AMSER Case of the Month: November 2019

57 y/o male presents with acute left ankle pain

Kyle Hatcher, MS3
Drexel University College of Medicine

Dr. William Peterson, MSK Radiologist

Allegheny Health Network
Patient Presentation

• HPI: 57 y/o male presents to the ED with acute left ankle pain after sliding on railroad tracks and falling off his bicycle onto his left side
• PMHx: obesity, hyperlipidemia, diverticulitis
• SHx: left knee replacement
• Social: daily alcohol use, occasional cannabis use
• Vitals: BP 131/86, Pulse 88, Temp. 98.2 °F, RR 12
• Physical: oriented x3, obvious deformity of left ankle, 2+ left ankle DP and PT pulses, limited range of left ankle motion
What Imaging Should We Order?
ACR Appropriateness Criteria

This imaging modality was ordered by the ER physician

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>SOE</th>
<th>Adult RRL</th>
<th>Peds RRL</th>
<th>Rating</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-ray ankle</td>
<td>Usually appropriate</td>
<td>≤ 0.1 mSv</td>
<td>9</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT ankle without IV contrast</td>
<td>Usually not appropriate</td>
<td>≤ 0.1 mSv</td>
<td>1</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT ankle without and with IV contrast</td>
<td>Usually not appropriate</td>
<td>≤ 0.1 mSv</td>
<td>1</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT ankle with IV contrast</td>
<td>Usually not appropriate</td>
<td>≤ 0.1 mSv</td>
<td>1</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MRI ankle without IV contrast</td>
<td>Usually not appropriate</td>
<td>≤ 0.1 mSv</td>
<td>1</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MRI ankle without and with IV contrast</td>
<td>Usually not appropriate</td>
<td>≤ 0.1 mSv</td>
<td>1</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>US ankle</td>
<td>Usually not appropriate</td>
<td>≤ 0.1 mSv</td>
<td>1</td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Findings (unlabeled)
Findings: (labeled)

- Transverse fracture through base of medial malleolus
- Oblique fracture through lateral malleolus extending to syndesmosis
- Coronal fracture through posterior malleolus and posterior dislocation of the tibiotalar joint
Final Dx:

Left trimalleolar ankle fracture/dislocation
Following external reduction, a CT was performed looking for additional fractures, tendon entrapment, interposed fragments and to aid is surgical planning.

- Transversely oriented fracture of the medial malleolus
- Oblique fracture through lateral malleolus
- Reduction of tibiotalar dislocation
- Up to 8 mm posterior displacement of the posterior malleolus fracture
Trimalleolar Fractures

- Three part fracture of the ankle
- Includes:
  - Medial malleolus
  - Posterior tibial plafond (aka posterior malleolus)
  - Lateral malleolus
- Associated with ligamentous injury
Ankle Fracture Epidemiology

• Mechanism: dependent on direction of ankle and force applied
  • Logical progression described by the Weber and Lauge-Hansen Classification
• Bimodal age distribution of malleolar fractures
  • Young males associated with sports
  • Elderly females associated with osteoporosis
• Associated with tobacco use and obesity
• 60-70% Unimalleolar
• 15-20% Bimalleolar
• 7-12% Trimalleolar
Simplified Weber and Lauge-Hansen Classification

• Used to estimate and predict the extent of ligamentous injury and ankle stability
  • Weber system focuses on integrity of the syndesmosis
  • Lauge-Hansen focuses on the trauma mechanism

• Weber: three categories
  • Type A: Infrasyndesmotic
  • Type B: Transsyndesmotic
  • Type C: Suprasyndesmotic

• Lauge-Hansen: two word description of ankle injury
  • First word: Pronation or supination – position of foot at time of injury
    • In ankle pronation, medial ligaments fully stretched/vulnerable
    • In ankle supination, lateral ligaments fully stretched/vulnerable
  • Second word: adduction, abduction, or exorotation – injuring force direction
    • Ankle adduction results in initial lateral malleolar tension
    • Ankle abduction results in initial medial malleolar tension
    • Ankle exorotation results in initial fibula tension or medial malleolar tension
Weber A: Infrasyndesmotic
- Supination/adduction
- Infrasyndesmotic tension results in avulsion of the lateral malleolus (stage 1), followed by medial malleolus (stage 2)

Weber B: Transsyndesmotic
- Supination/exorotation
- Transsyndesmotic tension results in oblique fibula fracture (stage 2), followed by avulsion of the posterior malleolus (stage 3), followed by avulsion of the medial malleolus (stage 4)
- Our patient likely had a Weber B Stage 4 injury

Weber C: Suprasyndesmotic
- Pronation/exorotation
- Suprasyndesmotic tension results in avulsion of medial malleolus (stage 1), followed by fibula fracture (stage 3), followed by avulsion of the posterior malleolus (stage 4)
Trimalleolar Fracture Treatment

- Trimalleolar fractures require surgical repair using open reduction and internal fixation
- Non-surgical treatment is considered in patients with significant comorbidities
  - Associated with malunion
- Recovery typically lasts six to twelve weeks
Surgical Treatment For Our Patient

- Plate and screw fixation of distal fibula fracture
- Medial malleolar screws placed
- Tibiofibular syndesmotic screw placed
- Improved alignment
Patient F/U with Orthopedic Surgeon

• Discharged post-op day 2
• Patient undergoes OT at home
  • Revaluation after 2 weeks
• Continues to have sensation and full range of motion
References:


