AMSER Case of the Month
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70 y/o M with ankle pain after ~10ft fall

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Patient Presentation

- **HPI:** 70 y/o M nonsmoker who presents with bilateral leg and foot pain after ~10ft fall from ladder during which R leg was tangled within struts.

- **PMHx:** BPH, Class I obesity (BMI 30.1)
- **PSHx:** None
- **Vitals:**
  - HR 127, BP 144/88
  - T: 98.2F, Resp 19, SpO2 94%
- **Labs:**
  - CBC, BMP, UA: WNL

- **Physical Exam:**
  - **Left leg**
    - Leg does not tolerate ROM exam 2/2 pain
    - Severe tenderness to palpation of tibial plateau
  - **Right leg**
    - Leg 5/5 extensor and flexor strength, full ROM
    - Right ankle edematous, ecchymotic, severe anterior TTP, minimal ROM 2/2 pain
Ottawa Ankle Rules:

1. Inability to bear weight immediately after the injury
   OR

2. Point tenderness over the medial malleolus, the posterior edge or inferior tip of the lateral malleolus, talus, or calcaneus
   OR

3. Inability to ambulate for 4 steps in the emergency department

*Patient history and physical exam met all of these criteria
# What Imaging Should be Ordered

*Acute trauma to the ankle or acute trauma to the ankle with persistent pain for more than 1 week but less than 3 weeks.*

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiography ankle</td>
<td>Usually Appropriate</td>
<td>☀</td>
</tr>
<tr>
<td>US ankle</td>
<td>Usually Not Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>MRI ankle without and with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>O</td>
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<tr>
<td>MRI ankle without IV contrast</td>
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</tr>
<tr>
<td>Bone scan ankle</td>
<td>Usually Not Appropriate</td>
<td>☀️</td>
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ACR Appropriateness Criteria. Accessed March 4, 2024

https://acsearch.acr.org/list?_gl=t"62uiK"_ga"MTc0MDgyNjM5MjI4NzA5NTY1MjOx"_ga
K91Z3E72MV"MTc0MDgyNjM5MjI4NzA5NTY1MjOx"_ga
K91Z3E72MV"MTc0MDgyNjM5MjI4NzA5NTY1MjOx"_ga
K91Z3E72MV"MTc0MDgyNjM5MjI4NzA5NTY1MjOx"_ga
Findings: Right Ankle (Unlabeled)
Findings: Right Ankle (Labeled)

- Comminuted mildly displaced talar neck fracture

Lateral Radiograph

Non-Contrast CT

Coronal

Axial
Open Reduction and Internal Fixation

Radiographs: 1-, 2-, & 3- month follow-up
Patient Presentation (4 mo Post-Op)

- **HPI:** Continued pain and inability to bear weight

- **Physical Exam:**
  - Minimal ROM 2/2 pain
  - Diffusely edematous
What Imaging Should be Ordered

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<td>O</td>
</tr>
<tr>
<td>MRI area of interest without and with IV contrast</td>
<td>May Be Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>CT area of interest without IV contrast</td>
<td>May Be Appropriate (Disagreement)</td>
<td>Varies</td>
</tr>
<tr>
<td>Bone scan area of interest</td>
<td>Usually Not Appropriate</td>
<td>☀️☀️☀️</td>
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*Clinically suspected osteonecrosis (any bone). Normal radiographs or radiographs that show findings suspicious for osteonecrosis. Next imaging study*
Findings: 4mo Post-op (Unlabeled)

Non-Contrast CT. Indication: pain w/ indeterminate radiograph
Findings: 4mo Post-op (Labeled)

Sclerosis = Hypovascularity (Osteonecrosis)

Lucency = Hypervascularity (Healing)

Diffuse disuse osteopenia

Non-Contrast CT
The Hawkins Sign

- Subchondral lucency in talar dome after talar neck fracture (≥ 6-8 weeks s/p injury)

- Evidence of sufficient vascularity and reduced likelihood of later osteonecrosis

- May be complete or incomplete

- Absence of Hawkins sign (subchondral sclerosis) signals vascular insufficiency and suggests underlying osteonecrosis
Talar Avascular Necrosis Pathophysiology

Fracture-Induced Avascularity
• Talar neck fractures (75% of cases) disrupt tenuous retrograde watershed blood supply
• Ischemia leads to cellular necrosis and osseous breakdown
• Inflammation and necrosis disrupts fracture remodeling

Clinical Manifestations
• Lack of improvement
• Evolving pain at rest (red flag)

Ficat Classification
I. Normal radiographs
II. Cystic/sclerotic bone with normal contour
III. Subchondral collapse
IV. Features of arthrosis, talar collapse

**Talar Avascular Necrosis Management**

**Early Stages / Anatomic**
- Usually conservative
- Non-opioid analgesia
- Casting, Limit weight bearing
- Extra-corporeal shock wave therapy

**Late Stages / Bone or Joint Deformity**
- Core decompression
- Arthrodesis
- Prosthesis
- Vascularized bone grafting

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Summary: Imaging Talar Fractures

- Due to tenuous vascular supply, talar neck fractures have high risk of avascular necrosis.

- The Hawkins sign, subchondral lucency of the talus at ≥ 6-8 weeks, indicates good blood flow.

- Subchondral sclerosis indicates avascularity and is a warning sign for osteonecrosis, especially with evolving pain at rest.
References: