UROLOGICAL EMERGENCIES

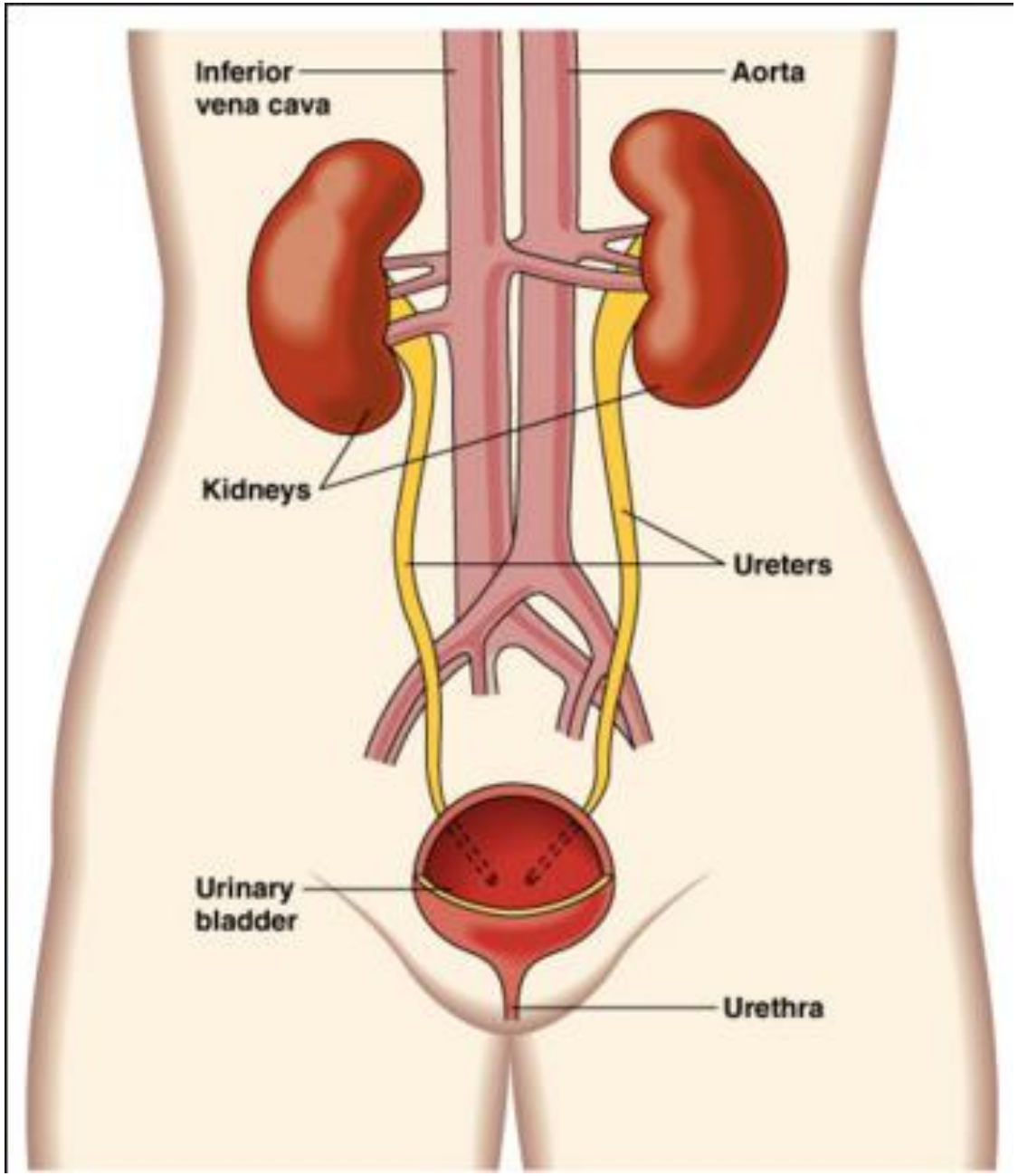
URINARY SYSTEM

The purpose of the Urinary System is

- The Eliminate waste from the body
- Regulate Blood volume and pressure
- Control levels of Electrolytes and metabolites
- Regulate blood pH levels

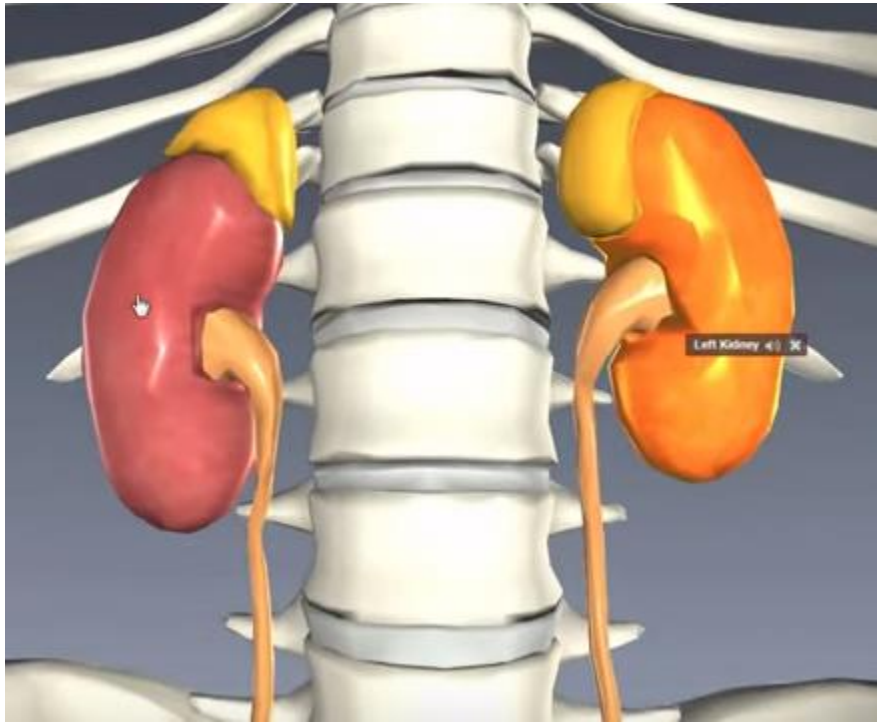
The urinal system consists of

- Left and Right Kidneys
- The Ureters Left and Right
- The Urinary Bladder
- The Urethra



Kidneys

- The kidneys lie **retroperitoneally** (behind the peritoneum) in the abdomen, either side of the vertebral column. The left and right kidneys are located at different vertebral levels:
- Left kidney: T11- L2.
- Right kidney: T12 – L3 **(it is lower due to the presence of the liver**).
- Each kidney is approximately three vertebrae in length



- Resting on top of the Kidneys are the Rt and Lt Adrenal Glands.

Kidneys

- Posteriorly the Kidneys are protected by the 11^{th} and 12^{th} Ribs

- Each Adult kidney weighs 125gm-170gm in males and 115gm – 155gm in females.

Ureters

- The ureters are two thick tubes which act to transport urine from the kidney to the bladder. They are 25cm long, and are situated bilaterally, with one ureter draining each kidney.
- The ureteric walls are comprised of **smooth muscle**, which contracts to produce peristaltic waves. This propels the urine towards the bladder.
- The ureters are lined by transitional epithelium.

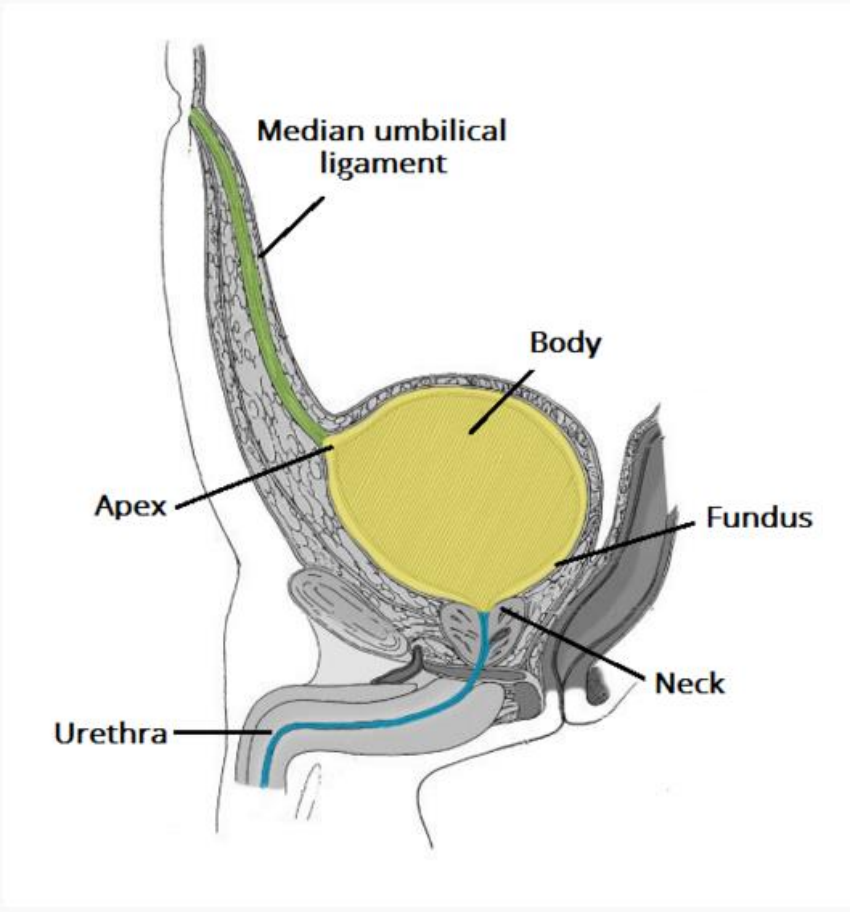
The Urinary Bladder

Functions of the Bladder

- The bladder largely serves two functions:
- **Temporary store of urine** – The bladder is a hollow organ. The walls are very distensible, with a folded internal lining (known as rugae), this allows it to hold up to 700ml - 1000ml.
- **Assists in the expulsion of urine** – During voiding, the musculature of the bladder contracts, and the sphincters relax.

Urinary Bladder

- **Apex –** This is located superiorly, pointing towards the pubic symphysis. It is connected to the umbilicus by the median umbilical ligament (a remnant of the urachus).
- **Body** – The main part of the bladder, located between the apex and the fundus
- **Fundus (or base)** – Located posteriorly. It is triangular shaped, with the tip of the triangle pointing backwards.
- **Neck** – Formed by the convergence of the fundus and the two inferolateral surfaces. This structure joins the bladder to the urethra.



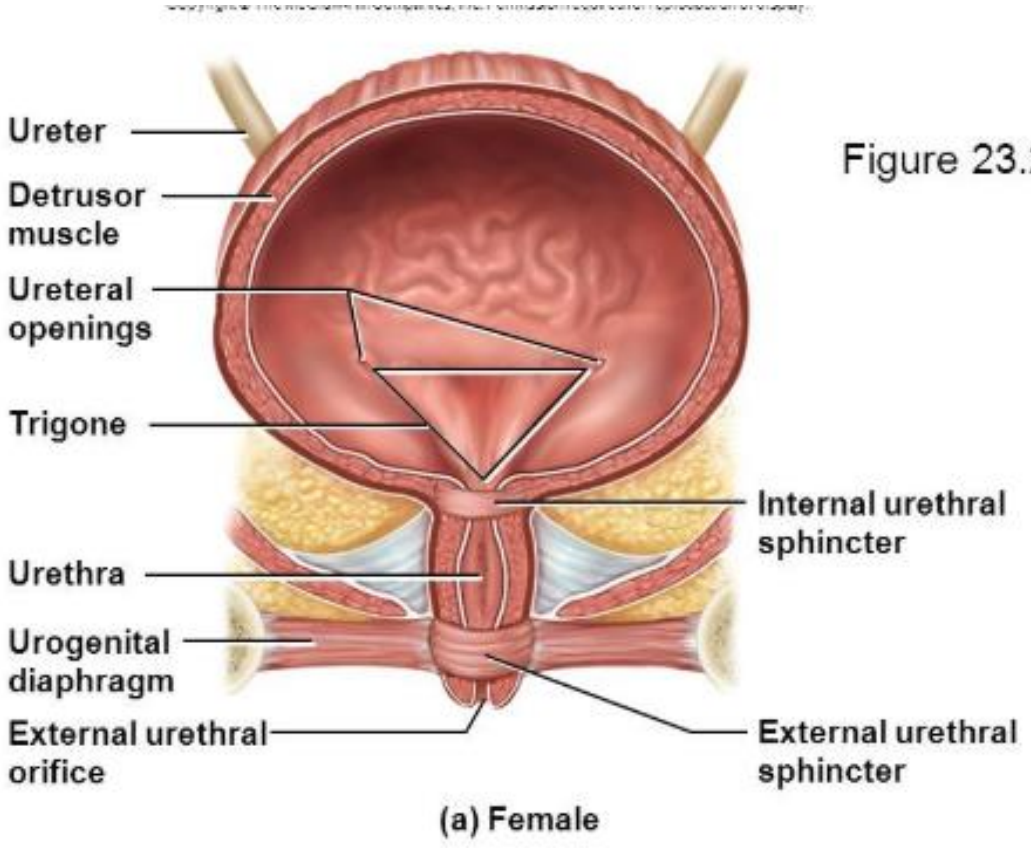


Figure 23.23a

- The **trigone** is a smooth triangular region of the internal urinary bladder formed by the two ureteric orifices and the internal urethral orifice.
- The area is very sensitive to expansion and once stretched to a certain degree, the urinary bladder signals the brain of its need to empty. The signals become stronger as the bladder continues to fill.

Urinary Bladder

- Urine enters the bladder by the left and right **ureters**, and exits via the **urethra**. Internally, these orifices are marked by the **trigone** – a triangular area located within the fundus. In contrast to the rest of the internal bladder, the trigone has smooth walls.
- There are two **sphincters** controlling the outflow of urine; the internal and external urethral sphincters. The internal urethral sphincter is only present in men.

Urethra

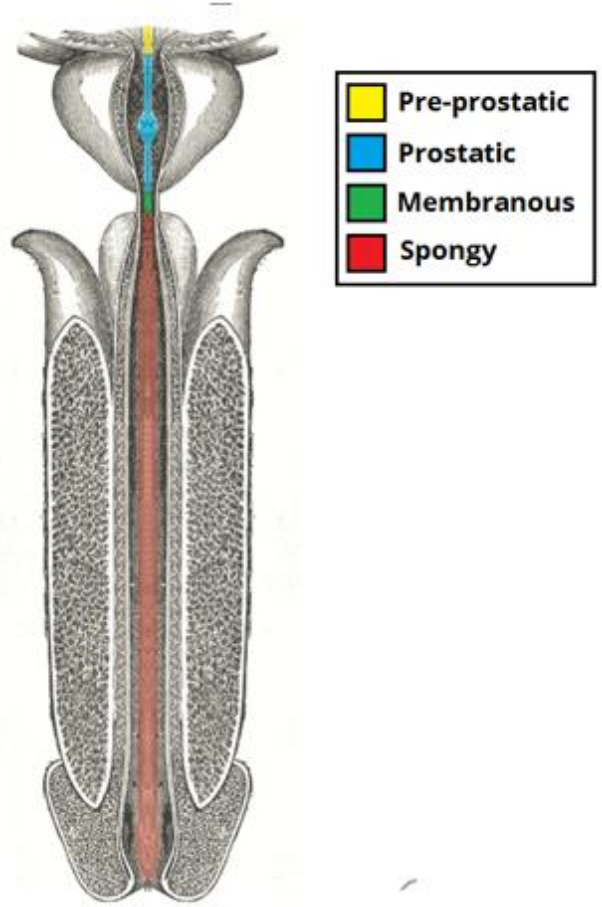
- The urethra is the vessel responsible for transporting urine from the **bladder** to an external opening in the **perineum**. It is lined by stratified columnar epithelium, which is protected from the corrosive urine by mucus secreting glands.
- The anatomical course of the urethra is different in males and females.

Male urethra

- The male urethra is approximately 15-20cm long. In addition to urine, the male urethra provides an exit for **semen** (a fluid containing spermatozoa and sex gland secretions).

Male Urethra

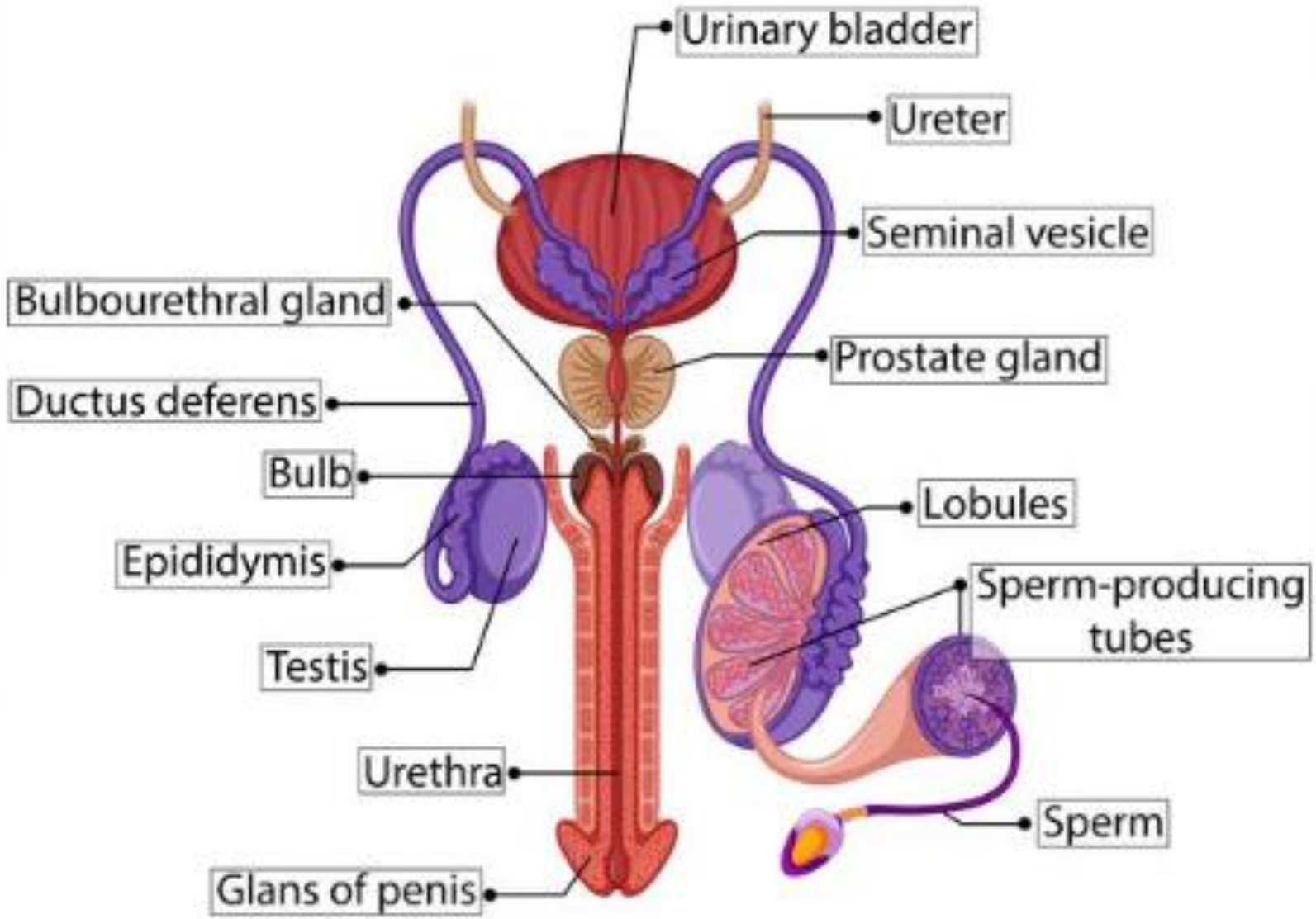
- Anatomically, the urethra can be divided into 3 parts:
- **Prostatic**: Passes through the prostate gland. The ejaculatory ducts (containing spermatozoa from the testes, and seminal fluid from the seminal vesicle glands) and the prostatic ducts drain into the urethra here.
- **Membranous**: Passes through the pelvic floor, and the deep perineal pouch. It is surrounded by the external urethral sphincter, which provides voluntary control of micturition.
- **Spongy**: Passes through the bulb and corpus spongiosum of the penis, ending at the external urethral orifice. In the glans penis, the urethra dilates, forming the navicular fossa. The bulbourethral glands empty into the proximal urethra.



Female Urethra

- In women, the urethra is relatively short (approximately 4cm). This predisposes women to urinary tract infections.

Male Reproductive System



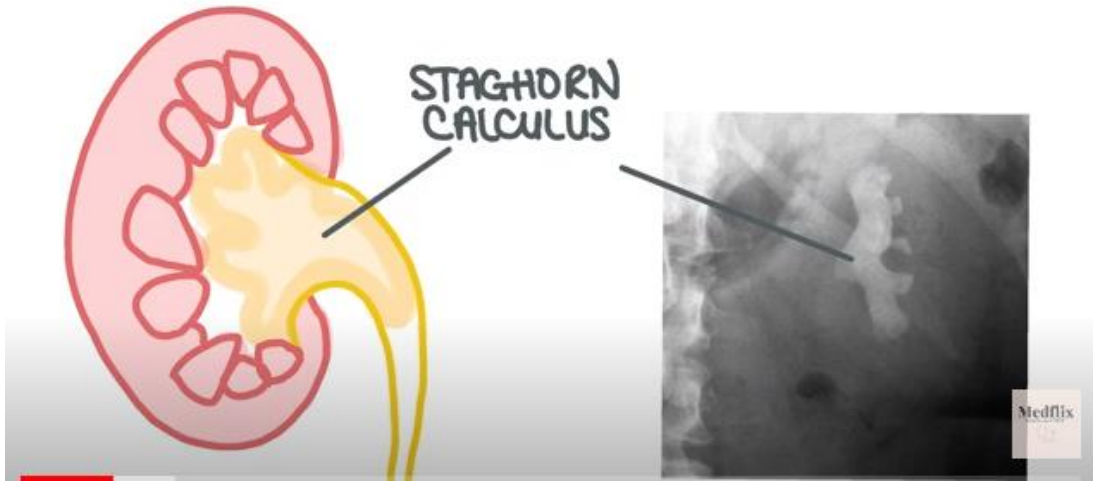
Renal Tract Calculi

- Are a common Urological Emergency
- Can Result in Sepsis, Hydronephrosis, Acute Renal Injury
- Incidence is 1-2/ 1000 people (with a High Recurrence Rate)

Types of Renal Calculi

- Calcium Oxalate 40% (Radio-opaque)
- Mixed Calcium Oxalate/ Phosphate 25% (Radio-opaque)
- Calcium Phosphate 10% (Radio-opaque)
- Triple Phosphate 10% (Radio-opaque)
- Urate 5-10%(Radiolucent)
- Cystine 1% (Radiolucent)
- Xantine 1% (Radiolucent)

Types of Renal Calculi



- A Staghorn Calculus is a Stone in the Renal Pelvis extending into one or more Calysis
- It is made of Struvite (Magnesium , Ammonium &Phosphate)

Renal Tract Calculi- History

- Severe Pain in the loins/Flanks of Sudden Onset Radiates into the scrotum
- Pain is Colicky, Stabbing
- No Relieving Factors
- May be associated with Dysuria, Fever, Nausea and Vomiting

Renal Tract Calculi- Examination

- HR ⬆ Temp ⬆

  ? Urinary Sepsis
- Patient in Pain
- Writhing, Unable to stay still

- On Abdominal Examination
- May Palpate Kidney (Obstructive Uropathy)

Renal Tract Calculi- Investigations

- FBC
- BUE & Cr
- Urine R/E
- Blood Culture

- Plain Abd-Pelvic X-Ray
- CT Scan
- USG

Renal Tract Calculi- Management

- Analgesia

  NSAIDS (Per Rectum) / IV Paracetamol

- Antibiotics
- IV Fluids/ Liberal Fluids

Renal Tract Calculi- Management

- Stones less than 5mm (Conservative Management+ NSAIDS)
- Less than 10mm) Alpha Blocker+ NSAIDS
- Up to about 20mm (Lithotripsy, Ureteroscopy)

Complex/ Staghorn – Percutaneous Nephrolithotomy

Renal Tract Calculi- Prevention

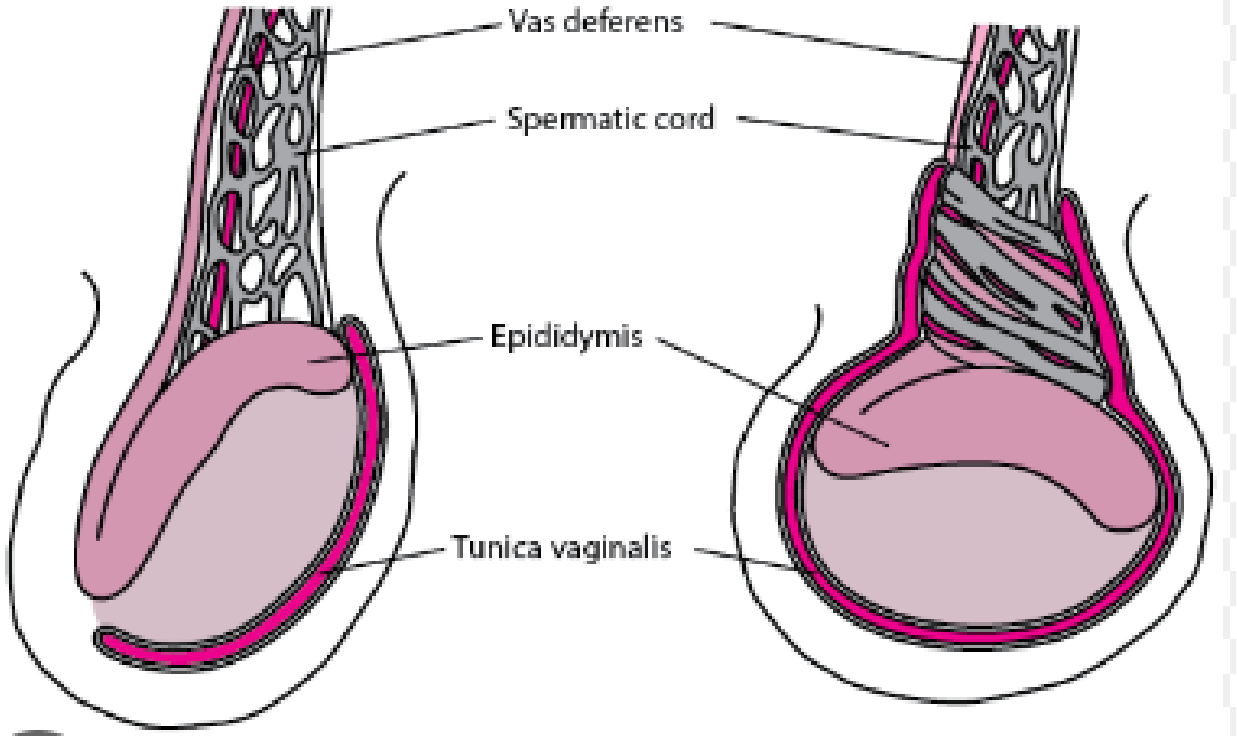
Calcium Stones

- Increased Fluid intake
- Reduce Salt intake
- Reduce Fizzy Drinks
- Reduce Animal Protein
- Add Lime to Water

Urate Stones

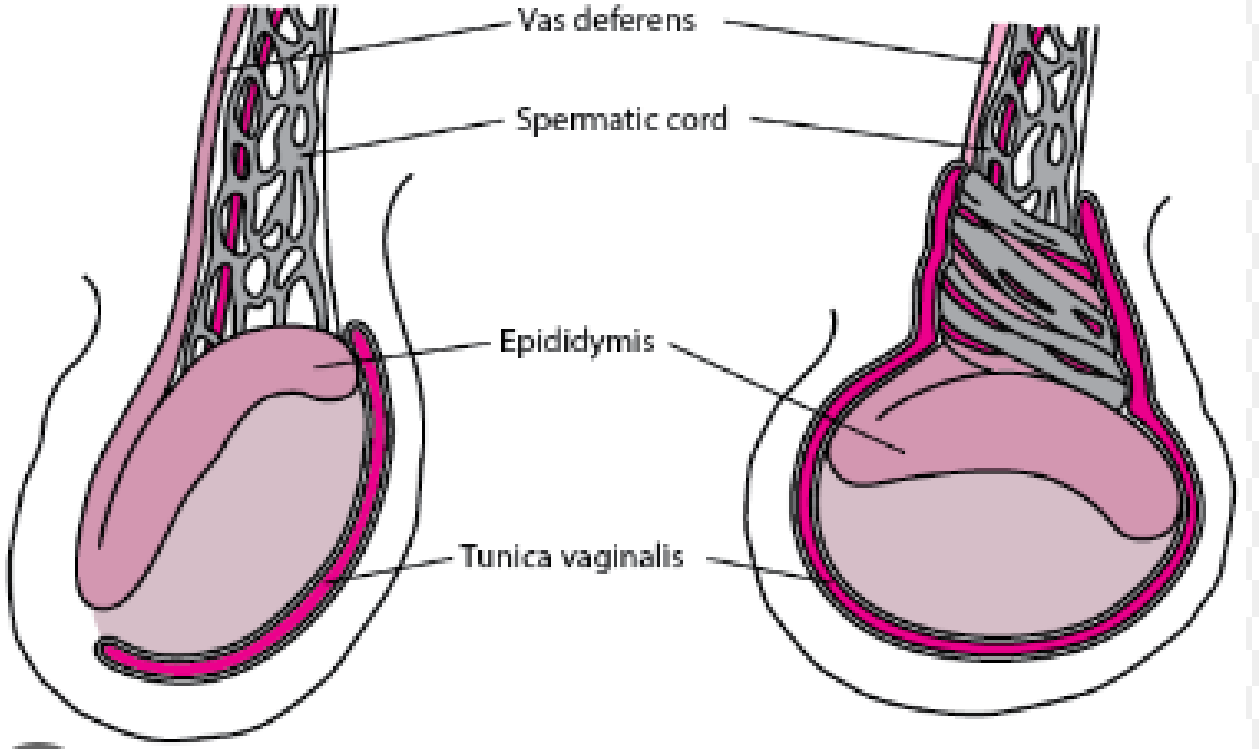
- Allopurinol
- Reduce High Purine Foods

Testicular Torsion



- It is an Urological Emergency that can Result in Ischaemia and Necrosis of the Testis if not Diagnosed and Managed within 6 hours.

Testicular Torsion



- It is caused by the spermatic cord twisting on itself and being unable to untwist.

Testicular Torsion

- Usually occurs in young men in their teens and early 20s

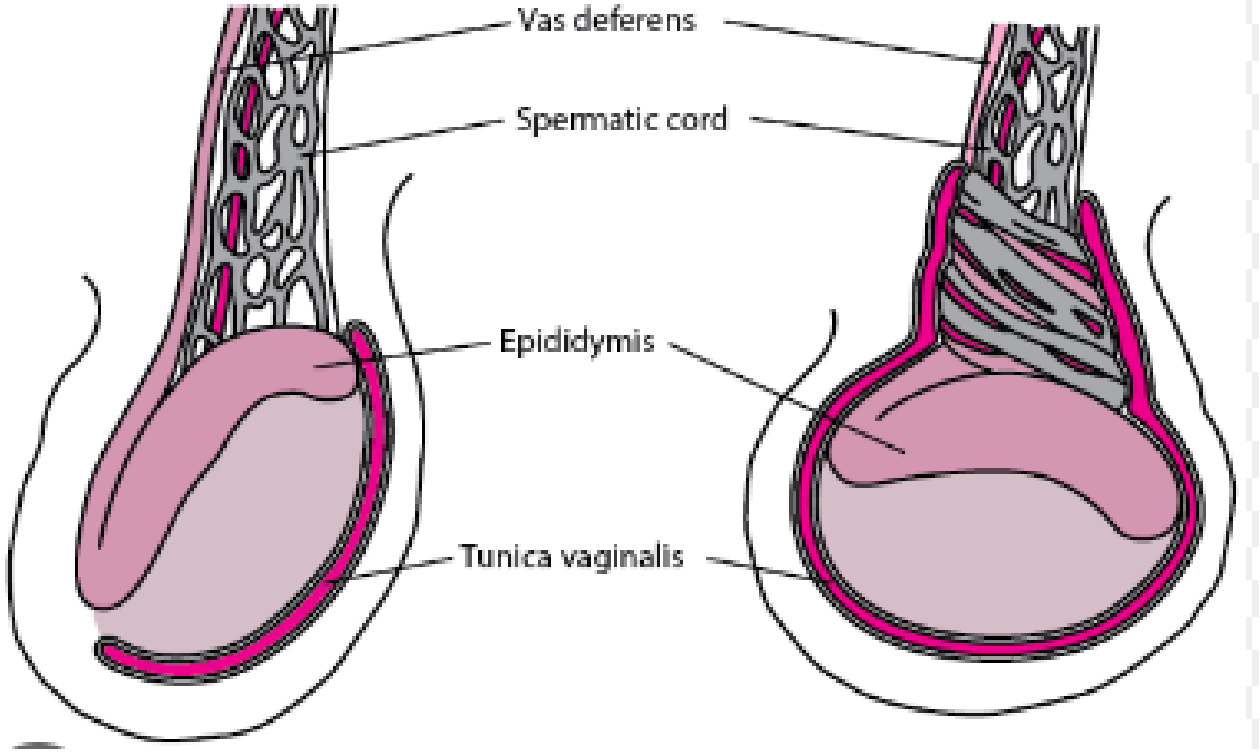
Testicular Torsion- History

- Severe Unilateral Pain in the testis of Sudden onset. Often said to have started after vigorous activity/ Sports.
- Pain is Sharp and Radiates into the Flanks, Pain is Constant
- No Relieving Factors
- Associated with Nausea and Vomiting

Scrotal Swelling Differential Diagnosis

- Testicular Torsion
- Hydrocele
- Testicular Cancer
- Indirect Inguinal Hernia
- Epididymo-orchitis
- SCC Scrotum
- Varicocele
- Haematocele

Testicular Torsion- Examination



- Testis – Erythematous/ Dark Tender
- Swollen
- Elevated / Transverse

- Prehn’s sign (-Neg)

Testicular Torsion- Management

- Scrotal Exploration – Orchidopexy ± Orchidectomy

Acute Urinary Retention

- **Acute urinary retention** (**AUR**) is the inability to voluntarily pass urine.
- Subsequently leads to pain and discomfort, with significant residual volumes.

- It is the most common urologic emergency in Elderly Men

Acute Urinary Retention- Causes

- Constipation
- Post- Operative
- Medications – Opiods, BZDs, Anticholinergics
- Benign Prostatic Hyperplasia
- Prostate Cancer
- Strictures

Acute Urinary Retention- History

- Inability to Pass Urine
- Lower Abdominal Pain
- Hx of Urinary Frequency
  - Dysuria
  - Urinary Incontinence
  - Constipation
  - Prostatic Dx

Acute Urinary Retention- Examination

- Suprapubic Tenderness
- Suprapubic mass

  (Stony Dull on Percussion)
- ± Prostate Abnormality
- ± PV Prolapse

Acute Urinary Retention- Examination

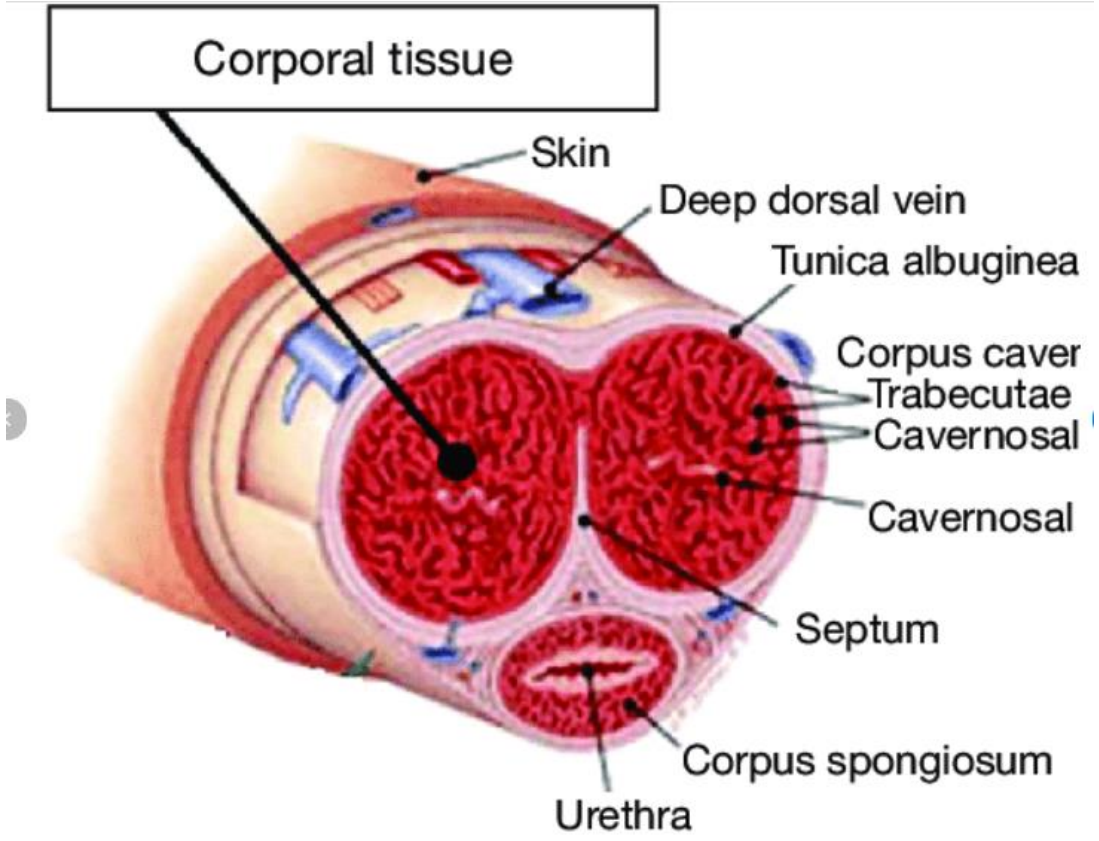
- FBC
- BUE & Cr
- Urine R/E
- Pelvic USG

Acute Urinary Retention- Management

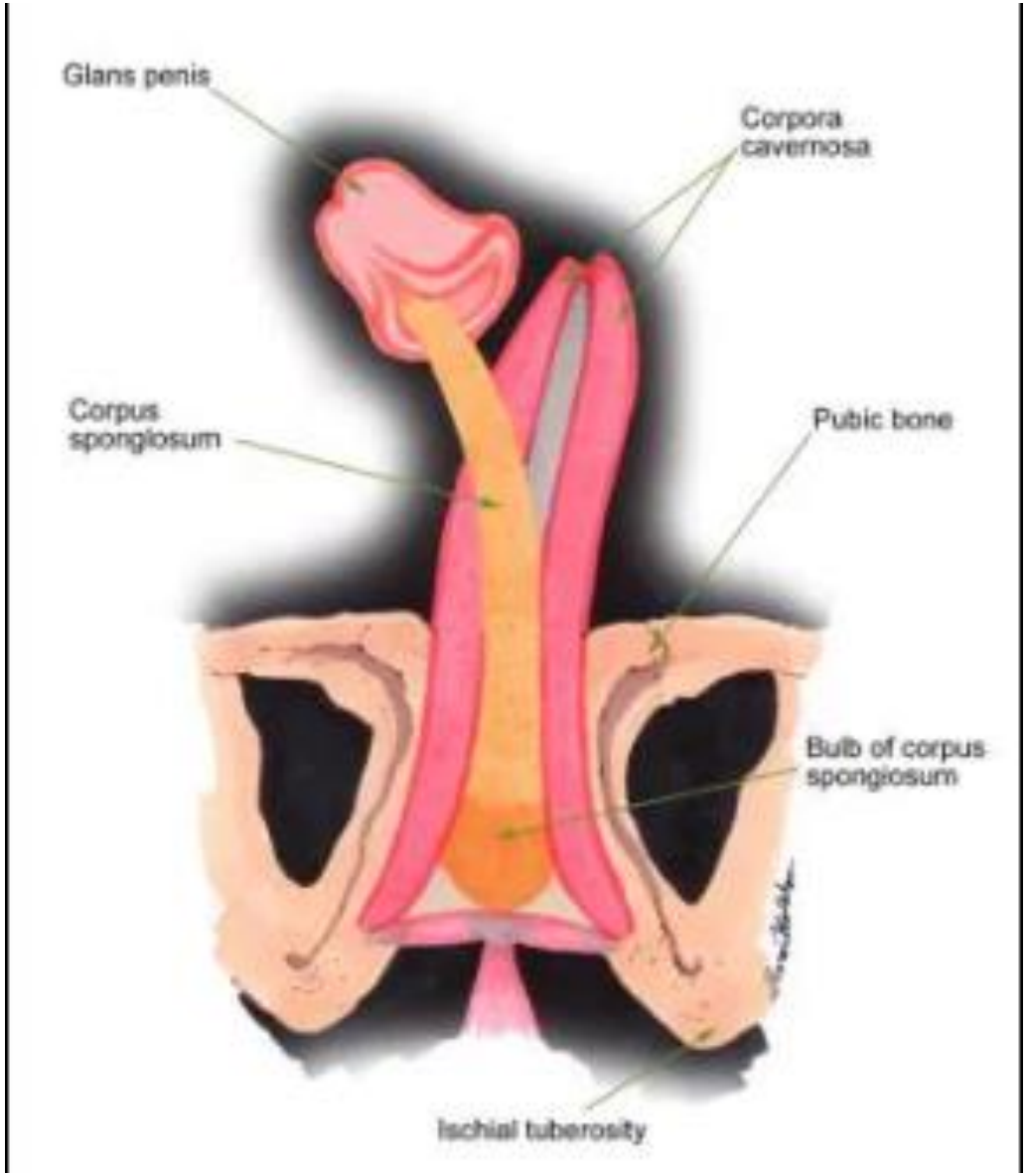
- Catheterize
- Treat the Cause

Priapism

- Priapism is a medical Emergency
- It is a Painful Penile Erection lasting more than 4 hours and is not associated with sexual stimulation



Priapism - Types



- Ischaemic – Venous Congestion in the Corpus Carvenosa
- Non- Ischaemic Increased Arterial inflow

Priapism- Causes

- Blood disorders, like sickle cell anemia and leukemia.
- Prescription drugs, like some erectile dysfunction drugs, mental health drugs and blood thinners.
- Aphrodisiacs
- Alcohol
- Injury to your genitals, pelvis or the area between the penis and the anus, or to the spinal cord.
- Tumors.

Priapism- Treatment

- Ischaemic Priapism- Aspiration of Blood from the Corpus Cavernosa + Saline Flushes

- Non- Ischaemic - Conservative