AMSER Case of the Month
March 2022
21 y.o. Female with Left Foot Injury

Amanda Jacubowsky, MS-4
Lake Erie College of Osteopathic Medicine at Seton Hill

Timothy Stooksberry, MD, PGY-6
MSK Fellow—Allegheny Health Network

Lulu He, DO
Attending Physician—Allegheny Health Network
Patient Presentation

• **HPI:** Patient injured left foot on trampoline the night prior to presentation. Unsure of the mechanism of injury. Pain in the left midfoot to the toes, non-radiating, and 5/10 on the pain scale. Has associated paresthesia and weakness of left foot. Pain and swelling relieved by Naproxen. Aggravated by movement, ambulation, and palpation.

• **PMHx:** PCOS

• **Medications:** Metformin and oral contraceptive

• **Social Hx:** Non-smoker, no EtOH or drug use
Patient Objective Data

• **Vitals:**
  - Temp 97.7°F, BP 144/74 mmHg, HR 96 bpm, RR 16, SpO2 98% on RA

• **MSK Exam:**
  - **Gait:** unable to bear weight on left foot
  - **Swelling/ Bruising:** dorsal and plantar left midfoot
  - **Palpation:** TTP over left medial cuneiform and 2nd metatarsal base
  - **ROM:** limited with all motions
  - **Strength:** 5/5
  - **Neurovascular:** intact
What Imaging Should We Order?
Select the applicable ACR Appropriateness Criteria

Variant 5: Adult or child older than 5 years of age. Acute trauma to the foot. Suspect Lisfranc injury, tendon injury, or occult fracture or dislocation. Radiographs are normal or equivocal. Next imaging study.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT foot without IV contrast</td>
<td>Usually Appropriate</td>
<td>☀️ ☀️</td>
</tr>
<tr>
<td>MRI foot without IV contrast</td>
<td>Usually Appropriate</td>
<td>0</td>
</tr>
<tr>
<td>US foot</td>
<td>May Be Appropriate</td>
<td>0</td>
</tr>
<tr>
<td>CT foot with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>☀️ ☀️</td>
</tr>
<tr>
<td>CT foot without and with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>☀️ ☀️</td>
</tr>
<tr>
<td>MRI foot without and with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>0</td>
</tr>
</tbody>
</table>

This imaging modality was ordered after equivocal radiographs. Additionally, weight-bearing radiographs were ordered.
Findings (unlabeled)
Equivocal non-weight bearing distances, widened with weightbearing

Medial cuneiform - 2nd metatarsal base interval
NWB = 1.7mm
WB = 3mm

1st-2nd metatarsal base interval
NWB = 3 mm
WB = 5mm

Nondisplaced proximal medial cuneiform fracture

T2 MRI shows full-thickness tears of dorsal, interosseous, and plantar Lisfranc ligaments
Final Dx:

Complete Tear of Lisfranc Ligamentous Complex with Nondisplaced Fracture of Left Medial Cuneiform
Case Discussion

• Lisfranc Joint and History Lesson
  • Articulation between the medial cuneiform and 2nd metatarsal, stabilized by dorsal, interosseous, and plantar ligaments
  • Jacques Lisfranc, a surgeon in Napoleon's army was the first to describe this joint during an amputation for gangrene after a soldier fell off a horse with his foot caught in the stirrup

• Imaging Findings
  • Malalignment of 2nd tarsometatarsal joint
  • 1st-2nd metatarsal base diastasis >2 mm
  • Medial cuneiform - 2nd metatarsal base interval >2.5 mm
  • Fleck Sign: tiny avulsion fracture fragment
  • With negative or equivocal radiographs, MRI is useful to directly assess for ligamentous injury
Case Discussion

• Mechanism of Injury
  • Direct Trauma: external force strikes foot
  • Indirect Trauma: transmitted to stationary foot via torque, rotation, or compression

• Subtypes
  • Homolateral: Lateral displacement of the 1\textsuperscript{st} to 5\textsuperscript{th} metatarsals or of the 2\textsuperscript{nd} to 5\textsuperscript{th} metatarsals where the 1\textsuperscript{st} MTP joint remains congruent
  • Divergent: a divergent injury is a lateral dislocation of the 2\textsuperscript{nd} to 5\textsuperscript{th} metatarsals with medial dislocation of the 1\textsuperscript{st} metatarsal
  • Isolated: this involves one or two metatarsals that dislocate dorsally in isolation
Case Discussion

• **Treatment**
  • Stable injuries (partial sprains, extra-articular fractures) are treated non-operatively, typically with temporary boot immobilization. Repeat weightbearing radiographs 2-3 weeks after injury.
  • Surgical management is indicated for unstable (displaced) injuries of the midfoot, including pure ligamentous, bony, or variable combinations. Most surgeries are performed 12-24 hours after injury.

• **Complications of Injury**
  • Persistent pain, activity limitations, and progressive post-traumatic arthritis in the involved joints
References


