CRITICAL GU CONCEPTS
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OBJECTIVES

AT THE END OF THIS SESSION, THE STUDENT SHOULD BE ABLE TO:

- Make an accurate assessment and workup of Genito-Urinary Pain, Hematuria, Urolithiasis, Priapism, and Acute Scrotum

- Distinguish, through the history, physical exam and laboratory testing, a differential diagnosis for these conditions

- Appropriately order imaging studies to make the diagnosis
GU Pain

- Usually caused by either urinary tract obstruction or inflammation. Pain is usually severe once inflammation involves parenchyma of organ causing significant edema and distention of the capsule.

- Tumors in GU tract are generally not painful unless they cause obstruction or extend into adjacent nerves.
DIFFERENTIAL DX FOR GU PAIN

- Renal Pain/Colic
- Ureteral Pain/Colic
- Vesical Pain
- Prostatic Pain
- Penile Pain
- Testicular Pain
RENAL PAIN/COLIC

- Pain located at costovetebral angle but may be referred anteriorly to upper abd/umbilicus or to the testis/inguinal area
- Caused by acute distention of renal capsule usually from inflammation or obstruction
- Renal/Retroperitoneal disease should be considered in a patient with testicular pain and a negative scrotal exam
RENAL PAIN

- Pain due to inflammation is usually constant whereas pain from obstruction (stone) fluctuates and is colicky in nature as ureteral peristalsis intensifies the pain.

- Renal and intraperitoneal pathology both may cause GI symptoms, however intraperitoneal causes may radiate to shoulder due to irritation of the diaphragm or phrenic nerve while true renal pain will not.
**Renal Pain**

- Patients exhibiting intraperitoneal causes will prefer to lie motionless to reduce discomfort whereas patients with renal pain prefer to move around to reduce pain
- Nausea/vomiting with renal colic
- Women state pain “worse than childbirth”
Ureteral Pain/Colic

- Usually due to acute distention, hyperperistalsis, and smooth muscle spasm in attempts to relieve obstruction
- Right midureter pain may be referred to RLQ McBurney’s point imitating appendicitis
- Left midureter pain may be referred to LLQ and imitate diverticulitis
Ureteral Pain

Distal ureteral pain may produce symptoms of bladder irritation such as frequency, urgency, suprapubic pain that can radiate down the urethra to the tip of the penis or down the groin to scrotum or vulva.
DISTAL URETERAL STONE WITH HYDRONEPHROSIS OF PELVIS AND URETER
Vesical Pain

- Usually caused by over distention of the bladder from acute urinary retention or inflammation
- Inflammation of bladder usually produces suprapubic discomfort
- Cystitis can be referred to distal urethra and is associated with dysuria, urgency and frequency
**Prostatic Pain**

- Pain usually caused by inflammation with secondary edema and distention of capsule.
- Patient may complain of lower abd, inguinal, perineal, lumbosacral, or rectal pain.
- Usually associated with dysuria and frequency.
- Acute prostatitis-fever, positive u/a for wbc and nitrates, elevated wbc.

*DO NOT MASSAGE PROSTATE GLAND*
Penile Pain

- Pain of flaccid penis usually associated with inflammation of bladder or urethra due to referred pain.
- Paraphimosis – pain due to foreskin being trapped behind glans penis creating venous obstruction. Surgical emergency if unable to reduce.
- Pain in erect penis usually due to priapism or Peyronie’s disease (painful only with erection).
TESTICULAR PAIN

- Primary pain usually secondary to epididymitis or torsion
- Chronic pain most often caused by hydrocele or varicocele described as a dull heavy feeling
- Renal pain and inguinal hernia pain may be referred to scrotum
TAKE HOME MESSAGES

G-U pain requires history, physical exam, u/a, labs and appropriate imaging studies.

Renal and ureteral colic can be excruciating and the smallest stones cause the most symptoms, whereas the large stones may cause minimal discomfort.

Scrotal and testicular pain will be reviewed in more detail in the acute scrotum discussion.
HEMATURIA

- Defined as > three rbc per high power field.

- Questions to ask: 1) Gross vs microscopic 2) Timing of hematuria 3) Association with pain 4) Presence of clots 4) Shape of clots
GROSS VERSUS MICROSCOPIC

- The chance of identifying the pathologic etiology of the hematuria increases with the degree of hematuria.
- The cause of gross hematuria can be identified with workup in most cases.
TIMING OF HEMATUREIA

- Timing during urination when hematuria becomes apparent usually indicates the source of the pathology within the urinary tract
- Initial hematuria indicates urethral origin
- Total hematuria indicates a bladder or upper UT source
- Terminal hematuria indicates a bladder neck or prostatic urethral origin
ASSOCIATED PAIN

- Hematuria which is painless is a concern for malignancy.
- Pain with urinary symptoms and some clots is usually associated with cystitis.
- Pain worsened by clot passage indicates upper UT hematuria origin with ureteral obstruction from clots.
PRESENCE AND SHAPE OF CLOTS

- Presence of clots usually indicates a more significant degree of gross hematuria and a greater index of suspicion of malignant etiology.
- Most clots are amorphous in shape, but vermiform clots indicates upper UT origin.
**Hematuria Differential DX**

- In an adult with painless gross hematuria, malignancy must be ruled out.
- Hematuria workup includes urinary cytology, and imaging of upper tracts (CT without and with contrast) should be performed to discover the pathologic source followed by cystoscopy in the office. Latter can be done initially if gross painless hematuria presents in office. Prior to imaging always check renal function and pregnancy status.
- Most common cause of hematuria in a patient older than 50 is bladder cancer.
Hematospermia

- Almost always due to inflammation of prostate and/or seminal vesicles that will usually resolve in several weeks.
- Frequently occurs in periods of sexual abstinence such as men whose wives are in the final weeks of pregnancy.
- Persistence beyond several weeks requires a genital/rectal exam to exclude TB, a DRE and PSA to exclude prostate carcinoma, and urinary cytology to exclude TCC of prostate.
PNEUMATURIA

- Pneumaturia usually due to a fistula between bladder and intestines
- Causes include diverticulitis, carcinoma of sigmoid colon, and regional enteritis such as Crohn’s
- Recent UT instrumentation or urethral catheritization can also be an iatrogenic cause
Kidney Infection

- Acute Pyelonephritis
- Emphysematous Pyelonephritis
- Renal Abscess
- Perinephric Abscess
- Xanthogranulomatous Pyelonephritis
**ACUTE PYELONEPHRITIS**

- Inflammation of kidney and renal pelvis yet true diagnosis is clinical
- Presents classically as abrupt onset of fever and chills >100.0 F with unilateral/bilateral flank or CVA pain
- Upper UTI symptoms often present with dysuria, urinary frequency, and urgency in addition
ACUTE PYELONEPHRITIS

In a study of 201 women and 12 men with recurrent UTI’s by Busch and Huland, it was shown that fever and flank pain are no more diagnostic for pyelonephritis than for cystitis.
LAB DX

- UA reveals numerous WBC’s with a predominance of neutrophils and bacterial rods or cocci.
- Presence of large amounts of leukocyte or granular casts is indicative of pyelonephritis.
BACTERIA

- Urine cx may be negative 20% of cases
- E coli responsible for 80% of cases
- Patients with P blood group phenotype who lack vesicoureteral reflux may be susceptible to recurrent pyelo due to ecoli as it allows P pili of the bacteria to bind to P blood group antigen receptors
**BACTERIA**

- Other bacteria that should be suspected in recurrent UTI’s, hospitalized patients, and pt’s with catheters include Proteus, Klebsiella, Pseudomonas, Serratia, Enterobacter, Citrobacter, and the gram positives E. faecalis, S epi, S aureus

- Blood cx are positive in 25% of patients and usually replicate the urine cx thus blood cx are not routinely required in uncomplicated cases
Radiologic Imaging

- Ultrasound and CT may be used to evaluate complicated UTI’s or patients who do not respond to treatment after 72hrs.
- Imaging will show enlargement and attenuation of parenchyma and a compressed collecting system.
ACUTE PYELO IMAGES

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Differential Dx

- Acute appendicitis, diverticulitis, pancreatitis can cause same degree of pain but location is usually different and urine analysis usually clarifies dx
- Herpes zoster can cause pain in same location but shingles will become apparent
MANAGEMENT

 3 degrees of disease: 1) uncomplicated disease with no hospitalization, 2) uncomplicated infection in patient who is ill enough for admission and IV antibiotics, 3) complicated infection with admission and urologic survey for UT abnormalities

 Factors that may or may not weigh on admission include: high fever, high WBC count, vomiting, dehydration, sepsis
MANAGEMENT

- Outpatient therapy includes a fluoroquinolone over Bactrim
- Inpatients should receive IV fluoroquinolone, aminoglycoside with/without amp, or extended spectrum cephalosporin with/without aminoglycoside
**MANAGEMENT**

- Length of Treatment: 7 days in ambulatory patient and 7 days with IV antibiotics and 10 to 14 additional days PO in complicated cases

- In patients with fever over 72 hrs, obstruction should be ruled out
Emphysematous Pyelonephritis

- 25-35% Mortality if not treated urgently
Emphysematous Pyelonephritis

- Acute necrotizing parenchymal and perirenal infection due to gas forming bacteria
- Thought to be caused by impaired host response such as obstruction or diabetes that allows pathogens to use necrotic tissue to produce carbon dioxide.
Emphysematous Pyelonephritis

- Presents usually with triad of fever, vomiting, flank pain
- Diagnosis is made radiographically on x-ray as tissue gas appears as mottled gas shadows within the kidney
- CT is also used to define extent of involvement
- Treat patients with fluids and broad spectrum antibiotics, but nephrectomy is recommended if patient does not improve after a few days of therapy
**Emphysematous Pyelonephritis**

Emphysematous pyelonephritis; plain film. Extensive perinephric (*long arrows*) and intraparenchymal (*short arrows*) gas secondary to acute bacterial pyelonephritis.

Renal Abscess

- Collection of purulent material confined to renal parenchyma
- Likely due to ascending infection associated with tubular obstruction
- Hematogenous seeding of gram positives from a skin infection or IVDU is possible and such details may be present in the history 1 to 8 weeks prior to urinary symptoms
RENAL ABSCESS

- Presents as fever, chills, abd or flank pain, weight loss
- Laboratory dx includes positive blood cx, but a potentially negative urine culture if gram positive bacteria are the cause
- CT or U/S are the radiographic diagnostic tests of choice
Renal Abscess

Chronic renal abscess. A, Enhanced CT scan shows an irregular septated low-density mass (M) extensively involving the left kidney. Note thickening of perinephric fascia (arrowheads) and extensive compression of the renal collecting system. Findings are typical of renal abscess. B, Ultrasound longitudinal scan demonstrates a septated hypoechoic mass (M) occupying much of the renal parenchymal volume.
Renal Abscess - Management

- Classic treatment includes percutaneous or open drainage, but there is increasing evidence for medical management of abscesses 3cm or less in size if begun early enough.
- If hematogenous source suspected then gram positive treatment with higher generation PCN is indicated.
- If cortical abscess is present as in an abnormal urinary tract, gram negative coverage is indicated with 3rd generation cephalosporin, antipseudomonas pcn, or aminoglycoside.
PERINEPHRIC ABSCESS

- Caused by rupture of cortical abscess or hematogenous seeding
- Should be considered when suspected pyelo does not respond to treatment in 4 to 5 days
- Presentation similar to pyelo but symptoms last at least 5 days and a limp may be present due to psoas muscle involvement
Perinephric Abscess

- CT is the gold standard for radiographic diagnosis
- Management includes drainage with attention to evaluation of the underlying cause of the abscess
Nonenhanced CT scan through the lower pole of the right kidney (previous left nephrectomy) shows extensive perinephric abscess. Extensive abscess (A) distorts and enlarges the renal contour, infiltrates perinephric fat (straight arrows), and also extends into the psoas muscle (asterisk) and the soft tissues of the flank (curved arrow). Also note that normal renal collecting system fat has been obliterated by the process.
XANTHOGRA

ANTHOGRA

NULOMATOUS

GRANULOMATOUS

PYELONEPHRITIS

- Inflammation and enlargement of kidney secondary to nephrolithiasis followed by obstruction and infection
- Infection most commonly occurs with E.coli and leads to tissue destruction and lipid accumulation within macrophages that begins in the pelvis and progressively destroys the parenchyma
XANTHOGRANULOMATOUS PYELONEPHRITIS

- Presents with flank pain, fever, persistent bacteruria
- Radiologic diagnosis includes the triad of renal enlargement with poor to no function of the kidney and large stones in the renal pelvis
- CT imaging modality of choice usually showing large reniform mass with a central calcification within the renal pelvis in addition to dilated calyces and abscess cavities
XANTHOGRANULOMATOUS PYELONEPHRITIS

Xanthogranulomatous pyelonephritis. Enhanced CT scan shows collecting system and parenchymal calculi (*straight arrows*) with lower pole pyonephrosis (*curved arrow*) and an irregular, predominantly low-density perinephric abscess (A) extending into the soft tissues of the flank.
**KEY POINTS**

- After completion of the history, PE, and urinalysis, you should be able to establish at least a differential diagnosis that will allow the subsequent diagnostic evaluation and treatment to be carried out in an efficient manner.

- Urinary calculi typically present with renal colic and hematuria.

- Unenhanced CT is the best initial diagnostic test.

- Clinicians need to assess the need for urgent intervention.
KEY POINTS: HEMATURIA AND INFECTION

- Gross painless hematuria is associated with high risk of malignancy, esp. bladder cancer
- Urinary cytology, urine culture and CT imaging without and with contrast is indicated-UPT/BMP or Cr needed
- Urology consult or referral based on findings
- Urinary tract infection are both prevalent and costly
- UTI diagnosis made by u/a and clinical picture
- Effective treatment depends on pathogen, severity and site of illness, and other complicating patient factors
Kidney stones in the minor and major calyces of the kidney

Kidney stone in the ureter
Stone Formation

- Crystal formation occurs when concentrations of stone components reach supersaturation within the urine
- Crystals must then aggregate to form stones
- Normal urine contains inhibitors of stone formation
  - Citrate
  - Magnesium
  - Tamm-Horsfall protein
  - Nephrocalcin
- A metabolic etiology can be found in 97% of patients!
**Types of Stones**

- **Calcium (75%)**: includes Calcium Oxalate (most common) and Calcium Phosphate
- **Struvite (15%)**: composed of Magnesium Ammonium Phosphate
  - Often due to urea-splitting bacteria (*Proteus*) and account for most staghorn calculi
- **Uric Acid (5-10%)**: radiolucent
- **Cystine (1%)**
  - Autosomal recessive defect in reabsorption of COLA
- **Indinavir**
**Risk Factors**

- Hypercalciuria can be due to increased intestinal absorption, decreased renal absorption, or increased bone resorption
- Hyperoxaluria occurs in patients with IBD or bypass surgery
- Hyperuricosuria, hypocitraturia
- Type 1 RTA
  - Hypokalemia, hyperchloremia, metabolic acidosis, and urine pH > 5.5
  - Treat with potassium citrate
- Dietary calcium is not a risk factor!
SIGNS AND SYMPTOMS

- *Severe* colicky flank pain +/- radiation to groin or scrotum
- Gross or microscopic hematuria
- Nausea/Vomiting due to hydronephrosis or capsular distension
- Must differentiate from an acute abdomen
**Diagnostic Tests**

- **Urinalysis and Culture** – look for RBCs or evidence of UTI
- **Noncontrast abdominal/pelvic CT**
  - Can diagnose small stones and hydronephrosis
  - Study shows CT is superior to IVP
- **KUB** – cheap, quick, but less sensitive
- **Renal U/S** should be used in pregnant women or a limited IVP can be ordered if severe hydronephrosis on U/S
EXPECTANT MANAGEMENT

- Stones <5 mm should be given trial of passage
  - IV or PO hydration
  - NSAIDs vs. Opiates
  - Renal colic can be managed with opiates
  - Alpha-blockers must be ordered on d/c from ER

- Stones that have not passed within 1-2 months or unlikely to pass spontaneously

- Sites where passage is likely to become arrested include the UPJ, pelvic brim, just outside the bladder, and the UVJ

- Dissolution of uric acid and cystine stones can be attempted by alkalizing the urine and increasing fluid intake
INDICATIONS FOR EARLY INTERVENTION

- Obstructed upper tract with infection
- Impending renal deterioration
- Pain refractory to analgesics
- Intractable nausea/vomiting
- Patient preference
- Fully obstructed or infected collecting systems should be decompressed with cystoscopy/ JJ-stent or nephrostomy tube
Surgical Interventions

- Extracorporeal Shock Wave Lithotripsy (ESWL)
- Ureteroscopy
- Percutaneous Nephrolithotomy (PCNL)
- Open or laparoscopic lithotomy
**Metabolic Workup**

- Workup should be conducted *after* the acute stone episode is resolved
- Stone composition analysis
- Serum Ca, pH, Uric acid, HCO₃, BUN/Cr, Alb, Alk Phos, and PTH (selected patients)
- 24 hour urine for Ca, Na, Mg, pH, Oxalate, Uric Acid, Citrate, Cr, Total Volume
- Urinalysis and culture
- Cyanide nitroprusside test to screen for cystinuria
STONE PROPHYLAXIS

- Most common factors are low UOP, hypercalciuria, and hypocitraturia
- High fluid intake with >2L of UOP
- Moderate sodium restriction
- Avoid dietary excesses, especially protein and salt
- Potassium citrate is beneficial for most stone-forming patients
**Key Points**

- Kidney stone composition and radio-opacity
- Best imaging study - CT Abd/Pelvis without contrast
- Medications to relieve renal colic and assist with expulsion of calculus
- Clinical situations that require urgent decompression of a ureteral stone include febrile illness, compromised renal function, intractable pain with or without nausea and vomiting (2\textsuperscript{nd} or 3\textsuperscript{rd} ER visit)
PRIAPISM
CRITICAL CARE CONCEPTS
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PRIAPISM

- Persistent erection that lasts over 4 hours
- Management includes detumescence, preservation of erectile function and prevention
- Types
  a. Ischemic- most common-includes stuttering
  b. Non-ischemic
CORPORAL PENILE BLOOD GAS
ISCHEMIC PRIAPISM

- Low Flow, Veno-occlusive Priapism
  Causes - Sickle cell trait and disease, Malig. infiltration of corpora, ED intracavernosal injections, trazodone and cocaine.
  Prolonged, painful and fully rigid erection
  Treatment is a medical emergency
STUTTERING PRIAPISM

- Recurrent ischemic priapism
- Patients with sickle cell, therapy may include hydration
- LHRH agonists or anti-androgens
- IC injection of dilute phenylephrine
NON-ISCHEMIC PRIAPISM
HIGH FLOW, ARTERIAL PRIAPISM

- Increased arterial inflow without decreased venous outflow
- Prolonged, non-painful, partially rigid erection without hypoxia or acidosis
- Cause—perineal or penile trauma
- Not an emergency
WORK UP

- Hx and PE
- Labs  CBC, SS Prep/hgb electrophoresis, urine toxicology
- Cavernosal (penile) blood gas (nl flaccid pO2 40mmHg; pCO2 50mmHg; pH 7.35)
- Ischemic- pO2 < 30; pCO2 > 60; pH < 7.25
- Non-Ischemic- pO2 > 90; pCO2 < 40; pH 7.40
- Doppler Ultrasound of Cavernosal Arteries
ALGORITHM

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TREATMENT

- Ischemic
  - Cavernosal Asperation and Irrigation
  - Intracavernosal Phenyleprine (Monitor V.S.)
  - Persists—Consult Urology for Surgery-Shunt
TREATMENT

- Non-ischemic priapism
  - Observation
    - Persists or patient desires treatment - Consult IR for angiography and embolization
Key Points

- **Ischemic Priapism**
  - Low flow
  - Veno-occlusive disease
  - Penile blood gases or Doppler ultrasound
  - Emergency

- **Non-Ischemic Priapism**
  - Conservative therapy
ACUTE SCROTUM
CRITICAL CARE CONCEPTS
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ACUTE SCROTUM

- The occurrence of severe pain and associated symptoms in one or both testicles.
  - Related to the term *acute abdomen*, it indicates the requirement for urgent diagnosis and adequate treatment.
- Usually but not exclusively occurs in young males.
- A child or adolescent with acute scrotal pain, tenderness, or swelling should be looked at as an emergency situation requiring prompt evaluation, differential diagnoses, and potentially immediate surgical treatment.
DIFFERENTIAL DIAGNOSIS

- **Torsion** of testis or appendages (Ischemic pain)
- **Infection/inflammation**
  - *Acute epididymitis* +/- *orchitis*
  - *Fournier’s Gangrene*
  - Abscess
- **Systemic diseases**
  - Idiopathic lymphedema
  - Henoch-Schonlein purpura (HSP)
- **Trauma** – rupture, hematoma, hematocoele, contusion
- **Hernia** – Incarcerated, strangulated inguinal hernia
- Spermatocele, hydrocele, varicocele
HISTORY AND PHYSICAL

- **History**
  - Timing: acute or insidious onset
  - Associated symptoms or prior episodes
  - Age at presentation

- **Physical**
  - General appearance
  - Lie of testes, scrotal skin, fluid collection
  - Testes or epididymis tender, cremasteric reflex

<table>
<thead>
<tr>
<th>Condition</th>
<th>Symptom onset</th>
<th>Pain location</th>
<th>Cremasteric reflex</th>
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<tbody>
<tr>
<td>Testicular torsion</td>
<td>Acute</td>
<td>Diffuse</td>
<td>Negative</td>
</tr>
<tr>
<td>Appendiceal torsion</td>
<td>Subacute</td>
<td>Upper pole of testis</td>
<td>Positive</td>
</tr>
<tr>
<td>Epididymitis</td>
<td>Subacute</td>
<td>Epididymis</td>
<td>Positive</td>
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CREMASTERIC REFLEX

- This reflex is elicited by lightly stroking the superior and inner thigh. Normal response is a contraction of cremaster muscle that pulls the scrotum and testis on the side stroked.
- Utilizes sensory and motor fibers of the genitofemoral nerve from L1 and L2.
- When inner thigh stroked, sensory fibers of the genitofemoral and ilioinguinal nerve are stimulated. These synapse in the spinal cord and activate the motor fibers of the genital branch which causes the cremaster muscle to contract.
LABORATORY AND DIAGNOSTIC TESTS

- **Urinalysis**: bacteria, WBC’s, crystals
  - may be present in torsion or tumors
  - commonly infected in epididymitis
- Urine Cx, CBC
- Radiographic studies
  - **Ultrasonography** vs Nuclear Scintigraphy (Tc-99)
    - U/S shows BOTH anatomy and blood flow
NORMAL TESTICULAR ANATOMY
Spermatid Cord Torsion

- A true surgical emergency of the highest order. Irreversible ischemic injury to the testicular parenchyma may begin as soon as 4 hours after occlusion of the cord.

- Extravaginal vs. Intravaginal

- Intravaginal: Torsion of the cord within the space of the tunica vaginalis. May result from lack of normal fixation of an appropriate portion of the testis and epididymis.
2 Y.O WITH ACUTE SWELLING
Spermatid Cord Torsion

Abnormality of testicular fixation permits torsion of spermatic vessels with subsequent infarction of the gonad.
Note the Decreased blood flow in the left testis.

FIGURE 4. Color Doppler ultrasonogram showing acute torsion affecting the left testis in a 14-year-old boy who had acute pain for four hours. Note decreased blood flow in the left testis compared with the right testis.
Spermatogenic Cord Torsion

- History
  - Sudden onset of pain
  - Past history of similar pain in 50%

- Physical
  - Absence of a cremasteric reflex is a good indicator of torsion of the cord
  - **Prehn’s sign**: elevation of testes does NOT relieve pain
    - Negative Prehn’s sign

- If certain of diagnosis based on clinical findings: emergent surgery
- If uncertain: Testicular U/S
Small polypoid appendages are often found attached to the testis or epididymis and are either Mullerian or Wolffian duct remnants.
Testicular Appendage Anatomy

Appendix testis

Appendix epididymis
APPENDAGE TORSION

- Usually a **more gradual onset**, pain moderately severe (but may be as severe as testicular torsion)
  - Localizes to the **superior aspect** of the testis
  - Testis is not hard
  - Scrotal erythema and a boggy epididymis are more indicative of a torsed appendix

The classic **blue dot sign** (arrow) indicates an infarcted appendix, though it is only seen in 21% of cases.
APPENDAGE TORSION

- Rarely seen after puberty.
- **Nonoperative management allows most cases to resolve spontaneously.**
  - Limitation of activity, NSAIDS, observation.
  - Pain may last for several weeks to months.
- Surgical exploration is performed IF there is suspicion of torsion of the CORD.
- Surgical excision of the appendix testis, while not necessary, is safe and quick.
  - Patients can usually resume normal activity without pain in a few days.
EPIDIDYMISIS

- Inflammation or infection of the epididymis
- Presents with scrotal swelling, erythema, and pain similar to other acute scrotal pathologies
- Usually caused by infections
  - In men <35, often due to STDs (Chlamydia, GC)
  - Older men, or men with BPH: Gram neg enteric bacteria related to ascending urinary infection
**PHYSICAL EXAM**

- Induration and swelling of the involved epididymis with exquisite tenderness.
- More advanced cases present with testicular swelling and pain (epididymo-orchitis)
- The **cremasteric reflex should be PRESENT** in patients with epididymitis. **Its absence is highly suggestive of spermatic cord torsion.**
- **MUST RULE OUT TORSION!**
- Prehn’s sign: Elevation of testis relieves pain
  - Controversial based on reliability
DIAGNOSIS AND TREATMENT

• Presence of pyuria, bacteriuria, or a positive urine culture indicates but normal U/A does not rule out epididymitis.

• Tx: Initial broad spectrum Abx used with therapy further directed based on culture results.

• Overall, epididymitis and orchitis are managed conservatively with antibiotics, anti-inflammatories, analgesics, rest, and scrotal elevation.
Fournier’s Gangrene

- FG: Fasciitis of scrotum and groin, involves a rapidly progressive, life threatening infection of the genital soft tissues.
- **Most often seen in the immunocompromised or DIABETIC patient**
- 20-50% mortality rate; Rapid progression from erythema to necrosis, sometimes within hours
- **Polymicrobial;** wide range of both aerobic and anaerobic organisms
Scrotal Wall Infections: Fournier’s Gangrene

Left: Large erythematous scrotum with central necrosis suggestive of necrotizing infection.

Right: CT reveals subcutaneous air in scrotum secondary to Fournier's gangrene.
MANAGEMENT OF Fournier’s

- Aggressive surgical debridement/triple drug abx therapy.
- Metronidazole, Amp, and Gent good initial abx

Appearance of patient's pubic region after initial debridement, with scrotum and suprapubic fat pad excised, testes preserved within tunica vaginalis, and penile skin and subcutaneous tissue debrided.
ACUTE IDIOPATHIC SCROTAL EDEMA

Case:

- 40 yo WM presents to ED with acute onset, bilateral, **painless** swelling of the scrotum, which had developed over the past 12hr.
  - Physically well, unremarkable medical Hx, no medications, allergies, trauma, insect bites
  - No urinary Sx and not sexually active
  - Physical: **Minimal tenderness**, normal gonads
  - Diagnostic tests (U/A, ESR, Cx, transillumination, and U/S) were all negative
ACUTE IDIOPATHIC SCROTAL EDEMA

• Management: Pt received expectant management and treatment with NSAIDs to relieve inflammation.
• Pt was D/C’ed from hospital and his symptoms resolved within 72hr of onset of treatment
HENOCH-SCHÖNLEIN PURPURA (HSP)

- Diffuse vasculitis involving:
  - Skin, joints, GI tract and kidneys
    - Palpable purpura on legs and buttocks
  - Hematuria and proteinuria
- Etiology unknown
  - Complement / IgA involvement
  - 75% of patients < 7 years of age
- 33% have scrotal / testicular involvement
  - Differentiate from torsion
Henoch-Schönlein Purpura (HSP)
Filariasis – Wuchereria bancrofti

- Parasitic filarial nematode worm spread by a mosquito vector.
- Very rare in the US. 120 million people affected worldwide, primarily in Africa, S America, and other tropical and sub-tropical countries.
INGUINAL HERNIA AND HYDROCELE

- **Inguinal Hernia**: Large opening of the processus vaginalis which may allow abdominal contents to enter scrotal sac.
  - In this case, pain and swelling involve both the scrotal contents and the groin area.
  - *Incarcerated inguinal hernia* involves bowel that is obstructed and is a true surgical emergency.
- **Hydrocele**: Incomplete obliteration of the processus vaginalis
- **Neonatal hydrocele**: 50% of newborns
  - Most close by age 1
Inguinal Hernia and Hydrocele

Figure 127-9 Anomalies of the inguinal canal and scrotum that may result from anomalous closure of the processus vaginalis. (From Welch KA, Randolph JG, Ravitch MM, et al [eds]: Pediatric Surgery, vol 2, 4th ed. St Louis, Year Book, 1986, p 780.)
INGUINAL HERNIA EXAM

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Strangulated Inguinal Hernia

Scrotal swelling in a patient with a strangulated indirect inguinal hernia
Scrotal U/S showing Hydrocele

Large left hydrocele
ACUTE OR PAINFUL HYDROCELE
NON-REDUCABLE VARICOCELE

- Ultrasound imaging necessary to rule out malignancy or other testicular pathology
- CT Imaging to R/O retroperitoneal pathology
Scrotal Mass - Bag of Worms
Scrotal Trauma
Testicular Mass
# Acute Scrotum Summary

## Diagnosis

<table>
<thead>
<tr>
<th>Condition</th>
<th>Onset of symptoms</th>
<th>Age</th>
<th>Tenderness</th>
<th>Urinalysis</th>
<th>Cremasteric reflex</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testicular torsion</td>
<td>Acute</td>
<td>Early puberty</td>
<td>Diffuse</td>
<td>Negative</td>
<td>Negative</td>
<td>Surgical exploration</td>
</tr>
<tr>
<td>Appendiceal torsion</td>
<td>Subacute</td>
<td>Prepubertal</td>
<td>Localized to upper pole</td>
<td>Negative</td>
<td>Positive</td>
<td>Bed rest and scrotal elevation</td>
</tr>
<tr>
<td>Epididymitis Insidious</td>
<td>Adolescence</td>
<td>Epididymal</td>
<td>Positive or negative</td>
<td>Positive</td>
<td>Antibiotics</td>
<td></td>
</tr>
</tbody>
</table>
ACUTE SCROTUM SUMMARY

FLOWCHART

History, physical examination and urinalysis

- Short duration of symptoms and negative urinalysis: high probability of torsion
  - Surgical exploration

- Long duration of symptoms and positive urinalysis: low probability of torsion
  - Color Doppler ultrasonography
    - Decreased or absent blood flow or equivocal results
      - Surgical exploration
    - Increased or normal blood flow
      - Nonoperative management or observation
KEY POINTS
ACUTE SCROTUM

- The list of differential diagnoses for an acute scrotum is extensive, a full range of scrotal pathology must be considered.
  - However, the most common causes are testicular torsion, appendiceal torsion, and epididymitis
- Several conditions that result in acute scrotum require surgical exploration (cord torsion, Fournier’s), making this a very time sensitive condition
- The patient history and physical are key to the diagnosis and often guide decision making
- Imaging studies should complement, but not replace, sound clinical judgment.