Hoof Beats Sometimes Do Mean Zebras

Steve North, MD, MPH
Medical Director, Health-e-Schools
Medical Director, MCHP SBHCs


DR. TRIPLE BOARD CERTIFIED NERD
Steve North, MD MPH

Objectives

- Develop a practical approach to adolescents presenting with unusual clinical signs, symptoms, or confusing diagnostic tests
- Learn when to ask for help
- Review the benefits of a comprehensive risk assessment with all patients

Morning report

THIS IS AN INTERACTIVE PROGRAM

1. Present history
2. Provide PMHx
3. SHEADDDSSS
4. Exam findings
5. Test results/imaging
6. Diagnosis and further information

Refine ideas and diagnosis at every step of the process

“My knee hurts”

Medical question - pain that started in knee a week or so ago has spread throughout right calf. Not very latently painful, but really goes off when I squat down, or stand up from a squat. Cannot tell if it is in muscle, bone, ligament, etc. Worth investigating or wait out?

No particular causal incident I can think of

22 yo male who is an established patient

Currently attends college in NC

Has routine visits when home

EHR has secure messaging

Center for Rural Health Innovation

Is it on the inside or outside of your knee/calf? How far down the calf?

Sort of down the middle but more towards the outside than in. Honestly the knee is feeling a bit better now, pain is mostly in lower two-thirds of calf

How do you feel? Is your knee warm?

Fine, a little tired from studying for finals. No warmth.

Does pushing against resistance, like you were pushing on a stuck gas pedal, make the pain worse?

You could put a towel around you foot to see.

Could not activate the same sharp pain pushing against a towel, but I have had it when putting on shoes

Hard to recreate exactly

I’m not overly concerned, I think it is just a muscle strain, possible because you tweaked your knee and then began walking differently to compensate.

I’m happy to do a video visit if you want to.

I will continue observing and if it changes I’ll consult

Thank you

Past Medical History

- Accessory toe removed before he could walk
- Undescended testicle at age 8
- Enuresis into middle school
- ADHD – current stimulant use when at school/studying
- Anxiety/OCD in middle and high school treated with therapy
- Last visit 8/23 = 6’2”; 130lbs; BMI = 16.7

SHEADDDSSS Assessment

- Strengths: thoughtful, kind
- Home: FT college student, lives in an apartment
- Education: Graduating in 11 days
- Activities: Camping, video games. Headed to an Americorps program post-graduation
- Diet: Does not restrict, limited vegetables/fruits, unclear if he cooks for himself
- What else???

SHEADDDSSS Assessment

- Drugs: Drinks alcohol on weekends, probable cannabis use – avoids the question, denies other illicit drugs, smoked Swisher Sweets w/friends in high school
- Depression: PHQ-2 is negative, denies
- Sexual Health: Not sexually active
- Safety- Feels safe at home, uses seatbelt, no guns, denies Phys, Emotional abuse.

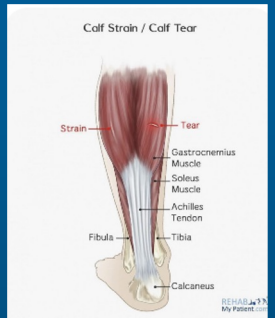
The Next Day

Any change today?

THREE HOURS LATER

Nope, same movements causing similar pain

Does this article describe the pain?



Calf strains: Symptoms and Management : Orthopedic Center for...

nolasportsmedicine.com

Maybe the soleus strain, but no discoloration or bruising

Good - then it isn't your Achilles. If you tore that the rehab would not align well with your plans for the next year.

That was my main concern

Let me say it is highly unlikely to be your Achilles. Tears/ruptures for guys in their 20s tend to occur with a very specific injury.

k

One week later

1 day before graduation

45 days before he leaves for Americorps

“a little swollen”

unilateral knee swelling

Three days later

Exam Findings

- AF, 6’2”; 130lbs; BMI = 16.7
- GEN: NAD, ACOx3
- HEENT: normal tonsils, supple neck, WNL
- Neck: supple, no masses
- Resp: CTAB
- Cards: RRR, no murmur, 2+ peripheral pulses
- Abd: Nontender, nondistended, normal bowel sounds, no masses
- Skin: warm, no rashes or bruising, no atypical lesions
- R knee: full ROM, **NO EFFUSION**

Next steps??

Center for Rural Health Innovation

Diagnosis

- Lyme IgM + by ELISA

Discussion: Knee effusion etiologies

- Traumatic
- Vascular conditions and Neoplasms
  - Hemarthrosis:
  - Hemophilia – often secondary to minor trauma

Discussion: Knee effusion etiologies

- Crystalline-induced arthritis
  - Gout, pseudogout
- Rheumatic conditions
  - Spondyloarthropathies of childhood
  - Psoriatic arthritis
  - Reactive arthritis
  - ***Juvenile Idiopathic arthritis***

Consider infection immediately when there is erythema and warmth in any swollen joint

Center for Rural Health Innovation

Infectious causes of knee effusions

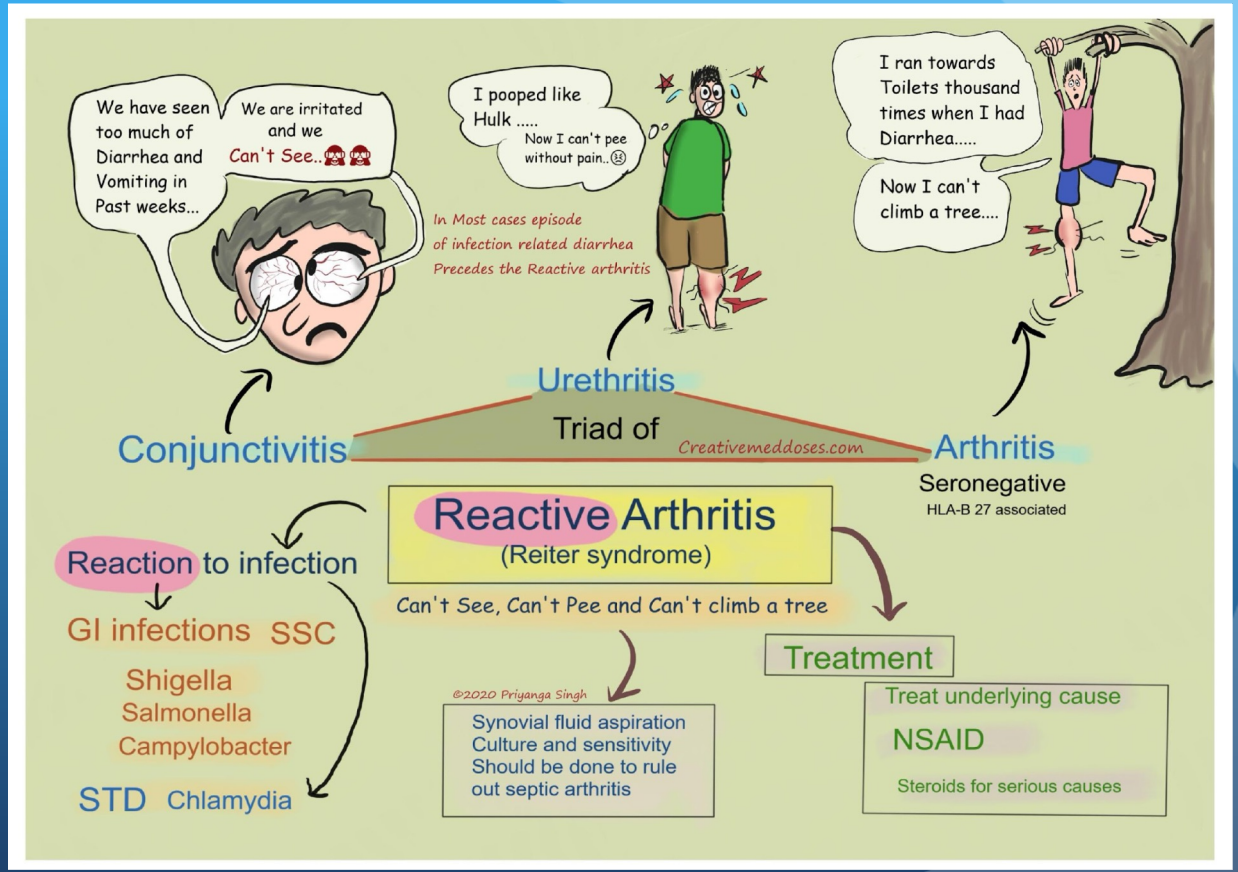
- Viral Causes:
  - Parvovirus (arthritis is rare in kids)
  - Hepatitis B or C
  - Rubella: occurs during the week before/after rubella rash.
  - Alphaviruses – typically see a rash, rare in the US

Reactive Arthritis (*A spondyloarthropathy*)

- Salmonella of various types
- Shigella
- Yersinia
- Campylobacter
- C. difficile
- Chlamydia

Seronegative Reactive Arthritis

Reiter Syndrome



Acute Rheumatic Fever (ARF)

- 2 to 4 weeks post Group A Strep Pharyngitis
- Arthritis (usually migratory polyarthritis predominantly involving the large joints) – 60 to 80 percent
- Carditis and valvulitis (eg, pancarditis) that is clinical or subclinical – 50 to 80 percent
- Central nervous system involvement (eg, Sydenham chorea) – 10 to 30 percent
- Subcutaneous nodules – 0 to 10 percent
- Erythema marginatum – <6 percent

Evaluation of knee effusion w/warmth

- Arthrocentesis
  - WBC, crystals, Gram stain, culture
- Source of infection:
  - Diarrhea – Stool cultures
  - Urine – Culture and NAAT
- Labs
  - CBC w/diff, CMP w/LFTs, Lyme titer

Center for Rural Health Innovation

Treatment

- Treat underlying infection
  - For lyme disease: Doxycycline

- Treatment of Arthritis
  - NSAIDs – diclofenac, naproxen, indomethacin
  - Intra articular glucocorticoids
  - Oral glucocorticoids
  - *Long term >3 months* – consider DMARDs (sulfasalazine)

“My Little Ball Hurts”

- 15yo male presented to SBHC for his annual comprehensive physical examination with the complaint of “I have 1 little ball and it aches sometimes”
- Patient had been to clinic once before for his asthma but received his “annual exam” last year during the local sports medicine program’s Saturday physicals

History

- Denies recent acute or past GU injury, pain or other symptoms, no swelling per patient.
- States he noticed the issue in the shower
- PMHx: Uses B-Agonist “when asthma acts up.”
- FMHx: Asthma, allergic rhinitis
- Allx: NKDA, NKFA
- What else do we need to know?

SHEADDDSSS Assessment

- Strengths- good relationship with parents, good student, “independent,” has “some good friends”
- Home- Lives with Mom and Dad.
- Education- Attends 10th Grade at local public Secondary School
- Activities- Plays football with friends, “hangs out”
- Diet- Regular diet, no supplements
- What else???

SHEADDDSSS Assessment

- Drugs- No tobacco, ecig, or alcohol use. Occasional THC use “when my friend has it”
- Depression- denies depression, SI/HI
- Sexual Health- Sexually active, Vaginal sex only, uses condoms “most of the time,” Attracted to girls, male identity.
- Safety- Feels safe at home, uses seatbelt, no guns, denies Phys, Sexual, Emotional abuse

Physical Examination

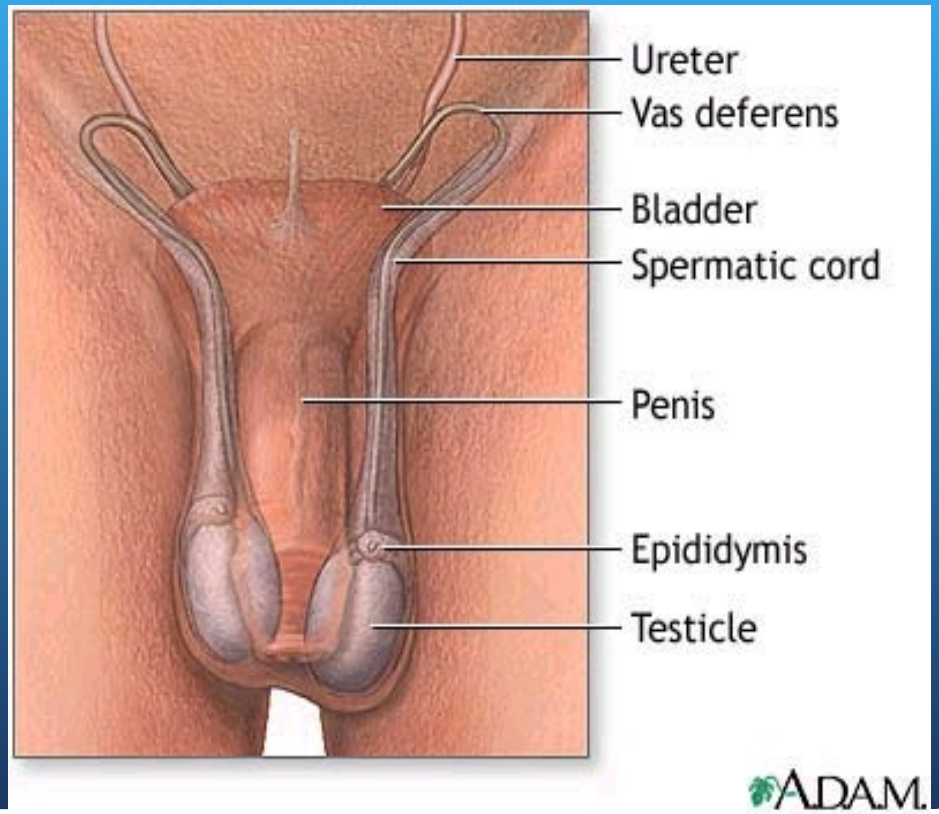
- T-98.5 P-70 RR-12 BP- 116/68 Pn 2/10 BMI-26
- HEENT, Neck, CV, Lung, Skin all normal
- Abdomen: Normoactive Bowel Sounds, non-tender, no CVA TTP, no rebound or gaurding or masses noted
- No hepato-splenomegely
- GU- ?

Tanner Stages

Stage	Pubic Hair	Penis	Scrotum/ Testes	Age/s
1	None	Pre-Adol.	Pre- adol.	10-14yrs
2	Scanty	Slight Increase	>3ml = Tanner 2	
3	Darker/ Curls	Longer	Larger	12-15yrs
4	Adult Coarse/ Curly	Larger	Scrotum Dark 15ml	
5	Adult/ to thighs	Adult	Adult 20ml	14-16yrs

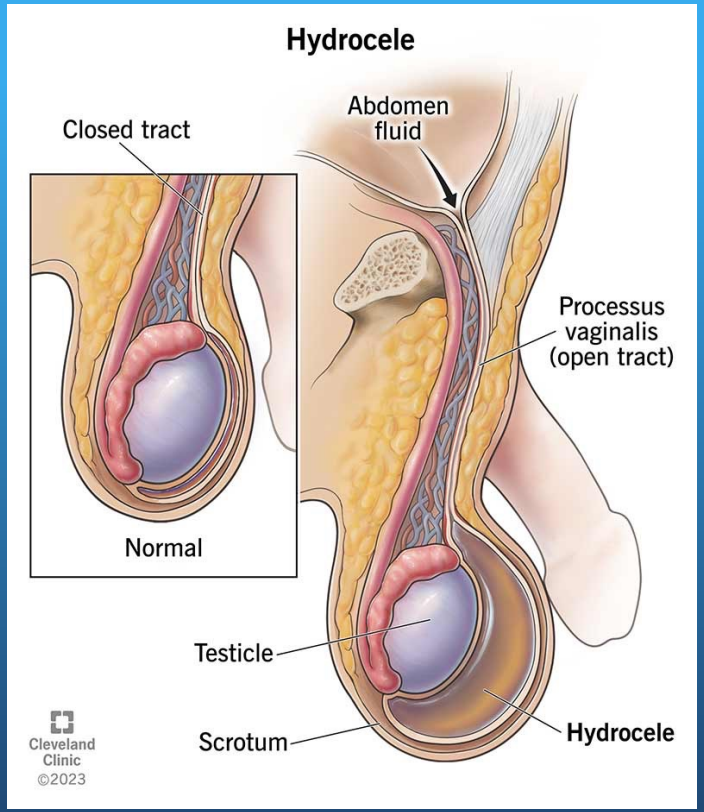
The Scrotum & Testicular Examination

- Scrotum
  - Spermatic Cord
  - Epididymis
  - Testis
  - Inguinal Canal



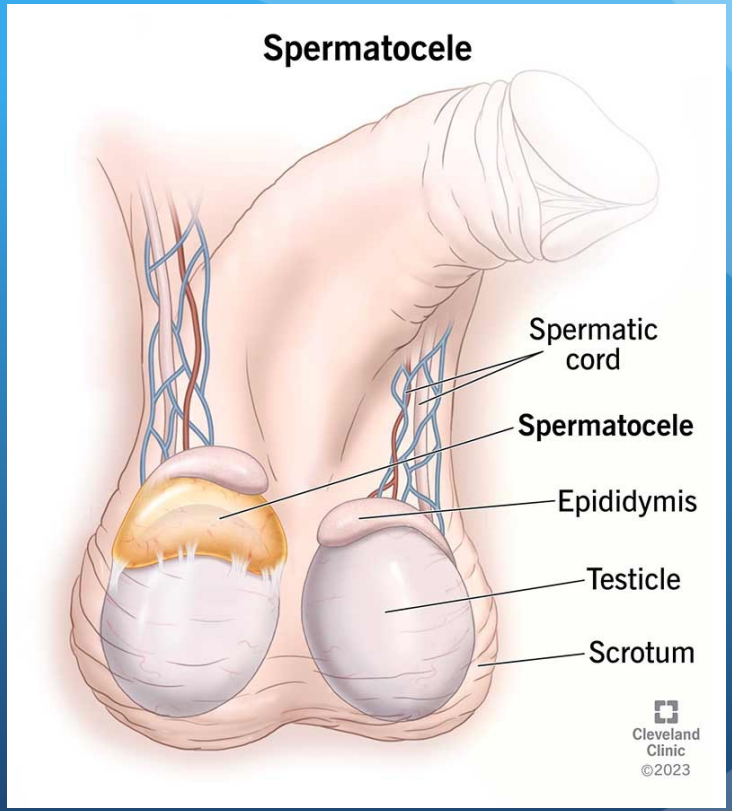
Scrotal Masses

- Hydrocele
- Spermatocele
- Varicocele
- Testicular Cancer
- Torsion



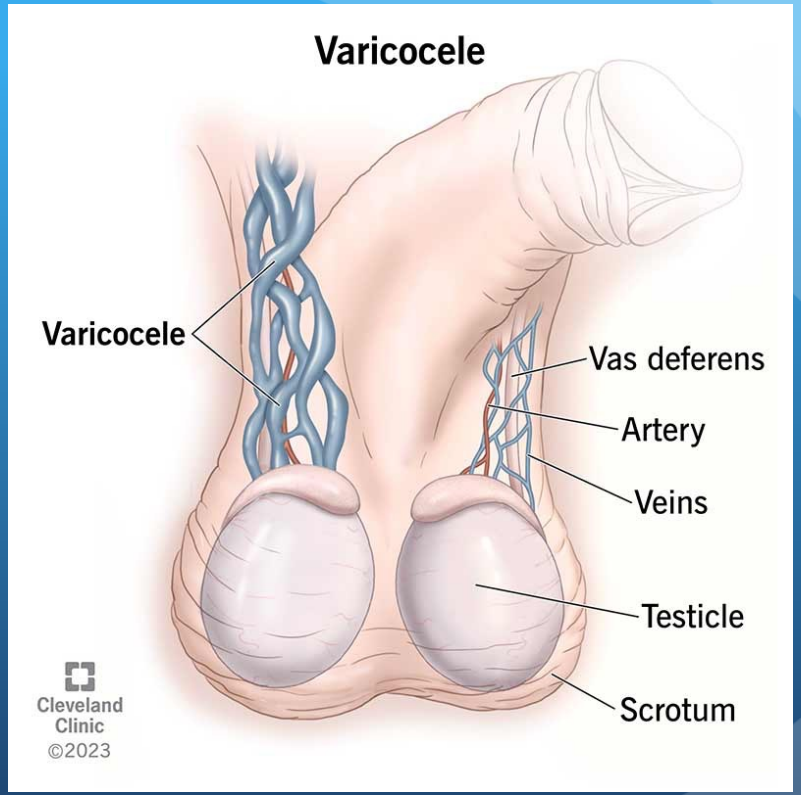
Scrotal Masses

- Hydrocele
- Spermatocele
- Varicocele
- Testicular Cancer
- Torsion



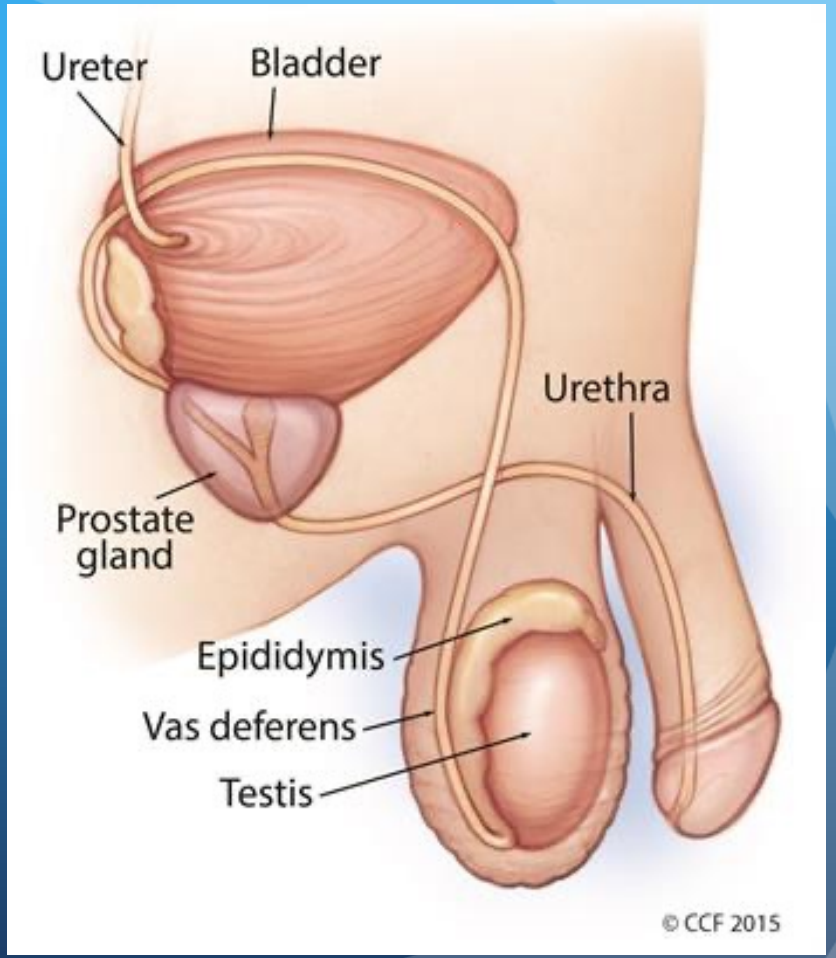
Scrotal Masses

- Hydrocele
- Spermatocele
- Varicocele
- Testicular Cancer
- Torsion



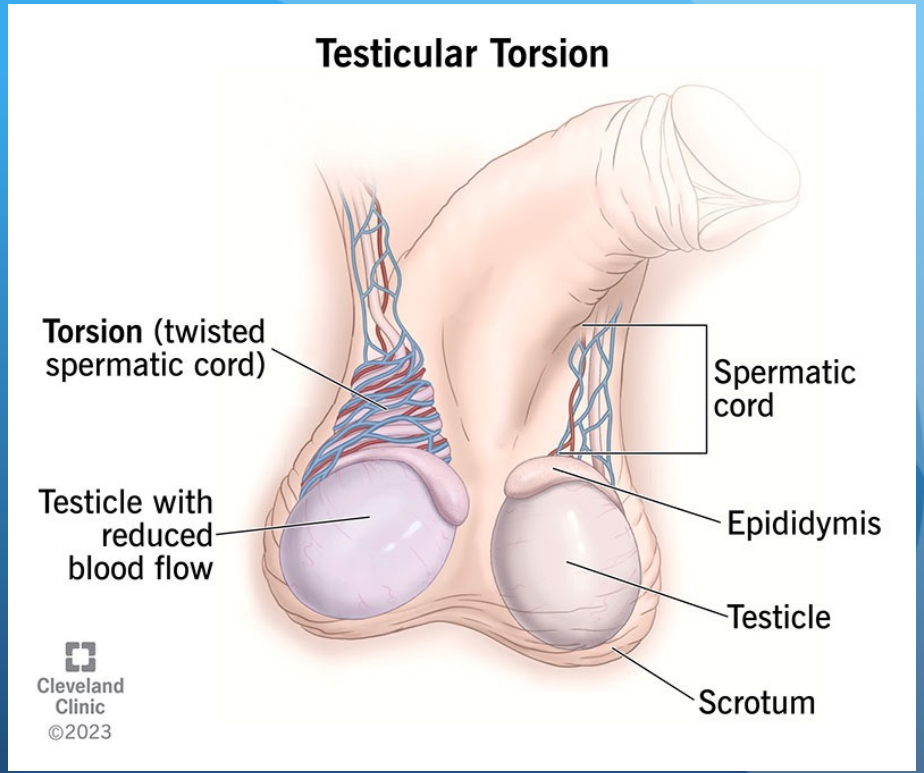
Scrotal Masses

- Hydrocele
- Spermatocele
- Varicocele
- Testicular Cancer
- Torsion



Scrotal Masses

- Hydrocele
- Spermatocele
- Varicocele
- Testicular Cancer
- Torsion



GU Examination

- Tanner Stage 3
- Large varicocele and approximately 10ml testicle on Left. Varicicocele enlarges with valsalva
- >30ml testicle on Right
- No palpable mass at testicle
- No hernia noted on valsalva/cough

Further Evaluation

- What next?

Further Evaluation

ULTRASOUND TESTICULAR WITH DOPPLER DUPLEX/COLOR: There are multiple dilated veins on the left within the left hemiscrotum with maximum transverse diameter measured at 4.5 mm.(abn >3 mm.). There is augmentation of flow during provocative maneuvers to include standing and Valsalva. The left testicular volume is diminished at 10.7 cc compared to the right at 31.8 cc. Testicular and epididymal structures appear otherwise uniform in echo-texture and normal in appearance. There are no abnormal masses or cysts and no evidence of hydrocoele.

IMPRESSION: Prominent left varicocoele with augmentation of flow and significant testicular atrophy. *Possible right testicular hypertrophy.*

Compensatory Hypertophy of the Testicle

- Noted in pre-pubertal/pubertal males with history of cryptorchidism
- “Normal” Testicle was noted to oftentimes be larger than normal range
- Initial studies showed “normal hormone levels” for Testosterone, LH, FSH and normal pubic-hair, penile development and skeletal growth at initiation of puberty

Compensatory Hypertophy of the Testicle

More recent studies demonstrated both increased variability and range of hormone levels, hyperresponsiveness of FSH to LH

Tanner 1-4 boys showed normal or high testosterone levels but by Tanner 5 levels were below normal

In those where semen analysis was performed, all had oligospermia or azoospermia

Compensatory Hypertophy of the Testicle

Pathological analysis

Small (Left) side- Reduced diameter of seminiferous tubules, and number of cells in the germinal epithelium

These changes are directly related to size of varicocoele

Large/hypertrophic (Right) side- either normal histology or increased seminiferous tubule size, increased number of cells in germinal epithelium and increased density of seminiferous tubules

Compensatory Hypertophy of the Testicle

Bottom Line- Many young persons with testicular hypotrophy due to varicocele or cryptorchidism may have normal physical development but are at risk for infertility and low testosterone states into adulthood

Differences amongst those developing oligo/azoospermia and those with normal seminal quality are difficult to elucidate but SIZE of varicocoele is directly related to diminished volume and histologic changes at the testicle

”I haven’t peed”

- 14 yo male w/o urination in the past 24 hours
- Has been weed whacking 2-3 hrs per day for the past 3 days.
- Temp has been 85° F in the evenings
- No prior hx of renal disease

History

No recent illness

No fevers, chills

No myalgias, CVA pain, suprapubic pain

No dysuria prior to event.

Darker urine with last urination

Drink mainly soda and 1-3 Red Bulls per day

PRN Loratadine

SHEADDDSSS Assessment

- Strengths – friendly, likes to fix things
- Home- stable mom, dad, 2 younger sibs
- Education- 9th grade, primarily Bs
- Activities – four wheeler (prn helmet use) hunting, fishing
- Diet – hasn't eaten since yesterday. Juice most mornings

HEADDDSSS Assessment

- AODA/Tobacco – oral tobacco, otherwise negative
- Depression- denies depression, SI/HI, PHQ-2 = 0
- Sexual Health- denies masturbation or sexual activity
- Safety- Feels safe at home, uses seatbelt, gun safety course, denies Phys, Sexual, Emotional abuse

Examination

- T-98.5 P-68 RR-14 BP 120/64
  BMI: 19.66 (52%ile)
- HEENT, CV, Lung all WNL
- Abd: NT/ND +BS, no CVAT
- GU: normal, no mass, no suprabubic pain with palp

Further Evaluation

- What next?
- Other history or evaluation?
- Other studies?

Laboratory Results

Urinalysis (late afternoon)

- ✓ pH = 5
- ✓ SG = 1.025
- ✓ appearance: clear
- ✓ Color: colorless
- ✓ Urobilinogen: 0.2

CMP

- ✓ BUN = 10
- ✓ Creatinine = 0.71
- ✓ CO_2= 30
- ✓ Otherwise WNL

CBC w/Diff

- ✓ WNL
- ✓ Eosinophils: 9.0

Contents of Red Bull

Loratadine

Tricyclic antihistamine

Histamine H1 receptor antagonist

Smooth muscles have H1 receptors

Bladder detrusor = smooth muscle

Anuria rare side effect

Treatment

- Stop loratadine and Red Bull
- Drink more water:
  - Recommendation of additional 1.5L per Kg lost
  - **7-10 oz of water every 20 minutes of sweating**
  - Sport drinks are good – look at electrolytes
- Decrease Red Bull and soda consumption
- Take breaks to cool off

WE'RE HIRING

MCHP

Advanced Practice Provider – School Based Health Centers

Behavioral Health Director

https://www.mchp.care/careers