Language of Fractures

Topics

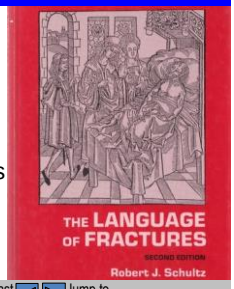
Language of Fractures

Title:

- Robert Jordan Schultz
- Orthopedic Surgeon
- Out of print since 1990

Ideas in this talk:

- My 20 years of trying to understand fractures



Why are Fractures Hard?

There are 206 bones!

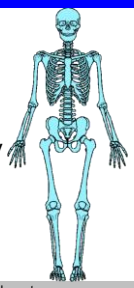
- **Carpals**: Scaphoid, Lunate, Triquetrum, Pisiform (proximal row) Hamate, Capitate, Trapezoid, Trapezium (distal row)
- **Fingers**: Thumb, Index, Long, Ring, Small (Metacarpals, Phalanges)
- **Tarsals**: Talus, Calcaneus, Navicular, Cuboid, 3 Cuneiforms
- **Arm**: Scapula, Humerus, Radius, Ulna
- **Leg**: Femur, Patella, Tibia, Fibula
- **Pelvis**: Sacrum, Innominate (Ilium, Ischium, Pubic)
- **Spine**: Cervical (7), Thoracic (12), Lumbar (5), [ribs & sternum]
- **Skull**: 1 big bone + Mandible
  Maxilla, Nasal, Frontal, Parietal, Occipital, Temporal, (Zygomatic, Sphenoid, Ethmoid, Lacrimal)

Why are Fractures Hard?

There are 206 bones!

They're all different!

- They have different functions.
- Exposed to different mechanical forces.
- They each respond differently to stress/trauma.



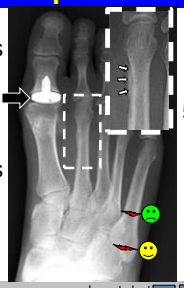
Example: Metatarsals

1st MT:

- Fractures
  - ✓Rare
- Common
  - ✓OA

2nd MT:

- Fractures
  - ✓Common
  - ✓Stress (Fatigue) "March"



5th MT:

- Fractures
  - ✓Very Common
  - ✓Base 5th MT
  - 1) Avulsion Fx
    - ❖99% Heal
  - 2) Jones Fx
    - ❖50% non-union

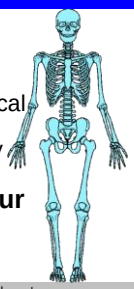
Why are Fractures Hard?

There are 206 bones!

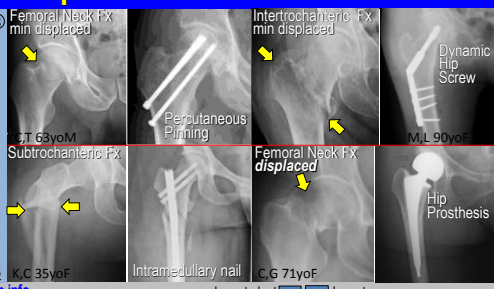
They're all different!

- They have different functions.
- Exposed to different mechanical forces.
- They each respond differently to stress/trauma.

Even *where* fractures occur within a bone affects the treatment, prognosis

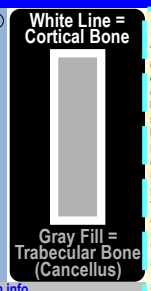


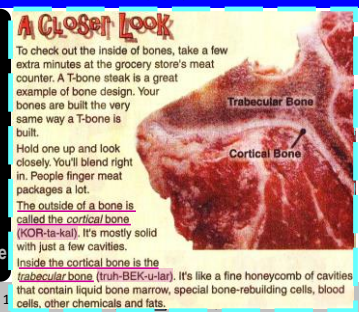
Example: Proximal Femur Factures



Language of Fractures Looking at Bones in General

Bone Model





Language of Fractures Looking at Bones in General

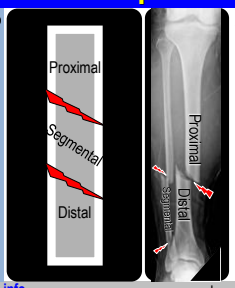
Terminology

Radiographic Views
- AP (Anterior → Posterior)
  - ✓Most frontal radiographs
  - ✓PA (Posterior → Anterior)
    - ❖Hands, wrists
    - ❖Chest (Standard non-portable)
- Lateral view
  - ✓From the side (R→L, L→R)

Patient sides
- Medial: Towards the middle
- Lateral: Towards the side
- Anterior: Front (Volar)
- Posterior: Back (Dorsal)

Language of Fractures Looking at Bones in General

Simple vs Comminuted

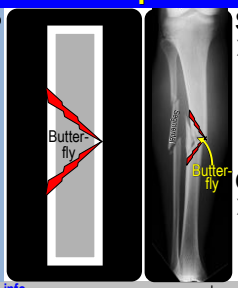


Simple Fx:
- 2 fragments
  - ✓Proximal fragment
    - ❖[L] *proximus:* "nearest"
    - ❖Near body attachment
  - ✓Distal fragment
    - ❖[L] *distare:* "distant"
    - ❖away from attachment

Comminuted:
- >2 fragments
  - ✓Segmental fragment

Language of Fractures Looking at Bones in General

Simple vs Comminuted

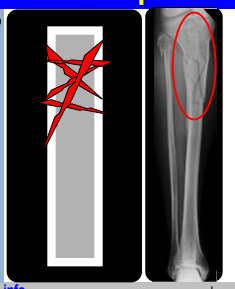


Simple Fx:
- 2 fragments
  - ✓Proximal fragment
    - ❖[L] *proximus:* "nearest"
    - ❖Near body attachment
  - ✓Distal fragment
    - ❖[L] *distare:* "distant"
    - ❖away from attachment

Comminuted:
- >2 fragments
  - ✓Segmental fragment
  - ✓Butterfly fragment

Language of Fractures Looking at Bones in General

Simple vs Comminuted

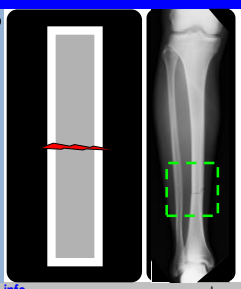


Simple Fx:
- 2 fragments
  - ✓Proximal fragment
    - ❖[L] *proximus:* "nearest"
    - ❖Near body attachment
  - ✓Distal fragment
    - ❖[L] *distare:* "distant"
    - ❖away from attachment

Comminuted:
- >2 fragments
  - ✓Segmental fragment
  - ✓Butterfly fragment
  - ✓Severely comminuted

Language of Fractures Looking at Bones in General

Fracture Orientation

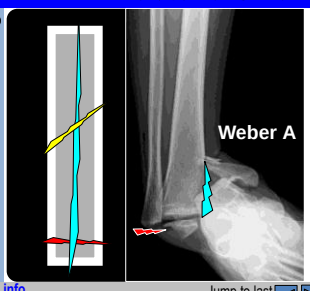


Transverse ↔
- Horizontal

Language of Fractures Looking at Bones in General

Fracture Orientation

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



Transverse ↔
- Horizontal
- Avulsion
  - ✓End of bone

Longitudinal ↕
- Vertical
- Compression

Oblique ⤢
- Diagonal
- Most common

Language of Fractures Looking at Bones in General

Fracture Orientation

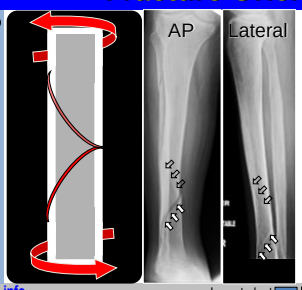
Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

Spiral Fracture
- Twisting injury
- Resembles:
  - ✓Oblique fracture
  - ✓Butterfly frag.
- Need multiple views to see the spiral

Language of Fractures Looking at Bones in General

Fracture Orientation

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

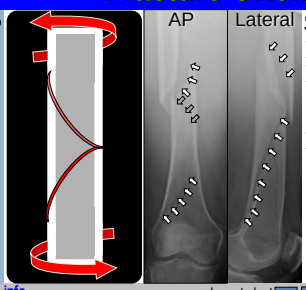


Spiral Fracture
- Twisting injury
- Resembles:
  - ✓Oblique fracture
  - ✓Butterfly frag.
- Need multiple views to see the spiral

Language of Fractures Looking at Bones in General

Fracture Orientation

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

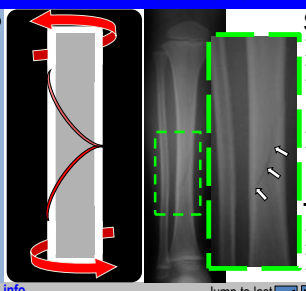


Spiral Fracture
- Twisting injury
- Resembles:
  - ✓Oblique fracture
  - ✓Butterfly frag.
- Need multiple views to see the spiral

Language of Fractures Looking at Bones in General

Fracture Orientation

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



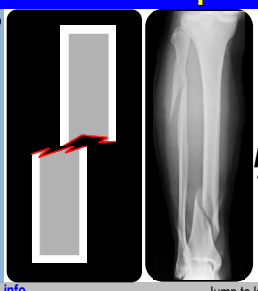
Spiral Fracture
- Twisting injury
- Resembles:
  - ✓Oblique fracture
  - ✓Butterfly frag.
- Need multiple views to see the spiral

Toddlers Fx
- Distal Tibia
- < 5 years old

Language of Fractures Looking at Bones in General

Displacement

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



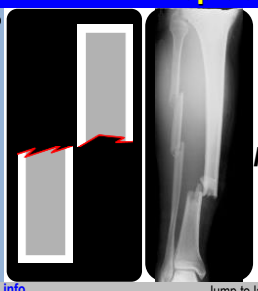
RULE:
We describe displacement of *distal* fragment relative to *proximal* fragment

"There is an oblique fracture of the distal tibia, with *lateral* displacement of the distal fracture fragment ½-shaft width."

Language of Fractures Looking at Bones in General

Displacement

Intro ① ② ③
Patterns
Orientation
●Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



RULE:
We describe displacement of *distal* fragment relative to *proximal* fragment

"There is an transverse fracture of the distal tibia, with *lateral* displacement of the distal fracture fragment by 1-shaft width."

Language of Fractures Looking at Bones in General

Displacement: Check all Views

Intro ① ② ③
Patterns
Orientation
●Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

Language of Fractures Looking at Bones in General

Open (Compound) Fracture

Intro ① ② ③
Patterns
Orientation
●Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

Fractured end of the bone is poking through the skin.

- Common with Tibia Fxs
  - ✓Very little skin covers tibia
- Sterile bone is exposed to the non-sterile air…
- Bone is now infected
  - ✓"Osteomyelitis"
- Requires:
  - ✓Surgical washout
  - ✓IV antibiotics (6 weeks)

Language of Fractures Looking at Bones in General

Displacement… exceptions

Intro ① ② ③
Patterns
Orientation
●Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

Clavicle

- ➢*Proximal* fragment relative to distal
- ➢Neck muscles pull the *proximal* fragment up

Language of Fractures Looking at Bones in General

Displacement… exceptions

Intro ① ② ③
Patterns
Orientation
●Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

Clavicle

- ➢*Proximal* fragment relative to distal
- ➢Neck muscles pull the *proximal* fragment up

"Superior displacement *proximal* clavicle fragment >2-shaft widths, with a segmental fragment"

Language of Fractures Looking at Bones in General

Displacement… exceptions

Intro ① ② ③
Patterns
Orientation
●Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

Clavicle

- ➢*Proximal* fragment relative to distal
- ➢Neck muscles pull the *proximal* fragment up

"Superior displacement *proximal* clavicle fragment >2-shaft widths, with a segmental fragment"

Language of Fractures Looking at Bones in General

Displacement… exceptions

Intro ① ② ③
Patterns
Orientation
○Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

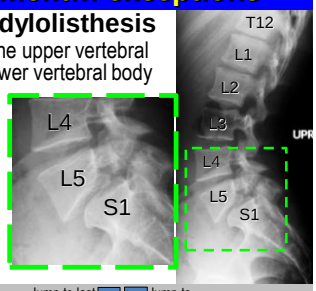
Spine – Spondylolisthesis

➢Displacement of the upper vertebral body relative to lower vertebral body

"Anterior slippage of L5 on S1"

"Spondylolisthesis of L5 on S1"

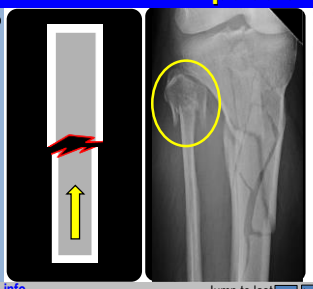
"Anterolisthesis of L5 on S1"



Language of Fractures Looking at Bones in General

Impaction

Intro ① ② ③
Patterns
Orientation
○Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



Fragments are driven into each other.

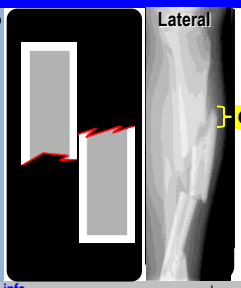
➢Foreshortened

➢"Telescoped in"

Language of Fractures Looking at Bones in General

Override

Intro ① ② ③
Patterns
Orientation
○Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



Similar to impaction

➢Foreshortened

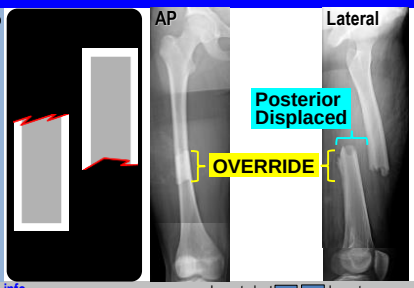
➢Fragments overlap

OVERRIDE

Language of Fractures Looking at Bones in General

Override

Intro ① ② ③
Patterns
Orientation
○Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



Language of Fractures Looking at Bones in General

Override

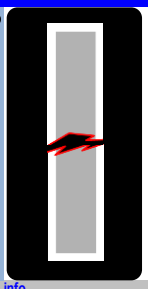
Intro ① ② ③
Patterns
Orientation
○Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

"Superior displacement *proximal* clavicle 1-shaft width"

Language of Fractures Looking at Bones in General

Distraction

Intro ① ② ③
Patterns
Orientation
○Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



Fragments pulled apart

➢Doesn't usually occur as the result of direct trauma

✓Trauma tends impact/override

✓Patella fractures tend to distract

➢Distraction can occur when reducing fractures under traction

Language of Fractures Looking at Bones in General

Diastasis: Joint Widening

Intro ① ② ③
Patterns
Orientation
○Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

Scaphoid-Lunate Joint

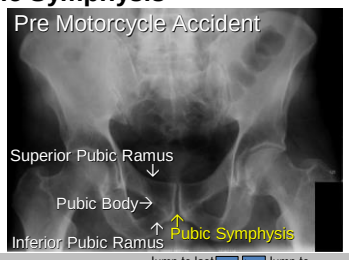
- Space between scaphoid & lunate should not be wider than the spaces between carpal bones.
- Not always due to trauma
- Scapholunate diastasis + Chondrocalcinosis **= CPPD** aka "Pseudo-Gout"

Language of Fractures Looking at Bones in General

Diastasis: Joint Widening

Intro ① ② ③
Patterns
Orientation
○Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

Pubic Symphysis



Language of Fractures Looking at Bones in General

Diastasis: Joint Widening

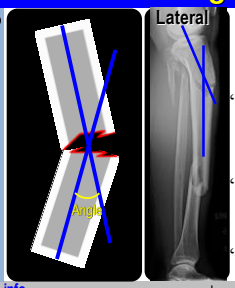
Intro ① ② ③
Patterns
Orientation
○Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

Pubic Symphysis

Language of Fractures Looking at Bones in General

Angulation

Intro ① ② ③
Patterns
Orientation
Displaced
○Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



Need to specify what is angulated relative to what.

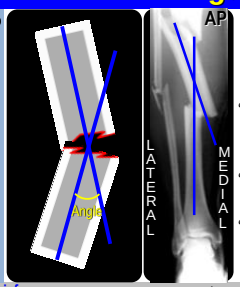
"Segmental tibia fractures, none of the fragments are very displaced"

"Dorsal angulation of the distal fracture fragments"
or
"Vertex anterior angulation"

Language of Fractures Looking at Bones in General

Angulation

Intro ① ② ③
Patterns
Orientation
Displaced
○Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



Need to specify what is angulated relative to what.

"Lateral angulation of the distal fracture fragment"
or
"Vertex medial angulation"
or
"***Valgus*** angulation"

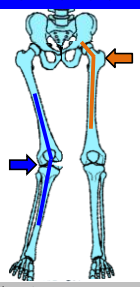
Language of Fractures Looking at Bones in General

Angulation: Valgus vs Varus

Intro ① ② ③
Patterns
Orientation
Displaced
○Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

VALGUS:

- Vertex deviated MEDIAL
  - ✓Knee deviated medially (knock-kneed) = ***"Genu Valga"***
  - ✓Angle femoral neck/shaft (normally 120°) is deviated medially = ***"Coxa Valga"***
- Vertex deviated towards **GENITALS**

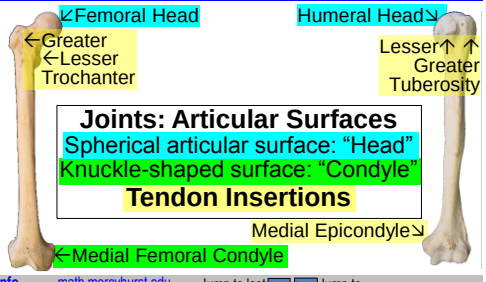


Hallux Valgus

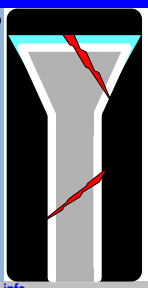
"Bunion"

- 1st MTP (Metatarsal-phalangeal joint)
  - ✓"Hallux"
- Joint deviates **medially**
  - ✓"Valgus"
- Very common in women
  - ✓Due to tight pointy shoes

Ends of Bones



Extra vs Intra-Articular Fractures



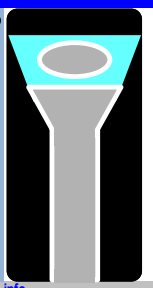
Intra-articular fractures

- Involve articular cartilage
- Extend into joints
  - ✓Risk of developing 2° OA
- Reduction must be *anatomic*

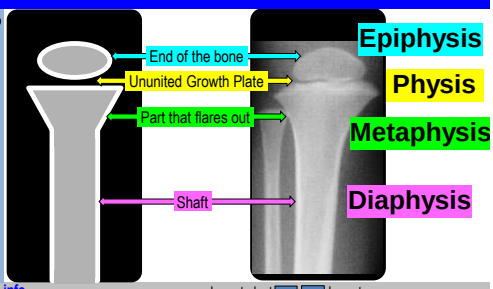
Extra-articular fractures

- Don't involve joints
- Reduction can be *relatively* anatomic
- Bones will remodel
  - ✓Particularly with weight-bearing

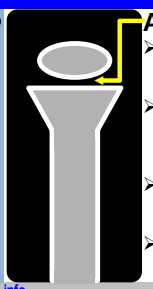
Immature Bone



Parts of the Immature Bone



Salter-Harris Fractures



All involve the Physis

- If fracture doesn't involve the physis ***not Salter-Harris***
- If the patient is skeletally mature (physis fused) ***not Salter-Harris***
- Physis fractures risk of premature growth plate fusion
- Could lead to a leg length discrepancy

Salter-Harris Fractures

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
•S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

"Types I – V"
As the # goes up, fractures get worse

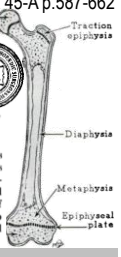
Journal Bone & Joint Surgery
1963 v 45-A p.587-662

Injuries Involving the Epiphyseal Plate

BY ROBERT B. SALTER, M.D., F.R.C.S.(C)*, AND W. ROBERT HARRIS, M.D., F.R.C.S.(C)†, TORONTO, ONTARIO, CANADA

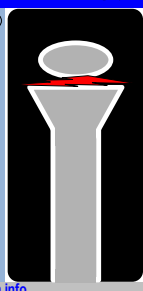
An Instructional Course Lecture, The American Academy of Orthopaedic Surgeons

Injuries involving the epiphyseal plate present special problems in diagnosis and management. The dread complication of serious disturbance of growth is usually predictable and, in certain circumstances, can be prevented. Thus, knowledge of the prognosis for a given injury to the epiphyseal plate in a particular child is of considerable importance to the surgeon, who has the dual responsibility of treating the child and advising the parents. The purpose of this presentation is to discuss epiphyseal-plate injuries from both the clinical and the experimental points of view.



Salter-Harris: Type I

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
•S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

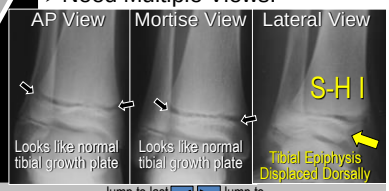


Physis Only
- Can be quite subtle
  - ✓Especially when non-displaced
- Comparison with normal contralateral side helps

Salter-Harris: Type I

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
•S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

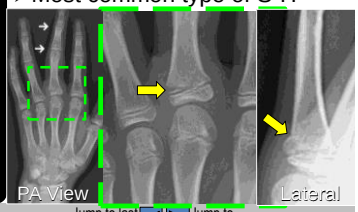
Physis Only
- Can be quite subtle
  - ✓Even when slightly displaced
- Need Multiple Views!



Salter-Harris: Type II

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
•S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

Physis + Metaphysis
- Doesn't extend into the joint
- Most common type of S-H



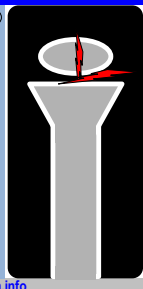
Salter-Harris: Type II

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
•S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

Physis + Metaphysis
- Doesn't extend into the joint
- Most common type of S-H

Salter-Harris: Type III

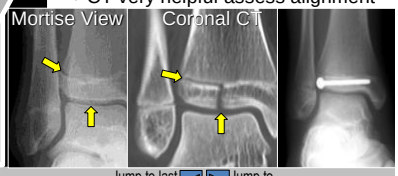
Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
•S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



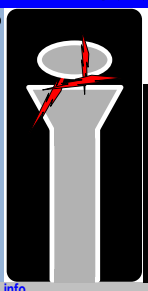
Physis + Epiphysis
- Extends into joint
- Potentially more serious

Salter-Harris: Type III

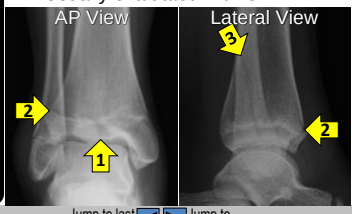
Physis + Epiphysis
- Extends into joint
- Potentially more serious
  - ✓>2mm articular step-off → surgery
  - ✓CT very helpful assess alignment



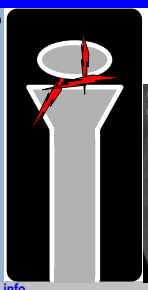
Salter-Harris: Type IV



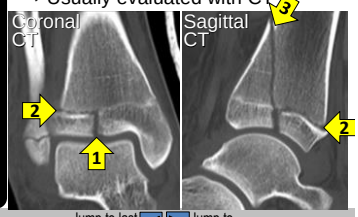
+ Epiphysis + Metaphysis
- Distal Tibia="Triplane Fracture"
  - ✓Usually evaluated with CT



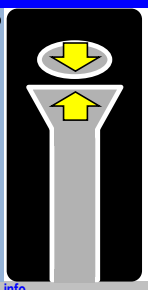
Salter-Harris: Type IV



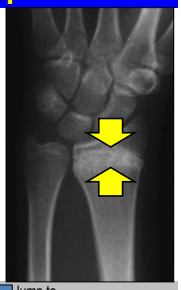
+ Epiphysis + Metaphysis
- Distal Tibia="Triplane Fracture"
  - ✓Usually evaluated with CT



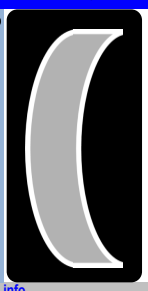
Salter-Harris: Type V



Crush Injury
- Rare
- High rate of premature fusion



Bowing (Plastic) Fractures

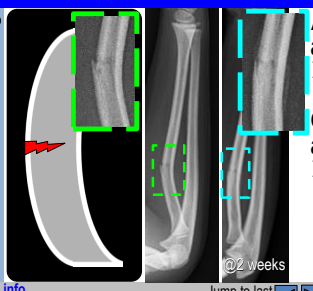


Adult bones are brittle
- Tend to break

Child bones are soft
- They can bend
  - ✓Bowing ("plastic") deformation
  - ✓Typically will remodel with time

Bowing (Plastic) Fractures

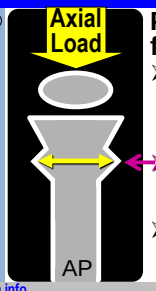
Greenstick Fracture



Adult bones are brittle
- Tend to break like a dry stick

Child bones are soft
- Can break like a green stick
  - ✓Only through one cortex
  - ✓Incomplete Fx

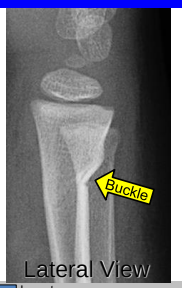
Torus (Buckle) Fracture



Plastic-type fracture
- Commonly in radius of children who fall on hand
- ↔ **Metaphysis-Diaphysis junction**
- Outward cortical buckling

Torus (Buckle) Fracture

Plastic-type fracture
- Commonly in radius of children who fall on hand
- ↔ **Metaphysis-Diaphysis junction**
- Dorsal cortical buckling



Radiographically Occult Fractures

Not detected on radiographs
- Places with many overlapping structures
  - ✓Cervical Spine
  - ✓CT is good for these fractures
- Fractures too non-displaced to see
  - ✓Femoral neck, scaphoid
  - ✓CT is *not* good for these fractures
    - ❖Non-displaced on radiographs is non-displaced on CT
  - ✓MR is good for these fractures
- Fractures with is no cortical disruption
  - ✓Stress fractures
  - ✓MR is good for these fractures

Stress Fractures

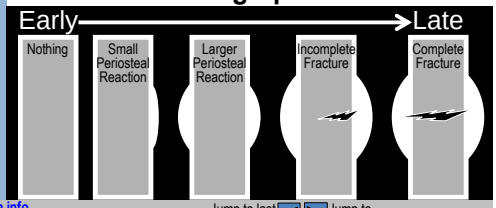
Fatigue Fractures
- ***Abnormal*** forces on ***normal*** bones
  - ✓Athletes; People who increase activities (Military)
  - ✓Change in habits (Different shoes)
- Occur in lower extremities
  - ✓Femur, Tibia, 2nd Metatarsal, Navicular

Insufficiency Fractures
- ***Normal*** forces on ***abnormal*** bones
  - ✓Osteoporosis; Osteomalacia
- **OCCUR IN FEMORAL NECK**
- Occur in Spine; Sacrum

Fatigue Fractures

- Result of chronic repetitive micro-fractures
- Will progress if repetitive stress continues

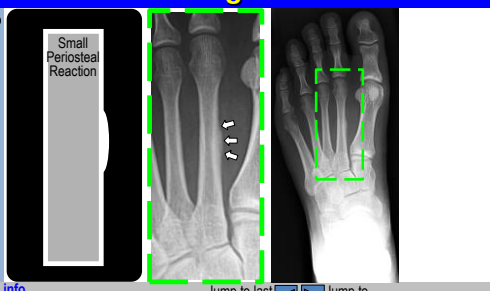
Radiographs…



Language of Fractures Looking at Bones in General

2nd MT Fatigue Fractures

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



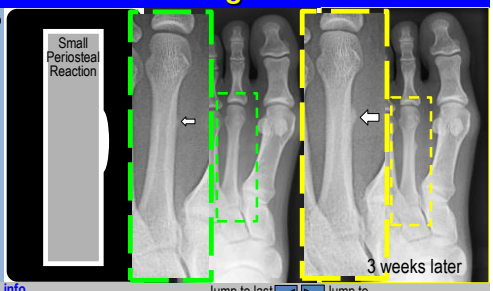
www.schreibman.info

G,J 19yoF Jump to last slide viewed Jump to next slide Slide 61 of 76

Language of Fractures Looking at Bones in General

2nd MT Fatigue Fractures

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



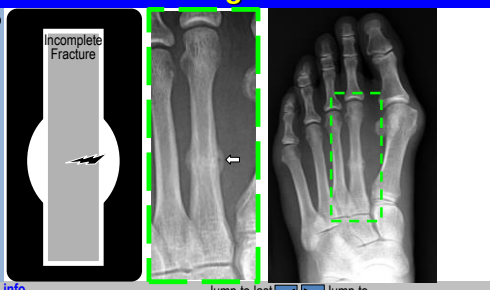
www.schreibman.info

K,D 40yoF Jump to last slide viewed Jump to next slide Slide 62 of 76

Language of Fractures Looking at Bones in General

2nd MT Fatigue Fractures

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



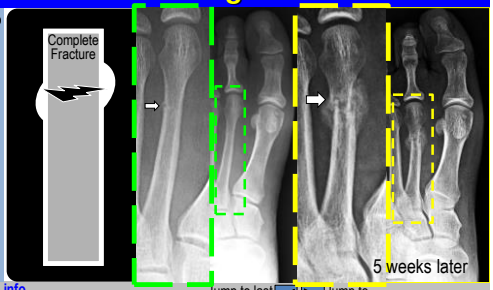
www.schreibman.info

H,S 50yoF Jump to last slide viewed Jump to next slide Slide 63 of 76

Language of Fractures Looking at Bones in General

2nd MT Fatigue Fractures

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss



www.schreibman.info

K,D 58yoF Jump to last slide viewed Jump to next slide Slide 64 of 76

Language of Fractures Looking at Bones in General

Tibial Fatigue Fractures

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

- **Common site for Fatigue Fractures in athletes**
- **Radiographically may see:**
  - ✓Nothing
    - ❖most usual finding
  - ✓Periosteal Reaction

www.schreibman.info

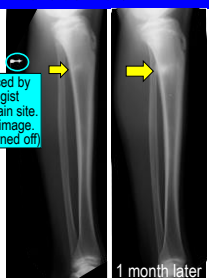
H,C 22yoF Jump to last slide viewed Jump to next slide Slide 65 of 76

Language of Fractures Looking at Bones in General

Tibial Fatigue Fractures

Intro ① ② ③
Patterns
Orientation
Displaced
Angulated
Bone Ends
Immature
S-H
Plastic
Torus
Occult
Stress ④
Don't Miss

- **Common site for Fatigue Fractures in athletes**
- **Radiographically may see:**
  - ✓Nothing
    - ❖most usual finding
  - ✓Periosteal Reaction
  - ✓Trabecular Sclerosis



www.schreibman.info

D,G 16yoM Jump to last slide viewed Jump to next slide Slide 66 of 76

Language of Fractures

Tibial Fatigue Fractures

- **Common site for Fatigue Fractures in athletes**
- **Radiographically may see:**
  - ✓Nothing
    - ❖most usual finding
  - ✓Periosteal Reaction
  - ✓Trabecular Sclerosis
  - ✓Cortical Lucency
  - **"Dreaded Black Line"**

Fatigue Fracture: Management

Diagnosis primarily by History/Exam
- ➢Patient tells of new or repetitive activities
- ➢Pain worse with activity; relieved with rest
- ➢Focally tender

Get Radiographs
- ➢May confirm diagnosis (periosteal reaction)
- ➢Make sure not already a complete fracture
- ➢May find something else (arthritis, foreign body,…)

Treat (even if radiographs are negative)
- ➢Stop/change activity; hard soled shoe

DON'T NEED TO ORDER MRI

MRI for Stress Fractures

MR is Sensitive & Specific for fracture
- ➢Sees marrow edema, periosteal reactions
- ➢(Bone scans: sensitive but not specific)

When should you consider MR?
- ➢Fatigue fractures in patients reluctant to stop
  - ✓College athletes
  - ✓Ironmen; Marathoners
  - ✓Patients not responding to conservative treatment
- ➢Insufficiency fractures in osteoporotic pts
  - ✓Spine/sacral fractures may require prolonged rest
  - ✓Hip fractures require surgery

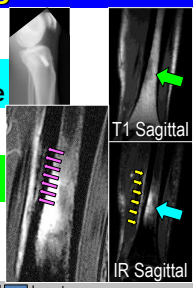
MR staging Tibia Fatigue Fractures

1) Periosteal reaction only
- ➢"Shin Splints"

2) Marrow edema: Most sensitive sequence
- ➢T2 with fat suppression (or IR, STIR)

3) Marrow edema: Most specific sequence
- ➢T1

4) Line through Cortex



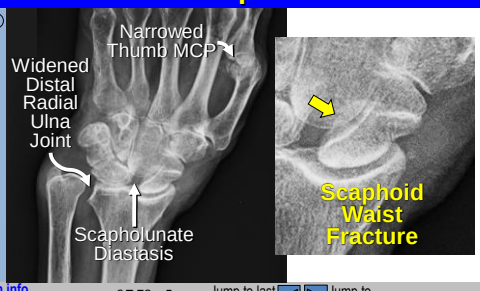
2 Fractures Not to Miss

1) Femoral Neck Fracture
- ➢Common in osteoporotic patients
- ➢Need to detect non-displaced
  - ✓Can treat with percutaneous pinning
- ➢If fracture becomes displaced…
  - ✓Need to treat with hip replacement
- ➢But non-displaced fractures are hard to see on radiographs
  - ✓Particularly in osteoporosis
- ➢**MRI does not miss fractures!**
  - ✓Get MR if radiographs are negative & you are concerned for occult hip Fx

2 Fractures Not to Miss

2) Scaphoid Fracture
- ➢High rate of non-union, avascular necrosis
  - ✓Non-displaced fractures require splint/cast
  - ✓Displaced fractures require surgical screw
- ➢But non-displaced fractures are hard to see
- ➢Diagnosis is made primarily by exam
  - ✓**Snuffbox Tenderness = Presumed Scaphoid Fx**
- ➢Treat with splint/cast for 2 weeks
  - ✓*Even if radiographs are read as negative*
- ➢Reexamine after 2 weeks
  - ✓Repeat radiographs if still has snuffbox tenderness
- ➢**MRI does not miss fractures!**
  - ✓Used for persistent pain; UW athletes

Don't Miss Scaphoid Fractures!



Old Radiology Saying…

"The hardest fracture to find… is the second fracture"

"Satisfaction of the Search"

- You feel good when you find one fracture… so you stop looking for other fractures
- This is why it is important to understand
  - ✓Mechanisms of injury
  - ✓Patterns of fractures
- *This is why it's important to have a **Radiologist** formally interpret all studies!*

Schreibman's Sayings…

"Trauma is not evenly distributed within the population"

- Patients who come in with new fractures have had fractures in the past
  - ✓People who drive recklessly… do so repeatedly
  - ✓People who get into fights… do so repeatedly
  - ✓Students who get drunk on Friday night and punch walls… do so repeatedly
- It can be hard to tell old from new fractures
- *This is why it's important to have a **Radiologist** formally interpret all studies!*
- Sometimes we suggest additional studies

Any Questions?