Musculoskeletal Specialty Review

Christopher Cerniglia, DO, MEng
Chief, Division of Musculoskeletal Imaging
Department of Radiology
UMass Memorial Medical Center
Program Director, Musculoskeletal Fellowship
Associate Director, Radiology Residency Program
University of Massachusetts Medical School

Outline

• Cases
• Trauma
• Tumors
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Case 1

Hx: Trauma

Slide 5

Case 1

Hx: Trauma

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Case 1

CT images of the head and neck.
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Question 2

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Case 3

• Hx: Clip injury while playing football

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Case 3

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Question 4

Case 5
- Slowly Enlarging Palpable Mass
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Question 6

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Case 7

- 51 year old female with several week history of knee pain.

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Case 7
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Question 8

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Trauma & Sports Injuries

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TRAUMA

• Axial Trauma
  – Spine
  – Pelvis
• Appendicular Trauma
  – Upper Extremity
  – Lower Extremity
• Sequela & Complications
TRAUMA

- Axial Trauma
  - Spine
  - Pelvis
- Appendicular Trauma
  - Upper Extremity
  - Lower Extremity
- Sequela & Complications

SPINE

- Mechanism of injury
  - Flexion
  - Extension
  - Axial load/burst
  - Distraction
  - Translation
- Fracture/ligament injury patterns
- Column concept/stability
  - Cervical
  - Thoracic
  - Lumbar
  - Sacrum/Coccyx
**MECHANISM OF INJURY**

- Flexion/Extension
  - E.g. Teardrop Fx
- Axial Load/Distraction
  - E.g. Compression Fx
- Rotation
- Translation
- MIXED
  - E.g. Hangman (Distraction/Extension)

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**FLEXION**

- Hyperflexion Sprain (Ant. Subluxation)
- Anterior Wedge Fx
- Clay Shoveler’s Fx
- B/L Interfacetal Dislocation
- Flexion Teardrop Fx

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**Anterior Wedge Fx**

- Loss of height of anterior vertebral body
- Buckled anterior cortex
- Anterior Superior Fx of VB
- C/V with NO Vertical Fx Component and NO Post cortical involvement
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Seatbelt Fracture

- Secondary to hyperflexion at the waist:
  - Anterior compression of the vertebral body
  - Distraction of posterior elements and ligaments
- Usually involves T12, L1, or L2

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Bilateral Locked Facets

- There is hyperflexion, the spinous process is distracted, facets override, and the spine recoils
- 50% vertebral body displacement anteriorly

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Flexion Teardrop

- Teardrop fragment anterior vertebral body avulsion fracture
- All ligaments are disrupted
- Posterior subluxation of vertebral body into the spinal canal often leads to spinal cord compression
- Spinous Process Fracture
EXTENSION

- C1 anterior arch Avulsion Fx
- C1 posterior arch Fx
- Extension Teardrop Fx
- Laminar Fx
- Hangman’s Fx

ANSWER 1

Hangman’s Fracture

- Extension & Distraction of C2 from MVA/Hanging
- B/L C2 pars (common) or pedicle fx
- Anterior sublux of C2 can occur
- Ant Inf corner Fx C2 can occur (ALLig)
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AXIAL LOAD

- Jefferson Fx
- Compression Fx

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Jefferson’s Fx

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Jefferson Fx
- Fracture of C1 vertebra
- Axial loading with neck extended
- Transverse ligament integrity determines stability
- Open mouth view: lateral masses of C1 align with lateral masses of C2

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MIXED/OTHER
- Unilateral Facet
- Odontoid Fracture

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Unilateral Facet
- MIXED Severe flexion associated with rotation
- Results in:
  - Rupture of facet joint ligaments
  - Facet joint dislocation
- 25% anterior vertebral body displacement
- "Bow tie" appearance on lateral radiograph
Unilateral Facet

- MIXED Severe flexion associated with rotation
- Results in:
  - Rupture of Facet joint ligaments
  - Facet joint dislocation
  - 25% anterior vertebral body displacement
  - "Bow tie" appearance on lateral radiograph

Unilateral Facet

Unilateral Facet

Odontoid Fx

- Type 1
  - Fx upper dens
  - Rare
- Type 2
  - Fx at base of dens
- Type 3
  - Base and body of C2

Odontoid Fx

Odontoid Fx
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DISH/AS

- Be careful with ankylosis and fused spine
- Significant injury with minor trauma

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TRAUMA

- Axial Trauma
  - Spine
  - Pelvis
- Appendicular Trauma
  - Upper Extremity
  - Lower Extremity
- Sequela & Complications

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Sacral Insufficiency Fracture

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Pelvic Fx
- Stable
  - Single break of ring
  - Unilateral Pubic Ramus
  - Peripheral Fracture
  - Avulsions
    - ASIS, AIIS, IT, Pubis
- Unstable
  - 2 breaks of ring
    - Malgaigne: SI & Ipsilateral PR
    - Bucky: SI & Contralateral PR
    - Straddle: B/L Optional
    - Dislocation: SI and Symphysis

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TRAUMA
- Axial Trauma
  - Spine
  - Pelvis
- Appendicular Trauma
  - Upper Extremity
  - Lower Extremity
- Sequelae & Complications
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Upper Extremity Trauma
• Clavicle & AC joint
• Shoulder & GH joint
• Elbow
• Forearm
• Wrist
• Hand

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Clavicle and AC joint
• Grades of acromioclavicular joint separation
• Clavicle fracture
• Sternoclavicular fracture / dislocation
• Post-traumatic osteolysis

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AC Separation
**Clavicle Fracture**
- Nonunion and malunion greatest at central 1/3 of clavicle
- Allman Classification

**SC Fracture/Dislocations**
- Direct Impact
- Anterior MC
- Posterior LC
- Risk for vascular injury

**Post Traumatic Osteolysis**
- Common repetitive trauma/overuse
- Weightlifters
- DDX:
  - B/L: Hyperparathyroidism/RA/Scleroderma
  - U/L: Infection/Tumor/Surgery
Upper Extremity Trauma

- Clavicle & AC joint
- Shoulder & GH joint
- Elbow
- Forearm
- Wrist
- Hand

Shoulder

- Anatomic vs. surgical neck humerus fracture
- Greater tuberosity humerus fracture
- Scapular fracture – Body – Glenoid
- Dislocations – Anterior (a) Hill Sachs fracture (b) Bankart fracture (c) Recurrence – Posterior (a) Reverse Bankart (b) Neurovascular injuries – Other
- Inferior scapulothoracic dissociation*
- Rotator cuff tear
- Labral tear – Address of instability
- Fracture – Dislocation
- Impingement syndrome – Anterior – Posterior – Coracoid
- Adhesive capsulitis
Greater Tuberosity Fx
- Post dislocation
- Avulsion fractures of RTC

Anterior Dislocation

Anterior Dislocation
Hill-Sachs Deformity
Bankart Lesion
**Anterior Dislocation**
- Indirect force from
  - abduction,
  - external rotation and
  - extension
- Best demonstrated on AP internal rotation view
- Recurrence is common after first dislocation

**Posterior Dislocation**
- Direct or Indirect force a/w seizures or electrical shock
- Fixed internal Rotation
- No overlap of humerus
  - + Rim Sign
  - +/- Trough Sign
  - +/- Reverse Bankart

**Inferior Dislocation**
- Luxatio Erecta
- Risk of injury to:
  - Ax artery
  - Brachial Plexus
  - Rotator Cuff
**Pseudo-dislocation**

- Inferior and lateral displacement of humeral head due to hemarthrosis
- Often occurs in fractures of the humeral head or neck
- NOT a true dislocation

**RTC**

- SS, IS, TM = GT
- SubS = LT
- AH interval <6mm Chronic RCT
Labral Injuries

SLAP
- Type I Fraying
- Type II Tear SL
- Type III bucket handle of SL
- Type IV Tear SL w/biceps involvement

Prox Biceps Tear/Dislocation
- A/W Labral tear
- Often degenerative in etiology c/w distal biceps often traumatic

Impingement
- Supraspinular Notch
- Spinoglenoid Notch
- Quadrilateral Space Syndrome
Upper Extremity Trauma

- Clavicle & AC joint
- Shoulder & GH joint
- Elbow
- Forearm
- Wrist
- Hand

Elbow

- Radial head fracture
- Fracture/dislocation
- Humeral condyle fractures
- Extensor tendinosis (tennis elbow/lateral epicondylitis)
- Flexor tendinosis (pitcher’s elbow/medial epicondylitis)
- Ulnar collateral ligament tear
- Radial collateral ligament tear
- Biceps avulsion
- Triceps avulsion

Radial Head/Neck Fx
Posterior Elbow Dislocation

Lateral Epicondylitis
- Tennis Elbow
- Degeneration and Tearing of CET (ECU, EDC, and ECRB)
- Overuse injury

RCL tear
Post Tendon Repair

Upper Extremity Trauma
- Clavicle & AC joint
- Shoulder & GH joint
- Elbow
- Forearm
- Wrist
- Hand
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**Forearm**
- Galeazzi fracture/dislocation
- Monteggia fracture/dislocation
- Isolated ulna (nightstick) fracture

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**Galeazzi fracture-dislocation**

Fx RADIUS with Dislocation at DRUJ.
Galeazzi fractures have a peak incidence of 9-12 years of age.

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**Monteggia fracture-dislocation**

- Fracture of the ulna diaphysis & dislocation of radial head
- Detect Ulnar Fx -> Look to radial head – can miss disloc
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**Night Stick Fracture**

- Isolated ulnar shaft fracture
- Most commonly as a self-defense against blunt trauma
- Force is to the medial forearm as the arm is used to shield head and body

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**Essex-Lopresti Fracture**

- Comminuted fracture of the radial head
- Dislocation of the DRUJ

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**Buckle and Greenstick Fractures**

- Distal radius Buckle (Torus) fractures: very common injuries in children.
- Quick to heal
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**Forearm**
- Galeazzi fracture/dislocation
- Monteggia fracture/dislocation
- Isolated ulna (nightstick) fracture

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**Upper Extremity Trauma**
- Clavicle & AC joint
- Shoulder & GH joint
- Elbow
- Forearm
- Wrist
- Hand

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**Wrist**
- Colles fracture
- Smith fracture
- Radial styloid fracture
- Isolated carpal bone fracture
  - Scaphoid fracture
  - Triscaphoid fracture
  - Troncular fracture
  - Other
- Complex carpal bone injuries
  - Perilunate dislocation
- Ligament tears
  - Interosseous ligaments
  - Triquetrohamate ligaments
  - Triscaphoid ligaments
  - Chronic carpal instability
  - Distal intercalated segment instability
  - Volar intercalated segment instability
  - Scapholunate advanced collapse
- Distal radioulnar joint injury
- Carpal tunnel syndrome
- Ulnar impaction syndrome
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Colles Fracture

- MC Fx distal radius.
- Transverse Fx of distal radial metaphysis.
- Dorsal angulation and displacement of the distal fragment.
- Typically produced by a fall on an outstretched hand, with the wrist dorsiflexed.

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Smith Fracture

- Reverse Colles fracture with fracture of the metaphysis and volar angulation of the distal fracture fragment.
- Younger patients results from extensive traumatic forces on the volar flexed wrist.
- Volar comminution is common.

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Smith Fracture

- Type 1: Horizontal Fx line
- Type 2: Oblique Fx line
- Type 3: Intra-articular oblique (Reverse Bartons)
Chauffeur Fracture

- Chauffeur aka Hutchinson or Backfire fracture consists of an oblique, intraarticular fracture of the distal radius involving the radial styloid. Displaced fracture fragments indicates disruption of intercarpal ligaments.
- The name originates from documented injuries while cranking backfiring automobile starters in the early 20th century. This fracture is classically a shearing force transmitted through the scaphoid or scapholunate interval.

Scaphoid Fracture

- Most common carpal fracture
- At risk of AVN, especially at proximal pole
  - 65%: waist
  - 15%: proximal pole
  - 10%: distal body
  - 8%: volar tuberosity
  - 2%: through the distal articular surface
Scaphoid Fracture

Lunate Fracture

Triquetral Fracture
- Common at dorsal surface
- Avulsions from ligamentous attachments
- Dorsal avulsion best detected on a lateral projection
Hamate Fractures

Other Carpal Fracture

- Capitate fx - rare; high suspicion
- Trapezoid fracture are rare due to stabilization from its articulations, and may be associated with a dislocation of the second metacarpal.
- Pisiform (sesamoid bone) within FCU tendon and injury often occurs in the setting of direct trauma.
  - vertical
  - transverse
  - or a compressive
Perilunate dislocation (lesser arc injury) is a pure ligamentous disruption around the lunate.

Perilunate dislocation with associated fracture of one or more bones around the lunate (scaphoid, trapezium, capitate, hamate, or triquetrum) is called a greater arc injury.

Perilunate injuries result from high-energy wrist hyperextension, typically falls from a height, motor vehicle collisions, or sports-related injuries.

Perilunate injury: Greater and Lesser Arcs

Lesser Arc injuries (ligamentous)
- Scapholunate
- Perilunate
- Midcarpal
- Lunato

Greater Arc injuries (ligamentous with adjacent fractures)
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Lesser Arc Injury
Stage II: Perilunate

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Trans Styloid Perilunate Dislocation

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Lesser Arc Injury
Stage III: Midcarpal
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**SLAC: Watson Classification**

- **Stage I** Arthritis between scaphoid and radial styloid
- **Stage II** Arthritis between scaphoid and entire scaphoid facet of the radius
- **Stage III** Arthritis between capitate and lunate

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**Wrist**

- Colles fracture
- Smith fracture
- Radial styloid fracture
- Isolated carpal bone fracture
  - Scaphoid fracture
  - Triquetral fracture
  - Hamate fracture
- Complex carpal bone injuries
  - Perilunate dislocation
  - Lunate dislocation
- Ligament tears
  - Interosseous ligaments
  - Triangular fibrocartilage complex
- Chronic carpal instability
  - Dorsal intercalated segment instability
  - Volar intercalated segment instability
  - Scapholunate advanced collapse
- Ulnar impaction syndrome
- Distal radioulnar joint injury
- Carpal tunnel syndrome
- Ulnar impaction syndrome

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**Upper Extremity Trauma**

- Clavicle & AC joint
- Shoulder & GH joint
- Elbow
- Forearm
- Wrist
- Hand
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Hand
• Phalanx fracture / dislocation
  – Intra vs. extra articular
  – Volar plate fracture
  – Tuft fracture
• Metacarpal fracture
  – Bennett vs. Rolando fracture
  – Boxer fracture
• Carpometacarpal dislocation
• Tendon injuries
• Pulley injuries
• Capsular and collateral ligament injuries
  – Gamekeeper (skier) thumb
  – Metacarpophalangeal joint

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Slide 135
TRAUMA
• Axial Trauma
  – Spine
  – Pelvis
• Appendicular Trauma
  – Upper Extremity
  – Lower Extremity
• Sequela & Complications
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Lower Extremity Trauma
- Hip
- Femur
- Knee
- Ankle
- Foot

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Hip & Femur
- Acetabular fracture - fracture patterns
- Hip dislocation - risk of osteonecrosis
- Femoral neck fracture
- Intertrochanteric fracture
- Femoral head fracture
- Labral injury

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Lower Extremity Trauma
- Hip
- Femur
- Knee
- Ankle
- Foot
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Parrot-beak

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IT Band Syndrome

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Displaced Meniscal Fragments
• Anterior Flipped LM
Knee

- Femoral condyle fracture
- Tibial plateau fracture
- Knee dislocation
- Patella fracture
- Patella dislocation
- Meniscal injury
  - Bucket handle tear
  - Parrot-beak tear
  - Horizontal oblique tear
  - Horizontal cleavage tear
  - Vertical longitudinal tear
  - Radial tear
  - Complex tear
  - Root tear
  - Meniscocapsular separation
  - Fraying and degeneration
  - Displaced fragments
  - Meniscal cyst
- Ligament injury
  - Anterior cruciate
  - Posterior cruciate
  - Medial collateral
  - Lateral collateral
- Extensor mechanism injury
  - Quadriceps tear
  - Patellar tendon (ligament) tear
  - Retinaculum injury
- Posterolateral corner injury
  - Popliteus muscle/tendon
  - Arcuate ligament*
  - Popliteofibular ligament*
  - Fabellofibular ligament*
- Articular cartilage injury
- Overuse injuries
  - Plica syndrome
  - Iliotibial band friction syndrome
  - Pes anserine bursitis
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**Lower Extremity Trauma**

- Hip
- Femur
- Knee
- Ankle
- Foot

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**Ankle Foot**

- Mechanisms of injury
- Pilon fracture
- Tilleaux fracture
- Maisonneuve fracture
- Ligament injury
  - Anterior talofibular ligament
  - Calcaneofibular ligament
  - Posterior talofibular ligament
- Talar fracture
  - Dome fracture
  - Neck fracture
  - Lateral process fracture
- Calcaneal fracture - anterior process fracture
- Fifth metatarsal base fracture
- Metatarsal fracture
- Lisfranc fracture/dislocation
- Phalanx fracture
- Cuboid fracture
- Navicular fracture

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**Lisfranc**
TRIUMA
• Axial Trauma
  – Spine
  – Pelvis
• Appendicular Trauma
  – Upper Extremity
  – Lower Extremity
• Complications

FRACTURE COMPLICATIONS
IMMEDIATE
• Hemorrhage/Epidural Hematoma
• Fat Embolism
• Acute Ischemia
• Spinal Cord Injury

DELAYED
• Malunion
• Nonunion
• Premature physeal closure
• Osteonecrosis
  – Femoral head
  – Scaphoid proximal pole
  – Talar dome
• Infection
• Arthritis
AVN scaphoid

- Post fracture
- AVN of scaphoid without prior fx:
  - Preiser Dz
- DDx fx nonunion without avn
- Typically prox pole waist fx and nonunion
- T1C+ indicates viable marrow

Osteonecrosis

- Femoral Head
- Scaphoid
- Talar dome

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OTHER TRAUMA

- Stress injuries (bone and soft tissue)
  - Mechanisms
  - Pathophysiology
  - Epidemiology
  - Imaging diagnosis
  - Implications for treatment
- Repetitive trauma
  - Tendinosis
  - Enthesophytes
  - Other
- Soft tissue injuries
  - Grades of muscle tear
  - Grades of ligament tear
  - Myositis ossificans
- Thermal trauma
  - Burns
  - Cold injury

Answer 4

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Tenosynovitis 2nd EC

- Extensor Carpi Radialis Longus and Brevis Tenosynovitis
• End Part 1: Trauma
• Begin Part 2: Tumor after the break

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Tumors

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Answer 5
PEARLS: AGE

• AGE < 30
  – Infection
  – EG
  – ABC
  – NOF
  – Chondroblastoma
  – UBC

• AGE > 40
  – Mets
  – Myeloma
  – Infection

PEARLS: Symptoms

• PAINLESS
  – FD
  – Enchondroma
  – NOF
  – UBC

PEARLS: Location

• Epiphysis
  – Infection
  – GCT
  – Chondroblastoma
  – Infection
  – Geode
  – Mets/Infiltrative
  – CCC
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PEARLS: Symptoms

• PAINLESS
  – FD
  – Enchondroma
  – NOF
  – UBC

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Lodwick Classification

RADIOGRAPHS

• IA Geographic
  – Well defined
  – Sclerotic Rim
  – Intact Cortex

• IB Geographic
  – Well defined
  – Non-sclerotic rim
  – Thinning of Cortex

• IC Geographic
  – ill defined
  – Non-sclerotic rim
  – Perforation / Destruction of Cortex

• II Moth-eaten
  – Lamellar/Onion-skin Rxn.

• III Moth-eaten and permeative
  – Destruction
  – Radial/Spicular rxn.

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CT/MRI - Bone

- **CT:**
  - Matrix characterization

- **MRI:**
  - Assessing the response to treatment
  - Postchemotherapeutic MRI signal-intensity changes
  - Detecting recurrence

PEARLS: Multiple Osseous Lesions

- METS
- Myeloma
- EG
- FD
- Enchondromas
- Brown Tumors

Bone: BENIGN

- Cartilaginous
  - Enchondroma
  - Multiple (Ollier disease) 
  - Maffucci syndrome
  - Osteochondroma
  - Multiple hereditary exostoses
  - Chondromyxoid Fibroma
  - Chondroblastoma
  - Chondroma
  - Periosteal (surface, juxtacortical)

- Fibrous
  - Fibroxanthoma (non-ossifying fibroma)
  - Fibrous cortical defect
  - Benign fibrous histiocytoma
  - Fibrous dysplasia - McCune-Albright
  - Chondromyxoid fibroma
  - Desmoplastic fibroma
  - Osteofibrous dysplasia (ossifying fibroma)

- Osteogenic
  - Enostosis (bone island)
  - Multiple
  - Osteoma
  - Multiple
  - Osteoid osteoma
  - Osteoblastoma

- Lipoid
  - Lipoma
  - Liposclerosing myxofibrous tumor (LSMFT)

- Vascular
  - Hemangioma - Multiple (Osler-Weber-Rendu)
  - Hemophilic pseudotumor
  - Lymphangioma
  - Glomus tumor
  - Hemangiopericytoma
  - Gorham disease

- Other
  - Unicameral bone cyst (simple bone cyst)
  - Aneurysmal bone cyst
    - (a) Primary
    - (b) Secondary
  - Giant cell tumor of bone
  - Langerhans cell histiocytosis (eosinophilic granuloma)
  - Chordoma
  - Intraosseous ganglion
  - Reactive lesions
    - Giant cell reparative granuloma
    - Bizarre parosteal osseous proliferation (BPOP)
    - Epidermoid inclusion cyst
Bone: BENIGN

- Cartilaginous:
  - Enchondroma
  - Multiple (Ollier disease)
  - Maffucci syndrome
  - Osteochondroma
  - Multiple hereditary exostoses
  - Chondromyxoid Fibroma
  - Chondroblastoma
  - Chondroma - Periosteal (surface, juxtacortical)

- Fibrous:
  - Fibroxanthoma (non-ossifying fibroma)
  - Fibrous cortical defect
  - Benign fibrous histiocytoma
  - Fibrous dysplasia - McCune-Albright
  - Chondromyxoid fibroma
  - Desmoplastic fibroma
  - Osteofibrous dysplasia (ossifying fibroma)

- Osteogenic:
  - Enostosis (bone island) - Multiple
  - Osteoma - Multiple
  - Osteoid osteoma - Osteoblastoma

- Lipoid:
  - Lipoma
  - Liposclerosing myxofibrous tumor (LSMFT)*

- Vascular:
  - Hemangioma - Multiple (Osler-Weber-Rendu)
  - Hemophilic pseudotumor
  - Lymphangioma
  - Glomus tumor
  - Hemangiopericytoma*
  - Gorham disease*

- Other:
  - Unicameral bone cyst (simple bone cyst)
  - Aneurysmal bone cyst
  - (a) Primary
  - (b) Secondary
  - Giant cell tumor of bone
  - Langerhans cell histiocytosis (eosinophilic granuloma)
  - Chordoma
  - Intraosseous ganglion
  - Reactive lesions
    - Giant cell reparative granuloma
    - Bizarre parosteal osseous proliferation (BPOP)*
    - Epidermoid inclusion cyst

Bone: MALIGNANT

- Cartilaginous - Chondrosarcoma
  - Central
  - Peripheral
  - Dedifferentiated
  - Mesenchymal
  - Clear cell

- Fibrous:
  - Fibrosarcoma
  - Malignant fibrous histiocytoma

- Osteogenic - Osteosarcoma
  - Conventional
  - Surface
  - Periosteal
  - Parosteal
  - High grade surface
    - Telangiectatic
    - Low grade central

- Vascular:
  - Angiosarcoma
  - Hemangioendothelioma

- Other:
  - Chordoma
  - Multiple myeloma (plasmacytoma)
  - Ewing sarcoma
  - Primitive neuroectodermal tumor (PNET)
  - Adamantinoma
  - Lymphoma
  - Leukemia
  - Chloroma

SECONDARY

- Radiation
- Pagets
- Metastatic
Bone: MALIGNANT

PRIMARY
- Cartilaginous - Chondrosarcoma
  - Central
  - Peripheral
  - Dedifferentiated
  - Mesenchymal
  - Clear cell
- Fibrous - Fibrosarcoma
  - Malignant fibrous histiocytoma
- Osteogenic - Osteosarcoma
  - Conventional
  - Surface
    - Periosteal
    - Parosteal
  - High grade surface
    - Telangiectatic
    - Low grade central
- Vascular - Angiosarcoma
  - Hemangioendothelioma
- Other - Chordoma
  - Multiple myeloma (plasmacytoma)
  - Ewing sarcoma
  - Primitive neuroectodermal tumor (PNET)
  - Adamantinoma
  - Lymphoma
  - Leukemia
- Chloroma

SECONDARY
- Radiation
- Pagets
- Metastatic

SOFT TISSUE
**Soft Tissue: BENIGN**

- **Fibrous**
  - Fibroma
  - Fibromatosis
  - Desmoid
  - Elastofibroma

- **Neural**
  - Neurofibroma
  - Schwannoma
  - Neurofibromatosis
  - Neuroma
  - Lipomatosis of nerve (fibrolipomatous hamartoma)
  - Post-resection neuroma
  - Morton neuroma

- **Cartilaginous**
  - Soft tissue chondroma

- **Vascular**
  - Hemangioma
  - Hemangioendothelioma
  - Glomus tumor
  - Vascular malformations
  - Lymphangioma

- **Lipoid**
  - Lipoma
  - Angiolipoma
  - Hibernoma
  - Lipoblastoma

- **Muscle**
  - Rhabdomyoma
  - Leiomyoma

- **Dermal/subcutaneous**
  - Sebaceous cyst
  - Dermatofibroma
  - Granuloma annulare
  - Granular cell tumor*

- **Other**
  - Myxoma
  - Giant cell tumor of tendon sheath
  - Pigmented villonodular synovitis
  - Ganglion

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**Desmoid Tumor**

- Plantar Fibromatosis

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**Elastofibroma**
Soft Tissue: BENIGN

- Fibrous
  - Fibroma
  - Fibromatosis
  - Desmoid
  - Elastofibroma

- Neural
  - Neurofibroma
  - Schwannoma
  - Neurofibromatosis
  - Neuroma
  - Lipomatosis of nerve (fibrolipomatous hamartoma)
  - Post-resection neuroma
  - Morton neuroma

- Cartilaginous
  - Soft tissue chondroma

- Vascular
  - Hemangioma
  - Hemangioendothelioma
  - Glomus tumor
  - Vascular malformations
  - Lymphangioma

- Lipoid
  - Lipoma
  - Angiolipoma
  - Hibernoma
  - Lipoblastoma

- Muscle
  - Rhabdomyoma
  - Leiomyoma

- Dermal/subcutaneous
  - Sebaceous cyst / Epidermoid cyst
  - Dermatofibroma
  - Granuloma annulare
  - Granular cell tumor*

- Other
  - Myxoma
  - Giant cell tumor of tendon sheath
  - Pigmented villonodular synovitis
  - Ganglion

Soft Tissue: MALIGNANT

PRIMARY

- Fibrosarcoma
- Malignant fibrous histiocytoma (high-grade undifferentiated pleomorphic sarcoma)
- Synovial sarcoma
- Rhabdomyosarcoma
- Malignant peripheral nerve sheath tumor
- Liposarcoma
  - (a) Myxoid
  - (b) Well-differentiated
  - (c) Dedifferentiated
- Melanoma

SECONDARY

- Metastasis
- Leukemia
- Lymphoma
- Soft tissue extension of bone lesion
Soft Tissue: MALIGNANT

- Fibrosarcoma
- Malignant fibrous histiocytoma (high-grade undifferentiated pleomorphic sarcoma)
- Synovial sarcoma
- Rhabdomyosarcoma
- Malignant peripheral nerve sheath tumor
- Epithelioid sarcoma*
- Liposarcoma – (a) Myxoid – (b) Well-differentiated – (c) Dedifferentiated
- Dermatofibrosarcoma protuberans*
- Alveolar soft part sarcoma*
- Myxofibrosarcoma*
- Soft tissue osteosarcoma*
- Kaposi sarcoma*
- Melanoma
- Metastasis
- Leukemia
- Lymphoma

Thank You

Contact/Questions:
Christopher.Cerniglia@umassmed.edu