

AMSER Case of the Month

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21 y.o. Female with Left Foot Injury



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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:

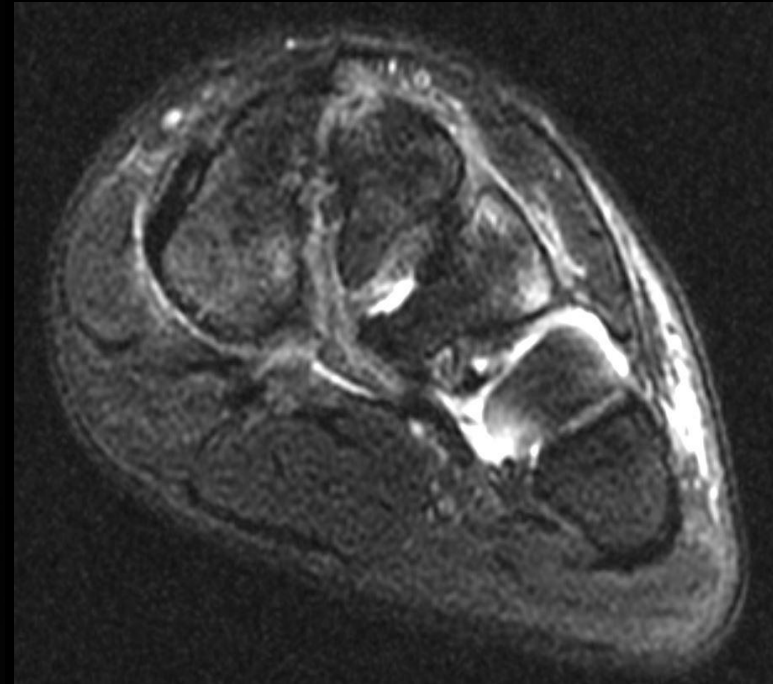
Adult or child older than 5 years of age. Acute trauma to the foot. Suspect Lisfranc injury, tendon injury, or occult fracture or dislocation. Radiographs are normal or equivocal. Next imaging study.

Procedure	Appropriateness Category	Relative Radiation Level
CT foot without IV contrast	Usually Appropriate	☼☼
MRI foot without IV contrast	Usually Appropriate	0
US foot	May Be Appropriate	0
CT foot with IV contrast	Usually Not Appropriate	☼☼
CT foot without and with IV contrast	Usually Not Appropriate	☼☼
MRI foot without and with IV contrast	Usually Not Appropriate	0

This imaging modality was ordered after equivocal radiographs. Additionally, weight-bearing radiographs were ordered



Findings (unlabeled)



X-Ray Findings (labeled)

Equivocal non-weight bearing distances, widened with weightbearing

Medial cuneiform - 2nd metatarsal base interval

NWB = 1.7mm

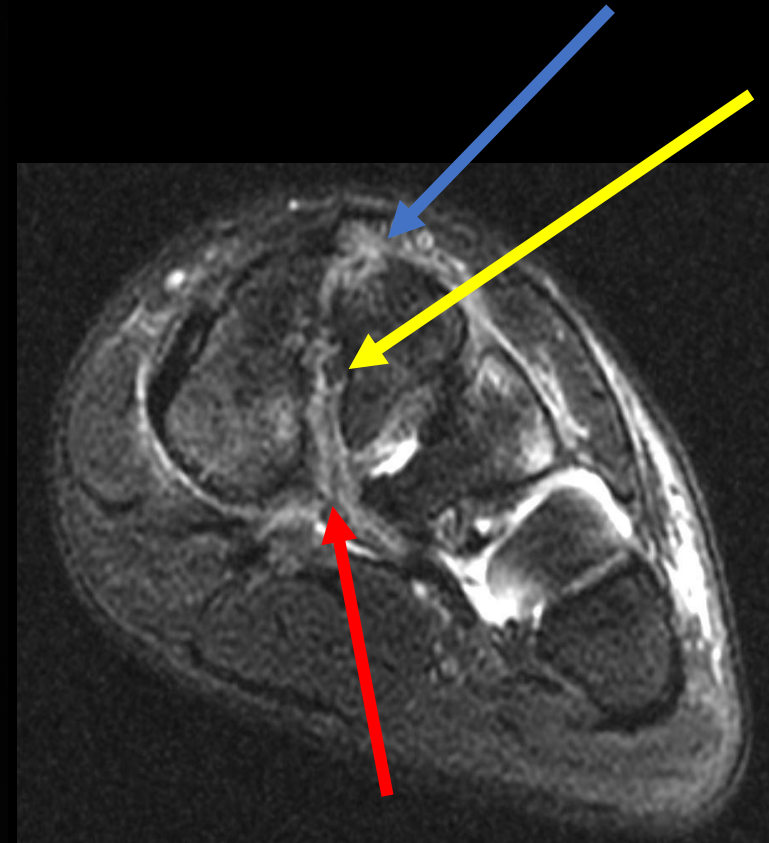
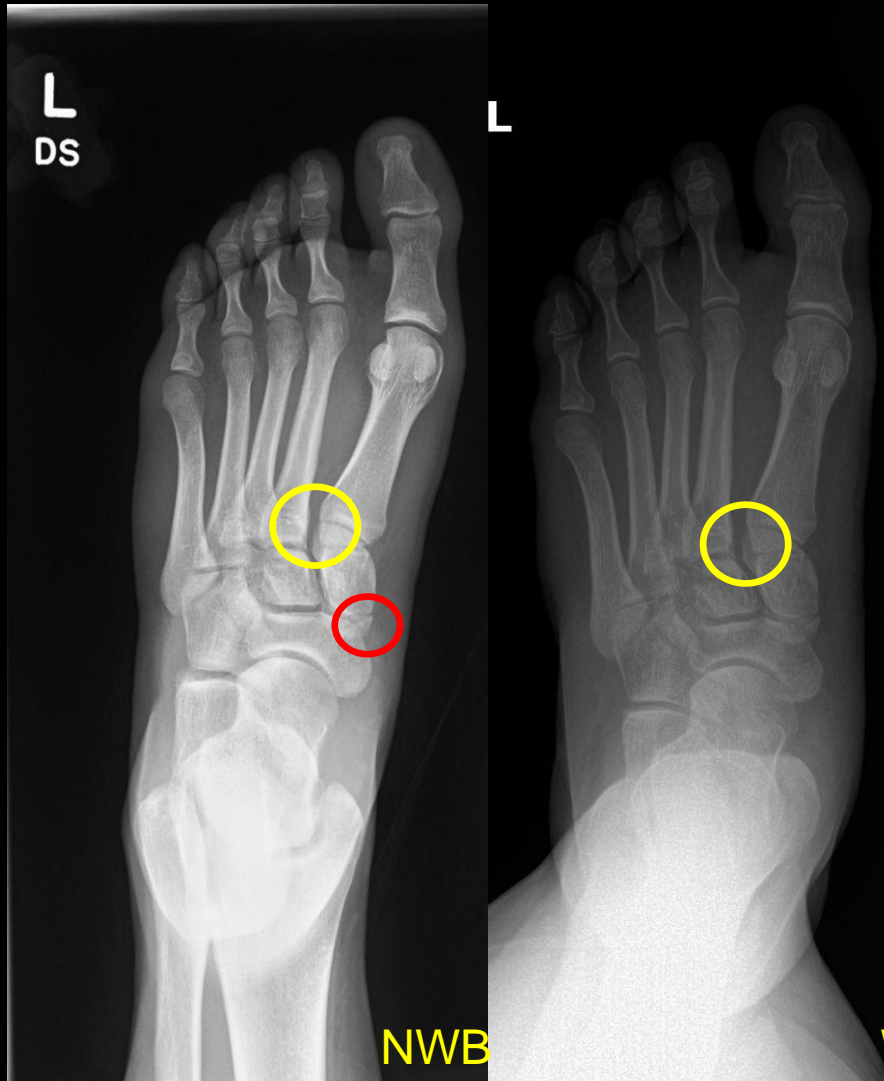
WB = 3mm

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

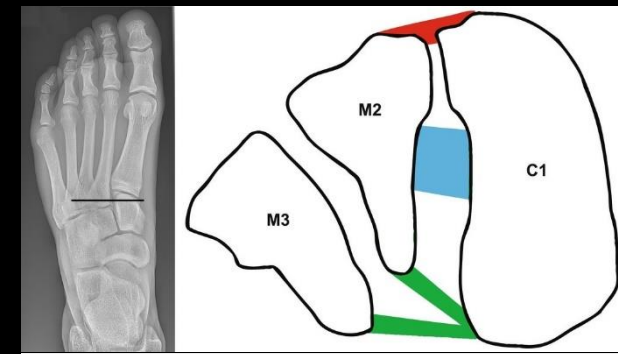
Case Discussion

• 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



Red = dorsal Lisfranc ligament
Blue = interosseous Lisfranc ligament
Green = plantar Lisfranc ligament



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 1st to 5th metatarsals or of the 2nd to 5th metatarsals where the 1st MTP joint remains congruent
- Divergent: a divergent injury is a lateral dislocation of the 2nd to 5th metatarsals with medial dislocation of the 1st 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

1. American College of Radiology. ACR Appropriateness Criteria®. Available at <https://acsearch.acr.org/list>. Accessed January 4, 2022.
2. Burroughs, K E et al. "Lisfranc injury of the foot: A commonly missed diagnosis." *American Family Physician* vol. 58,1 (1998): 118-24.
3. Siddiqui, Nasir A et al. "Evaluation of the tarsometatarsal joint using conventional radiography, CT, and MR imaging." *Radiographics : a review publication of the Radiological Society of North America, Inc* vol. 34,2 (2014): 514-31.
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4. Clare, Michael P. "Lisfranc injuries." *Current reviews in musculoskeletal medicine* vol. 10,1 (2017): 81-85. doi:10.1007/s12178-017-9387-6
5. Gaillard, F., Knipe, H. Lisfranc injury. Reference article, Radiopaedia.org. (accessed on 04 Jan 2022) <https://doi.org/10.53347/rID-1590>