Disclosure Statement

- I do not receive any financial compensation or benefits from the information presented in this lecture
My Background

- Undergrad: Concordia University
- Medical School: UNMC
- Orthopaedic Residency: U. Texas Health Science Center at San Antonio
- Orthopaedic Sports Medicine Fellowship: American Sports Medicine Institute/Dr. James Andrews Clinic
- Previous Team Physician Assignments:
  - Washington Redskins, San Antonio Spurs, WWE, Birmingham Barons, University of Alabama, Auburn University, University of West Alabama
Current Practice

- Sports Medicine/Joint Replacement/Fracture Care
- Team Physician for Lincoln Saltdogs Baseball, Lincoln Stars Hockey, and for the athletes of Concordia University, Doane College, and Nebraska Wesleyan University
- LMEF Resident education
- Physician Assistant education Union College
- Athletic Training education with Doane College and NWU
Outline

- Radiographs vs MRI
- Choosing an MRI
- Injections
- Olecranon & Pre-Patellar Bursitis
- Open Fractures
- Splint vs Cast
- Compartment Syndromes
- Knee Effusions In Young Athletes
Choosing Appropriate Imaging

How to decide?
- Age
- Acute vs Chronic
- Mechanism of injury
- Differential Diagnosis

What to Consider?
- Health Care Resources
- Financial Impact to Patients
Radiographs

- Should X-rays always be taken if a soft tissue, tendinous, or ligamentous injury is suspected?
- What else should you consider with soft tissue injuries?
  - Fractures
  - Physeal/Epiphysyal injuries
  - Arthritic changes
Possible scenarios for not ordering radiographs

- Muscle aches/Strains
- Contusions
- Questionable:
  ○ Joint sprains
    □ Ottawa Score
The Ottawa ankle rules
Ankle X-ray is only required if there is any pain in the malleolar zone and any one of the following:
- Bone tenderness along the distal 6 cm of the posterior edge of the tibia or tip of the medial malleolus, OR
- Bone tenderness along the distal 6 cm of the posterior edge of the fibula or tip of the lateral malleolus, OR
- An inability to bear weight both immediately and in the emergency department for four steps.
Additionally, the Ottawa foot rules indicate whether a foot X-ray series is required. It states that it is indicated if there is any pain in the midfoot zone and any one of the following:
- Bone tenderness at the base of the fifth metatarsal (for foot injuries), OR
- Bone tenderness at the navicular bone (for foot injuries), OR
- An inability to bear weight both immediately and in the emergency department for four steps.
MRI without X-rays

What can be missed or poorly defined by MRI?

- Physeal injuries vs Skeletal Maturity
- Arthritic findings
- Fractures
- Bone Cysts
MRI Pitfalls

- X-Ray findings that would discourage MRI use
  - Arthritic changes
  - Fractures
- Quality Measures Impacted by MRI use
When is it appropriate for MRI use in arthritic situations?

- Acute change in symptoms
- Concern for meniscal injuries if catching/locking symptoms are the dominant pathology
Case Example

- 62 y/o M with mild knee pain previously has a gradual worsening of his symptoms over the past few weeks after a minor twisting injury. The patient presents to PCP office.
- No X-rays ordered
- MRI ordered: shows ACL tear, meniscal tearing, chondral bruising, and tricompartmental OA
- Referred for ACL reconstruction and meniscal debridement
- First step in orthopaedic office?
  - Plain radiographs
Case 1

- Treatment Options?
- Did this patient need the MRI?
Case Example

- 72 y/o F presents to PCP office with longstanding mild right shoulder pain and now has worsening weakness and pain over the past several weeks. No acute trauma or injuries reported
- No X-rays ordered
- MRI ordered: shows full thickness supraspinatus and infraspinatus tears, degenerative SLAP tearing, and moderate glenohumeral arthritis
Case 2

- Referred for RTC repair
- Initial surgeon recommended RTCR and still no X-rays taken
- Pt chose to pursue second opinion and presents to my office
  - X-rays taken:
  - Treatment options?
  - Had Xrays been taken first, would MRI be necessary?
Appropriate Arthritis Radiographs

- Weight bearing or standing films are preferred
- Knee Series: AP/Lateral/Tunnel/Sunrise with contralateral extremity comparisons of Tunnel/Sunrise
Shoulder Dislocations:

- Initial: AP/Axillary (can obtain even with minimal abduction)/scapular Y
- Post-Reduction: **ALWAYS OBTAIN AXILLARY!!!** In addition to AP
  - Why is Axillary important?
Case Example

- 29 y/o M with h/o seizures presents to EC c/o shoulder pain and decreased ROM. Patient reports waking up on floor of his kitchen with shoulder pain.
- Initial films:
Pt had 1-View post-reduction view taken, ER physician confirmed reduction on X-ray and the patients was d/c to home, reports pain is improved, but still having difficulty with ROM
Pt returns to ER 1 day later with worsening pain/numbness/decreased ROM. Orthopaedics team consulted this time and Axillary view obtained:

Pt underwent closed rdx in OR
The Importance of the Axillary View
MRI Pitfalls

- **Evaluation of soft tissue mass or osseous abnormality:**
  - Consider IV contrast
- **Shoulder instability or labral tears**
  - MRI arthrogram preferred
Injections

**Most Common?**
- Knee
- Shoulder Subacromial

**Injection use**
- Arthritis
- Tendonitis
- Subacromial bursitis

**Injection Approaches**
- Knee
  - Superolateral
  - Infero-: medial or lateral
  - IT Band Injection
- Shoulder
  - Posterior: Subacromial injection
  - Anterior: Biceps or Subacromial injections
- AC Joint
What would you consider an inappropriate injection?

- Depends upon what you are injecting
- Steroid Injection Pitfalls:
  - Patella/Quad Tendons
  - Achilles Tendon
Additional treatments to consider when utilizing a corticosteroid injection:

- NSAIDs
- Physical Therapy
- Multiple studies point to better long-term outcomes of injections with addition of PT and NSAIDs
Bursitis

- Olecranon and Pre-Patellar Bursitis
  - Antibiotic choice
  - Should you aspirate or perform local I&D?
    - Pitfalls:
      - The “chronically draining elbow”
      - Potential for formal operative I&D
  - Should you immobilize? Duration? Compression?
My Treatment Algorithm:
- Splint with compression x 7-10 days
- NSAIDs x 2 weeks
- Compression x 4 weeks Post Splint
- PO Antibiotics if erythema present
- Will follow patient weekly
- Will aspirate after 4-6 weeks if not improved with Non-op treatment, if no infection present
- Surgical I&D as last resort
Fracture Care

- **How to address wounds/cuts/abrasions near fractures**
  - What to consider?
  - When should you consult Orthopaedist in this scenario?

- **Open Fracture Signs**
  - The abrasion that keeps oozing
  - Fat protruding near the cut/abrasion
  - What to do if concern for open fracture?
    - Consult orthopaedics
    - Give IV Antibiotic dose
    - Assess Tetanus status
    - **Always obtain a thorough neurovascular exam!!**
    - Do not attempt to suture wound or debride wound at bedside, cover with moist dressing and place splint
Immobilization

- Splint vs Cast
  - What is the goal of immobilization?
  - How much swelling is present
  - Is there a chance the swelling may worsen

- What Not To Cast:
  - Acute fractures
  - Acute ankle sprains
  - Acute Tendon Ruptures
  - ACUTE INJURIES!!!!
Splint Types

- Volar Splint
- Sugar-Tong Splint
- Posterior Arm Splint
- AO Leg Splint
- Posterior Leg Splint
Splinting PEARLS

- Always place extra padding/ABDs over bony prominences: i.e. Olecranon, Calcaneus
- Never use Kerlix wrap underneath splint or around acute injuries: can lead to compartment syndrome
- Secure with ACE wrap, but not under significant compression
- Be careful about transporting fractures with EMS bean-bag splints
Compartment Syndrome

- Occurs when excessive pressure builds up within a confined space (i.e. fascial compartments) resulting in neuromuscular and vascular compromise that can become permanent.

- When to suspect a compartment syndrome?
  - High energy trauma
  - Compression/crush injuries
  - Prolonged extrication from MVAs
  - Metabolic syndrome
  - Patients who have been found down/unresponsive or “the drunk” who passed out
  - Suicide attempt via overdose
  - Exertional Compartment Syndrome: runners/endurance athletes
Compartment Syndrome Signs

- Firm/Poorly Compressible compartments
- Pain with Passive stretch of toes/fingers!!!
- Numbness
- Pulseless extremity
- Pain out of proportion to injury
- High narcotic requirement
Compartment Syndrome Treatment

- Immobilize
- Ice
- Remove compression
- NO elevation
- Emergent referral to orthopaedic/vascular specialist
Case Example

- 21 y/o M college football player presents to PCP office c/o Right leg pain/tightness. Pt has h/o diabetes, but reports managing his glucose levels well. Pt reports that he has been training hard in the off-season with weight lifting/conditioning. Pt does report using herbal supplementation to boost training. Pt reports worsening RLE pain/tightness x 12 hrs.
  - Pt initially diagnosed with calf strain and sent home with pain medication
Pt returns home and begins to have worsening pain/tightness/mild numbness and presents to Urgent Care 4 hours later.
- Diagnosed again with calf strain and d/c to home with stronger pain meds
Pt continues to have uncontrollable pain/worsening numbness/loss of motor function to RLE and presents to ER 12 hrs later
- Ortho team called and Pt found to have compartment syndrome and underwent fasciotomies
  - Pt sustained permanent nerve/tissue damage
  - Needed skin grafting
  - Will require lifetime AFO to RLE
Knee Effusions In Young Athletes

- Is this just a sprain?
- Should they return to competition?
- Differential Diagnosis?
- Imaging modalities?
14 y/o Jr. High Football player sustained injury to left knee when jumping for a ball. He noted feeling a pop in his knee and initially a deformity, which then disappeared when he extended his knee. Pt was not able to finish practice. Pt was seen by ATC who found an effusion and diagnosed Pt with a knee sprain. He was prescribed ice/NSAIDs/home rehab program. Pt was re-evaluated by same ATC 1 week later with large effusion, and continued on same treatment course. Pt continued to have swelling, but pain was improved, thus was allowed to return to competition. Pt reports having 2 more similar events happen to knee with worsening swelling and finally went to PCP office.
PCP diagnosed knee sprain and referred to therapy, but held patient out of competition
- Swelling/pain continued despite therapy/rest
- PCP then sent for MRI
  - Dx: Patella dx, with multiple loose bodies
  - Orthopaedics was then consulted
Thank You