteral Anomalies

1. Ureteropelvic Junction Obstruction.
2. Vesicoureteral Reflex.
3. Ureteral Duplication.
4. Ectopic Ureter.
5. Ureterocele.

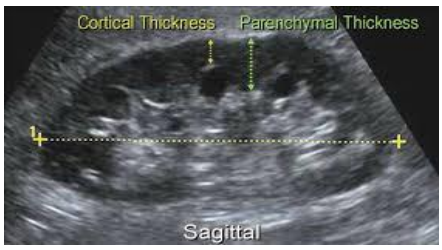
❖ <u>Ureteropelvic Junction Obstruction:</u>



➢ **Definition:**
- Obstruction to urine outflow from the kidney to proximal ureter.
- **It is the commonest cause of pediatric hydronephrosis.**
- Occurring in 1 in 1000-2000 live births.

➢ **Etiology:**
- Intrinsic lesion of the circular smooth muscle of the UPJ (adynamic segment).
- Valvular mucosal folds.
- Extrinsic compression by an aberrant, accessory, or early branching vessel to the lower pole.

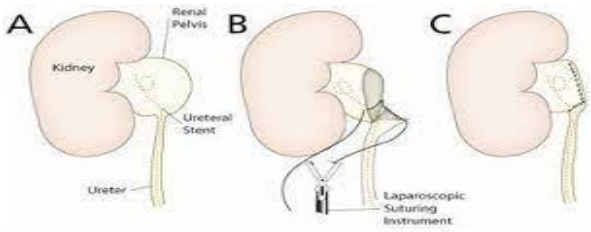
➢ **Diagnosis (most cases are diagnosed nowadays by antenatal scan):**



- Ultrasound (AP diameter of renal pelvis, Parenchymal thickness).
- CTU.
- Radio-active isotopes study (diuretic renogram).

➢ **Treatment:**
- Based on AP diameter of renal pelvis and symptoms, children are either treated conservatively or surgically.
- **<u>Indication of surgery:</u>**
  - ✓ AP diameter > 50 mm.
  - ✓ Obstruction with differential function <40% on renogram.
  - ✓ Deterioration of renal function during follow up.

- **Pyeloplasty:**
  - ✓ Is the gold standard treatment that can be done either open, laparoscopic or robotic.
- **Anephrectomy**
  - ✓ May be indicated if < 10 renal function remains.



❖ Vesicoureteral Reflux:

- Is the backward flow of urine from the bladder into the upper urinary tract.
- Associated with recurrent urinary tract infections and a particular form of renal damage known as reflex nephropathy.
- Result in hypertension or end stage renal failure if not treated.
- It may be primary or secondary to a neurogenic bladder.
- Primary VUR occurs in 1 % of children five times more common in girls and there is often a family history.

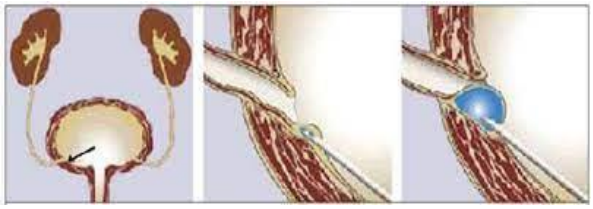
➢ **Factors associated with primary VUR include the following:**
- A short submucosal ureter.
- Lateral placement of the ureteral orifice.
- Abnormal configuration of ueteral orifice (e.g., stadium, horseshoe, and golf hole orifice).
- Infection.

➢ **Grading system: Is based primarily on the radiographic appearance of the calyces on voiding cystourethrography:**
- Grade I Reflux into non dilated ureter.
- Grade II Reflux into pelvis and calyx's ureter and renal pelvis.
- Grade IV Moderate dilatation and or tortuosity of ureter.
- Grade V sever dilatation and tortuosity of ureter, renal pelvis, and calyces.

➢ **Diagnosis:**
- The commonest presentation is a child with recurrent UTI.
- The principal diagnostic test for evaluating VUR: the Voiding Cystourethrogram (VCUG).

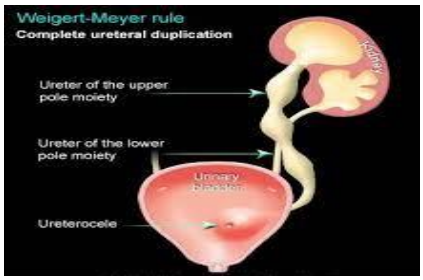
➢ **Treatment:**
- **Medical management:**
  - **It is appropriate for:**
    - ✓ All infants < year and young children.
    - ✓ With mild to moderate grades of reflux (I-III).
  - **Consists of:**
    - ✓ Regular timed voiding.
    - ✓ Continuous low dose antibiotic prophylaxis.
    - ✓ Regular urine cultures (every month).
    - ✓ Yearly voiding cystourethrogram and renal ultrasound.

- **Surgical management:**
  - The success rate for antireflux (uretero-vesical re implantation) procedures is >90% in experienced hands.
  - **Indications for early surgical intervention are:**
    - ✓ Severe reflux (grade IV or V).
    - ✓ Breakthrough infection despite antibiotic prophylaxis.
    - ✓ Progressive renal scarring and damage on antibiotic prophylaxis.
  - **Endoscopic:**
    - ✓ Endoscopic sub trigonal injection of the ureteric orifice is a new accepted technique for treatment of VUR in selected cases.



❖ Ureteral Duplication:

- Is the most frequent anomaly of the ureter and is twice as common in females as in males.
- It ranges from a bifid pelvis to a complete duplex system with two ureters passing down to open with two ueteral orifices in the bladder.
- In this case, the ureteral orifice of the upper renal segment drains inferiorly and medially to the orifice of the lower segment (Meyer- Weigert law).
- The orifice draining the upper segment is prone to the development of a ureterocele and is often obstructed, whereas the orifice of the lower segment generally refluxes.



➢ Clinical picture:

- Most duplex abnormalities are asymptomatic.
- Duplex kidneys can however be associated with complication.
- Some of complications are associated with ectopic insertion of the upper moiety ureter of a complete duplex.
- Often occurring with an ureterocele this in female cases can cause incontinence.
- Another common complication is reflux of the lower moiety which can predispose to recurrent UTI.

➢ Investigations:

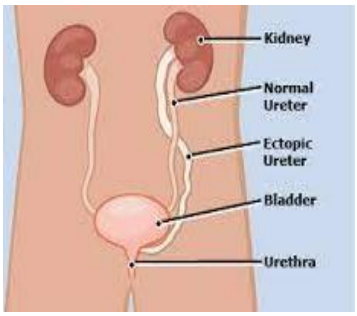
- Magnetic resonance (MR).
- Computed tomography (CT).
- Nuclear medicine studies.
- Micturating cystourethrograms (MCUS).

➢ Treatment:

- Symptoms refractory to antimicrobials: Ureteric reimplantation for reflux.
- Ureterocele: Endoscopic incision.

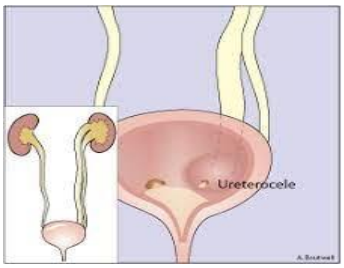
❖ Ectopic Ureter:

- Is one that opens in some location other than the bladder.
- 80% are associated with a duplicated system, usually in females.
- 20% are single ectopic ureters usually occurring in males with an absent hemitrigone.



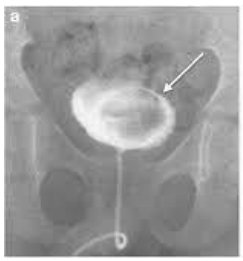
- Most common sites for insertion of the ectopic orifice in Females are present as urinary incontinence:
  - Urethra.
  - Vestibule.
  - Vagina.
- Most common sites for insertion of the ectopic orifice in male are:
  - Posterior Urethra.
  - Seminal vehicles.
- Often remaining unrecognized until late in life.
- Continuous incontinence in an otherwise normal female should suggest an ectopic ureteral orifice.
- Males present with urinary tract infections, not incontinence.

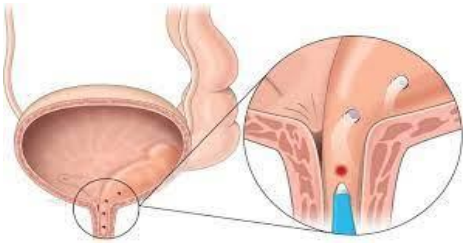
❖ Ureterocele:



- Is a congenital cystic ballooning of the terminal submucosal ureter mostly secondary to stenotic ureteral orifice.
- It is classified as simple or ectopic.

➢ **Investigations:**
  - Antenatal Ultrasound.
  - Cystoscopy For confirmation.
  - IVU (Cystogram Phase) Characteristic cobra head or spring onion.
  - VCUG Assess for reflux (40%).





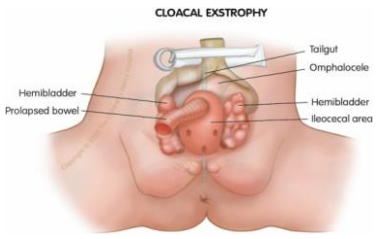
➢ **Treatment:**
  - By endoscopic transurethral incision of the ureterocele allowing drainage.
  - In ectopic cases, excision and reimplantation may be needed.

Bladder & Urethral Anomalies

❖ Exstrophy Complex:

- Is a rare congenital defect secondary to persistence of the cloacal.
- It occurs in approximately 1 in 3000. live births.
- Male predominance of 3:1.
- Three major subgroups are recognized to represent different degrees of severity of membrane in utero.

➢ **Cloacal Exstrophy (10%):**
  - There is a massive defect of the anterior abdominal wall.



- Exposed bladder.
- Ileocecal bowel.
- Short blind-ending colonic segment with imperforate anus.
- Myelomeningoceles are present in 50%.
- Management of these severe problems has recently become more aggressive with some encouraging and successes.

➢ **Classical Bladder Exstrophy (60%):**

- Classical bladder exstrophy presents as a protruding red mass in the suprapubic region.
- Is the exposed back wall and trigone of the bladder and an epispadias urethra leaking urine.
- Associated defects include a widely separated pubic symphysis and lower rectus muscles.
- **Treatment:**
  - ✓ All patients deserve an attempt at staged functional reconstruction.
  - ✓ Preferably in the first 48 hrs. of life to minimize bladder damage secondary to environmental exposure.

➢ **Epispadias (30%):**

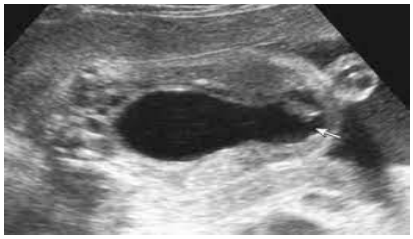
- Is the least severe defect with only an open urethra.
- On the dorsum of the penis.
- Or dorsum of clitoris in females.
- And less separation of the pubic symphysis.

❖ Posterior Urethral Valves:

- Are the most common etiology of bladder outlet obstruction in boys.
- Occur in 1 per 5000-8000 male births.
- They are congenital membrane-like structures located in the distal prostatic urethra covered by transitional epithelium.
- They present with varying degrees of obstruction are usually diagnosed antenatally

➢ **Diagnosis:**

- Typical prenatal findings include bilateral hydroureteronephrosis.
- Distended bladder.
- Dilated prostatic urethra.



➢ **Investigations:**

- **Ultrasound**
  - ✓ Most PUVs are diagnosed after detection of hydronephrosis by routine prenatal ultrasound.
- **VCUG**
  - ✓ Demonstrating a dilated and elongated posterior urethra and reflux in about 50%.
- **Cystourethroscopy**
  - ✓ Direct visualization can be made during along with noting bladder trabeculation.

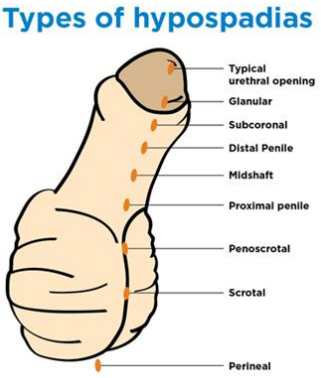
➢ **Treatment:**

- Endoscopic resection of the valves.
- **Treatment of PUV requiring active management from infancy to adulthood to avoid:**
  - ✓ Progressive renal dysfunction.
  - ✓ Deterioration of the upper and lower urinary tracts.

Penile Anomalies

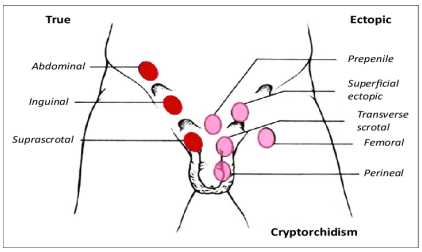
❖ Hypospadias:

- **Hypospadias is the commonest congenital anomaly of the penis.**
- It can be expected to occur in about one of every 300 live male births.
- Have a multifactorial genetic mode of inheritance.
- Resulting from an incomplete development of the anterior urethra.
- The defect primarily involves an abnormal urethral opening Proximal to its normal location and often with an associated ventral chordee or curvature of the penis as well as absence of ventral part of prepuce.



➢ **Familial incidence:**
- An additional family member with hypospadias is found in 7% of families, but this is more predominant in anterior and middle forms.
- Classification is simply by anatomic description of the meatal position.

➢ **Classification:**
- Distal-anterior hypospadias **(located on the glans or distal shaft of the penis and the most common type of hypospadias).**
- Intermediate-middle (penile).
- Proximal-posterior (penoscrotal, scrotal, perineal).

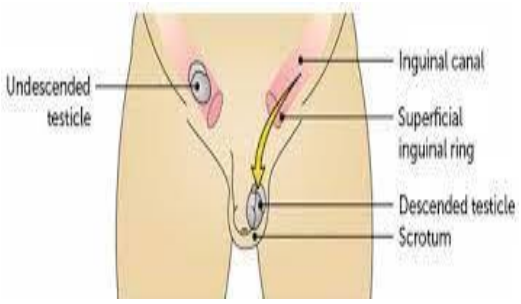


➢ **Associated Anomalies (Up to 10%):**
- Inguinal hernia (9-15%).
- Severe hypospadias with unilaterally or bilaterally impalpable testis.
- Or with ambiguous genitalia, requires a complete genetic and endocrine work-up immediately after birth to exclude DSD.

➢ **Management (Surgical):**
- All must contend with functional and plastic repair of the chordee.
- The optimal time for repair is between **6 to 18-24 months.**
- **Surgical complications include:**
  - ✓ Failure.
  - ✓ Urethrocutaneous fistula.
  - ✓ Persistent chordee.
  - ✓ Urethral stricture.
  - ✓ Diverticula.
  - ✓ Meatal stenosis.

❖ Undescended Testis:

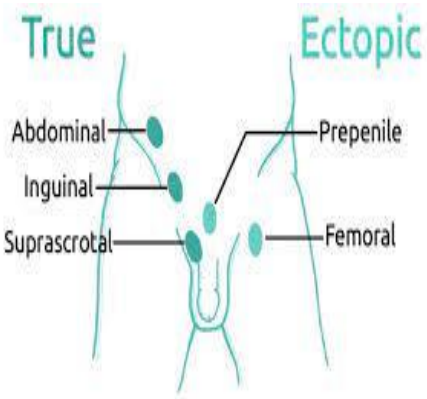
- UDT is one of the most common disorders in pediatric urology.
- Undescended testis may be arrested along the line of descent from the posterior abdominal wall (Cryptorchidism).
- Or located in an abnormal site (ectopic): such as the perineum.
- It has been observed to occur in1.0-4.6% of full ten infants and 1.1-45% of premature infants.



- 10% of cases are bilateral.
- The etiology is unclear, but it may be related to abnormal development of the gubernaculum and epididymis and fetal androgen levels.

➢ **Classification of undescended testis:**

- **Palpable**
  - Inguinal.
  - Ectopic.
  - Retractile.
- **Non-Palpable**
  - Inguinal.
  - Ectopic.
  - Intra-Abdominal.
  - Absent:
    - ✓ Agenesis.
    - ✓ Vanishing Testis.

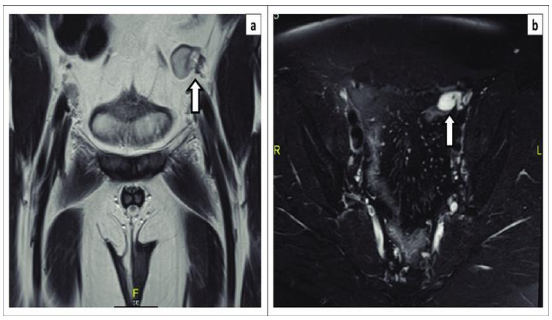


➢ **Significance:**

- Ten percent of testicular cancer arise in an undescended testis.
- Fertility is impaired (30% only with bilateral cryptorchidism will be fertile).
- A high incidence of inguinal hernia (25%).
- An increased susceptibility of Torsion.

➢ **Diagnosis:**

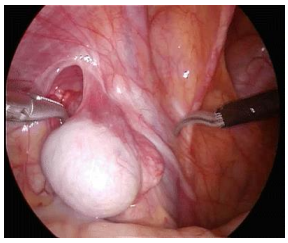
- History taking.
- Physical examination.
- Clinical examination should distinguish a retractile testis from a UDT.
- **A retractile testis is one that can be easily brought down into the scrotal position when the child is:**
  - ✓ Relaxed (ideally squatting).
  - ✓ Or under anesthesia.
- TTT is not required.
- Imaging studies cannot determine with certainty whether a testis is present or not.
- Imaging modalities is limited and only recommended in specific and selected clinical scenarios.
- Such as identification of Müllerian structures in cases with suspicion of DSDs.



➢ **Treatment:**

- **Aim:**
  - Decrease potential for malignancy.
  - Improve prospects of fertility.
  - Decrease risk of torsion.
  - Repair inguinal hernias.
  - Avoid Psychological Problems.
- **Hormonal therapy:**
  - Hormonal therapy using hcG or gonadotropin-releasing hormone (GnRH). Based on hormonal dependence of testicular descent. But has a limited success rate of only 20%. Success rates depend on testicular location.
  - The higher the testis is located prior to therapy, the Lower the success rate.
  - Hormonal therapy is contraindicated in ectopic testes, Hernia, and after prior orchiopexy.

- **Surgical therapy:**
  - **Palpable testis:**
    - ✓ Orchiopexy.
    - ✓ Adequate mobilization.
    - ✓ Fixation.
    - ✓ Repair of the associated hernia and fixation of the testis in sub - dartos pouch.
  - **Non Palpable testis:**
    - ✓ **Still non-Palpable**
      - Diagnostic Laparoscopy.
      - Inguinal exploration with possible laparoscopy.
    - ✓ **Palpable**
      - Standard orchidopexy.



In diagnostic Laparoscopy:

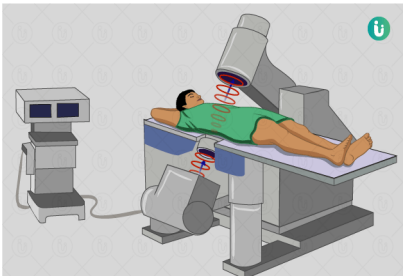
- Testis close to Internal Ring: Laparoscopic or inguinal Orchidopexy.
- Testis too high for orchiopexy: Staged Fowler Stephens Procedure.
- Blind ending Spermatic vessels: vanishing testis no further steps.
- Spermatic Vessels enter inguinal ring: exploration Inguinal.

Genitourinary Trauma

Renal Trauma

❖ Introduction:
- 8-10% of all abdominal trauma.
- 80-90% have blunt renal trauma.

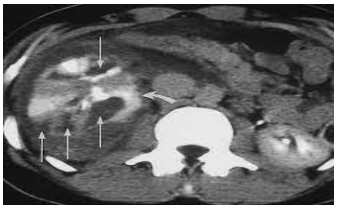
❖ Etiology:
- Penetrating (e.g., gunshot wounds, stab wounds).
- Blunt (e.g., pedestrian struck, motor vehicle crash, sports, fall).
- iatrogenic (e.g., endourologic procedures (PCNL), ESWL).



❖ Initial Evaluation:
- Vital signs.
- Physical examination of the flanks for ecchymosis, fracture rib or stab wound, gross hematuria on catheter insertion.
- Hb%, hematocrit and baseline creatinine Urine analysis.
- Hematuria is the hallmark of injury to the kidney, although the degree of hematuria does not correlate well with the extent of injury.

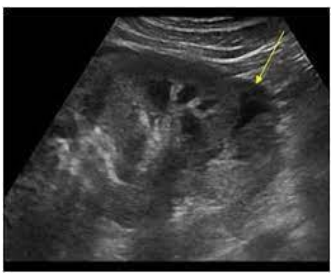
❖ Investigations:

➢ **CT Urography scan (The investigation of choice):**
- **Sensitive and specific for demonstrating:**
  - ✓ Parenchymal lacerations.
  - ✓ Urinary extravasations.
- **Delineating:**
  - ✓ Segmental parenchymal infarcts.
  - ✓ Size and Location of retroperitoneal hematoma associated intra- abdominal injury (spleen, liver, and bowel).

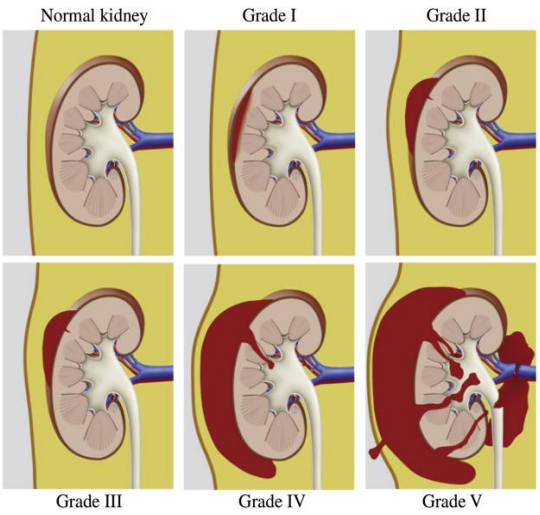


➢ **IVU:**
- For assessment of gross function and the evaluation of the contralateral kidney in hemodynamically unstable patients.

➢ **Ultrasound:**
- Used only as a part of the primary trauma survey (FAST).
- Not recommended as an initial study.
- Operator dependent.
- Can not determine the function.
- Can be an option for follow up.
- Grading of renal injury.



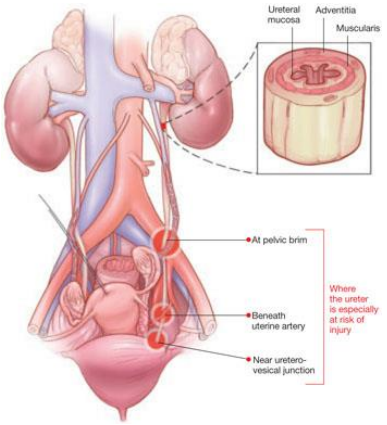
- Grading:
  - **Grade I**
    - Contusion or contained subcapsular hematoma, without parenchymal laceration.
  - **Grade II**
    - Confined perirenal hematoma or cortical laceration less than one cm deep without urinary extravasation (simple laceration).
  - **Grade III**
    - Parenchymal laceration extending more than cm into the cortex without urinary extravasations.
  - **Grade IV**
    - Parenchymal laceration extending through the corticomedullary junction and into the collecting system with urinary extravasation.
    - Main renal artery or vein injury.
  - **Grade V**
    - Completely shuttered kidney.
    - Avulsion of renal hilum which devascularizes the kidney.



- Management:
  - **Conservative Management:**
    - Blunt injury: Stable patient.
    - Penetrating injury: Stable and site of injury (post to the anterior axillary line).
  - **Indication of surgical intervention:**
    - The unstable patient (not respond to resuscitation) Persistent.
    - Renal bleeding. (Vascular contrast extravasation).
    - Concomitant laparotomy for associated injuries.
    - Penetrating trauma.
    - Nonviable tissue and major laceration.
    - Urinary extravasation.
- Complications
  - **Early (within weeks)**
    - Urinary extravasation and urinoma (usually cured spontaneously) Needs DJ or PCN drainage.
    - Perinephric abscess, sepsis, (PC drainage).
    - Delayed bleeding, arteriovenous fistula pseudoaneurysm Hypertension.
  - **Late (within months):**
    - Hydronephrosis.
    - Calculus formation.
    - Chronic pyelonephritis.
    - Hypertension.

Ureteral Trauma

Introduction:



- Ureteral injuries are quite rare.
- **Most are iatrogenic.**
- They are often missed intra-operatively, usually involve the lower ureter, and may result in severe sequelae.
- Overall, ureteral trauma accounts for 1-2.5% of urinary tract trauma.
- Ueteral injury should be suspected in all cases of penetrating abdominal injury, especially gunshot wounds, as it occurs in 2-3% of cases.
- It should also be suspected in blunt trauma with a deceleration mechanism, as the renal pelvis can be torn away from the ureter.

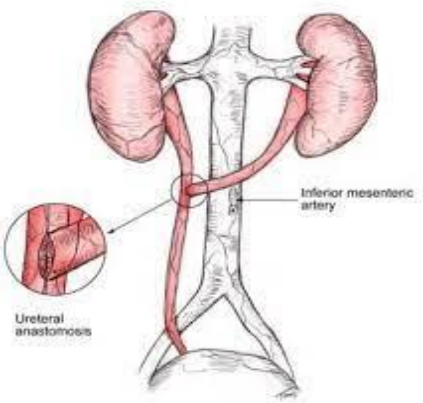
Diagnostic Evaluation:

- A high index of suspicion of ureteral injury should be maintained as most cases are diagnosed late.
- Predisposing the patient to pain, infection, and renal function impairment.
- Hematuria is an unreliable indicator.
- Extravasation of contrast material in computed tomography (CT) is the hallmark sign of ureteral trauma.
- In unclear cases, a retrograde or antegrade urography is required for confirmation.

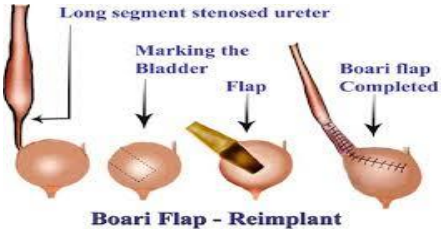
Management:

➢ **Will depend on whether injury is recognized immediately or after some period of delay:**

- Immediate recognition.
- Delayed recognition.



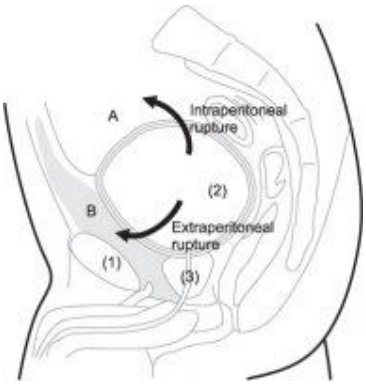
- **Immediate recognition:**
  - ✓ Injuries diagnosed within a few days should be treated with exploration.
  - ✓ An internal stent should be left until it is completely healed.
  - ✓ Ureteroureterostomy is the preferred repair, when possible, in abdominal (upper) ureter.
  - ✓ Lower ureteral injuries can be treated by reimplantation into the bladder with or without psoas hitch or boari bladder flap.



- **Delayed recognition:**
  - ✓ Urinary diversion by percutaneous nephrostomy and drainage of any urinary collection.
  - ✓ Reconstructive surgery is undertaken when hydronephrosis or/and infection subsided.

Bladder Trauma

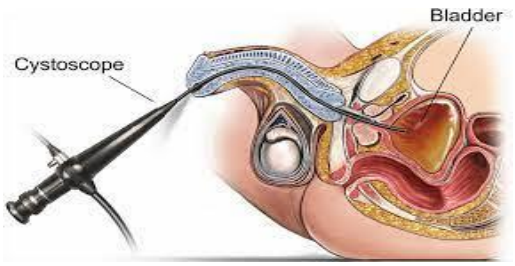
Introduction:



- Bladder trauma is primarily classified according to the location of the injury as it guides further management:
  - ✓ Intraperitoneal.
  - ✓ Extraperitoneal.
  - ✓ Combined intra/extraperitoneal.
- Bladder trauma is categorized by etiology:
  - ✓ Non-iatrogenic (blunt and penetrating).
  - ✓ Iatrogenic (external and internal).
- Extraperitoneal injury:
  - ✓ Is almost always associated with pelvic fractures.
- Intraperitoneal injury:
  - ✓ Is caused by a sudden rise in intravesical pressure of a distended bladder secondary to a blow to the pelvis or lower abdomen.

Diagnostic Evaluation:

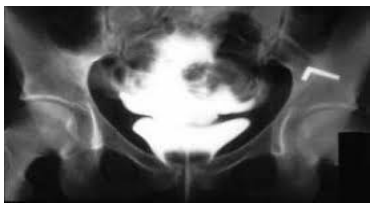
- The principal sign of bladder injury is visible hematuria.
- **Absolute indications for bladder imaging include:**
  - ✓ Visible hematuria and a Pelvic fracture.
  - ✓ Non-visible hematuria combined with high-risk pelvic fracture.
  - ✓ Posterior urethral injury.
- **In the absence of these absolute indications, further imaging is based on clinical signs and symptoms including:**
  - ✓ Inability to void or inadequate urine output.
  - ✓ Abdominal tenderness or distension due to urinary ascites, or signs of urinary ascites in abdominal imaging.
  - ✓ Uremia and elevated creatinine level due to intraperitoneal reabsorption.
  - ✓ Entry/exit wounds at lower abdomen, perineum, or buttocks in penetrating injuries.
- **Intra-operative signs of external iatrogenic bladder injury include:**
  - ✓ Extravasation of urine.
  - ✓ Visible laceration.
  - ✓ Visible bladder catheter.
  - ✓ Blood and/or gas in the urine bag during laparoscopy.
- **Internal bladder injury is recognized by:**
  - ✓ Cystoscopy identification of fatty tissue, dark space, or bowel.



Investigations:

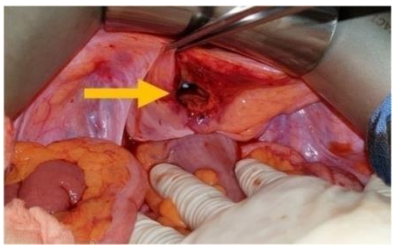
- **Cystography**
  - Is the preferred diagnostic modality for non-iatrogenic bladder injury and for a suspected iatrogenic bladder trauma in the post-operative setting.
- **Intraperitoneal extravasation:**
  - Is visualized by free contrast medium in the abdomen outlining bowel loops or abdominal viscera.

- **Extraperitoneal extravasation:**
  - Is typically diagnosed by flame-shaped areas of contrast extravasation in the peri-vesical soft tissue.



❖ Management:

- **Extraperitoneal rupture:**
  - Many patients may be successfully treated with urethral catheter alone.
  - **Open surgical repair recommended for any of the following scenarios.**
    - ✓ Bladder neck injury.
    - ✓ Vaginal or rectal injury.
    - ✓ Bone fragments in the bladder.
    - ✓ Laparotomy is planned for other indication.



- **Intraperitoneal rupture:**
  - Requires transperitoneal exploration to rule out associated injuries and removal of urine from peritoneum.

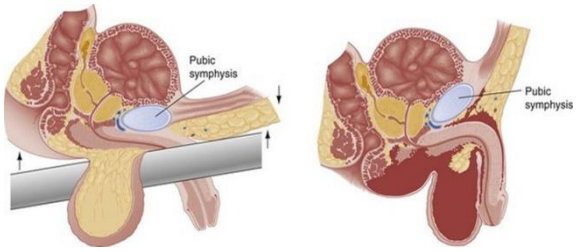
❖ Complications:

- Cystitis.
- Sepsis.
- Pelvic collection.
- Vesico - vaginal fistula.

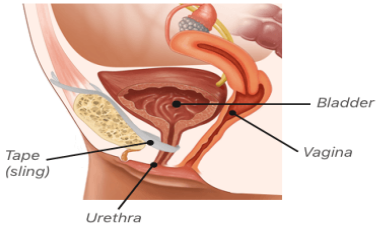
Bladder Trauma

❖ Introduction:

- **Injuries to the anterior urethra are caused by:**
  - Straddle injuries.
  - Trauma during sexual intercourse (associated with penile fracture).
  - Penetrating trauma and from iatrogenic trauma e.g., endoscopic instruments, catheterization.



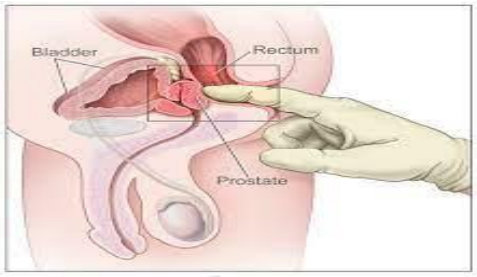
- Pelvic fractures are the predominant cause of male posterior and female urethral injury.
- Pelvic fracture and penetrating urethral injuries have a high likelihood of life-threatening concomitant injuries.
- Female urethral injures are often associated with vaginal injuries.
- Insertion of asynthetic suburethral sling for the treatment of stress urinary incontinence is an important case of iatrogenic female urethral injury.



❖ Diagnostic Evaluation:

- Blood at the external urethral meatus is the most common clinical sign indicates the need for further diagnostic work up.
- Inability to void is usually a sign of a complete injury.
- Incomplete injuries are associated with pain on urination and hematuria in the majority of cases.

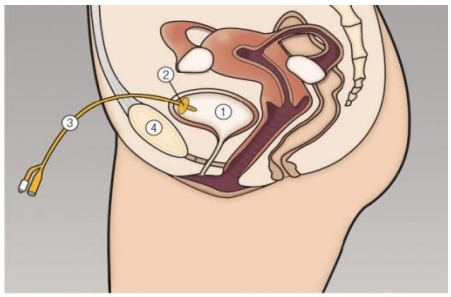
- Blood at the vaginal introitus is present in most female patients with pelvic fractures and Co-existing urethral injuries.
- Rectal examination may reveal a "high-riding" prostate. However, this is an unreliable finding
- Blood on the examination finger is suggestive of a rectal injury associated with pelvic fracture.
- Urethral bleeding or urinary extravasation can cause penile and scrotal swelling and hematoma, but these findings are usually delayed (> 1 h).
- Retrograde urethrography is the standard in the early evaluation of a male urethral injury.
- Except for penile fracture related injuries for which cysto-urethroscopy is preferred.
- Cysto-urethroscopy combined with vaginoscopy is the preferred diagnostic modality in case of suspected female urethral injury.



❖ Management:

➢ **Anterior urethral contusion:**
- May be treated conservatively if the patient can void with mild hematuria.

➢ **If there is significant hematuria:**
- Urethral catheterization for several days is enough.



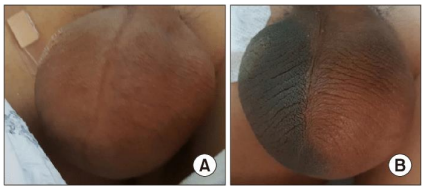
➢ **Anterior urethral laceration best treated by:**
- Diverting the urine by suprapubic cystotomy with spontaneous healing.

➢ **Stretch injury and incomplete tear Posterior urethral injury:**
- Best treated by urethral catheter for few days.

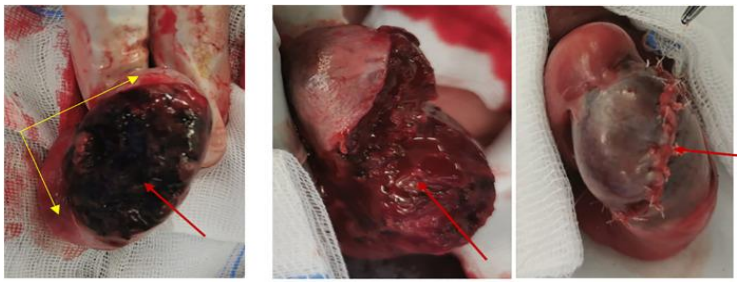
➢ **Complete posterior urethral tear:**
- Primary realignment; involves opposing the torn ends of the urethra over a catheter with concomitant suprapubic diversion.
- Suprapubic diversion with delayed repair.
- Endourologic; may allow primary alignment without the risk of surgical exploration of the disrupted urethra.

Scrotal & Testicular Trauma

1. Blunt Scrotal Trauma:



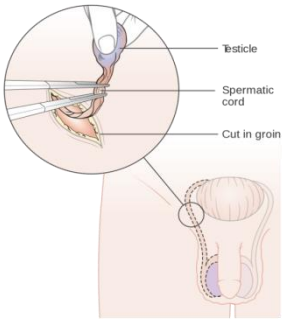
❖ Introduction:
- May result in testicular dislocation, haematocoele, testicular rupture and/or scrotal hematoma.
- Traumatic dislocation of the testis is treated by manual replacement and secondary orchidopexy.
- If primary manual reposition cannot be performed, immediate orchidopexy is indicated.
- If haematocele is smaller than three times the size of the contralateral testis: Conservative management.
- If large Hematocele: explore.
- If testicular rupture suspected: Explore, evacuate clot and any necrotic testicular tubules, and close the tunica albuginea.



2. Penetrating Scrotal Trauma:

❖ Introduction:

- Surgical exploration with conservative debridement of non-viable tissue.
- Primary reconstruction of testis and scrotum can be performed in most cases.
- In complete disruption of the spermatic cord, re-alignment without vasostomy may be considered.
- In extensive destruction of the tunica albuginea, mobilization of a free tunica vaginalis flap can be performed for testicular closure.
- If reconstruction cannot be achieved, orchiectomy is indicated.
- In improvised explosive device blast injury, the extensive loss of genital tissue often requires complex and staged reconstructive surgical procedures.



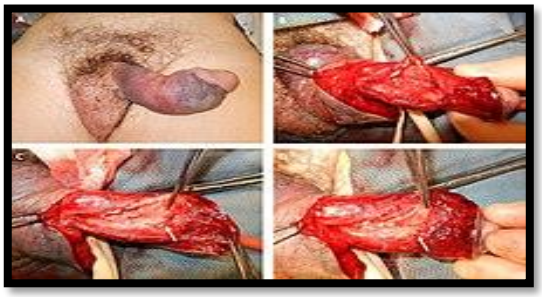
3. Penile Trauma:

❖ Etiology:

- Gunshot wounds.
- Stab wounds.
- Machinery accidents.
- Animal attacks.
- Self-mutilation.

❖ Introduction:

- Penetrating trauma is managed by: Debridement, hemostasis, and repair of injured tissue.
- Machinery accidents may result in partial or complete avulsion of genital skin, such injuries require careful debridement and skin grafting.



❖ Spontaneous Penile Fracture:

- May occur during sexual intercourse and results in rupture of tunica albuginea of the corpora.
- **Fracture penis appears with onset of:**
  - ✓ Sharp pain.
  - ✓ Swelling.
  - ✓ Ecchymosis.
  - ✓ Deviation of the penis away from the side of fracture.
  - ✓ Loss of erection.

❖ Management:

- Surgical exploration of the penis with repair of the tunica albuginea with non-absorbable suture.
- If there is concomitant urethral injury urethral catheter is required.

Urinary Tract Infection

- **Types:**
  - **Specific Type:**
    - **Bacterial e.g., TB**
    - **Fungal e.g., Actinomycosis**
    - **Parasitic e.g., Bilharziasis**
  - **Non-Specific Type:**
    - **Kidney**
      - Pyelonephritis
        - ✓ Acute
        - ✓ Chronic
      - Perinephric abscess
      - Renal abscess
    - **Urinary bladder**
      - Cystitis
        - ✓ Acute
        - ✓ Chronic
    - **Prostate**
      - Prostatitis
        - ✓ Acute
        - ✓ Chronic
    - **Testis**

Definitions of UTI:

- **Bacteriuria:**
  - Is the presence of bacteria in the urine.
- **Pyuria:**
  - The presence of pus cell more than 5/Hpf.

Causative organisms of UTI:

- Most infections area caused by aerobic gram-ve organism as E-coli.
- Some gram +ve cocci (enterococci).
- Chlamydia trachomatous needs certain culture techniques.

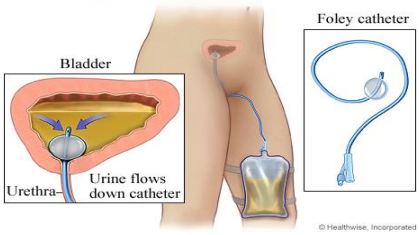
Classification:

- **Uncomplicated infection**
- **Complicated infection**
  - Unresolved bacteremia.
  - Bacterial persistence.
  - Reinfection.

Diagnosis:

- **Urine collection:**
  - **In males:**
    - **Clean mid-stream catch:**
      - ✓ Urethral meatus is cleansed with butadiene.
      - ✓ First 30 ml is discarded and next S0-100m is collected and examined as soon as possible.
  - **In adult females:**
    - Clean midstream urine sample as in male.

- If not satisfactory, we can get the urine sample by catheterization under complete aseptic technique.

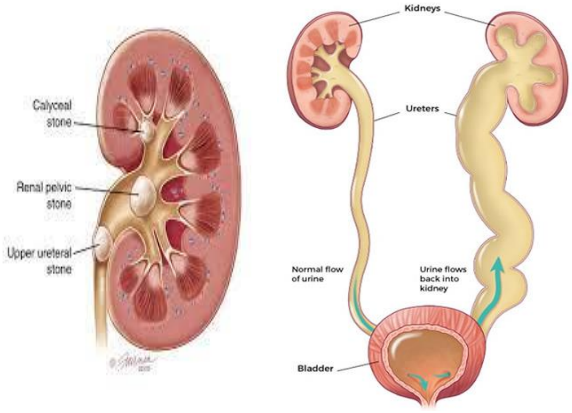


- **In children:**
  - Sterile plastic bag over the penis or vulva after sterilization of genitalia.
  - Also, supra pubic needle aspiration and the bladder may be required to obtain a reliable urine specimen.

➢ **Urine analysis:**
- Microscopic examination:
  - ✓ Pus cells: (WBCs) >5/ hpf suggests infection.
  - ✓ Red blood cells (RBCs) >5 hematuria.
  - ✓ Microorganisms bacterial count >10° colony forming nit/ ml.
  - ✓ Chemical examination:
    - Nitrites: bacteria reduce nitrates into nitrites.
    - Leukocytes estrase: pus cells produce leukocytes esterase.
- Urine culture.

Acute Pyelonephritis

❖ Introduction:
- Bacterial infection cases inflammation of the renal pelvis and parenchyma.
- E-coli is responsible for about 80% of cases.
- **Predisposing factors:**
  - ✓ Obstruction (stones or stricture).
  - ✓ Septic focus.
  - ✓ Vesicoureteric reflux.
  - ✓ Instrumentation.



❖ Clinical Picture:

➢ **Symptoms (Called upper tract signs):**
- Chills.
- Fever (100.3°F or greater).
- Flank pain.
- Nausea, vomiting, malaise.

➢ **Signs:**
- **On physical examination:**
  - Tender renal angle.
  - Patient looks ill, fever, tachycardia.

❖ Investigations:

➢ **Laboratory Diagnosis:**
- CBC: leukocytosis with a predominance of neutrophils.
- Urine analysis: pus cells and bacterial.
- Urine cultures: are positive.

➢ **Ultrasound:**
- To detect presence of obstruction.

- **IVU:**
  - Map both kidneys and could diagnose the cause of infection (e.g., stones).

- **Voiding cystourethrogram:**
  - After the resolvement of the acute stage to detect the vesicouretric reflux.

❖ Complication:
- Renal Abscess.
- Perinephric abscess.
- Renal insufficiency in bilateral cases.

❖ Management:
- Obstruction must be relieved with ureteral catheter or PCN.
- Rest in bed.
- Plenty of fluids oral or parental if vomiting is present.
- **Antibiotics:(10-14 days)**
  - ✓ Ampicillin+ gentamycin or
  - ✓ Fluroquinolones or
  - ✓ Third generation cephalosporins

Chronic Pyelonephritis

❖ Definition:
- A process of renal scarring resulting in renal insufficiency.
- Accounts for 18% of adult cases of renal failure and 30% of childhood cases.

❖ Predisposing Factor:
- DM.
- Calculi.
- VUR.
- Analgesic nephropathy.
- Obstruction.

❖ Management:
- Identifying and correcting any underlying structural abnormality.
- Preventing the recurrence of UTI by the long-term use of prophylactic antibiotics.
- Nephrectomy in unilateral atrophic kidney.

Pyonephrosis

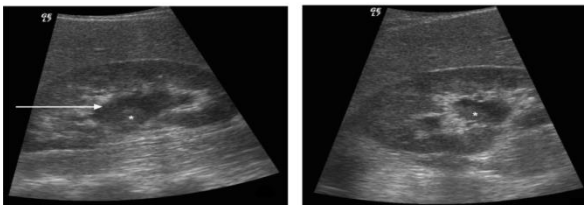
❖ Definition:
- Infected hydronephrosis is bacterial infection in a hydronephrotic kidney.
- Suppurative destruction of the parenchyma of the kidney.
- There is total or nearly total loss of renal function.

❖ Clinical Picture:
- Patients look ill, fever and chills.
- Flank pain and tenderness.
- Nausea and vomiting.
- There is a history of calculi, UTI, or surgeries.

❖ Investigations:

➢ **Ultrasound:**

- Dilated collecting system with dependent echoes.

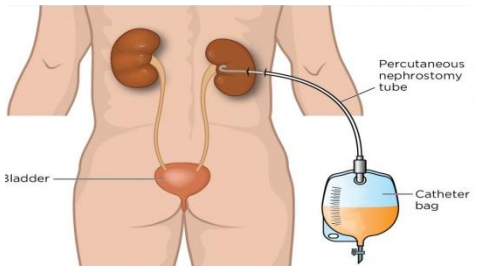


➢ **IVU:**

- The affected kidney is usually non visualized.

➢ **CT scan:**

- Suppurative parenchymal destruction.



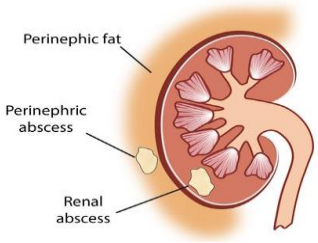
❖ Treatment:

- The treatment is initiated with appropriate antimicrobial drugs.
- Drainage of the infected pelvis.
- Nephrectomy in most cases.

Perinephric Abscess

❖ **Pathogenesis & Clinical Picture:**

- Same as pyonephrosis with collection of pus around the kidney.



❖ **Investigations:**

➢ **CT Scan:**

- Is the most sensitive diagnostic to D.D from pyonephrosis.

❖ **Management:**

- Small: conservative treatment (antibiotics).
- Big abscess: Surgical drainage.

Renal Abscess

❖ **Definition:**

- Renal abscess or carbuncle is a collection of purulent material confined to the renal parenchyma.

❖ **Predisposing Factor:**

- Complicated UTI
- Skin carbuncle
- Calculi
- Intravenous drug abuse
- Neurogenic bladder
- DM
- Hemodialysis.

❖ **Clinical picture:**

- Fever
- Chills
- Abdominal or flank pain
- Weight loss and malaise

❖ **Investigations:**

➢ **CT scan:**

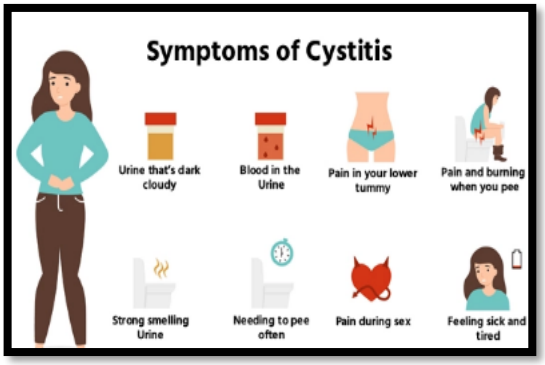
- **Is the diagnostic procedure of choice.**

- **Radionucleotide imaging with gallium 67:**
  - Could be used to DD from tumors.

❖ **Management:**
- Less than 3 cm: medical treatment + follow up.
- 3-5 cm percutaneous drainage.
- >5 cm surgical drainage.

Acute Cystitis

❖ **Introduction:**
- More common in women.
- The ascending route is the primary mode of infection.
- E-coli is responsible for 60% of bladder infections.



❖ **Clinical Picture :**
- Frequency.
- Urgency.
- Dysuria.
- Hematuria.
- Supra pubic pain.

❖ **Investigations:**
- **Radiological:**
  - Is rarely indicated in uncomplicated cases that KUB and US may be done to exclude stone bladder.
- **Laboratory Diagnosis:**
  - Urine Analysis: pyuria, bacteruia hematuria.
  - Urine culture: for choice of antibiotic.

❖ **Management:**
- Antibiotics: trimethoprim + sulfamethoxazole or nitrofurantoin or fluroquinolones.
- Increase fluid intake.
- Vaginal douche with anti-septic solution in females.

Chronic Cystitis

❖ **Predisposing Factor:**
- Stones.
- Diverticulum.
- Fistulae.

❖ **Clinical Picture:**
- Frequency.
- Dysuria.
- Urgency.

It may be due to bacterial persistence or bacterial reinfection

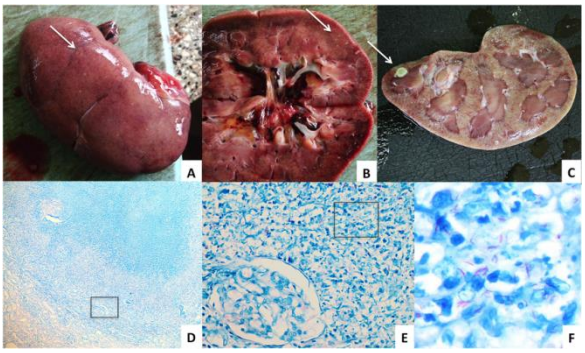
❖ **Investigations:**

- **Radiological:** to detect vesicoureteric reflux and vesico-vaginal fistula.
  - US,
  - KUB,
  - IVU
  - Ascending cystogram
- **Urine analysis:**
  - Pyuria and bacteriuria

Kidney Tuberculosis

❖ **Introduction:**

- It's a granulomatous lesion caused by mycobacterium tuberculosis of human or bovine type.
- Renal T.B is always secondary to a primary focus from lungs, bone, GIT, or lymph nodes.



❖ **Incidence:**

- 20-40 years, males affected more than females.

❖ **Etiology:**

- The infecting organism is mycobacterium tuberculosis. It is gram positive, acid- fast, alcohol fast and stained with Ziehl - Neilson stain.

❖ **Pathogenesis:**

- Renal T.B usually starts at cortex (hematogenous spread).

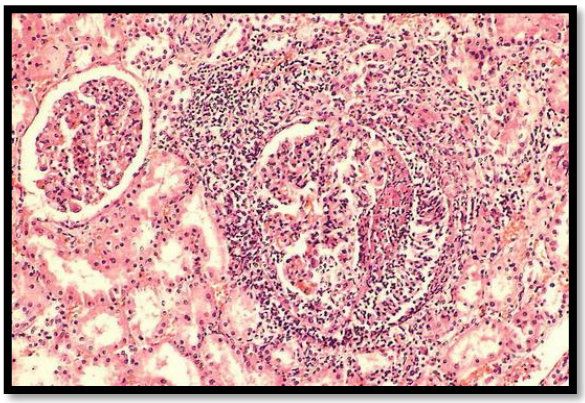
❖ **Pathological types of renal TB:**

- Renal tubercle (Medler's focus).
- Renal nodule, multiple nodules without caseation.
- **Ulcerating moth- eaten appearance of minor calyx (this is the first radiological sign of T.B.).**
- Hydronephrosis (Partial obstruction).
- Pyonephrosis (obstruction plus infection).
- Auto – nephrectomy: complete replacement with cheesy material and renal atrophy with P.U. obstruction.
- Miliary T.B: bilateral in immuno-compromised patients, incompatible with life (seen only in postmortem specimen).

❖ **Fate of TB lesions:**

- Healing and scarring with fibrosis and calcification.
- Progress and spread (softening, caseation, and organ destruction with dystrophic calcification).
- Encapsulation.

❖ Microscopic appearance:



- The solid tubercle consists of a central collection of epithelioid cells often in whorl formation.
- Scattered throughout the epithelioid cells are giant cells of the Langhans type.
- Beyond the tubercles there are collections of lymphocytes and plasma cells and intermingled with these varying numbers of fibroblasts.
- The soft tubercle is essentially similar except that there is a preponderance of central necrosis.

❖ Clinical Picture:

- There may be no symptoms or signs.
- **Hematuria occasionally is the first symptom**.
- Sterile pyuria.
- Rarely, dull aching pain in the loin or renal colic due to blockage of the ureter by caseous material or blood clot.
- **Frequency of micturition is the most common and usually the earliest symptom It is due to:**
  - ✓ Highly acidic urine
  - ✓ Polyuria
  - ✓ Irritation of the bladder by caseous material
  - ✓ Tuberculous cystitis
  - ✓ Secondary infection or contracted bladder
- Tuberculosis of epididymis, prostate or seminal vesicles may be present.
- General symptoms are lacking in patients without active pulmonary lesions.

❖ Investigations:

➢ Urine Examination:

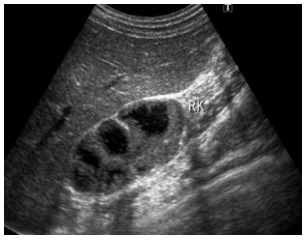
- **Is highly acid and contains pus, blood and albumin -Identification of tubercle bacillus may be done by:**
  - ✓ Acid fact staining of the sediment of 24-hour urine of 3 successive days.
  - ✓ Urine culture (Dorset egg medium or Lowenstein- Jensen medium).
  - ✓ Guinea pig inoculation.

➢ Plain Radiograph:

- Important because they show enlarged kidney and calcification.

➢ Ultrasonography:

- **It gives us an idea about**
  - ✓ Size of the kidneys
  - ✓ Stones
  - ✓ Thickness of renal parenchyma
  - ✓ Contents of pelvis and calyx



➢ Intravenous urography Shows:

- Moth- eaten appearance due to papillary ulcers
- Abscess cavities that connect with calices
- Ureteral strictures with secondary dilatation
- Straightening of the ureter from shortening due to fibrosis

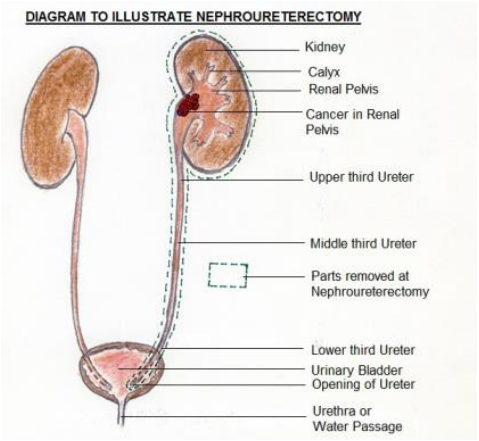
❖ Management:

➢ **Antituberculous Drugs:**

- INH 300 mg/day.
- Rifampicin 600 mg/day.
- Streptomycin IM 1g/day first month then 1g twice a week.
- Pyrazinamide tab 1gm / day.
- Ethambutol tab 800 gm/day.

➢ **Surgery:**

- Nephroureterectomy: this is indicated in unilateral advanced disease.



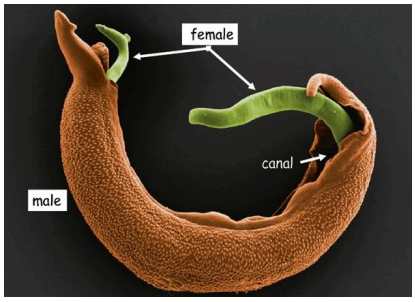
Urinary Schistosomiasis

❖ **Incidence:**

- Approximately 300 million humans are infested.
- Incidence of urinary involvement (40- 60) %.

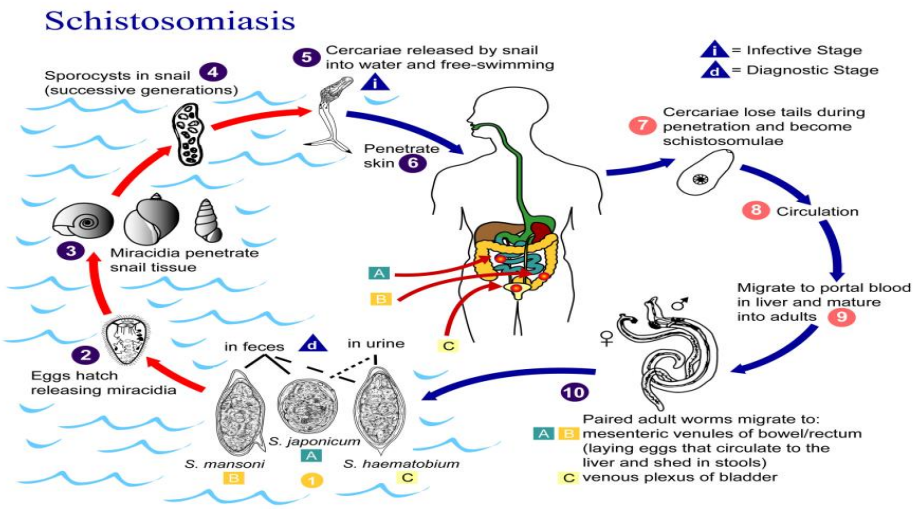
❖ **Etiology:**

- Schistosoma mansoni, S. Japonicum, or S. Haematobium
- GU Schistosomiasis is caused mainly by S. Haematobium
- It is endemic mainly in Africa and certain areas in the Middle East
- S. mansoni & S. Japonicum cause mainly intestinal Schistosomiasis



❖ Life Cycle:

- Humans are infested through contact with infested fresh water contaminated with infective stage (larva = cercaria) which penetrates the skin or the mucous membrane.
- Cercaria reach the general circulation, only worms that reach the portal circulation live.
- Urinary S. reach sub mucosal venous plexus in (bladder, ureter, & seminal vesicles)
- Ova is eliminated in human faeces and urine.
- If they reach fresh water they start asexual cycle in snails and continue the life cycle.



❖ Pathogenesis:

➢ Stage 1: Generalization or Incubation period:

- Larvae acquire host antigenic material as immunological camouflage.
- They cause hypersensitivity and general manifestations of illness.
- **Clinical picture**
  - ✓ Allergic skin reaction
  - ✓ Fever
  - ✓ Cough malaise
  - ✓ Bone aches
  - ✓ GIT Symptoms may be present

➢ Stage 2: Deposition of ova by mature worm:

- Slowly progressive.
- Toxins and antigenic materials initiate a granulomatous inflammatory reaction around the egg (Bilharzial pseudo tubercles).
- **Clinical picture**
  - ✓ General manifestations: (Swimmer's itch or Katayama fever).
  - ✓ GU manifestations:
    - Terminal painful hematuria
    - Dysuria
    - Pyria
    - Haemospemria (irritative lower urinary tract symptoms LUTS)

➢ Stage3: Late complications:

- Result of repeated chronic infestation and secondary bacterial infection.
- Fibrosis is the ultimate result of infection and involves (bladder, ureter, urethra & seminal vesicles).
- Lesions may be atrophic or hypertrophic.
- As: polyps, nodules, masses, tubercles, ulcers, sandy patches (calcification).

❖ Complications:

- It leads to hydronephrosis & renal atrophy.
- It leads to bladder contraction (contracted bladder).
- The relation to bladder malignancy is usually squamous cell carcinoma.

❖ Investigations:

➢ Of Infection:

- Urine sediment: terminal spined egg (Haematobium).
- Rectal or bladder mucosal biopsy: granuloma.
- Serological tests: not reliable (Ag/ Ab reaction).

➢ Plain Radiograph:

- Bladder calcification.
- Seminal vesicles, urethra& distal ureter calcifications may be seen.

➢ Intravenous Urography:

- For obstructive uropathy.

➢ US & CT:

- For polyps, obstructive & destructive lesions.

➢ Endoscopic:

- For Diagnosis and treatment.

- **Management:**
  - **Medical Management:**
    - **Praziquantel (Biloicide): is the drug of choice for treatment of all species**.
    - Niridazole (Ambilhar):
    - Metrifonate: It is the drug of choice in treating endemic infection with S. Haematobium
  - **Surgical Management (for the lesion or for the complication):**
    - Polyp: resection
    - Ueteral stenosis: ureteral dilatation or reimplantation
    - Contracted bladder: bladder augmentation
    - Bladder cancer: cystectomy with urinary diversion)

Prostatitis

- **Incidence:**
  - Affects men in all ages with peak at sexual activity.
- **(NIH classification):**
  - **I** Acute bacterial prostatitis
  - **II** Chronic bacterial prostatitis: recurrent infection.
  - **III** Chronic abacterial prostatitis/chronic pelvic pain syndrome: no demonstrable infection.
  - **IV** Asymptomatic inflammatory prostatitis: detected by presence of wbcs in prostatic secretions.

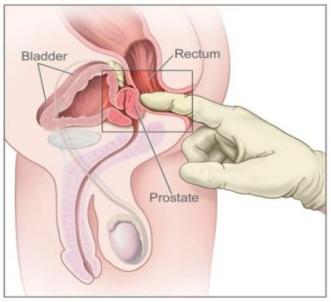
(III) Sub divided into:

- **IIIA**. Inflammatory chronic pelvic pain syndrome: White blood cells present in semen/prostatic secretions or voided bladder urine.

-IIIB. Non inflammatory chronic pelvic pain syndrome: no White blood cells noted in semen/expressed prostatic secretions.

- **Causative organism in the acute & chronic bacterial prostatitis:**
  - E. coli accounts for 80% prostatic infections.
  - Other gram-negative organisms (Pseudomonas, Serratia, Klebsiella) account for 10-15% of infections.
- **Etiology:**
  - Reflux of infected urine into prostatic ducts that drain into the posterior urethra.
  - Inflammation and edema may lead to Occlusion of these ducts, trapping bacteria within, leading to chronic bacterial prostatitis.
  - Intraprostatic urinary reflux, causing a "chemical" prostatitis, may play a role in the etiology of nonbacterial prostatitis.
- **Clinical Picture:**
  - **Symptoms:**
    - Urinary frequency.
    - Urgency.
    - Dysuria.
    - Malaise.
    - Pain in perineum, groin, testes, Suprapubic area.
  - **Signs:**
    - Fever.
    - Chills if acute bacterial.

- Decreased urine flow rate.
- Nocturia.
- **Tender, boggy, or firm prostate in DRE**.



❖ Diagnosis of bacterial infection:

- After cleansing and retraction for skin, the first 10 ml (urethral flora) of urine is collected in a sterile container (VB1).
- After voiding 200 ml a midstream sample is collected in a sterile container (VB2).
  {represents bladder, prostate, or urethral bacteria}
- The patient stops voiding, and prostatic massage is performed.
- The expressed prostatic secretion (EPS) is gently milked.
- The next 10 of voided urine is collected immediately (VB3) (represents prostatic infection)

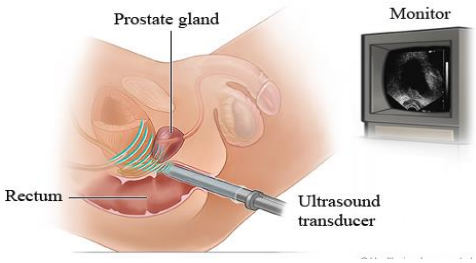
❖ Investigations:

➢ Laboratory Diagnosis:

- Urine culture and sensitivity.
- Expressed prostatic secretion culture and sensitivity.
- Semen culture and sensitivity.
- The four-glass test (Meares-Stamey) is the gold standard.

➢ Radiological:

- Abdominal ultrasound for bladder Scanning and estimation of post-voiding residual urine volume to ensure complete bladder emptying.
- Transrectal ultrasound (TRUS).
- Uroflow: helpful in patients with voiding problem.



❖ Management:

➢ Acute Bacterial Prostatitis:

- With antibiotics typically fluoroquinolones for 6-12 wks.

➢ Chronic Bacterial Prostatitis:

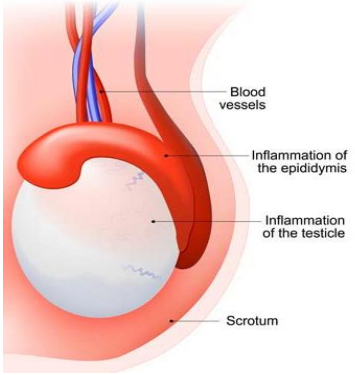
- Antibiotics for extended periods.
- Patients with frequent recurrent infections long-term prophylactic antibiotics may be employed up to six months.

➢ Nonbacterial Prostatitis may be treated with:

- **Category IIIA: Trial of**
  - Broad spectrum antibiotics.
  - Alpha-blocker therapy.
  - Anti-inflammatory agents.
  - Phytotherapy.
  - Transurethral microwave therapy.
- **Category IIIB:**
  - Alpha-blocker therapy.
  - Muscle relaxant.
  - Analgesics.
  - Relaxation exercises.

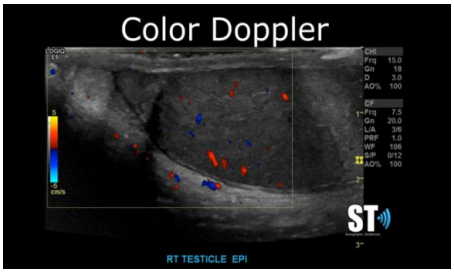
Epididymitis / Epididmo-orchitis

- **Definition:**
  - Inflammation localized to the epididymis or also involving testis.
- **Epidemiology:**
  - Common in teenager.
  - Onset: Usually gradual onset.
- **Causes:**
  - Gram negative bacterial infection.
  - Also caused by sexually transmitted diseases, STDs, (Chlamydia, gonorrhea, ureaplasma).
  - Teenage it is usually 1ry to viral infection mainly with parotitis.



- **Clinical Picture:**
  - Usually, unilateral.
  - Dull aching pain radiating to the spermatic cord, lower abdomen, or flank.
  - Swollen, tender epididymis (+/- testis).
  - The pain may be relieved by elevating the testis (Prehn's sign) possible scrotal wall erythema.

- **Complication:**
  - Abscess formation.
  - Testicular infarction.
  - Chronic pain.
  - Infertility.
- **Investigations:**
  - **Laboratory Diagnosis:**
    - Urine analysis & Culture & sensitivity.
  - **Radiological:**
    - Scrotal duplex to differentiate between torsion & inflammation in which there is:
      1. Decreased blood flow in torsion.
      2. Increase blood flow in case of inflammation.



- **Management:**
  - Antibiotic therapy according to culture & Sensitivity (erythromycin, cephalosporines or quinolones).
  - Decreased activity and analgesics.
  - Scrotal elevation.
- **DDs:**
  - **Testicular torsion (Symptoms & Signs)**:
    - ✓ Age: Typically, Perinatal or adolescent
    - ✓ Abdominal, flank or scrotal pain
    - ✓ Nausea/vomiting
    - ✓ Testicular swelling
    - ✓ High-riding testicle
    - ✓ Testicular hardness

- **Testicular torsion (Management)**:
  - ✓ Any suspicion at all requires a color doppler Ultrasound.
  - ✓ If torsion is obvious, attempt the open-book technique to detort the testicle.
  - ✓ Requires surgical management.
- **Epididymitis / Epididmo-Orchitis (Symptoms & Signs)**:
  - ✓ Can occur at any age.
  - ✓ Dysuria, Frequency, Urethral discharge (thick and yellow suggests N. gonorrhea).
  - ✓ Aching pain radiating to flank, abdomen, or groin.
  - ✓ Tender along epididymis.
  - ✓ An inflammatory hydrocele.
  - ✓ Manual elevation of testicle will decrease pain (Prehn's sign).
  - ✓ Also. tender on testicle = Epididymo-orchitis. (Should consider Mumps).
- **Epidimytis / Epididmo-Orchitis (Management)**:
  - ✓ Urinalysis + Urine culture.
  - ✓ Ultrasound to rule-out torsion typically shows increased blood flow with Epididymitis.
  - ✓ In men under 35 give 1 gram of Azithromycin and cover for Gonorrhea based on local resistance patterns.
  - ✓ In children and men over 35 treated like a UTI.
  - ✓ NSAIDS can help reduce symptoms no response to treatment in 3 days require follow-up.

Tumors of the upper urinary tract

❖ Classification:

A. Benign tumors
- Renal adenoma.
- Renal oncocytoma.
- Angiomyolipoma (hamartoma).
- Others.

B. Malignant tumors
- Primary tumors:
  - ⇨ Renal cell carcinoma (RCC).
  - ⇨ Wilm's tumor (Nephroblastoma).
  - ⇨ Renal pelvis and ureteral tumors (TCC- SQ CC).
- Secondary renal tumors.

Benign tumors of the upper urinary tract

Renal cortical adenoma

- Small well differentiated glandular tumor of the renal cortex.
- Usually, asymptomatic.
- Should be considered as early RCC.

Renal Oncocytoma

- Often present as an incidental finding.
- Treated by exploration and excision.

Angiomyolipoma

- Mostly in middle-aged females.
- Associated with multiple sclerosis.
- U/S and CT are diagnostic.
- < 4cm yearly follow up (U/S and or CT).
- > 4cm with no complaint: follow up 6 months.
- > 4cm + complaint: nephron sparing surgery.

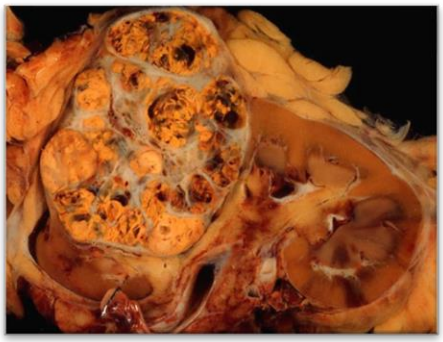
Malignant tumors of the upper urinary

Renal cell carcinoma

❖ Etiology
- Exposure to cadmium and asbestos.
- Chromosomal abnormalities.
- Genetic malformation as VHL syndrome.
- Cigarette smoking.

Pathology

Macroscopic picture:



- Yellow orange cut surface.
- No true capsule.
- Rounded and bulged from the renal surface.

Microscopic picture:

- Clear cell type (75%).
- Chromophobe (5%).
- Papillary (15%).

Spread:

- Direct invasion of surrounding structures.
- Direct invasion of the renal vein and systemic circulation.

Staging (TNM)

T:

- **TX**: primary tumor cannot be assessed.
- **T0**: no evidence of primary tumor.
- **T1**: tumor ≤ 7 cm or less in greatest dimension, limited to the kidney.
- **T2**: tumor > 7 cm in greatest dimension, limited to the kidney.
- **T3**: tumor extends into major veins and IVC or perinephric tissues but not into the ipsilateral adrenal and not beyond Gerota fascia.
- **T4**: tumor invades beyond Gerota fascia.

N:

- **NX**: regional lymph nodes cannot be assessed.
- **N0**: no regional lymph node metastasis.
- **N1**: metastasis in regional lymph node(s).

M:

- **M0**: no distant metastasis.
- **M1**: distant metastasis.

Grading

- According to nuclear size and irregularities (dysplasia) and nuclear prominence.
- Grades from one to four with grade four is highly malignant.

Clinical picture

- Classic triad: hematuria, loin pain and abdominal mass.
- Para neoplastic syndrome; fever, weight loss, erythrocytosis, hypercalcemia
- Symptoms of metastasis.

Investigations

Laboratory findings

- Hematuria.
- High ESR.
- Anemia.
- Para neoplastic syndrome.

Radiologic

- US.
- IVU.
- CT (gold standard).
- Renal angiography.
- MRI.

❖ Treatment

➢ **Localized disease:**

- Stage I, II, IIIA: radical nephrectomy.

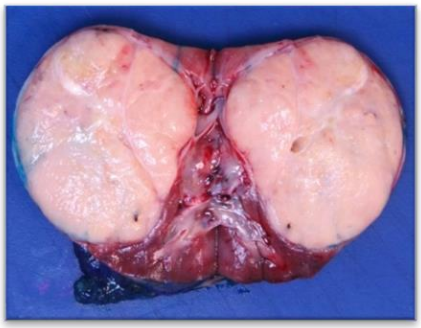
➢ **Disseminated disease:**

- Radical nephrectomy to relief pain and hemorrhage, solitary metastasis in lung and brain is removed.
- Radiotherapy (radioresistant).
- Hormonal therapy: Progesterone or androgen.
- Chemotherapy.
- Purified human leukocytic interferon and interleukins.

Wilm's tumor (Nephroblastoma)

❖ Etiology

- Abnormal proliferation of metanephric blastema.



❖ Pathology

- Renal or extra renal.
- Solitary large well demarcated.
- Cut surface is grey in color with focal areas of hemorrhage and necrosis.
- 2 types: Favorable & unfavorable histology.

❖ Staging

- **Stage I**: tumor limited to the kidney and completely excised.
- **Stage II**: extend beyond the kidney but completely excised.
- **Stage III**: residual tumor non hematogenous and confined to the abdomen.
- **Stage IV**: hematogenous metastasis.
- **Stage V**: bilateral Wilm's.

❖ Clinical picture

A. Asymptomatic renal **(abdominal mass)**.
B. Abdominal pain.
C. Hypertension.
D. Hematuria.
E. Distension, anorexia, nausea, and vomiting.
F. Rare: varicocele, brain and/or pulmonary metastasis.

❖ Investigations

➢ **Laboratory findings**

- Microscopic hematuria.
- Anemia.
- Liver function disturbance.

➢ **Radiologic**

- US.
- IVU.
- CT.
- Chest X ray.
- MRI.
- Needle biopsy.

❖ Treatment

➢ **Surgery in:**

- Unilateral involvement.
- **Bilateral cases:**
  1. With favorable histology: preoperative chemotherapy and nephron sparing surgery.
  2. With unfavorable histology: aggressive surgery followed by radio and chemotherapy.

➢ **Chemotherapy:**

- After surgery (vincristine and actinomycin).

➢ **Radiotherapy:**

- Radiosensitive.

❖ **Differential diagnosis (flank mass in children):**

1. Hydronephrosis.
2. Multicystic kidney.
3. Neuroblastoma.
4. Hepatoblastoma.
5. Mesenteric cyst.
6. Renal and lymphosarcoma.

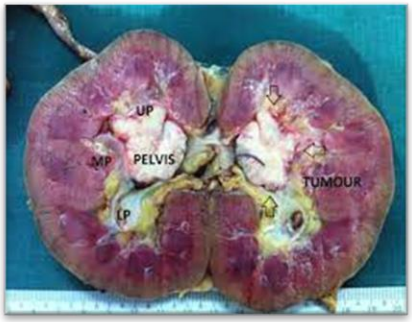
Renal pelvis and ureteral tumors

❖ Etiology

1. Smoking.
2. Excessive coffee use.
3. Occupational exposure to certain dyes and solvents
4. Analgesic abuse.
5. Chronic irritations (stones and infections).

❖ Pathology

- Transitional cell carcinoma (90%).
- Squamous cell carcinoma (10%).
- Adenocarcinoma (very rare).



❖ Staging (TNM)

- **T0:** no evidence of primary tumor.
- **Ta:** tumor confined to mucosa.
- **Tis:** carcinoma in situ.
- **T1:** submucosal infiltration only.
- **T2:** muscular invasion only.
- **T3:** invasion of periureteral – peri pelvic fat.
- **T4:** extension to adjacent organs.

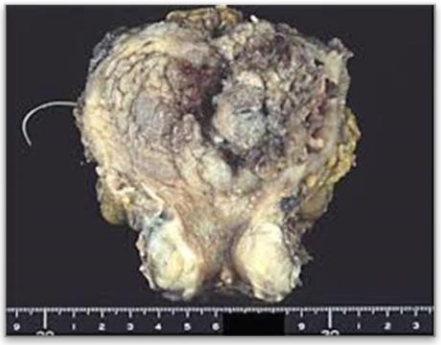
❖ Clinical picture

A. Frank hematuria.
B. Flank pain.
C. Flank mass.
D. Irritative voiding symptoms.
E. Symptoms and signs of metastasis.

- Investigations
  - **Laboratory findings**
    - Hematuria and pyuria.
    - Elevated liver enzymes.
  - **Radiologic**
    - US.
    - IVP.
    - CT.
    - Endoscopy.
- Treatment
  - **Surgery in:**
    - Radical nephroureterectomy with bladder cuff.
    - **Renal sparing surgery in**:
      1. Single kidney.
      2. Marginal renal function.
      3. Bilateral cases.
      4. Low grade tumors.
  - **Chemotherapy:**
    - Locally after aggressive resection (BCG).
    - Systemically with metastasis.
  - **Radiotherapy:**
    - Of limited value.

Bladder cancer

- Risk factors
  - Male gender (50-70 years).
  - White race.
  - Smoking.
  - Occupational exposure: aniline, rubber manufacture (e.g., tires or electric cables), dye manufacture, leather workers, painters, and hairdressers.
  - Chronic irritation of bladder mucosa due to urinary bilharziasis, recurrent UTIs, bladder stones or long-term catheters.
  - Chemotherapy: cyclophosphamide.
  - Pelvic radiotherapy.
- Pathology
  - **Histopathological Types:**
    1. **Primary bladder tumors:**
       - **Urothelial carcinoma (most common type).**
         - Transitional cell carcinoma.
         - Squamous cell carcinoma.
         - Adenocarcinoma.
       - Non-urothelial carcinoma as:
         - Pheochromocytoma.
         - Melanoma.
         - Lymphoma.
         - Sarcoma.



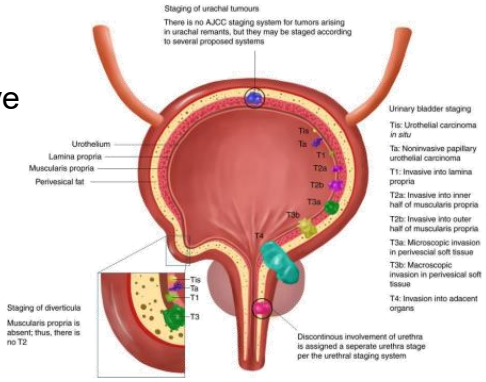
2. **Secondary bladder tumors:**
   - They are mostly metastatic adenocarcinoma from:
     - Gut.
     - Prostate.
     - Kidney.
     - Ovary.

➢ **Spread:**

- **Direct** to the detrusor muscle, the ureteric orifices, prostate, urethra, peri vesical fat, uterus, vagina, bowel, or pelvic side walls.
- **Implantation** into abdominal wounds or percutaneous catheter tracts
- **Lymphatic** infiltration of the iliac and para-aortic nodes
- **Hematogenous** to liver, lung, adrenal gland, and bone

❖ Staging (TNM)

➢ **T:**



- **TX:** primary tumor cannot be assessed
- **T0:** no evidence of primary tumor
- **Ta**: non-invasive papillary carcinoma
- **Tis**: carcinoma in situ
- **T1**: tumor invades the subepithelial connective tissue
- **T2**: tumor invades the detrusor muscle
- **T2a**: inner half (superficial muscles)
- **T2b**: outer half (deep muscles)
- **T3**: tumor invades the peri vesical fat:
- **T3a**: microscopic
- **T3b**: macroscopic
- **T4**: tumor invades surrounding structures:
- **T4a**: tumor invades the prostate, uterus, vagina, or bowel.
- **T4b**: tumor invades the pelvic or abdominal wall.

➢ **N:**

- **Nx:** lymph nodes cannot be assessed.
- **N0**: no regional lymph node metastasis.
- **N1**: single regional lymph node metastasis in the true pelvis.
- **N2**: multiple regional lymph node metastasis in the true pelvis.
- **N3**: lymph node metastasis to the common iliac lymph nodes.

➢ **M:**

- **Mx:** lymph nodes cannot be assessed.
- **M0**: no distant metastasis.
- **M1**: distant metastasis.

❖ Grading

- It is divided into well, moderately, and poorly differentiated (G1,G2, and G3 respectively).

❖ Clinical picture

- Asymptomatic microscopic hematuria.
- Irritative symptoms, such as:
  - Urgency.
  - Frequency.
  - Dysuria.
- Pain is unusual and late (suprapubic pain).

- Recurrent urinary tract infections and pneumaturia
- More **advanced cases** may present with:
  - Bone pain.
  - Weight loss.
  - Anorexia.
  - Confusion.
  - Anuria.

➢ **General examination may reveal:**
  - Pallor, indicating anemia due to chronic blood loss or renal impairment.

➢ **Abdominal examination may reveal:**
  - A suprapubic mass in cases of locally advanced disease.
  - Or a renal swelling in advanced hydronephrosis.

➢ **Digital rectal examination may reveal:**
  - Indurated bladder base or a bladder mass above or involving the prostate.

➢ **Bimanual examination (DRE):**
  - Under anesthesia before cystoscopy.
  - Gives an idea about staging of tumor.

❖ Investigations

➢ **Laboratory**
  - For evaluation of renal function and fitness for operation.

➢ **Radiological**
  - **CT of the abdomen and pelvis with and without IV contrast.**
  - MRI.
  - US.
  - IVU.
  - CT chest, MRI brain, bone scan.

➢ **TURBT**
  - **Cystoscopy and biopsy/ Transurethral resection of a bladder tumor.**
  - Biopsy should be taken from the base of the tumor including the muscle.

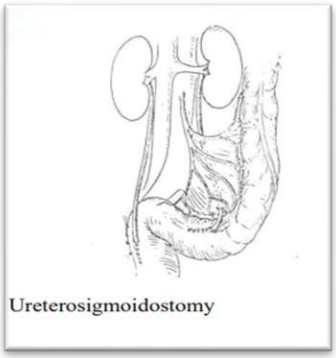
❖ Treatment

➢ **Tis, Ta, T1:**
  - Transurethral resection of bladder tumor (TURBT): completely with the underlying detrusor muscle.
  - Intravesical chemotherapy / immunotherapy therapy: due to high rate of recurrence.
  - Intravesical chemotherapy: mitomycin C, gemcitabine and thiotepa.
  - Intravesical immunotherapy: as BCG.
  - **Follow up after TURBT and intravesical therapy:**
    - Cystoscopy and urine cytology are done every 3 months for two years to detect any recurrences.
    - Thereafter, these investigations are repeated every 6 months for 3 years and then annually thereafter.
  - Radical cystectomy is indicated only for rapidly recurring multifocal tumors especially those of high grade or associated with CIS or BCG unresponsive disease.

➢ **Localized muscle invasive disease:**
  - Radical cystectomy with neoadjuvant chemotherapy.
  - Urinary diversion.
  - Partial cystectomy for very selective cases.

- Radiotherapy.
- Trimodal therapy for unfit patients (maximal TURBT+ 6 cycle of chemotherapy + fractionated radiotherapy).

➢ **Types of urinary diversion:**


Ureterosigmoidostomy

1. **Uretero- cutaneous diversion**: direct reimplantation of the ureters to the skin.
2. **Uretero-sigmoid ostomy**: reimplantation of the ureters into the sigmoid colon. It has the complications of hyperchloremic acidosis, ascending infection, malignancy at the site of anastomosis.
3. **Ileal conduit (the most common method):** reimplantation of the ureters into an ileal segment after its isolation from the rest of the ileum and this isolated segment is then connected to the skin with a stomas.
4. **Orthotopic ileal neo-bladder** (Mansoura W-pouch and Tanta pouch): formation of a neobladder from an isolated ileal segment and the ureters are reimplanted into it and this ileal neo-bladder is connected to the urethra.

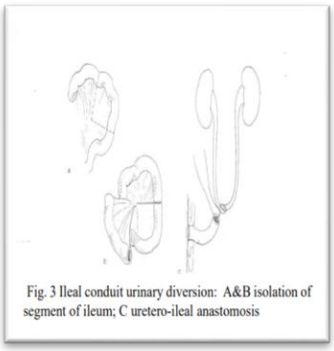


Fig. 3 Ileal conduit urinary diversion: A&B isolation of segment of ileum; C uretero-ileal anastomosis

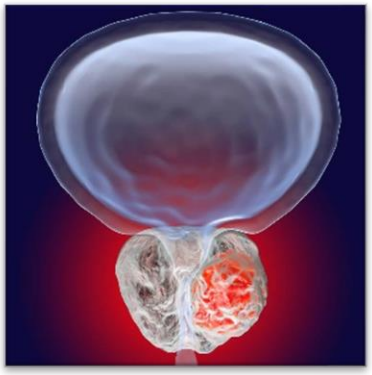
➢ **Locally advanced and metastatic disease:**

- Systemic chemotherapy.
- Palliative radiotherapy.
- Salvage cystectomy for cases with intractable hemorrhage.

Prostate cancer

❖ Risk factors

A. Age.
B. African race.
C. Family history.
D. Genetic mutations or syndromes (e.g., BRCA2 mutations and Lynch syndrome).



❖ Pathology

➢ **Types:**

- Adenocarcinoma.
- Others: transitional cell carcinoma, squamous cell carcinoma, small cell Carcinoma and sarcoma.

➢ **Spread:**

- **Direct spread** to the seminal vesicles, periprostatic tissue, urethra, ureters and rarely to the rectum as the Denonvillier fascia acts as a natural barrier.
- **Lymphatic** to the obturator, internal, external, and common iliac lymph nodes then to the para-aortic lymph nodes.
- **Blood:** 90% of the blood metastasis occurs in bones mainly the vertebrae, neck of femur, pelvic bone, and ribs (osteoblastic) but it may be osteolytic, lately, the metastasis occurs in liver and lung.

75% arise from peripheral zone

Staging (TNM)

Primary Tumor (T) - Clinical Stage

- **Tx:** Primary tumor cannot be assessed.
- **TO**: No evidence of primary tumor.
- **T1**: Clinically inapparent tumor that is not palpable.
- **T1a**: Tumor incidental histologic finding in 5% or less of tissue resected.
- **T1b**: Tumor incidental histologic finding in more than 5% of tissue resected.
- **T1c**: Tumor identified by needle biopsy found in one or both sides, but not palpable.
- **T2**: Tumor is palpable and confined within the prostate.
- **T2a**: Tumor involves one-half of one side or less.
- **T2b**: Tumor involves more than one-half of one side but not both sides.
- **T2c**: Tumor involves both sides.
- **T3**: Extra prostatic tumor that is not fixed or does not invade adjacent structures.
- **T3a**: Extracapsular extension (unilateral or bilateral).
- **T3b**: Tumor invades seminal vesicle(s).
- **T4**: Tumor is fixed or invades adjacent structures other than seminal vesicles such as external sphincter, rectum, bladder, levator muscles, and/or pelvic wall.

Primary Tumor (T) - Pathologic Staget

- **pT2:** Organ confined.
- **pT3**: Extra prostatic extension.
- **pT3a**: Extra prostatic extension (unilateral or bilateral) or microscopic invasion of bladder neck.
- **pT3b**: Tumor invades seminal vesicle(s).
- **pT4**: Tumor is fixed or invades adjacent structures other than seminal vesicles such as external sphincter, rectum, bladder, levator muscles, and/or pelvic wall.

Regional Lymph Nodes (N)

- **Nx:** Regional lymph nodes cannot be assessed.
- **NO**: No positive regional nodes.
- **NI**: Metastases in regional node(s).

M Stage

- **MO:** No distant metastasis.
- **M1**: Distant metastasis.
- **M1a**: Nonregional lymph node(s).
- **M1b**: Bone(s).
- **M1c**: Other site(s) with or without bone disease.

Grading (Gleason)

- The two most abundant patterns are assigned a number from 1 to 5.
- These two pattern numbers are added to obtain the Gleason score.
- The Gleason score is reported as the most abundant pattern plus the second most abundant pattern, followed by the sum (e.g., 4+3=7).
- The higher the Gleason pattern and the higher the Gleason score, the worse the prognosis.

Gleason Pattern	Tumor Confined to Well-circumscribed Nodules	Stroma Present Between Each Gland	Variability in Gland Size and Morphology
1	Yes	Yes	None (large uniform glands)
2	Yes	Yes	Minimal

3	No	Yes	Moderate
4	No	No (Fused glands)	Fused ("back-to-back") glands or cribriform* glands
5	No	Tumor cells don't form glands (solitary tumor cells or cells packed together in sheets or nests).	

❖ Clinical picture

A. Asymptomatic.
B. Urine retention.
C. Bone pain.
D. Hematuria, more common with BPH > Ca. Prostate.
E. Hematospermia.
F. Constipation.
G. Ureteral obstruction and hydronephrosis is indicative of advanced disease.

➢ **Digital rectal examination (DRE):**

- Can reveal hard nodule, irregular induration in a part or the whole gland.
- The median sulcus may be obliterated.
- Normal DRE doesn't exclude PC.

❖ Investigations

➢ **Laboratory**

1. Prostatic specific antigen (PSA).
2. Alkaline phosphatase.
3. Routine laboratory examination as blood picture and renal function tests.

➢ **Radiological**

- Multiparametric MRI (prostate protocol).
- US.
- Trans-rectal US.
- CT chest, pelvis, spine, LN mets.
- Bone scan by Technetium 99.

➢ **TRUS**

- Trans Rectal or Transperineal Ultrasound guided biopsy.
- For any patient with abnormal DRE and /or elevated PSA.
- From lesions + at least 12 areas from the prostate.

❖ Treatment

1. Localized prostate cancer (T1, T2a, T2b) N0M0:
   - Watchful waiting.
   - Radical prostatectomy.
   - Radiotherapy if unfit.
2. Locally advanced prostate cancer (T2c, T3) N0M0:
   - Watchful waiting if other co-morbidities.
   - Radical prostatectomy after neo-adjuvant hormonal therapy.
   - Radiation & hormonal therapy.
   - Chemotherapy if hormonal resistant.
3. Metastatic disease:
   - Chemotherapy.
   - Hormonal therapy.

Testicular tumors

Risk factors

A. Undescended testis.
B. Gondal dysgenesis, androgen insensitivity, and disorders of sexual development.
C. Family history.

Pathology

Types:

1. **Germ Cell Tumors:**
   - Seminoma.
   - Non-Seminoma:
     - Yolk sac tumor.
     - Teratoma.
     - Embryonal carcinoma.
     - Choriocarcinoma.
2. **Sex cord (stromal) tumors:**
   - Sertoli cell tumor.
   - Granulosa cell tumor.
   - Stromal cells (fibroma, thecoma, Leydig cell tumor).
3. **Mixed: gonadoblastoma**
4. **Secondary tumors:**
   - Leukemia.
   - Lymphoma.

Spread:

- To para-aortic and para-caval retroperitoneal lymph nodes.
- Distant metastasis to lung, liver, brain, bone, kidney, and adrenals.

Staging

1. **Stage I:** tumor confined to testicles.
2. **Stage II:** retroperitoneal lymph nodes are involved.
3. **Stage III:** metastatic disease.

Clinical picture

- Heterogenous consistency or stony hard irregular mass.
- No pain nor tenderness.
- Absent testicular sensation.
- Manifestation of secondaries (GIT troubles, bone, liver, brain metastasis).

Investigations

Radiological

- Scrotal US.
- MRI of the pelvis and lower testis.

Laboratory

1. **Tumor markers**: Beta HCG), alpha feto-protein, & lactic dehydrogenase.
2. **Complete blood picture**: anemia in patients with disseminated metastases.

Treatment

- Radical orchiectomy through inguinal approach with ligation of spermatic cord at internal ring.
- **Adjuvant therapy**:

1. Adjuvant therapy for seminoma:
   - Radiation to pelvis and lymph nodes.

- Retroperitoneal lymph nodes dissection.
- Chemotherapy.

2. Adjuvant therapy for non-seminoma:
   - Retroperitoneal lymph nodes dissection.
   - Chemotherapy.

❖ **Differential diagnosis of scrotal swellings**:

1. Lymphedema
2. Sebaceous cyst
3. Epithelioma
4. Vaginal hydrocele
5. Hematocele
6. Pyocele
7. Chylocele
8. Hematoma
9. Torsion
10. Orchitis
11. Tumors
12. Epididymis
13. Periurethral abscess
14. Trauma to bulbar urethra with urine extravasation

❖ **Differential diagnosis of inguino-scrotal swellings**:

1. Complete oblique inguinal hernia
2. Undescended testis at neck of the scrotum
3. Hydrocele
4. Varicocele
5. Lymphocele
6. Lipoma
7. Funiculitis

❖ **Differential diagnosis of inguinal swellings**:

1. Inguinal hernia
2. Femoral hernia
3. Saphena varix
4. Cold abscess
5. Psoas bursitis
6. Inguinal lymph nodes
7. Undescended testis
8. Ilio-femoral aneurysm
9. A-V fistula

Obstructive uropathy

❖ Etiology

➢ **Kidney:**

- **Congenital**: polycystic kidney, renal cyst, pelvi-ureteric junction obstruction
- **Neoplastic**: Willm's tumour, renal cell carcinoma, TCC of the renal pelvis
- **Inflammatory**: tuberculosis, echinococcus
- **Metabolic**: calculi
- **Miscellaneous**: sloughed papillae, trauma, renal artery aneurysm

- **Bladder and urethra:**
  - **Congenital**: posterior urethral valve, phimosis, urethral stricture, hypospadias and epispadias, hydrocolpos
  - **Neoplastic**: bladder, prostatic, penis, urethra cancer
  - **Inflammatory**: paraurethral abscess
  - **Miscellaneous**: BPH, neurogenic bladder
- **URETER:**
  - **Congenital**: stricture, ureterocoele, ureterovesical reflux, ureteral valve, retrocaval ureter, Prune belly syndrome
  - **Neoplastic**: primary carcinoma of the ureter, metastatic carcinoma
  - **Inflammatory**: tuberculosis, schistosomiasis, abscess, urethritis cystica.
  - **Miscellaneous**: retroperitoneal fibrosis, aortic aneurysm, radiation therapy, lymphocele, trauma, urinoma, pregnancy, endometriosis

Clinical picture

A. Acute obstruction:
- Unilateral: renal pain and ureteric colic
- Bilateral obstruction: anuria

B. Chronic obstruction:
- No complaints
- Hydronephrosis
- Renal failure in bilateral obstruction
- Others: hypertension & hyperkalaemia

Diagnosis

- **History.**
- **Clinical picture:**
  - Hydronephrosis.
  - Uremia.
  - Cause of obstruction.
- **Laboratory:**

A. Urine analysis:
- Hematuria.
- Necroturia.
- Crystalluria.
- Casts.
- Proteinuria.

B. Renal function tests:
- Blood urea: normal 20-40 mg%.
- S. Creatinine: normal < 1.2 mg% Creatinine clearance: 80-120 ml/min.

Investigations

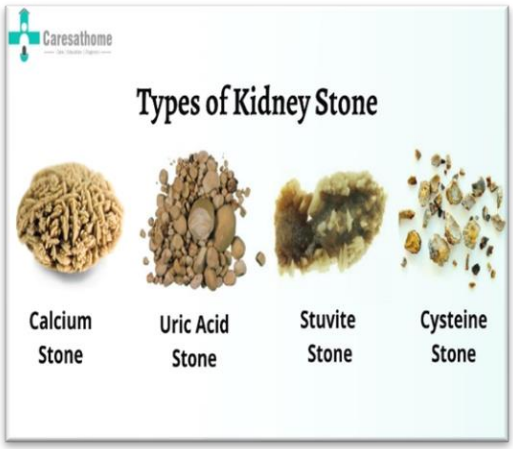
- **Radiological**
  - US
  - KUB
  - IVP
  - MRI
  - CTU
  - Radio-isotopes study

❖ Treatment

- **Treatment of the cause.**
- **Corrective surgery**: UPJ obstruction, ureterocele.
- **Palliative diversion if the cause of obstruction is irremovable**: in the form of cystostomy (in urethral stricture) or percutaneous nephrostomy (PCN) (in hydronephrosis).
- **Nephrectomy if non-functioning kidney.**

Urinary stones

❖ Etiology



➢ **Factors influencing stone formation:**

- **Genetic:**
  - Cystinuria.
  - Renal tubular acidosis.
- **Environmental:**
  - Hot climates.
  - With decreased fluids intake.
  - Disturbed diet.

➢ **Calcium stones may be due to:**

- Intestinal hyperabsorption of calcium.
- Impaired tubular absorption of calcium.
- Hyperparathyroidism.
- Calcium oxalate stone formation associated with hyperoxaluria may be due to intestinal hyperabsorption of oxalate 2ry to fat malabsorption or intestinal bypass.

➢ **Uric acid stones may be due to (3 factors are necessary):**

- Low pH.
- Low urinary volume.
- Hyperuricosuria.

➢ **Cystine stones are due to:**

- Cystinuria which is an inherited renal tubular absorption defect of cystine, ornithine, lysine, and arginine (COLA).

➢ **Struvite stones are due to:**

- Alkaline urine with associated infections with bacteria having urease activity.

❖ Physical characteristics

	Degree of Radiopacity	Color	Character
Calcium phosphate.	Very Radiopaque. ++++	Yellow	Tend to be staghorn
Calcium oxalate.	Radiopaque. +++	Brown	Small multiple
Magnesium ammonium phosphate	Moderate Radiopaque. ++	Yellow	Tend to be staghorn
Cystine.	Slightly Radiopaque. +	whitish	Small multiple
Uric acid.	Non opaque (Radiolucent)	Reddish brown	Small multiple

Renal stones

❖ Clinical picture:

A. Asymptomatic.
B. Renal colic (intermittent obstruction or movement of stones), associated with nausea and vomiting.
C. **Hematuria**: it may be gross or microscopic.
D. **Fever**, **chills**: this suggests that infection is present.
E. Tenderness in the costovertebral angle (renal angle) may or may not be present.
F. Some muscle rigidity over the kidney.
G. Abdominal distention and diminished peristalsis.
H. If marked hydronephrosis has occurred because of prolonged obstruction, a mass in the loin may be seen, felt, or percussed.

❖ Complications

1. **Obstruction**: leading to hydronephrosis, and finally loss of renal function.
2. **Infection**: pyelonephritis, Pyonephrosis.
3. **Hematuria**: leading to anemia.
4. **Migration**: to the ureter or urinary bladder.
5. **Malignancy**: in long standing stones with infection, metaplasia and carcinoma may occur from chronic irritation.

❖ Investigations

➢ **Laboratory**

A. Urinalysis:
- Gross or microscopic hematuria, pyuria, crystals, if acidic, the stone may be uric acid or cystine while if it is alkaline, the stone is struvite.

B. Blood analysis:
- White blood count may be increased if there is infection.
- If renal function is not adequate blood urea and s. creatinine may be elevated
- Serum uric acid may be elevated in some patients with uric acid stone formers.

➢ **Radiological**

- KUB.
- IVU.
- US.
- Retrograde urography.
- CT.
- Radionuclide renography.

❖ Treatment

▪ **Medical (single, smooth, and small stone less than ½ cm, with patent urinary tract):**

A. Dilution
B. Medications:
   - Orthophosphates.
   - Potassium citrate or magnesium citrate.
   - Hydrochlorothiazide.
   - Allopurinol.
   - Alkalinization of urine with molar sodium lactate.
C. Diet regulation:
   - Low in Na & oxalates.
   - Limited dairy products in absorptive oxaluria.

- Restricted animal proteins in gout & hyperuricosuria

D. Surgical:

- Extra corporeal shock wave lithotripsy (ESWL): <2 cm.
- Percutaneous nephrolithotomy (PCNL): > 2cm.
- Combined ESWL and PCNL: for residuals.
- **Open surgical treatment**:
  - ⇨ Pyelolithotomy
  - ⇨ Nephrolithotomy
  - ⇨ Anatrophic nephrolithotomy
  - ⇨ Partial nephrectomy
  - ⇨ Nephrectomy
  - ⇨ Nephrostomy

Ureteral stones

N.B:

- The stone is arrested in the narrowest points in the ureter:

  - ➢ At the uretero- pelvic junction
  - ➢ At the point where the ureter crosses over the iliac vessels
  - ➢ At the ureterovesical junction

❖ Clinical picture

A. Renal pain.
B. Renal colic.
C. Renal mass.
D. Nausea, vomiting and abdominal distention.
E. **Hematuria**: microscopic or macroscopic.
F. **Fever, chills**: if there is infection.
G. Marked tenderness in the costovertebral angle and flank.
H. The abdomen is distended, tympanitic, and quiet on auscultation.
I. The ipsilateral testis may be hypersensitive if the stone is in the upper ureter & it may be retracted.
J. The scrotal skin may be hyperaesthetic if the stone lies in the lower ureter.

❖ Investigations

➢ Laboratory

A. Urinalysis:

- Gross or microscopic hematuria, pyuria, crystals, if acidic, the stone may be uric acid or cystine while if it is alkaline, the stone is struvite.

B. Blood analysis:

- White blood count may be increased if there is infection.
- If renal function is not adequate blood urea and s. creatinine may be elevated.
- Serum uric acid may be elevated in some patients with uric acid stone forms.

- **Radiological**
  - KUB.
  - IVU.
  - US.
  - Retrograde urography.
  - CT.
  - Radionuclide renography.

❖ Treatment

- **Expectant treatment (single, smooth, and small stone less than ½ cm, with patent urinary tract):**

A. Dilution

B. Medications:
   - Orthophosphates.
   - Potassium citrate or magnesium citrate.
   - Hydrochlorothiazide.
   - Allopurinol.
   - Alkalinization of urine with molar sodium lactate.

C. Diet regulation:
   - Low in Na & oxalates.
   - Limited dairy products in absorptive oxaluria.
   - Restricted animal proteins in gout & hyperuricosuria.

D. Stones in lower ureter < 0.8 cm:
   - Ca++ channel blockers.
   - Alpha- blockers.
   - Corticosteroids.

E. Surgical:
   - Extra corporeal shock wave lithotripsy (ESWL): upper ureteral calculi.
   - Ureteroscopy.
   - Ureterolithotomy.

Bladder stones

❖ Clinical picture

A. Urgency.
B. Frequency.
C. Interrupted stream.
D. Hematuria.
E. Pyuria.

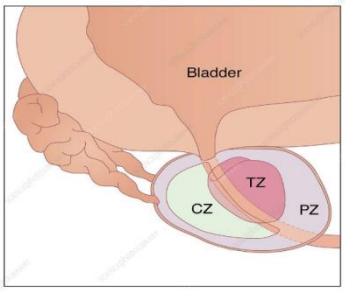
❖ Investigations

- **Laboratory**
  - **A. Urinalysis:**
    - Pyuria.
    - Or hematuria.
- **Radiological**
  - KUB.
  - US.
  - IVV.

❖ Treatment
- Lithotrites.
- Electrohydraulic or ultrasound lithotripsy.
- Cystolithotomy.

Benign Prostatic Hyperplasia

❖ Background:
- **BPH is the most common benign tumor in men**.
- The enlargement of the prostate gland may restrict the flow of urine from the bladder and cause male **LUTS**.
- Lower urinary tract symptoms (LUTS) can be divided into:
  - Storage.
  - Voiding.
  - Post-micturition symptoms.



❖ Definitions:

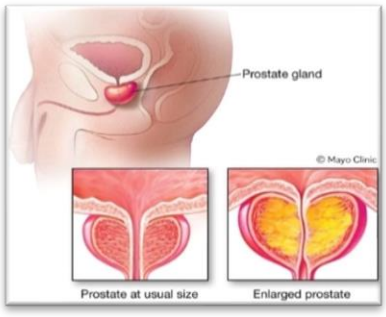
C. Acute retention
- Acute retention of urine is defined as a painful, palpable or percussible bladder, when the patient is unable to pass any urine.

D. Chronic retention
- Chronic retention of urine is defined as a non-painful bladder, which remains palpable or percussible after the patient has passed urine.

E. Bladder outlet obstruction
- It is the generic term for obstruction during voiding and is characterized by increasing detrusor pressure and reduced urine flow rate.

F. Benign prostatic hyperplasia
- Benign prostatic hyperplasia is a term used for the typical histological pattern, which defines the disease.

❖ Pathophysiology
- The prostate is a walnut-sized gland that forms part of the male reproductive system.
- The gland is composed of several regions or lobes that are enclosed by an outer layer of tissue (capsule).
- The different zones are:
  - Peripheral.
  - Central.
  - Anterior fibromuscular stroma.
  - Transition.
- The transition zone, which surrounds the urethra, enlarges with age in a hormonally dependent manner.



Castrated males do not develop BPH.

❖ Symptoms
1. Urinary frequency
2. Nocturia
3. Urinary urgency
4. Hesitancy
5. Incomplete bladder emptying
6. Straining
7. Decreased force of stream
8. Dribbling

Symptom score questionnaires

Definition

- International Prostate Symptom Score (IPSS): Developed to quantitate and validate responses to the questions asked, this set of questions has been adopted worldwide and yields reproducible and quantifiable information regarding symptoms and response to treatment.

International Prostate Symptom Score (I-PSS)

Patient Name: _____ **Date of birth:** _____ **Date completed** _____

In the past month:	Not at All	Less than 1 in 5 Times	Less than Half the Time	About Half the Time	More than Half the Time	Almost Always	Your score
1. Incomplete Emptying How often have you had the sensation of not emptying your bladder?	0	1	2	3	4	5	
2. Frequency How often have you had to urinate less than every two hours?	0	1	2	3	4	5	
3. Intermittency How often have you found you stopped and started again several times when you urinated?	0	1	2	3	4	5	
4. Urgency How often have you found it difficult to postpone urination?	0	1	2	3	4	5	
5. Weak Stream How often have you had a weak urinary stream?	0	1	2	3	4	5	
6. Straining How often have you had to strain to start urination?	0	1	2	3	4	5	
	None	1 Time	2 Times	3 Times	4 Times	5 Times	
7. Nocturia How many times did you typically get up at night to urinate?	0	1	2	3	4	5	
Total I-PSS Score							

Score: 1-7: *Mild* 8-19: *Moderate* 20-35: *Severe*

Quality of Life Due to Urinary Symptoms	Delighted	Pleased	Mostly Satisfied	Mixed	Mostly Dissatisfied	Unhappy	Terrible
If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that?	0	1	2	3	4	5	6

Examination

- General examination.
- Abdominal examination.
- Local examination of the genitalia.
- Digital rectal examination.

Investigation

Lab Studies

A. Urinalysis:

- Hematuria.

B. PSA:

- To differentiate between BPH and cancer of the prostate.

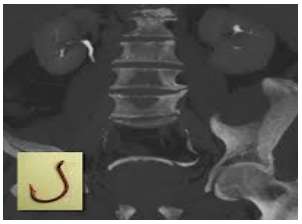
Imaging Studies

A. Ultrasound (abdominal, transrectal):

- Size of the prostate.
- Residual urine volume.
- Upper urinary tract abnormalities.

B. KUB:

- To rule out calculi.



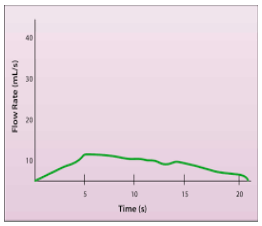
C. IVP:

- If suspicious upper urinary tract abnormalities.

➢ **Optional tests**

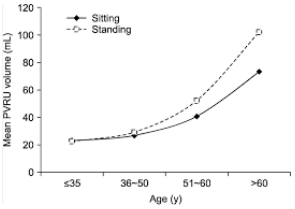
A. Flow rate

- Flow rate is useful in the initial assessment and to help determine the response to treatment.
- A Qmax value of greater than 15 mL/s is considered to be normal.
- A value of less than 7 mL/s is widely accepted as low.



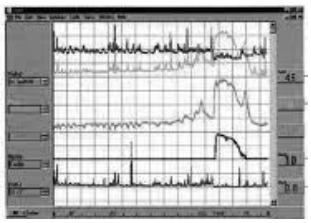
B. Residual urine

- It can be obtained invasively with a catheter but is best determined noninvasively with a transabdominal ultrasonic scanner.



C. Pressure flow studies

- Urodynamic studies are the only way to help distinguish patients with poor bladder contraction ability (detrusor underactivity) from those with bladder outlet obstruction (BOO).
- BOO is characterized by high intravesical voiding pressures (>60 cm water) accompanied by low urine flow rates (Qmax < 15mL/s).



❖ Complications

1. Urinary retention
2. Renal insufficiency
3. Recurrent urinary tract infections
4. Gross hematuria
5. Bladder calculi
6. Renal failure or uremia

❖ Treatment

i. Medical TTT

1. Alpha-adrenergic receptor blockers

- They decrease resistance along the bladder neck, prostate, and urethra by relaxing the smooth muscle and allowing passage of urine.
  - Nonselective alpha-blockers include phenoxybenzamine.
  - Selective short-acting alpha- blockers include prazosin, alfuzosin.
  - Selective long-acting alpha- blockers include and doxazosin.
  - Partially subtype (alpha- a)–selective agents include tamsulosin.

2. Alpha-reductase inhibitors

- The inhibition of -alpha reductase selectively blocks androgen action in tissues whose function is dependent on continuing production of DHT, including prostate and hair follicles.
  - Finasteride (Proscar).
  - It has demonstrated type II alpha-reductase blocking activity resulting in the inhibition of DHT-receptor complex formation.
  - This effect causes a profound decrease in the concentration of DHT in plasma, which, in turn, results in a consistent decrease in prostate size.

- A third of men treated with this agent exhibit improvements in urine flow and symptomatology.

3. **Phytotherapeutic agents**
   - Most of the phytotherapeutic agents used in the treatment of LUTS secondary to BPH are extracted from the roots, seeds, bark, fruits of plants.
     - Antiandrogenic effect.
     - Antiestrogenic effect.
     - Inhibition of -alpha reductase.
     - Blockage of alpha receptors.
     - Antiedematous effect.
     - Anti-inflammatory effect.
     - Inhibition of prostatic cell proliferation.
     - Interference with prostaglandin metabolism.
     - Protection and strengthening of detrusor.
4. **Muscarinic receptor antagonists**
   - Five muscarinic receptor subtypes (M1-M5) have been described, of which M2 and M3 are predominant in the detrusor.
   - The detrusor is innervated by parasympathetic nerves whose main neurotransmitter is acetylcholine, which stimulates muscarinic receptors (M-cholinoreceptors) on the smooth muscle cells.
     - Darifenacin hydrobromide (darifenacin).
     - Oxybutynin hydrochloride (oxybutynin).
     - Propiverine hydrochloride (propiverine).
     - Solifenacin succinate (solifenacin).
     - Tolterodine tartrate (tolterodine).
     - Trospium chloride.
5. **Beta-3 agonist**
   - Or Mirabegron 50 mg.
   - **Mechanism of action**:
     - Beta-3 adrenoceptors are the predominant beta receptors expressed in the smooth muscle cells of the detrusor and their stimulation is thought to induce detrusor relaxation.
6. **Phosphodiesterase 5 inhibitors**
   - **Mechanism of action:**
     - Phosphodiesterase 5 inhibitors (PDE5Is) increase intracellular cyclic guanosine monophosphate.
     - Thus, reducing smooth muscle tone of the detrusor, prostate and urethra.
   - Tadalafil 5 mg:
     - IT reduces IPSS by 22-37% and improvement may be seen within a week of initiation of treatment.

ii. Surgical TTT

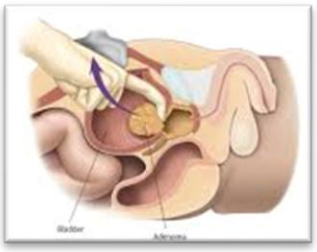
➢ **Indications:**

1. Failed medical treatment.
2. Gross hematuria.
3. Refractory urinary retention.
4. Impending renal insufficiency.

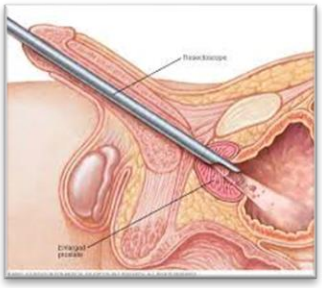
➢ **Operations:**

a) Open prostatectomy (suprapubic, retropubic, perineal).
b) Transurethral resection of the prostate (TURP).
c) Transurethral incision of the prostate (TUIP).
d) Minimally invasive treatment for BPH.
e) Ablative techniques
f) Non-ablative techniques
g) Intra-prostatic injections

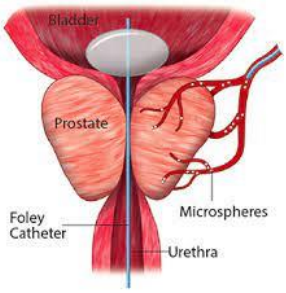
1. Open prostatectomy
   - Suprapubic
   - Retropubic
   - Perineal
   - This procedure is now reserved for patients with prostates more than 80g, patients with concomitant bladder stones or bladder diverticula.



2. Transurethral resection of the prostate
   - TURP is the gold standard method to remove obstructing prostate tissue less than 80g through the urethra by cystoscopy.



3. Transurethral incision of the prostate
   - Alternative to TURP for patients with small prostates.
4. Minimally invasive treatment for BPH
   - High intensity focused US (HIFU)
   - Laser therapy
   - Hyper-thermia & thermo-therapy.
   - Transurethral electro-vaporization
   - Intra-urethral stents
   - Trans-urethral needle ablation (TUNA)
   - Balloon dilation of the prostate
5. Ablative techniques
   - Aquablation – image guided robotic waterjet ablation: Aqua Beam.
     - Prostatic artery embolization
     - Water vapor energy (WAVE) ablation: The Rezum system

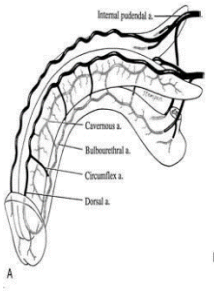


6. Non-ablative techniques
   - Prostatic urethral lift
7. Intra-prostatic injections
   - Various substances have been injected directly into the prostate in order to improve LUTS as Botulinum toxin-A (BoNT-A).

Erectile Dysfunction

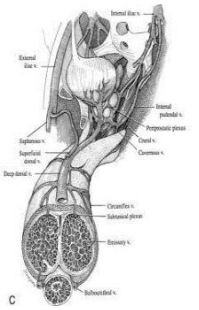
Definition

- The consistent or recurrent inability to attain or maintain a penile erection sufficient for sexual intercourse.



Physiology of penile erection

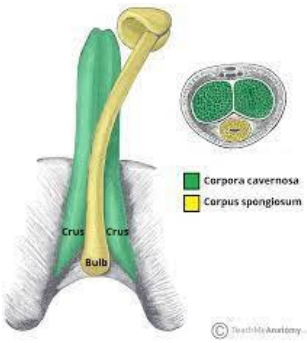
Hemodynamics and Mechanism of Erection



1. Corpora Cavernosa

a) In the flaccid state, these smooth muscles are tonically contracted, allowing only a small amount of arterial flow for nutritional purposes.
b) Sexual stimulation triggers release of neurotransmitters from the cavernous nerve terminals.
c) This results in relaxation of these smooth muscles and the following events.
d) Dilatation of the arterioles and arteries by increased blood flow.
e) Trapping of the incoming blood by the expanding sinusoids.
f) Compression of the subtunical venular plexuses between the tunica albuginea and the peripheral sinusoids, reducing the venous outflow.
g) Stretching of the tunica to its capacity, which encloses the emissary veins.
h) An increase in intracavernous pressure (maintained at around 100 mmHg), which raises the penis to the erect state (the full-erection phase).
i) A further pressure increase (to several hundred millimeters of mercury) with contraction of the ischiocavernosus muscles (rigid-erection phase).

2. Corpus Spongiosum and Glans Penis



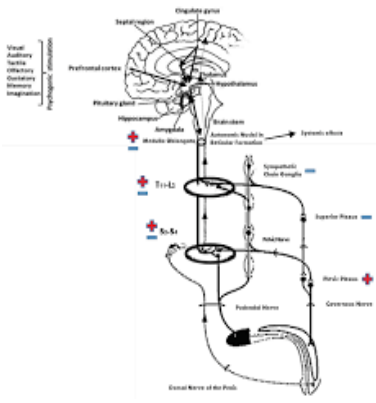
- During erection, the arterial flow increases in a similar manner.
- However, the pressure in the corpus spongiosum and glans is only one third to one half of that in the corpora cavernosa because the tunical covering (thin over the corpus spongiosum and virtually absent over the glans) ensures minimal venous occlusion.

Neuroanatomy and Neurophysiology of Erection

1. Autonomic Pathways

a) The parasympathetic pathway is responsible for tumescence.
b) The sympathetic pathway is responsible for detumescence.

2. Somatic Pathways



a) The pudendal nerve innervates the Ischiocavernosus and bulbocavernosus muscles.
b) Contraction of the ischiocavernosus muscles Produces the rigid-erection phase.
c) Rhythmic contraction of the bulbocavernosus muscle is necessary for ejaculation.

3. Supraspinal Pathways

a) The hypothalamus and hippocampus as important integration centers for sexual function and penile erection.
b) Pathologic processes in these regions, such as Parkinson's disease or cerebrovascular accidents, are often associated with ED.

❖ Pathophysiology

➢ Incidence

- 35% of married men aged 60 years and older suffer from some degree of erectile dysfunction.
- The incidence increases with age.

❖ Classification

1. Psychogenic
   - About 90% of impotent men thought to suffer from this condition. Most men with ED have a mixed condition that may be either predominantly functional or predominantly physical.
2. Neurogenic
   - Parkinson's disease
   - Stroke
   - Encephalitis
   - Temporal lobe epilepsy
   - Tumors
   - Dementias

3. Endocrinologic
   - Hypogonadism
   - Hyperprolactinemia
   - Hyperthyroid state
   - Hypothyroid state
   - Affect libido and sexual behavior.
4. Arteriogenic
   - Atherosclerotic
   - Traumatic arterial occlusive disease.
   - Common risk factors include:
     - Hypertension
     - Hyperlipidemia
     - Cigarette smoking
     - Diabetes mellitus
     - Blunt perineal or pelvic trauma
     - Pelvic irradiation
5. Cavernosal (Venogenic)
   - Failure of adequate venous occlusion has been proposed as one of the most common causes of vasculogenic impotence.
   - Degenerative changes:
     - Peyronie's disease
     - Old age
     - Diabetes
   - Traumatic injury to the tunica albuginea:
     - (Penile fracture).
   - Acquired venous shunts.
6. Drug-Induced
   - Sympatholytics including methyldopa, clonidine
   - α-Adrenergic blocking agents such as phenoxybenzamine and phentolamine
   - β-Adrenergic blockers
   - Thiazide diuretics, spironolactone
   - Alcohol in large amounts
   - Cimetidine

❖ Diagnosis

1) Sexual history and examination.
2) Neurologic evaluation.
3) Nocturnal Penile Tumescence Test. Normally 3-5 times erection during sleep.
4) Duplex ultrasonography to study arterial & venous penile system.
5) Internal pudendal arteriography.

❖ Treatment

A. Behavioral sex therapy.

B. Vacuum erection device:

- placed around the penis to create negative pressure for erection and its constriction ring to maintain erection.

C. Intracavernous injection:

- Alprostadil (PGE2), papaverine, phentolamine.

D. Drugs:

- Transurethral alprostadil
- Oral phosphodiesterase Inhibitors: Sildenafil (Viagra), Vardenafil, Tadalafil

E. Penile prothesis.

Male Infertility

❖ Definition

- Infertility is the inability of sexually active, non- contracepting couple to achieve pregnancy in one year.

❖ Epidemiology

- About 25% of couples do not achieve pregnancy within 1 year.
- Male causes for infertility are found in 50% of involuntarily childless couples.

❖ Etiology

1. Congenital factors
   - Anorchia
   - Testicular dysgenesis
2. Acquired factors
   - Trauma
   - Testicular torsion
   - Orchitis
   - Tumor
   - Surgery
3. Maldescended testes
4. Chromosomal abnormalities
5. Systemic diseases
   - Liver cirrhosis
   - Renal failure
6. Varicocele
7. Idiopathic

Idiopathic male infertility

❖ Cause

- Many men presenting with no demonstrable cause of male infertility.

❖ Treatment

- Empirical treatments: A wide variety of empirical drug approaches have been used.

❖ Therapeutic approaches

➢ **Hormonal:**

- GnRH
- hCG/hMG
- FSH
- Androgens
- Anti-oestrogens (clomiphene citrate, tamoxifen-testosterone undecanoate)

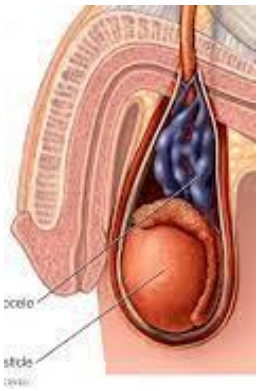
➢ **Non-hormonal:**

- Kinin-enhancing drugs
- Bromocriptine
- Antioxidants May benefit selected patients
- Mast cell blockers

Varicocele

❖ Definition

- VARICOCELE is a common abnormality, with the following andrological implications:
  1. Failure of ipsilateral testicular growth and development.
  2. Symptoms of pain and discomfort.
  3. Infertility.



❖ Classification

1. Subclinical:
   - Not palpable or visible at rest or during Valsalva manoeuvre, but demonstrable by special tests (reflux found upon Doppler examination).
2. Grade 1:
   - Palpable during Valsalva manoeuvre but not otherwise.
3. Grade 2:
   - Palpable at rest, but not visible.
4. Grade 3:
   - Visible and palpable at rest.

❖ Diagnosis

- The diagnosis of varicocele is made by clinical examination.
- It may be confirmed by color Doppler.

❖ Investigations

➢ **Semen analysis:**

- Sill forms the basis of important decisions concerning appropriate treatment.

Parameters	Lower reference limit
Volume (mL)	**1.5**
Total sperm number (10° per ejaculate)	**39**
Sperm concentration (10° per mL)	**15**
Total motility (Progressive + Non progressive%)	**40**
Progressive motility (%)	**32**

Vitality (live spermatozoa%)	**58**
Sperm morphology (normal forms%)	**4**
pH	**≥7.2**

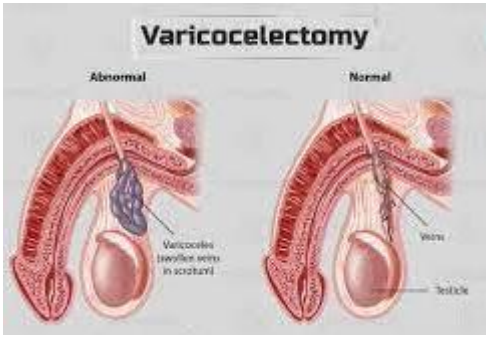
- **Frequency:**
  - It is important to distinguish between oligozoospermia (< 20 million spermatozoa/mL), astenozoospermia (< 50% motile spermatozoa) and teratozoospermia (< 14% normal forms).
  - Quite often, all three pathologies occur simultaneously as OAT syndrome.
  - In extreme cases of OAT syndrome (< 1 million spermatozoa/mL), as in azoospermia, there is an increased incidence of obstruction of the male genital tract and genetic abnormalities.
- **Azoospermia:**
  - No sperms in semen.
  - Causes:
  - Testicular atrophy, agenesis.
  - Obstructive azoospermia at:
    - Rete testis: treated by artificial spermatocele and ECSI.
    - Epididymis: treated by vaso-epididymostomy.
    - Ejaculatory duct obstruction (absent fructose in semen): treated by transurethral resection.

➢ **Hormonal determinations:**

- Generally, the levels of follicle-stimulating hormone (ESH) are mainly correlated with the number of spermatogonia.

➢ **Testicular biopsy:**

- A diagnostic testicular biopsy is indicated in patients without evident factors (normal ESH and normal testicular volume) to differentiate between obstructive and NOA.



❖ Management

➢ **Varicocelectomy:**

- High approach (Palomo).
- Or inguinal approach.

URINARY INCONTINENCE

❖ Definition

- Involuntary leakage of urine.

❖ Types

1. Stress Incontinence:
   - Due to increased abdominal pressure under stress (Weak pelvic floor muscles).
2. Urge Incontinence:
   - Due to involuntary contraction of the bladder muscles.
3. Overflow Incontinence:
   - Due to blockage of the urethra.

4. Neurogenic Incontinence:
    - Due to disturbed function of the nervous system.

❖ Differential diagnosis

- Leakage of fluids other than urine or leakage of urine via a route other than the urethra.

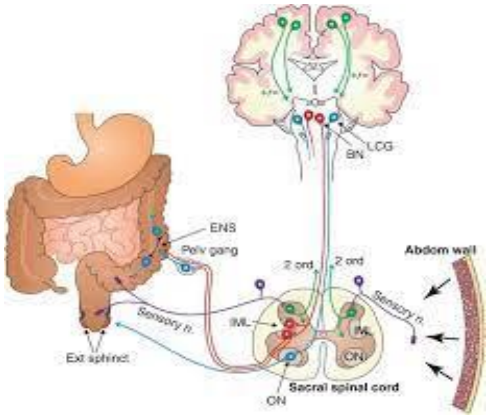
A. Nonurinary wetness.
    - Loss of body fluids that may be confused with urine.
    - Since urine contains very high level of creatinine, the creatinine level of the fluid should be measured.

B. Nonurethral urinary incontinence.
    - Leakage of urine via a route other than the urethra.

1. **Fistula:**
    - Vesicovaginal fistula
    - Ureterovaginal fistula
    - Urethrovaginal fistula
2. **Ureteral ectopia:**
    - It is congenital insertion of the ureter into a location other than its normal location.
    - If the insertion is distal to the external urethral sphincter it may cause continuous incontinence (only in females).

❖ Physiology of continence

➢ **The lower urinary tract performs two tasks:**
    - Storage.
    - Emptying of urine.



- **Urinary continence requires that the bladder be able to store an adequate volume of urine at low pressure, that:**
    - ⇨ Urethral sphincters be competent.
    - ⇨ Neurologic mechanisms coordinating storage and emptying be intact.
- The bladder neck must remain closed at all times except during voiding.
- And it must be able to withstand momentary increases in intraabdominal pressure.

➢ **Bladder**
    - **Viscoelastic properties:**
        - The normal bladder will allow expansion during filling with little increase in intravesical pressure.
        - This property is known as compliance.
    - **Detrusor muscle:**
        - It is normally relaxed owing to inhibition of its parasympathetic nerves.

➢ **Outlet**
    - The anatomic support and innervation of the bladder outlet as well as the intrinsic tone of the bladder neck and urethra all contribute to continence.
    - The prostatic and membranous portions of the male urethra act as the primary continence mechanism, whereas in the female, the entire urethra performs this function.

❖ Classification of urinary incontinence

1. Stress urinary incontinence:

- It is the complaint of involuntary leakage on:
    - Effort or exertion
    - Sneezing
    - Coughing

2. Urge urinary incontinence:
   - It is the complaint of involuntary leakage accompanied by or immediately preceded by:
     - Urgency.
3. Mixed urinary incontinence:
   - It is the complaint of involuntary leakage associated with:
     - Urgency.
     - And also with exertion, effort, sneezing, or coughing.
4. Overflow incontinence:
   - It is urinary leakage in combination with urinary retention.
   - This is demonstrable clinically by measuring high postvoid residuals in conjunction with observable incontinence.
5. Continuous incontinence:
   - It is the complaint of continuous urinary leakage.
6. Nocturnal enuresis:
   - It is urinary loss that occurs only during sleep.

❖ Assessment of urinary incontinence

A. History

1) **Identification of the type of incontinence:**
   - Stress.
   - Urge.
   - overflow, etc.
2) **Duration of symptoms.**
3) **Severity:**
   - Described by the number pad use.
   - Or micturition diary.
4) **Medications can cause or worsen incontinence:**
   - Sympatholytic (e.g., clonidine, terazosin) can weaken sphincter tone.
   - Sympathomimetics (e.g., pseudoephedrine, imipramine) can cause urinary retention and overflow incontinence.
5) **Past surgical history**
   - Pelvic surgery (e.g., abdominoperineal resection).
   - Prior ant incontinence surgery.
   - Prostate surgery.
   - Bladder surgery.
6) **Obstetric and gynecological history**
   - Gravity, parity, outcomes, and complications.
   - Vaginal delivery versus cesarean section, prolonged second stage.
   - Hysterectomy.
   - Sexual activity, pain or leakage with intercourse.
   - Menopause and hypoestrogenic state.
7) **Neurologic history**
   - Spinal cord surgery or injuries.
   - Cerebrovascular accident.
   - Parkinson's disease.
8) **Gastrointestinal history**
   - Diarrhea.
   - Constipation.
   - Fecal incontinence (suspicious for neurologic lesion).
9) **Associated lower urinary tract symptoms: e.g.**
   - Urgency.
   - Frequency.
   - Nocturia.

10) Symptoms associated with pelvic organ prolapse include:

- Any introital bulge.
- Or mass.

B. Physical examination

1) Abdominal examination:

- Tenderness
- Palpable masses
- Suprapubic fullness (distended bladder)
- Hernias
- Careful note should be made of all surgical scars, which should be correlated with the history.

2) Female pelvis:

- **External genitalia** are examined for signs of:
  - Chronic wetness (erythema, skin breakdown)
  - Atrophy (pale, shiny mucosa)
  - Labial adhesions
- **Internal pelvic organs**:

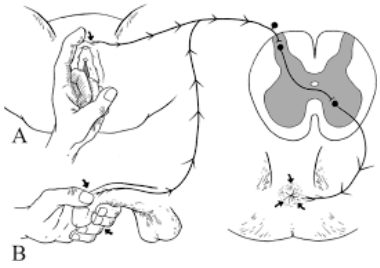
1. Urethral examination
   - ⇨ It may demonstrate:
     - Stenosis
     - Masses
     - Tenderness
   - ⇨ Stress incontinence, if present, will be exhibited on Valsalva or cough maneuvers.
2. Vaginal examination
   - ⇨ Atrophic vaginitis
   - ⇨ Discharge
   - ⇨ Bimanual examination can reveal:
   - ⇨ Vaginal narrowing
   - ⇨ Or palpable scars (e.g., episiotomy or prior surgery).
   - ⇨ Bimanual examination
     - For diagnosis of pelvic organ prolapse, examination of the anterior and posterior vaginal walls should be performed both at rest and during Valsalva maneuvers.
     - **Cystocele:** herniation of the bladder into the anterior vaginal wall.
     - **Enterocele:** herniation of small bowel or omentum into the vagina.
     - **Rectocele:** herniation of rectum into the vagina.
3. Neurological examination

(A) Sensory examination

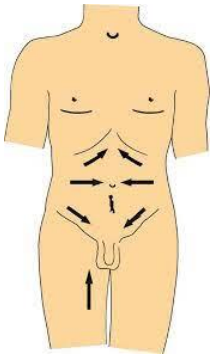
- ⇨ Can help locate the level of sensory deficit.
- ⇨ Important reference points include the following:
  - **T5** = nipple level.
  - **T10** = umbilicus.
  - **L3** = knee.
  - **S3 to S5** = perineum, labia.

(B) Reflexes

1. **Deep tendon reflexes:**
   - ⇨ Altered in muscular / peripheral nerve pathology.
     - **L3 to L4 =** quadriceps.
     - **L5 to S2** = Achilles tendon.



2. **Cutaneous reflexes:**
   - ⇨ Response to stimuli applied to the skin.
   - ⇨ **Sacral reflex** >> S2 to S4
     - It is called (Bulbocavernosus reflex).
     - Absence of this reflex is a reliable indicator of neurologic disease.
     - During rectal examination, the glans penis or glans clitoris is squeezed, resulting in reflex contraction of the anal sphincter and bulbocavernosus muscles.

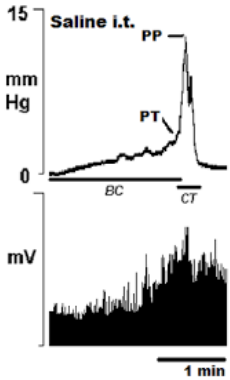


   - ⇨ **Cremasteric reflex** >> L1 to L2
   - ⇨ **Abdominal reflex** >> T6 to L2
   - ⇨ **Anal reflex** >> S2 to S5

(C) Urodynamic Studies

- ⇨ It assesses lower urinary tract function by measuring physiologic parameters (pressure, volume, flow, leak, and bladder descent).
- ⇨ The urodynamic measurements can help determine the underlying pathophysiologic process and aid in making treatment decisions.
- ⇨ **Components**:

1. **Uroflowmetry**
   - ➢ It is a recording of the rate of urine flow in milliliters per second.
2. **Cystometrogram**
   - ➢ It involves filling the bladder while recording the pressure- volume relationship.
   - ➢ The following can be detected:
     - Abnormal bladder sensation
     - Compliance
     - Detrusor overactivity



3. **Voiding pressure**
   - ➢ Study records the pressure in the bladder concurrently with the urine flow rate.
4. **Assessment of urethral function**
   - ➢ The detrusor leak point pressure measures the lowest intravesical pressure that will produce urine leakage in the absence of detrusor contraction.
   - ➢ The Valsalva or abdominal leak point pressure measures the intraabdominal pressure that will cause leakage of urine in the absence of detrusor contraction.
   - ➢ “A normal urethra should not leak with increased intraabdominal pressure”.
   - ➢ The urethral pressure profile is an indication of urethral resistance at various points along the urethra.

- It is measured by withdrawing a perforated urethral catheter and graphing the pressure at recorded catheter lengths.

5. **Electromyogram**
   - It measures sphincter activity concurrent with the rest of the exam.
   - Either electrodes are attached to the perineal skin, or needles are placed directly into the urethral sphincter.
6. **Videourodynamics**
   - Combine cystography with urodynamics to observe for leak point pressures and bladder neck descent.

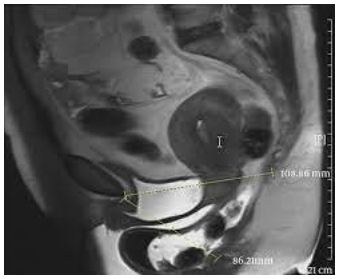
❖ Investigations of urinary incontinence

➢ Imaging studies

1) Voiding cystourethrogram (VCUG)

- The patient is asked to strain with a full bladder, at which time leakage, if present, is recorded radiographically.
- The VCUG may also be used as an objective measure of the degree of a cystocele.
- The extent of bladder descent below the inferior border of the pubic symphysis is measured.
- A distance of 0 to 2 cm below the symphysis corresponds to a grade 1 cystocele, 2 to 5 cm below the inferior border of the symphysis to grade 2, and >5 cm to a grade 3 cystocele.

2) MRI

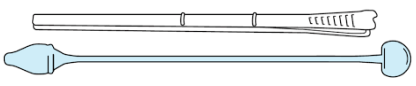


- It is used as a radiographic measure of pelvic organ prolapse.
- This study is useful because it provides detailed anatomic information on the pelvic organs without radiation exposure.
- The disadvantage of MRI: is that it must be done in the supine position and may underestimate the degree of prolapse.

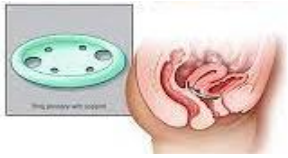
❖ Treatment of urinary incontinence

A. Nonsurgical:

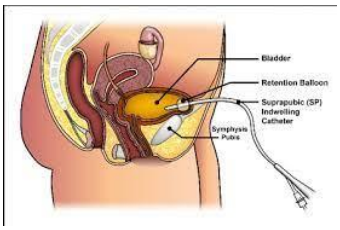
1. **Behavioral modification**
   - It is an education-based program that teaches patients.
   - For example, excessive fluid or caffeine intake and delayed voiding are habits that are modifiable for symptomatic improvement.
2. **Pelvic floor therapy**
   - "Kegel exercises" is the widely used term for any type of pelvic floor strengthening.
   - By contracting external sphincter intermittently.
3. **Urethral inserts**
   - Various urethral meatal devices.
   - And inserts are available for women.



4. **Pessary**
   - Various intra vaginal devices are available for:
     - Support.
     - And reduction of pelvic organ prolapse.



5. **Indwelling catheters**
    - It may be in the form of:
        - Urethral catheter.
        - Or a suprapubic tube.



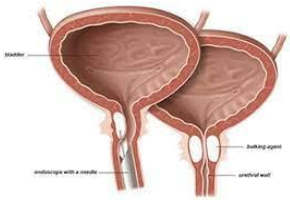
B. Pharmacologic agents:

1. **Stress incontinence**
    - **α-Adrenergic agonists:**
        - Increase internal sphincter tone. (e.g., Pseudoephedrine).
    - **Estrogens:**
        - Have been used to treat stress urinary incontinence in postmenopausal women orally or vaginally.
2. **Detrusor overactivity**
    - **Antimuscarinic agents:**
        - Are used to suppress detrusor overactivity.
        - Oxybutynin chloride (Ditropan):
        - Oxybutynin is supplied as a 5-mg tablet.
        - The dose is 1 to 4 tablets spaced out during the day.
    - **Tolterodine tartrate (Detrol):**
        - Is a competitive muscarinic receptor antagonist.
        - The dose is 2 mg PO twice daily.
    - **Imipramine:**
        - A tricyclic antidepressant.
        - Used for its effect of closing of the bladder neck and relaxing the detrusor.
        - The dose is 10 to 25 mg PO qid.

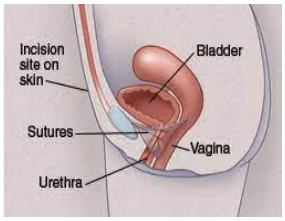
C. Surgical TTT of stress urinary incontinence:

- Aims to improve the ability of the bladder outlet to resist increased intraabdominal pressure.

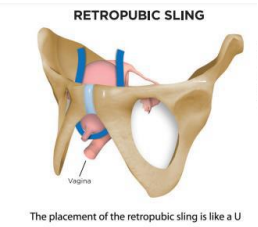
1. **Urethral bulking**
    - The mechanism of action is improvement of urethral coaptation.
    - These agents are also capable of increasing outlet resistance. e.g. Collagen, Teflon, Silicone or Autologous fat.



2. **Retropubic suspension procedures (colposuspensions)**
    - Aim to support and restore the bladder neck to its retropubic location.



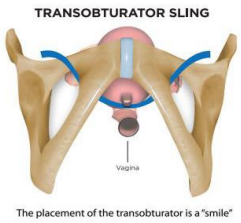
3. **Transvaginal bladder neck suspensions**
4. **Pubovaginal sling**
    - Are tapes below bladder neck to support the urethra to suprapubic rectus muscle.
    - **Types:**
        - **a. Autologous sling materials include:**
            - Rectus fascia
            - Fascia lata



The placement of the retropubic sling is like a U

b. Allograft sling materials:

- Are those harvested from a human donor.

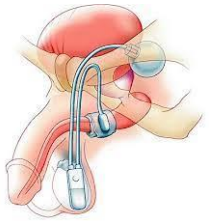


c. Xenograft sling materials:

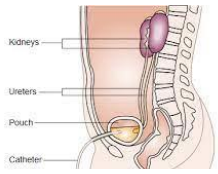
- Are harvested from nonhuman donors.
- Porcine dermal and intestinal submucosal grafts are available.

d. Synthetic sling materials include:

- Monofilament polypropylene mesh or multifilament polyester mesh e.g., tension-free transvaginal tape (TVT).

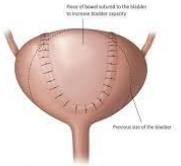


5. **Artificial urinary sphincter**
   - It involves placement of a synthetic cuff around the bladder neck/proximal urethra; the cuff remains inflated until intentional deflation by a scrotal or labial pump.
6. **Urinary diversion**
   - It is indicated as a last resort in some patients with stress or urge urinary incontinence that is refractory to the above- mentioned treatment options.



D. Surgical TTT of urge urinary incontinence:

1. **Augmentation cystoplasty**
   - Using bowel segments.
   - Can be performed for patients with overactive bladder refractory to medication.



2. **Sacral neuromodulation**
   - May be used in patients with overactive bladder or urinary retention refractory to medical or conservative management.
   - This involves placement of a surgical electrode permanently stimulating S3 afferent or motor nerves.

Urological Emergencies

❖ Classification:

- ➢ Upper tract:
  - Renal colic
  - Calcular anuria
- ➢ **Lower tract:**
  - Hematuria
  - Acute urine retention
- ➢ **Genital:**
  - Penile fracture
  - Testicular torsion and acute scrotum
  - Priapism

Renal Colic

❖ Causes:

- **The most common cause of renal colic is stone disease**.
- Other caused include:
  - Urothelial malignancy of the ureter.
  - External compression of ureter by a tumor.
  - Retroperitoneal fibrosis.
  - Stricture disease of ureter.

❖ Risk factors for stone formation:

- Age: peak incidence age 20-50 years.
- Sex: more common in males.
- Positive family history.
- Personal history of renal stones.
- Inflammatory bowel disease.
- Low fluid intake.
- Diet (especially high intake of animal protein).

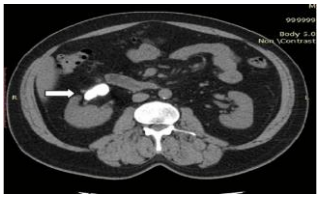
❖ Clinical Picture:

- ➢ **Symptoms:**
  - Acute severe colicky loin pain.
  - +/- radiation to the ipsilateral groin and testicle or labia.
  - Usually, the patient cannot find a comfortable position.
  - Nausea and vomiting are common.
  - May visible hematuria.
  - Fever or rigors are important indicators of (obstructed infected kidney).
  - May get symptoms of AKI or even be anuric (which should raise suspicion of an obstructing stone in a single functioning kidney or bilateral obstructing ureteric stones).
- ➢ **Signs:**
  - Temperature, HR, RR, BP and UO.
  - Abdominal and loin examination mainly to exclude other causes of pain (e.g., Ruptured AAA, appendicitis).
  - External genitalia to examination to exclude alternative diagnoses such as testicular torsion.
- ➢ **Features of AKI/ uremia:**
  - Nausea, vomiting.
  - Fatigue.
  - Muscle cramps.

- Pruritus.
- Mental state changes.
- Visual changes.
- Thirst.

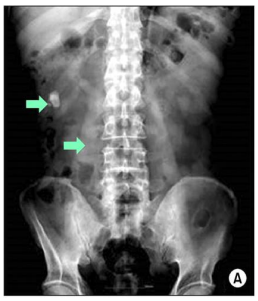
❖ Investigations:

➢ **Non contrast Spiral CT scan:**
- Has a high sensitivity and can detect other causes of abdominal pain.



➢ **Plain abdominal (KUB) X-Ray:**
- If a stone was confirmed on CT.
- Useful in the follow up of radio-opaque stones.

➢ **U/S:**
- Bedside.
- Children/Pregnant.
- Look for hydronephrosis and the presence of stones.



➢ **Urine Analysis:**
- +/- urine culture.
- (Dipstick hematuria is present in approximately 80% of patients with stones but decreases as time passes).

➢ **Bloods:**
- CBC.
- U&E.
- C-reactive protein (CRP).
- Clotting screen (in case an invasive procedure is necessary).
- Blood culture if there is fever.

➢ **Blood Glucose:**
- +/- HbA1c if poorly controlled diabetes is suspected.

➢ **Pregnancy test:**
- Ectopic pregnancy.
- CTU.

❖ Differential Diagnosis:

➢ **Urological causes:**
- Obstruction may be due to a stone, clot, ureteric tumor,
- PUJO.
- Infections: UTI pyelonephritis.
- Non-urological causes.
- Leaking abdominal aortic aneurysm (the most important diagnosis to exclude in the acute setting).

➢ **Surgical causes:**
- Appendicitis (especially if retrocecal).
- Inflammatory bowel disease.
- Diverticulitis.
- Bowel obstruction.

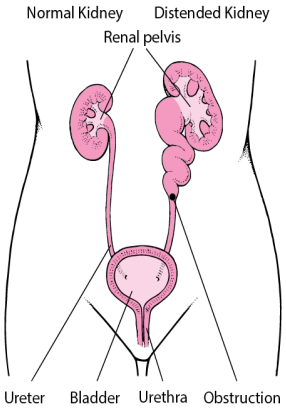
➢ **Medical causes:**
- Pneumonia.
- Myocardial infarction.

➢ **Gynecological causes:**
- Ectopic pregnancy.
- Pelvic inflammatory disease.
- Ovarian pathology (e.g., torted ovarian cyst).

- Management:
  - **Medical treatment:**
    - NSAIDs e.g., **diclofenac 100mg** per rectum (offer excellent analgesia where there are no contraindications to their use).
    - Opioids with antiemetic are an alternative if NSAIDs cannot be used.
  - **Indications of urgent decompression of the renal system:**
    - Unremitting pain.
    - Stone in a single kidney (or functionally single kidney).
    - Sepsis.
    - AKI.
    - Bilateral obstruction.
  - **Then, Treatment will be tailored to the individual patient and will depend upon both patient and stone.**

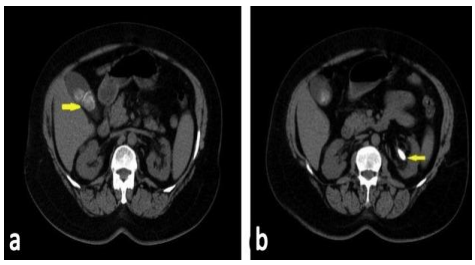
Calcular Anuria

- Definition:
  - Arrest of urine flow secondary to obstruction of the ureter (no urine produced in 12 hours).



- Epidemiology:
  - 5% of all cases of AKI.
- Etiology:
  - Bilateral obstruction of both ureters.
  - Ureteric obstruction of a single functioning kidney.
- Clinical Picture:
  - **Stage of onset:**
    - Sudden onset of ureteric colic with no production of urine.
  - **Stage of tolerance:**
    - Pain gradually relieved with no production of urine and progressive deterioration of renal function.
  - **Stage of Uremia**
- Differential Diagnoses:
  - **Must be differentiated from acute retention of urine by:**
    - Palpation of a full bladder.
    - Insertion of a catheter.

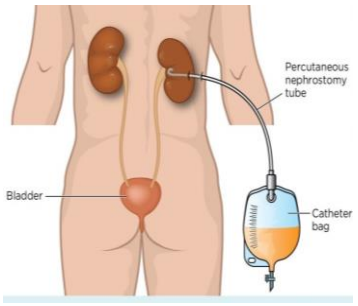
- Investigations:
  - **Non contrast CT scan**
  - **Labs:**
    - CBC.
    - PA.
    - INR.
    - Renal functions including Na, k and ABG.

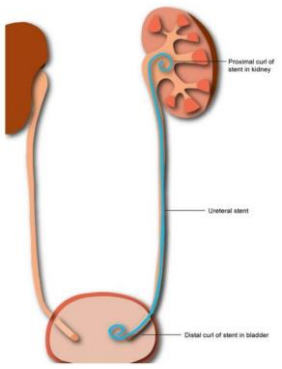


❖ Management:

➢ **Emergency:**

- **Urgent decompression by:**
  - Ureteric JJ stent or.
  - Percutaneous nephrostomy.
- **Follow up of UOP and monitoring of physiological Post obstructive diuresis.**
- **Improvement of renal functions are mandatory.**





Acute Urine Retention

❖ Definition:

- Sudden painful inability to pass urine with a strong desire and a full bladder.

❖ Etiology:

➢ **Mechanical:**

- Enlarged prostate (most common).
- Urethral stricture.
- Urethral stone.

➢ **Hysterical:**

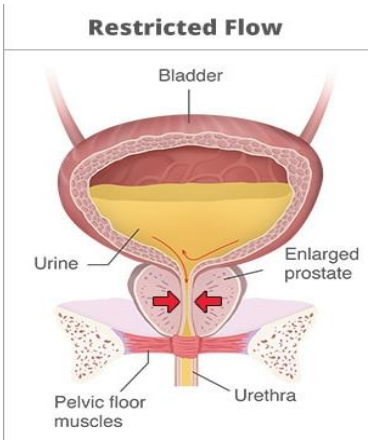
- In a young female.

➢ **Neurogenic:**

- Acute stage of spinal cord injury.
- MS.
- Spinal anesthesia.

➢ **Reflex:**

- Due to pain: especially after anal operations.



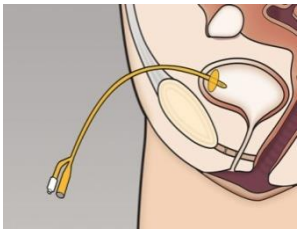
❖ Clinical Picture:

➢ **Symptoms:**

- Suprapubic pain.
- Inability to pass urine.
- Severe desire for micturition.

➢ **Signs:**

- Full bladder can be palpated or percussed.
- DRE for examination of enlarged prostate.



❖ Investigations:

➢ **Ultrasound.**

❖ Management:

➢ **In reflex retention never run to catheterization:**

- Strong analgesics, running tab in font of patient, warm application to thigh and perineum are usually enough,
- If failed catheterization is indicated.

➢ **In mechanical or neurogenic retention:**

- Urethral catheterization is a must.
- Good lubrication, analgesia, aseptic technique, and confirmation of location before inflation of balloon are must.
- If failed. suprapubic cystostomy under local anesthesia is required.

Penile Fracture

- Definition:
  - Traumatic rupture of tunica albuginea of the corpora cavernosa.
- Etiology:
  - Trauma due to buckling of an erect penis most common cause is vigorous intercourse.
  - Other causes include vigorous masturbation and self-pending of an erect penis.
- Clinical Picture:
  - **Symptoms:**
    - Sudden painful swelling of the penis.
    - With history of a "click" sound during intercourse or masturbation.
  - **Signs:**
    - **Eggplant deformity:**
      - Swelling and ecchymosis of penile shaft.
      - Caused by hematoma.
      - Contained by buck's fascia.
      - IF buck's fascia is ruptured, Hematoma extends to perineum and Suprapubic region limited by colles fascia producing the (butterfly appearance).
      - Bleeding per meatus: Suggests concomitant urethral injury if present (10% of cases).

- Investigations:
  - No investigations are exclusive:
  - Surgical exploration is mandatory if clinical examination is suggestive of penile fracture
  - **Penile Doppler:**
    - Detect hematoma and can detect the tunical tear in some cases.
  - **Penile MRI.**
  - **Retrograde Urtetherogram:**
    - Required in cases of urethral injury.
  - **Flexible Uretheroscope:**
    - Can replace RUG.
  - **Routine lab:**
    - CBC.
    - PA.
    - INR.

- Management:
  - Immediate surgical exploration by penile degloving and repair of tunical tear.

Priapism

- Definition:
  - Persistent erection for more than 24 hours in absence of sexual stimulation.
- Types:
  - Ischemic Priapism (Veno -Occlusive, Low-Flow).
  - Non-Ischemic Priapism (Arterial, High-Flow) No ischemia= no pain = no emergency Tumescent.

❖ Etiology:

➢ **Ischemic Priapism (low-flow):**

- ED therapies ICI.
- Sickle cell anemia.
- Polycythemia.
- Leukemia.
- Alcohol.
- Antipsychotic drugs.
- Heparin treatment.

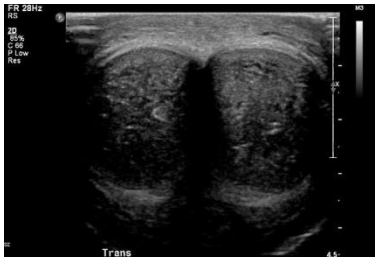
➢ **Non-Ischemic Priapism (high-flow):**

- Perineal trauma.
- Straddle injury.
- Spinal cord injury.

Presenting Symptoms	Ischemic	Non - Ischemic
Etiology	Veno - occlusive	Arterial inflow
Tenderness / Pain	Yes	No
Tumescence	Rigid	Fullness
Cavernosal arterial flow	Minimal / none	Normal / high
Blood aspirate	Dark	Bright red
Compartment syndrome	Yes	No
Emergency	Yes	No
Erectile dysfunction secondary to priapism	Variable (30-90%)	Infrequent

The penile glans is usually detumesced in ischemic and non-ischemic priapism

❖ Investigations:



➢ **Penile Duplex:**

- To differentiate ischemic and non-ischemic priapism by detection of blood flow.

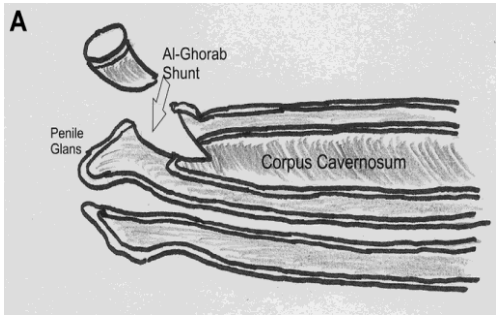
➢ **Corporal Blood ABG:**

- To differentiate ischemic and non-ischemic priapism.

❖ Management:

➢ **Treatment of ischemic priapism:**

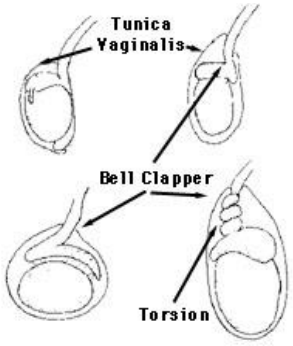
- **Aspiration and irrigation:**
  - A cannula is placed in corpora and blood is aspirated followed by irrigation with an alpha-adrenergic agonist with cardiac monitoring.
- **Distal shunts:**
  - To create a cavenoglanular fistula e.g., winter, Ebbehoj and Al-Ghorab shunt.
- **Penile prosthesis.**
- **Proximal shunts.**
  - To create fistula between corpora cavernosa and spongiosum or saphenous vein is rarely performed due to difficulty and high incidence of complications.

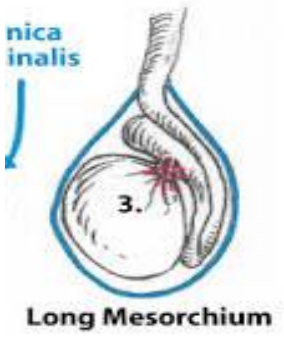


- **Treatment of non- ischemic priapism:**
  - **Conservative:**
    - Successful in 70% of cases.
  - **Selective arterial embolization:**
    - In failed conservative treatment with risk of ED.

Testicular Torsion

- Definition:
  - Twisting of the spermatic cord along the longitudinal axis causing blockage of the blood supply to the testis.
- Epidemiology:
  - The most common urological pediatric emergency.
- Predisposing factors:
  - Inversion of testis.
  - Long mesorchium.
  - Clapper in bell deformity (high investment of tunica vaginalis).
  - Spirally attached cremasteric muscle
  - Minor trauma.
  - Strong cremasteric reflex.
  - May occur spontaneously.





- Pathology:
  - The testis rotates from inside outwards.
  - Edema and congestion occur.
  - Ischemic gangrene occurs if neglected for more than 12 hours.
- Clinical Picture:
  - **Symptoms:**
    - Sudden severe agonizing pain in scrotum.
    - Scrotal swelling.
    - Reflex nausea and vomiting.
  - **Signs:**
    - **General:**
      - Pallor and tachycardia due to severe pain.
    - **Local:**
      - Swollen tender hemiscrotum.
      - High fixed testis with absent cremasteric reflex elevation doesn't decrease the pain.
      - The knot may be palpated in the spermatic cord.

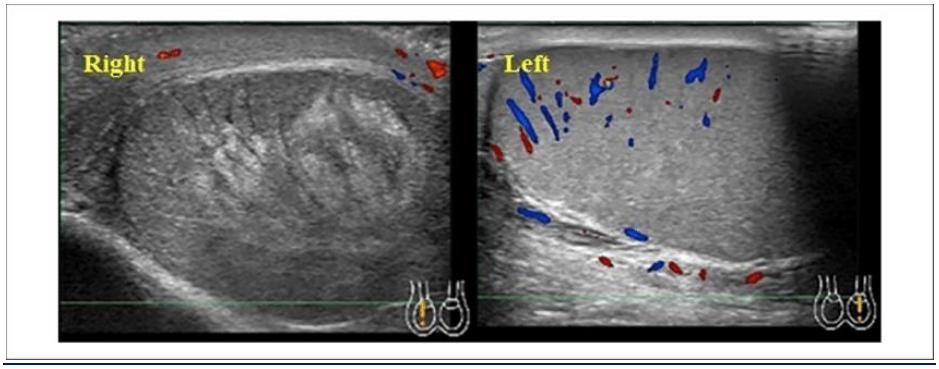
- Differential diagnosis:
  - **Differential diagnosis for acute scrotum:**
    - Testicular torsion.
    - Torsion of testicular appendage.
    - Testicular infarction.
    - Acute epididymitis.
    - Acute epididymo-orchitis.
    - Fournier's gangrene.
    - Abscess.

- Strangulated inguinoscrotal hernia, with or without associated testicular ischemia.
- Hydocoele with added infection.
- Testicular tumor with infection, bleeding, or ischemia.
- Varicocele.
- Trauma and Ruptured testicle.
- Scrotal/testicular **hematoma** or haematocoele.

❖ Investigations:

➢ **Scrotal Doppler**

- To detect blood flow to testis.



❖ Management:

➢ **Emergent detorsion and bilateral orchiopexy:**

- Manual detorsion may be possible during examination but that doesn't eliminate the emergent requirement of bilateral orchiopexy.
- After untwisting of the cord orchiopexy by absorbable sutures is performed.
- Bilateral orchiopexy is required as the predisposing factor is present bilaterally.

➢ **In cases of neglected torsion:**

- Orchiectomy is performed “although is a type of dry gangrene".
- To eliminate the theoretical risk of immunologic infertility due disruption of blood testicular barrier and formation of anti-sperm antibodies.
- A recent study compared patients with orchiectomy and patients with preservation after neglected torsion found the only significant difference in sperm analysis in motility and viability with no difference in count.