Emergency in urology, Non-Traumatic

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Color Index:

-Doctor's Notes -Surgery Recall -Doctor's Slides -Extra explanation -Important

Correction File

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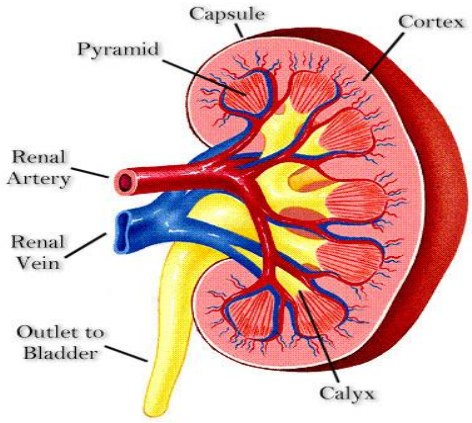
Anatomy of genitourinary system.

Kidneys :

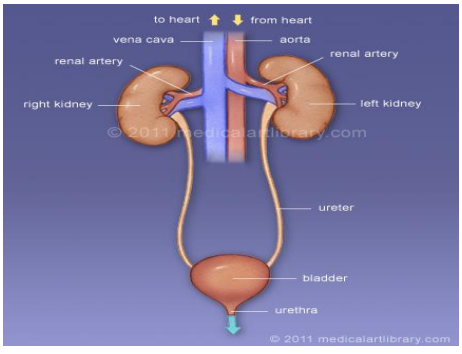
are retroperitoneal organs that are located between T12-L3 on left while slightly lower on the right due presence of liver.



The kidney is covered by a capsule of fibrous tissue beneath this capsule are cortex and medulla.

The medulla comprises the early portions of Urinary collecting : Renal pyramids, Renal papillae, minor calyces and major calyces. The major calyces form renal pelvis which becomes ureter.

Arterial supply : Renal artery (from abdominal aorta)
Venous drainage : Renal vein (drained to IVC)
Nerves supply : Thoracic splanchnic nerve
Lymphatic drainage : Lumber nodes



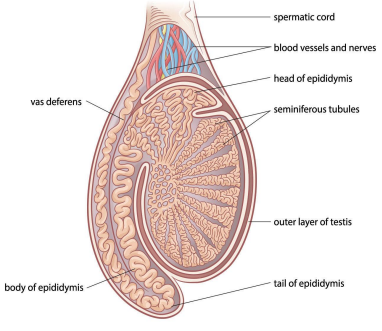
Ureters and bladder:

Ureters are retroperitoneal organs that connect kidneys to the bladder.

Bladder : is situated beneath peritoneum within bony pelvis.

Testis :

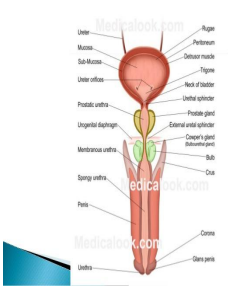
Are almond shape which is considered the primary sex organ in males. Testis have many important functions such as ; spermatogenesis and secretion of testosterone.

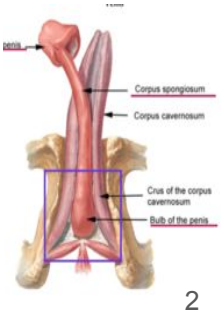


Arterial supply : testicular artery from abdominal aorta
Venous drainage : Pampiniform plexus -> testicular vein (right drained to IVC while the left to left renal vein)
Lymphatic : Para-aortic lymph nodes.

Male urethra and penis:

Male urethra is composed of 3 parts: Prostatic, membranous and penile urethra (the longest).





Penis is composed of two corpora cavernosa and one corpus spongiosum.

Emergency in urology

Why the patients come to emergency?

Patients usually come to ER due generalized pain or fearing from any changes in the body.

Classification of emergency in urology :

Emergency in urology		
Types	Non-Traumatic	Traumatic
Example	1-Hematuria 2-Renal colic 3-Urinary retention 4-Acute scrotum 5-Priapism	1-Renal Trauma 2-Ureteral Injury 3-Bladder Trauma 4-Urethral Injury 5-External Genital Injury

1-Non-Traumatic.

Hematuria.

Is presence of blood or RBC in the urine and is divided into :

1- Gross (also called clinical, macroscopic and visible) hematuria = Emergency hematuria. 1 ml of blood in 1 liter of urine is visible for the patients

2- Microscopic hematuria = Not Emergency. 3 or more RBCS/High power, in 2 out of 3 properly collected samples.

Notes : Gross hematuria is more serious than microscopic hematuria and has about 24% chance to be caused from cancer.

Variation of causes of hematuria, according to :

1-Patient age : Renal colic usually occurs in those in middle age and above.

2-Symptomatic or ASymptomatic : patients with bladder cancer have painless hematuria while those with kidney stones, UTI, Renal vein thrombosis and trauma have painful hematuria.

3-The existence of risk factors of malignancy : such as smoking and work in factory.

4-The type of hematuria

Causes of hematuria:

Causes of hematuria	
Pre-renal (systemic)	Chemotherapy,Radiation, liver problems, Malaria, Sickle cell anemia, Thalassemia, hemophilia and anticoagulant
Renal	Renal colic,Renal vein thrombosis,Pyelonephritis, renal tumors renal trauma and nephritic syndrome.
Post-renal	BPH, Cystitis,UTI, schistosomiasis, trauma and transitional cell carcinoma of bladder

What is the most common cause of hematuria (other than trauma, radiation and chemotherapy) ? From where does it usually originate?

-Transitional cell carcinoma. Its risk factors (Workers in factories, smoking, petroleum workers and cyclophosphamide)

-From urothelium of bladder

Mention the name of industrial carcinogens that can cause TCC ?

Aromatic amines.

Management of hematuria:

Full work up of gross Haematuria is mandatory.

1- Taking a history (very important part)
2- Physical examination (Usually no signs)
3- Investigations
4- 3 ways urethral catheter and bladder wash out for heavy bleeding.(saline in, saline out and وحدة تثبت البالون)
5- Treat according to the cause.

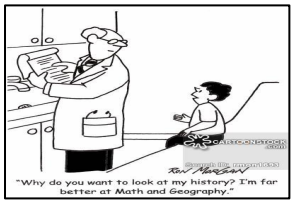
History of hematuria:

- Age (Important because some diseases affect only specific group of age)
- Residency (due bilharziasis = schistosomiasis common in some regions such as Jazan.
- Duration
- Occupation (those who work in factories have a high risk of TCC)

- Painful or Painless (because each one has different indications) also very important to ask which comes first pain or hematuria. If pain comes first -> indicates most likely stones while if hematuria appears first -> indicates Malignancy
- Timing of hematuria : 1- Initial hematuria (presence of blood in the onset of the urine) -> urethral causes.

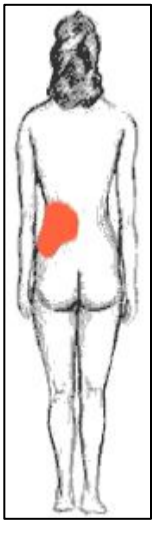
  2- Terminal hematuria (persistence of blood at end of urine) -> Bladder neck or Triagone problems

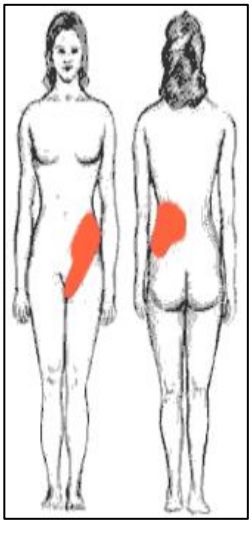
  3- Total hematuria (persistence of blood in a whole urine) -> Upper UT, rest of bladder or pre-renal causes
- How dark colored is urine (To assess the severity)
- Clots and shape of clots (from kidney the shape will be straight line while rounded in other UT organs).
- Trauma
- Bleeding from other sites
- Associated symptoms urinary and systemic
- History of : bleeding disorders, infections, TB, bilharziasis and stones.
- Family history of : Malignancy (prostatic cancer is familial), hematological disorders (such as sickle cell anemia and thalassemia)
- Drugs : 1- rifampicin causes orange discoloration of urine, 2-Warfarin may cause hematuria.
- Colored food and drinks intake (heavy amounts can cause hematuria)
- Smoking (risk factor of TCC)



Renal Colic.

- The commonest cause of Emergency in urology
- One of the commonest causes of the "Acute Abdomen.
- Risk factors include : poor fluid intake, IBD , hypercalcemia , Renal tubular acidosis and bowel bypass.





Features of the renal colic pain:

- Severe
- Sudden onset
- Colicky in nature (Starts and stop abruptly)
- Radiates :

  1- If the stones are in kidney or upper ureter, it will radiate to testis because they have the Same embryologic place and the same dermatome (T7-T9.)

  2- if stones are in the mid ureter (T10), the pain will radiate to iliac fossa.

3- If stones are in lower or distal ureter (T12) , it will radiate to trigone of bladder, posterior Urethra, scrotal skin, labia majora and lower abdomen.

- May change in location, from the flank to the groin, (the location of the pain does not provide a good indication of the position of the stone)
- The patient cannot get comfortable, and may rolled around
- Associated with nausea / Vomiting with / without fever.

How to differentiate between right iliac fossa pain that is caused by acute appendicitis and right Mid ureteral colic ?

Those are affected by acute appendicitis can't move due severe pain while the pain of mid ureteral colic are relieved by movement so, the patients are gonna move continuously.

Causes or differential diagnosis:

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

What is the radiculitis ?

Musculoskeletal pain due Inflammation or irritation of nerve root in the intervertebral foramen. A common form of it is sciatica.

When does the radiculitis cause these symptoms in picture ?

Irritation of intercostals nerves (T7-T9) give these symptoms.

When does the radiculitis cause lower limb pain and how to differentiate it from renal colic ?

-Radiates to lower limb if involving sciatic nerve roots.

-Radiculitis is aggravated by movement and usually has lower limb pain (يجيه الم في السجود والركوع)

Notes: in history of radiculitis, don't forget to ask about back pain and predisposed mobility (carrying something heavy).

Work up:

- ★ History
- Examination: patient want to move around, in an attempt to find a comfortable position.
- +/- Fever
- Pregnancy test (to exclude Ectopic pregnancy)
- Mid stream urine (presence of hematuria)
- Urea and electrolytes (to assess renal function)

Radiological investigation:

1-KUB: Plain x-ray of kidney, bladder and ureter
2- RUS (renal ultrasound): not good for investigations because the stones doesn't appear the ureter
3- Intravenous urogram (IVU) or intravenous Pyelogram (IVP) : x-ray and contrast before and after injection (Not preferable due presence of contrast that contains iodine that may cause rigidity and renal failure.
4-CT without contrast (CTU):

- ➢ Is the gold standard of diagnostic renal stones.
- ➢ Greater sensitivity (95%) and specificity (97%) for diagnosing ureteric stones.
- ➢ Faster taking just a few minutes,
- ➢ The cost of CTU is the same to that of IVU.

5- MRI : Very accurate to determine presence of stones in ureter or not, but very expensive and consuming time. We used only if patient are pregnant (because is safe to embryo).

RUS

IVU

CTU

KUB

Mention the four types of renal stones?

1- Calcium oxalate/ calcium PO4 (75%) secondary to hypercalciuria due either (increased intestinal absorption, decreased renal reabsorption or increased bone resorption.
2-Struvite (MgAmPh) (15%) is infection stones seen in UTI with Urea splitting bacteria (proteus). May cause staghorn calculi (Upper urinary tract stones that involve the renal pelvis and extend into at least 2 calyces are classified as staghorn calculi) . the PH of urine will be high.
3-Uric acid (7%) : stones are radiolucent (not seen in x-ray). Seen in gout, lesh-nyhan and chronic diarrhea.The PH of urine will be low.
4-Cystine (1%) : genetic predisposition (1%).

What stones are seen in IBD and bowel bypass?

Calcium oxalate.

What are the classic findings symptoms in renal colic?

Flank pain, stone in abdominal x-ray and hematuria.

How to diagnose the renal colic ?

KUB (90% of radiopaque), IVP, Urinalysis and culture, blood urea nitrogen (BUN) and CBC.

What is the significance of presence pyuria and hematuria ?

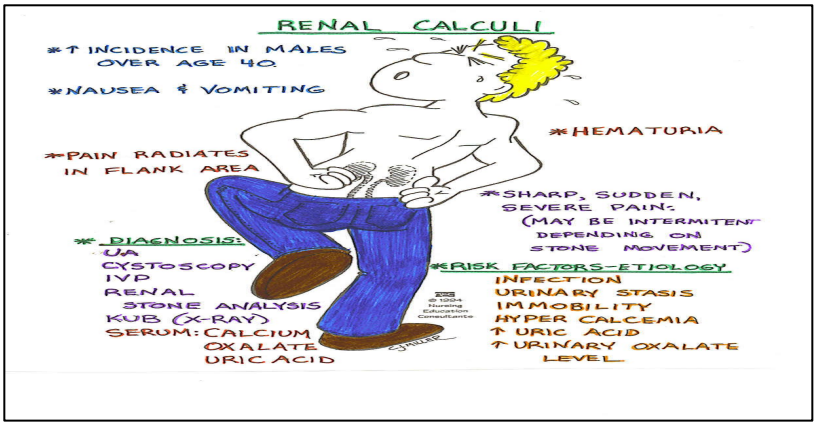
Stone with infection.

Which of the stones can lead to sepsis ?

Struvite.

What are contraindications of outpatient treatment ?

Pregnancy, diabetes, obstruction , severe dehydration, severe pain, urosepsis, fever, pyelonephritis , previous urologic surgery and only one functioning kidney.



Renal colic management	Indications for surgical interventions	Surgical intervention	Definitive treatment
★ Pain relief 1-NSAIDs 2-Intramuscular or intravenous injection, by mouth, or per rectum 3- +/- Opiate analgesics (pethidine or morphine). ★ Hyper hydration ★ watchful waiting' with analgesic supplements ★ 95% of stones measuring 5mm or less pass spontaneously	To Relieve Obstruction and/or Remove the stone 1-Pain that fails to respond to analgesics. 2-Associated fever. 3-.Renal function is impaired because of the stone (solitary kidney obstructed by a stone, bilateral ureteric stones) 4. Obstruction unrelieved (not to exceed 4 weeks) 5- Personal or occupational reasons 6- Persistent infection	Temporary relief of the obstruction By insertion of a JJ stent from renal pelvis to bladder or percutaneous nephrostomy tube 	1-Extracorporeal Shock Wave Lithotripsy (ESWL). : Good for kidney and upper ureter stones (used for large stones) 2-percutaneous nephrolithotomy (PCNL) : If stones are big 3-Ureteroscopy (URS): From urethra 4-Laparoscopic extraction(we used If there is other pathology 5-Open Surgery: very limited

Urinary retention: From recall : Enlarged urinary bladder resulting from medications or spinal anesthesia.

How is it diagnosed ?

1-Physical exam (palpable bladder and bladder residual volume upon placement) and 2-foley catheter

With massive bladder distention, how much urine be drained immediately? Most would clamp after? and What is the classic sign of urinary retention in elderly ?

-Most would clamp after 1 L and then drain the rest over time to avoid a vasovagal reaction.

- Confusion.

Acute urinary retention:

Painful inability to void, with relief of pain following drainage of the bladder by catheterization (المريض يجي يصيح في الطوارئ)

Causes of Acute urinary retention	
Men	❑ ***Benign prostatic enlargement (BPE) due to BPH*** ❑ ***Carcinoma of the prostate*** ❑ ***Urethral stricture*** ❑ ***Prostatic abscess*** ❑ ***Stones*** ❑ ***Constipation***
Women	❑ ***Pelvic prolapse (cystocele, rectocele, uterine)*** ❑ ***Urethral stenosis*** ❑ ***Urethral diverticulum;*** ❑ ***Post surgery for 'stress' incontinence*** ❑ ***pelvic masses (e.g., ovarian masses*** ❑ ***Transvaginal tape in those with stress incontinence*** (لو كان مشدود أكثر من اللازم) very common

Management of Acute urinary retention:

Initial management:

1-Give the patient analgesic to prevent spasm

2-Urethral catheterization (foley catheter) if you can't enter it use the–Suprapubic catheter (SPC) which is pass directly to the bladder

Late management:

Treat the cause.

Chronic retention:

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

Notes: many patient with chronic retention come to ER with renal failure

What are the presentations of chronic urinary retention ?

Urinary dribbling, Overflow incontinence , Palpable Bladder and Symptoms of renal failure

How manage the patient with chronic urinary retention ?

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

Acute Scrotum.

Requires a prompt evaluation.

Differential Diagnosis:

***Torsion of the spermatic cord (most Serious).**

***Epididymitis (most common).**

*Torsion of the appendix testis

*Torsion of the appendix epididymis

*Epididymo-orchitis

*Orchitis

*Hernia

*Trauma/ insect bite

*Dermatological lesion

*Inflammatory vasculitis

*Neurological (adductor tendonitis)

Surgical Recall:
The Differential Diagnosis are:
1-Testicular Trauma.
2-Inguinal Hernia.
3-Epididymitis.
4-Appendage Torsion.

A. Torsion of the Spermatic cord.

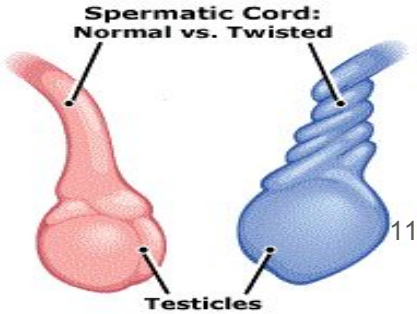
***Common among teenagers (12-18) years.**

***The torsion (twist) blocks the venous return -> subsequent arterial occlusion ->infarction + the testis become bigger.**

***True surgical emergency of the highest order.**

***Irreversible ischemic injury to the Testicular parenchyma may begin as soon as 4 hours.**

***Testicular salvage ↓ as duration of torsion ↑**



Presentations:

*Acute onset of scrotal pain.

*Majority with history of prior episodes of severe, self-limited scrotal pain and swelling.

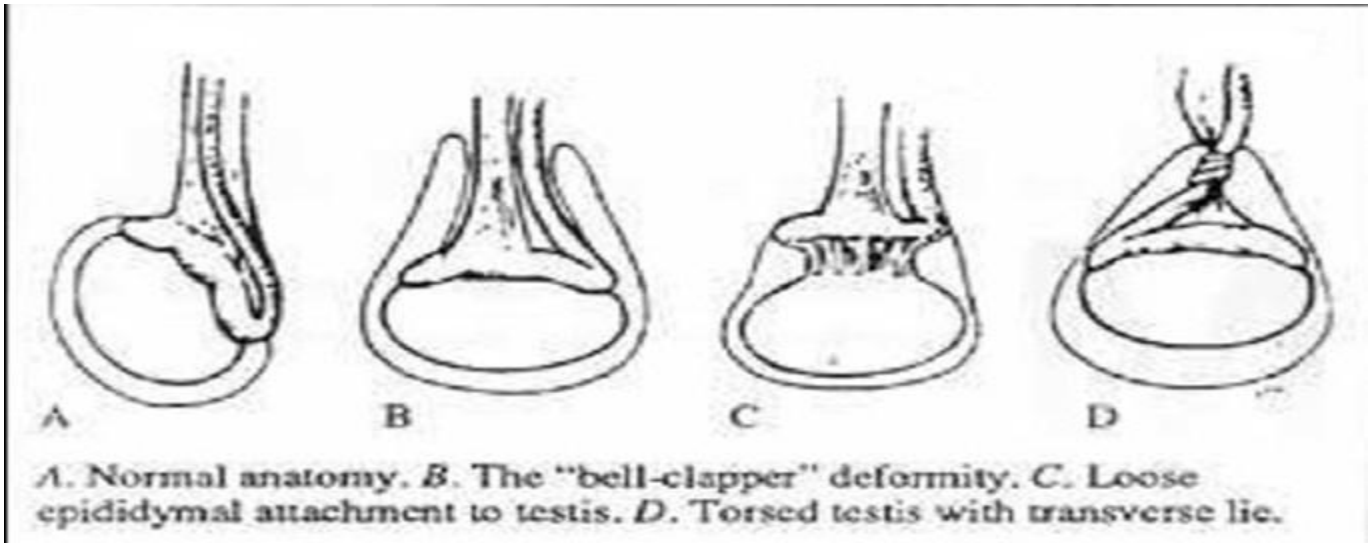
*Referred to the ipsilateral lower quadrant of the abdomen.

*Associated with Nausea/Vomiting.

*Children mostly come with abdominal Pain and vomiting only (without Testicular Pain or swelling).

*No Urinary Symptoms e.g.No Dysuria

Surgical Recall:
The Symptoms are::
Pain in scrotum + suprapupic pain.
-
The Signs are:
Very Tender, Swollen, Elevated Testicle, Non-Illumination, Absence of cremasteric reflex.



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

Physical Examinations:

The affected testis is high riding transverse orientation

-Acute hydrocele or massive scrotal edema

-Cremasteric reflex is absent (due presence of the nerve in spermatic cord)

-Tender larger than other side

-Elevation of the scrotum causes more pain

Investigations:

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

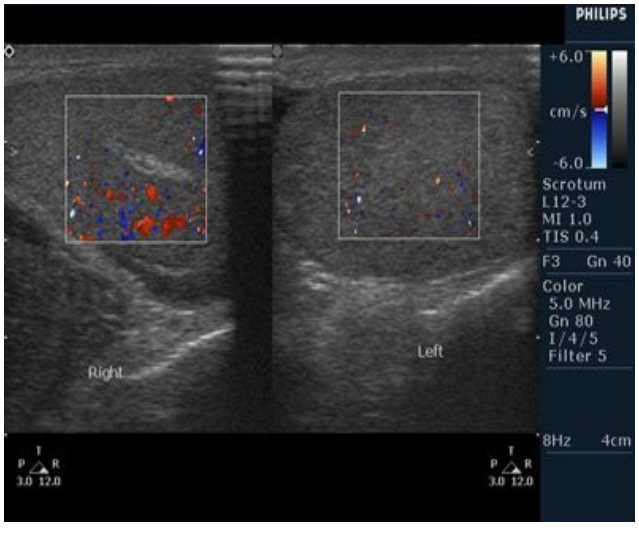
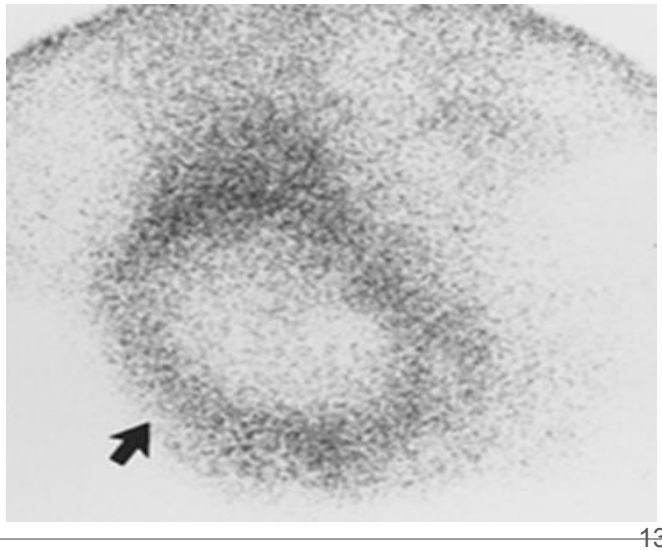
We use the investigations to:

-To aid in differential diagnosis of the acute scrotum.

-To confirm the absence of torsion of the cord.

-Doppler examination of the cord and testis

-High false-positive and false- negative

1-Color Doppler ultrasound.	2-Radionuclide.
*Assessment of anatomy and determining the presence or absence of blood flow. *Sensitivity: 88.9% specificity of 98.8% *Operator dependent.	*Assessment of testicular blood flow. *A sensitivity of 90% & specificity of 89%. *False impression from hyperemia of scrotal wall. *Not helpful in Hydrocele and Hematoma
	

Surgical Exploration:

-A scrotal incision

-The affected side should be examined first

-The cord should be detorsed.

-Testes with marginal viability should be placed in warm and re-examined after several minutes.

-A necrotic testis should be removed

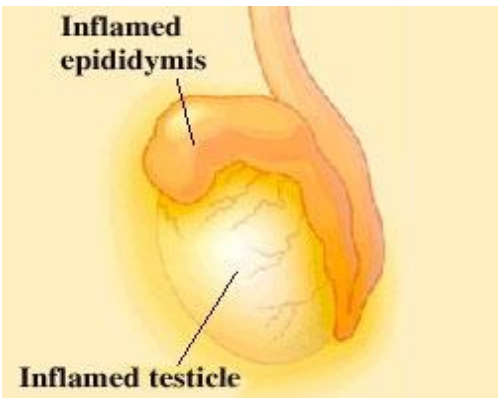
-If the testis is to be preserved, it should be fixed

-The contra-lateral testis must be fixed to prevent subsequent torsion

Surgical Recall:
How is Diagnosis Made?
Surgical Exploration, U/S Solid Mass, Doppler flow study and Cold Tc-99m Scan (nuclear study).

B. Epididymo-orchitis.

*Mostly Secondary to UTI.
*Mostly In Adult due STD and rarely in Children.
*In Children Mostly caused by special Viruses which are Mumps, Coxsackie And brucella viruses.
In elderly due UTi or urinary retention because of BPH



Presentation:

-Indolent process.

-Scrotal swelling, erythema, and gradual pain.

-Dysuria and fever are more common (Urinary symptoms).

P/E :

-localized epididymal tenderness, a swollen and tender epididymis, or a massively swollen hemi-scrotum with absence of landmarks.

-Cremasteric reflex should be present

-The pain is relieved by elevation of scrotum.

Urine:

-Pyuria, bacteriuria, or a positive urine culture

Management:

-Bed rest for 1 to 3 days then relative restriction

-Scrotal elevation, the use of an athletic supporter

-parenteral antibiotic therapy should be instituted when UTI is documented or suspected.

-Urethral instrumentation should be avoided

Priapism.

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

Causes:

-Primary (Idiopathic) : 30% - 50 %

-Secondary: Drugs Trauma,Neurological, Hematological disease And Tumors.

Types of Priapism	
1-Ischemic. (most common)	2-Non-Ischemic.
veno-occlusive, low flow	arterial, high flow
Due to hematological diseased e.g.Sickle cell anemia,Leukemia, malignant infiltration of the corpora cavernosa with malignant disease or pelvic Tumor, or drugs such as (prostaglandin injection)	Due to perineal trauma, which creates an arterio-venous fistula.
Painful	Painless

The Diagnosis:

-Usually obvious from the history

*Duration of erection >4 hours?

*Is it painful or not?.

*Previous history and treatment of priapism ?

*Identify any predisposing factors and underlying cause.

Examination:

-Erect, tender penis (in low- flow)

-Characteristically the corpora cavernosa are rigid and the glans is flaccid.

-Abdomen for evidence of malignant disease

-DRE: to examine the prostate and check anal tone.

Investigations:

-CBC (white cell count and differential, reticulocyte count) for Leukemia.

-Hemoglobin electrophoresis for sickle cell.

-Urinalysis including urine toxicology.

-Blood gases taken from either corpora:

*low-flow (dark blood; pH <7.25 (acidosis); pO2 <30 mmHg (hypoxia); pCO2 >60 mmHg (hypercapnia).

*high-flow (bright red blood similar to arterial blood at room temperature; pH = 7.4; pO2 >90 mmHg; pCO2 <40mmHg).

-Color flow duplex ultrasonography in cavernosal arteries;

-Ischemic (inflow low or nonexistent).

-Non-ischemic (inflow normal to high).

-Penile pudendal arteriography.

Treatment:

-Depends on the type of priapism.

-Conservative treatment should first be tried.

-Medical treatment (alpha-Adrenergic Agent).

-Surgical treatment.

-Treatment of underlying cause.

Surgical Recall:
1st line treatment is:
1-Aspiration of blood from corporus cavernosum.
2-Alpha-Adrenergic Agent.