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:

1. Skin
2. Dartos muscle = Fatty layer of superficial fascia of abd. wall
3. Collie'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

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. Extraperitoneal fatty tissue
9. 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
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<tr>
<td>epididymitis</td>
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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
Intravaginal Torsion

- More common
- Puberty
- Bell-clapper Deformity
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 testicle 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 fixatie (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, torsed 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 hypoechochogenic 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
EPIDIDYMIS

- 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

- Bladder
- Seminal vesicle
- Vas deferens
- Epididymis
- Testis
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 \textit{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
* 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 gonorrhea.
• 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
  - Faniting
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 .

![Ultrasound Image]
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