Common Foot/Ankle Injuries: Diagnosis/Workup

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Common Foot/Ankle Injuries

Target Audience:
• Medical Students/Residents
• Primary Care Clinicians
• Non Orthopedic Specialists
• Urgent Care/Emergency Medicine Providers

Disclosures
• I have no relevant financial relationship(s) within the products or services described, reviewed, evaluated or compared in this presentation.
Foot/Ankle Injuries - General

- Very common
  - 1-5 MILLION/year in US

- Significant variability in regards to severity

- Can effect ALL age groups
  - Pediatric ➔ Geriatric

- Evaluation/Treatment by MANY different providers
  - ED, Urgent Care, PCP, Trainers, Therapists, Surgeons
Foot/Ankle Injuries - History

- **Mechanism of Injury**
  - Why/When/Where/How??
  - *Beware correlation - severity*

- **Position of Ft/Ankle**
  - Which structures at risk?
  - *Lauge-Hansen Classification*

- **Audible/Visible Δ**
  - Minor vs. Major Deformity
  - Listen to patient long enough....
Foot/Ankle Injuries - History

- Prior Injury/Tx
  - Results
  - Frequency of Injury

- Pre-existing S/S
  - Pain prior to or between injury(ies)

- Comorbid Medical Conditions
  - DM, PVD, Inflammatory arthritis, Neuro Conditions
  - Tobacco, EtOH, W/C
Physical Examination

- Establish a ROUTINE!!
- Step-by-Step Exam
  - Less likely to miss an injury
- Contralateral Exam
  - Especially in Peds
- WB vs NWB Exam (if possible)
  - Both PE and Xray exam
- Don’t forget the basics!!!
Physical Examination - Basics

- **Visual Exam**
  - Deformity/Alignment
  - Ecchymosis/Swelling
  - Open Wounds
  - Sitted/Standing Exam

- **Shoewear**
  - Abnormal Wear Pattern
  - Type of shoe used

- **Gait Pattern**
  - Antalgic Pattern?
  - Tight Heel Cord?
Physical Examination - Basics

- Neurological Exam
  - Sensation; ? Tinels
  - Remember anatomy!!

- Vascular Exam
  - DP/Tibial; Cap Refill

- Range of Motion
  - Heel Cord Tightness?
  - Hypermobility?

- Muscle Strength
Physical Examination - Basics

- Have patient lead the way… but beware!!

- Palpatory Exam****

- Routine – Step Approach
  - Proximal Fibula/Shaft
  - Medial/Lateral Malleolus
  - Achilles Tendon
  - Base of 5th Metatarsal
  - Midfoot
  - Anterior Process of Calcaneus
  - Lateral Talar Process
Physical Examination
Specific Foot/Ankle Tests

- Thompson’s Test
  - Achilles Rupture
- Homan’s
  - DVT
- Ant. Drawer/Talar Tilt
  - Ankle Instability (ATFL/CFL)
- ‘Squeeze’ Test
  - Syndesmotic Injury
- Single/Double Heel Rise
  - PTTD
Radiographic Exam – Foot/Ankle

- **Standard Exam**
  - Ankle (AP/Lat/Mortise)
  - Foot (AP/Lat/Oblique)

- **WB vs. NWB**
  - Prefer WB if possible**

- **Special Views**
  - Calcaneus (Axial/Broden)
  - Stress Views
Ankle Exam

- Deltoid Injury
  - Medial Clear Space > 5 mm with Ext. Rotn Stress test
  - Normal - = or < 4 mm

- Syndesmotic Injury
  - Decreased Tib/Fib Overlap
    - >6 mm (AP); >1 mm (Mortise)
  - Increased Medial Clear Space
  - Increased Tib/Fib Clear Space
    - <6 mm on both AP/Mortise

- Fibular Length
Xray Pearls – Foot/Ankle

Foot Exam

- Arch appearance
  - Meary’s Angle
  - Talar Head Uncovering
- Metatarsal Cascade
- Accessory Ossicles
- Bohler’s Angle – Calc. Fx
- Midfoot Relationships
  - AP View – 1/2 MT - Cuneiform
  - Oblique View – 4 MT - Cuboid
  - Lateral View – Dorsal Surface
  - ‘Fleck’ Sign
Ankle Sprains - General

- Most common sports related injury (up to 40%)
  - 45% of Basketball; 31% Soccer
  - 15% of time lost in Football

- 10% of all ED visits

- 1/10,000 people/day

- Avg. ED Cost for Ankle Sprain = $1,211
- Annual Cost > $1.1 billion**
Ankle Sprains – Exam/Work-Up

- Remember the Routine
- Basics
  - Specs of Injury; Preinjury pain?
  - N/V Exam; Visual Exam
  - Anterior Drawer / Talar Tilt
  - Palpate Key Areas**
  - Assess Peroneal Tendons
  - Assess for Tarsal Coalition
  - Classification
- Xrays
  - 3 View (AP/Lat/Mortise)
  - OLT? (Role of MRI)
  - Ottawa Rules**
Ankle Sprains – Treatment

**Acute**
- Three Phase Functional Tx
  - I – R/I/C/E
  - II – Short Period Immob/Protection
  - III – AROM, WB, Proprioception, Peroneal Strengthening

**Chronic**
- Surgical Indications
- > 80 Surgical Procedures
- Anatomic vs. Nonanatomic
- Treat Associated Conditions
Ankle Sprains – Long Term Issues

- Functional vs. Mechanical
- Acute ➔ Chronic Instability

- Associated Pathology
  - Impingement Syndrome
  - Peroneal Tendon Pathology
  - OLT
  - Unrecognized Bone Trauma
  - Neuropraxia
Ankle Fractures - General

- Account for 9% of all fractures
- ↑ incidence over last 30 years
- 2% of general population will sustain an ankle fracture during their life
- Need to determine Stable vs. Unstable
Ankle Fractures – Exam/Work-Up

- **Classification**
  - Dennis-Weber
  - Lauge-Hansen

- **Basics**
  - Areas of Tenderness
  - N/V Evaluation

- **Radiographic Findings**
  - AP/Lateral/Mortise
  - Mortise Instability??
  - Stress Views??
  - Stable vs. Unstable ***
Nonoperative

- SLC (WB?)

Indications

- Nondisplaced Medial Malleolus Fx
- Distal Fibula Fx with < 3 mm. displacement and Talar displacement
- Posterior Malleolar Fx with < 25% or < 2 mm. step-off
Ankle Fractures - Treatment

- Operative
  - Anatomic Reduction with stable internal fixation

- Indications:
  - Any Talar Displacement
  - Displaced Isolated MM, LM Fxs
  - Bimalleolar (or equivalent) Fracture
  - Posterior Malleolar Fx with > 25% or 2 mm. displacement
  - Open Fractures
  - Maisonneuve Fracture
  - ‘Pilon’ Fracture
Overall success rate 90%; however prolonged recovery (2 years)

Worse outcomes with: smoking, increased age, alcohol use, decreased education

Complications
- Infection (Superficial/Deep)
- Posttraumatic Arthrofibrosis/Arthritis
- Irritable Hardware
Incidence has increased over last 50 years
• Growing interest/participation in sports

2-10 cases/100,000 people annually in industrialized nations

Male predominance 2:1 to 19:1

Less common causes
• Steroids
• Quinolone Abx
• Gout, Hypothyroid, Renal Insufficiency, Arteriosclerosis
Achilles Rupture – Exam/Work-Up

- **Dx by patient history**
  - Feeling of direct blow/pop

- **Clinically**
  - Difficult gait/Pushoff weakness
  - Indentation/Ecchymosis
  - Thompson Sign
    - Calf Squeeze Test

- **Radiographic**
  - Xrays (Avulsion Fx)
  - MRI, U/S
Achilles Rupture - Treatment

- **Nonoperative**
  - Significant medical issues or limited functional gains/expectations
  - Serial casting with progressive dorsiflexion

- **Operative**
  - Direct (or Percutaneous) End-to-End Repair, followed by aggressive functional rehab
  - Gastroc. Turndown/Plantaris/FHL
  - Beware ‘Cast Disease’
Complications

• Missed Diagnosis
• Nonoperative
  • Incomplete Return to Function
  • **Rerupture (3-4x more common)
• Operative
  • Infection/Wound Dehiscence
  • Nerve Injury / Scar Tissue

Results/Outcomes

• Dynamic Resting Length Δ
• Long Term Achilles Tendinosis
Relatively uncommon
- About 0.2% of fractures

Mechanism of Injury
- Direct (Crush Injury)
- Indirect (Axial Load of Plantar flexed foot / Abd.)

TMT Anatomy
- 2\textsuperscript{nd} MT Base – Wedge Shaped
- Lisfranc Ligament
- 3 Columns (Medial, Middle, Lateral)
High Index of Suspicion!!
  - 20% missed in Polytrauma

TTP at Midfoot/Swelling
  - Midarch Ecchymosis**

Remember Xray Pearls!!
  - 3 Views – each valuable
  - ‘Fleck’ Sign
  - Stress Radiographs
  - Comparison Views
Nonoperative
- Limited role
- Medically unstable

Operative
- Timing based on Soft Tissue
- Anatomic Reduction with Rigid Internal Fixation
- ? Percutaneous Fixation
- ? External Fixation
- Primary Arthrodesis
Most studies recommend operative management with displaced injuries

Anatomic Reduction does NOT guarantee excellent results!!

Posttraumatic DJD, pain, swelling is commonplace
Different location of frxs = different treatment options

Avulsion (Dancer’s) Fx
- Inversion Injury of Foot
- Peroneus Brevis vs. PF

Jones Fracture (Acute/Stress)
- Fx at Metaphyseal/Diaphyseal Junction
- Precarious Blood Supply
- Beware the Cavovarus Foot!!
Acute vs. Stress Fracture
- ? Prodrome of pain in area
- Check foot/ankle deformity

Radiographs
- Fracture at junction M/D
- Check for sclerosis/osteolysis at fracture site
Nonoperative
- NWB 6-8 wks with SLC
- PWB 2-4 wks with Boot
- ? Smoking/NSAID use
- Bone Stimulator??

Operative
- ‘High Caliber Athlete’??
- IM Screw Fixation (Solid vs. Cann)
- Plate/Screw Fixation
- Address deformity (Cavovarus)
- Bone Graft??
- Bone Stimulator??
Nonunion
- Inadequate Fixation
- Failure to address deformity
- Noncompliance

Hardware Issues
- Failure
- Prominence