

Acute scrotum

Dr Ahmad Darraj

Urologist

Kidney Hospital

Lecturer in Syrian Private University

Member of Middle East Fertility Society



ACUTE SCROTUM

- Torsion of testis and appendage
- Infection: epididymitis, epididymo-orchitis, orchitis
- Trauma
- Hernia
- Idiopathic scrotal edema



Outline

- ◆ Introduction
- ◆ Anatomy review
- ◆ Etiology
- ◆ Clinical presentation
- ◆ Testicular torsion
- ◆ Torsion of appendages
- ◆ Epididymitis
- ◆ Orchitis
- ◆ Testicular rupture



Introduction

- Acute scrotum is a spectrum of conditions affecting scrotum and its contents that ranges from incidental findings that may require patient reassurance only OR acute events that may require immediate surgical intervention
- Hx & PE are the key to diagnosis (often management too)
- Imaging studies complement, but don't replace, sound clinical judgment



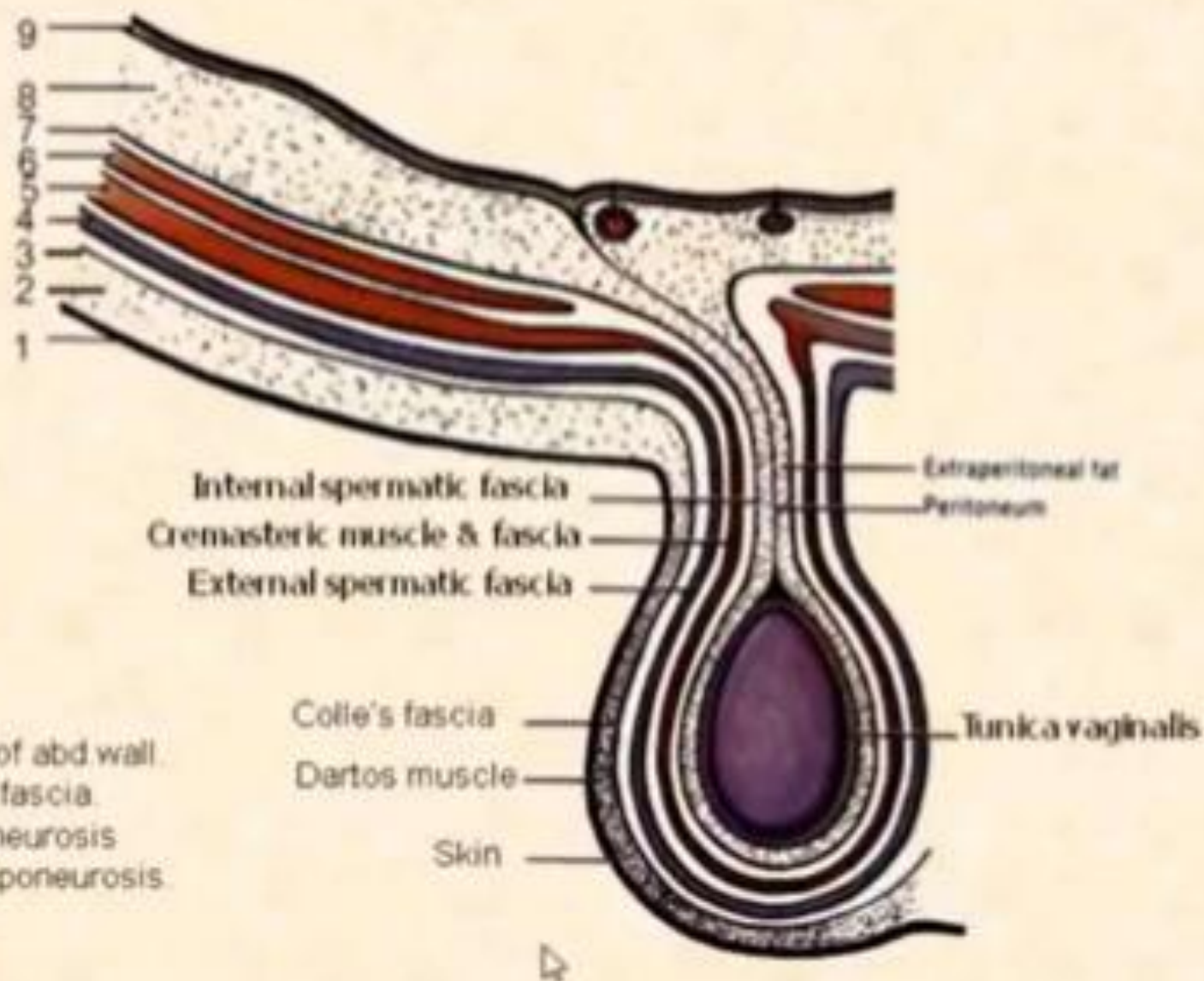
Layers of scrotum

Layers of anterior abdominal wall:

1. Skin
2. Fatty layer of superficial fascia
3. Membranous layer of superficial fascia
4. External oblique
5. Internal oblique
6. Transversus abdominus
7. Fascia transversalis
8. Extrapertoneal fatty tissue
9. Peritoneum

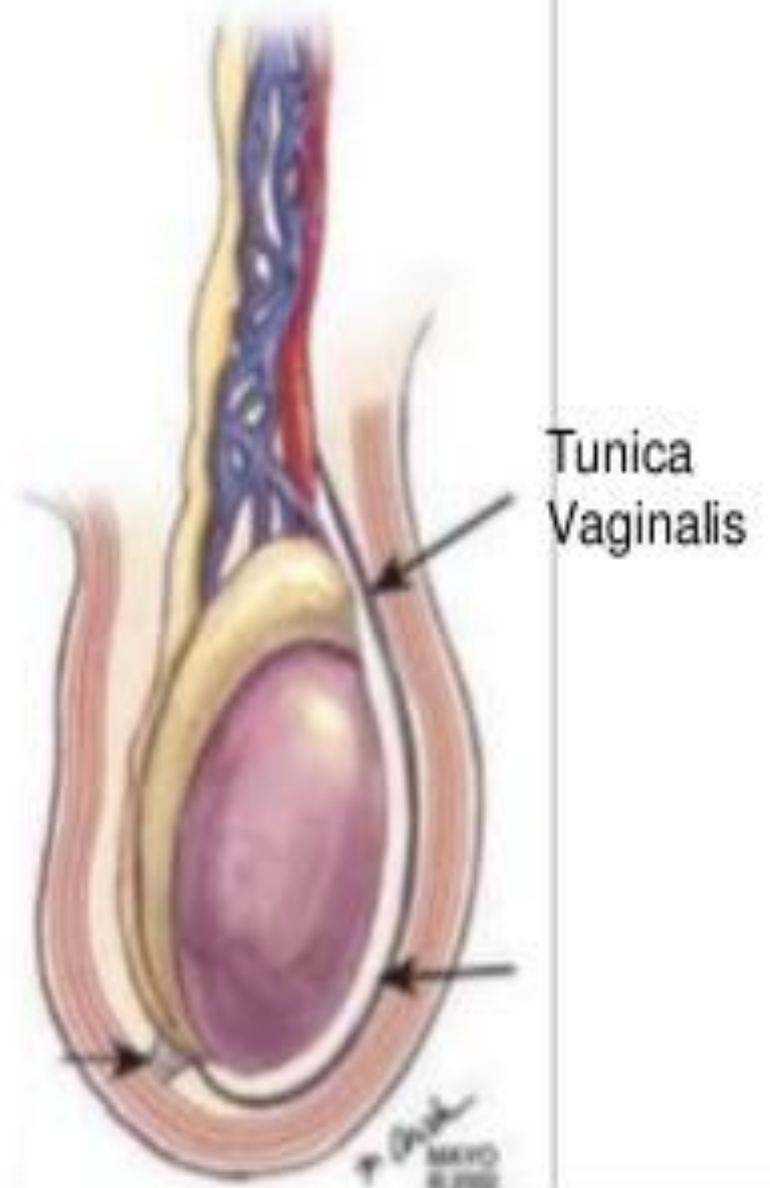
Layers of scrotum:

1. Skin
2. Dartos muscle = Fatty layer of superficial fascia of abd wall
3. Colle's fascia = Membranous layer of superficial fascia
4. External spermatic fascia = External oblique aponeurosis
5. Cremasteric muscle & fascia = Internal oblique aponeurosis
6. Internal spermatic fascia = Fascia transversalis
7. Tunica vaginalis = Peritoneum



Anatomy of the testicles

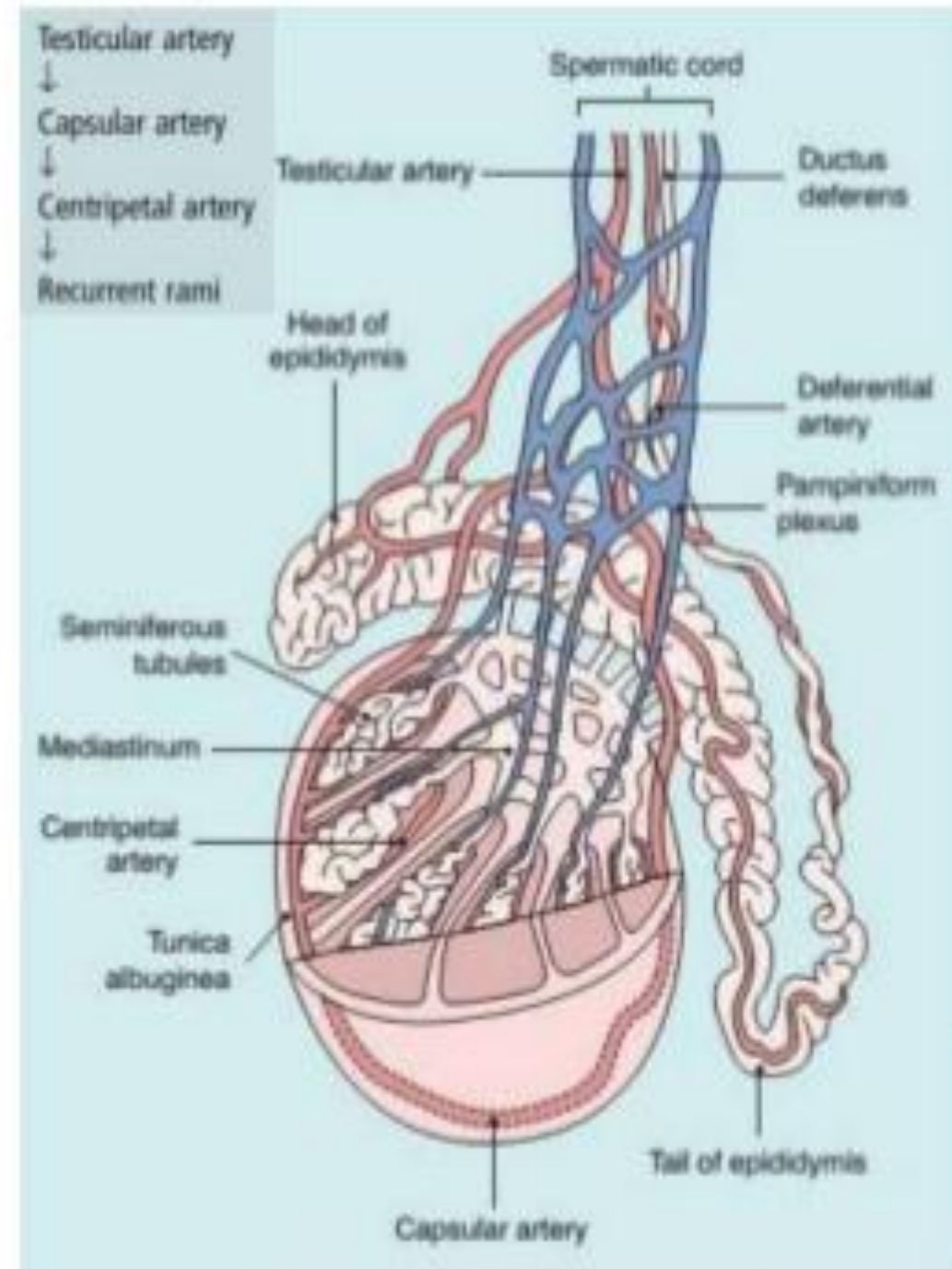
- Normally, tunica vaginalis does not completely surround the testis and epididymis, which are attached to the posterior scrotal wall.



Anatomy of the testicles

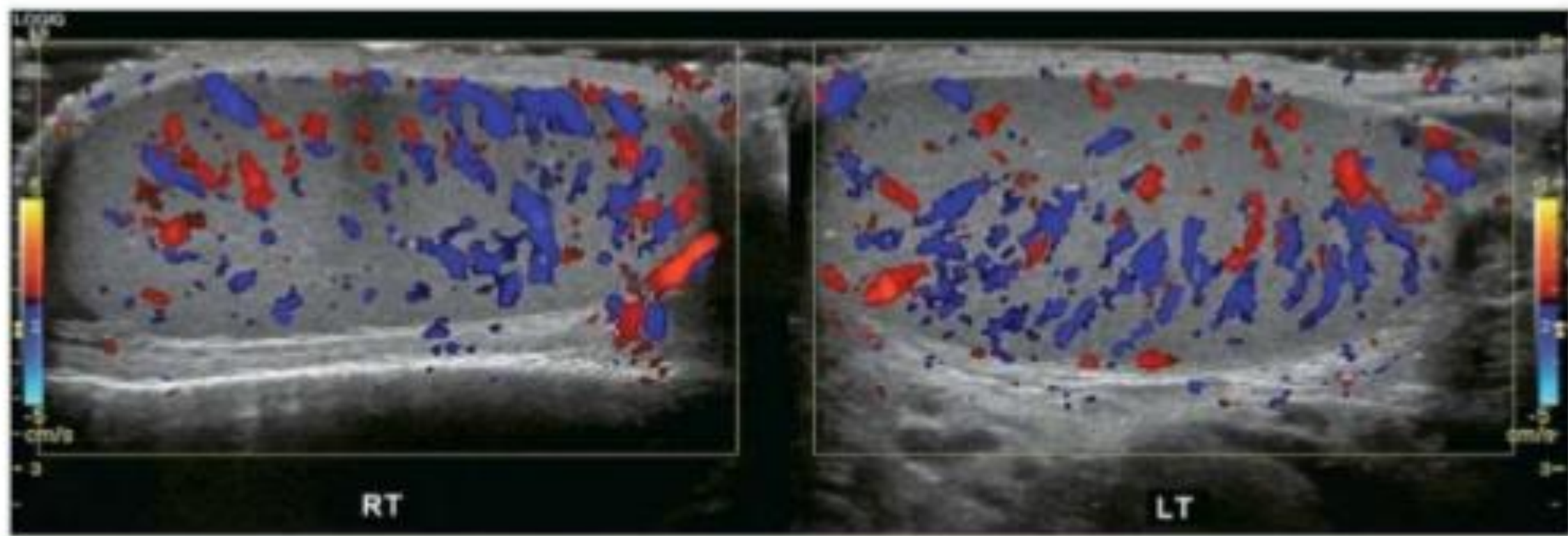
Arterial blood supply

- Intra-testicular; Testicular artery, Branch off aorta
- Extra-testicular; Cremaster and deferential arteries



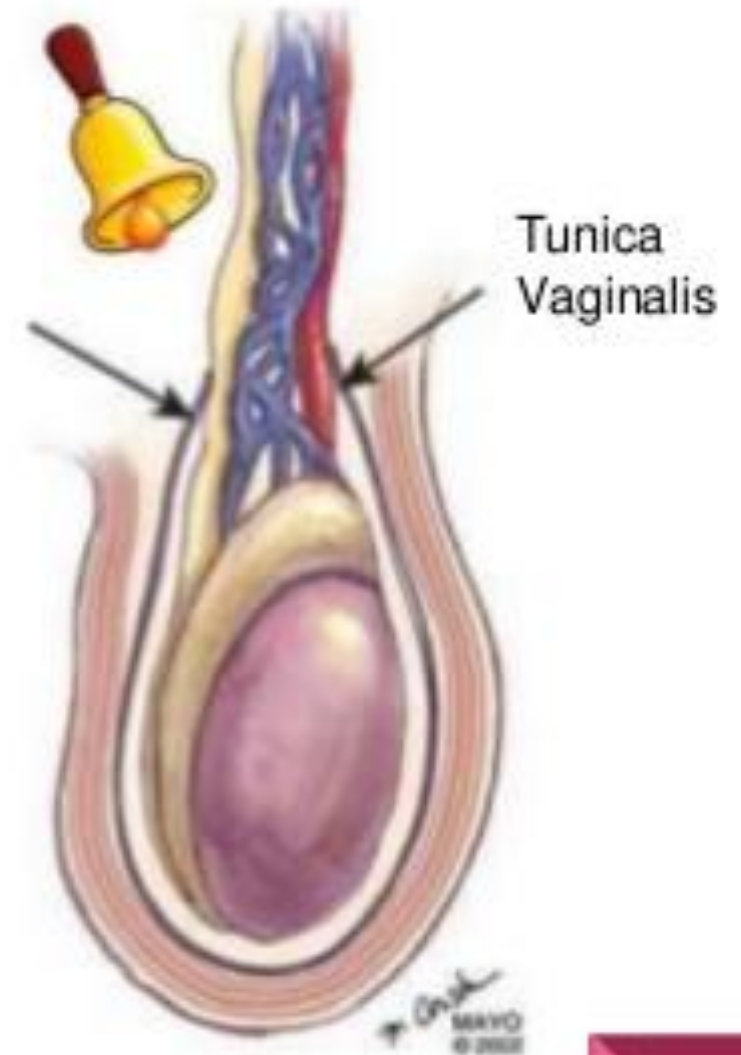
Anatomy of the testicles (Doppler)

- Color Doppler should reveal bilaterally symmetric and relatively uniform flow through both testes and epididymides



Bell-clapper anomaly

- The tunica vaginalis **completely** surrounds the testis, epididymis, and part of the spermatic cord, predisposing to torsion
- ~ 12% of human males



Causes of Acute Scrotum

➤ **Ischemic:**

- Torsion of the testis or appendages
- Testicular infarction due to other vascular insult (cord injury, thrombosis)
- Incarcerated/strangulated inguinal hernia (+/- testicular ischemia)

➤ **Traumatic:**

- Testicular rupture
- Intratesticular hematoma
- Contusion Hematocele

➤ **Infectious:**

- Acute epididymitis, or epididymo-orchitis
- Acute orchitis
- Abscess (or Fournier's gangrene)

Other causes include...(cont.)

➤ **Acute or chronic events:**

- Spermatocele; rupture or hemorrhage
- Hydrocele; rupture, hemorrhage, infarction
- Testicular tumor; rupture, hemorrhage, infarction or infection
- varicocele

➤ **Inflammatory:**

- Henoch-Schonlein purpura (HSP) or scrotal wall
- Fat necrosis, scrotal wall



Acute Scrotal Conditions in 750 children

testis torsion	140	(19%)
appendix torsion	217	(29%)
epididymitis	239	(32%)

Clinical presentation

❖ History of:

- Recent trauma
- Previous similar pain
- Acute vs subacute onset
- Previous history of urethral discharge
- Sexually transmitted infections, or unprotected sex

Clinical presentation

❖ Physical examination for:

- Fever
- Swelling
- Erythema of scrotal skin
- Position of the testicle
- Transillumination
- Cremasteric reflex
- Prehn's sign
- Inguinal lymphadenopathy



Testicular Torsion

Refers to the torsion of the spermatic cord structures and subsequent loss of the blood supply to the ipsilateral testicle.

Urological emergency:

- survival

- fertility

Adolescent and Neonates

MCC of testicular loss in these groups

Testicular Torsion_(pathophysiology)

- As testicle rotates between **90-180** this cause compromising blood flow to and from testicle.
- COMPLETE TORSION; occurs when testicle twists **>360**
- Twisting of testicle ~ venous occlusion ~ enlargement
arterial ischemia ~ infarction of the testicle.

Testicular Torsion_(pathophysiology)

- Viability of the testicle is influenced by:
 - degree of torsion
 - duration to torsion (salvage is likely if <6-8 hs)
- If 24 hs or more elapse, testicular necrosis develops in most patients.

Extravaginal Torsion

- Newborns; without “bell clapper” anomaly
- Poor/absent attachment of testis to scrotal wall ⇒ Rotation of testis + epididymis + tunica vaginalis as a **unit** and causing torsion of the cord *at the level of the external ring*



TESTICULAR TORSION



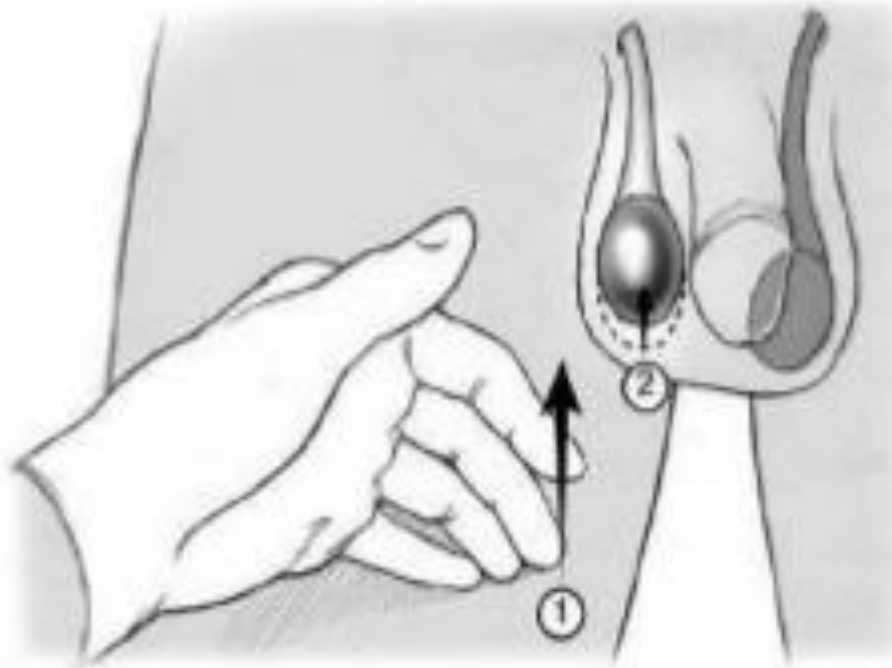
history

- Acute onset of severe unilateral scrotal pain
- Previous episodes, spontaneous resolution (intermittent)
- Related to activity, sport, trauma, or awakening from sleep
- Nausea, vomiting, abdominal pain, fever



Physical exam

- Swollen, tender, high-riding testis
- Abnormal transverse lie
- Loss of cremasteric reflex



The reflex is elicited by (1) stroking the ipsilateral inner thigh with a tongue depressor or gloved hand, resulting in (2) the elevation of the testis through contraction of the cremasteric muscle.



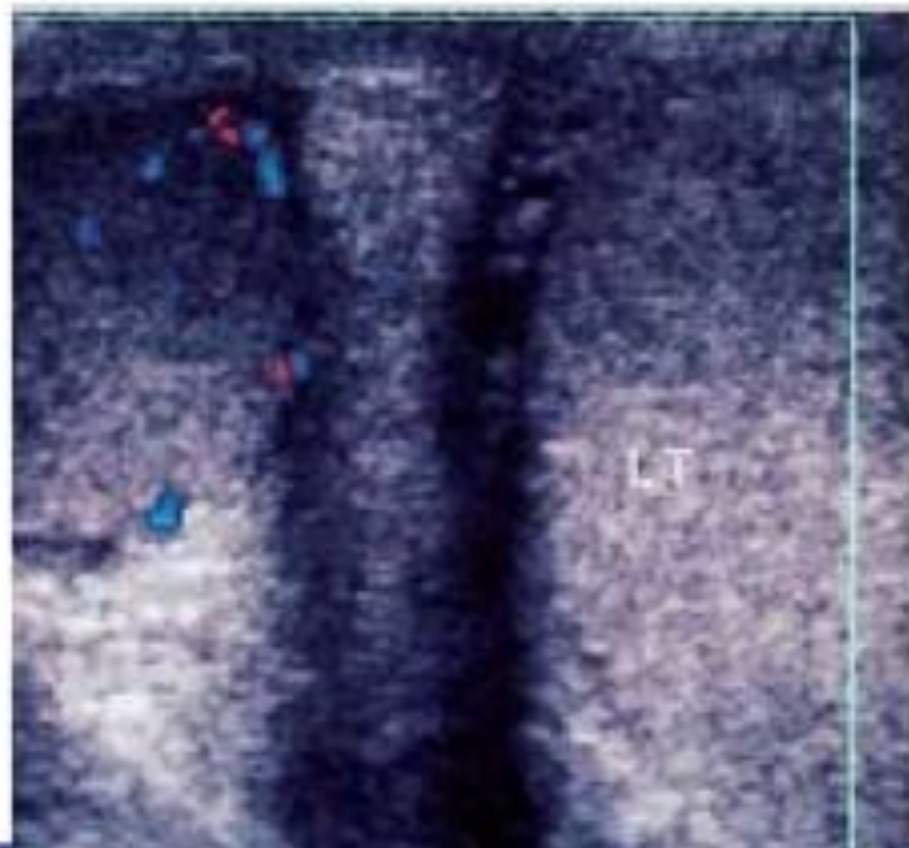
imaging

- Doppler ultrasonography:
 - diagnostic test of choice
 - testicular torsion Vs. others(epididymitis, hernia...)
 - testicular arterial flow is absent TORSION
- However, lack of immediate access should not delay surgical exploration

Ultrasonography (Doppler)

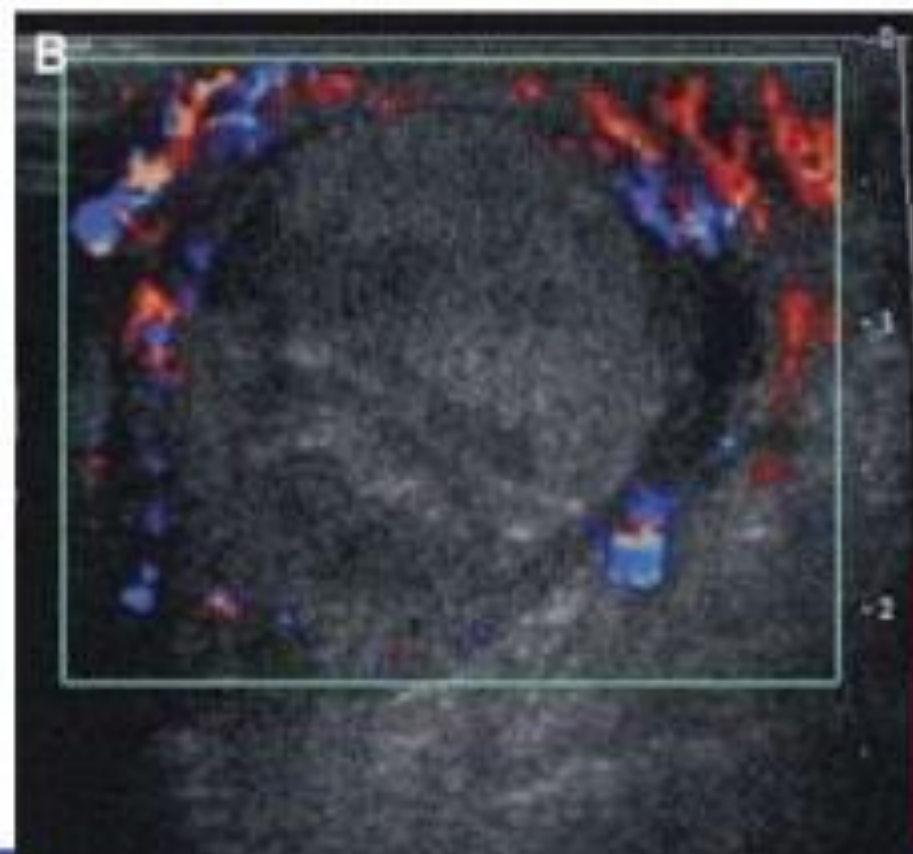
Early Torsion (4-6 hr's)

- No flow,
- Echogenicity similar



Late Torsion (>24 hr's)

- Heterogenous echotexture
- Increased extra-testicular blood flow

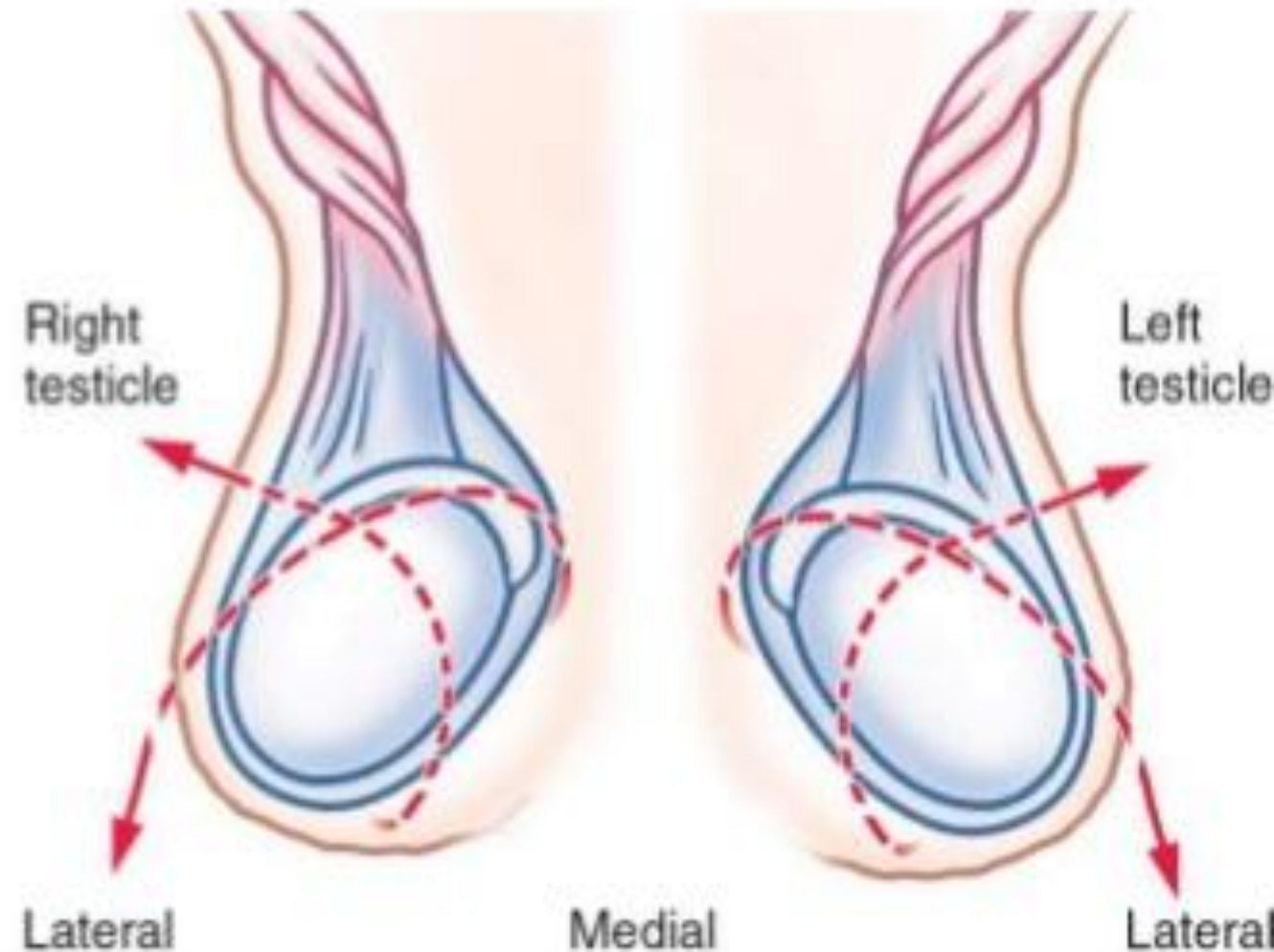


Treatment

- **High suspicion** ⇒ Call Urologist for **Immediate surgical exploration**
 - >80% of testes salvaged if done within 6 hr's
 - <20% beyond 12 hours.
- Once testis is **detorsed**, assess for viability and fixation (if viable)
- If clearly necrotic ⇒ **Orchiectomy**
- At surgery, Explore and fix the **contralateral** testis

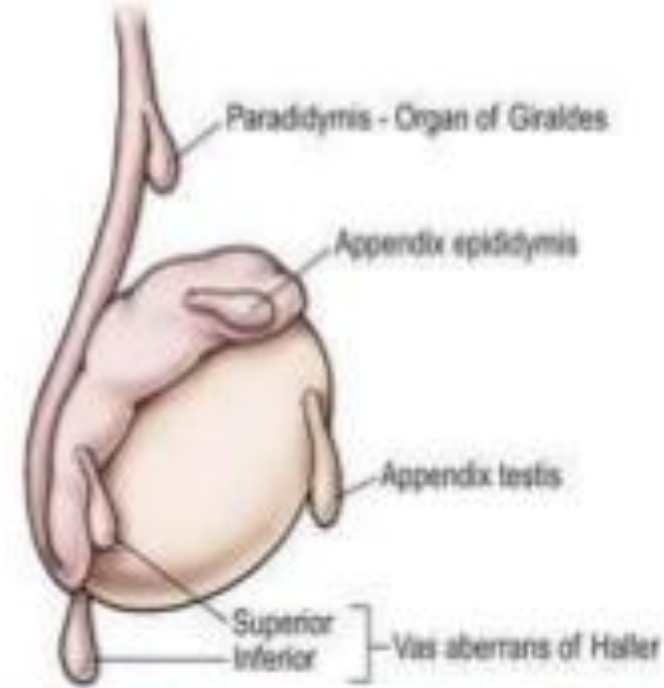
Treatment

- Definitive treatment:
Surgical detorsion & Orchiopexy
- If not immediately available; **Manual detorsion**
 - *Medial to lateral; "opening a book"*
 - *May need to rotate 2-3 times for complete detorsion*



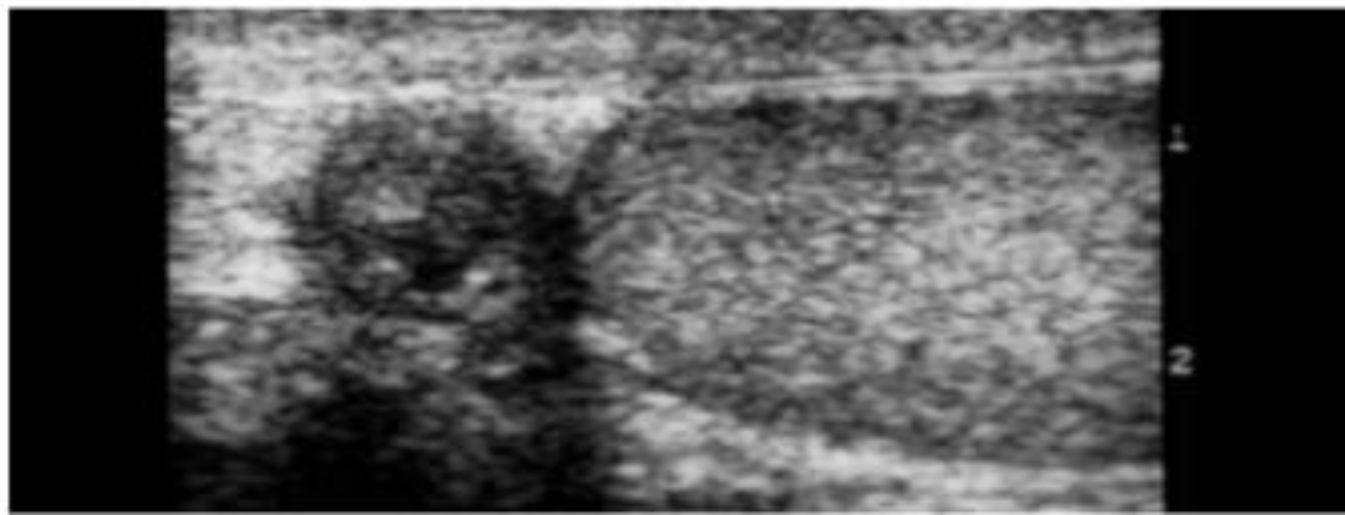
Torsion of appendages

- Small polypoid appendages attached to testis/epididymis
- Mullerian/Wolffian duct remnants
- Torsion of appendix testis or appendix epididymis:
 - Acute onset of scrotal pain and mass
 - **Testis is palpable with normal lie**
 - If early, the edematous, torted appendage palpated at upper pole of testis
 - If ecchymotic, seen as "**blue-dot sign**"



Testicular appendage torsion

- Testicular appendage torsion appears as a lesion of low echogenicity with a central hypoechogenic area adjacent to the epididymis.
- Peak incidence at 11 years of age.
- Presents with scrotal pain of less severe intensity, upper scrotal tenderness and some times with blue dot sign.
- Most of the time however, we don't see it and we do the US just to exclude a testicular torsion.
- We should see torsion of testicular appendices more as a diagnosis of exclusion.



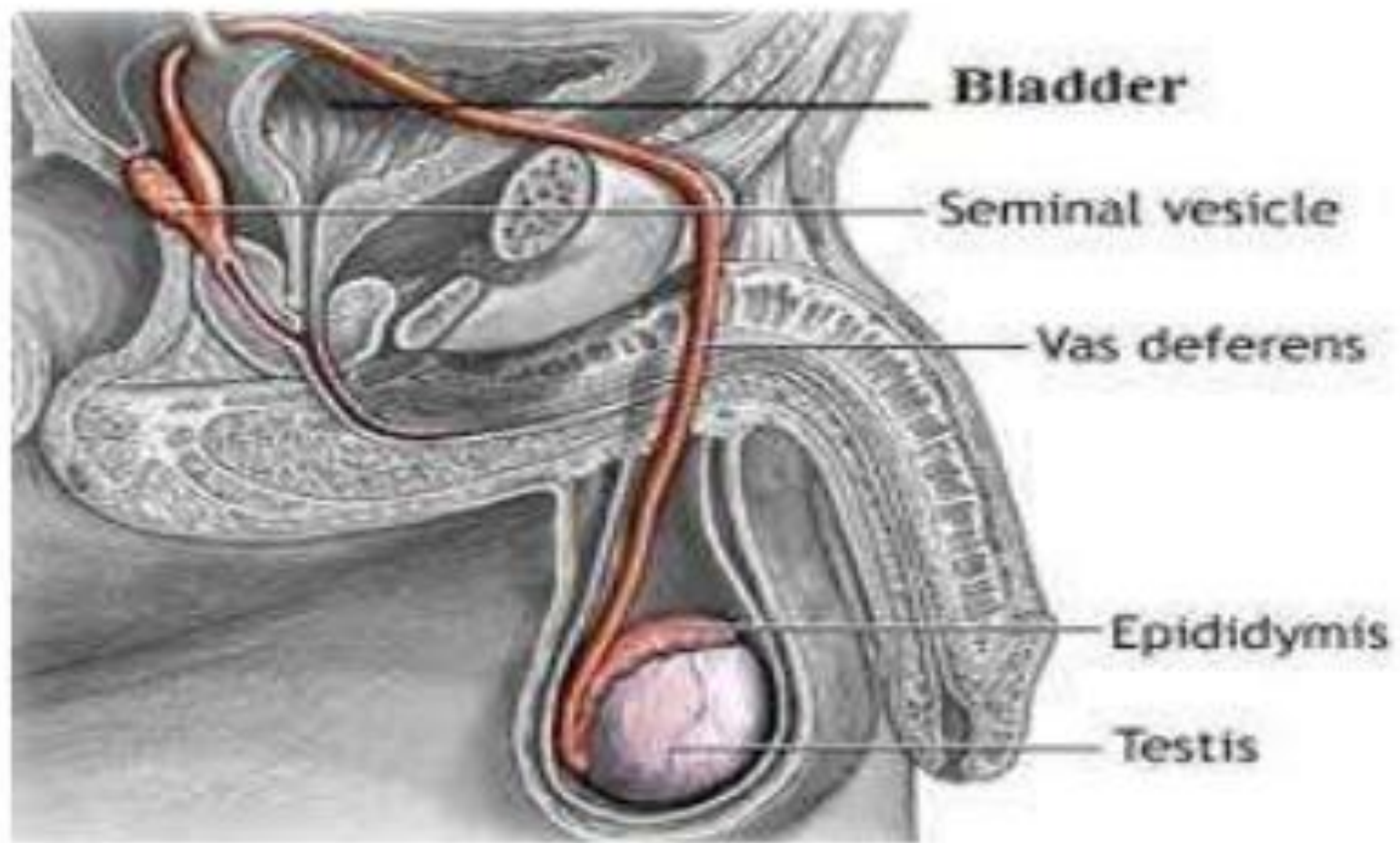
Torsion of appendages

- Doppler ultrasound \Rightarrow **Perfused testis**, often with hypervascularity in the area of the appendage.
- Ultrasound is more valuable later in course of disease; as a result of scrotal edema (Vs, Testicular torsion, Epididymitis...)
- **Self-limited** (infarcted appendage atrophy by time)
 - Rest and NSAID's
 - Last from weeks to months
- If **exploration** \Rightarrow simply excise appendage without orchidopexy
Severe/Persistent pain

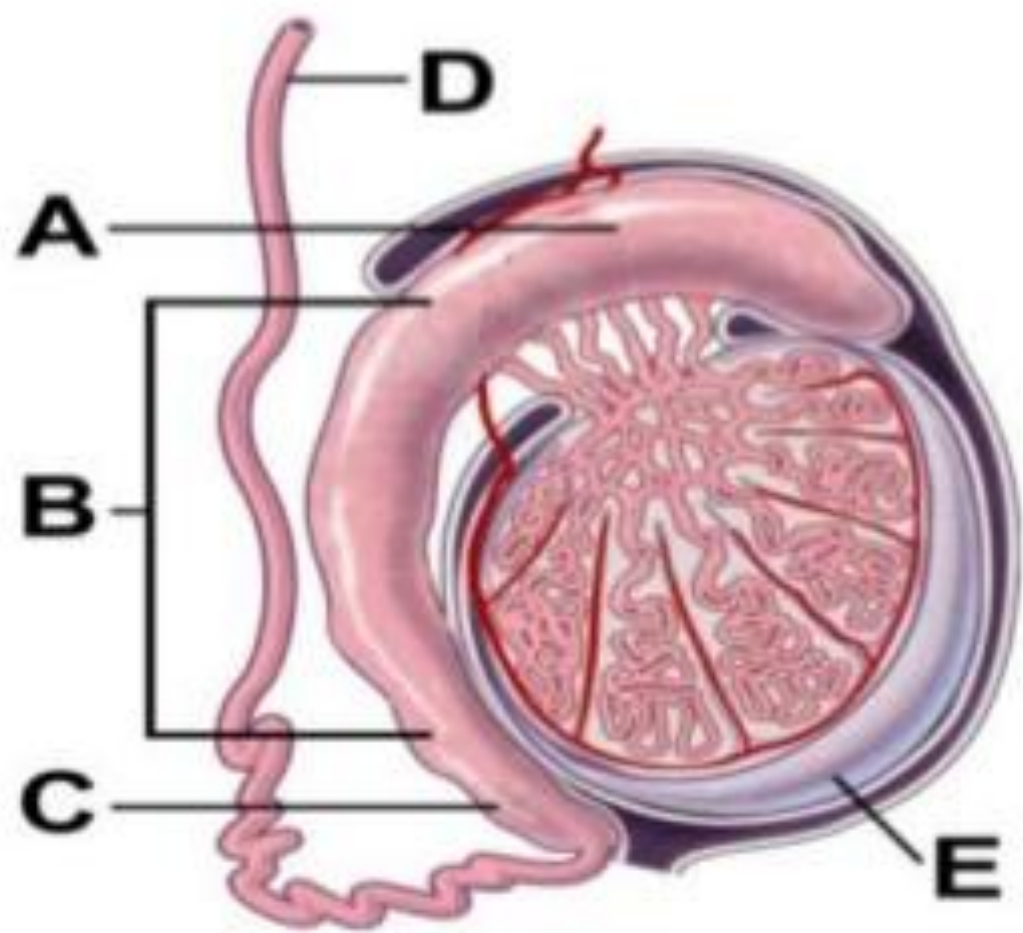
EPIDIDYMITIS

- Inflammation of the epididymis
- If the inflammation spreads to the testicle spreads to the scrotum it is called orchiepididymitis
- Epididymitis is the **most common cause** of scrotal pain in adults in the outpatient settings

Anatomy



Anatomy



A: Caput or head of the epididymis

B: Corpus or body of the epididymis

C: Cauda or tail of the epididymis

D: Vas deferens

E: Testicle

Causes of the epididymitis

1. infectious:

- Among sexually active men aged <35 years
 - C.trachomatis or N.gonorrhoeae
- Men who are the insertive partner during anal intercourse:
 - Escherichia coli and Pseudomonas spp
- Men aged >35 years
 - sexually transmitted epididymitis is uncommon
 - bacteriuria secondary to obstructive urinary disease is more common

Causes of the epididymitis

2. Non-infectious:

- Medication
- Urine reflux in ejaculatory ducts
- Extravasation of fluid and sperm after vasectomy



Causes of chronic epididymitis

- Inadequate treatment of acute epididymitis
- Recurrent epididymitis
- Granulomatous reaction
 - mycobacterium tuberculosis (TB)is the most common granulomatous disease affecting the epididymis
- Chronic disease



incidence

- Epididymitis is most common in young men ages 19-35
- About 1 in 1000 men develop epididymitis annually
- Acute epididymitis accounts for >600000 medical visits per year in the U.S
- Patients with **epididymitis secondary to a STI have 1-5 times the risk of acquiring and transmitting HIV**



Presentation

- **Acute:**
- Discomfort and/or pain in the scrotum, testicle, or epididymis lasts **<6 weeks**
- Usually caused by a bacterial infection
- **Chronic:**
- Discomfort and/or pain in the scrotum, testicle, or epididymis lasting **>6 weeks**
- Pain may be constant or waxing and waning
- Scrotum is not usually swollen but may be indurated in long-standing cases

Signs / Symptoms

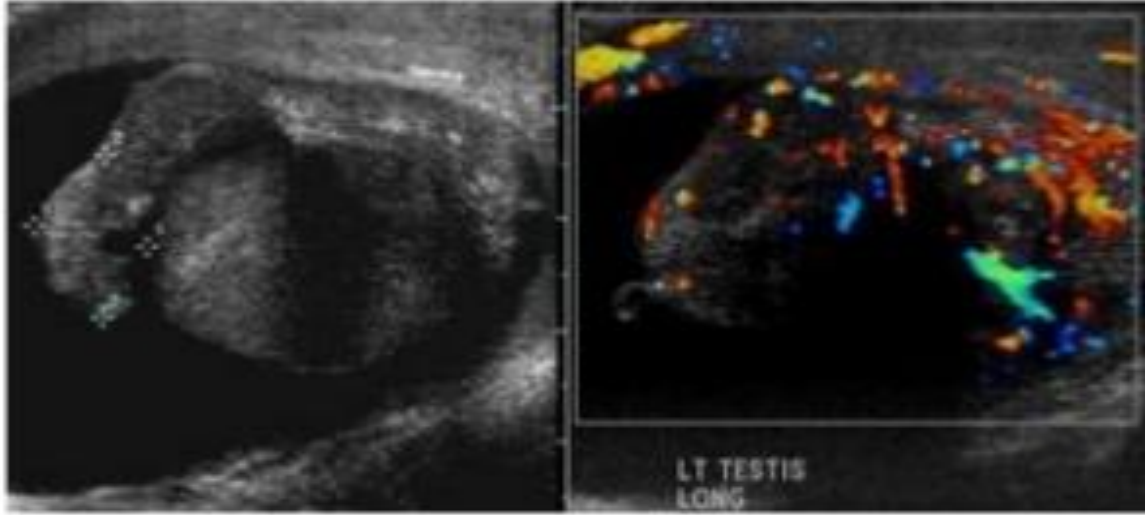
- Heavy sensation in the testicle area
- Painful scrotal swelling
- Fever
- Chills
- Testicle pain gets worse with pressure
- Lump in the testicle
- Blood in the semen
- Discharge from urethra
- Pain or burning during urination or ejaculation
- Discomfort in the lower abdomen or pelvis

Diagnosis

- HPI
- Physical exam
- Additional tests:
 - CBC
 - Doppler ultrasound
 - Testicular scan (nuclear medicine scan)
 - Urinalysis and culture
- Germ stain of urethral secretions demonstrating >5 WBC
- Positive leukocyte esterase test on first-void urine
- Culture, nucleic acid hybridization test, & NAATs are available for detection of *N.gonorrhoeae* & *C.trachomatis*



Epididymitis



The case on the left shows the typical features of epididymitis.

The epididymis is swollen and heterogeneous. There is a hydrocele and scrotal wall thickening. With color Doppler there is increased flow. A normal epididymis has only limited color flow.

Acute epididymitis vs Testicular Torsion

Acute epididymitis

- ◆ Gradual onset of scrotal pain(days)
- ◆ Normal cremasteric reflex
- ◆ Usually no nausea & vomiting
- ◆ More common in sexually active men

- ◆ HPI & exam support diagnosis of urethritis or UTI
- ◆ Empiric treatment & follow up

Testicular Torsion

- ◆ Sudden onset of scrotal pain(hours)
- ◆ Abnormal cremasteric reflex
- ◆ Nausea & vomiting common
- ◆ More common in adolescents& men without evidence of inflammation or infection

- ◆ HPI & exam don't support diagnosis of urethritis or UTI
- ◆ Surgical emergency

treatment

- Empiric treatment is indicated before laboratory results are available
- Goals of treatment of acute epididymitis caused by *C.trachomatis* or *N.gonorrhoeae*:
 - Microbiological cure of infection
 - Improvement of signs& symptoms
 - Prevent transmission to others
 - Reduce potential complications



- **Recommended Regimens**

- * Ceftriaxone 250mg IM in a single dose **plus**

- * Doxycycline 100mg PO BID for 10 days

for acute epididymitis most likely caused by enteric organisms:

- * Levofloxacin 500mg PO once daily for 10 days

OR

- * Ofloxacin 300mg BID for 10 days

Follow up

- Pain improves within 1-3 days
- Induration can last a few weeks- months to resolve
- Swelling and tenderness that persist after completion of treatment should be evaluated comprehensively
- Evaluate for formation of an epididymal abscess or a testicular abscess

complications

complications of epididymitis:

- Abscess in the epididymis
- Chronic epididymitis
- Fistula on the skin of the scrotum (cutaneous scrotal fistula)
- Death of testicular tissue due to lack of blood (testicular infarction)
- Sepsis & infertility



Prevention

- Practicing safe sex
- Treating sexual partners as a contact to epididymitis
- Repeat screening for STI till 2 months after initial testing for re-infection
- Abstain from sex until the individual & sex partners have completed treatment



orchitis

- Orchitis is an inflammation of the testicles. It can be caused by either bacteria or virus.
- Both testicles may be affected by orchitis at the same time. However, the symptoms are usually in just one testicle.
- This kind of testicular inflammation is often associated **with the mumps virus.**

causes

- Most commonly, **mumps** causes isolated orchitis
- Other rare viral etiologies include coxsackievirus, infectious mononucleosis, varicella, and echovirus.
- **Bacterial** causes usually spread from an **associated epididymitis in sexually active men or men with BPH:**
- Bacteria include Neisseria gonorrhoea, Chlamydia trachomatis, Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa, and Staphylococcus and streptococcus species
- Bacterial orchitis rarely occurs without an associated epididymitis.

symptoms

- Pain in the testicles and groin is the primary symptom of orchitis
- Tenderness in scrotum
- Painful urination
- A swollen scrotum
- Blood in the semen
- Abnormal discharge
- Enlarged prostate
- Swollen lymph nodes in the groin
- fever

Clinical manifestations

Testicular examination reveals the following:

- Testicular enlargement
- Induration of the testis
- Tenderness
- Erythematous scrotal skin
- Edematous scrotal skin
- Enlarged epididymis
- On rectal examination, there is a soft boggy prostate (prostatitis)
- Other findings include parotitis and fever

Risk factors

People who engaged in high risk sexual behavior may be more likely to develop orchitis. High risk sexual behavior includes:

- Having sexual intercourse without condoms
- Having history of STI
- Congenital urinary tract abnormalities can also increase risk of orchitis. This means if one is born with structural problems involving bladder or urethra

Diagnosis- labs

- Laboratory tests are often not helpful making the diagnosis of orchitis
- Diagnosing mumps orchitis can be comfortably made based on history and physical examination alone. Diagnosing mumps orchitis can be confirmed with **serum immunofluorescence antibody testing**
- In sexually active males, urethral cultures and gram stain should be obtained for Chlamydia trachomatis and N gonorrhoea.
- Urinalysis and urine culture should also be obtained



Diagnosis- imaging

- Color Doppler ultrasonography has become the imaging test of choice for the evaluation of an acute scrotum.



Orchitis

Complications

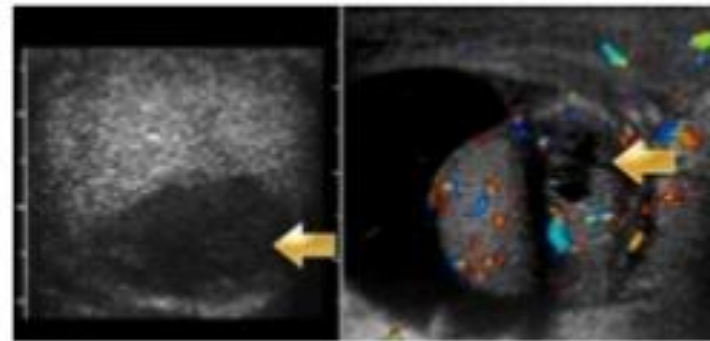
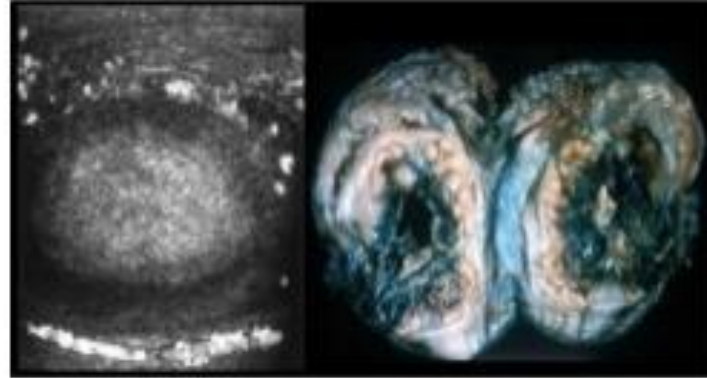
Abscess

hypoechoic area with surrounding hyperemia
rim of increased uptake at scintigraphy
(mimics late torsion)

Testis ischemia: from edema

enlarged epididymis
enlarged, poorly perfused testis
normal axis of testis in hemiscrotum
spermatic cord normal

ORCHITIS COMPLICATIONS



Treatment

- No cure for viral orchitis, but the condition will go away on its own.
- Suppurative treatment maybe applied:
 - Bed rest.
 - Hot or cold compress.
 - Scrotal elevation.
- Bacterial orchitis is treated with antibiotics, anti-inflammatory medications, and cold packs.

Trauma

In trauma **there is either hematocele or testicular hematoma.**

In acute phase the hemorrhage is echogenic and in chronic phase it is hypoechic

A hemoatocele results from **scrotal or intra abdominal** hemorrhage. It represents bleeding between the leaves of the tunica vaginalis and appears as a complex fluid collection. With time, this collection can develop **loculation**, which appear as thick separations. It is important to be able to tell sonologically if the **testis is intact**, because if there is a **rupture**, this can sometimes be treated surgically.

HEMATOCELE



Testicular rupture

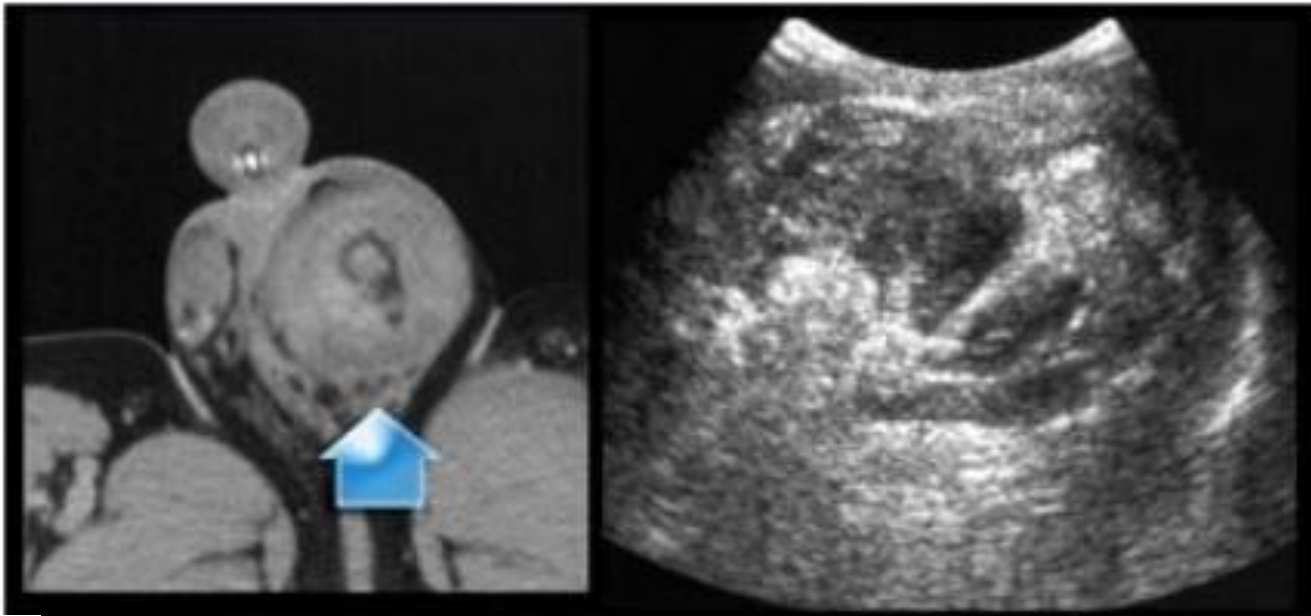
- Rupture of the tunica albugenia
- Symptoms:
 - Testicular pain
 - Nausea
 - Vomiting
 - Fainting



Testicular rupture

Testicular rupture is seen as focal alterations of testicular echogenicity correlating with areas of intratesticular hemorrhage or infarction in a patient with a hematocele.

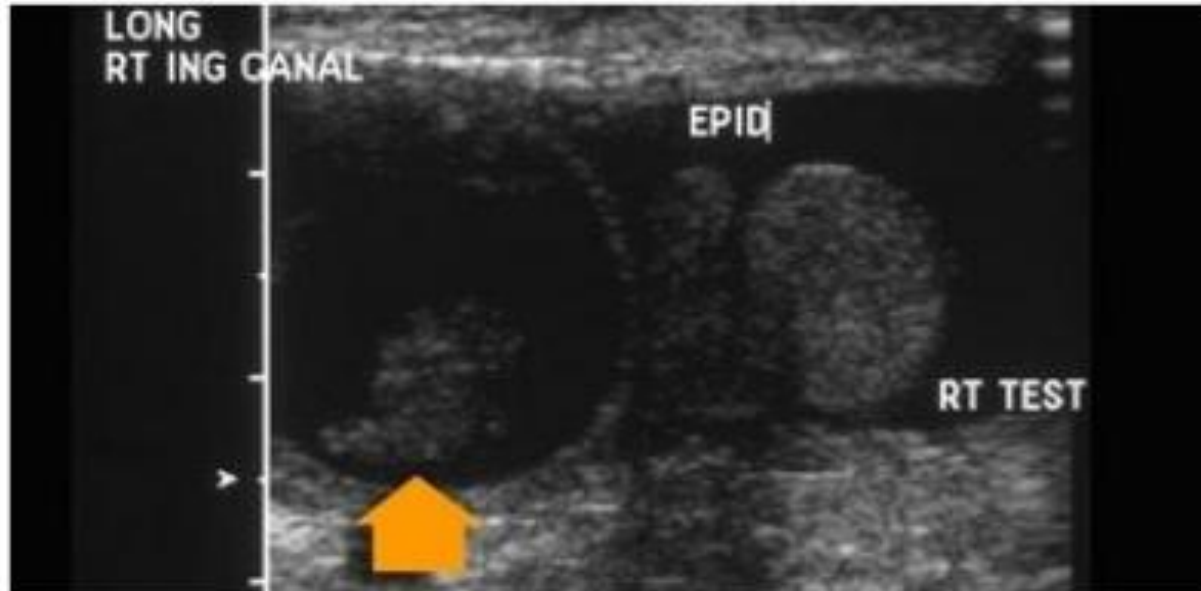
A discrete fracture plane is identified in fewer than 20% of cases, although visible alterations in the testicular contour are a common finding sonologically.



- **Examination:** swollen tender scrotal hematoma
- **Ultrasound:** rupture of tunica albugenia, hematocele
- **Treatment:** surgical exploration, hematoma evacuation, resection of necrotic tissue, closure of tunica albugenia

STRANGULATED HERNIA

- Strangulated Hernias in children are common especially in infancy.
- Children may present with acute irreducible scrotal swelling, irritability and symptoms and signs of intestinal obstruction.
- Sometimes we can see them on plain films .
- If they are filled with bowel, they are easy to detect on ultrasound, but sometimes these hernias are only filled with soft tissue .



Idiopathic Scrotal Edema

- = boys aged 4-10
- = pain, edema, +/- erythema
- = resolves in days without sequela
- = US: - scrotal wall thickening
- testis and epididymis normal

***Idiopathic scrotal edema is seen in school-aged boys.**

***They present with scrotal skin swelling which spread to or from the inguinal region, penis or perineum so redness is not confined to hemiscrotum but spreads to both halves of scrotum.**

***Cause is not always apparent but may be bacterial cellulitis or a topical allergy.**

So the clinical question is, if there is torsion or infection.

***At examination the testes and epididymis are normal and all that we see on US is skin edema.**

***If the child does not have fever or elevated white count, which can be seen in cellulitis, than we can make the diagnosis of Idiopathic scrotal edema.**

Thank you



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