**Extremity Assessment and Radiology**

A **QUICK** look at Orthopedics.

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**Web Pages**


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**Athletic Injuries...**

- What is key to get in the HPI?
- Location: Give me the finger!
  - Single vs. multiple joints?
- Associated Symptoms?
- Precipitative (Mech of Injury!!!)
- Provocative? Palliative?
- Quality of Pain
- Severity? Sequence? Functional limitation?
- TIMING!!!!! (also: any prior problems?)

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**Ortho exam!**

- Exam Rules and Approach
  - Superior to Inferior & Superficial to deep & Side to Side, Painful area last!
  - Well exposed both sides
    - Gowns, No pants, etc
- Inspection for?
  - Inflammation? Deformity? Opposite side?
- Know normal function of joint
  - Bones, Tendons, Bursa sacs,
- Close observation!
Ortho exam cont.

- Palpate for?
  - “Visualize” what you are palpating.
- ROM Active and Passive
- Strength, Neuro-vascular assessment
- Hints: examine unaffected side first.
- Be comfortable with exam
- DON’T SAY “SORRY!”

Indications of a Potential Fracture!

- From history: “Heard a snap” or felt a break.
- Deformity: compare with opposite side
- Shortening of limb
- Muscle Spasms
- Pain at the sight
- Tenderness, usually point

Indications of a Potential Fracture!

- Swelling
- Discoloration
- Loss of ability to use extremity
- Inability to move fingers/toes
- Grating
- Loss of Pulse

General Approach to X-rays

- First thing you check for is…….
  - PATIENT’S NAME!!!!
- Next – check Date Done!
- Position Markers: (left, right, upright)
- Patient position: Upright, Supine, Lateral
- Quality of film
- For long bones: joint above and below
- Two views (at least!!!!)
- Organize approach
**Legal and Ethical Considerations**

- Must have films read by a radiologist
- Should never replace a physical examination
  - More to an exam than diagnosing a fracture!
  - Think about what complications can be present?
- Responsible for entire X-ray

**Basic Densities**

- Gas (Air) Appears as ….
- Fat & Lipids appear as….
- Soft Tissue (muscle) appears as…
- Calcium (Bone) appears as…
- Heavy Metal (FB) appears as…

**Reading the Film**

- MUST KNOW ANATOMY!!!!!!
- Joint above & Joint below
- Approach: superior to inferior, superficial to deep

**Rules for bones**

- **Patient** – considering their gender and age will help put the x-ray in context and guide your differentials
- **Soft tissues** - so you don’t forget them – calcification, swelling, masses, foreign bodies, gas
- **Bones** – density, anatomy (is everything in the right place), follow the cortex for fractures, look at the periosteum
- **Joints** – joint space: loose bodies? Loss of space? Interarticular surface?
**Signs of fractures**
- Breaks in the continuity of the cortex
- Radiolucent fracture lines
- Overlap of both cortical and spongy bone creating an abnormally white zone
- Bone fragments (Older = Inc risk of comminuted fracture)
- Denser areas (bone impaction)
- Flocculent density in soft tissues adjoining bone in healing fractures (callus)

**Indirect radiographic signs of fracture**
- helpful in identifying hard to see fractures.
  - Soft tissue swelling
  - Obliteration or displacement of fat stripes and fat pads (ant elbow and wrist)
  - Periosteal and endosteal reaction (i.e. stress fractures)
  - Joint effusions
  - Intracapsular fluid - layering of blood elements giving "fluid/fluid levels"

**Fractures**
**Types of fractures**
- Complete
- Buckle (or Torus) Fracture.
- Greenstick
- Displaced
- Angulated
- Comminuted
- Intertarticular
- WHAT'S THE DIFFERENCE?

**Dislocation**
- A displacement of a bone in relation to the apposing bone at the joint, resulting in a complete loss of continuity of the joint surfaces

**Subluxation**
- A displacement of a bone in relation to the apposing bone at the joint resulting in a PARTIAL loss of continuity of the joint surfaces
OPEN vs. CLOSED

Shoulder
- Very complex Joint to understand!
- Acute vs. Chronic
- Repetitive motions
  - Bursitis vs. Tendonitis
- Injury
  - Fracture vs. soft tissue tear

Clavicle Fractures
- Med, Mid and lateral
- Landing on shoulder
- Pointing of the skin
- Side to side difference
- HEAL EASILY
- Figure 8 harness
- Precautions!
  - Pneumothorax?

Clavicle Fractures
- Rare ortho referral of midshaft fractures.
- Neurovascular compromise?
- Multiple injuries
- Non-union after 12-16 weeks.
- Distal 1/3 fractures – may not be deformed: Tender around AC joint can involve ligament and may need surgery.
- Prox 1/3 fractures – may involve sternoclavicular dislocation - All should be referred.
AC Joint Injuries

- Common with contact sports where a person is driven to the ground without protection.

Shoulder Tests

- Drop Arm Test
- Empty can test
- Impingement
  - Strain vs. tendonitis vs. Tear
- Hawkins
- Neer’s Test

Treatment

- Activity modification
- Ice packs first couple of days then heat
- Exercises

Shoulder dislocation

- Needs to be reduced immediately
- Various techniques for reducing
- Sedation may need to be required
- Can damage or impinge nerves
- Post reduction
  - chronic
Fractures of Elbow

- Long Arm Posterior splint
- Elbow in 90 degree flexion
- Hemarthrosis?
- Joint aspiration to relieve pressure

Epicondylitis

- Medial (Golfer’s) vs. Lateral (Tennis)
- Ask about job or repetitive motion
- What causes pain?
- Point tenderness distal to epicondyle
- Rest, NSAIDs, band, and Ice Messages!

Colles’ Fracture

- Fracture caused by forced dorsiflexion of the wrist
- Occurs in pts 40+ who fall on outstretched hand (60-70%) (FOOSH!)
- Skateboarders!!!
- Dorsal surface compresses; volar surface undergoes tension
- Wrist deformity (silver-fork deformity)

Treatment

- Limited ROM, Median nerve function tested, Cap refill OK, full radial pulse
- Sugar tong splint
- Wrist in slight extension; elbow: 90deg
- Stable Distal radius fractures: manageable in a primary care setting (with experience)
- Referral to Ortho: More urgent with sig. displaced or comminuted, intra-articular, compression, “High-demand” patient.
Metacarpal neck fracture

- Boxer’s fracture (most common)
- S/Sx: dorsal swelling, MCP joint depressed
- PEARL: Look for teeth marks!!!!!

Management:

- If severe angulation (>40 degree), the MC head can interfere with normal function need reduction, but will they stay reduced?
- Assess for rotation (fingers point to scaphoid bone)
- Splint type: Gutter splint. MCP joint 70-90 degrees.
- RICE f/u one week
- Manageable: Nondisplaced 2nd & 3rd MC and fractures with minimal angulation of 4th & 5th (<30 & <40)

Scaphoid fractures

- 70% of all fractures in carpal injuries
- 80% will transverse the scaphoid bone.
- Blood supply from radial artery
- proximal two thirds to three fourths of scaphoid is supplied by vessels entering dorsal surface.

Scaphoid fractures

- “Snuffbox” tenderness.
- Automatic Referral
- Suspect?: Short-Arm thumb Spica
- Nondisplaced: Long Arm thumb spica splint
- Natural deviation.
**Lower Extremity**

- **Knee exam**
  - **Ligament stability**
    - Anterior drawer test
    - Posterior drawer test
    - Valgus stress test
    - Varus stress test
    - Lachman’s test
  - **Meniscal**
    - Appy’s test
    - McMurray’s test

  Additional tests:
  - Q-Angle
  - ROM
  - Palpation of the joint
  - Palpation of femoral surface

**Knee: Tendons**

- **Tendons**
  - **Patellar Tendon**
    - Connects the Patella to the Tibia. This tendon covers the patella and continues up the thigh as part of the Quadriceps tendon.
  - **Quadriceps Tendon**
    - Connects the Patella to the Quadriceps muscles.

**Quadriceps tendon ruptures**

- Older recreational patients—40s and 50s—
- Result of an eccentric quadriceps load.
- Unable to actively extend the quadriceps or perform a straight-leg raise.
- Palpable gap can be detected proximal to the patella. 3 to 4 in. wide medially to laterally.
- Imaging technique
- Quadriceps tendon ruptures should be referred for surgical management.
Jumper’s Knee
- Under extreme stresses such as those involved in jumping a partial rupture can occur.
- Leads to inflammation & degeneration of the tissue.
- Also results from overuse, jumping or throwing sports. Weightlifters, Tennis and Badminton players can also be affected.
- Rest in the early stages is important.

Achilles Tendon
- Hyper-dorsiflexion sign:
  - The patient is placed in the prone position, and the knees are flexed to 90 deg.
  - The examiner then passively dorsiflexes both feet maximally and compares the injured to the non-injured side.
- Thompson Test:
  - Have the patient prone w/ both feet extending past end of examining table.
  - Calf muscles on the affected side are squeezed by the examiner.
  - If tendon is intact, the foot will plantar flex, & conversely if tendon is ruptured, the foot will not contract.
  - This text may lose accuracy after one week from injury.

Ankle
- Injuries to Ligaments of the ankle.
- Occurs when stepping on non-level surface.
- Inversion vs. Eversion
- Inversion: Talofibular lig and calcaneofibular ligament.
- APQRST?
- X-rays?
Ottawa Rules for Ankle X-ray

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.

Testing

- Anterior Drawer Test
  - Evaluates the Anterior Talofibular ligament (look for diff. of 8 mm)
- Talar Tilt test
  - Assesses ATF ligament primarily and the CF ligament secondarily; - ATF rupture vs. combined rupture of ATF & CF ligament

Ankle Follow up

- RICE
- Ortho for all EVERSION and Grade III
- NSAIDS
- REHAB (48 hr for minor)
  - (Alphabet, isometrics, toe raises)
  - (Strengthening)
- Follow up when?

Maisonneuve Fracture
What you don’t see…

Metatarsal fracture

Jones Fracture

Fracture Healing

- Healing occurs by periosteal or external callus formation in fractures managed by closed methods
- Five stages of bone healing
  - Hematoma formation (1-3 days)
  - Fibrocartilage formation (3 days-2 weeks)
  - Callus formation (2-6 weeks)
  - Ossification (3 weeks-6 months)
  - Consolidation/remodeling (6 weeks-1 year)