Common Office-Based Musculoskeletal Injuries

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Disclosures

No conflicts of interest, financial or otherwise, relevant to the subject of the talk.

Educational Need/Practice Gap

- This lecture should help to improve the knowledge base of the learner in clinical, outpatient scenarios of common musculoskeletal conditions and injuries.
- This lecture should help the provider in making an accurate diagnosis, ordering appropriate imaging, and when to refer on.

Objectives

- Recognize and Manage common musculoskeletal injuries
- Determine appropriate diagnostic imaging choice for common musculoskeletal injuries
- When to refer these conditions

Expected Outcome

- Providers will improve in their abilities and comfort level when seeing outpatient musculoskeletal patient concerns.

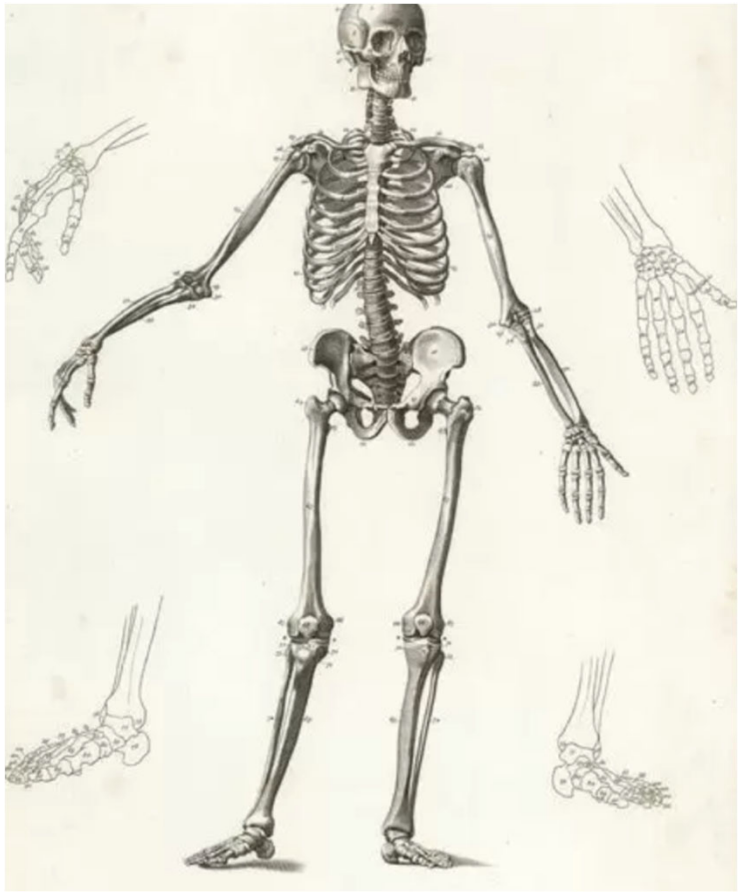
Basic Approach

- History is Key!
- OLDCARTS
- Onset, Location, Duration, Characterization, Aggravating factors, Relieving factors, Timing, Severity
- Acute vs Chronic
- Previous MSK conditions or injuries

Physical Examination

- Inspection
- ROM
- Palpation
- Strength Testing
- *Special Tests*
- Neurovascular status
- Exam the joint above and below

Injuries
Head to Toe



Head

- A 16yo female soccer athlete presents to your office with headache, sensitivity to light and sound, nausea, and difficulty concentrating. She was hit in the head during a game that she played in over the weekend and the symptoms started instantly following that. She was taken out of the game following the injury.

Concussion

- It is important to know the laws in your individual state. In Kentucky only physicians can clear athlete's following concussion diagnosis for return to play, but concussions can be diagnosed by multiple levels of healthcare providers including athletic trainers.
- New evidence shows that early return to activity is optimal – within 24-48 hours after their original injury.
- Can be followed in clinic using the SCAT-5 form (Sport Concussion Assessment Tool)
- Athletes must complete 6-step return to play progression once symptoms have resolved and should be cleared to participate if no symptoms.

OFFICE OR OFF-FIELD ASSESSMENT

Please note that the neurocognitive assessment should be done in a distraction-free environment with the athlete in a resting state.

STEP 1: ATHLETE BACKGROUND

Sport / team / school: _____

Date / time of injury: _____

Years of education completed: _____

Age: _____

Gender: M / F / Other

Dominant hand: left / neither / right

How many diagnosed concussions has the athlete had in the past?: _____

When was the most recent concussion?: _____

How long was the recovery (time to being cleared to play) from the most recent concussion?: _____ (days)

Has the athlete ever been:

Hospitalized for a head injury?	Yes	No
Diagnosed / treated for headache disorder or migraines?	Yes	No
Diagnosed with a learning disability / dyslexia?	Yes	No
Diagnosed with ADD / ADHD?	Yes	No
Diagnosed with depression, anxiety or other psychiatric disorder?	Yes	No

Current medications? If yes, please list:

_____

_____

_____

_____

_____

_____

Name: _____

DOB: _____

Address: _____

ID number: _____

Examiner: _____

Date: _____

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STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read the instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post-injury assessment the athlete should rate their symptoms at this point in time.

Please Check: ☐ **Baseline** ☐ **Post-Injury**

Please hand the form to the athlete

	none	mild		moderate		severe	
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6
Total number of symptoms							of 22
Symptom severity score							of 132
Do your symptoms get worse with physical activity?						Y	N
Do your symptoms get worse with mental activity?						Y	N
If 100% is feeling perfectly normal, what percent of normal do you feel?							

If not 100%, why?

_____

_____

_____

Please hand form back to examiner

Concussion

- When to image??
  - PECARN Criteria – GCS <14, Vomiting, LOC, Severe Headache, Severe MOI (car crash)
  - Concern for skull fracture, intracranial hemorrhage, or focal neurologic deficit

- When to refer??
  - Post-Concussive Syndrome, Persistent Post-Concussive Symptoms
  - >14 days of symptoms
  - Inability to return to school
  - These are treated by Primary Care Sports Medicine Physicians and sometimes Neurologists

Neck and Back Pain

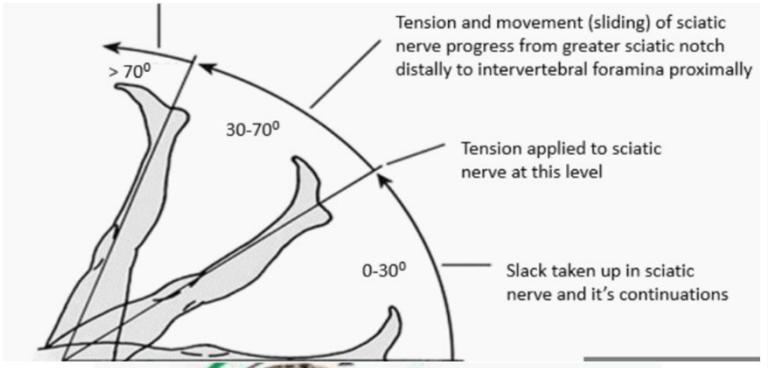
- Patient is a 58yo male who was recently helping his daughter move out of her college dorm room. He has since developed low back pain with pain symptoms radiating down his right leg with occasional numbness and tingling.

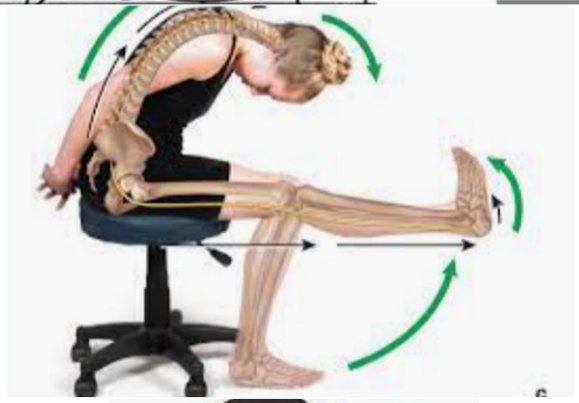
Radicular Back and Neck pain

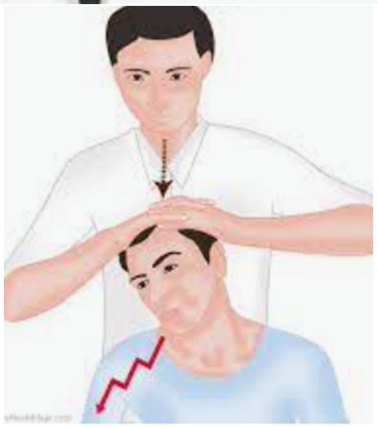
- Patient's can present with acute or chronic radicular symptoms from back or neck origin.
- These patient's could be having exclusively muscle pain (typically worse with movement, chronic overuse, acute muscle spasm).
- Or chronic arthritis pain resulting in disc pathology and possibly radiation of symptoms.

Physical Exam

- Straight leg raise
- Patient supine, examiner flexes leg at hip with knee in extension and symptoms should be felt around 30 degrees.
- Slump Test
- Patient seated, extends symptomatic leg, dorsiflexes ankle, flexes neck
- Spurling's Test
- Patient seated, turns head to ipsilateral side to pain, puts neck into extension, examiner provides axial load





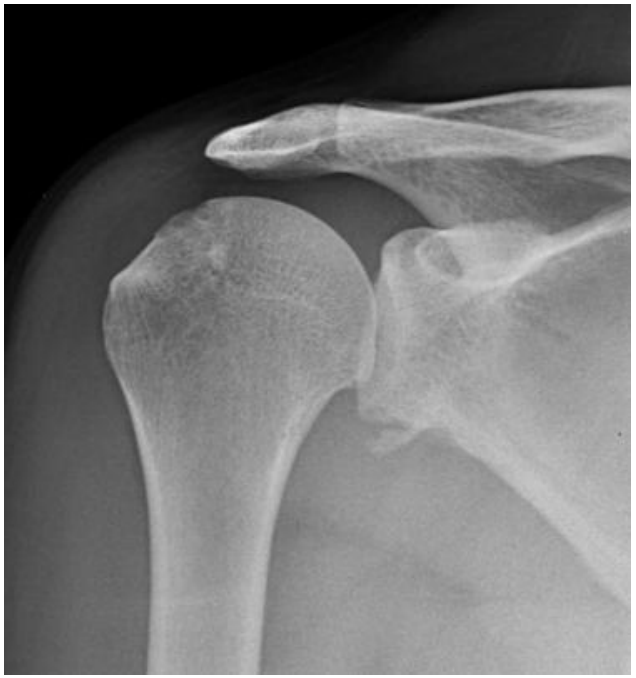


Radicular Back and Neck Pain

- When to image??
  - If patient has had no improvement with 6 weeks of physical therapy
  - If at any visit patient has neuromuscular compromise such as muscle weakness – ex. Foot Drop
  - Would want to start with X-Rays then MRI without contrast
- When to Refer??
  - If patient has had no improvement with conservative treatment options could consider referral to pain management for epidural or foraminal injections
  - If patient has neuromuscular compromise they would benefit from a referral to an orthopedic spine surgeon or a neurosurgeon

Shoulder

- 17yo football player with recent shoulder subluxation event during game. Right handed
- Reports feeling instability
- Apprehension positive

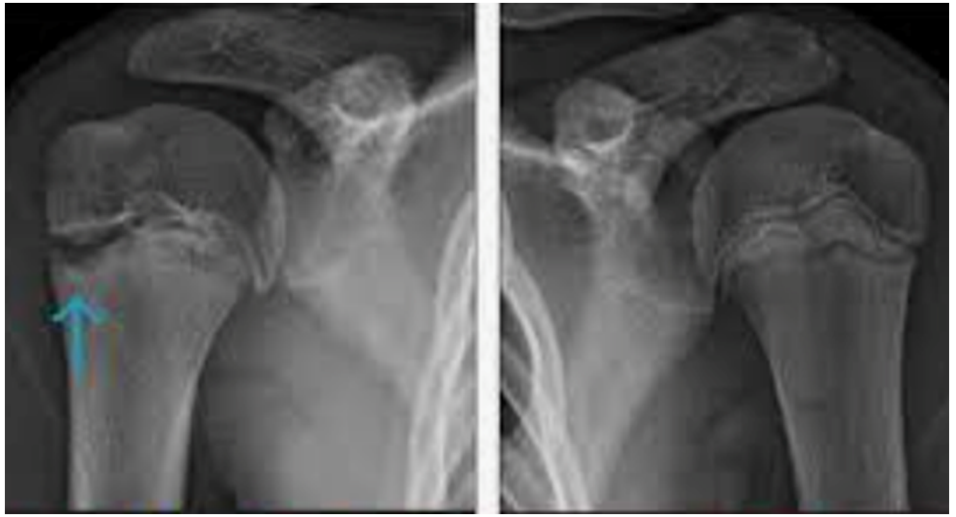


Shoulder

- Humeral Head Dislocation vs Subluxation
  - When to refer??
    - ALWAYS, always an injury to the labrum and sometimes can include a bony injury to the Humeral Head or Glenoid
  - When to image??
    - ALWAYS, get an X-Ray and an MRI
- AC Joint Sprain
  - When to refer??
    - If the athlete is in-season and wants to attempt quick return to activity, most of these are managed non-operatively
  - When to image??
    - If there is a note-able step-off on physical exam at the AC joint, piano key sign of the distal clavicle, or concern for clavicle fracture you should get an X-Ray
- Clavicle Fracture
  - When to refer??
    - These are almost never operative, if it is significantly displaced on imaging or posteriorly displaced could consider
  - When to image??
    - Always, can get clavicle view for best image

Shoulder

- 14yo male baseball pitcher with right shoulder pain
- This has been going on for about 6 weeks after working with a pitching coach all winter and now having started his summer baseball season.
- Describes dull aching pain all of the time at his shoulder and sharp pain if he throws.

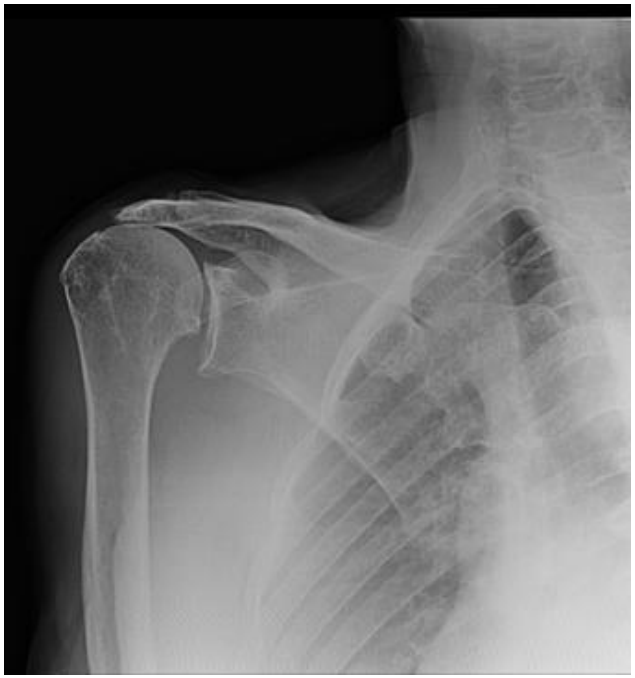


Little League Shoulder

- This athlete has developed Little League Shoulder – An overuse injury characterized by throwing related pain over the proximal humerus. This is an **epiphysitis**. Repetitive microtrauma damages the cartilage of the physis.
- When to image??
  - In athletes with tenderness to palpation over the proximal humerus, pain with rotator cuff testing, inability to throw due to pain would recommend starting with bilateral shoulder x-rays.
- When to refer??
  - Athletes should be referred to an experienced physical therapist once their pain they are experiencing at rest resolves.
  - They should be completely pain free and have completed a return to throwing program with an experienced physical therapist prior to return to throwing with their team.
  - Okay to do pain free activities – run bases, bat (if pain free)

Shoulder

- 65yo male with recent FOOSH injury
- Unable to lift his arm beyond 30 degrees
- Empty can test showed weakness and pain with strength 3.5/5



Shoulder

- Rotator Cuff Tear – Concerning presentation for rotator cuff tear is patient age >50, Weakness with specific rotator cuff testing on exam, acute injury, most sensitive test for rotator cuff tear is resisted external rotation
  - When to image??
    - If the patient has the above findings and a very convincing injury history would recommend X-rays and an MRI without contrast
  - When to refer??
    - If the patient has findings of a full thickness rotator cuff tear on MRI and is not interested in conservative management with physical therapy would recommend referral to orthopedic surgery (best outcomes are repair within 3 months after original injury)

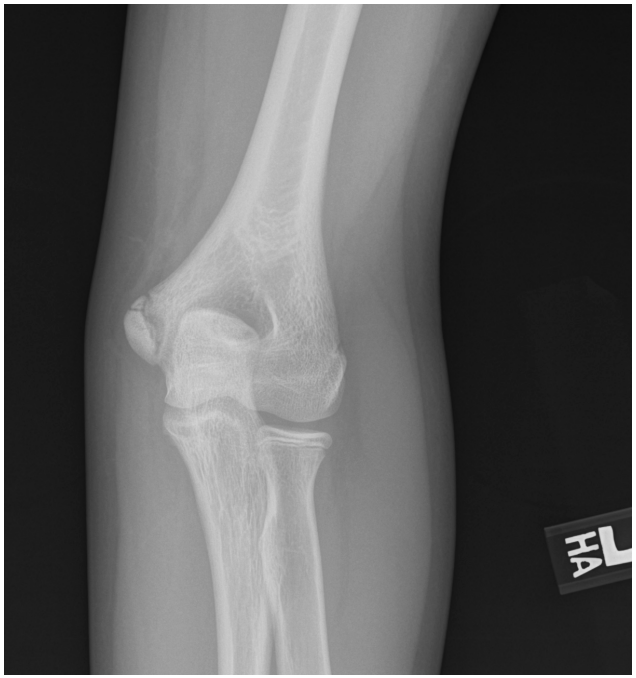
Shoulder

- Glenohumeral Joint Arthritis – Chronic pain without acute injury, decreased ROM, Pain at night
  - When to image??
    - If the patient has the above findings and has had no improvement with >6 weeks of physical therapy, if you are considering an injection, can obtain an X-ray
  - When to refer??
    - If the patient has findings of glenohumeral joint arthritis on imaging, no improvement with conservative treatment options, could refer for ultrasound guided GH joint injection or Shoulder Replacement surgery

Elbow, Wrist, and Hand

Elbow

- 13yo male baseball pitcher, left-handed, who presents with medial sided left elbow pain.
- This has been present for three weeks when he is throwing



Elbow

- Little League Elbow – Medial epicondyle **apophysitis**, occurs as a result of overuse and repetitive valgus stress placed on the elbow. Athletes have pain at the medial elbow with throwing, tenderness to palpation at the medial epicondyle.
  - When to image??
    - Patient with above history and physical exam, important to get bilateral elbow x-rays to evaluate the growth plate.
  - When to refer??
    - Would refer patient's with significant widening or concern for fracture on imaging. Otherwise manage this with rest until resolution of pain then return to throwing program with physical therapy.

Elbow

- 45yo male plumber presenting with lateral elbow pain. Tenderness over the lateral epicondyle. Pain with supination activities and resisted third finger extension.

Elbow

- Lateral epicondylitis – "Tennis Elbow", This is an overuse injury with micro-tearing of the tendons that join the extensor muscle tendons to the lateral epicondyle.
  - When to image??
    - Patient's that fail conservative management with topical medications, oral medications, physical therapy, you could consider an X-ray. Patient's with more chronic presentations will sometimes have bony changes.
  - When to refer??
    - As above patient's that have failed conservative management could benefit from a referral for an ultrasound guided or palpation guided injection. These can also be treated with surgery.

Wrist and Hand

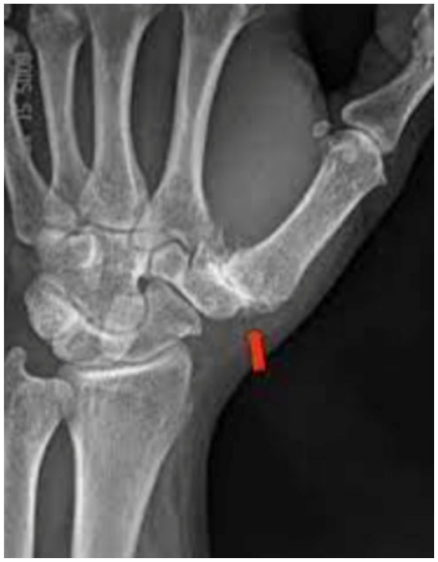
- Patient is a 63yo female who presents with 6 months of right hand palmar area numbness, tingling, burning pain worse at night.

Wrist and Hand

- Carpal Tunnel Syndrome – A compressive neuropathy of the median nerve at the wrist. Patient will have positive Tinel's sign on exam.
  - When to image??
    - To confirm compression of the median nerve at the wrist based on symptoms and physical exam getting an EMG/NCS is the best test.
  - When to refer??
    - Patient's can be treated with conservative measures such as wrist splints at night. If continued symptoms can be referred for corticosteroid injections or carpal tunnel release surgery.

Wrist and Hand

- Patient is a 63yo female who presents with chronic onset right thumb pain at the base worse when trying to grip items and open jars.

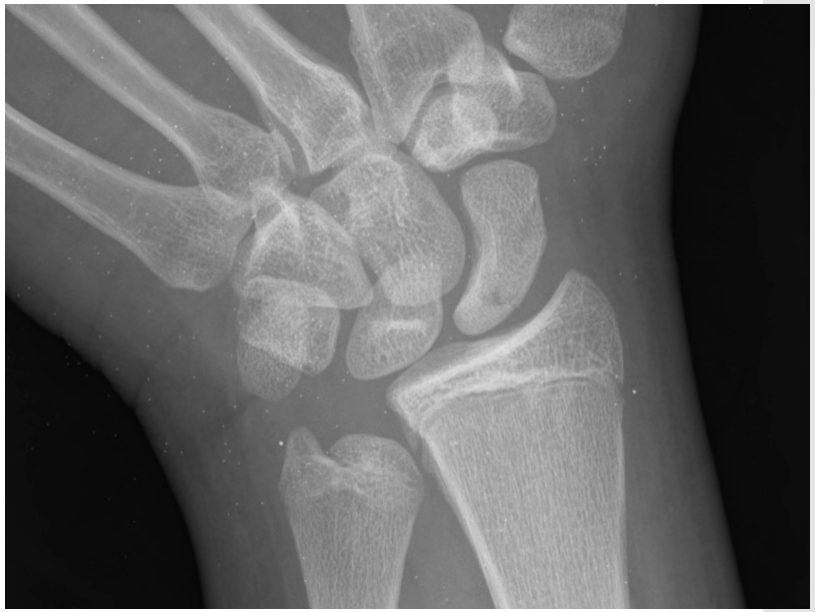


Wrist and Hand

- Carpal-metacarpal Joint Arthritis – A form of arthritis that causes pain at the base of the thumb and difficulty with pinching and grasping. Patient's will have a positive CMC grind test on exam.
  - When to image??
    - Patient's with findings of positive tenderness to palpation over the CMC joint and pain on the CMC grind test should have x-rays done to assess the severity of their arthritis.
  - When to refer??
    - Conservative management can be done with oral and topical arthritis medications, occupational therapy. Patient's who fail this can trial both palpation guided or image guided corticosteroid injections. Patient's can also be referred for surgery such as trapeziectomy with ligament reconstruction.

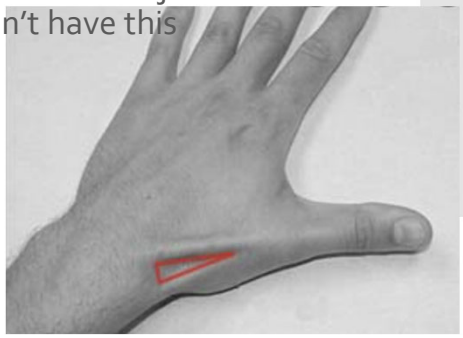
Wrist and Hand

- Patient is a 63yo female who presents after fall yesterday on an outstretched hand. She now has pain in her palm near the base of her thumb. She had x-rays at an outside facility that were read as normal.



Wrist and Hand

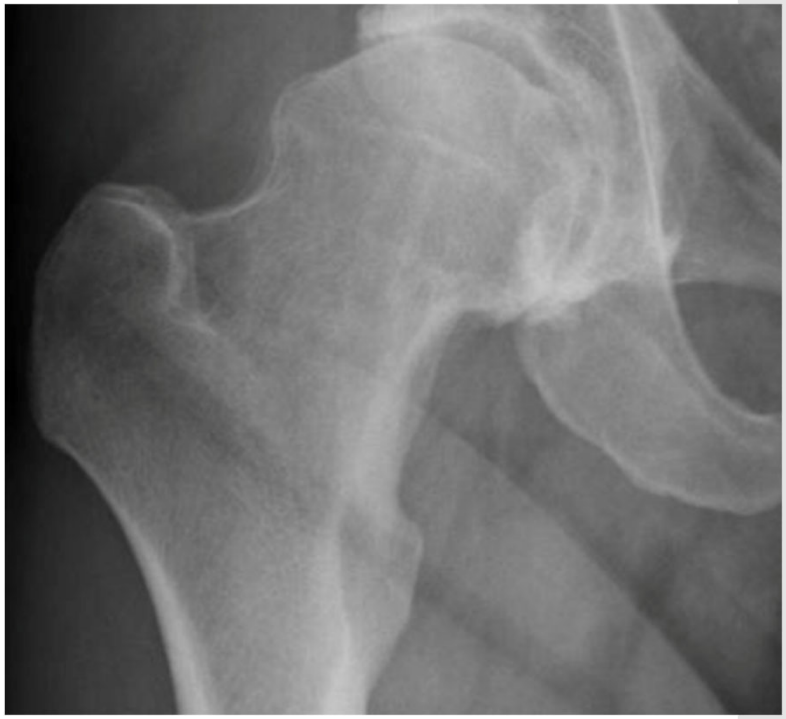
- Scaphoid fracture – The most common carpal bone fracture, typically after a fall on an out-stretched hand. Patient's will have tenderness to palpation over the anatomic snuffbox.
  - When to image??
    - Patient's should have x-rays done if they have had an acute injury and the above physical exam findings. X-ray sensitivity can be improved by getting a "scaphoid view" 30° wrist extension and 20° ulnar deviation. If negative with high clinical suspicion can repeat in 14-21 days. Could also obtain MRI if sooner diagnosis is needed.
  - When to refer??
    - If fractures have less than 1mm of displacement then 90% of these should heal without issue. If the fracture is in the proximal pole or is displaced these should be referred to a hand surgeon. These injuries require casting so would also need to refer if you don't have this capability. Cast typically in place for 12 weeks.



Lower Extremity

Hip

- Patient is a 71yo female who presents with right sided leg pain that is radiating into her groin. This has been worsening over the past few months. Has a hard time getting in and out of her car.

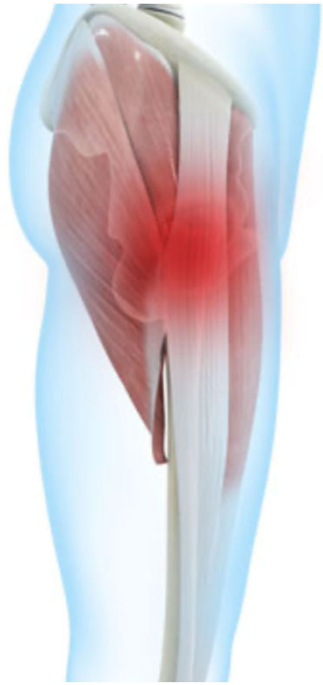


Hip

- Hip osteoarthritis – Degenerative disease of the femoral head and acetabulum. Physical exam findings include pain that radiates into the groin, Positive Log Roll test, Positive FABER and FADIR test that recreates patient's groin pain.
  - When to image??
    - With above physical exam findings patient is okay to begin trial of conservative management. If no improvement could obtain x-ray to establish baseline level of arthritis. No need for other imaging.
  - When to refer??
    - If patient fails conservative management with physical therapy, oral arthritis medications. Can refer to either Sports Medicine for trial of hip joint injection or to orthopedic surgery for THA.

Hip

- Patient is a 59yo female who presents with 6 weeks of lateral hip pain. Patient has pain when trying to sleep on that side at night and also worsening pain that she experiences when trying to exercise.

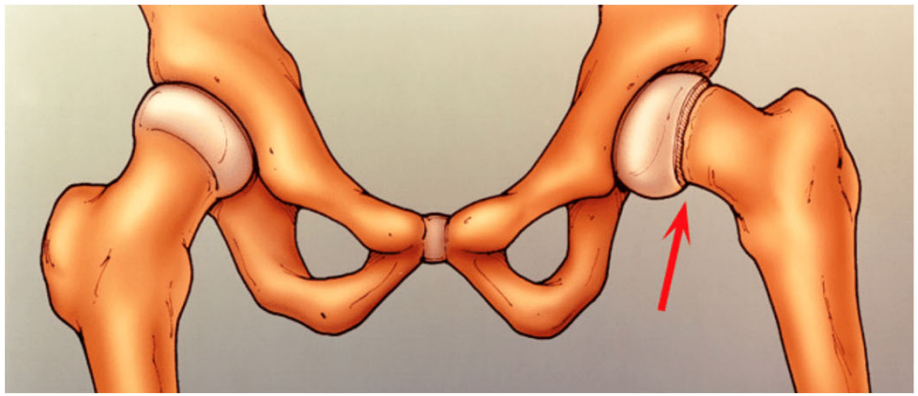


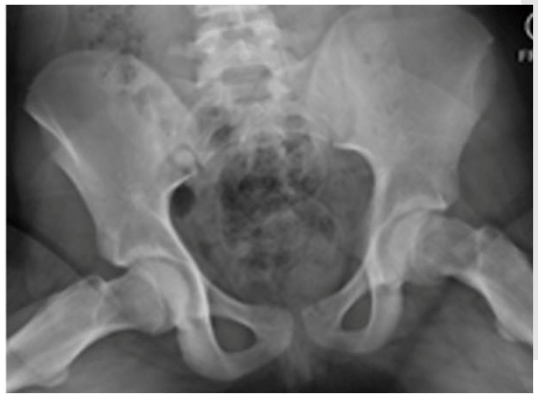
Hip

- Greater trochanter pain syndrome – A very common cause of lateral hip pain. Tendinopathy of the gluteus medius and minimus with or without co-existing bursal pathology. Patient's will have tenderness to palpation over the greater trochanter and pain with figure of four stretch.
  - When to image??
    - Patient's should be able to be treated conservatively with oral anti inflammatory medications and physical therapy. If no improvement would consider imaging of both the hip and low back to look at other possible origin of pain.
  - When to refer??
    - If patient fails above conservative measures, could consider palpation or ultrasound guided corticosteroid injection. Rarely managed with surgery.

Hip

- Patient is a 13yo male who presents with 4 months of hip pain. He also describes pain into his knee that makes it difficult to participate in gym class.



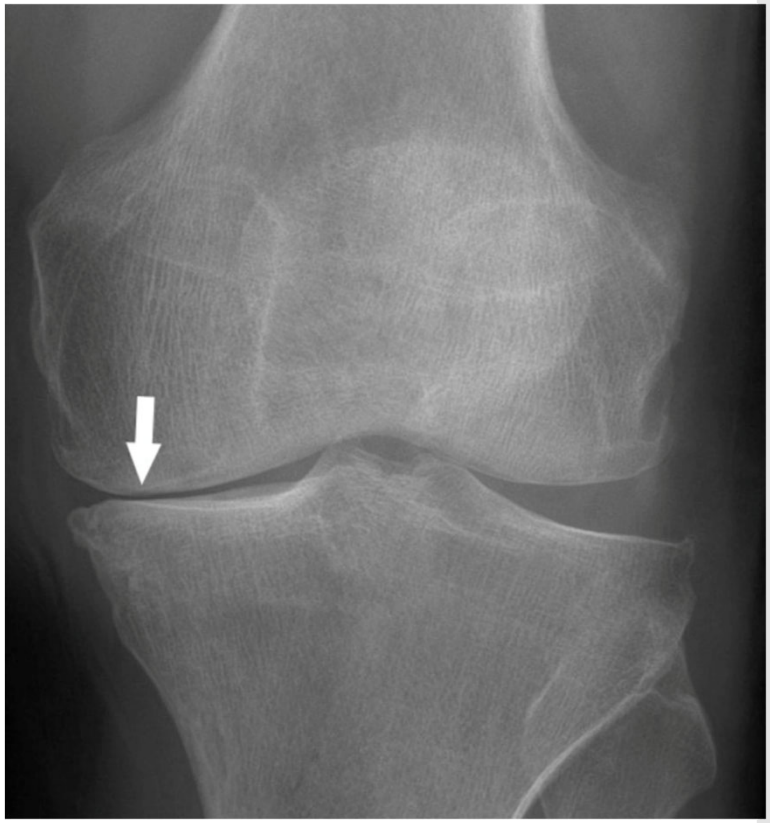


Hip

- Slipped Capital Femoral Epiphysis – A hip condition that occurs in pre-teens and teens (open growth plate) where the ball of the head of the femur slips off the neck of the bone in a backward direction – slipping of the metaphysis relative to the epiphysis. This causes pain, stiffness and instability.
  - When to image??
    - If you suspect SCFE it is important to obtain bilateral hip x-rays, especially in patients that fit this clinical picture and present with just knee pain.
  - When to refer??
    - These patients should be referred immediately to an orthopedic surgeon as these must be fixed typically with percutaneous pin fixation.

Knee

- Patient is a 62yo male who presents with worsening left knee pain. It bothers him most first thing in the morning when it is stiff and painful and this improves some during the day. His knee will swell on occasion.

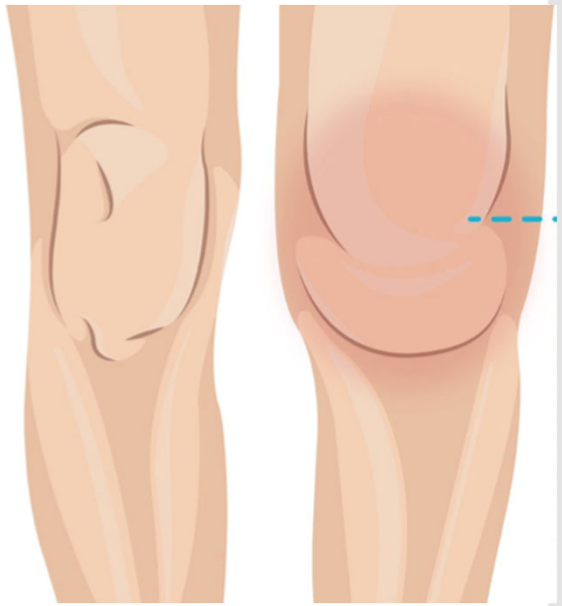


Knee

- Knee Osteoarthritis – Inflammation of the joint with pain, swelling, and stiffness being the primary symptoms associated with this. Degenerative, "wear and tear" process. Physical exam findings will include tenderness to palpation along the joint lines.
  - When to image??
    - Patient's should be started on conservative treatment options including topical and oral medications for arthritis pain. They should also trial a course of physical therapy. If they continue to have activity limiting pain would obtain x-rays.
  - When to refer??
    - If patient's have findings of arthritis on x-ray and have failed conservative treatment options and are interested in a knee replacement surgery they should be referred to an Orthopedic surgeon.

Knee

- A 16yo female soccer athlete presents to your office the morning after a game. She says that she went to cut and felt a pop deep in her knee. Her knee is swollen and it is difficult for her to walk.



Knee

- Anterior Cruciate Ligament Tear – The ACL attaches at the lateral femoral condyle and the medial tibial plateau to provide stabilization to the knee in rotational movement and anterior tibial translation. On physical exam the patient will have an effusion, and a positive Lachman's test.
  - When to image??
    - A knee effusion is never normal. If you have a patient that presents with an acute injury + a knee effusion, this is an indication for imaging. Patient's will need an x-ray followed by an MRI without contrast.
  - When to refer??
    - Patient's with positive MRI findings of a tear should be referred to an orthopedic surgeon ASAP, or at least within the first two weeks following their injury.

Knee

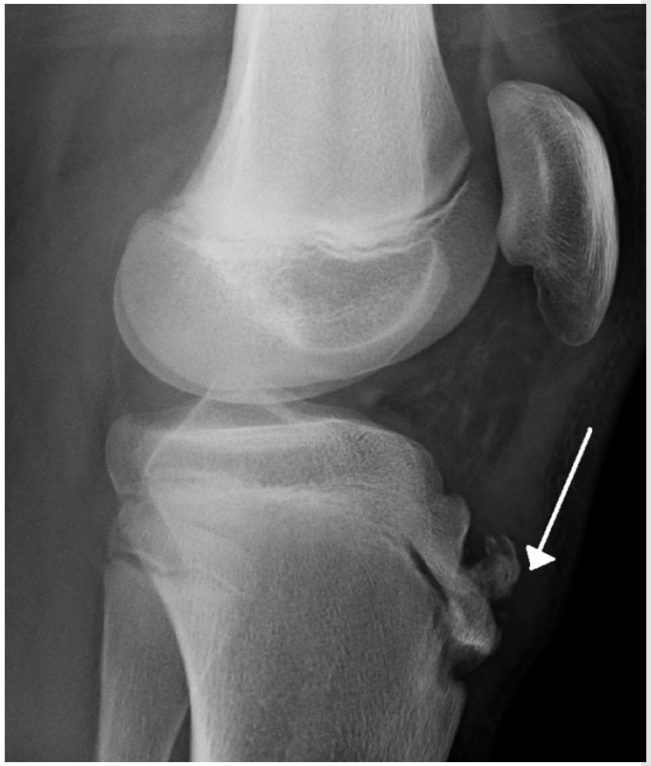
- What about…
  - PCL
  - Meniscal tear
  - MCL
  - LCL
  - Patellar Dislocation
  - Patellar Tendon rupture
  - Quad Tendon rupture

Knee

Intermediate (0-2hrs)- Hemarthrosis	Delayed (6-24hrs) – Effusion	No swelling
ACL rupture Patellar dislocation Physeal injuries Deep mcl sprain	Meniscus Smaller chondral lesion	MCL sprain (superficial)

Knee

- Patient is a 10yo male who presents with left anterior knee pain. This bothers him when he is trying to run around in gym class or at recess. He is limping when he runs.



Knee

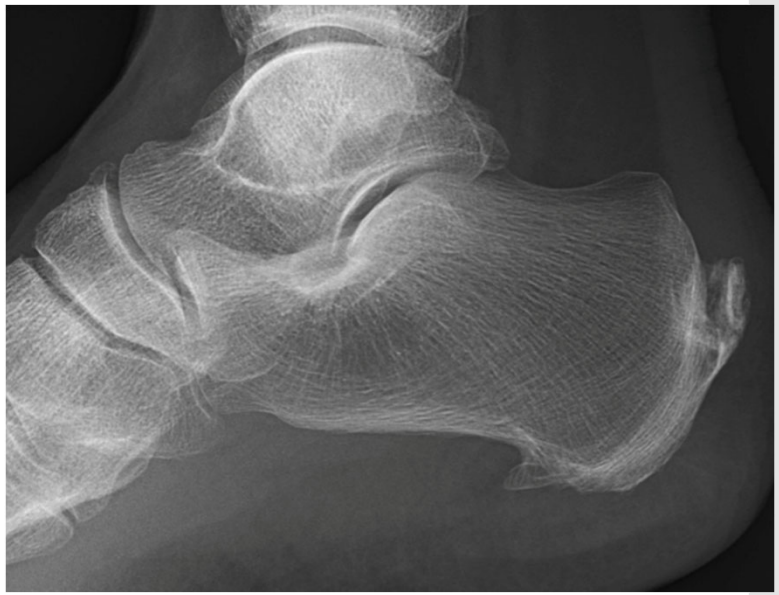
- **Osgood-Schlatter Disease** – An overuse injury seen in adolescents with anterior knee pain at the tibial tubercle at the distal patellar tendon attachment. Traction apophysitis. Patient's have tenderness to palpation at the tibial tubercle.
  - When to image??
    - Patient's should be treated conservatively with activity modification, oral anti-inflammatory medication, and physical therapy. If continued pain, x-rays of the knee are appropriate to look for irregularity and fragmentation of the tibial tubercle.
  - When to refer??
    - Patient's with continued pain after trial of above treatment plan can be referred to a pediatric orthopedic specialist although this condition is rarely treated with operative management.

Knee

- **Sinding-Larsen-Johansson** – An overuse injury seen in adolescents with anterior knee pain at the inferior pole of the patella at the proximal patellar tendon attachment. Traction apophysitis. Patient's have tenderness to palpation at the inferior pole of the patella.
  - When to image??
    - Patient's should be treated conservatively with activity modification, oral anti-inflammatory medication, and physical therapy. If continued pain, x-rays of the knee are appropriate to look for a spur at the inferior pole of the patella.
  - When to refer??
    - Patient's with continued pain after trial of above treatment plan can be referred to a pediatric orthopedic specialist although this condition is rarely treated with operative management.

Foot and Ankle

- Patient is a 37yo female who presents with 6 weeks of pain into the arch of her foot. It bothers her with her first step out of bed in the morning but continues to hurt throughout the day. She has no known injury.

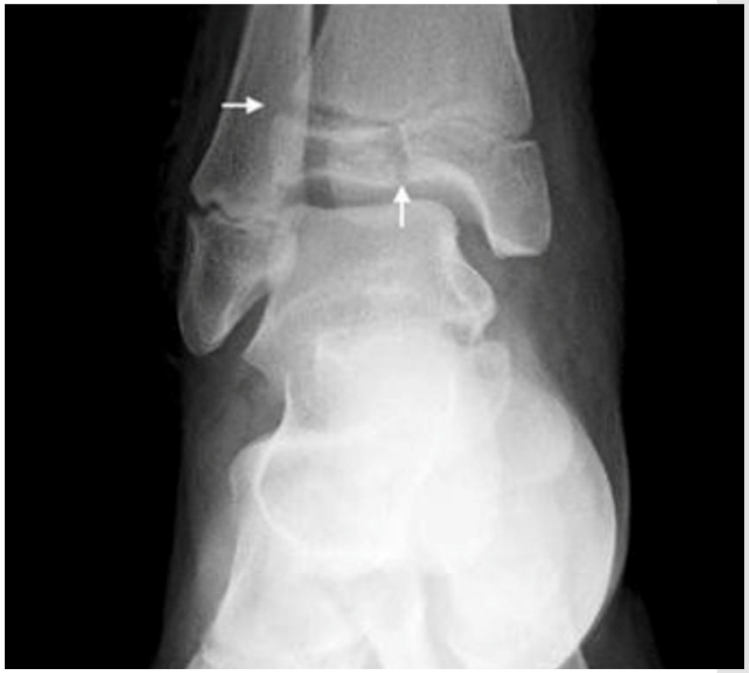


Foot and Ankle

- Plantar Fasciitis – A painful heel condition, inflammation of the plantar fascia aponeurosis at its origin on the calcaneus. Patient presents with tenderness to palpation over the medial calcaneal border.
  - When to image??
    - Usually no indication for imaging on initial visit. Patient's should be treated with formal physical therapy program that focuses on flexibility and foot and ankle strengthening. Oral anti-inflammatory medication can also be used. If no improvement could obtain x-rays. If concern for other diagnosis including stress fracture could obtain MRI.
  - When to refer??
    - If patient's do not have relief of symptoms with above treatment plan could consider referral to orthopedic specialist. Injection can be offered for these patient's although does come with risk. Surgery done if pain is recalcitrant.

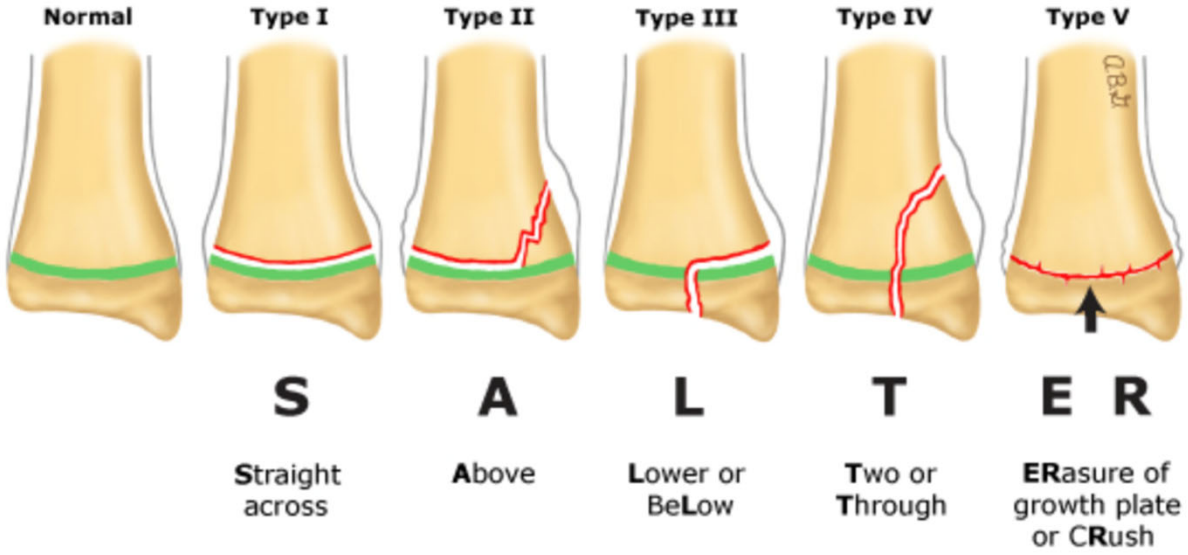
Foot and Ankle

- Patient is a 12yo male who presents after injury from falling off of his skateboard to his left ankle. He cannot remember exactly what happened but he has been unable to walk and with a very swollen lower leg since the injury yesterday.



Foot and Ankle

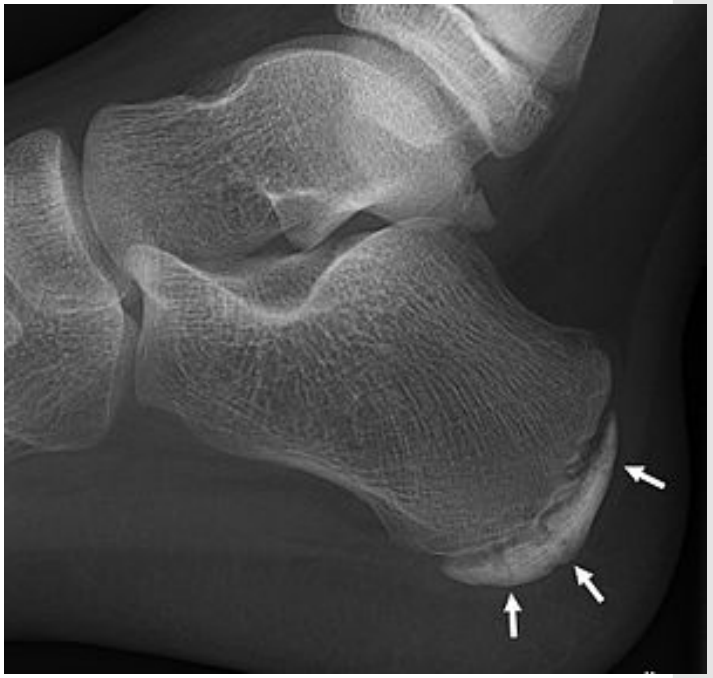
- Salter-Harris classification of physeal injuries



- These fractures can typically be managed non-operatively for Type I and II and should be considered operative for Type III and IV.

Foot and Ankle

- Patient is a 9yo male who presents with pain in his heel. This has made it so he doesn't want to walk with his heel touching the ground and difficult to play outside with his friends without pain.



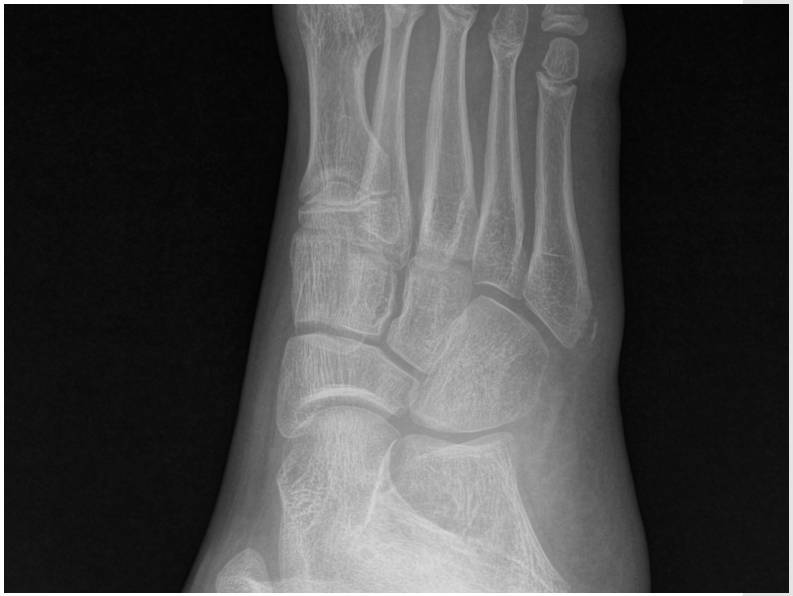
Foot and Ankle

- Sever's Disease – Overuse injury of the calcaneal apophysis in a patient with open growth plates. The patient will have tenderness to palpation over the calcaneal apophysis and pain with their heel touching the ground.
  - When to image??
    - Patient's should be treated with conservative management, activity modification, oral anti-inflammatory medication, and formal physical therapy. If no improvement could obtain x-rays which could show sclerosis of the calcaneal apophysis.
  - When to refer??
    - Patient's can be referred to an orthopedic specialist if they fail the above conservative management. There is no role for operative management but on rare occasions this can be managed with casting.

Foot and Ankle

- Iselin's Disease – An overuse injury and traction apophysitis of the peroneus brevis tendon at the tuberosity of the 5th metatarsal, sometimes confused with a fracture vs stress fracture. Patient's will have pain over the 5th metatarsal base and limping with activity.

- When to image??
  - Can image if concerned for acute fracture.
- When to refer??
  - Could consider cast immobilization if pain not improved by conservative treatment options.



Osteochondrosis

- Osteochondrosis – condition affecting the secondary ossification centers of the growing bones

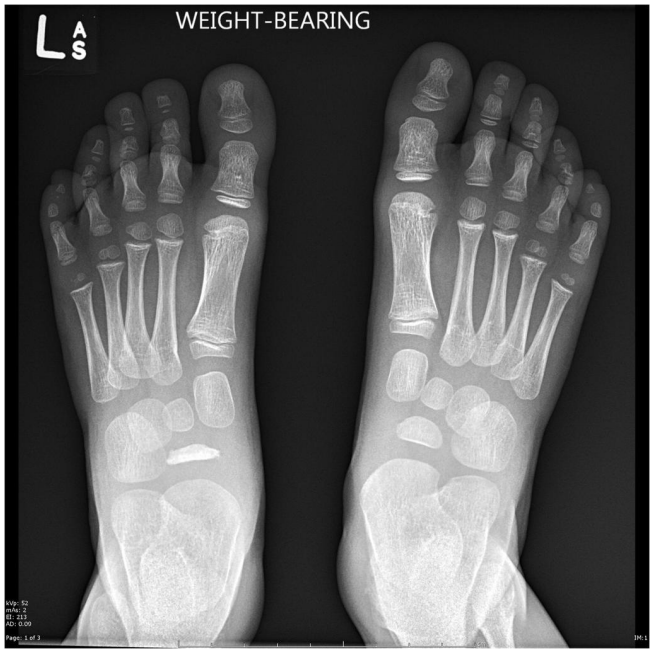
❖Legg-Calve-Perthes disease – Femoral head

❖Panner disease – Elbow capitellum

❖Kienbock's disease – Lunate

❖*Kohler's disease – Navicular*

❖Freiburg disease – Second metatarsal



Take-Home Points

- Apophysitis vs Osteochondrosis
  - Apophysitis = this occurs from a traction injury at the cartilage/bony attachment of tendons in patients with open growth plates. An overuse injury.
  - Osteochondrosis = Degenerative change in the epiphyseal ossification centers. Etiology for these is unfortunately unknown.
- High Risk Stress Fractures
  - Femoral neck (tension side), Patella, Anterior tibia, Medial malleolus, talus, tarsal navicular, proximal fifth metatarsal, great toe sesamoids.

Take-Home Points

- Different injuries happen in different aged populations – remember to think about if growth plates would still be open
- Imaging Keys

IV contrast – only for suspicion of neoplasm/tumor

Timing of imaging test – missed stress fracture

Wrong test giving false positive/negative – not ordering MR arthrogram to detect labral tear

Only order imaging that will influence management

- Always refer if concerned, but as Family Medicine physicians we can manage a lot of these conditions!

Thank You!

- If you have any questions please do not hesitate to reach out to me via e-mail Kathleen.Roberts@uky.edu