

Management of Lisfranc Injury of a C-17 Loadmaster

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Flying through uncertainty

Loadmaster's working environment

Hazardous cargo

Heavy machinery

Ramp building

Lisfranc injury

- Epidemiology
 - Diagnosis
 - Treatment
 - Prognosis
 - Military career concern
- Lesson learned/Safety measures

Flying through uncertainty

Loadmaster working environment



Flying through uncertainty

Loadmaster working environment



Flying through uncertainty

Loadmaster working environment



Flying through uncertainty

21 yo presented with pain of right foot with intact pulse after injury on the job



Flying through uncertainty

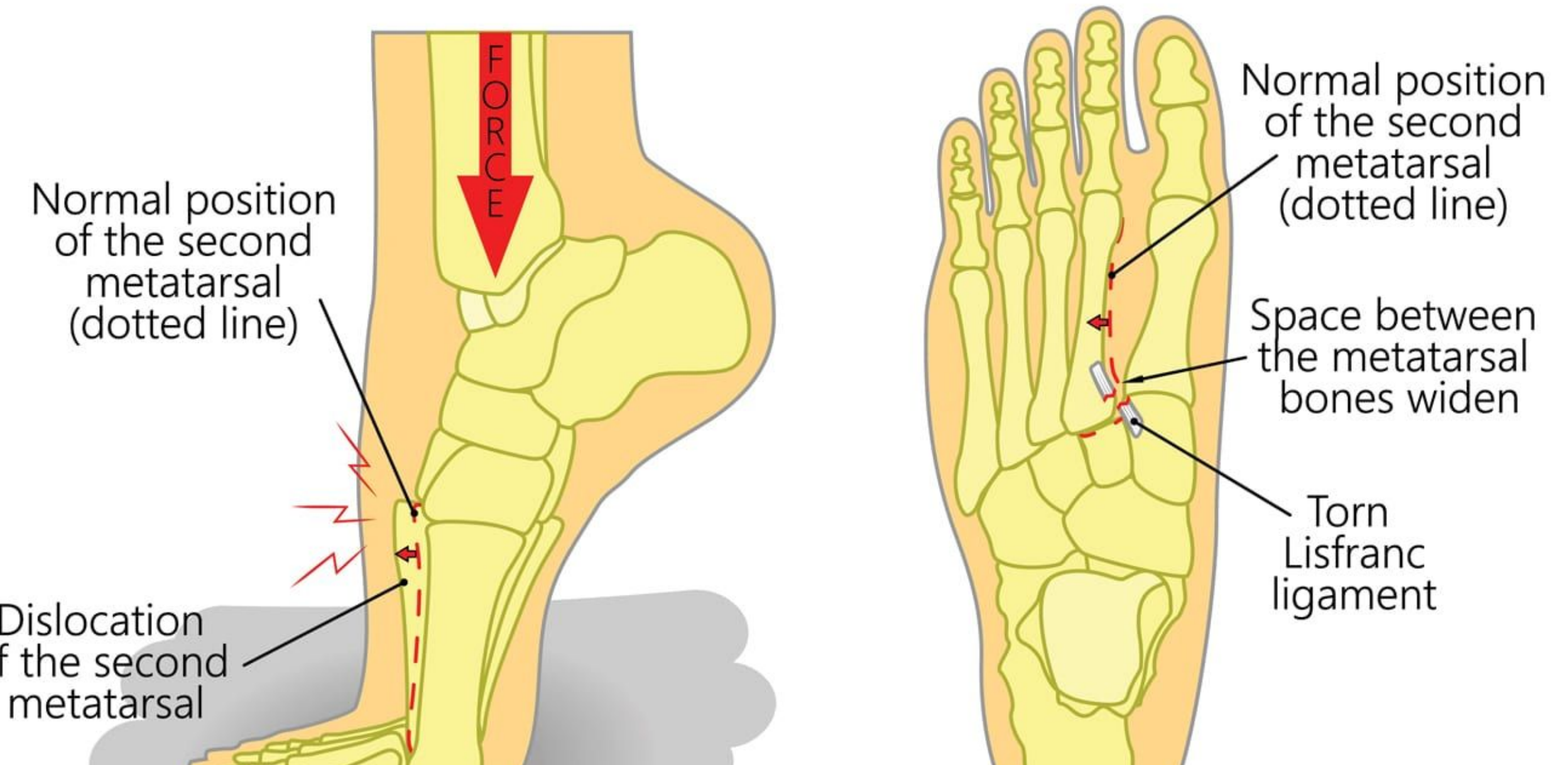




Lisfranc injury

Named after a French surgeon during Napolionic war

- Tarsometatarsal joint injury
- Lisfranc ligament is large band of collageous tissue that spans the articulation of the medial cuneiform and the second metatarsal base
- Injury pattern: homolateral, isolated, dispersed

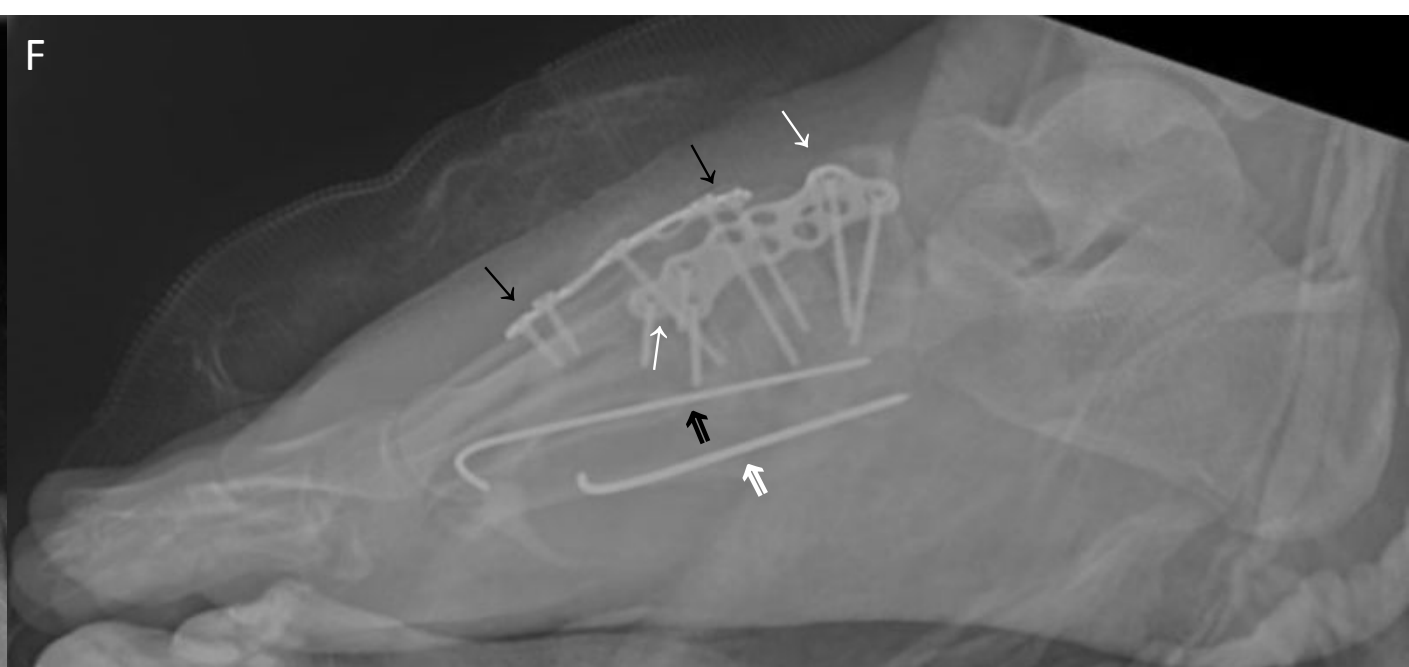




Figures A and B: AP and oblique radiographs of the right foot (Figures A and B, respectively) demonstrate significant widening of the first intermetatarsal space (*) with lateralization of the 2-5 metatarsal bones and medialization of the first metatarsal bone (small white arrows) consistent with divergent Lisfranc injury. Additional injuries include comminuted fracture of the medial cuneiform with anterolateral displacement of the dominant lateral fracture fragment between the first and second metatarsal bases (small black arrows) and another large fracture fragment displaced medially (large white arrows); mildly distracted avulsion fracture at the medial navicular (large black arrows); comminuted, overriding fracture at the base of the second metatarsal bone (open black arrows); and oblique transverse cuboid fracture with lateral displacement of distal fracture fragment (open white arrows).

Figure C: Lateral right foot radiograph shows dorsal step off at the tarso-metatarsal joint due to dorsal displacement of the second metatarsal base (small white arrow) and medial cuneiform fragment (small black arrow). Plantar step off is seen involving the cuboid fracture (*).

Note: Due to overlapping structures on all three figures, additional fractures involving the middle and lateral cuneiforms are difficult to exclude.



Figures D, E, and F: Postoperative AP, oblique and lateral radiographs (D, E, and F, respectively) following open reduction and internal fixation are shown. Note the improvement in tarsometatarsal joint alignment with plate and screw fixation from the navicular bone to the base of the first metatarsal bone (solid white arrows), by-passing the fragmented medial cuneiform. Another plate and screw fixation extends from the middle cuneiform to the proximal shaft of the second metatarsal bone (solid black arrows), with screws in both the proximal and distal second metatarsal shaft fragments. Percutaneous k-wires through the base of the fourth metatarsal bone into the lateral cuneiform (open black arrows) and through the base of the fifth metatarsal bone into the cuboid (open white arrows) stabilize the lateral aspect of the tarsometatarsal joint. Previously demonstrated navicular and cuboid fractures are also reduced. Note that evaluation of fine osseous detail is limited by the overlying shadows of splint material.

Flying through uncertainty

- Epidemiology of Lisfranc injury
 - Rare: 0.1-1% of all fractures
 - Frequently misdiagnosed: 20% on initial radiographs
 - Types of injury:
 - homolateral
 - isolated
 - divergent
 - Prognosis depending severity of damage, timely treatment, and rehabilitation

- Management of Lisfranc injury
 - Conservative: injury is stable, mild and moderate with no TMT joints displacement
 - Surgical: ORIF, unstable injury, displacement of TMT joint associated complete ligament disruption and fracture of the metatarsal base
 - Compartment syndrome fasciotomy

Flying through uncertainty

- Uncertain factors in the case

Where and whom you want to care for the patient?

Immediately surgery vs Aeromedical evacuation (AE)?

Do you flight with altitude restriction?

Will the patient develop Complex Regional Pain Syndrome?

pain that is greater than would be expected from the injury that causes it

Psychological effect

Flying through uncertainty

Remember to bivalve the cast!



Flying through uncertainty

- Lesson learned
 - steel toe shoe? will this prevent it? depends situation
 - clear communication and eye contact during directing cargo movement
 - Perhaps, a third party (besides the loadmaster and driver) should monitoring the loading process and call out if seeing imminent danger

Flying through uncertainty

Per Medical Standard Directory (MSD) Feb 2022:

DQ: Any injury of the feet which results in disabling pain, distracting discomfort, inability to satisfactorily perform military duties, including deployment...

Ref:

GC Balazs et al. "Military personnel sustaining Lisfranc injuries have high rates of disability separation". J R Army Med Corps. 2017 Jun;163(3):215-9

M Hawkinson. "Outcomes of Lisfranc Injuries in an Active Duty Military Population".

<http://journals.sagepub.com/doi/abs/10.1177/2473011417S000048>

AR Diebal. "Lisfranc injury in a west point cadet". Sports Health. 2013 May;5(3):281-5

Questions?