



Imaging evaluation of Lisfranc ligament injury in non-athletes without fracture-dislocation: A Case report.

KEYWORDS

Lisfranc, trauma

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ABSTRACT *The tarsometatarsal or Lisfranc joint complex provides stability to the midfoot and forefoot through osseous relationships between the distal tarsal bones and metatarsal bases and their connections which provides support for stabilizing ligamentous structures. Lisfranc joint injuries are relatively uncommon, and their imaging findings can be subtle.*

Imaging plays an important role in establishing the diagnosis & the management in injuries. This report documents a case of a young male who had ecchymosis over the plantar aspect of the left foot after a road traffic accident. The patient complained of pain on moving the 2nd phalynx. The patient was evaluated with a radiograph of the foot followed by MR imaging which confirmed the tear of the plantar Lisfranc ligament, without fracture or dislocation. The patient was managed conservatively in a non-weight-bearing cast for 4-6 weeks.

Introduction:

The term Lisfranc injury is used to describe a wide spectrum of injuries from a sprain to fracture dislocations through the tarsometatarsal joints. To lessen ambiguity, it has been suggested that the term "Lisfranc joint complex" should be used to refer to tarsometatarsal articulations and that the term "Lisfranc joint" should be used to describe the medial articulation between the first and second metatarsals with the medial and middle cuneiforms.¹

Injuries at the Lisfranc joint are relatively rare with a reported incidence of 1 per 55,000 yearly and make up about 0.2% of all fractures. These injuries can range from low-energy, simple ligamentous sprains associated with sports activities to high-energy motor vehicle accidents and industrial crushing injuries leading to complete disruption of normal anatomy through the tarsometatarsal (TMT), or Lisfranc joints.² Lisfranc ligament injuries commonly go undetected, and Lisfranc joint dislocations and sprains carry a high risk of chronic secondary disability.³

Shapiro et al noted a typical mechanism of injury in football players.² When the foot is plantar-flexed and the metatarsal-phalangeal joints maximally dorsi-flexed, a force directed down onto the heel by a falling player or a tackle from behind can lead to a hyperplantarflexion injury at the Lisfranc joint.

High-velocity Lisfranc injuries are commonly seen in high-speed motor vehicle accidents. The foot is usually on the brake pedal or the floor of the motor vehicle braced against the colliding impact.

Specific physical examination of the foot should evaluate the condition of soft tissues, presence of swelling, blisters, wounds, vascularity, and neurological status. There may be obvious deformity in severe injuries. Bruising over the plantar aspect of the midfoot, described as the plantar ecchymosis sign, is helpful in recognizing subtle Lisfranc injuries.⁴ Another sign that becomes apparent at a later stage, when the patient can bear weight on the feet, is a wider gap between the big and second toe in the injured foot

and has been described as the gap sign.⁵

Stable undisplaced Lisfranc injuries can be managed conservatively in a non-weight-bearing cast for 4-6 weeks. This is followed by weight-bearing in a shoe with molded insert supported underneath by a carbon insert or a steel shank. If the pain continues or if subsequent studies show signs of instability, operative intervention is considered.

Case Report:

A 32-year-old male patient presented to the emergency department with history of a road traffic accident. He had ecchymosis over the plantar aspect, near the 2nd metatarsal of the left foot. On examination, he had pain on moving the second phalynx. He was advised rest & started on analgesics. 2 weeks later, he presented to the Radio-diagnosis department with pain over the plantar aspect of the left foot.

Plain radiograph of the ankle was normal. MR imaging of the left foot was performed on a Philips Achieva 1.5T system.

Proton density, STIR, T1W & T2W sequences were performed in different acquisition planes. MR imaging revealed tear of the plantar Lisfranc ligament. Proton density images showed the ligament had a loss of its normal jet-black signal and demonstrated high signal with few intact fibers.



Figure 1: PD sagittal image showed tear involving plantar Lisfranc ligament (white arrow) with high signal. Note that the attachment site of the ligament is normal.

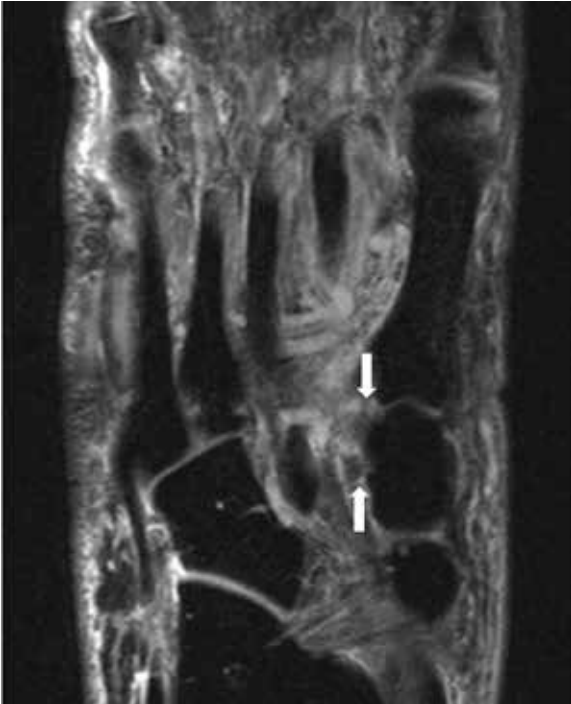


Figure 2: PD axial image showed tear involving plantar Lisfranc ligament (white arrow) with high signal. It has two bands, which are better appreciated on this image. Note that medial cuneiform is normal.

Since it was a stable undisplaced Lisfranc injury (Stage I), it was managed conservatively in a non-weight-bearing cast for 4-6 weeks following which the patient was given a shoe with a molded carbon-support insert when allowed weight bearing. The patient recovered well from the injury, 2 month after he was allowed weight bearing.

Discussion:

The incidence of Lisfranc ligament injury without fracture or dislocation is very low. The redundant Lisfranc joint complex is a complicated skeletal and capsuloligamentous structure that provides stability to the midfoot and forefoot. The tarsometatarsal joint is named after Jacques Lisfranc de Saint-Martin (1787–1847), a French army field surgeon who described a forefoot amputation through the first tarsometatarsal joint. However, Lisfranc did not describe the injury patterns or mechanisms of injury that oc-

cur at this articulation. Injuries to the Lisfranc joint complex are typically differentiated as high-impact or low-impact trauma. High-impact injuries usually occur due to greater energy forces such as those experienced during motor vehicle collisions, termed Lisfranc fracture-displacements. Low-impact injuries commonly occur during athletic activities and are termed Lisfranc injuries or midfoot sprains. The distinction between high- and low-impact injuries influences their clinical and radiologic presentations. An estimated 20% of all Lisfranc injuries are initially undiagnosed clinically, which could reflect their subtle initial presentation or the fact that they may occur with polytrauma thus may be overlooked while other critical injuries are being addressed. Moreover, low-velocity midfoot sprains can be difficult to detect radiographically. In one study³, nearly 25% of Lisfranc injuries were missed or appeared normal on initial radiographs because of subtle diastasis. A study of 15 patients², with subtle Lisfranc injuries reported normal-appearing findings on initial non-weight bearing radiographs in 50% of patients, with diastasis and loss of the normal longitudinal mid-foot arch identified later on weight-bearing radiographs. Even on weight-bearing radiographs, Lisfranc injuries may not be visible initially and may take up to 6 weeks to become apparent. When Lisfranc injuries are missed or undertreated, they can lead to significant mid-foot instability, planovalgus deformity, and osteoarthritis. Diagnostic difficulties and sequelae of the injury contribute to the high rate of litigation surrounding Lisfranc injuries. Therefore, an understanding of the anatomy, injury mechanisms, classification systems, and imaging features of Lisfranc injuries is necessary to facilitate early and accurate diagnosis and treatment.⁶

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