

Trauma-related Pediatric Orthopedic Emergencies



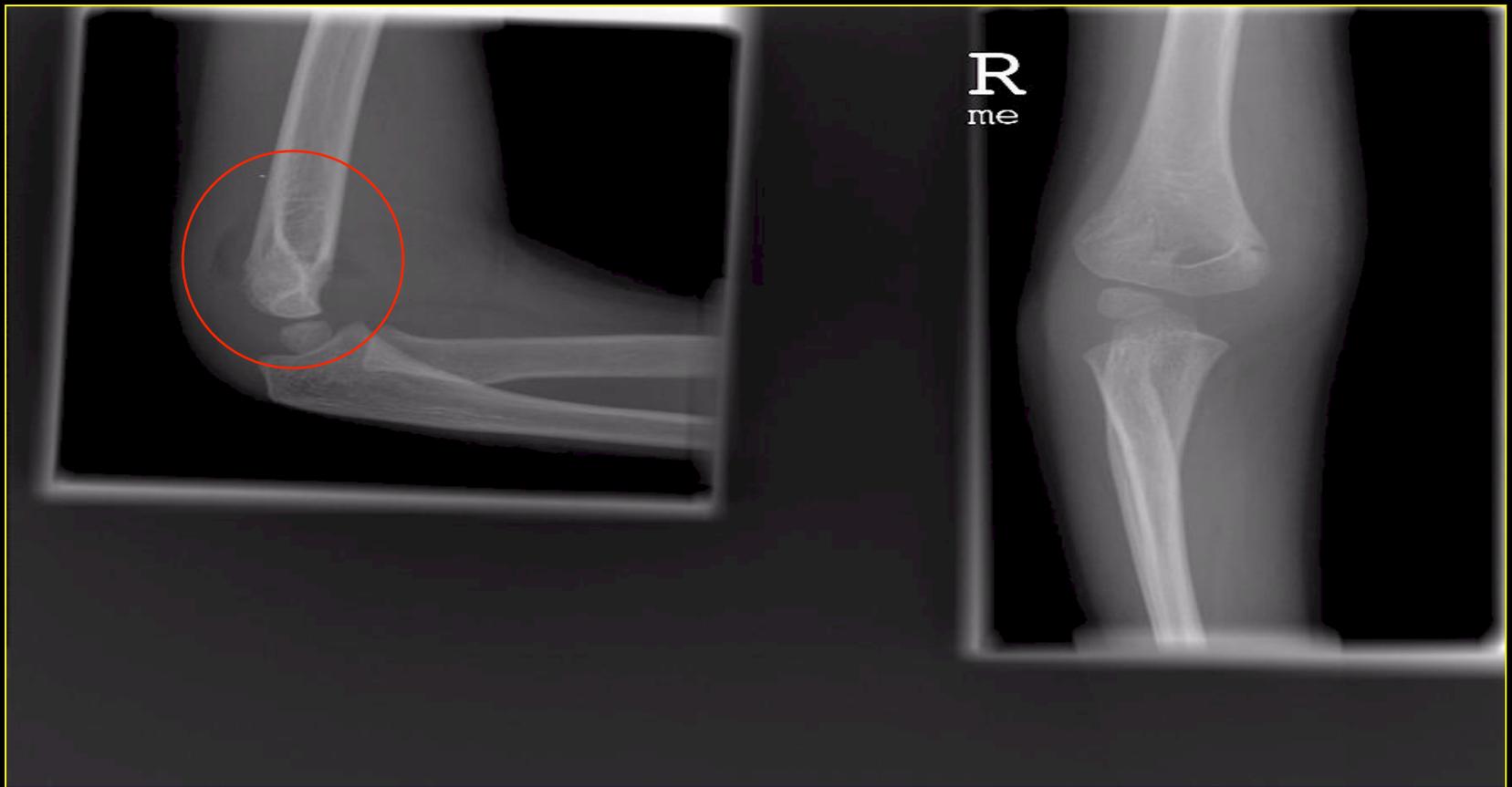
Javier Gonzalez del Rey, M.D.

Professor Pediatrics

Cincinnati Children's Hospital Medical Center

**Room # 10 ...7 month old “sick since
birth”...**

**Room # 11...5 y/o Fell off Monkey
Bars...Complaining about Elbow
Pain..**

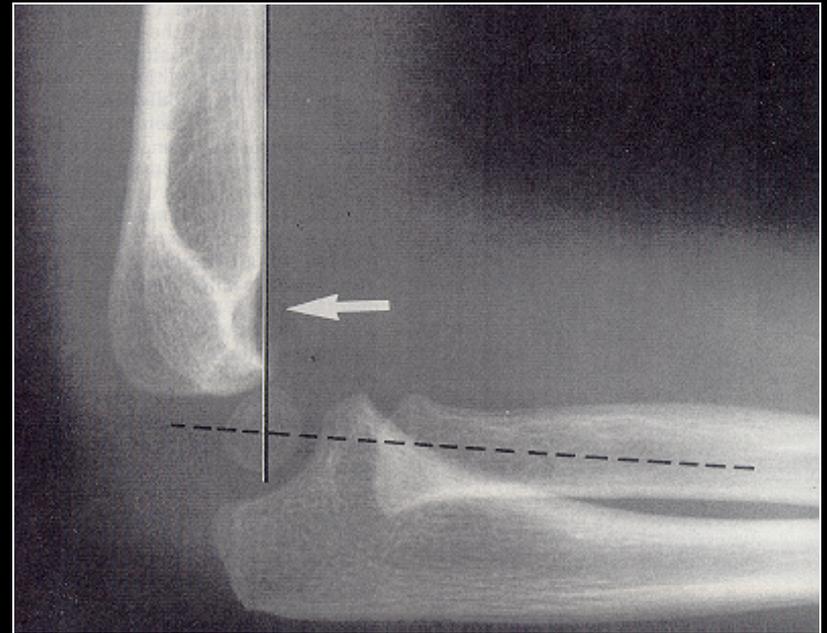


Same...However...What else is wrong?



Elbow Injuries - Radiographic Evaluation

- Fat pads
- Anterior humeral line
middle 1/3 capitellum
- Radiocapitellar line
center capitellum all views
- Hour Glass Sign
- Radial Head
- Ossification centers

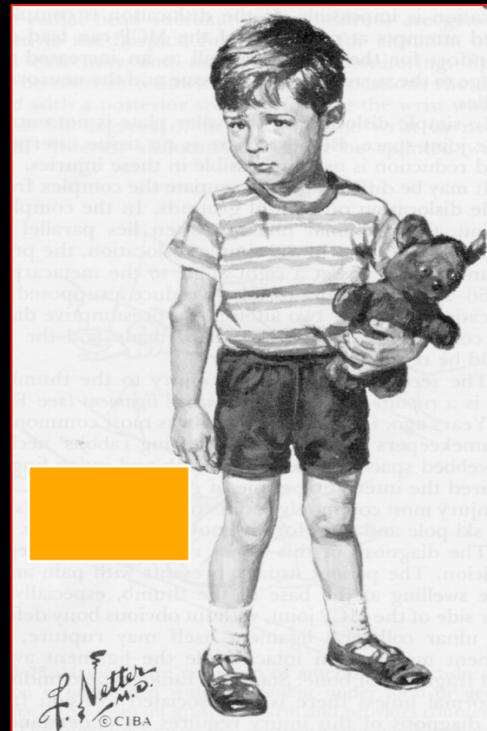


Elbow Fractures ... Management?



Arm Sling...Orhto!

Room # 12...3 y/o Playing with his brother comes running to his mother crying and holding the arm in the following position...



Subluxed Radial Head

Nursemaid's Elbow

- Pull on pronated forearm
- Rare after age 5 yr.
- Annular ligament is torn and some fibers roll over the radial head
- Presentation
 - Arm in pronation
 - Elbow slight flexion
 - No swelling
- Rarely associated with fracture
- Reduction techniques
 - Supination with flexion
 - Pronation with flexion
 - Extension hyperpronation
- Radiographic evaluation not necessary
- Give time to child after reduction and reevaluate for pain

**Room # 13...Time to “show off”...7 y/
o fell off tree ..arrives to ED by EMS...**

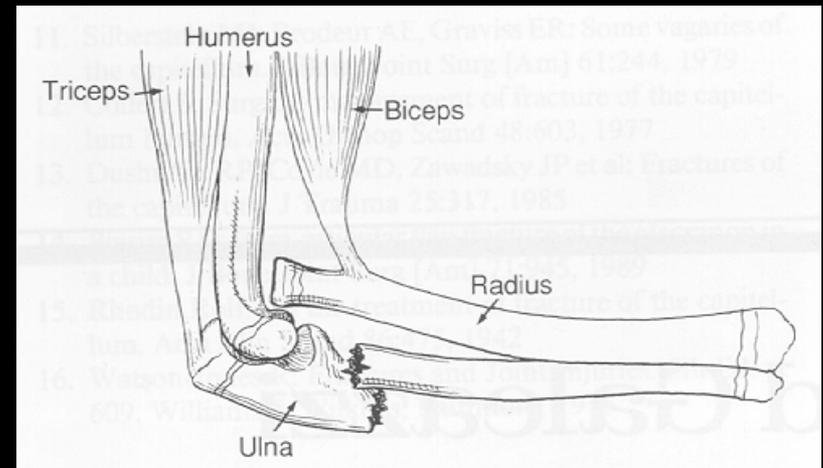


Forearm Fractures

- Proximal
 - Olecranon
 - Radial Head
 - Monteggia's
- Distal
 - Torus
 - Greenstick
 - Salter Harris I-IV
 - Galeazzi's
 - Colles'
 - Smith's
 - Barton's
 - Hutchinson's

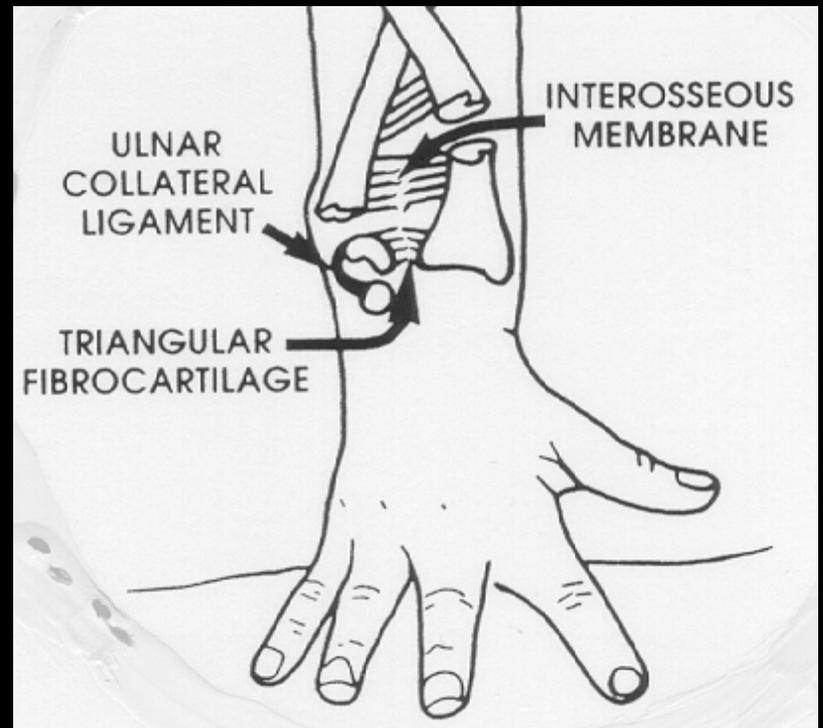
Monteggia's Fracture

- Fracture proximal ulna with radial head dislocation
- 2% of elbow fx
- **Caveat** - isolated fx of ulna, expect to find radius injury
- Orthopedic referral - reduction of radial head & ulnar fracture
- **Don't miss** - permanent disability



Galeazzi's Fracture

- Fracture of radial shaft, usually at junction middle/distal thirds with disruption of radioulnar joint
- More common teenagers & adults
- Suspect in angulated fractured distal radius
- Orthopedic consult



And you will use the following splint...

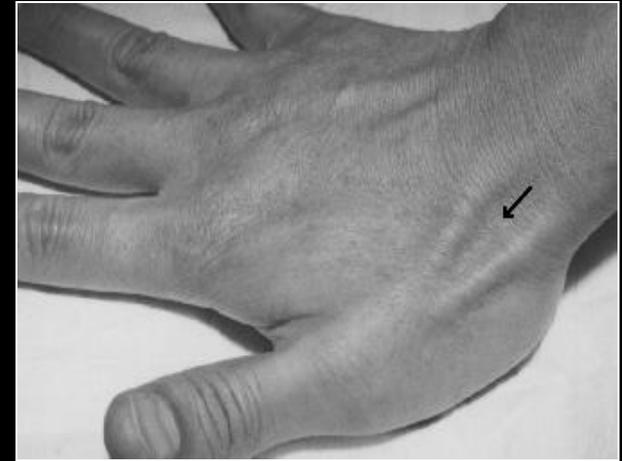


**Room # 14...10 y/o Complaining of
Pain ...Right there after a fall...**



Carpal Bone Fractures

Scaphoid (Navicular)



- Largely cartilaginous in childhood - rare fracture
- Scaphoid - most commonly fractured
- Examination in ulnar deviation of wrist
- Most pediatric scaphoid fracture diagnosed at time of injury heal without complication
- The more proximal the fracture line > chance of avascular necrosis

And you will use the following splint...

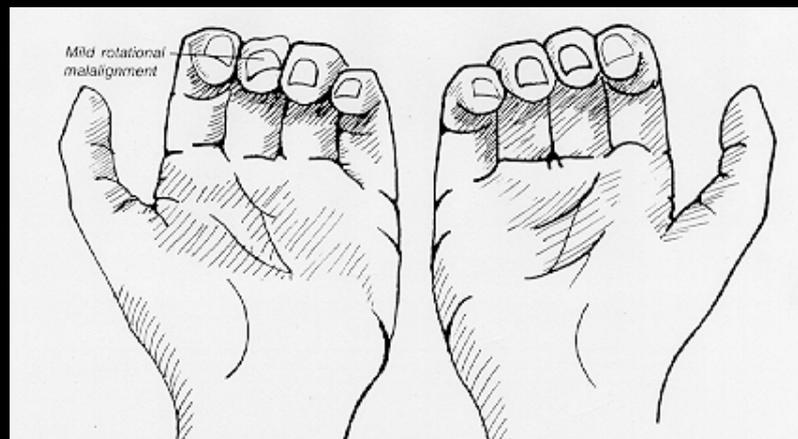
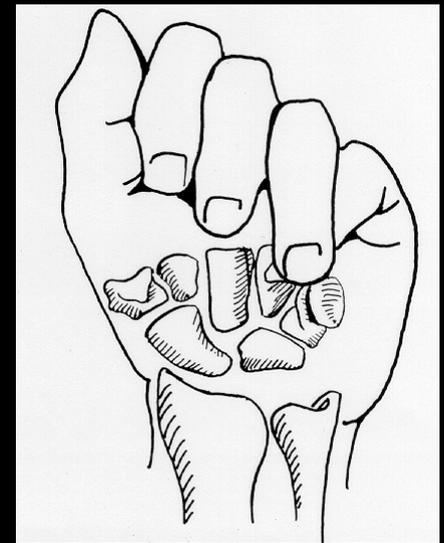


Metacarpal Fractures

- Uncommon - Mechanism of injury - direct blow
- P.E. - flexed fingers should all point the same direction
- Most common fracture - 5th MC *boxer's*
 - Splint with 45-90 degree flexion MCP, mild wrist extension with 15 if < 30 degrees angulation
- Referral
 - all intra-articular 1st MC or oblique shaft
 - MC 1,2,3 if > 20 degree
 - 4th 5th angulated > 30 degrees

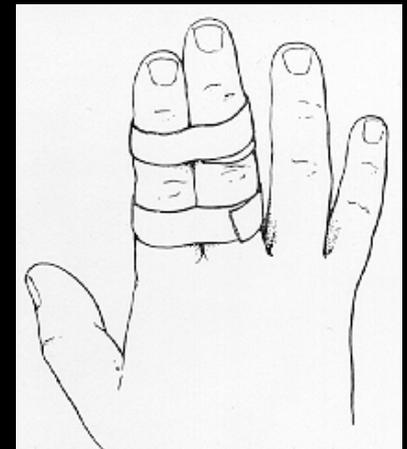
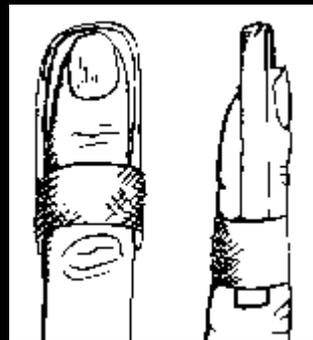
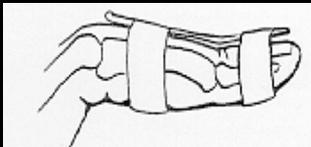
Rotational Deformities

- Never acceptable in fracture of metacarpal or phalanges (little remodeling)
- Acceptance of angulation deformities in metacarpal or phalangeal fractures is dependent on the degree of angulation and bony mobility
- Angulation is unacceptable in stationary bone (ie. 2nd or 3rd metacarpal)



Phalangeal Fractures - Treatment

- Middle phalanx -
 - less frequent than proximal
 - SH I or II and not angulated (refer others)
 - finger splint or buddy tape
- Distal phalanx - SH I or II, not angulated
 - bulky dressing, splint or buddy tape



Interphalangeal Dislocations & Tendon Injuries

- Uncommon in young children - common in adolescents
- Radiographic evaluation prior to manipulation to rule out concomitant fractures
- Perform reduction under digital block or nitrous sedation
- May require orthopedic referral
- Post reduction films and splints for 3 weeks

Tendon Injuries - Finger

- Mallet finger (baseball finger)
- Boutonniere finger
- Jersey finger
- Gamekeeper's Thumb (skier's)

Room # 15...5 y/o Fell off his bike (this one was wearing his helmet!)...pale and “lethargic”...HR 135 ...your diagnosis is?



Shock ... Shock ... Shock...

**Room
complains
by PMD.
... Pr**



**female
in ...seen
negative
..so??**

**Room # 17...2 y/o(Get it = a 2 y/o)
...Refusing to Walk ... No Hx of
trauma or Fever...**



Fractures of the Tibia and Fibula

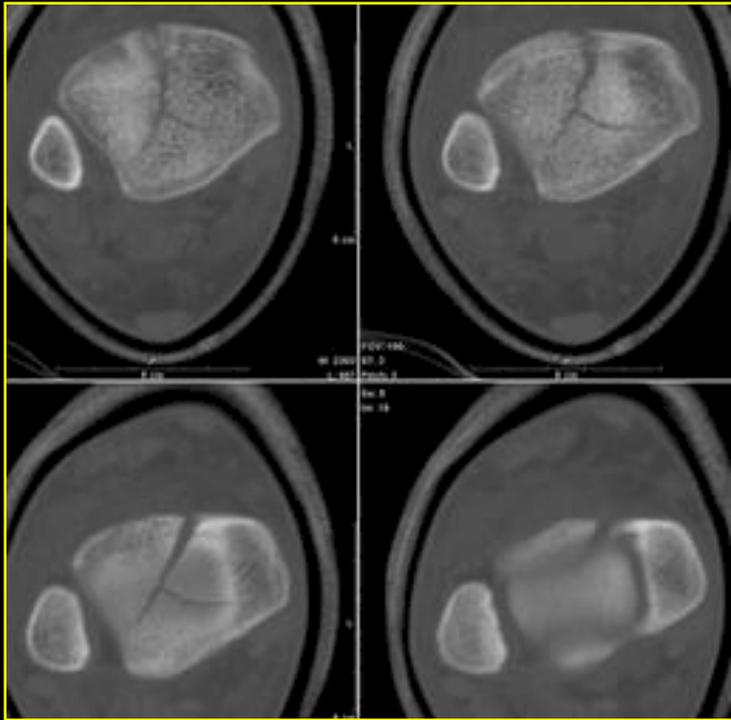
- Tibial and fibular shaft fractures are the most common fractures of the lower extremity in children
- Toddler's Fracture
 - Acute gait disturbance - refusal to walk
 - History of minor accident (or no Hx.)
 - Subtle physical findings
 - Spiral or oblique fracture of distal tibia
 - Splint or short leg cast

Room 7
with patient
to view



ED
able

Next Step ...



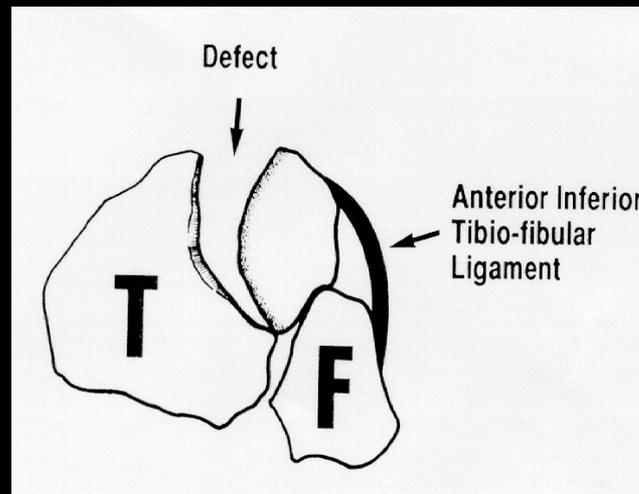
Room # 19...Painful swollen ankle...

Tillaux Fracture



Tillaux Fracture

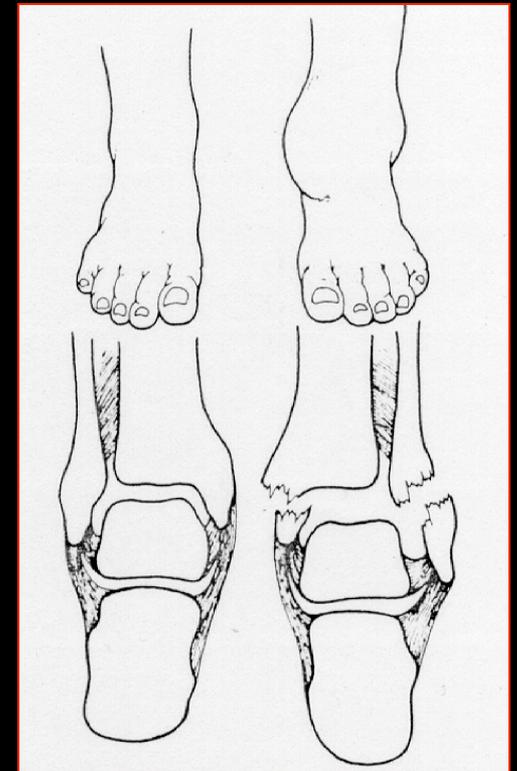
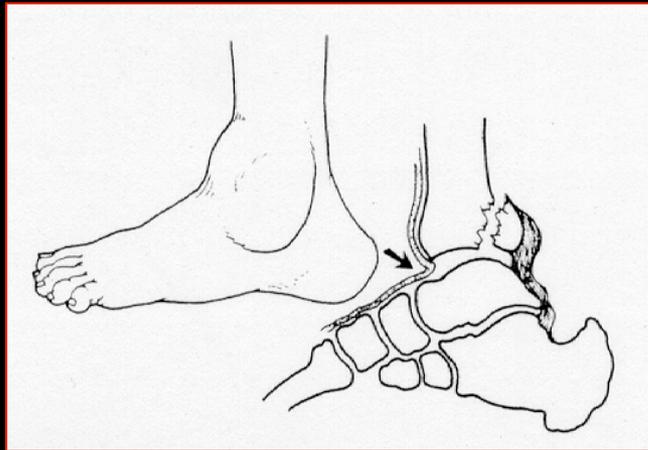
- SH III of the tibia caused by GP closing medial to lateral



Ankle Fractures

- May have any SH fracture of tibia or fibula
- SH I fibula
 - common
 - cast for 2 week intervals
- SH II tibia
 - Most common tibial fracture
 - Tibia = higher energy
 - Treatment
 - posterior splint
 - sugar tong with foot plate

Tillaux Fracture
Triplane
Bimalleolar
Trimalleolar



Ankle Sprains



- Prior to growth plate closure = SH I fracture
- Most common = inversion injury
- Eversion = higher rate of fractures
- Ottawa criteria
 - pain in the area of the malleoli
 - inability to bear weight - immediately & 4 step ED
 - bony tenderness distal tibia or fibula

Sprains - Rehabilitation

Rest

Ice

Compression

Elevation

Motion

Medication

**Room # 20...The student wants to present a
new case ...a 1 month old “spitting up”
after 5 formula changes...**

When in doubt...Splint!!

Gracias!!!

**Room # 2 ...14 y/o fell at gym
practice...**



Correct!!!

Initial Approach

- ABC's
- Evaluate involved limb for:
 - Neurovascular compromise
 - Open fractures / compartment syndrome
 - Fractures with increased risk for significant bleeding - Pelvic Fractures / Femur Fractures
- Consider associated injury
- PAIN MANAGEMENT!
- Radiographic evaluation

Initial Approach

- ABC's
- Evaluate involved limb for:
 - Neurovascular compromise
 - Open fractures / compartment syndrome
 - Fractures with increased risk for significant bleeding - Pelvic Fractures / Femur Fractures
- Consider associated injury
- **PAIN MANAGEMENT!** – Please “splint”
- Radiographic evaluation

Room # 4 ...3 y/o presents to DCP's office refusing to use the

**of a fall
X-R**



Radiographic Evaluation

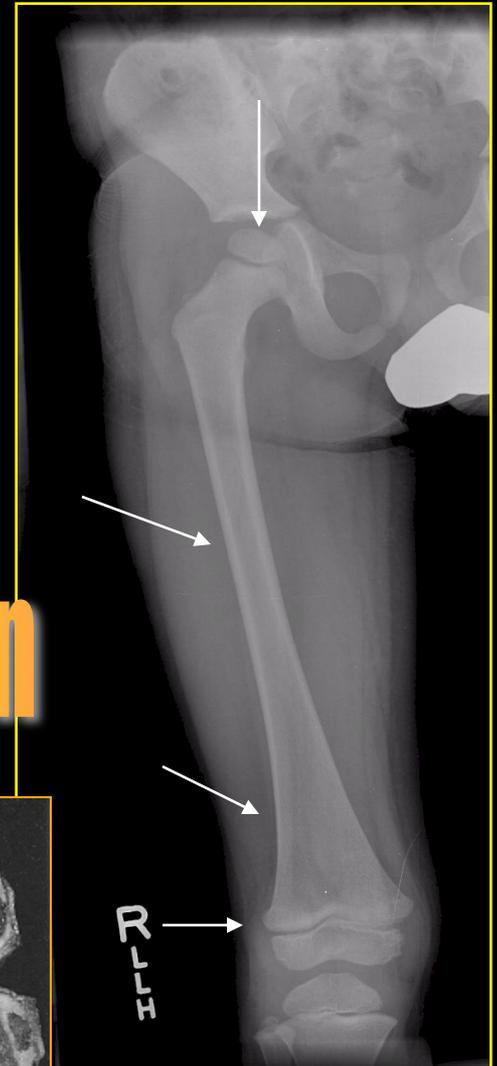
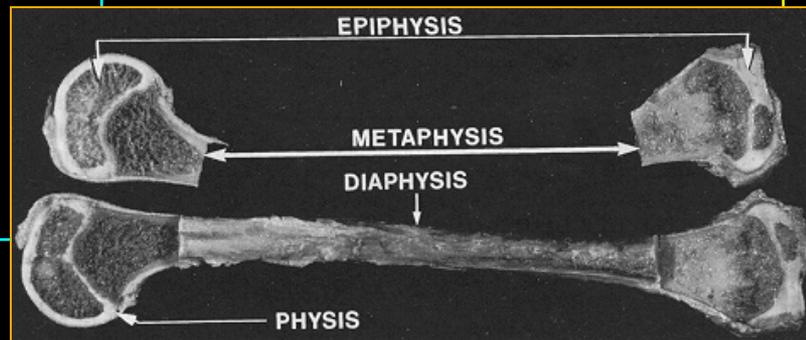
- Should be ordered if:
 - Point tenderness
 - Large amount of swelling
 - Severe pain
 - Persistent symptoms after 3 - 5 days
 - High risk mechanism
 - Pain with axial / transverse loading
- Joint above and below injury
- Comparison views

**Room # 5 ... Piece of cake ...broken leg ...
need to call Ortho in this great Sunday
afternoon...please Describe...**

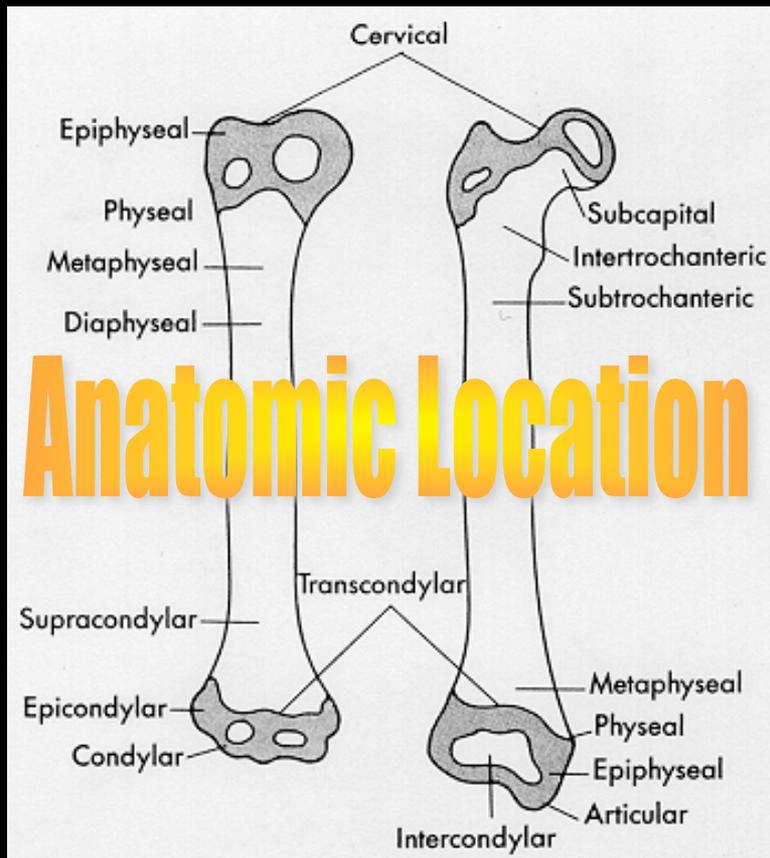


Femur Fx
Diaphysis
Transverse
Overriding
Shortening

Anatomic Location



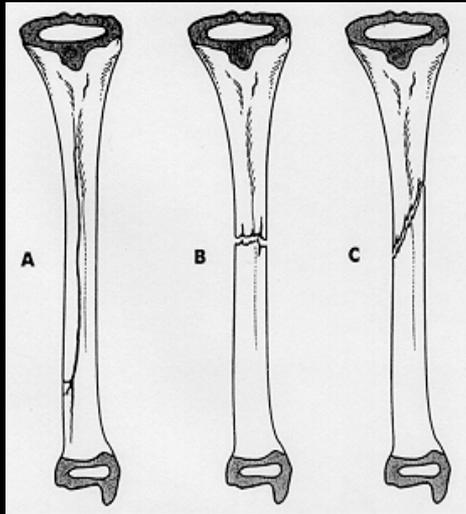
Radiographic Findings



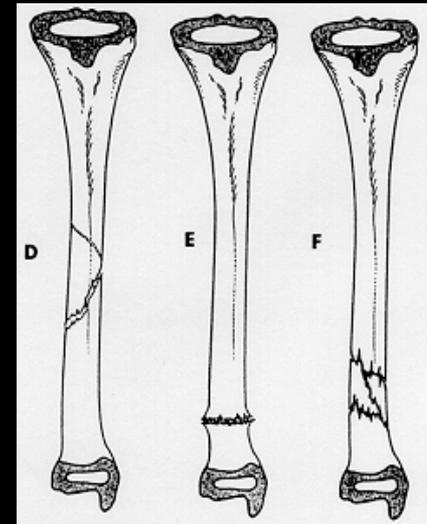
- Articular
- Subcapital
- Cervical
- Supracondylar
- Transcondylar
- Intercondylar
- Malleolar

Radiographic Findings

Type of Fracture



- Longitudinal
- Transverse
- Oblique

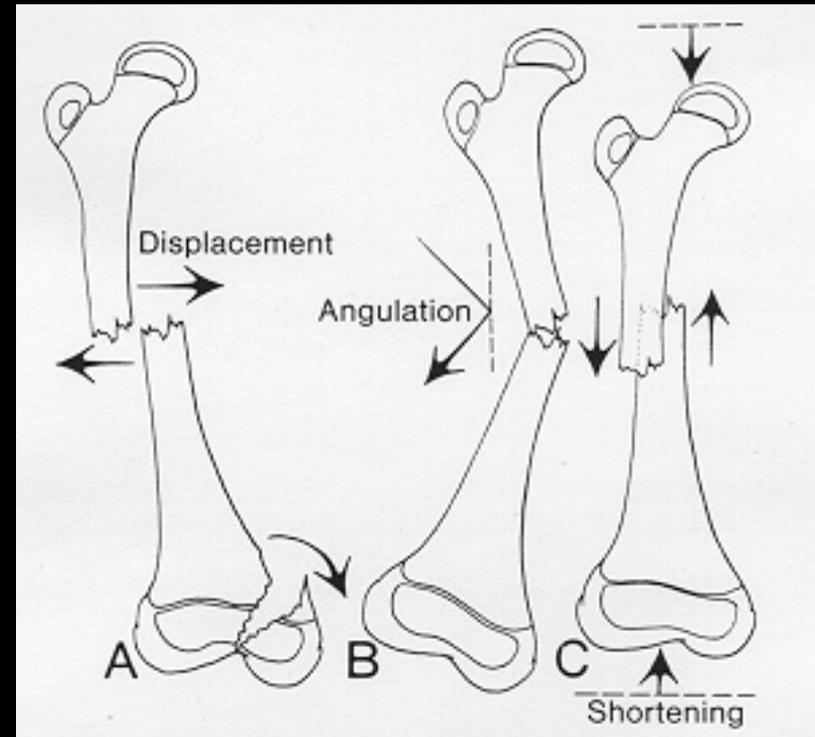


- Spiral
- Impacted
- Comminuted

Radiographic Findings

Deformities

- Displacement
- Angulation
- Overriding
- Shortening
- Distraction
- Rotation



Orthopedic Referral

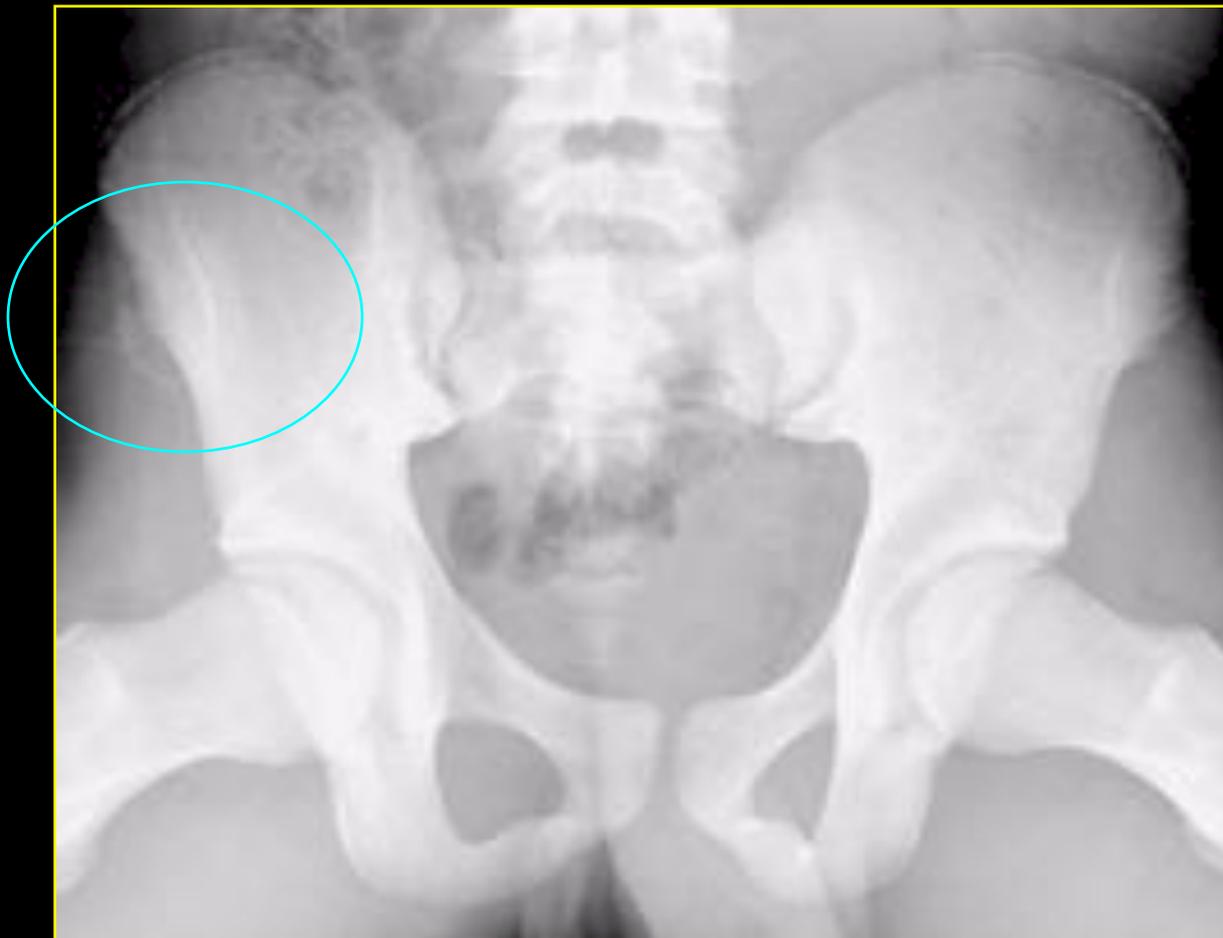
- Open fractures
- Neurovascular compromise
- Obvious deformity
- Significant joint or growth plate involvement
- Dislocation of major joints other than the shoulder
- Pelvic fractures or spinal injuries

**Room # 6...typical family of 3 after a
soccer practice**

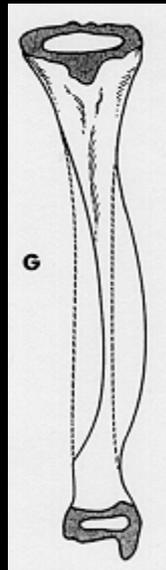
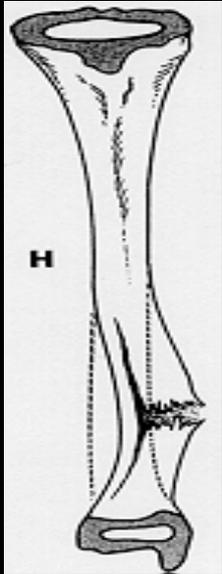
So...this is...a?



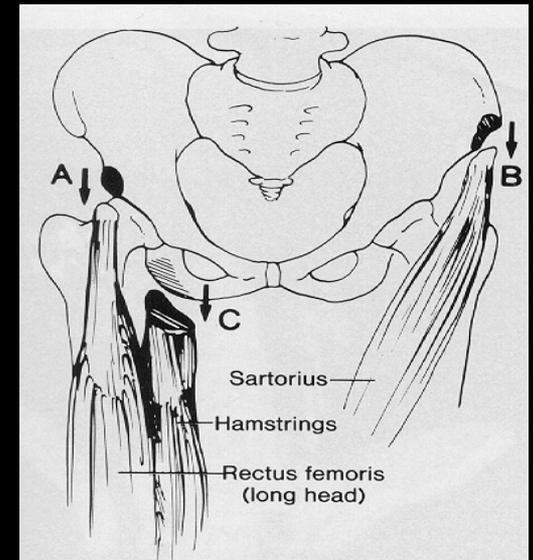
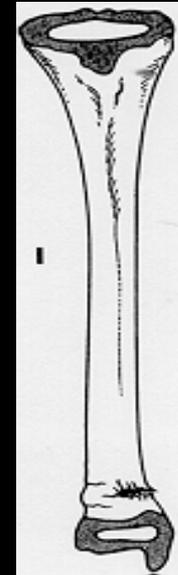
And this is ...?



Fracture Unique to Children



- Greenstick
- Torus (buckle)
- Bowing
- Avulsion
- Physeal



**Room # 7 as usual...cousins, relatives and
neighbors who heard that everyone is
having a great Sunday at the “all inclusive”
ED ...**

Room # 7 as usual...cousins, relatives and neighbors who heard that everyone is having a great Sunday at the “all inclusive” ED ...free meals, free soft drinks, movies, toys...and free rides (wheelchairs in the waiting room)...

Please tell me what these are...



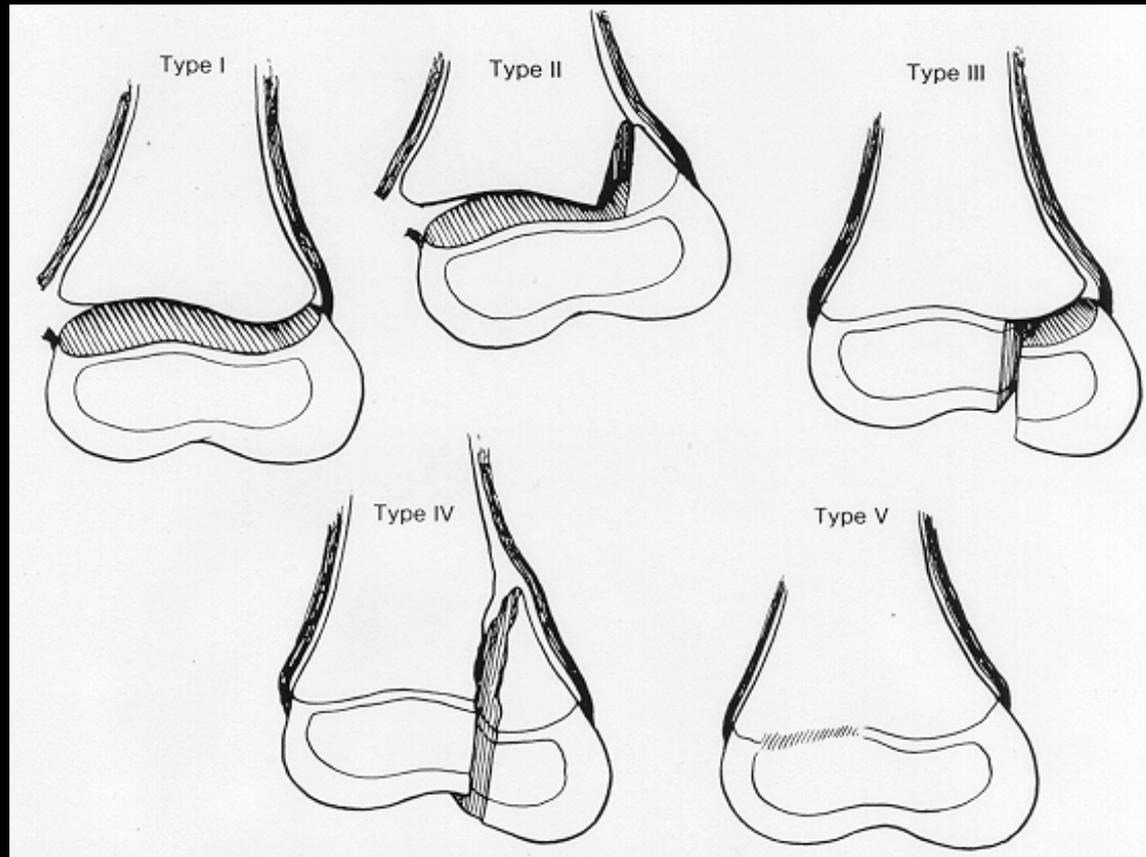




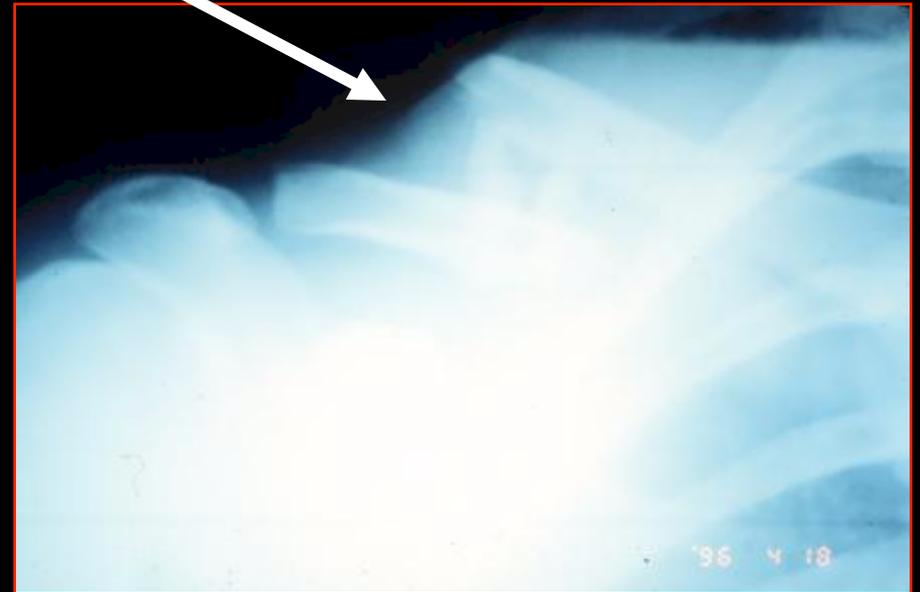


Physeal Fractures

Salter Harris Classification



Room # 8...12 y/o Fell of bike...(head is ok - he was not wearing a helmet)... and presents to your Urgent Care with left shoulder pain...so...what do we do?



Moving down...

Clavicle Fractures

- Most frequently fractured bone in childhood
- Usually result from direct trauma and from direct forces transmitted by falls onto an outstretched hand
- More than 50% in children younger than 10 years of age
- Most are greenstick to the midshaft
- Typically child complains of shoulder pain or injury is initially unnoticed until “a lump” appears as the callus forms
- Treatment- figure of eight or sling and swath + education

**Room # 9...14 y/o Male presents to
your ED with severe left shoulder
pain...**

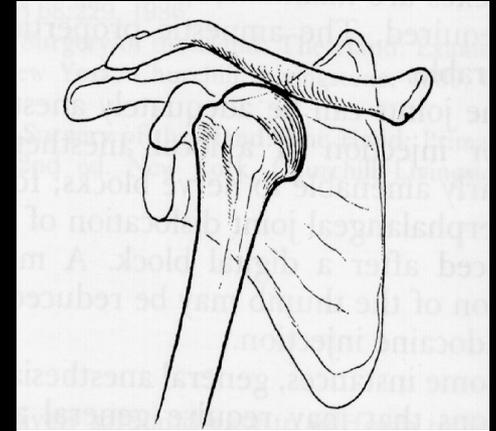
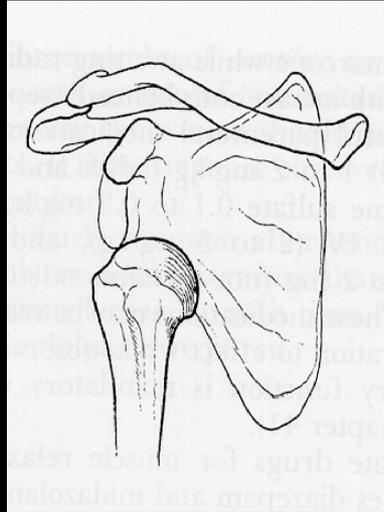
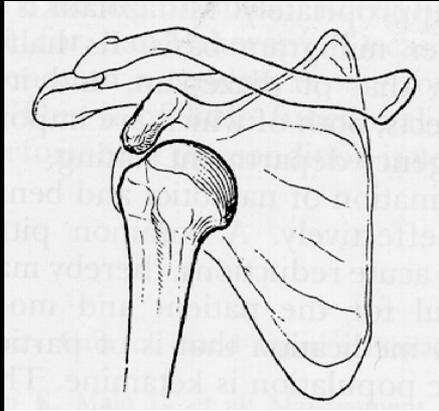




Shoulder Dislocations

- Shallow joint with wide range of motions
- Age adolescent or older
- 95% of dislocations are anterior.
- Arm is abducted and externally rotated and then forced posteriorly

Anterior Dislocations

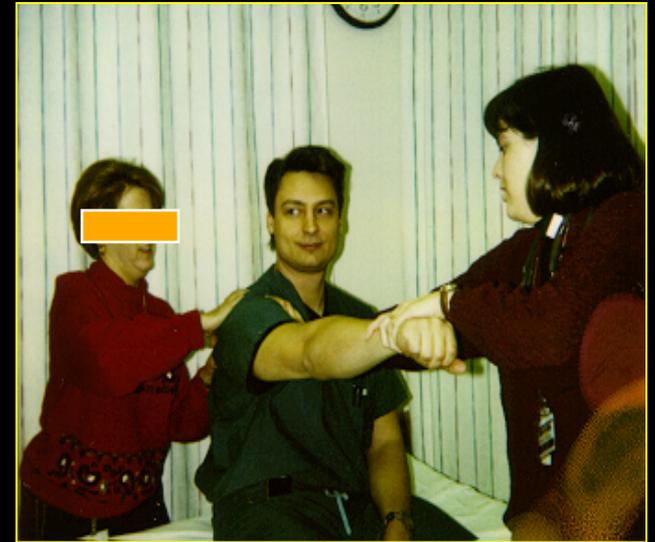
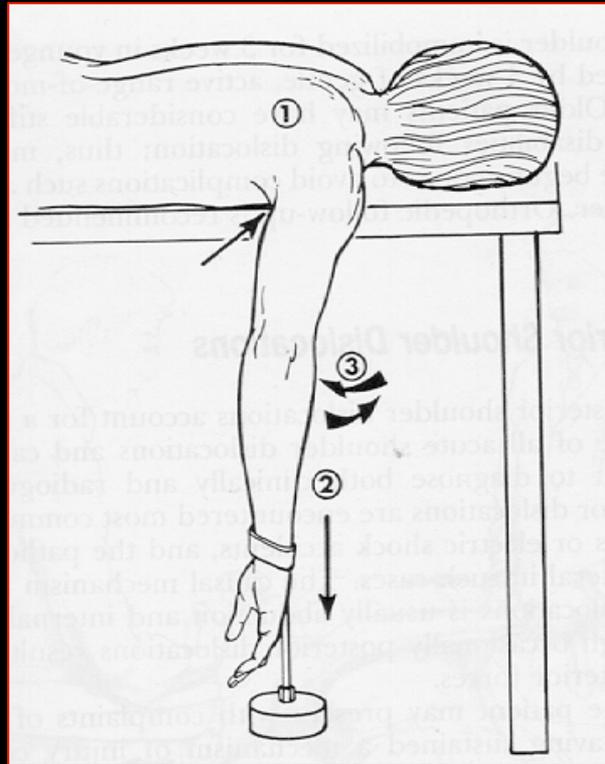


- Subcoracoid (most common)
- Subglenoid
- Subclavicular

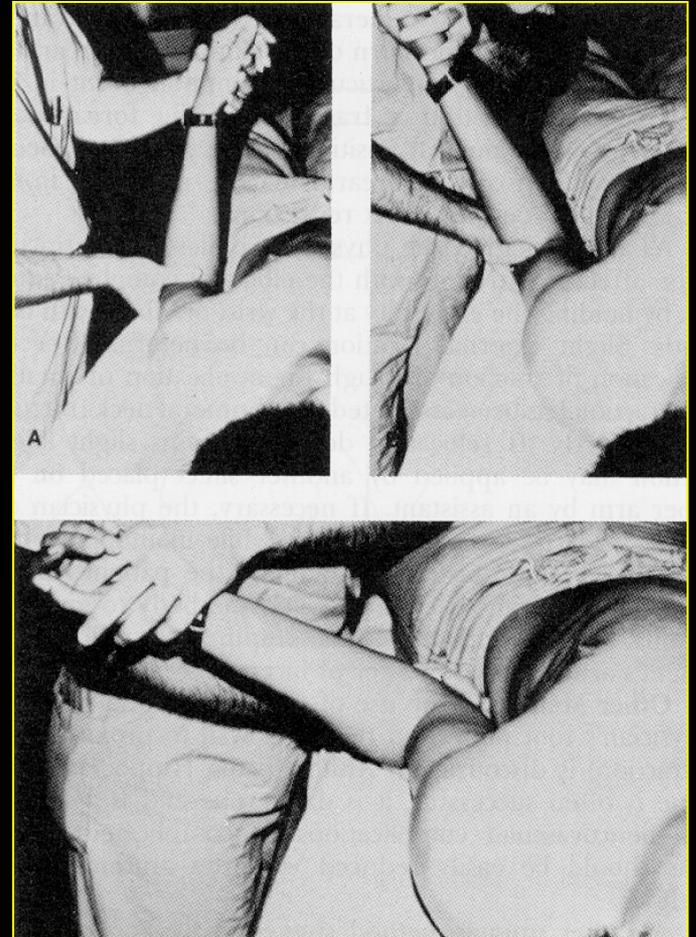
Management - Reduction

- Adequate analgesia and muscle relaxation
- Several reduction maneuvers:
 - Stimson
 - Scapular rotation prone / sitting
 - External rotation
 - Traction counter traction
 - Eskimo technique
- Immediately immobilize
- Post-reduction xray
- Orthopedic follow-up

Stimson...And Scapular Rotations...



Eskimo...And External Rotation..



Traction Counter Traction



"Pull ... Mama ... Pull"

In Conclusion...

- ABC's
- Careful history and physical examination
- Pain management
- Radiographic evaluation - remember SH
- Think “fracture” before “sprain”
- When in doubt - SPLINT!!

More to Come ... Thanks!!