Common Orthopaedic Injuries

Orthopaedic Injuries Board Review

- Concussions
- Finger/Hand/Wrist Injuries
- Shoulder Injuries
- Spine Injuries
- Knee Injuries
- Ankle/Foot Injuries

Definition of Concussion

- **Sports Concussion:** complex pathophysiological process affecting brain, induced by traumatic biomechanical forces.
  - Caused by direct blow to head/neck or elsewhere with "impulsive" force transmitted to head.
  - Results in neurologic impairment that resolves spontaneously.
  - Symptoms largely reflect functional disturbance not structural.
  - Results in graded set of clinical syndromes that may or may not involve LOC.
  - Resolution of clinical and cognitive symptoms follows sequential course.
  - Associated with grossly normal structural neuroimaging studies.

ICCS Prague 2001

Concussion Symptoms

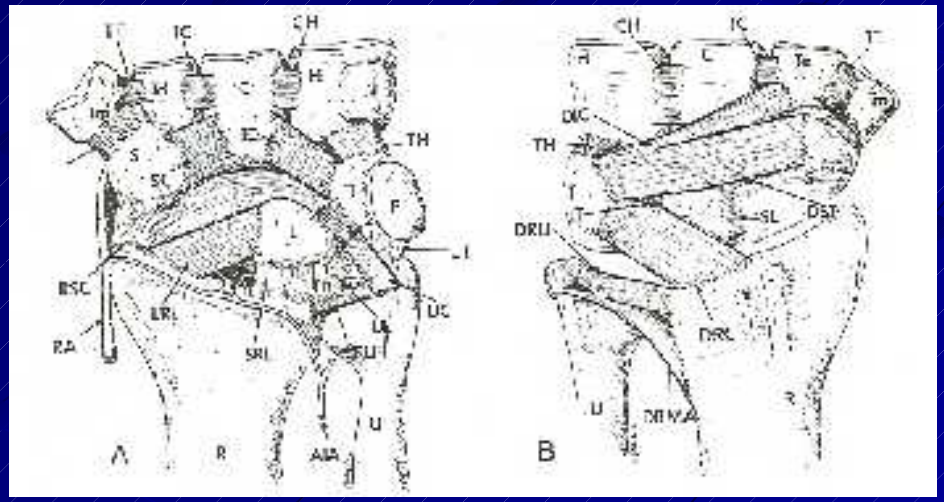
- Headache
- Nausea/ Vomiting
- Dizziness/ Vertigo
- Fatigue
- Hypersomnia/Insomnia
- Photo/Phono-phobia
- Irritability
- Visual Disturbances
- Tinnitus
- Depressed Mood
- Nervousness/Anxiety
- Numbness/Tingling
- General Confusion
- Difficulty with concentration
- Post-traumatic Amnesia
- Imbalance
- Speech Disturbance

Neuroimaging Studies

- **Brain CT:**
  - Best acute measure of intracranial vascular injury.
  - Contributes little to concussion evaluation.
- **MRI:** ***Gradient Echo, Perfusion/Diffusion Weighted***
  - Increased sensitivity for structural injury/abnormalities.
- **PET/SPECT/fMRI:**
  - Functional Imaging technology promising early findings indicative of altered cerebral function.

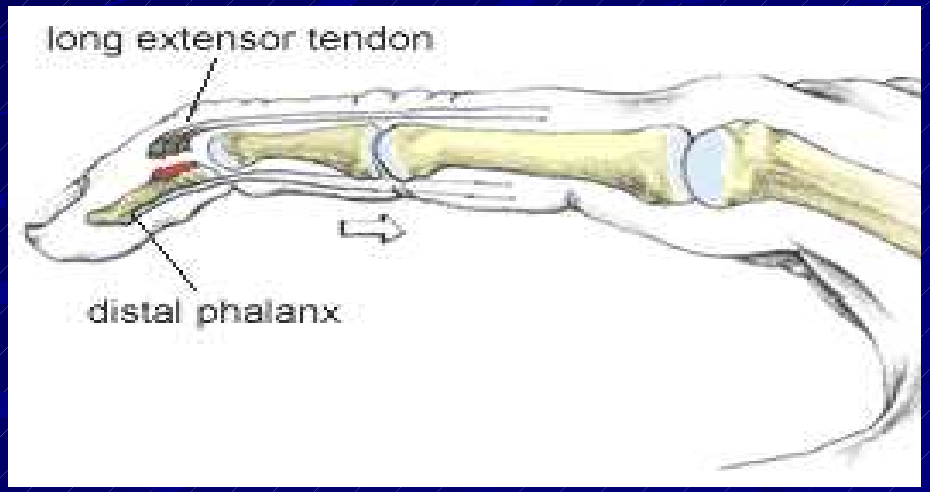
Wrist & Hand Injuries

- **Scapholunate Ligament Injury**
  - *Most common and most crucial ligament injury of wrist.*
  - *Often leads to chronic pain and/or functional instability.*
  - *SL Joint located proximal axial line from 3rd Metacarpal.*



FINGER

MALLET FINGER(Baseball Finger)



- Avulsion of Extensor Digitorum Communis (EDC) Tendon from DIP joint
  - Can be associated with Avulsion Fracture

FINGER

MALLET FINGER

- Mechanism of Injury:
  - Direct jam
  - Forced flexion
  - Dorsal dislocation of PIP
  - Laceration
- Splint
  - Slight hyperextension for 6 weeks
  - Night splint for additional 6 weeks
  - Best results if treated early

FINGER

JERSEY FINGER

- Avulsion injury of Flexor Digitorum Profundus (FDP) from volar base of distal phalanx
- Examination:
  - **FDP test** - blocked flexion of DIP
- Treatment - early surgical repair
- Permanent disability if missed

SWAN NECK DEFORMITY

VOLAR PLATE RUPTURE

- Volar plate function: limits hyperextension
- Examination
  - Pain at volar base of middle phalange
  - Deformity:
    - Hyperextension of PIP joint/flexion of DIP

SWAN NECK DEFORMITY

X-Ray

- Bony avulsion of distal attachment site

Treatment

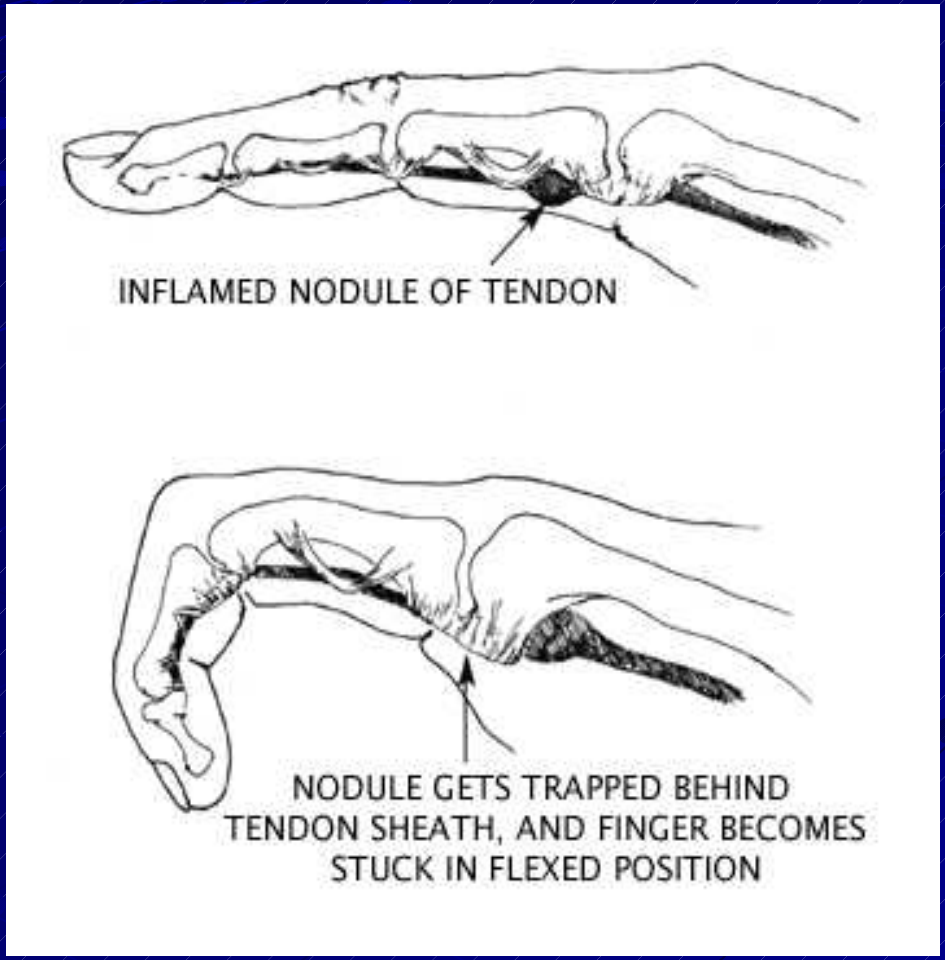
- Immobilize at 30 degrees flexion for 1-2 weeks
- Then extension-block splint for 3-4 more weeks with ROM exercises

FINGER

TRIGGER FINGER

- Inflammation of tendon and fibrous sheath
  - Causes a nodule to form on the FDS tendon
  - Nodule catches on proximal portion causing a painful snap
  - Possible radiation to PIP

TRIGGER FINGER



TRIGGER FINGER

Treatment

- Symptoms less than 3 months: inject
  - Steroid injection within tendon sheath
  - Hand therapy for tendon gliding
  - repeat once in 2-4 wks
- 3 months + of symptoms:
  - Injection versus surgical referral for release

BOXER'S FRACTURE

DEFINITION

- Distal neck fx of 5th metacarpal
  - Volar displacement acceptable to 45 degrees for office casting +/- closed reduction
  - Rotation deformity
    - referral
  - More than minimal valgus or varus displacement
    - referral

BOXER'S FRACTURE

METACARPAL BONES

BENNETT'S FRACTURE

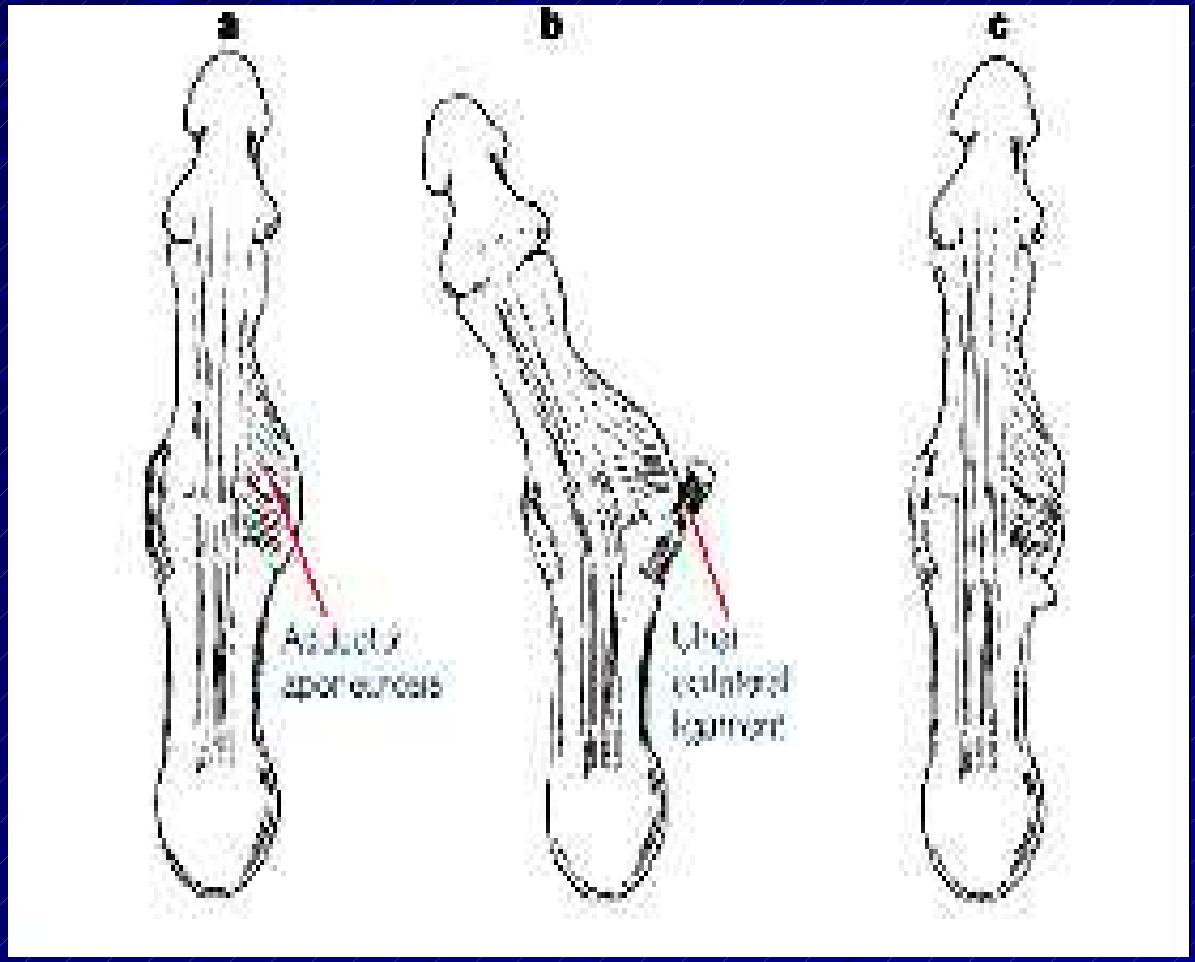
- Intra-articular fx at base of 1st metacarpal
- Wide displacement due to pull of FPL
- Fragment held in place by strong ligament

THUMB

Skier's (gamekeeper's) thumb

- *AKA* Ulnar collateral ligament (UCL) sprain
- Fall on outstretched hand
- causes acute overload of UCL as thumb is radially deviated
- UCL tear
  - Pinch strength weak
  - Metacarpal susceptible to volar subluxation/DJD

SKIER'S THUMB



SKIER'S THUMB

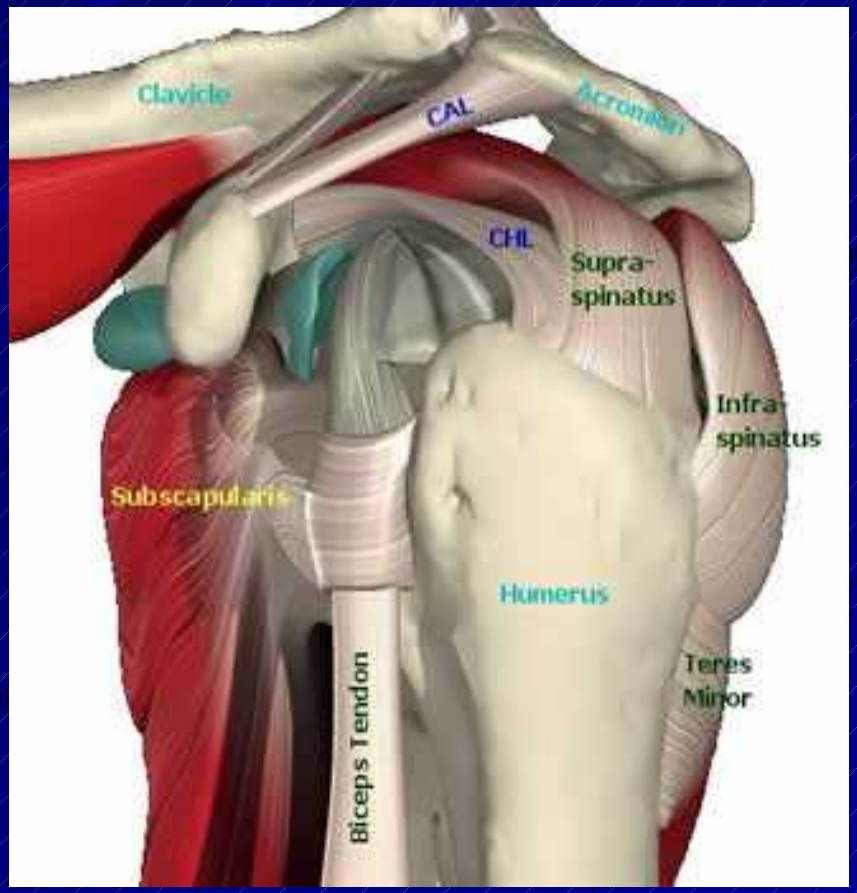
Diagnosis/Grading:

- Grade 1:
  - Pain without instability with stress
  - Splinting with Tape 1-2 Weeks
- Grade 2:
  - Pain with Mild Instability: gapping < 20 degrees
  - Thumb Spica Orthoplast Versus Casting 3-6 Weeks
- Grade 3:
  - Pain
  - Stenner's Lesion
  - Instability: gapping >20 degrees or >35 degrees compared to unaffected thumb
  - Early surgical intervention within 2-3 Weeks.

Shoulder/Rotator Cuff Injuries

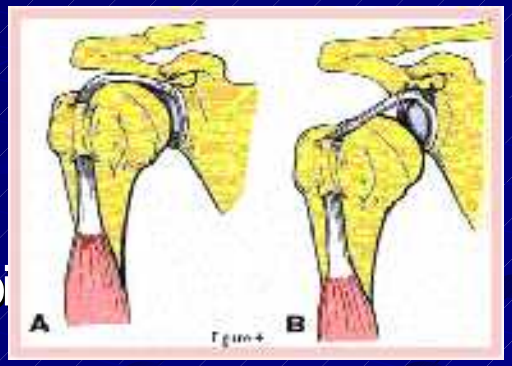
- 4 Rotator Cuff Muscles
  - Supraspinatous, Infraspinatous, Teres Minor, Subscapularis
- Rotator Cuff Sprains/Tendonitis/Tears/Tendionpathy
- Impingement Syndrome
  - Subacromial compression of Supraspinatous with superior Humeral Head Rotation/Migration

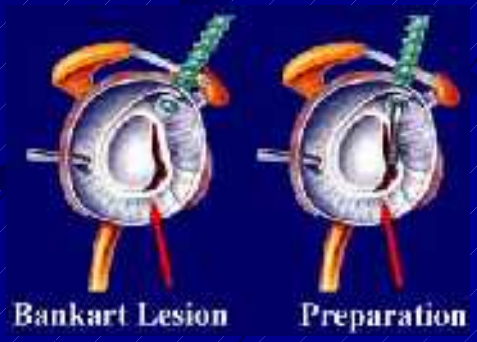
Rotator Cuff Injury



Shoulder Injuries

- **Labral Injuries**
  - Overuse Syndrome
    - **Labral Degeneration:**
      - Associated with capsular laxity or instabi
    - **SLAP**
      - 10-2 o'clock region at biceps tendon attachment.
  - Traumatic
    - **Bankart Lesions**
      - Anterior labral tears
      - Subluxation or dislocation mechanism





Shoulder Injuries

- **Labral Injuries**
  - **Diagnosis**
    - Clinical Exam:
      - Obrien's Test
      - Anterior Slide
      - Mayo Grind Test
      - Apprehension
    - Radiographically: MR Arthrogram

Shoulder Injuries

- **Acromioclavicular Joint Separations**
  - *Sprain → Inflammation → Laxity*

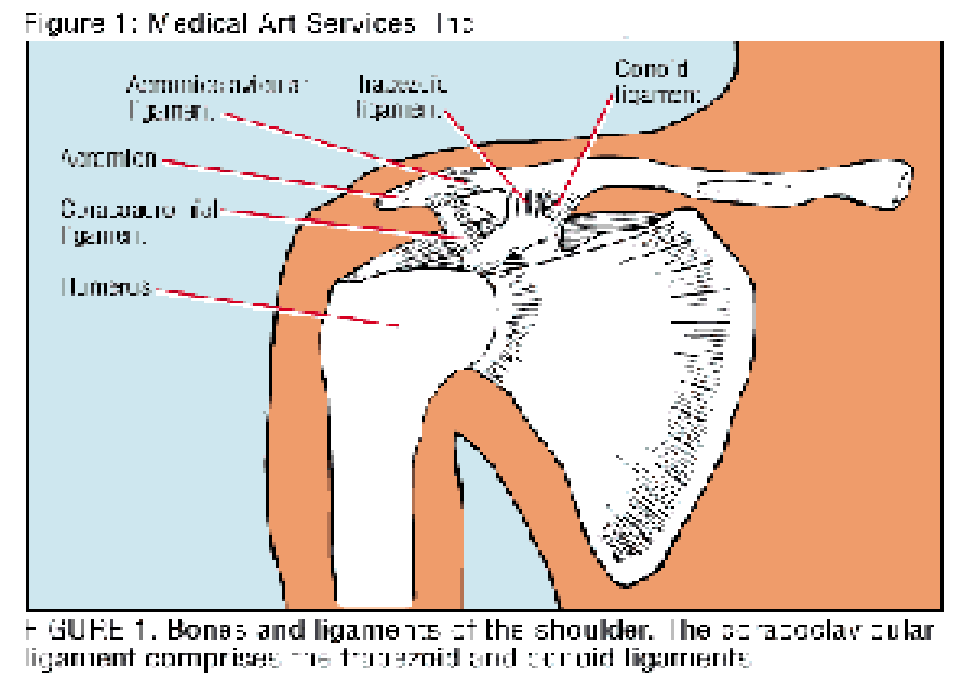


FIGURE 1. Bones and ligaments of the shoulder. The acromioclavicular ligament comprises the trapezoid and conoid ligaments.

Spondylolysis Clinical Presentation

- Focal low back pain
- Gradual or acute onset
- Increase with activity
  - Repetitive Rotation or Extension
- Stork Test:
  - Single leg hyperextension maneuver

Spondylolysis Diagnosis
Plain Radiography

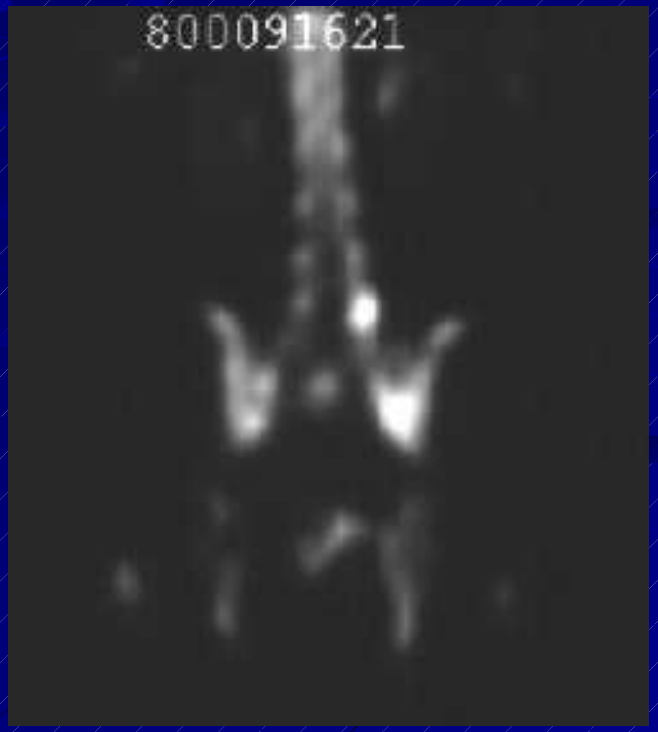
- "Scottie dog"
  - oblique films
  - 19% Detected
- Fracture in neck

Diagnosis
Nuclear Imaging

- Bone scan
  - more sensitive than plain films
- SPECT
  - more sensitive than bone scan, plain films for acute injury/irritation
    - Allows confirmation of anatomic location
  - Determine symptomatic lesions
    - increased metabolic activity
  - specificity limited for pars lesion

Nuclear Imaging

Bone Scan



SPECT

Diagnosis
CT

- More sensitive than plain films
- More specific than SPECT
  - pars vs. facet, pedicle, etc
- ?Relative sensitivity to MRI, SPECT
- Best Method to Stage defect
  - better able to predict healing[1]

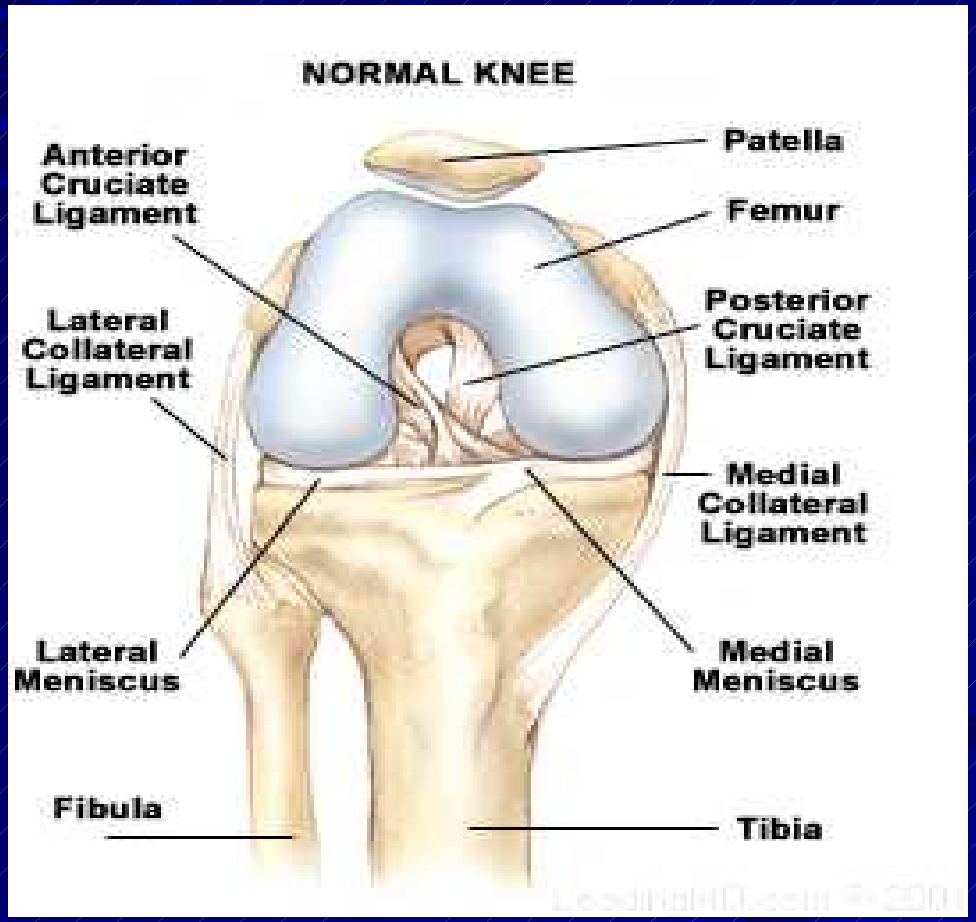
[1]Katoh, et al, NASS 1997

Diagnosis
CT

Early

Healed

Internal Anatomy of the Knee



ACL Injury

- **Physiology**
  - 0°-20° Flexion: both bands taught
  - 60°-90° Flexion: both bands relaxed
- **Mechanism of Injury**
  - Acceleration/Deceleration movements
  - Acceleration + Rotational movement injury
  - Often experience “pop” with associated sensation or actual giving-way

ACL Injury

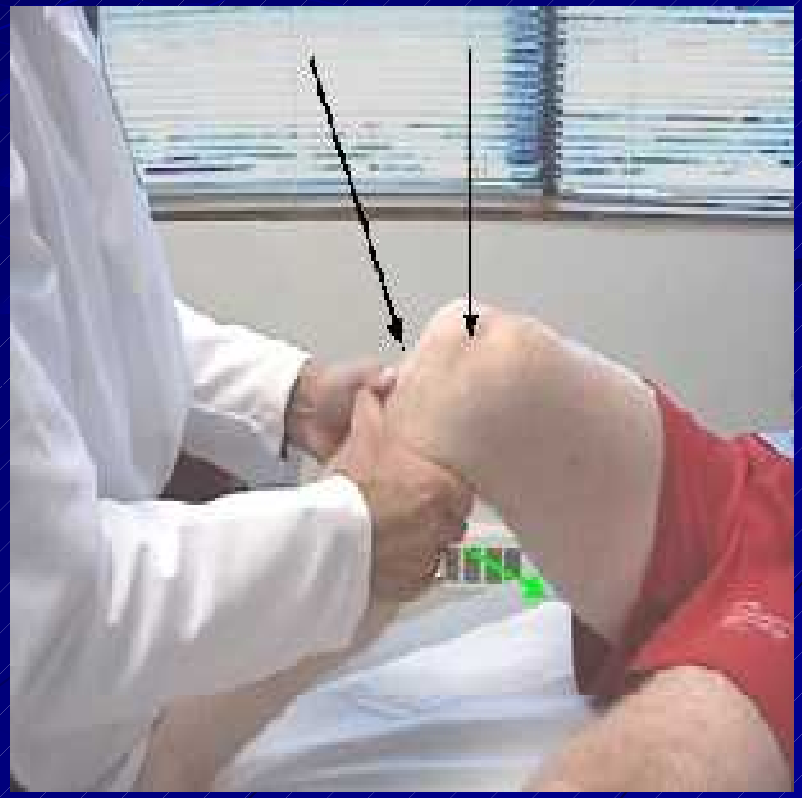
- **Signs/Symptoms**
  - Swelling/Joint Effusion (Ballottement)
    - ACL damaged in approx 75% knee injuries presenting with Hemarthrosis
  - Ecchymosis
  - Weight-bearing Status and ROM
  - Quadriceps and/or Biceps Femoris wasting
  - Autonomic Symptoms

ACL Special Tests

- **Lachman Test**
  - Supine position with knee flexed to 30° and leg externally rotated 30°. With femur stabilized attempt to sublux tibia anteriorly.
  - Best Indicator of ACL Injury
  - Compare with Contralateral Knee

ACL Special Tests

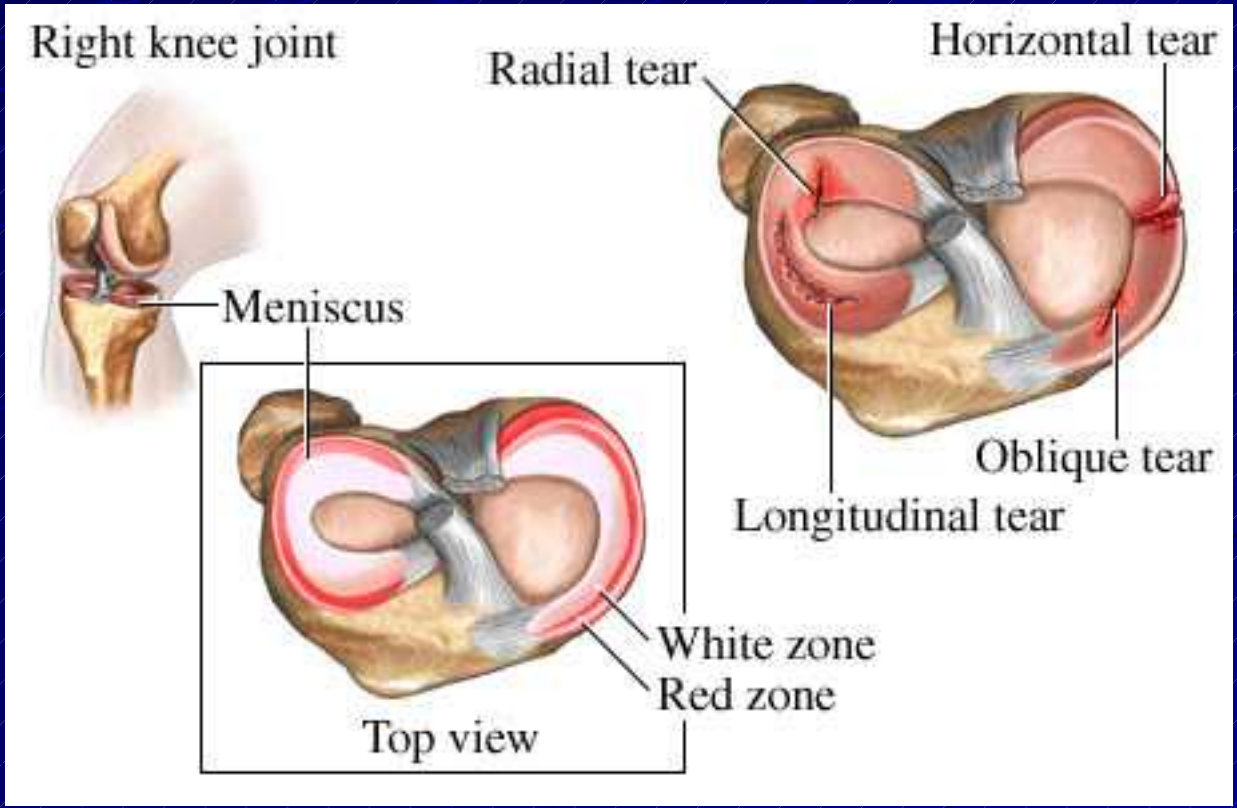
- **Anterior Drawer Test**
  - Hip flexed 45° and Knee flexed 90° and foot neutral.
  - Assess anterior displacement of Tibia
    - Foot at 30° External Rotation: Anteromedial Instability
    - Foot at 30° Internal Rotation: Anterolateral Instability



PCL Injury

- **Mechanism of Injury**
  - Anteroposterior force applied to a flexed knee
    - "dashboard injury"
  - Hyperextension or Hyperflexion
  - Multiple Ligament Injury: from deceleration with an applied varus/valgus stress

Meniscal Tears



Meniscal Tears

- **Signs/Symptoms**
  - Swelling: proportional to activity
  - Joint Line Pain: Flexion/Rotation
    - Pain at rest
  - Giving-Way/Pseudo-Giving-Way
    - Weakness
  - Locking/Pseudo-Locking
    - Limitation of ROM
  - Grinding/Popping

Meniscal Tears

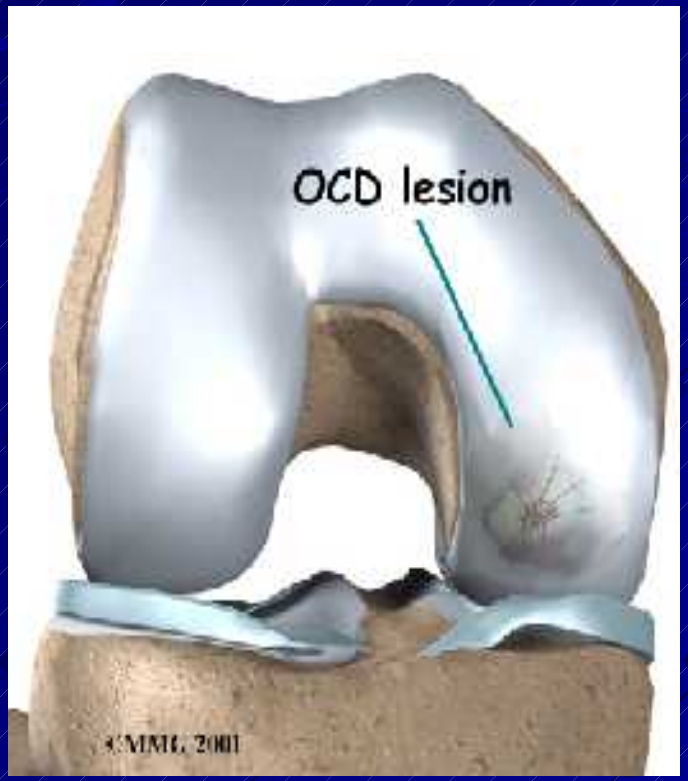
- **Special Tests**
  - **McMurray Test**
    - Patient supine with max knee flexion apply external and internal rotatory force to tibia and bring knee into full extension.
  - **Apley Compression Test**
    - Patient prone with knee flexed to 90°, apply internal and external tibial rotation with axial compression to tibia while moving knee into flexion and extension.
  - **Flick Test**
  - **Radiographic Studies**
    - Plain Films: may show loss of joint space, femoral contusion
    - MRI: intrasubstance signal enhancement

Osteochondral Injury

- **Osteochondritis Dissecans**
  - Avascular Necrosis of subchondral bone leading to secondary changes in overlying articular cartilage
  - Most often in Pediatric Population
  - Etiology Unknown
    - Perhaps traumatic
- **Osteochondral Defects**
  - Traumatic injury to articular cartilage and subchondral bone

Osteochondral Defects

- **Signs/Symptoms**
  - Pain and Effusion in proportion to level of activity
  - Mechanical signs
    - Loose Body may cause locking
  - Presentation may be confused with Meniscal Tear
  - Most Coomonly:
    - Medial Aspect of Lateral Femoral Condyle



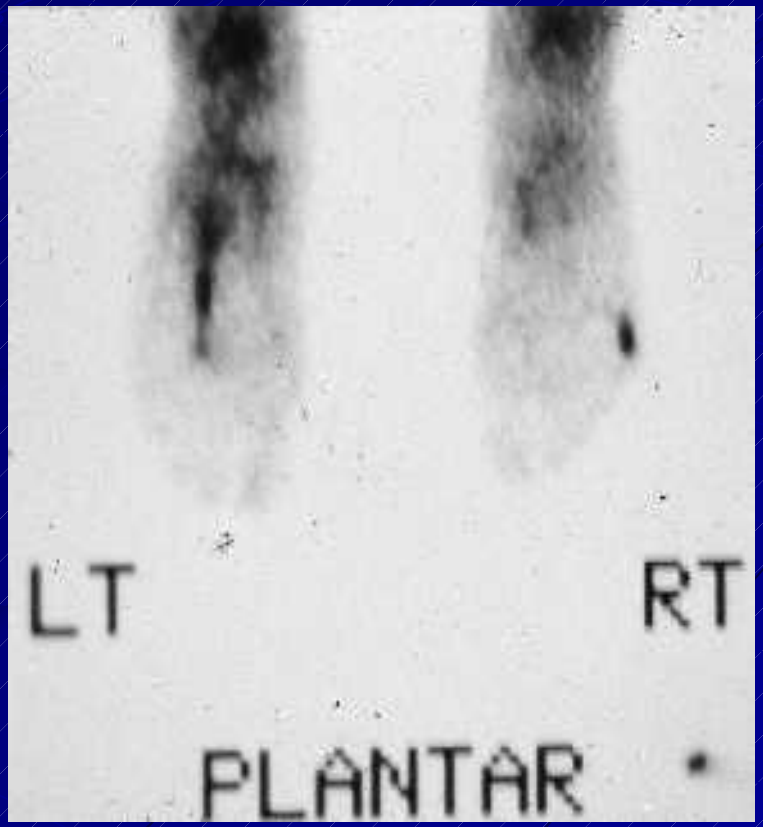
Mechanism of Ankle Injuury

- Inversion + Plantarflexion= 80% sprains
  - Most commonly involve the Anterior Talofibular Ligament.
- Inversion or Eversion alone
- Landing on unsteady object
- Change of Direction
  - Deceleration associated
- Manual Twisting
  - Wrestling injury

Proximal 5th Metatarsal Palpation

- Test of 5th Metatarsal Avulsion
  - Occurs most commonly with inversion
  - Peroneus Brevis pulls styloid off of 5th Metatarsal
  - Palpate at styloid for pain.
    - If positive for pain should X-ray.

Stress fracture is the end result of a continuum of the biological response to stress placed on bone.

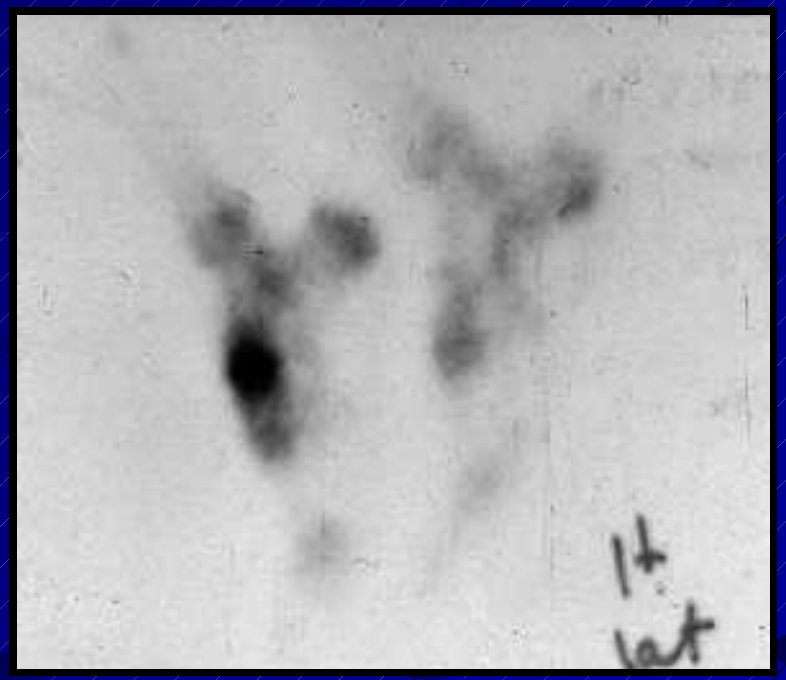


Stress Fracture Imaging Studies: Plain Radiographs

- Advantages
  - Cheap
  - Readily available
- Disadvantages
  - (+) test: a late response of bone injury (4-6 weeks)

Stress Fracture Imaging Studies: Bone Scan

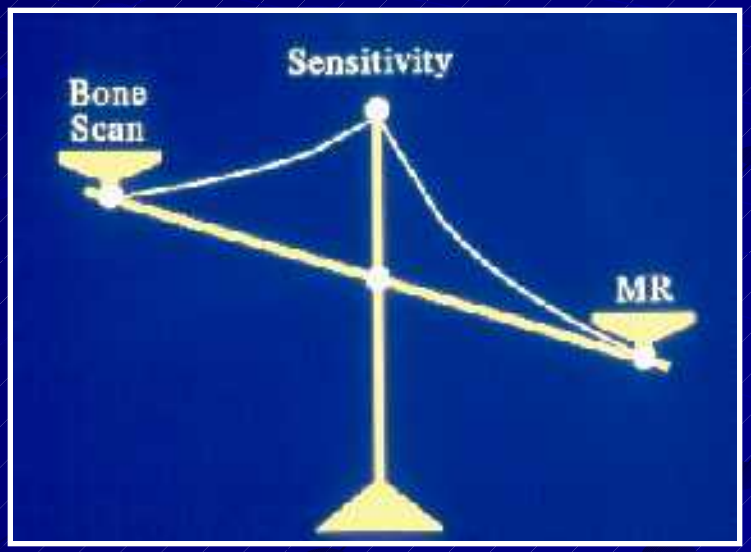
- Sensitive but not specific for stress fx
- Stress Fracture
  - Lights up all 3 phases
    - Phase I:
      flow / angiographic
    - Phase II:
      blood pooling /
      soft tissue
    - Phase III: delayed



Stress fracture Imaging studies: MR Scan

Identifies:

- Marrow edema vs. cortical changes
- Stress phenomena in early stages
- Bone vs. periosteal vs. soft tissue injury
- Age of injury
- Staging is possible



Good Luck !