A Pain in the Scrotum: When to be Concerned

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Objectives

- Recognize physical examination findings that should prompt evaluation
- Explain scrotal conditions that often cause men to seek care
- Summarize referral options and treatment criteria

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Testicular Anatomy

- Testis is surrounded by three connective tissue layers, which are, from outside inwards:

- tunica vaginalis
- tunica albuginea
- tunica vasculosa

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Male PE Specifics

Testes	Mass associated with testicle- *tumor, hydrocele, spermatocele* Solitary testes- *maldescent of testicle or previous surgical removal* Small, soft testicle(s)- *Klinefelter's disease, history of infection, late orchidopexy*
Epididymis	Cystic or nodular- *spermatocele, previous or current infection, history of vasectomy* Large and fluctuant- *spermatocele* Localized pain- *epididymitis, post-vasectomy pain syndrome*
Vas deferens and spermatic cord	Absence of vas bilaterally or unilaterally- *cystic fibrosis* Sperm granuloma- *s/p vasectomy* Congested veins unilaterally or bilaterally- *varicocele* Beading/nodularity of cord- *obstruction of epididymis, tubercular infection of epididymis*

Adapted from Quallich, S.A. (2022). Male Reproductive System. In Advanced Assessment: Interpreting Findings and Formulating Differential Diagnoses 5th edition, Goolsby, M.J. & Grubbs, L., (Eds.). Philadelphia: F.A. Davis.

Male PE Specifics

Cremasteric reflex	Brushing or touching skin of scrotum in downward direction can result in prompt elevation of testicle on the same side. Can be aggravated by cool room- reflex may be engaged prior to any contact with examiner
Valsalva maneuver to evaluate for varicocele	Performed with patient standing, and in warm room; having patient perform Valsalva reverses flow into pampiniform plexus and results in palpable distention of vessels to aid in identification of distended vessels. Graded as I, II, III

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Male H&P

- Habits
  - any activity that would put groin area at risk for trauma, such as
  - football
  - hockey
  - marathon cycling
  - Martial arts
  - motocross
  - riding 3- or 4-wheeled vehicles

- **History of any condition that would affect penis/testes/hormones**
  - cryptorchidism
  - hypothyroidism
  - pituitary malfunction

- **History of GU surgery**
  - orchidopexy
  - inguinal hernia repair
  - epispadias or hypospadis repair
  - prostate surgery

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Male H&P

- **Sexual history**
  - relevant when main complaint involves GU system
  - include recent changes in sexual partners
  - overall pattern of sexual activity
  - history of having previously fathered any children
  - evaluation and treatment of partner that may have preceded patient's current visit
- **Family history**
  - testicular or other GU malignancies specifically
  - history of any cancers

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Key Points

- Asymmetry of testes is normal
- Wide variation in size and body habitus influences ease of exam
- Social and cultural barriers

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Male Exam: Inspection

- Lesions or scarring to scrotum/groin
- Discoloration to scrotum/groin
- Asymmetry of testicles is **normal**
- Location and size of the opening of urethral meatus
- Presence of scars to abdomen, groin or inguinal areas

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Male Exam: Auscultation & Percussion

- Abdomen as indicated
- Rarely indicated in evaluation of male complaints, except with suspected herniation of bowel into scrotum or as part of complete physical

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Male Exam: Palpation

- **Most important part of male physical**

- Requires palpation for all suspected intrascrotal masses- masses may arise from surface of testicle, adjacent to or separate from testes

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DRE underestimates prostate size

Examination of inguinal canal

- Fingertip is placed into external inguinal ring by invaginating the scrotum to detect a small hernia
  - Have the patient cough or perform a Valsalva maneuver can facilitate identification of a hernia
    - bulge moving lateral to medial in the inguinal canal suggests **an indirect hernia**
    - bulge progresses from deep to superficial through the inguinal floor, suspect **direct hernia**
    - bulge identified below the inguinal ligament is consistent with **femoral hernia**

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Male PE Specifics

- **Testes**
  - Average measurements of adult men age > 25: **5.2 ± 0.6 cm**
  - Mass associated with testicle- tumor, hydrocele, spermatocele
  - Solitary testes- maldescent of testicle or previous surgical removal; possible retractile testis
  - Small, soft testicle(s)- Klinefleter's disease, history of infection, late orchidopexy

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Male PE Specifics

- **Epididymis**
- Cystic or nodular- spermatocele, previous or current infection, history of vasectomy
- Large and fluctuant- spermatocele
- Localized pain- epididymitis, post-vasectomy pain syndrome

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Male PE Specifics

Vas deferens and spermatic cord

- Absence of vas bilaterally or unilaterally- cystic fibrosis or variant
- Sperm granuloma- s/p vasectomy
- Congested veins unilaterally or bilaterally- varicocele
- Beading/nodularity of cord- obstruction of epididymis, tubercular infection of epididymis

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Acute scrotum

Ischemia:

- Torsion of the testis
- Appendiceal torsion
- Testicular infarction due to other vascular insult

Trauma:

- Testicular rupture
- Intratesticular hematoma, testicular contusion
- Hematocele

Infectious conditions:

- Acute epididymitis
- Acute epididym oorchitis
- Acute orchitis
- Abscess /Gangrenous infections (Fournier's gangrene)

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Acute scrotum

Inflammatory conditions:

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

Hernia:

- Incarcerated, strangulated inguinal hernia, with or without associated testicular ischemia

Acute on chronic events:

- Spermatocele, rupture or hemorrhage
- Hydrocele, rupture, hemorrhage or infection
- Testicular tumor with rupture, hemorrhage, infarction or infection
- Varicocele

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Testicular Mass

- Any complaint of a testicular mass is considered cancer until proven otherwise
  - Testicular torsion
  - Testicular tumor
  - Hydrocele
  - Spermatocele
  - Varicocele
  - Hematoma

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Testicular Torsion

- Acute and sudden onset of pain that localizes to the affected testicle
  - may radiate to inguinal areas or abdomen
  - often accompanied by abdominal discomfort, nausea and vomiting
- PE:
  - Asymmetric scrotal swelling
  - affected testicle being somewhat elevated
  - affected testicle may have somewhat horizontal lie
  - Traditional landmarks within scrotum may be difficult to assess due to edema
  - cremaster reflex may be absent on affected side

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Testicular Torsion

- **True urologic emergency** that must be identified quickly

- If testicular torsion is suspected, patient must be immediately referred to closest Emergency Department for evaluation and probable surgery to try and preserve the testicle

Testicular Torsion

- Immediate ultrasound
- urgent surgical exploration and detorsion
  →testicular torsion is a true vascular emergency
- Beyond 12 hours, risk of subsequent testis atrophy is significant but salvage is possible

Penetrating and Blunt Testicular Injury

- Testicular rupture results when there is laceration of the tunica albuginea
- blunt or penetrating trauma
- Surgical exploration- high risk for testicular injury

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Blunt Testicular Injury

- incidence of testicular rupture varies widely
  - depends on forces exerted
  - mechanism of injury
  - testis mobility
- PE: swelling, tenderness, ecchymosis
- Scrotal wall thickening from edema or hematoma may make testicular palpation difficult/impossible
- Emergent ultrasound
- May present with
  - testicular rupture
  - intratesticular hematoma
  - testicular contusion
  - hematocele
- Testicular rupture requires surgical repair
- Large +/- painful hematoceles may need drainage

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Penetrating and Blunt Testicular Injury

- Surgical exploration
- Most testicular injuries can be repaired
- Orchiectomy indicated when there is major injury to the spermatic cord with organ devitalization

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Case Study: LS

22 year old male with a 8-month history of left testicular pain that began after he was kicked during a Muay Thai class

"Achy" pain has never completely resolved

Previous physical examinations were unrevealing

Has been treated with

Inflammatories
Antibiotics
Short course of narcotic pain medication

…all with limited improvement

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Case Study: LS

Pain has been slowing getting worse, and he has noticed that his testis feels "heavy" as well

On current examination, he reports pain only with palpation of his left testis

Ultrasound shows an intratesticular mass that is suspicious for malignancy

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Testicular Tumor

- Malignant tumors of the testes are uncommon
  - Incidence has been increasing; risk 1 in 250
  - Average age at diagnosis is 33
    - usually presents between the ages of 15-35
    - slightly more common on the right side
    - arise from germ cells

- **Testes**
  - 2022: 9910 diagnosed, 460 deaths
  - 95.0% survive 5 years
  - Most common cancer in men aged 15 to 34 years
  - Median age at diagnosis 33 (2005-2009)
  - Diagnosis and Treatment of Early Stage Testicular Cancer: AUA Guideline (2019)

Testicular Tumor

- Greatest risk factor: **cryptorchidism**
  - overall incidence of 7-10% in the patient with a history of unilateral or bilateral undescended testes
- Increased screening and early detection have significantly decreased the mortality from this malignancy
  - Up to 19% of patients present with signs or symptoms of metastases: pain, constitutional or pulmonary complaints

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Testicular Tumor

- Painless swelling of the testicle
  - presentation is not uncommonly responsible for false diagnosis of epididymitis
  - Nonseminomas more likely to present with pain
  - Distinct nodule on self examination
- May have been some minor trauma to the affected side that initiated the onset of pain and/or swelling
- Testicle may have gradually enlarged over time, with some associated heaviness
- Rare complaints of acute pain as presenting symptom→ dull ache or heaviness that localizes to affected side
- Pretreatment subfertility/infertility

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Testicular Tumor

- Physical exam
  - distinct mass or diffuse enlargement of affected testicle
  - mass may be firm, smooth, nodular or fixed
  - palpation of inguinal, supraclavicular and axillary areas may show evidence of enlarged lymph nodes
  - Abdominal exam may demonstrate bulky retroperitoneal disease
  - in advanced disease, gynecomastia and wheezing may be observed

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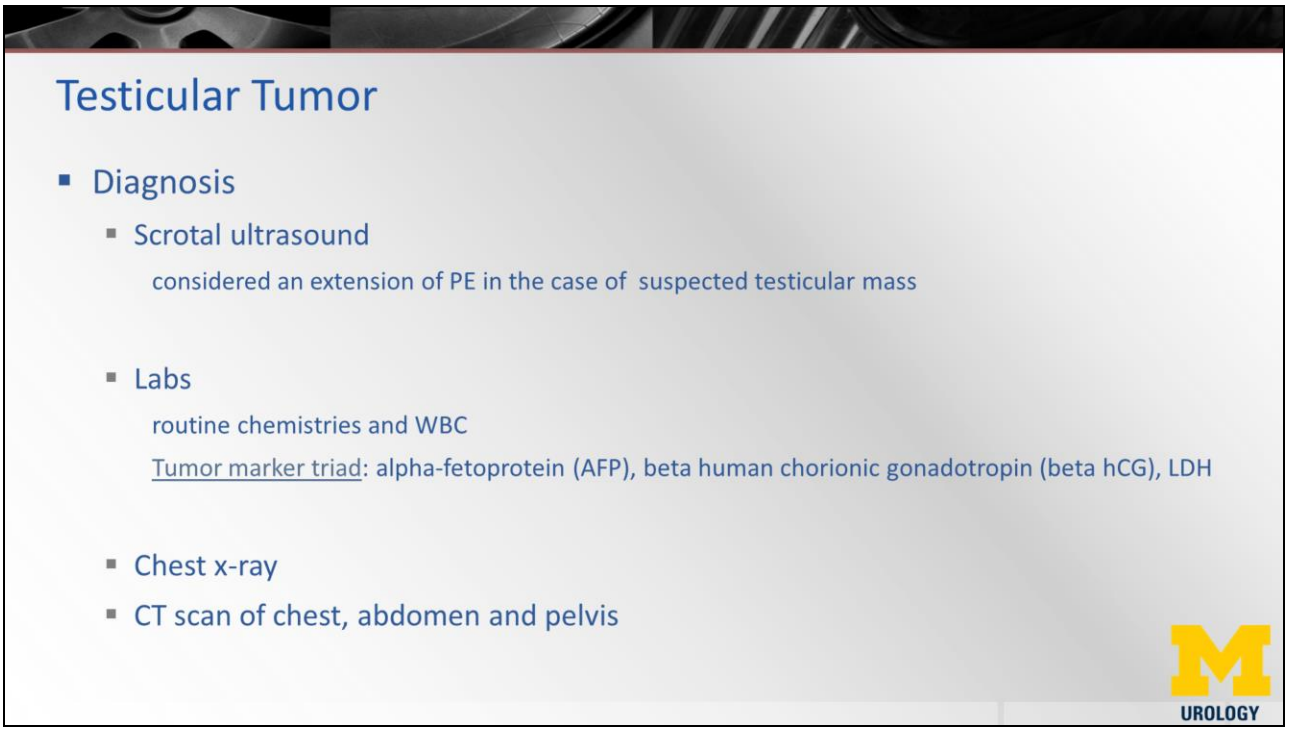
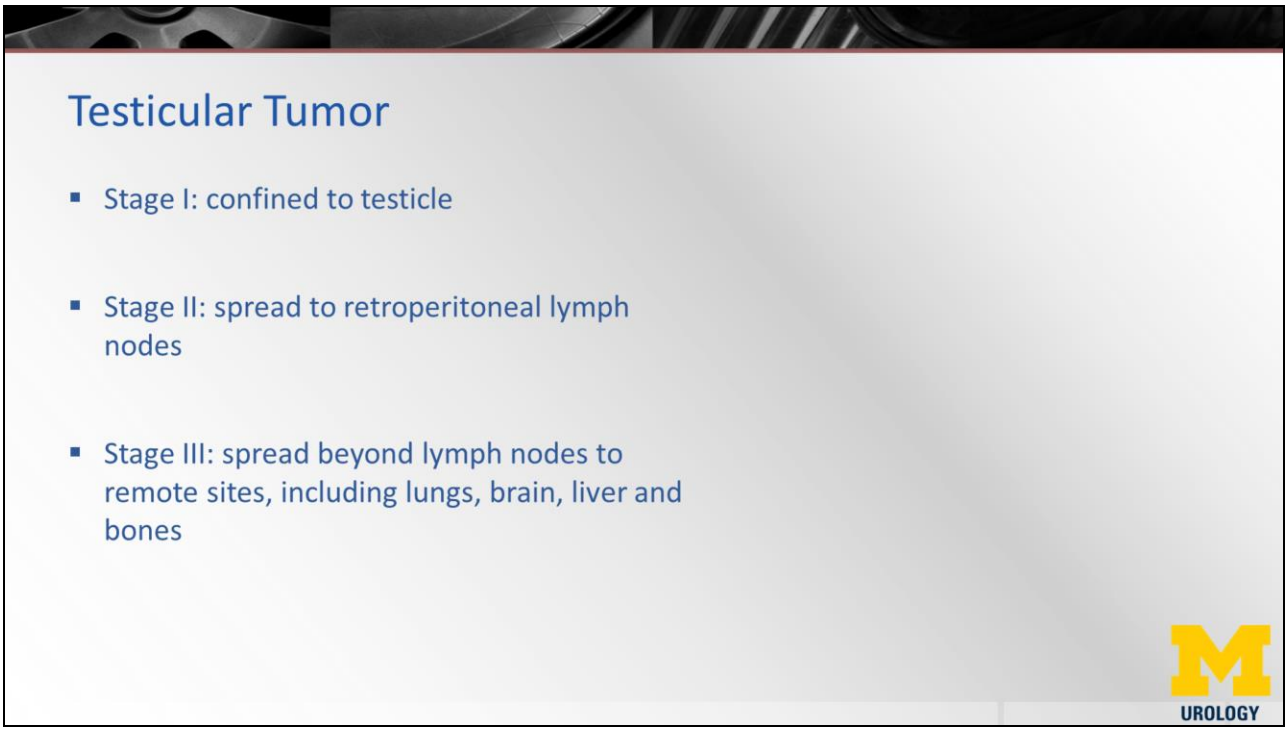


scrotal ultrasound will quickly and accurately distinguish a tumor from other intrascrotal pathologies, and is considered an extension of the physical exam in the case of a suspected testicular mass.



Stage I--The cancer is confined to the testicle.

Stage II--The cancer has spread to the retroperitoneal lymph nodes, located in the rear of the body below the diaphragm and between the kidneys.

Stage III--The cancer has spread beyond the lymph nodes to remote sites in the body, including the lungs, brain, liver and bones.

Testicular Tumor

- Patient should be referred urgently to a Urologist for further management
- In many cases removal of the testicle and prompt treatment of associated adenopathy can be curative, depending on stage of the disease
- Removal of the testicle is also necessary for an accurate pathologic diagnosis
- Sperm cryopreservation
  - Survivors report wanting information re: fertility preservation (Schover, J Clin Onc, 2002)

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Hydrocele

- Collection of fluid surrounding testicle
- Fluid collections within tunica vaginalis or along spermatic cord
  - Hydroceles are common in newborn infants and normally resolve after a few months after birth

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Hydrocele

- May represent persistent developmental connections along spermatic cord or imbalance of fluid production versus absorption
- Usually not dangerous
- Usually only treated when they cause discomfort, embarrassment, or get so large that they threaten blood supply of testicle
- Can be reactive after infection (epididymitis)

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Hydrocele

- On PE
  - enlarged asymmetric scrotum that is usually not tender
  - testicle cannot be felt because of surrounding fluid
  - painless, swollen testicle, on one or both sides, feels like a water-filled balloon; can be tense
  - size of the fluid-filled sack can sometimes be increased and decreased by pressure to abdomen or scrotum

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Hydrocele

- If the size of the fluid collection is variable, it is more likely to be associated with inguinal hernia
- Fluid in a hydrocele is usually clear; light can be shined through the scrotum, outlining the testicle and indicating the presence of clear fluid [transillumination]
- Ultrasound may be done to confirm diagnosis

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Hydrocele

- Lab studies
  - Few laboratory tests, if any, warranted specifically for simple hydroceles
  - Concomitant medical conditions may be indications for preop lab studies
  - Laboratory studies may be indicated if includes other surgical or medical conditions

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Male PE Specifics

- **Transillumination**
  - Useful in eliminating scrotal contents
  - Can distinguish between fluid filled and solid masses
  - Position a pen light adjacent to the scrotum, in a darkened room
  - Reddish glow is typical

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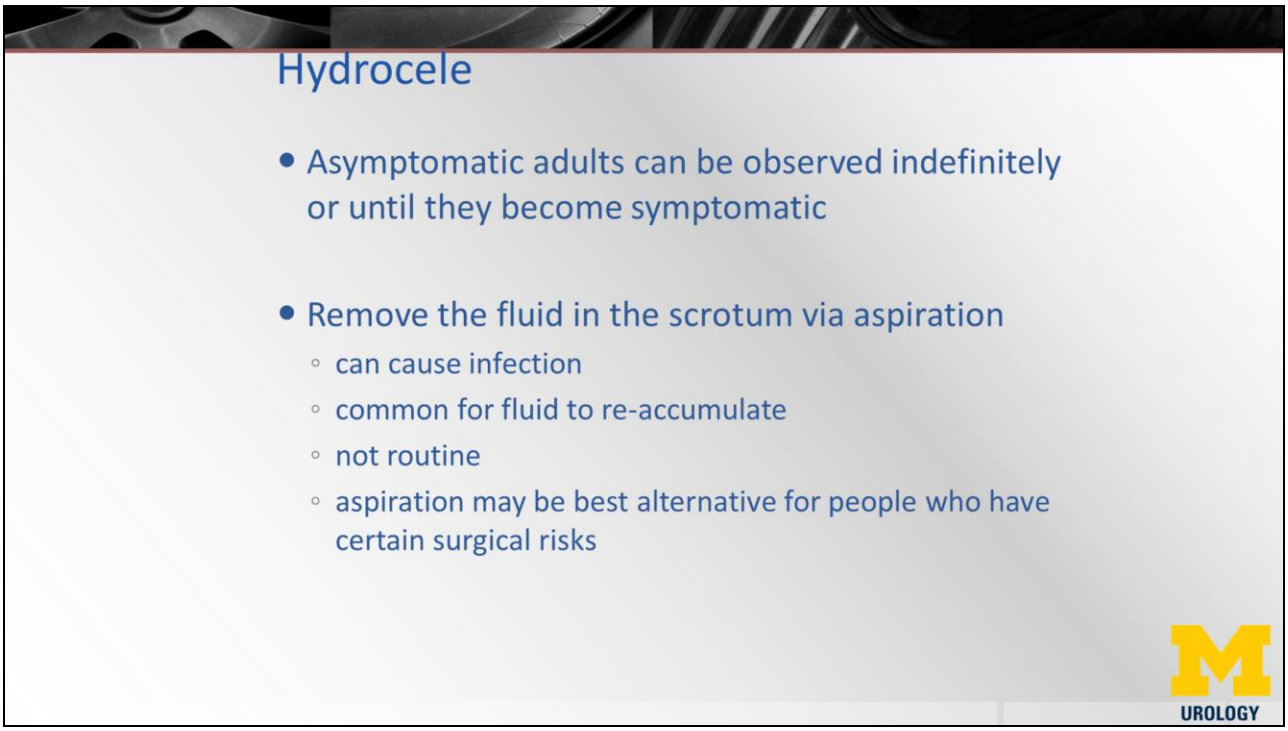

General

Few laboratory tests, if any, are warranted specifically for simple hydroceles, communicating or noncommunicating.

Concomitant medical conditions may be indications for preoperative laboratory studies.

Laboratory studies may be indicated if the differential diagnoses potentially include other surgical or medical conditions.

Hydrocele

- Hydrocelectomy
  - minor surgical procedure performed on an outpatient basis using general or spinal anesthesia
  - incision may be made in scrotum or lower abdomen
  - may require a scrotal drainage tube
  - large bulky dressing to scrotal area
  - scrotal support for after surgery
  - Ice packs should be kept to the area for first 24 hours after surgery to reduce swelling
- Possible complications include hematoma infection, or injury to scrotal tissue or structures

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Case Study: CK

29 year old male referred to chronic male genital pain clinic for chronic intermittent left testicular pain

- no other medial/surgical history

Has been seen multiple providers over the past 3 years for this pain that comes and goes

Reports that it seems to become worse the longer he is standing

- Pain interferes with his work as a personal trainer
- Previous examinations have been negative

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Case Study: CK

Referral paperwork reveals he has been labeled as a malingerer and drug seeker

He has been treated with

- Anti-inflammatories
- Antidepressants
- Narcotic pain medication
- …with little relief from any of these medications

A meticulous physical examination

- Pain is focally located over the left spermatic cord
- Not over the left testis
- Is consistent with the bulky slow filling grade 2-3 varicocele found on examination

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Varicocele Pathophysiology

- No specific risk factors
- Lack of adequate venous valves in internal spermatic system
- Gravity-related phenomenon specific to bipeds
  - increased hydrostatic pressure
  - Dilation of the vessels of pampiniform plexus
- ? Contributions from other veins
- Heating the scrotum
- Changes in testicular blood flow
- Reflux of hormones
- Atrophy of the cremasteric muscle

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Varicocele

- Most asymptomatic
- Possible symptoms: dull ache, fullness, pain that does not radiate, pulling on affected side
- Possible semen analysis derangements

- **Subclinical:** present on ultrasound only, not detected on physical exam
  - ?significance to male infertility
- **Grade I:** present only with Valsalva
- **Grade II:** present without Valsalva
- **Grade III**: visible through the skin ("bag of worms")

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Varicocele

- Physical exam
  - patient standing and lying
  - warm room!
  - patient performs Valsalva: reverse flow into pampiniform plexus resulting in palpable distention of vessels
  - vessels should empty with patient lying down
    - If not, more immediate action
  - long-standing varicocele can cause testicular atrophy

Sometimes need to have pt stand for couple of minutes in order to allow vessels to fill

Varicocele

- Conservative management
  - NSAIDs
  - supportive undergarments
  - Can monitor semen analysis every 6-12 mos if fertility not an actual concern at the time of if patient young/unpartnered
  - Mandatory to mention potential for impact on fertility
- Surgical treatment
  - varicocelectomy vs microsurgical varicocelectomy vs angioembolization

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Epididymitis

- Inflammation or infection of epididymis
  - Incidence is less than 1:1,000 males per year
  - Most in males aged 19-40 years
- Caused by spread of an infection from bladder, prostate or urethra via vas deferens
- Risk:
  - uncircumcised men
  - men with indwelling catheters
  - Spinal cord patients or other neurologic compromise
  - benign prostatic hypertrophy (BPH)
  - recent GU instrumentation
  - prostatic surgery

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Epididymitis

- Prepubertal males - Coliform bacteria (*E coli*)
- In heterosexual men <35, causative organisms: *Neisseria gonnorhoeae, Chlamydia trichomatis*
- In homosexual men, causative organism: *Eschieria coli*
- Nonbacterial causes
  - Chemical epididymitis due to reflux of sterile urine
  - Males with AIDS- candidal epididymitis
- In cases where an organism associated with a sexually transmitted disease is suspected, exposure to organism can significantly predate development of epipidymitis

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Epididymitis

- History: ?vasectomy
- Signs and Symptoms
  - Sudden onset (over 24-48 hours)
  - Complaints peak 24 hr after onset
  - Painful swelling in scrotum, unilateral or bilateral
    - Bilateral epididymal involvement (10%)
  - Pain may decrease with elevation of scrotum (Prehn's sign- *unreliable*)
  - Urethral discharge and/or fever, and complaints of urethritis, cystitis, or prostatitis are possible

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Epididymitis

- PE
  - pain will localize to affected epididymis with palpation
  - epididymis swollen and indurated
  - spermatic cord may be tender and swollen
  - pain may radiate to the inguinal canal and/or flank
  - Pain may radiate to other side of scrotum
  - + Prehn's sign
    - not reliable for distinguishing epididymitis from testicular torsion
  - Urethral discharge (10%)
  - Reactive hydrocele

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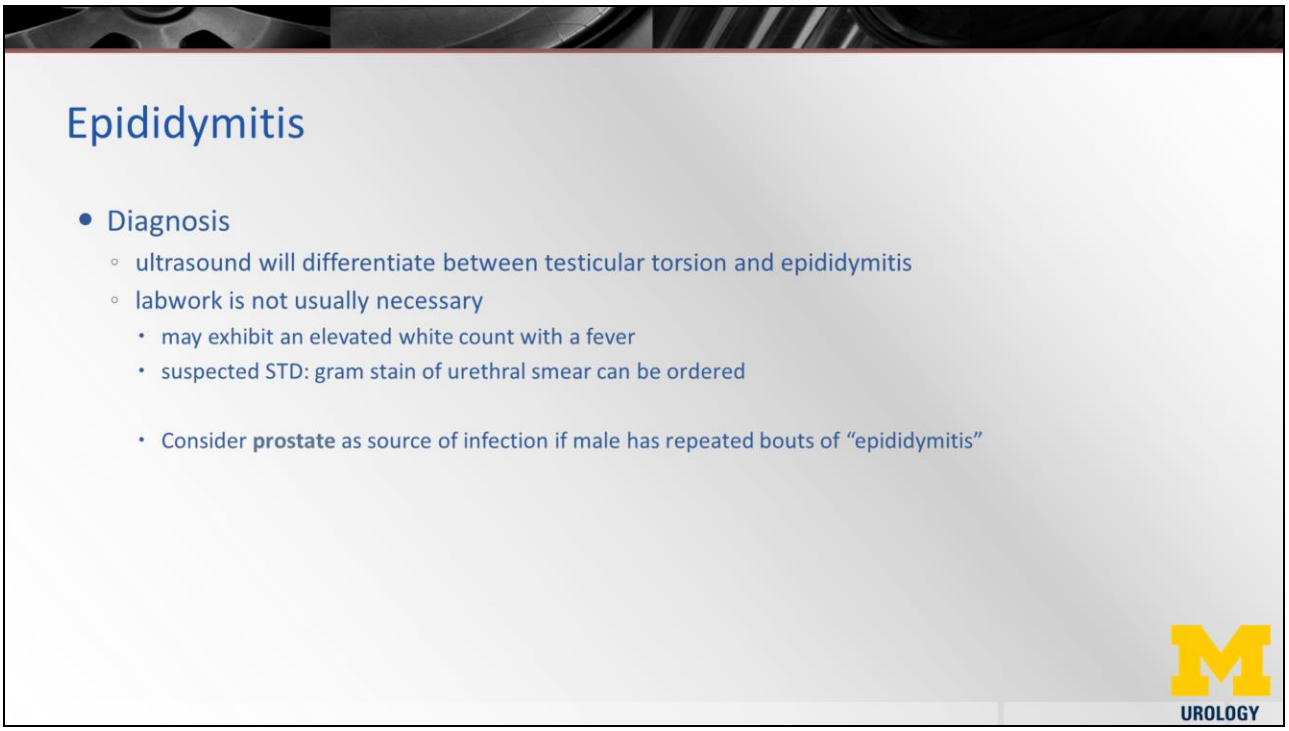

ultrasound will differentiate between testicular torsion and epididymitis

can be helpful to establishing the correct diagnosis in cases of the acute onset of pain

Epididymitis

- Treatment
  - Antibiotics
    - Course based on suspected organism
    - **Current CDC guidelines**
  - NSAIDs
  - Symptomatic (scrotal elevation, bed rest)
  - If suspected to be secondary to STI, can treat partner

- If epididymitis is left unrecognized/untreated, it can progress to abscess or chronic infection, with resulting fibrosis, chronic scrotal pain and infertility
  - epididymo-orchitis or testicular abscess possible
  - Spinal cord patients

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Fournier's Gangrene

- US Incidence (2011 data)
  - 1.6/100,000 males
  - Peaked in males who were 50 to 79 years old (3.3/100,000)
  - Highest rate in the South (1.9/100,000)
  - Overall case fatality rate was **7.5%**
  - Also happens in women, incidence is much less

- Typically a necrotizing fasciitis of the male genitals that is polymicrobial in origin, including *Staphylococcus aureus, Streptococcus sp., Klebsiella sp., Escherichia coli*, and anaerobic bacteria

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Fournier's Gangrene

- History
  - Obesity
  - Alcohol abuse
  - Possible history of some break in the skin within the preceding 48 hours
  - Recent poor blood sugar control, with recent rising levels/difficulty managing levels
- Characterized by progressive necrotizing infection of the external genitalia or perineum
- Essential to appreciate that the degree of internal necrosis is much greater than suggested by the external signs, and that adequate (repeated) surgical debridement is necessary to save life

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Fournier's Gangrene

- Signs and Symptoms
  - Painful swelling, erythema and induration of the genitalia
  - Cellulitis, odor, eschar, crepitus, tissue necrosis
  - Fever/chills and other systemic complaints, such as anxiety
  - Pain that seems in excess of the visible skin changes
  - Crepitus: a spongy, cracking feeling within the skin that indicates gas-producing microorganisms underneath
- Diagnostic aids
  - Plain films or computed tomography may demonstrate gas in the subcutaneous tissue
  - Elevated WBC
  - Serum blood sugar or finger stick
  - Diagnosis based on clinical suspicion

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Fournier's Gangrene

- Therapeutic interventions
  - Broad spectrum antibiotics
  - Provide analgesia and sedation
  - Admission to hospital for immediate debridement
- Surgical consultation (may involve general surgery, urology and plastic surgery) for extensive surgical debridement

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Fournier's Gangrene

- Concurrent parenteral antibiotic treatment should be given that covers all causative organisms and can penetrate inflammatory tissue

- Post-op: adjust antibiotic based on culture
- Wet→dry dressings
- Aggressive hydration
- Skin grafts
- Hyberbaric oxygen

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“Normal” Abnormal?

- Recognized entities that are common and found incidentially on male GU exam
  - Usually do not require workup or treatment
  - Usually not painful/uncomfortable
- AND/OR entities that are the result of some procedure, and are anticipated, and in some cases can resolve with time
  - Hydrocele, sperm granuloma, sebaceous cyst, varicocele

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Impact of COVID-19

- Infertility: ACE2 and TMPRSS2 receptors in male GU tract means organs vulnerable to COVID-19
  - Result of ED, orchitis with moderate/severe infection
  - Low risk sexual transmission- virus recognized in seminal fluid only during severe, acute infection
  - Risk to germ cells and Leydig cells
  - Impaired sperm parameters in moderately infected men- but likely transient
- Uncertain if any of these effects are permanent

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Red Flags: Need urgent/emergent referral

- Sudden onset of acute testicular pain
- Cellulitic or necrotic changes to skin of scrotum, penis, perineal region
- Complaints of new or painful mass in scrotum

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