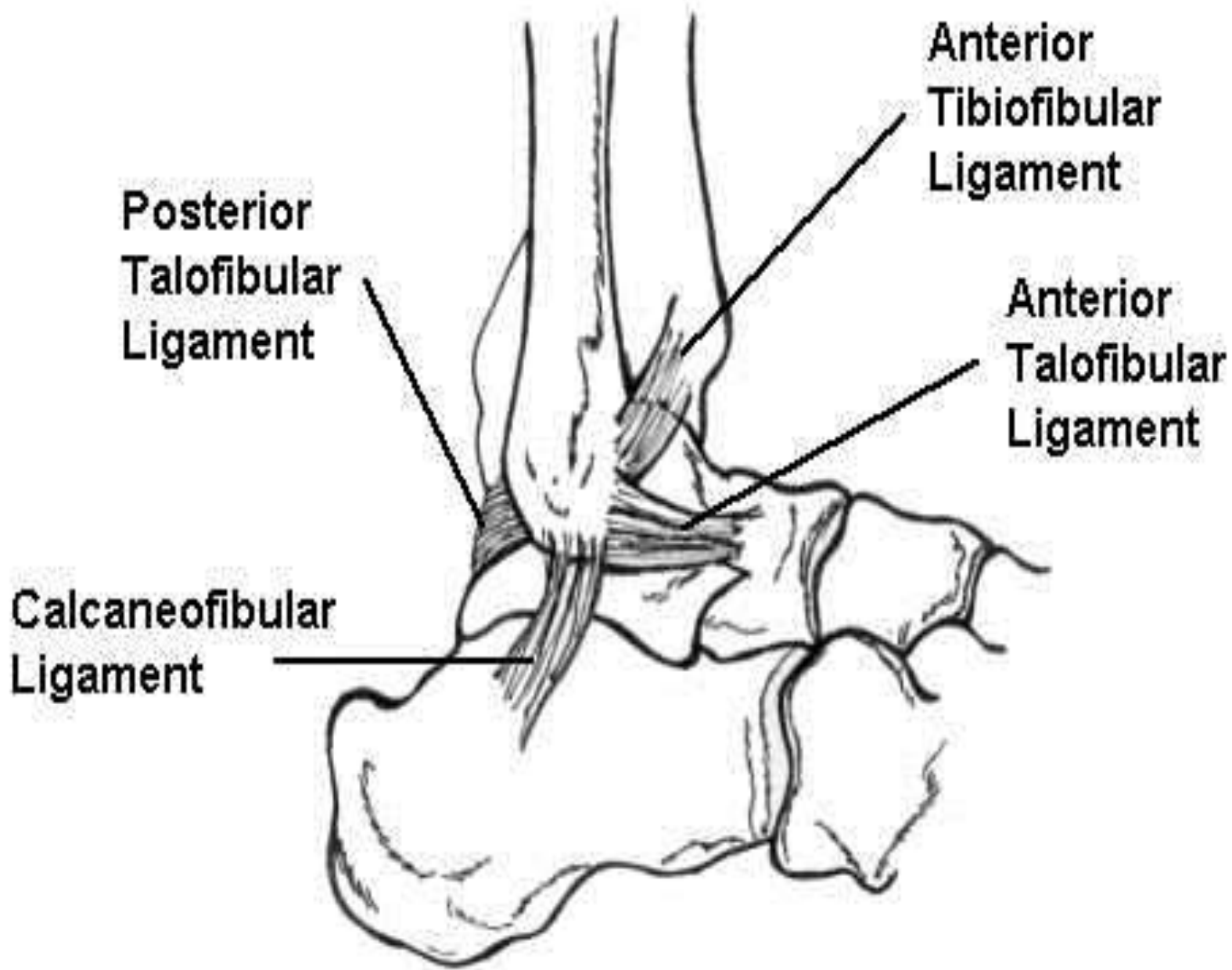




**Anterior View**





# Ankle Ligaments

- Lateral ligaments:
  - Anterior talofibular: Most common injured, inversion/plantar flexion.
  - Calcaneofibular: Deep to peroneal tendon sheath.
  - Posterior talofibular: smallest major ligament.

# Ankle Ligaments

- Medial ligaments:
  - Deltoid ligament: Largest ankle ligament, broad and fanlike.
  - Prevents abduction-eversion of the ankle and subtalar joint.
- Tibiofibular complex:
  - Anterior & Posterior tibiofibular ligaments
  - Syndesmosis
  - “high ankle sprain”

# Ankle: Sprains

- Tests
  - Anterior Drawer Test (ATFL)
  - Talar tilt (CF & ATFL)
- Prepubescent ankle injuries
  - increased risk of growth plate injury
    - ligaments stronger than growing bone
  - distal fibular physis

# Grading of Ankle Sprains



Type I Sprain  
• ligaments stretched

ADAM



Type II Sprain  
• ligaments torn slightly



ADAM



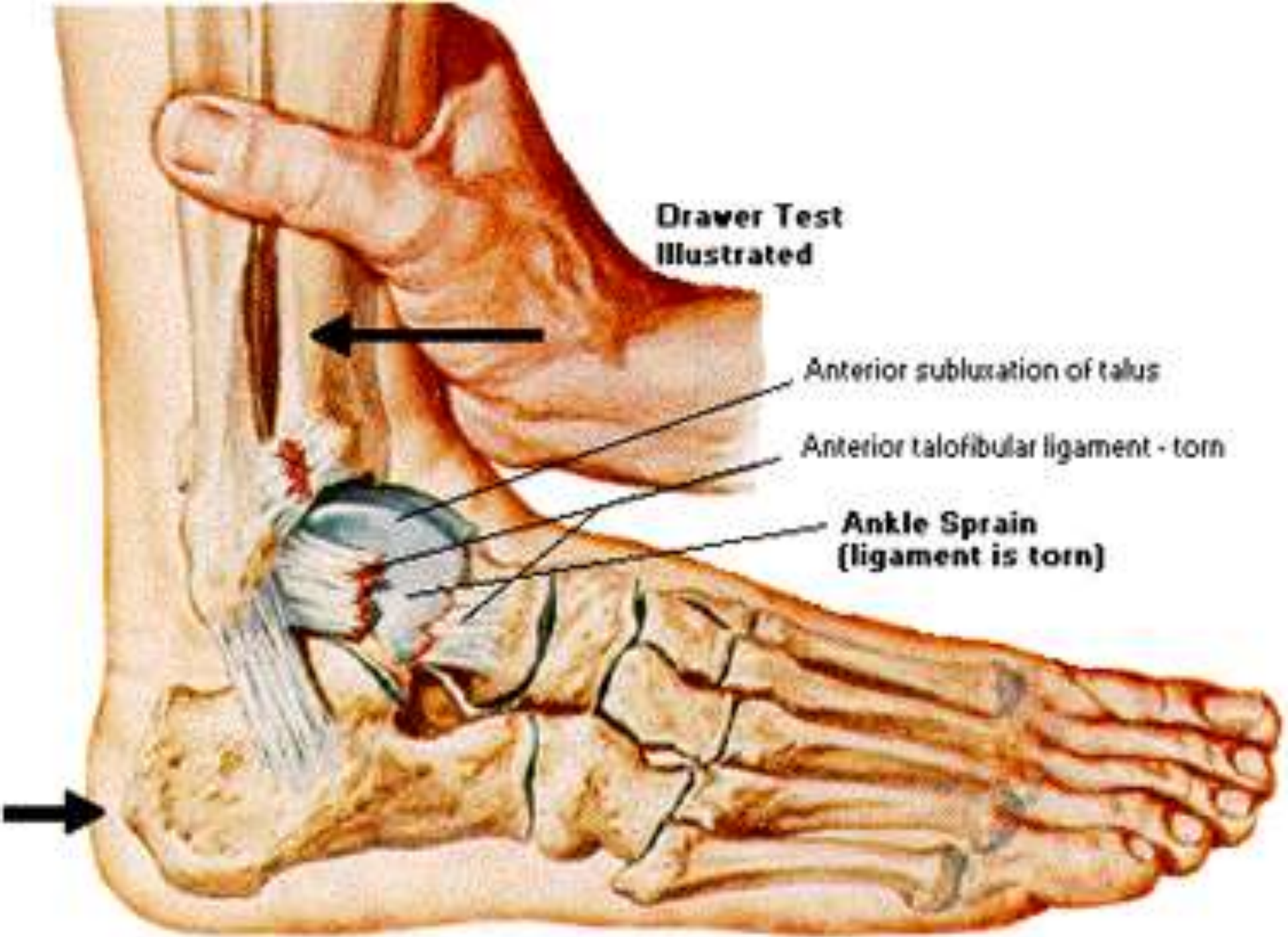
Type III Sprain  
• ligaments torn completely

ADAM

# Other Ankle Provocative Tests

- **Valgus (eversion) stress test**: for Deltoid lig.
  - Medial ankle sprain
- **Squeeze Test**: for syndesmosis injury.
  - High ankle sprain
- **Thompson's Test**: Achilles tendon continuity.
  - Squeeze calf w/ patient prone, if no plantar flexion...Achilles rupture
    - “someone kicked me in the heel”
    - Kobe Bryant





**Drawer Test Illustrated**

Anterior subluxation of talus

Anterior talofibular ligament - torn

**Ankle Sprain  
(ligament is torn)**

# Ottawa Imaging Rules

- Guidelines on when to order ankle/foot x-rays
  - In summary
    - Inability to bear weight due to pain
    - Tenderness over bony prominence/landmark of ankle/foot
  - If medial malleolus injury, order knee films

# Maissonneuve Fracture

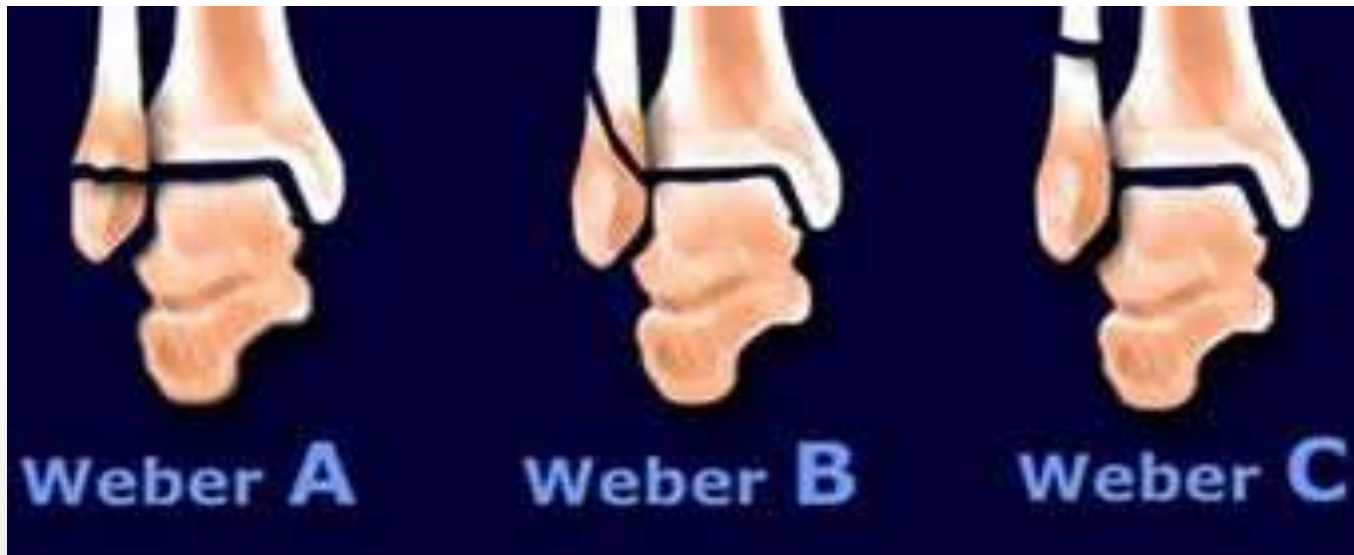
- Occurs from excessive external rotation force to ankle causing spreading of syndesmosis
- If medial ankle sprain, ALWAYS palpate proximal fibula to r/o tenderness
- Tibia/Fibula complex is a ring like structure
  - If a fracture in one place, look for 2<sup>nd</sup> fracture site
- Refer
  - ORIF

# Maisonneuve Fracture pattern



# Weber Classification

- Classification for lateral malleolar fractures
  - Different levels of stability with each type



# Treatment

- Weber A
  - stable fracture
  - Short leg cast 4 weeks, weight bearing OK
  - Change to boot
    - Radiographic healing
    - Clinically improved
  - Refer if no evidence of healing after 8 weeks



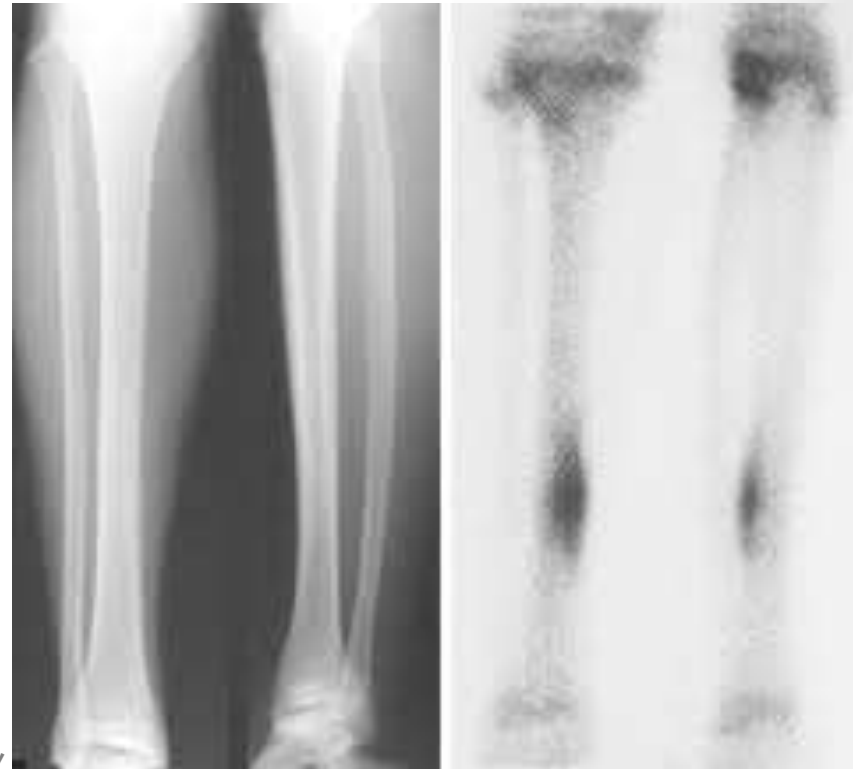
# Treatment

- Weber B and C
  - Refer for surgical fixation
  - Also bimalleolar or trimalleolar fx
  - Check medial ankle for mortise widening indicating syndesmosis injury



# Medial Tibial Stress Syndrome

- AKA “shin splints”
- Tenderness and pain along medial border of mid/distal tibia
- Long distance runners, deconditioned short distance runners
  - May progress to stress reaction and eventually stress fracture
  - Pain/throbbing at rest – suspect stress fracture
    - MRI or bone scan to confirm
- Treatment
  - Rest, ice, shoe modification, orthotics, non weight bearing if stress fx
  - Prophylactic intramedullary nailing in severe chronic cases
    - • athletes





# Foot X-rays

- AP, lateral, oblique
- If questionable abnormality, get contralateral films



# Proximal 5<sup>th</sup> Metatarsal Fractures

- Several types
  - Avulsion
    - Dancer's
  - Jones
  - Stress
- May accompany ankle sprain



# Jones fracture

- Plantar flexion inversion injury
- Zone of 5<sup>th</sup> MT base with least rich blood supply
  - May develop non union
- Initial treatment
  - WBAT in hard shoe
  - Serial x-rays to eval healing
  - may need ORIF with possible bone grafting



# Great toe sprain

- “turf toe”
- Hyperextension/hyperflexion injury to 1<sup>st</sup> MTP joint
  - Treatment
    - Rigid shoe insert
    - Ice, NSAIDs
    - Can take many months to resolve
    - May require surgery if ligament completely disrupted

# Lisfranc Injury



# Lisfranc Injury

- Named after Napoleon's surgeon, Lisfranc
  - Foot of soldiers caught in stirrup, caused wrenching of foot, eventually a likely amputation
- Injury to the tarsometatarsal joints, primarily the 1<sup>st</sup> and 2<sup>nd</sup> metatarsals and the connection to the cuneiforms
- Resulting from blow to posterior foot with toes in hyperextension (as if standing on toes) most commonly



# Lisfranc Injury



- Treatment is surgical (ORIF)

# Causes of heel pain

- Children
  - Sever's disease (calcaneal apophysitis)
    - Adolescent age 9-11
    - Treat with rest/activity modification, heel lift, heel cord stretching
    - No long term sequelae
- Adults
  - Achilles tendinitis
  - Heel contusion
  - Plantar fasciitis
  - Haglund's deformity



# HAGLUND'S DEFORMITY

- AKA “pump bump”
- Bone spur posterior calcaneus at Achilles insertion,
- Chronic inflammation/irritation to Achilles
- Treatment:
  - Non op: heel lift, PT, stretching
  - Operative: excision
    - Involves detaching/reattaching Achilles after removal of spur



# PLANTAR FASCIITIS

- Pain plantar aspect of calcaneus
- Insidious onset, stabbing pain with first few steps of the day
- May last several months
- Usually resolves spontaneously
  - Interventions help speed recovery
- excessive pull at origin of plantar fascia on calcaneus; heel spur results, not the cause
- RX: orthotics, shoe with higher heel, ice, heel cord stretch, NSAID
  - Surgical release last resort

Heel  
Bone

Strained  
plantar fascia



# Infectious Diseases

# Osteomyelitis

- Acute or chronic
- Infection of bone or bone marrow
- Suppurative (pus)
- Non-suppurative (sclerotic)
- *Staph aureus*
- MRI to evaluate for osteo



# Septic arthritis

- Usually bacterial
  - Staph
  - Strep
  - N gonorrhoea (young adult)
  - H flu (children)
- Also:
  - Tb
  - B burgdorferi (Lyme)
  - E. coli (immune compromised)

**Common finding...PAINFUL  
PASSIVE RANGE OF MOTION**



# Septic Arthritis

- Joint aspiration
  - Cell count
    - >50k WBCs, 75% PMN
    - Infection vs inflammatory process
  - Culture
  - Gram stain
  - Crystals

Bloodwork:

CBC

BMP

ESR

CRP

# Case Study

- 44M, 4 weeks of left knee swelling and pain
- No major medical problems
- No injury, crossfitter, went skiing w/ sore knee, got more swollen
- Pain with weight bearing, needs crutches
- ER visit 2 weeks prior, likely meniscus tear, f/u w/ ortho
- Symptoms worsened



# Case Study

- Exam:
- Knee w/ 3+ effusion, red, hot to touch
- ROM -10 – 50 w/ pain
- Afebrile
- Unable to test ligaments

## Aspiration

- 120ml cloudy fluid
- No organisms
- 15k WBCs
- No growth

## CBC

- WBC 10.3

CRP 12.64

ESR 90

# Case Study

- Upon further retrospective review...
  - 2 weeks prior to onset of knee pain, tested and treated for chlamydia
  - Treated for syphilis 1 year prior
  - Following ortho visit, referral to rheumatology
    - Positive ANA 1:640

REACTIVE ARTHRITIS

# Neoplastic Disorders



# Malignant bone tumors

- LOOK FOR CORTICAL DESTRUCTION-irregular edges
  - Constitutional symptoms – unintended weight loss, fatigue, fever
- Osteosarcoma
  - Common in long bones
  - Dx after uncommon injury
    - Mid shaft femur fx in young pt.
- Chondrosarcoma
- Ewing's sarcoma
- Fibrosarcoma
- Multiple myeloma
  - Metastatic lesions spine



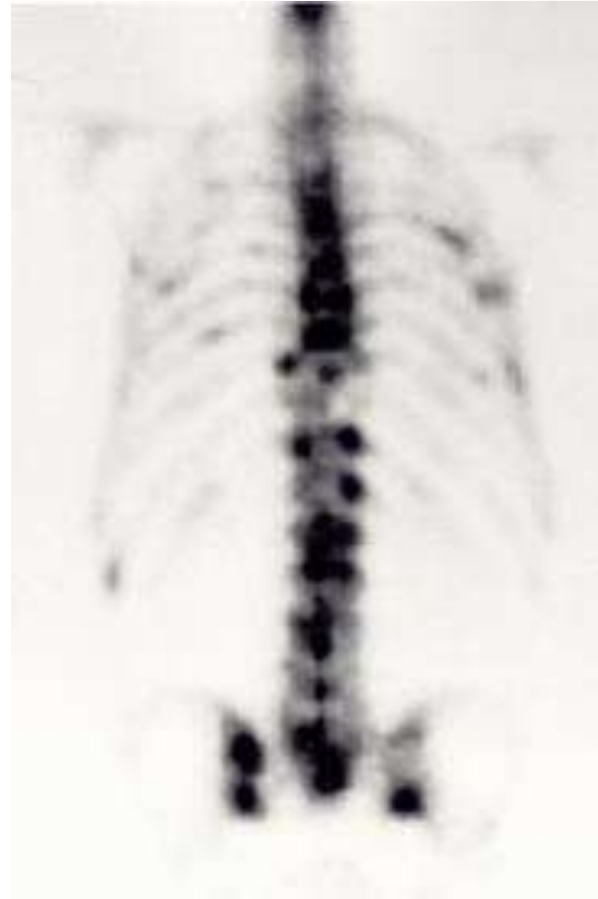
# Benign bone tumors (more common)

- Often asymptomatic, incidental findings on x-ray
- If symptomatic, can be resected
  - Enchondroma
  - Osteochondroma
  - Osteoid osteoma
  - Giant cell tumor
  - Aneurysmal bone cyst
  - Fibrous dysplasia
  - Non ossifying fibroma (NOF)



# Metastatic (secondary) bone tumors

- Breast
- Lung
- Prostate



# So In Summary....

- 1. Sprains happen to ligaments, Strains happen to muscles/tendons
- 2. DTR's: C5-Biceps, C6 – Brachioradialis, C7 - Triceps
- 3. Impingement Syndrome involves the Supraspinatus tendon
  - a. Hawkins and Neer tests
- 4. Injuries to the AC joint are Separations (cross arm test – very good indicator)...injuries to GH joint are dislocations ( apprehension, sulcus)
- 5. Bankart (labrum) and Hill Sachs (humeral head) lesions can occur during a first time shoulder dislocation and subsequent reduction
- 6. Most common fracture in the shoulder is fractured clavicle – commonly fractured between distal 1/3 and proximal 2/3
- 7. Medial epicondylitis – wrist flexors – Golfer's Elbow
- 8. Lateral epicondylitis – wrist extensors – Tennis Elbow
- 9. DeQuervains diagnosed by Finkelstein Test (wrap thumb in palm and ulnar deviate) – tenosynovitis (inflammation of tendon sheath)
- 10. Scapholunate dissociation – x-ray reveals Letterman sign (gap)
- 11. Carpal Tunnel Syndrome – Phalen and Tinel's tests – MEDIAN N.
- 12. Distal radius fx's: Colles' (FOOSH) – dorsal displacement
  - Smith (fall on flexed wrist) – volar displacement

# In summary... (cont'.)

- 13. Be familiar w/ Mallet finger (DIP), Boutonniere deformity (PIP)
- 14. Osteoarthritis:
  - a. Herberden's nodes – DIP (most common)
  - b. Bouchard's nodes - PIP
- 15. Spondylolysis (Scotty Dog Fx – NON DISPLACED) – fx at pars interarticularis
- 16. Spondylolisthesis (Forward slippage of one vertebrae over another)
- 17. HNP (herniated discs) commonly cause muscle weakness w/ or w/o pain
- 18. Hip avulsion fx sites: ASIS (sartorius), AIIIS (rectus fem), Ischial tuberosity (hamstrings)
- 19. HIP: SCFE (pediatric) – ice cream cone.....Legg Calve Perthes - AVN
- 20. Knee tests: ACL – lachman, Ant. Drawer, PCL – Sag, posterior drawer, MCL – Valgus stress, LCL – Varus stress, Meniscus - McMurray
- 21. Osgood Schlatter Disease – Tibial Tuberosity (Quadriceps insertion)
- 22. Sever's Disease – calcaneus (Achilles tendon insertion)
- 23. Ankle tests: Drawer – ATFL, Talar Tilt – CFL, Valgus (eversion) – Deltoid
- 24. Plantar fasciitis – Stabbing heel pain first step in the morning
- 25. 5th Metatarsal Head fractures – Avulsion (\*\*most common), Jones (most problematic), Metaphyseal Stress fx
- 26. Read over Ottawa Imaging rules (basically x-ray when bony tenderness and inability to bear weight)
- 27. Gout – Uric acid crystals – 1st MTP joint most common– very painful •



- 1. A 27 year old former swimmer presents to clinic with right shoulder pain that has increased over several months after increasing upper body strengthening workouts. She feels occasional clicking when she does certain movements and says the shoulder feels “loose”. She has 5/5 strength and a positive O’Brien’s test. What is the likely diagnosis?
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  - b. Adhesive capsulitis
  - c. Labral tear
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  - c. Non weight bearing for 6 weeks, then resume activity
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  - b. Cauda equina syndrome
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- b. Certain scaphoid fractures may require up to 16 weeks of casting for adequate healing.
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- 5. The gold standard clinical exam special test for diagnosing an ACL tear is:
  - A. McMurray
  - B. Lachman
  - C. Posterior Drawer test
  - D. Valgus stress test at 0 degrees

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  - B. Bankart lesion
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# Thank you



A typical non ortho PA trying to study orthopaedics...

