Orthopedics/ Musculoskeletal

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Tintinalli 1783-1910

Orthopedic Emergencies

- Open Fractures
- Dislocations
- Subluxations
- NV deficit
- Compartment Syndrome
- Unstable Fractures

General Principles

Open fractures, fracture dislocations, and fractures with a neuro deficit or circulatory compromise

- EMERGENT surgical consultation.

Open Fractures

- Contamination
- Principles of management
  - Early antibiotic therapy and surgical intervention

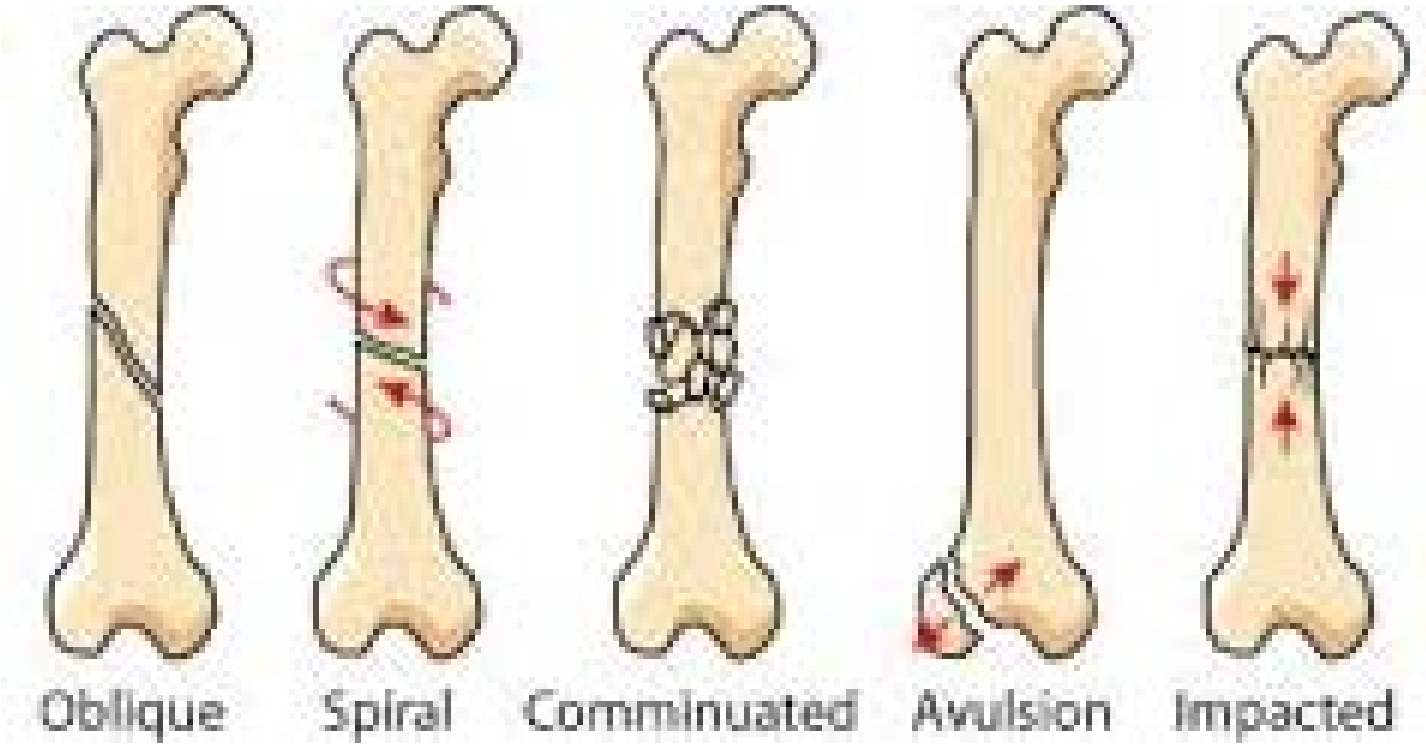
Initial Management

- Pain control
- NPO
- Reductions
- Immobilization

General Principles

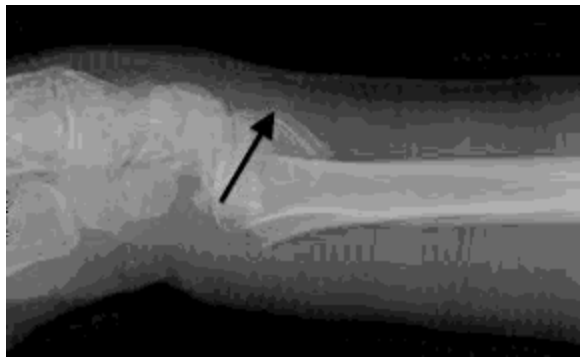
- All orthopedic injuries
  - Rest, Ice, Compress, Elevate (RICE)
- Displaced fractures
  - ortho consult
- All fractures
  - Follow up with ortho
- X-rays are not full proof
  - 2D image of a 3D object
    - Consider occult fracture when x-ray is normal
  - +/-CT scan

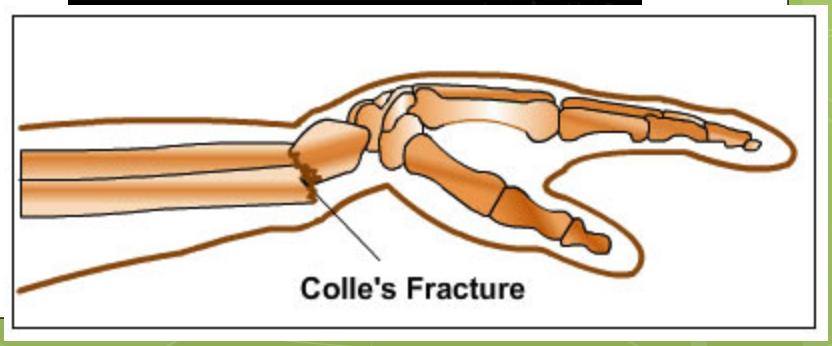
Radiographic Description of Fractures



What To Tell The Orthopedist

- Open vs closed
- Intra-articular vs extra-articular
- Displaced vs non-displaced
- Describe fracture
  - Type, location, angulation





Principles Of History and Physical Exam

- Is pain due to trauma or is it non-traumatic
- Signs and symptoms of orthopedic injury
  - STS, tenderness, ecchymosis, decreased ROM
- Early reduction for displaced fractures and dislocations
- Examine the joint above and below the injury
  - Image the joint above and below if you suspect fracture in close proximity to the joint space
- Check pulses distal to injury
- Check motor and sensation distal to the injury

Pediatric Considerations

Growth plate Injuries

- Comparison views

Different Injuries than adults

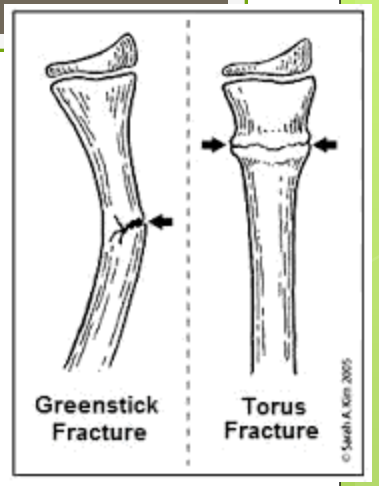
- Soft bones/Loose ligaments

Common peds fractures

- Torus
- Greenstick
- Both bone forearm
- Supracondylar
- Growth plate

Nursemaid's elbow

- Subluxation of the radial head
  - Mechanism of injury tells you diagnosis
- Does not require imaging
- RX: Reduce ("pop")
  - If reduction does not resolve symptoms
    - Image UE
    - Immobilize
    - f/u with peds or ortho


Greenstick Fracture
Torus Fracture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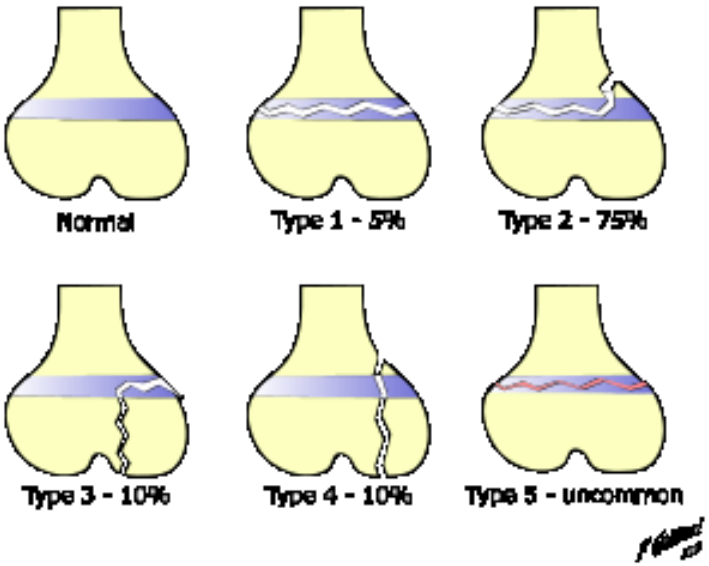
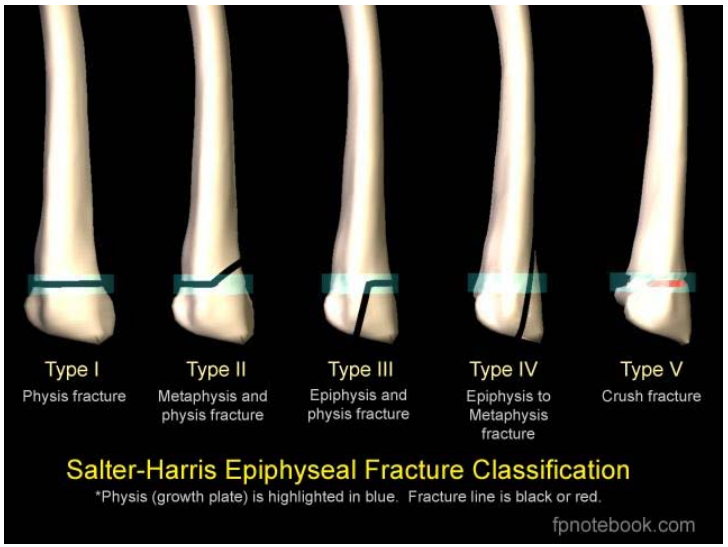
Salter Harris Fractures





Fractures and Child Abuse

Assess mechanism of injury

- Does the story make sense?
- Is the story changing as the visit progresses

Interaction between child/parent/provider

- Overly compliant child, overly affectionate with provider

Significant trauma under 5 years old

- Long bone Fractures/spiral fractures

Is there a witness to injury

Other Clues

Failure to Thrive

- Poor hygiene
- Little subcutaneous fat
- Avoidance of eye contact
- Increased muscle tone, more prominent in the lower extremities

The Limping Kid

Often too young to tell you if they injured themselves

Won't walk on extremity

What is your differential diagnosis?

Differential Diagnosis

Trauma

- Contusion, Fracture, Sprain

Septic Joint

- Recent URI, Fevers

What do you do next

- Assess
  - Was there witnessed trauma?
  - May start with x-ray
  - Motrin
  - Observe

Physical Exam

Inspect the entire lower extremity

- Deformity, ecchymosis, sts, erythema

Palpate

- Depending on pt's age
  - they may or may not be able to localize their pain
- Assess ROM of all joints.
  - Are they guarding?

Observe Gait

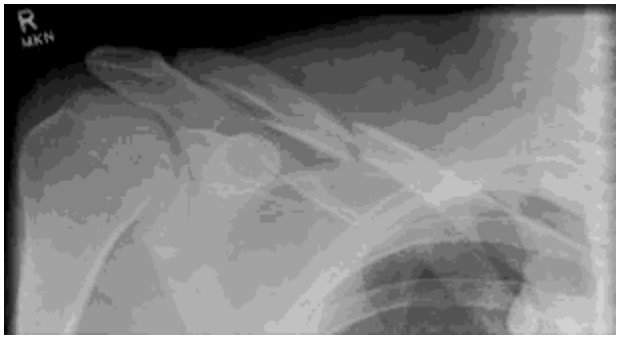
- Are they limping

What to do next

- Imaging: plain xray of the limb
  - Infant films depending on age
    - LE infant/UE infant films
- If films are normal,
  - May need to investigate for septic joint
    - CBC, SED rate
- Treatment
  - Motrin
  - Immobilize if fracture
  - If elevated WBC may consider admission
- Follow up
  - Speak with pediatrician
  - Close follow up in 24 hours

Upper Extremity Fractures

- Clavicle Fractures
- Humerus Fractures
- Glenoid Trauma
- Elbow Fractures
- Forearm Fractures
- Wrist Fractures
- Hand Fractures
- Finger Fractures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Clavicle Fractures

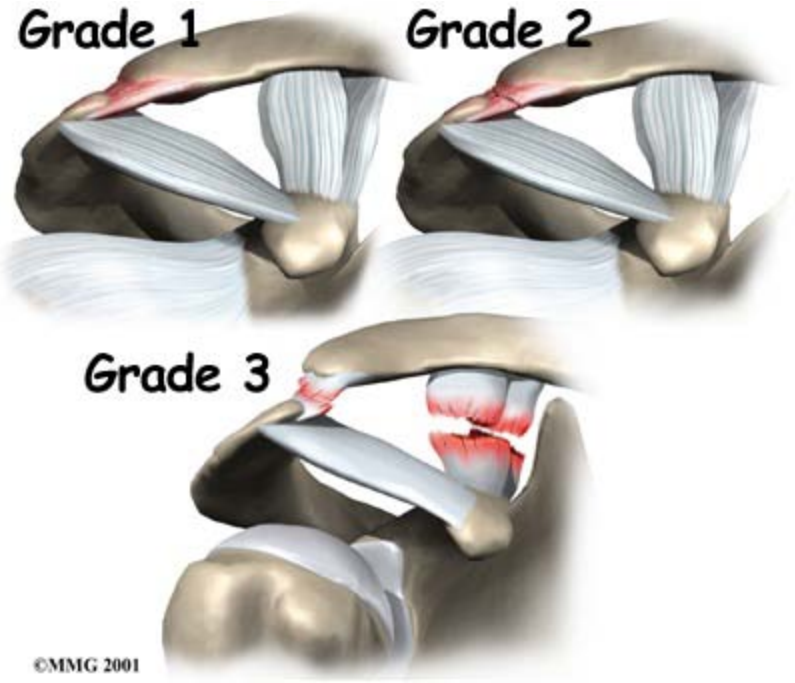
- Seen in kids
- Mechanism of injury
  - Jamming shoulder
    - i.e hockey players
- Types of clavicle fractures
- Physical findings
  - Deformity, sts, ecchymosis, tenderness over the clavicle
    - Often distal 1/3
- Treatment
  - Sling
  - Surgery only if skin is tenting

AC Separation

- Acromioclavicular joint injury
- Falling onto a point on the shoulder with arm adducted
- Physical Exam
  - Tenderness, sts, ecchymosis, deformity over the AC joint
- Imaging:
  - Shoulder x-ray
    - AP and Y view
- Treatment
  - Sling
  - Ortho follow up

AC Injuries

- Grade 1
  - AC ligament partially torn
- Grade 2
  - AC ligament completely torn & acromioclavicular ligament is stretched or partially torn
- Grade 3
  - Both ligaments are completely torn



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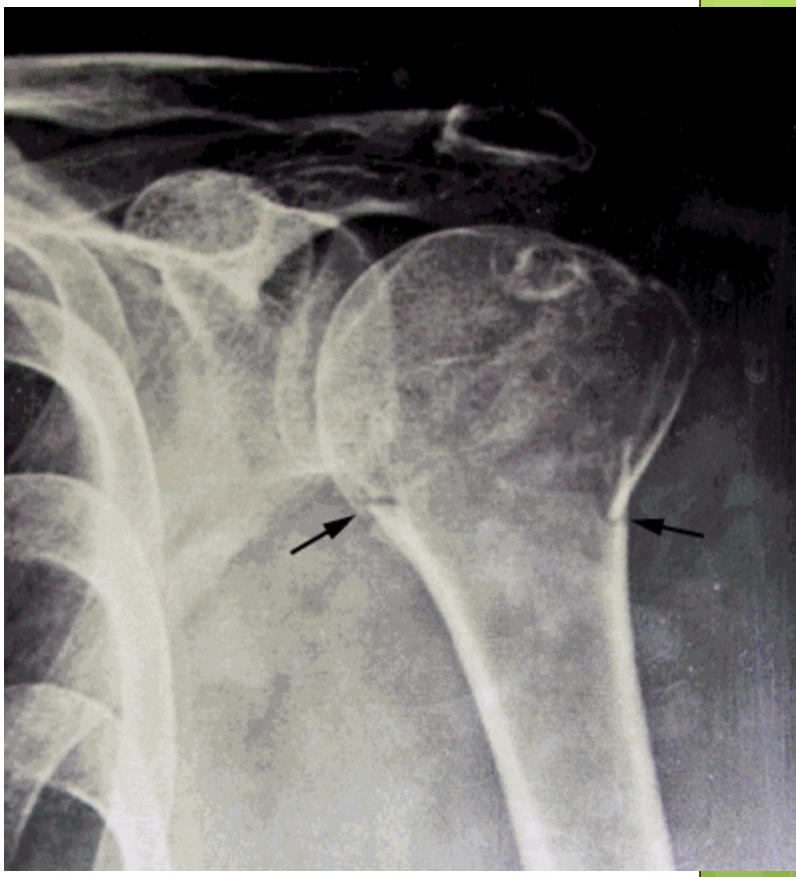


Humerus Fractures

- **Severe shoulder pain**
- Mid-Shaft Fractures
  - ***Assess for radial nerve injury***
    - Most commonly injured
    - weakness of wrist, finger, and thumb extension and some weakness of elbow supination.
    - **“thumbs up” sign**
- Proximal Fractures
  - ***Assess for axillary nerve injury***
    - Deltoid muscle weakness
    - Decreased sensation in the mid-deltoid area
  - ***Suprascapular nerve injury***
    - Supraspinatus/infraspinatus muscle weakness
      - Weakness with abduction & ext shoulder rotation

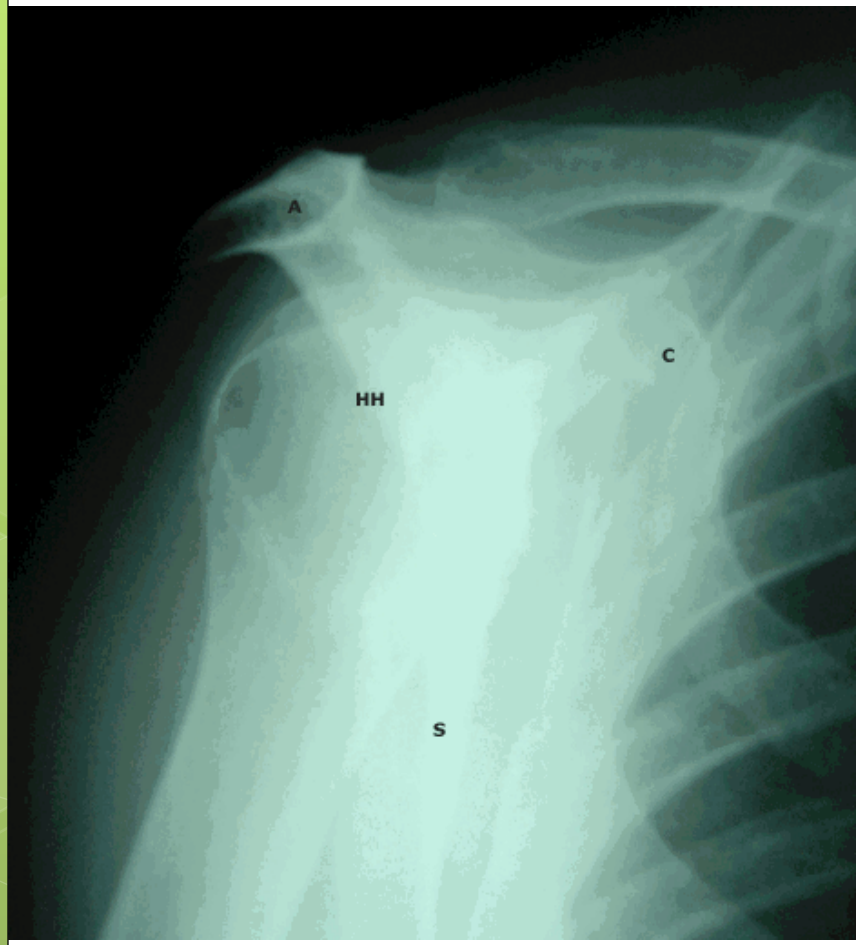
Treatment

Non-Surgical

- Non-displaced
  - Coaptation/sugar tong splint
  - Sling for 1 week
    - associated with better short term pain control and shoulder function
  - Swathe for comfort

Surgical

- Displaced multi-part fractures and displaced fractures.
- Types of Surgical repair
- Pain Control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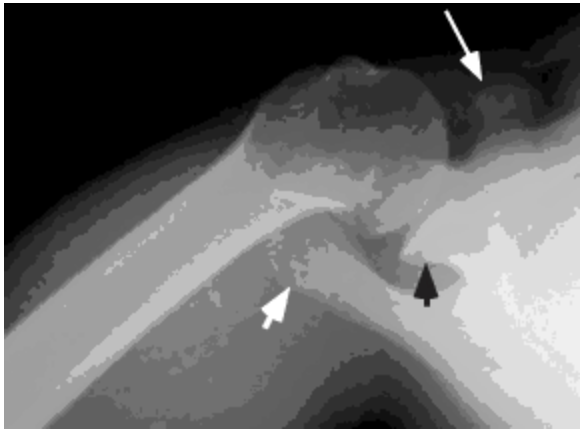
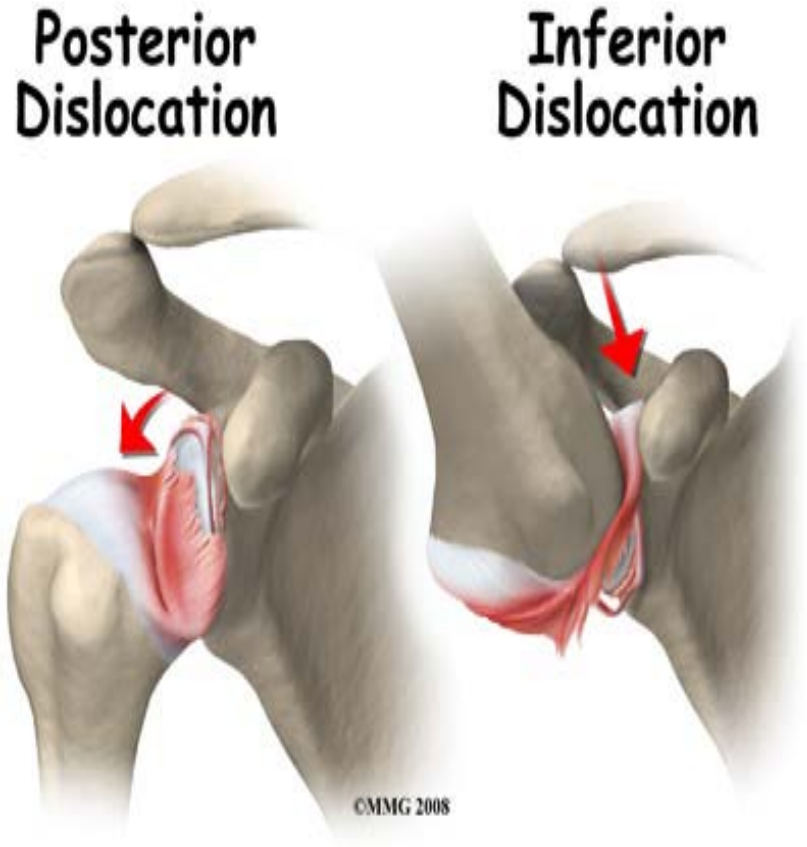


Shoulder Dislocations

- Anterior 95%
- Posterior < 2% of the time
- Inferior rare

- Mechanism of injury
  - Indirect forces: abduction, extension and external rotation
  - Direct blow to the proximal humerus


Posterior Dislocation
Inferior Dislocation
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Shoulder Dislocation

- S/S
  - Hold arm in adduction and internal rotation.
  - Visible depression where the humeral head with normally reside
- PE:
  - Unable to touch opposite shoulder
  - Assess NV
    - Sensation over the deltoid, pulses
- Imaging: AP and Y view

Anterior Shoulder Reduction Techniques

- Scapular Manipulation
  - Pt is prone, traction on arm hanging, push on tip of scapula while stabilizing the upper scapula
- External Rotation
  - Pt supine, arm is adducted close to the thorax. Elbow is flexed at 90 degrees and the operator very slowly externally rotates the arm without applying longitudinal traction.

Anterior shoulder reduction technique

- Modified Hippocratic
  - Traction-Countertraction method
    - Pt supine, elbow adbucted slightly and flexed to 90 degrees. Operator ties a sheet around his wasist and to the pt’ s proximal forearm. Assistant slings naother sheet around the thoraxa nd under the affected armpit and ties it around his own waist. Operator and the assistant pull in opposite directions
- Stimson Method
- Snowbird Technique
- Milch Technique


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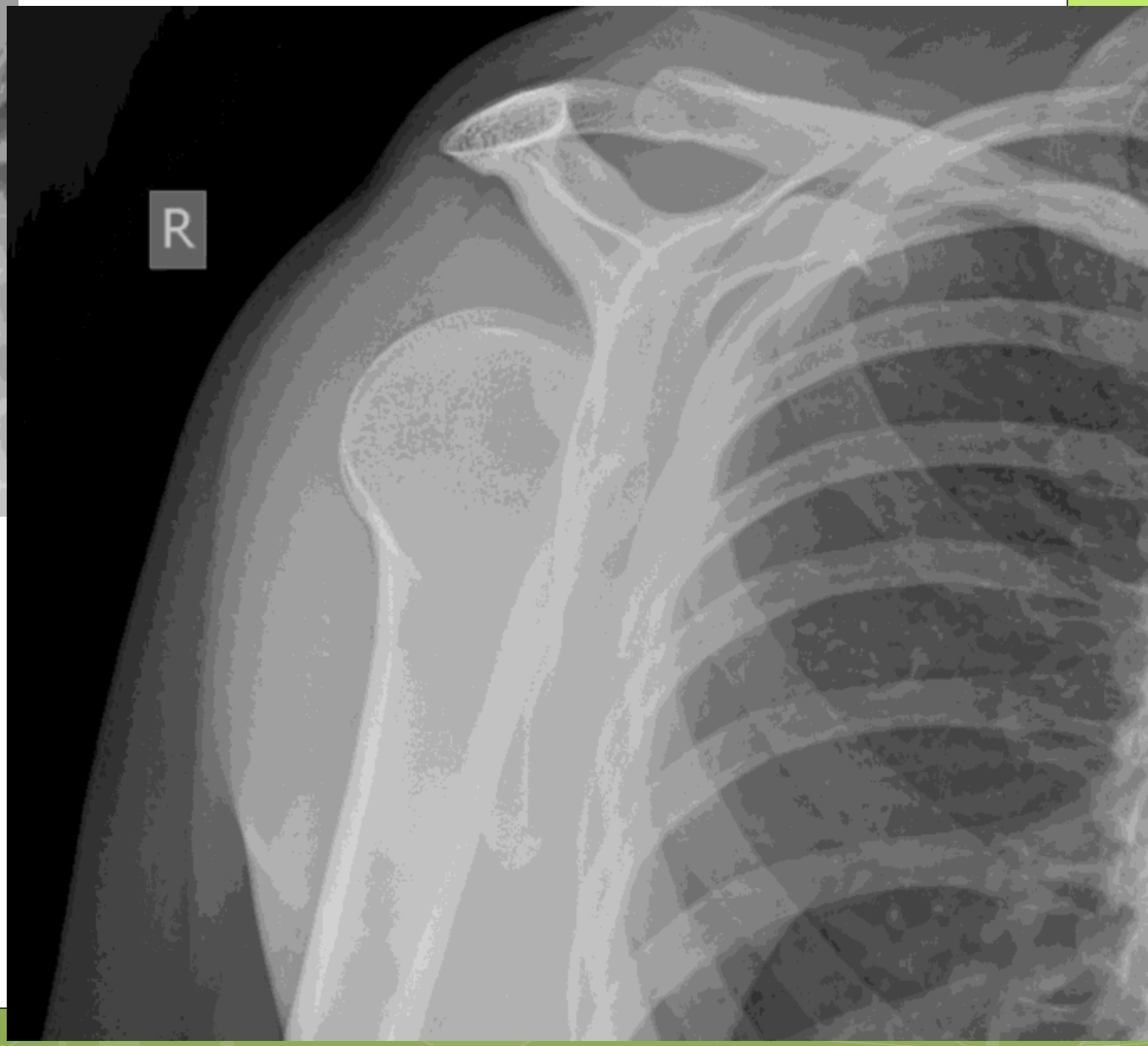
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Hill Sachs Deformity

Hills Sachs Deformity

- Posterior lateral depression of the humeral head
  - Occurs in the process of dislocating shoulder
- Seen in as many at 92% of anterior shoulder dislocations
- Surgical repair
  - If significant shoulder instability

Treatment

- Post reduction films
- Sling
- f/u ortho

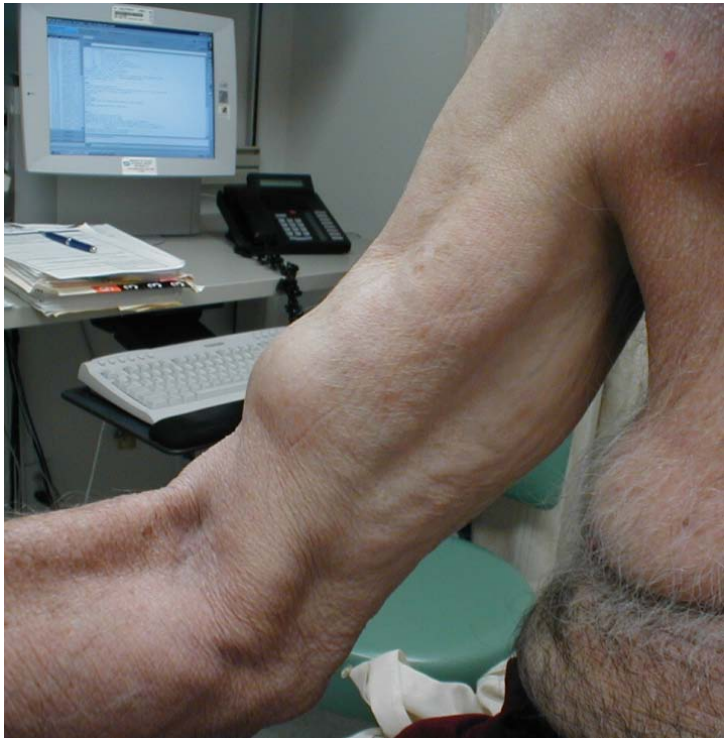
Rotator Cuff Injuries

- Traumatic vs chronic
- Mechanism
  - Overhead activities
    - Tennis, swimming, baseball, falling outstretched arm, lifting or catching heavy object
  - The trauma may not be significant in pt's with chronic rotator cuff injuries
    - Gradual pain

Rotator Cuff Injuries

- Physical exam
  - Tenderness w/ abduction, ext rotation, elevation
  - The empty beer can test
    - Isolates the supraspinatus
  - Tenderness at the joint
- Imaging
  - In ER
    - baseline x-ray to look for fx in the acute injury
    - Degenerative changes in pts with chronic injuries
- Treatment
  - Sling
  - Rest
  - f/u ortho to determine extent of injury (MRI)

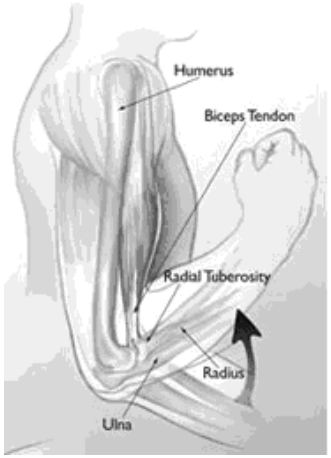
What is this?

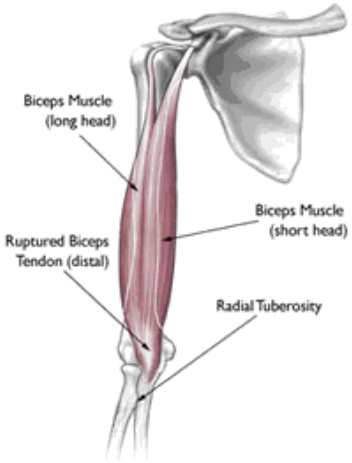


Biceps Injury

- Proximal
  - **Most common**
- Mechanism
  - Nearly all involve the proximal long arm of biceps
  - Elbow is forced straight against resistance
  - Snap or Pop
    - “ball deformity” while elbow is flexed
- Treatment
  - Sling, ice, rest
  - Surgical repair in young active people

- Distal
  - Less common
- Same mechanism
  - Pain in the antecubital fossa
  - Can’t palpate the tendon in the fossa
  - “ball deformity”
- Same treatment





Biceps Anatomy

Epicondylitis-Overuse

Lateral Epicondylitis

- "Tennis Elbow"
- Tenderness over the lateral epicondyle with forced extension and supination against resistance
- ED treatment
  - Rest, ice, NSAIDs, immobilize

Medial Epicondylitis

- "Golfers Elbow"
- Tenderness over the medial epicondyle with forced flexion and pronation of forearm, wrist and digits
- +/- ulnar neuropathy because of the proximity to ulnar nerve
- Treatment same

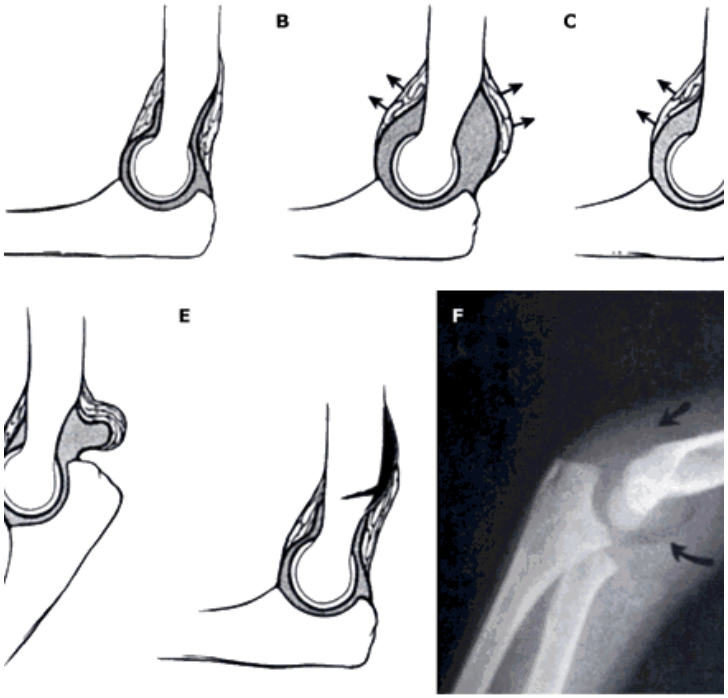
Radial Head and Neck Fractures

- Mechanism of Injury
  - FOOSH- Axial Load
  - Can occur in relation to a Monteggia fracture
    - Ulnar fracture with radial head fracture or elbow dislocation
    - Rarely injured, the posterior interosseous nerve can be tested by having the patient extend their thumb.

Radial Head Fracture

- S/S
  - Pain, tenderness, decreased ROM
- Assess ROM
  - Supination/Pronation, Flexion/Extension
    - decreased extension of the elbow joint
      - Hemarthrosis

Imaging- Sail Sign



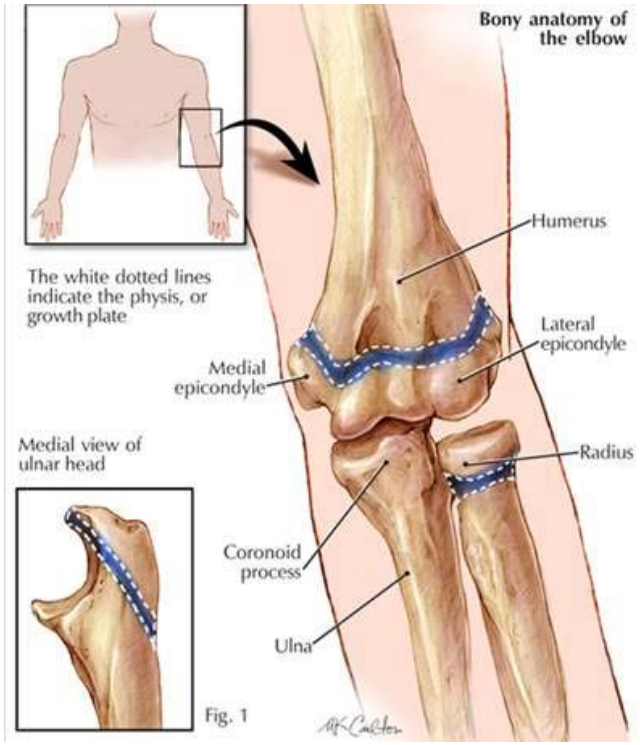
Mason Classification

- Mason Type I
  - Non-displaced fractures (displacement ≤2 mm)
- Mason Type II
  - Fx with Displaced >2mm
- Mason Type III
  - Comminuted fractures
- Mason Type IV
  - Radial head fracture with associated elbow dislocation

Treatment

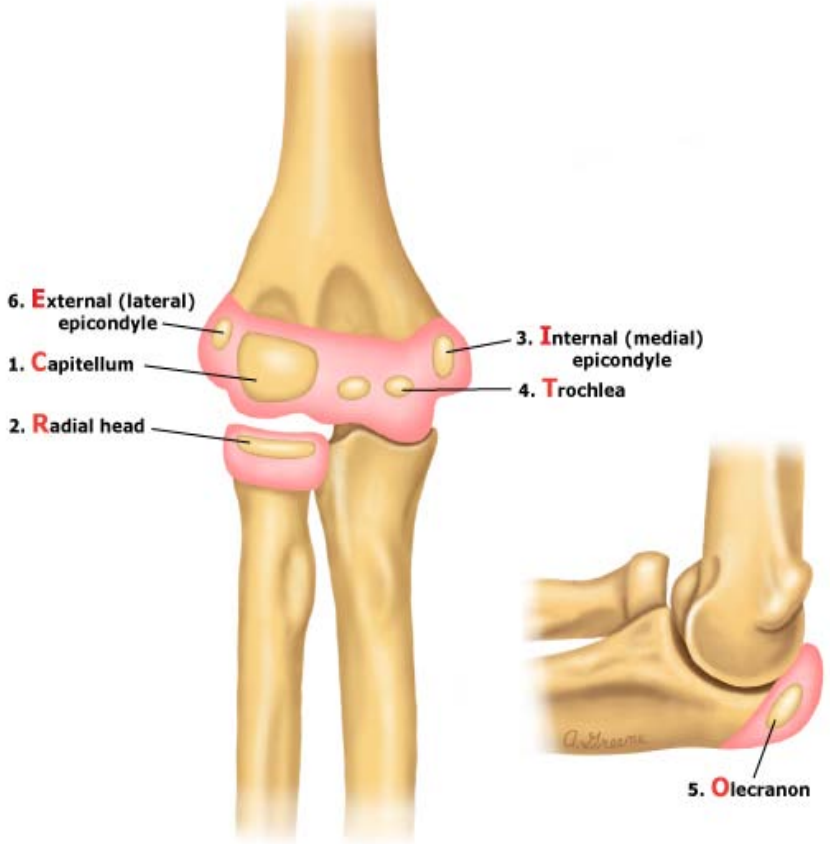
- Sling
- Posterior mold for comfort or severe injury
  - Range of motion exercises should be started as early as possible.
- RICE
- Analgesics
- Ortho Follow up for non-displaced fractures
- Ortho Consult for more complex fractures with or w/o dislocation
- Surgical intervention for Mason III-IV

Location of Growth Plates Elbow Joint



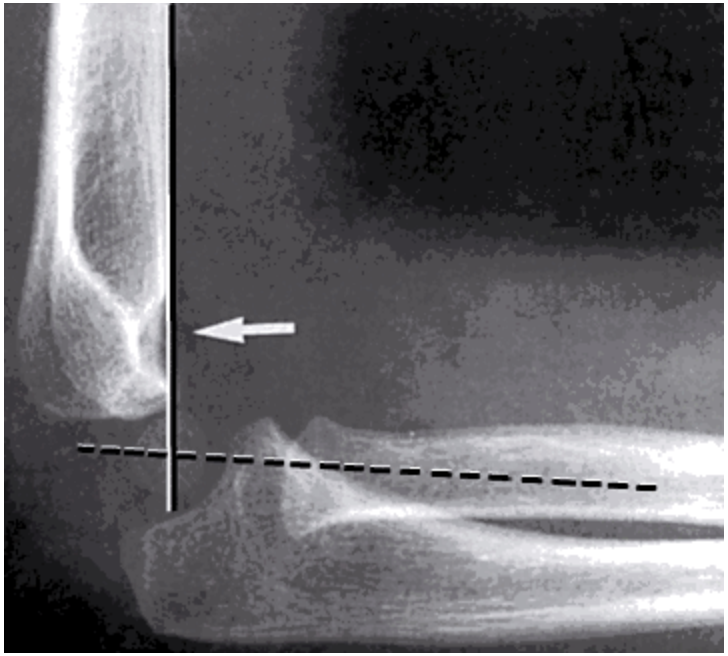
Ossification Centers

- C - Capitellum
- R - Radial head
- I - Internal (medial) epicondyle
- T - Trochlea
- O - Olecranon
- E - External (lateral) epicondyle



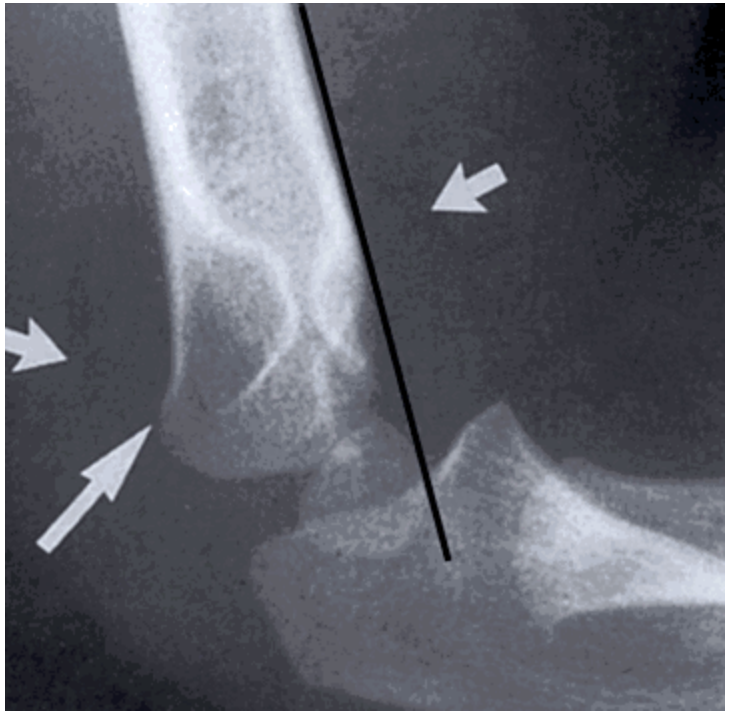
Normal Pediatric Elbow X-Ray

- Anterior fat pad (arrow)
- No Posterior fat pad
- Note the Alignment



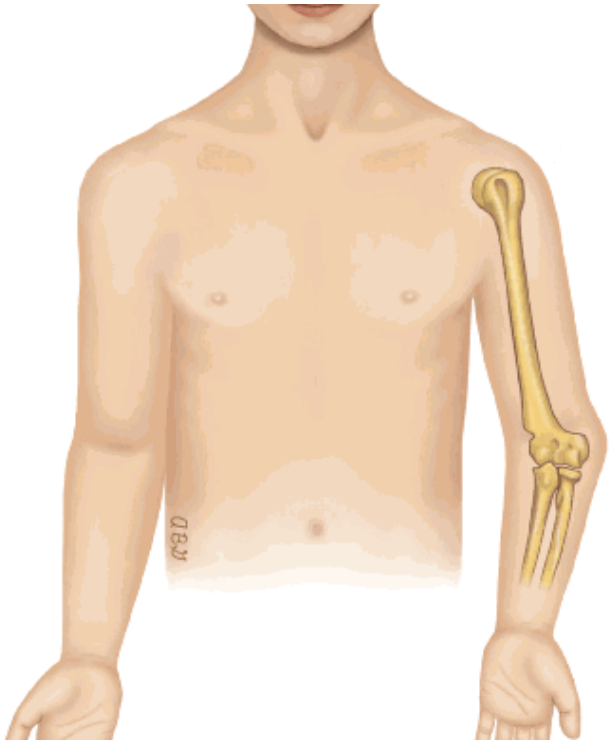
Abnormal Pediatric Elbow X-Ray

- Most common mechanism of injury is hyperextension
- Posterior displacement of the distal humerus is common when a fracture occurs.
- The anterior humeral line passes through the anterior third of the capitellum or fails to intersect it



Carrying Angle

- Normal carrying angle
  - 5 to 15 degrees
  - The arms in anatomic position
    - (eg, extended with palms facing forward)
    - Hands and forearms slightly away from the body.
- Varus deformity of the elbow
  - "gunstock deformity”
    - This abnormality may be seen with inadequate alignment of a displaced supracondylar fracture.

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Supracondylar Fracture

- Occurs in peds mostly
  - 4-10 years of age
- Mechanism
  - FOOSH
- S/S:
  - Hold affected arm in extension
  - STS, tenderness over the distal humerus
  - +/- S shaped deformity
- Imaging
  - lateral view most helpful
  - PEDS: Look for the anterior humeral line to pass through the capitellum
- Treatment (ortho consult)
  - Immobilize for non-displaced
  - Reduction if there is displacement
  - Surgical if completely displaced

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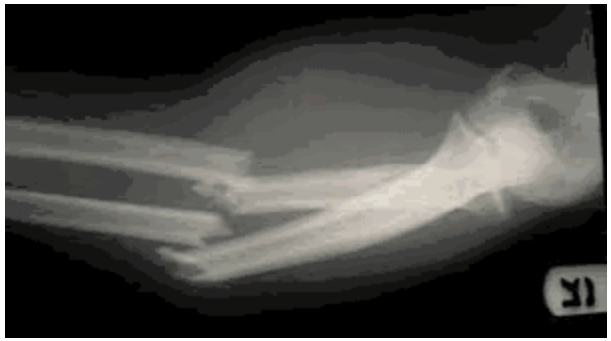
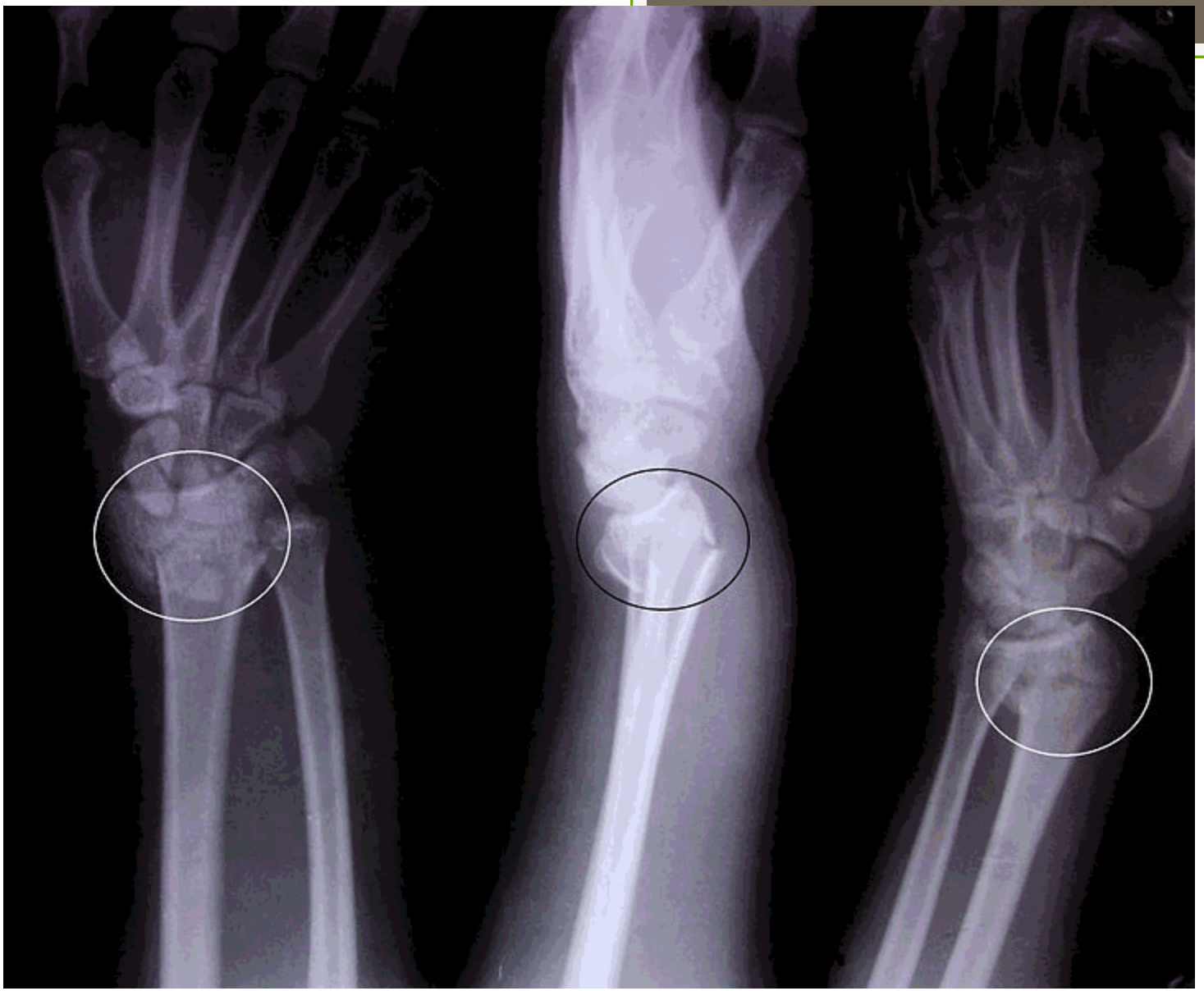


Forearm Fracture

- Mechanism
  - FOOSH
  - Small repetitive injuries
    - Stress fractures
  - Direct blow to forearm
  - i.e Night Stick Fracture
- S/S
  - STS, ecchymosis, tenderness, decreased ROM

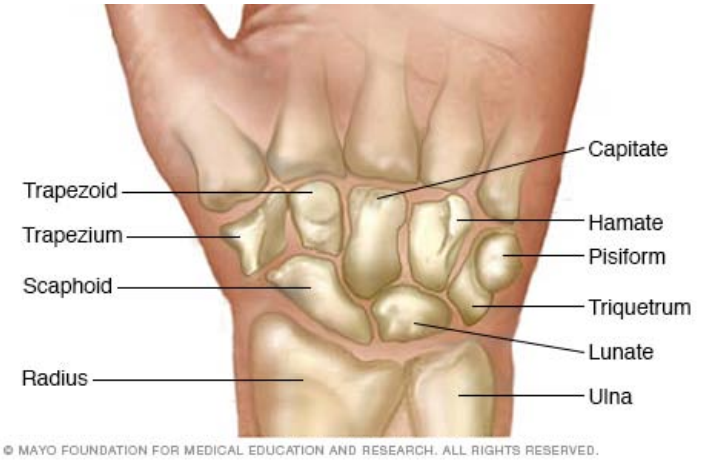
Types of Forearm Fractures

- Colles'
- Smith's
  - Reverse Colles'
- Galeazzi
  - Distal radius Fractu
  - With radio-ulnar dislocation
- Monteggia
  - Ulnar fracture
  - With Radial head dislocation



Wrist Fractures

- FOOSH
- Presentation
  - Sts, ecchymosis, tenderness, +/- Deformity
- Imaging
  - 3 views of the wrist



Scaphoid Fracture

- Most common carpal bone fracture
- ***10% of radiographs fail to detect fracture***
  - Leads to ***avascular necrosis***.
    - The bone has a distal blood supply
      - When fractured, the proximal portion may not get blood and dies.
- Always check for ***snuff box tenderness***
  - Get scaphoid view
  - If normal radiographs, but have scaphoid tenderness
    - Immobilize with thumb spica, f/u ortho

Triquetral Fracture

- 2nd most common
- Usually avulsion fracture
  - Twisting motion is suddenly resistend
  - Hyperextension shear stress pushes the other carpal bones against it
- Lateral radiograph is most important
- Avulsion fractures
  - treat with wrist splint 1-2 weeks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Hand/Finger Fractures

Stable Metacarpal Fractures

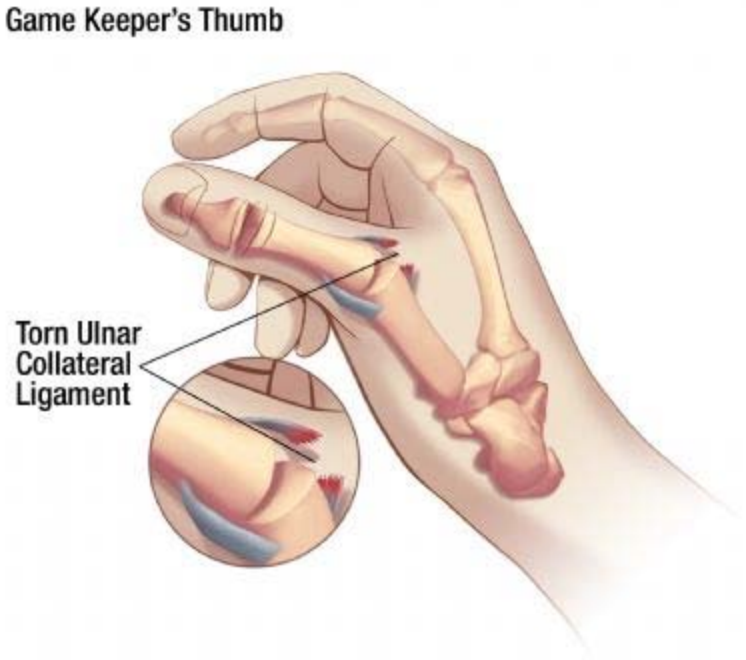
- 2nd-4th Metacarpal Fractures
  - More stable because of supporting structures
  - Less laxity
- Other MC fractures

Unstable Metacarpal Fractures

- Boxer's Fracture
  - Fracture through the neck of the 5th MC
  - Striking an object forcefully with closed fist
  - Rotational Deformity
    - Attempt closed reduction in ED
    - Ulnar gutter splint
    - Requires surgical repair
- Bennett's fracture
  - Fx of the proximal 1st MC
  - Axial load to the flexed thumb
  - Refer to hand surgeon
  - Thumb spica

Gamekeepers Thumb

- Hyperextension of the abducted thumb
  - Ulnar collateral ligament injury
    - +/-avulsion fracture
- PE
  - Tender over UCL
  - Laxity of the ligament
    - Laxity without an endpoint assume complete tear
- Treatment
  - Thumb spica
  - Ortho for ORIF

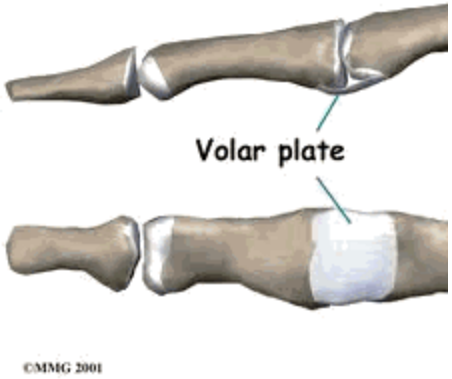


Mallet Finger

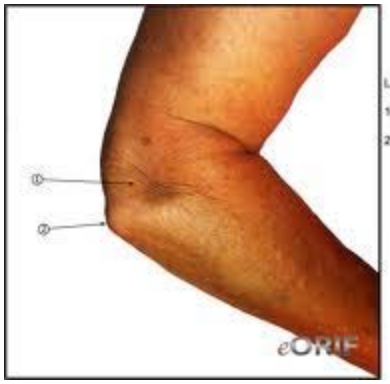
- Mechanism
  - 16 inch soft ball in Chicago (jamming)
- Presentation
  - Rupture of the distal extensor tendon
  - Flexion deformity of the DIP joint
  - Imaging
    - commonly shows an avulsion fracture at the DIP joint
  - Treatment
    - Splint in extension (stacks splint) for 6-8 weeks.

Other Finger Injuries

- Volar Plate Fractures
  - Hyperextension injury
  - Avulasion fracture at



- Finger dislocation
  - Most common dorsal displacement at PIP joint
  - image
  - 2point discrimination
  - Manual Reduction
  - Post reduction films



Lateral Elbow Dislocation
(lateral view)
1. Dipple and abnormal skin wrinkles.
2. Olecranon

Brachial Plexus Injuries

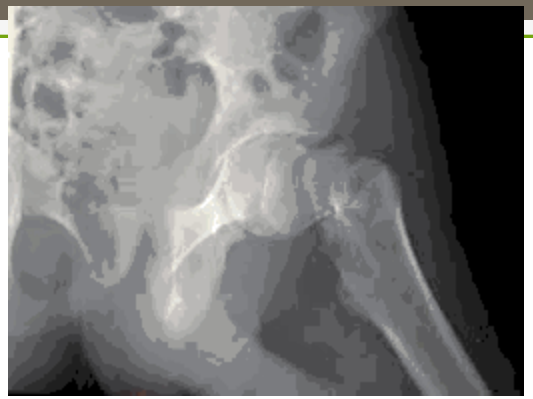
- How do they occur?
  - Penetrating, compression, or closed traction injuries.
  - High speed MVC or motorcycle crashes.
  - Often missed because of significant trauma
    - Chest trauma
    - fractures of nearby structures
      - clavicle, scapula, long bones

Identifying Brachial Plexus Injury

- C5
  - weakness of the deltoid and infraspinatus
    - Adduction and internal rotation of shoulder
- C6
  - Weakness of the biceps
    - Elbow extension
- C7
  - Weakness of the extensors
    - Flexion of the digits and wrists

Lower Extremity Fractures

- Hip Fractures
- Pelvis Fractures
- Femur Fracutres
- Knee Fractures
- Tibia Fractures
- Ankle Fractures
- Foot Fractures
- Toe Fractures

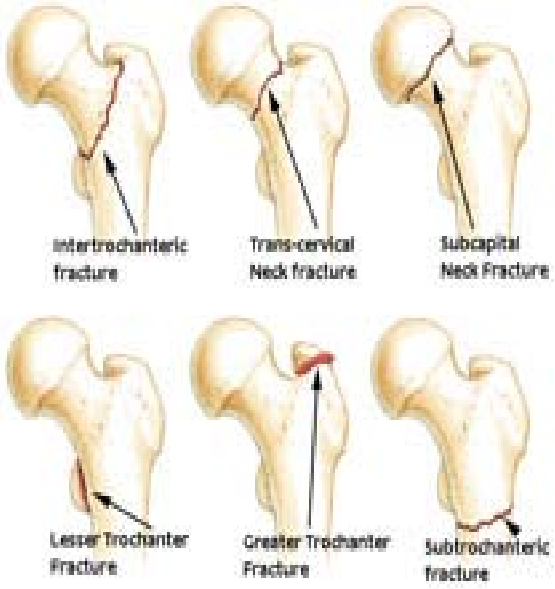


Hip Fracture

- Mechanism is usually fall
  - Assess mechanical vs syncope
  - Often seen in Elderly
    - Prolonged immobility after fall
      - Think about dehydration/rhabdomyolysis
- Presentation
  - Pain in hip joint, knee pain, groin pain

Types Of Hip Fractures

- Femoral head
  - High energy trauma (assoc with dislocation)
  - Dash board to flexed knee
- Femoral neck
  - Elderly
    - Low impact falls
  - Uncommon in young
- Greater trochanteric
  - Elderly (direct trauma)
  - Adolescents (Avulsions)
- Lesser trochanteric
  - uncommon
- Intertrochanteric/Subtrochanteric
  - Elderly
  - High energy trauma



Treatment

- Femoral Head
  - Ortho Consult
  - Emergency reduction, ORIF if unsuccessful
  - Admit
- Femoral Neck
  - Ortho Consult
  - Non-operative to total hip arthroplasty
  - Admit

Treatment

- Isolated Trochanteric Fractures
  - Protected weight bearing
  - Close ortho follow up
  - Significant displacement would require operative management
- Intertrochanteric Fractures
  - Occur between the greater and less trochanter
  - Ortho consult
  - Admit for ORIF
  - Blood loss can be significant with these patients

Treatment

- Subtrochanteric
  - Significant blood loss may develop
  - Immobilization with traction devise
  - Admit
  - ORIF is common

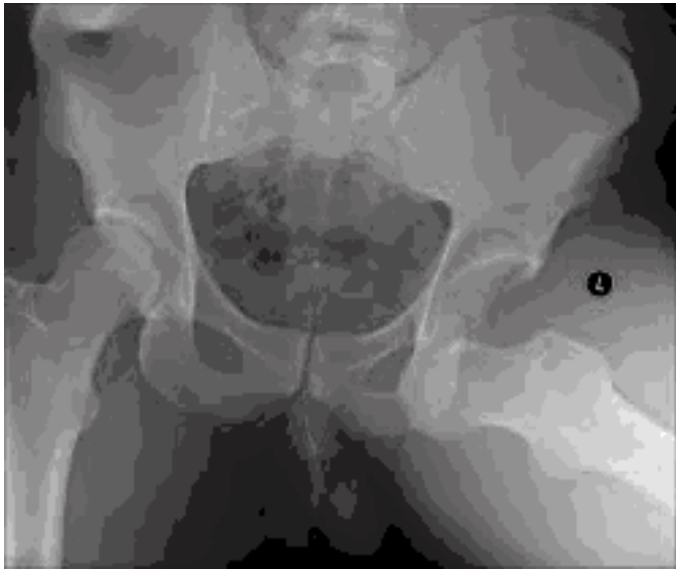
Hip Dislocations

Anterior

- 10%
- MVC
  - Most common
- Fall
- Blow to the back of the leg
- Reduce within 6 hours
  - To avoid avascular necrosis

Posterior

- 90%
- Force applied to flexed knee, directed posteriorly
- Mvc
  - most common
- PE: shortened, internally rotated, adducted
- Reduce within 6 hours
  - Will discuss techniques for reduction in simulation



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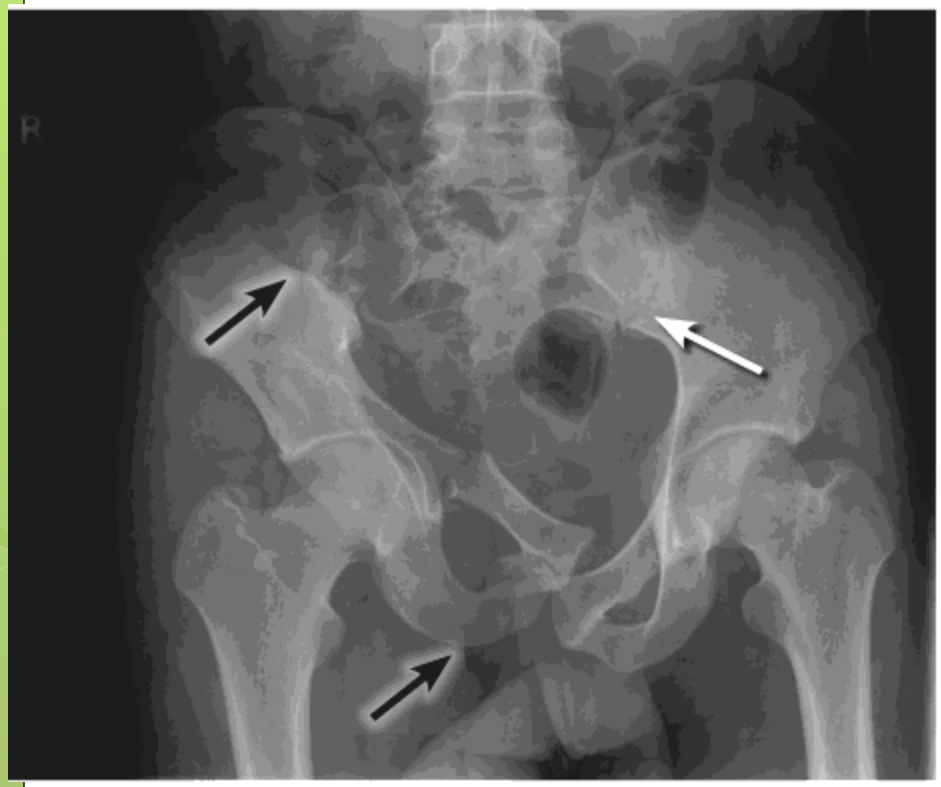
Pelvic Fracture

- Blunt trauma
- Assess urination, pregnancy, defecation
- Physical Exam
  - local tenderness over pelvis
  - Pelvic instability
  - Severe shock
    - Iliac artery and venous trunks pass through the SI joints bilat
  - Rectal exam
    - Displacement of prostate
    - rectal injury
    - abnormal bony prominence
    - large hematoma

Imaging

- AP Pelvis
- CT is more sensitive than plain film
  - **Gold standard** for evaluating the evaluating a pelvic fracture
    - If high suspicion and normal xray, consider CT
  - Contrast used if concern for hematoma, arterial bleeding, soft tissue injury
- If pelvic fracture is found
  - Look for intra-abdominal , retroperitoneal, gynecologic or urologic injury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Treatment

- Control bleeding
  - Fluid resuscitation
    - Crystalloid, blood, blood products
    - Most bleeding is venous.
      - 15% is arterial
    - Retroperitoneal bleeding is common with pelvic fractures
      - 4 L of blood can accumulate before tamponade occurs
      - If FAST exam was done and intraperitoneal fluid is found in an unstable patient, then laparotomy is needed.

Treatment

- Stabilize fracture
  - Bed sheet
- Bed rest
- Often require ORIF within 2 weeks time
- Treatment is guided by the **fracture location** and **pelvic instability**

Complications

- Urethral injuries
  - Retrograde urethrography
    - Before foley catheter is placed
- Vaginal lacerations
  - Perform pelvic exam
- Pregnancy
  - Associated with high fetal death rates
- Rectal injuries
  - Uncommon
  - Ass. with ischial fx
  - Rx: early colostomy
- Nerve root injuries
  - Deficits in a nerve root pattern.
  - Delayed presentation
    - Lumbar nerve root injuries seen with SI joint dislocations or fx
    - Sacral nerve injury
      - Seen with sacral fx (s1 and s2)

Femur Shaft Fracture

- Young people
  - High energy trauma
- Pathologic fractures uncommon
  - Secondary to metastases or rarely primary bone tumor
- Present with sts, deformity, shortening
- Physical exam: assess nv status
- Imaging
  - Plain films

Open Femur Fracture

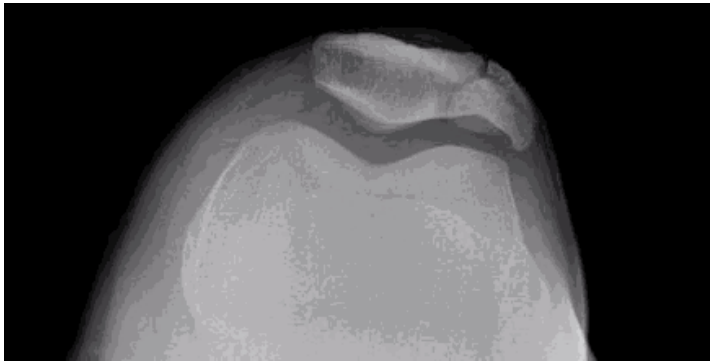
- Immediate broad spectrum antibiotic coverage
- Copious irrigation
  - OR for further irrigation and debridement
- Ortho consult early
- Pain control
- RX: TRACTION, OR

Patella Fractures

- Mechanism
  - Direct blow
  - Transverse Fractures
    - Most common
    - May be displaced
- Physical Exam
  - Focal tendenress, STS, effusion, ecchymosis
  - Associated with disrupted extensor mechanism
    - Check patient is able to extend lower leg
- RX: ortho consult, surgical if displacement immobilize

Sunrise View

Vertical patellar fracture



Bipartite Patella

Involves the superior lateral corner of the patella

Bilateral

Smooth cortical margins

Comparison view

Quadriceps Tendon Rupture

- From forceful rupture contraction or falling on flexed knee
- Seen with patellar fracture as well
- Unable to extend lower leg.
- X-ray may show high riding patella
- Surgical repair

Femoral Condyle Fractures

- Fall with axial load or direct blow
  - Presentation
    - Pain, sts, deformity, rotation, shortening, unable to ambulate
- Popliteal artery injury
  - Uncommon but distal sensation and pulses should be checked
    - Assess the deep peroneal nerve
      - Space between the first and second toe

Imaging

Treatment

- Ortho Consult
- Long leg splint
  - non-displaced fractures in all age groups, stable impacted fractures in the elderly
- ORIF for displaced fractures

Tibial Plateau Fractures

- Seen in Elderly population
- Valgus or varus forces combined with axial load
  - Ie fall, leg hit by car
- Presentation
  - STS, tenderness to knee join, inability to move knee joint
- Assess the ACL, PCL, MCL, LCL which can be injured in plateau fractures

Imaging- Easily missed

Treatment

- Treatment
  - Nondisplaced fractures
    - Knee immobilizer
    - Ortho follow up 2-7 days
  - Depression of the articular surface
    - Early ortho consult for ORIF

Tibia Shaft Fractures

- Direct blow to the bone
- Treatment
  - Long leg splint
  - Open fractures require immediate ortho cosult
    - Irrigated in OR
- Complications
  - Compartment syndrome

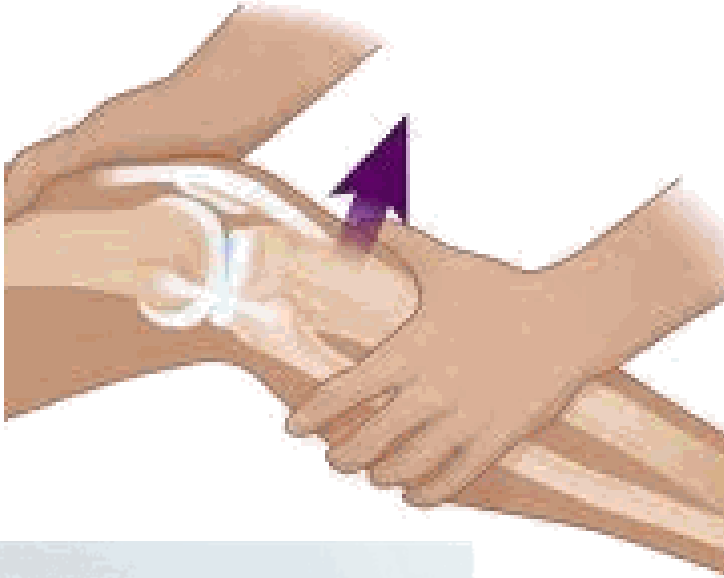
Knee Injury

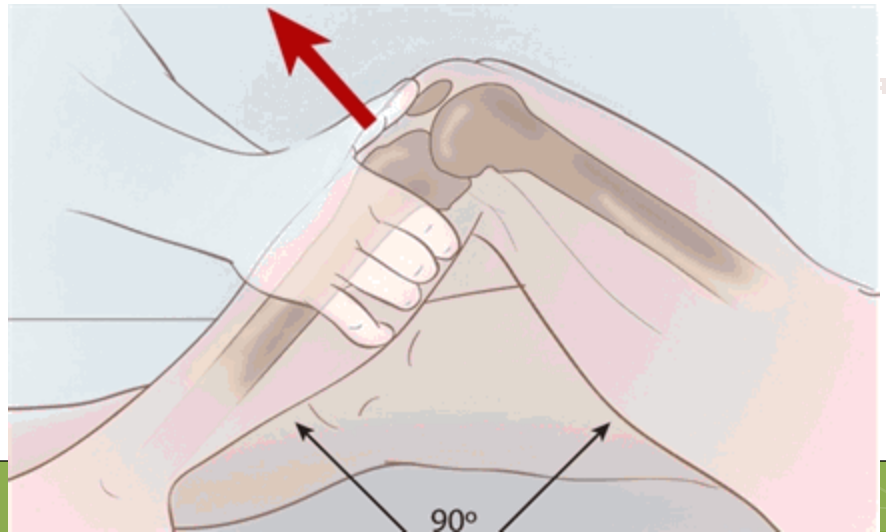
- Mechanism
  - Fall onto knee
    - bony injury
  - Planting/Twisting
    - Ligaments/cartilage injury
  - hit from medial or lateral side
    - MCL/LCL ligament injury
- Pain, tenderness, +/- effusion

- Physical exam
  - Compare two knees
    - Look for effusion, palpate for tenderness
    - Assess laxity
      - Anterior drawer sign
      - Posterior drawer sign
      - McMurray's
      - Valgus and Varus Stress
- Imaging
  - Plain x-ray of the knee
- Knee immbolizer, non-weightbearing, ortho

Anterior Cruciate Ligament Injury

- Anterior Drawer
- Lachman's- more sensitive
- Present with hemarthrosis
- X-ray
  - Effusion
  - May see avulsion fracture





Posterior Cruciate Ligament

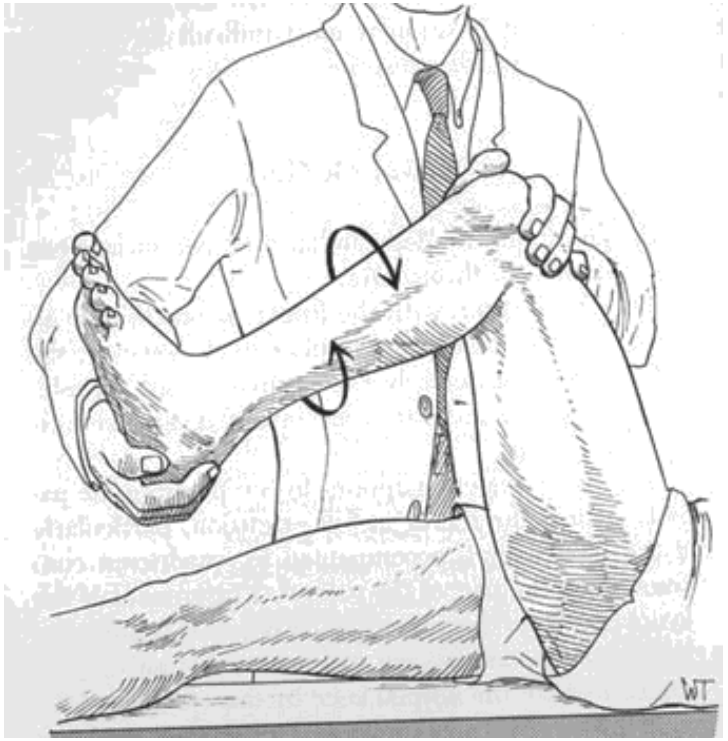
- Posterior Drawer Sign
- Usually seen in association with other ligament injuries
- Unusual to see it alone

Collateral Ligament Injuries

- Compare knees for effusion
- Usually hit from side of ligament injury
- Assess for laxity with valgus (MCL) and varus (LCL) stress
  - Laxity with an endpoint is partial tear
  - Full laxity with no endpoint assume complete tear
- X-ray image may only show effusion or possible avulsion fracture
- Rx: knee immobilizer, non-weightbearing, ortho

Meniscal Injuries

- Cutting, swatting, twisting
- Found to have joint line tenderness
- McMurray test
- Locking of the knee may occur with flexion/extension
- Partial weight bearing
- f/u ortho



Ankle Fractures

- Mechanism
  - Inversion injury with or without eversion
  - The type of resulting fracture depends on the amount of force involved
    - Distal fibular or tibia (unimalleolar)
    - Bimalleolar
    - Trimalleolar
    - Maisonneuve fracture
    - Dislocations/subluxation

Presentation
Physical Exam

- Pain, STS, ecchymosis, deformity
- Assess skin color, pulses, neurovascular
- Palpate
  - Lateral malleolus, medial malleolus, proximal fibula, base of the 5th MT, achilles, dorsal foot.
  - Stability of the ankle joint
- Open fractures
  - Require ortho consult, OR, early antibiotics and irrigation


R


A
B
R


SUPINE
R

Treatment

- Unimalleolar Fracture
  - Short leg immobilization
  - Non-weight bearing
  - F/u ortho 2-7 days
- Bimalleolar/Trimalleolar Fractures
  - Often can be unstable because of ligamentous
  - Immobilize/maintain pulse
  - Ortho Consult

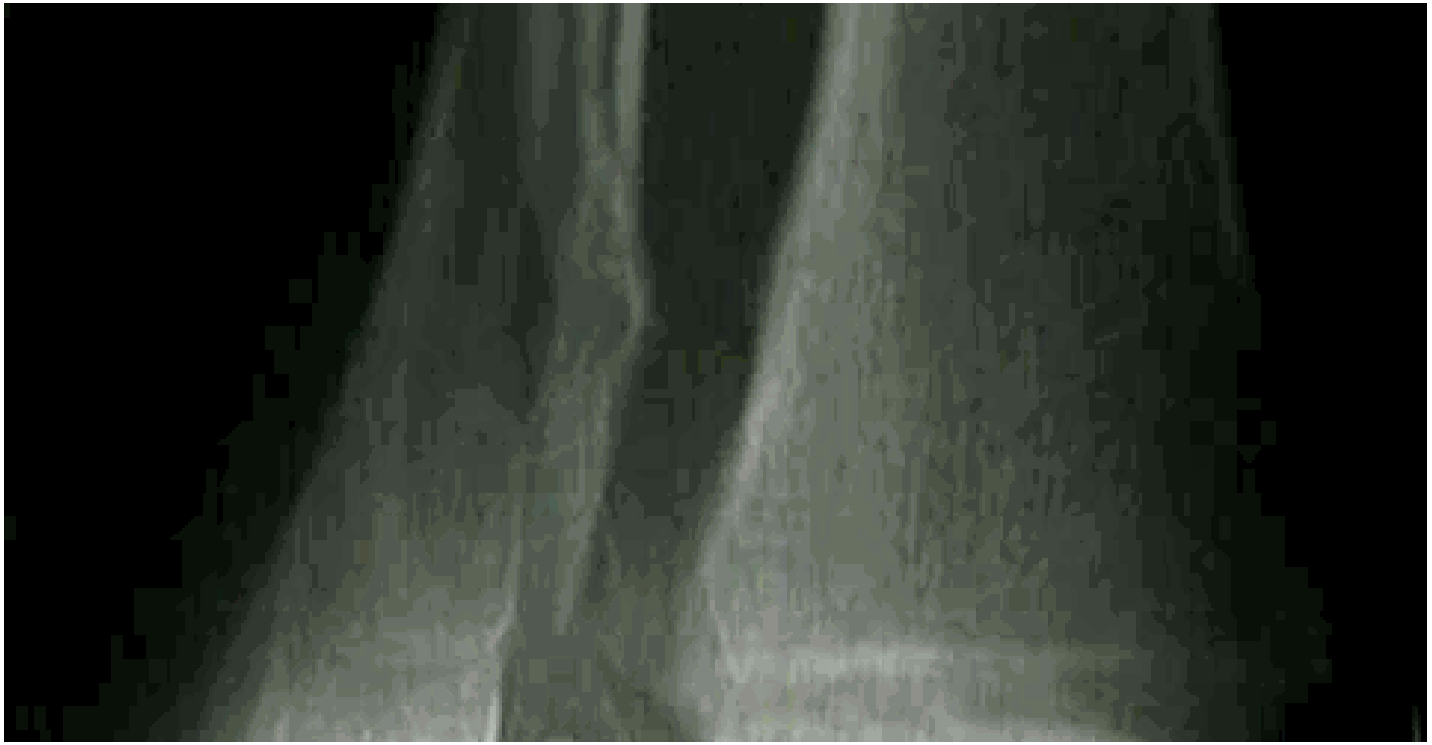
Maisonneuve Fracture

- Force on the foot that causes deltoid ligament injury or medial malleolus injury which causes the interosseous membrane to shear and a leads to a fracture of the proximal fibula.
- Tenderness at the proximal fibula with ankle injury requires imagining of tib/fib

Dislocations/Subluxations

- Posterior dislocation most common
  - Backward force on plantar flexed foot
  - Results in rupture of talofibular ligaments or lateral malleolus fracture
- Anterior are less common
  - Force on dorsiflexed foot associated with ant tibial fracture
- Lateral dislocations
  - Ligamentous disruption and fracture of one or both malleoli

Image



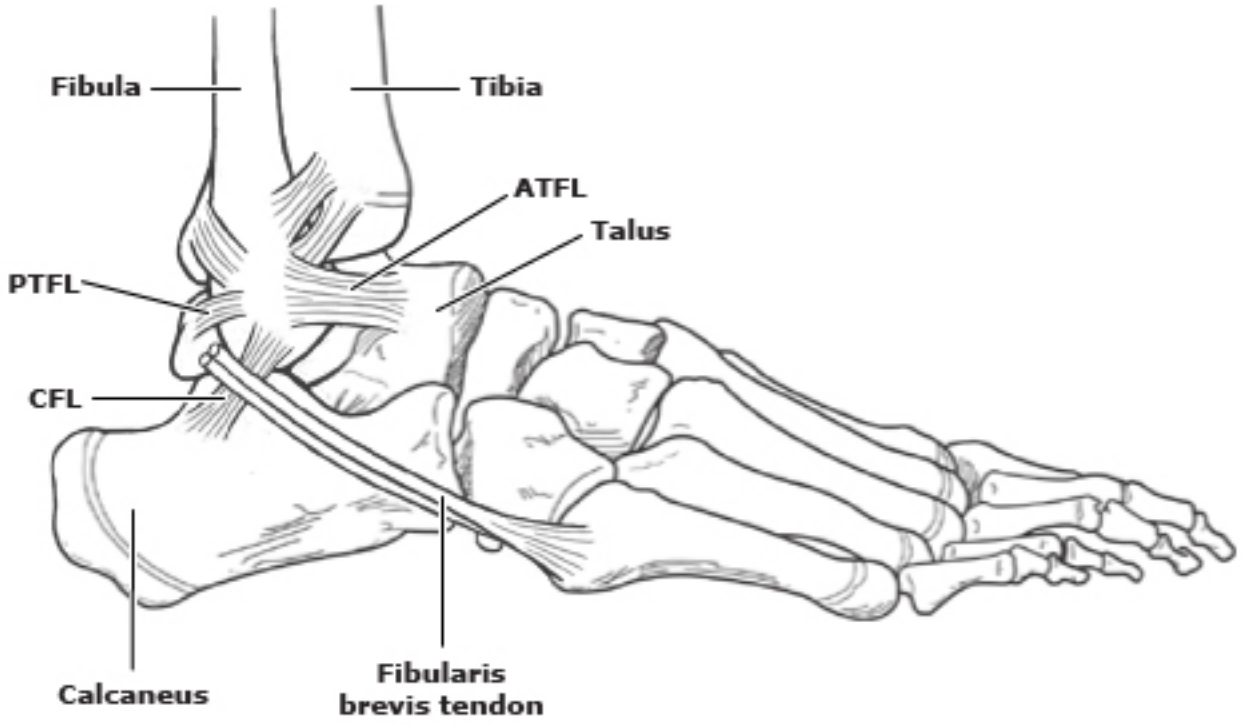
Concerns

- Neurovascular compromise and eventual open fracture
  - Dusky foot, absent pulses
  - Tenting of skin
    - Requires immediate reduction (with or without pre-radiographs)
    - Ortho consult

Ankle Sprain

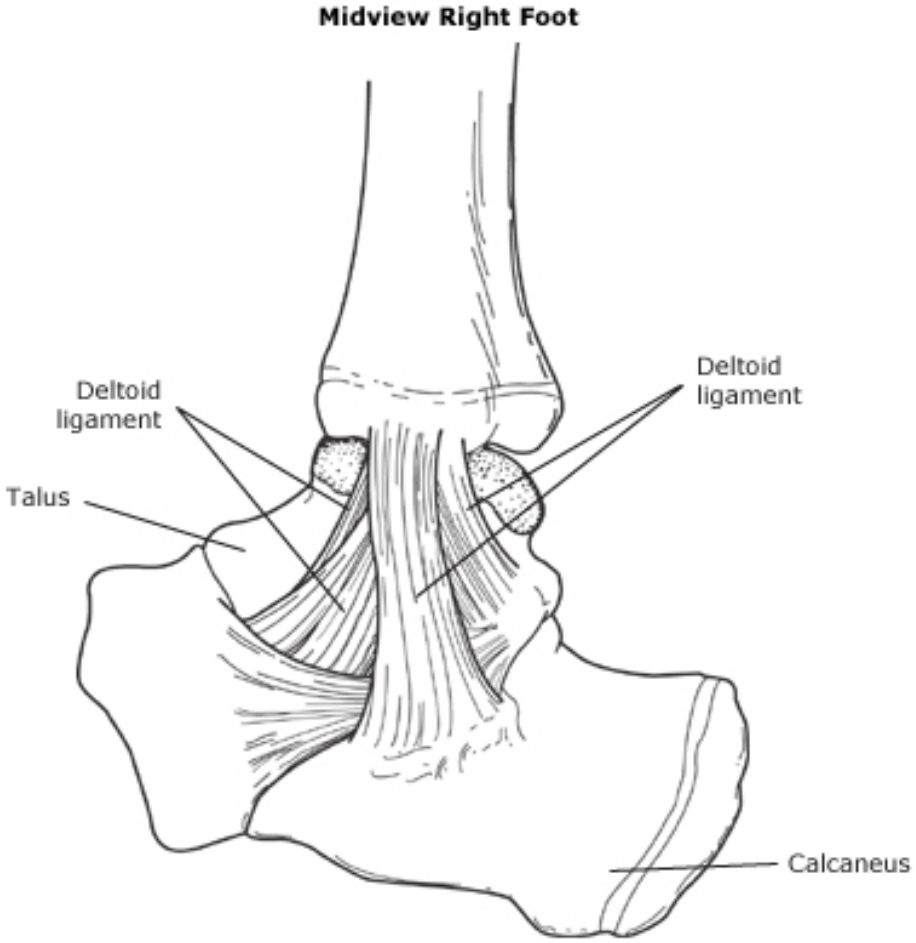
- Lateral Ankle Sprain
  - Inversion injury
  - Damage to the lateral ligaments
    - See slide
    - ATF ligament most commonly injured
  - Lateral tenderness
- Medial Ankle Sprain
  - Eversion injury
  - Damage to the deltoid ligament
    - Larger ligament, requires larger force to injure it
    - See slide
  - Medial tenderness

Lateral ankle ligaments



ATFL: anterior talofibular ligament; PTFL: posterior talofibular ligament; CFL: calcaneofibular ligament.

Medial ankle ligaments



The deltoid ligament, located on the medial side of the ankle, is a broad band of connective tissue that has four separate divisions connecting the distal tibia with the talus, calcaneus, and the navicular bones.

Ankle Exam

- Compare for swelling to the unaffected ankle
- Palpate over the lateral malleolus, medial malleolus, proximal fibula, mortise joint, base of the 5^{th} MT, achilles
- Check for laxity of the mortise joint
- Assess pulses

Management

- Imaging
  - Plain x-ray of ankle joint
    - Determine if tib/fib or foot x-ray is necessary as well.
    - If negative, determine grade of sprain
      - Grade I: ligaments are stretched. Mild sts and tenderness
      - Grade II: partial tear. Moderate sts, ecchymosis tenderness
      - Grade III: complete tear. Severe tenderness, sts, ecchymosis

Treatment

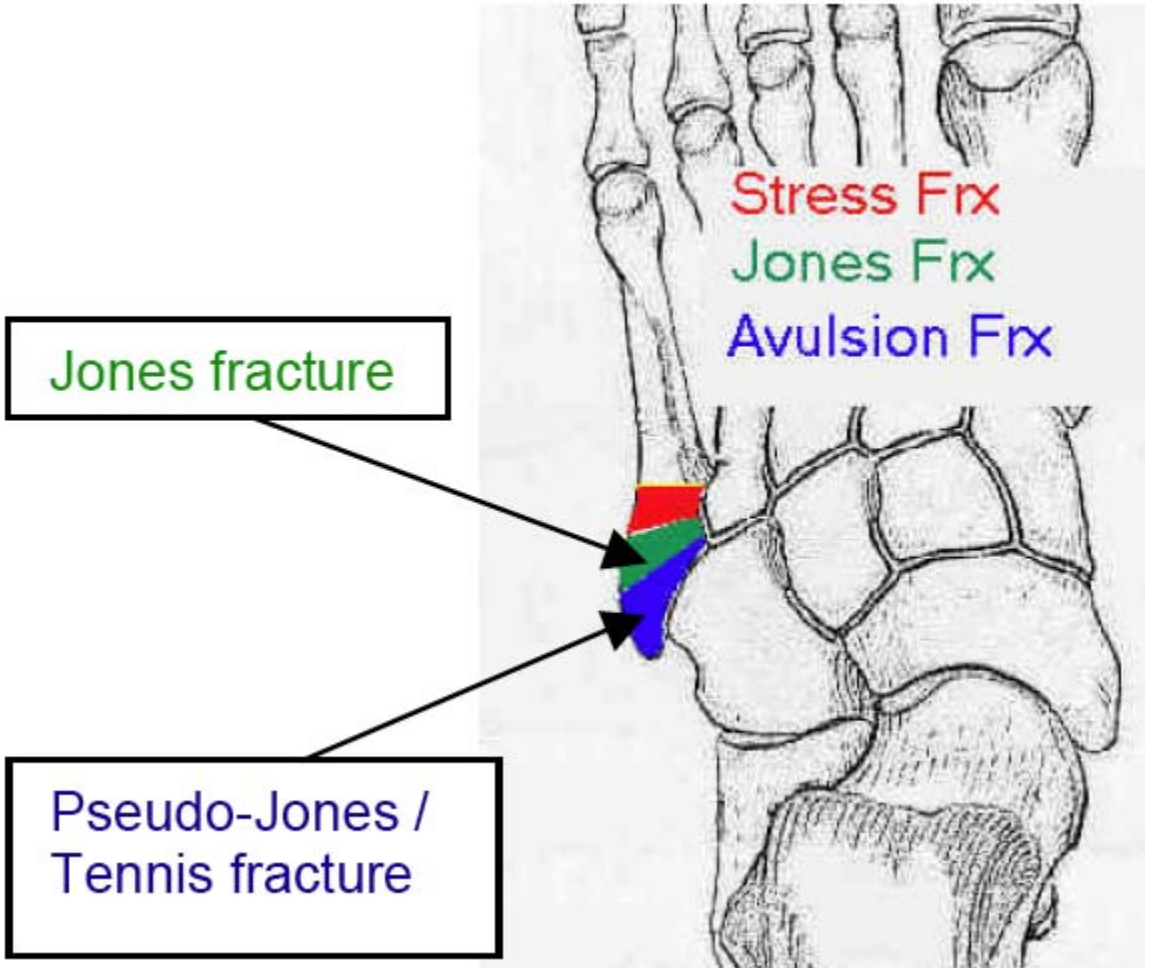
- Grade I-II sprain
  - Treat with ace wrap, aircast, crutches, NSAIDs, ortho follow up
- Grade III sprain
  - Treat with aircast or posterior mold, crutches, NSAIDs, ortho follow up

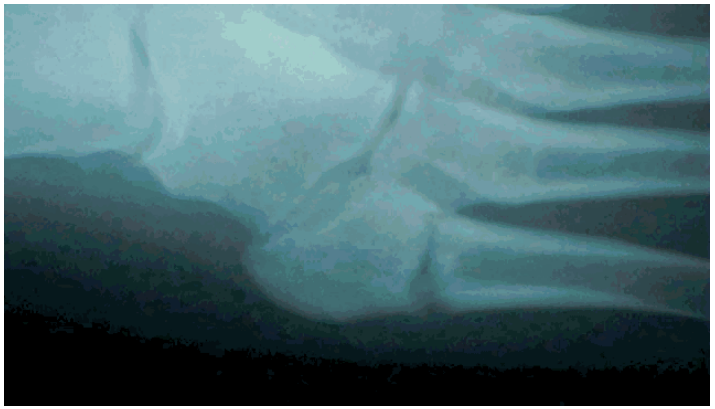
Ottawa Ankle Rules

- Xray of Ankle only if
  - Pain in the malleolar zone
    - And Bony tenderness exists
    - Or unable to bear weight immediately after the injury or take 4 steps in the ER
- X-ray of the foot only if
  - Pain in the midfoot
    - And have bony tenderness at the base of the 5th MT or the navicular
    - Or are unable to bear weight immediately after the injury or take 4 steps in the ER

Metatarsal Fractures

- 5th Metatarsal Fracture
  - Occurs for inversion and plantar flexion of the foot
  - Tenderness over the base of the 5th MT, STS, Ecchymosis
  - Jones fracture
    - More distal and require posterior mold
  - Pseudo-Jones Fracture
    - More proximal


Stress Frx
Jones Frx
Avulsion Frx
Jones fracture
Pseudo-Jones /
Tennis fracture



Jones Fracture

Metatarsal Fractures

- Fractures through MT 1-4
  - Direct blows
  - Crush injuries
  - r/o LisFranc fracture
  - Non-displaced fractures
    - Posterior splint, nonweight bearing and follow up with ortho
  - Displaced fractures require surgery

LisFranc Fractures

- Low-velocity indirect forces
  - sprain type LisFranc injuries
- Plantar-flexion with axial load (strenuous jumping over obstacle)
  - More significant injury
- Sports injuries and motorcycle injuries

LisFranc Fracture

- Presents with pain that is significant
  - May be out of proportion with the appearance of the foot
- Radiographs
  - Easy to miss on x-ray
  - Have to be looking for it
  - CT is ideal

Treatment

- Non-displaced
  - Non-weightbearing
  - Post mold
  - Ortho
- Displaced
  - Considered unstable and require reduction
  - Ortho consult

Navicular Fracture

- Direct blow or avulsion fractures
- Sts, ecchymosis, tenderness
- Imaging
  - Plain xray
  - CT if need more detail
- Treatment
  - Non-weightbearing
  - Short leg post mold
  - ortho

Cuboid Fractures

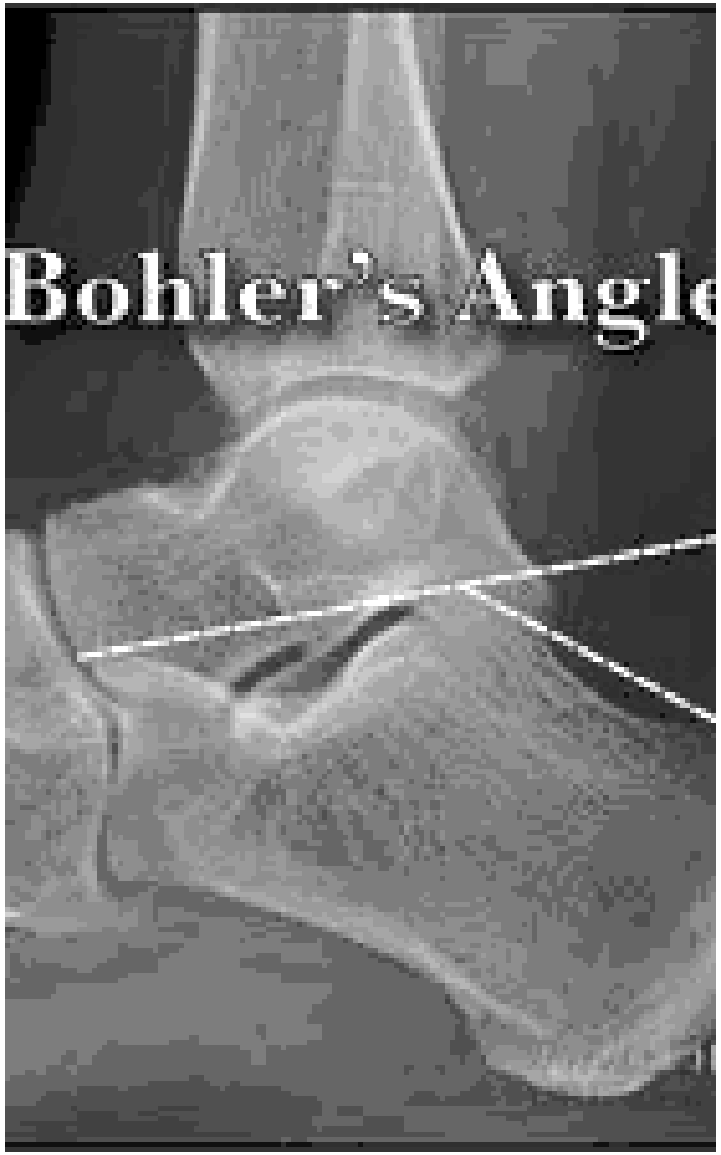
- Plantar flexion and abduction causes this
- Plain x-ray
- Treatment
  - Non-weightbearing
  - Post mold
  - f/u ortho
  - Comminuted fractures are treated with surgery

Cunieform Fracture

- Articulate with the navicular
- Uncommon
- Usually associated with other fractures of the foot
- Medial cunieform requires surgery

Calcaneus Fracture

- Axial load to heel
  - Fall from height
- STS, ecchymosis, tenderness to the calcaneus



Boehler Angle

If the angle is less than 25 degrees be suspicious for fracture

Comparison view may be helpful because angle varies in patients

CT is also helpful

Treatment

- Immobilization
- Elevate is key because these tend to swell quite a bit
- f/u ortho
- Non-weightbearing

Talus Fracture

- Extremedorsiflexion
- Fall from a height
- Tenderness, STS
- Image with plain xray/CT scan
- Large fractures have a high rate of avascular necrosis and can be surgical emergencies

Acute Presentation of Bursitis

- Bursitis
  - Traumatic, rheumatoid, crystal induced and idiopathic, infections
  - Olecranon Bursitis
    - Seen in certain occupations “students elbow”
  - Prepatellar Bursitis
    - “Carpet Layers Knee”
  - General management
    - Rest, elevation, compression dressing, NSAIDs
    - Septic Bursitis involves oral antibiotics (14 day course)
      - Cover for staph and streep

Common Presentations of Tendinitis in the ER

- Overuse syndrome
- Repetitive movements
- Seen in many areas of the body
  - Wrist, ankle, shoulder, fingers
- Present with pain, crepitus, minimal sts, tenderness with AROM.
- Management
  - RICE, NSAIDs