Lisfranc *fracture-dislocation*

Introduction

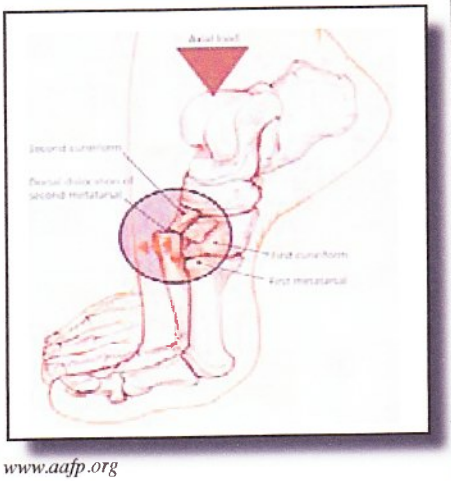
The Lisfranc fracture-dislocation is an injury of the midfoot and typically involves a fracture and dislocation of the first and second metatarsals and the cuneiform and an associated displacement of the lateral four metatarsal bones from the tarsal bones (the Lisfranc joint). This represents a disruption of the intermetatarsal ligament that stabilises the joint between the 1st and 2nd metatarsals (predictably named the Lisfranc ligament). (http://www.surgeons.org.uk/history-of-surgeons/jacques-lisfranc-de-st-martin.html)

> *"The Lisfranc joint actually refers to a number of joints."*

The Lisfranc joint actually refers to a number of joints which are formed by the junction of the metatarsals and the cuneiforms, and by the junction of the metatarsals and the cuboid bone. A Lisfranc injury indicates an injury to the normal alignment of the cuneiforms and the MT joints with the loss of their normal spatial relationships (The Centre for Orthopaedics & Sports Medicine).

Mechanisms of injury are varied, and include direct crush injury, or an indirect load onto a plantar flexed foot 3. Tarsometatarsal dislocation may also occur in the diabetic neuropathic joint (Charcot's). (http://radiopaedia.org/articles/lisfranc_injury). The mechanism of injury for most athletes is axial loading on a hyperplantarflexed midfoot. (http://emedicine.medscape.com/article/1236228-overview#a0112).

http://www.northcoastfootcareblog.com

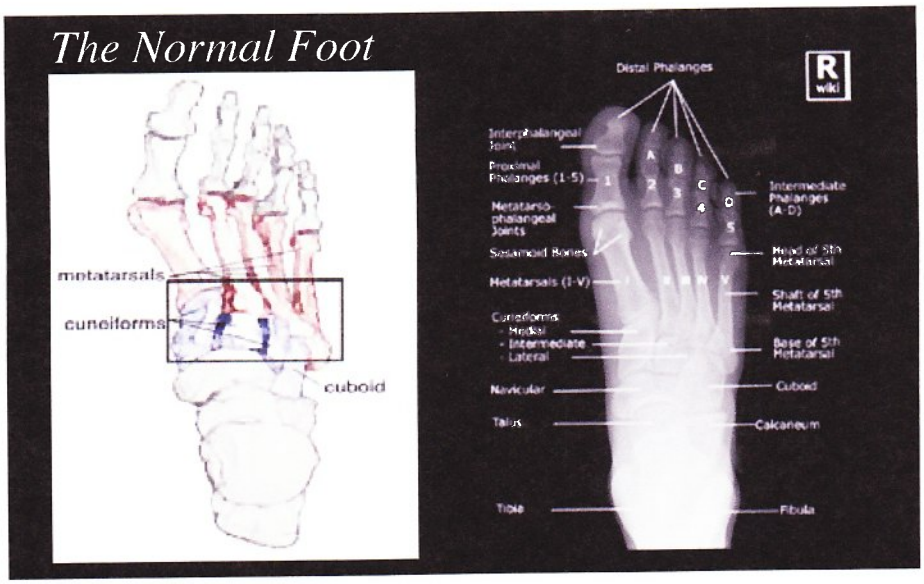


www.aafp.org

Historical Overview

Lisfranc is named after the 18th and 19th century surgeon and gynecologist, Jacques Lisfranc de St. Martin (Who Named It?' November 2011). He is arguably best known for his description of his self-titled injury, which involves a fracture within the forefoot (as outlined). This was first described by him during his time as a military surgeon in Napoleon's army around 1813 and occurred when riders fell from their horses with their feet caught in their stirrups. This twisting, high-impact injury can also be found with athletes partaking in contact sports such as rugby and American football and with gymnasts, ballet dancers and track and field athletes.

http://www.surgeons.org.uk/history-of-surgeons/jacques-lisfranc-de-st-martin.html.



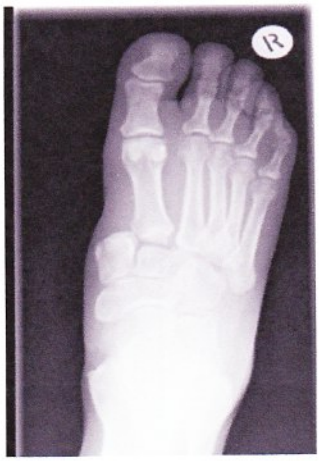
Classification of Lisfranc Injuries

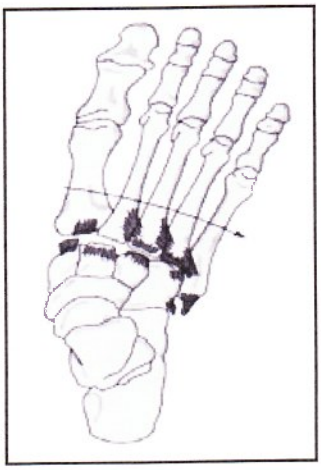
Homo-lateral: Involving displacement (in the same direction) of all five metatarsals.

Isolated: One or two MT are displaced from the others.

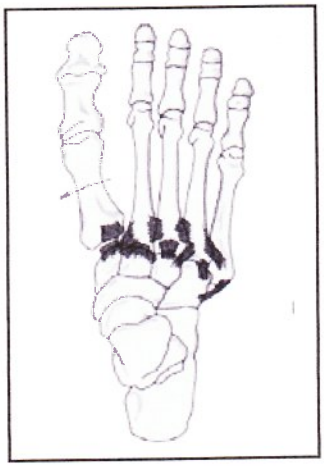
Divergent: MT are displaced in sagittal and coronal planes – these fractures can extend to intercunieform and the navicular (Wheeless' Textbook of Orthopaedics). They are considered to be partial or complete fracture-dislocations. There are three types, see illustration on next page.

Homo-Lateral





Isolated



Associated Injuries & Complications

- *Longitudinal Stress fractures.*
- *Fracture of the second M.T.*
- *Cuboid fracture -results from a compression of cuboid between the calcaneous and the 4th and 5th M.T.*
- *Navicular compression fracture.*
- *Rupture of the posterior tibial tendon.*
- *Compartment Syndrome (CS) – CS can occur in the foot as in other parts of the body. CS in the foot are associated with CS of the 'deep posterior compartment which contains Tibialis posterior, Flexor Digitorum Longus (FDL) and Flexor Hallucis Longus (FHL), (structures involved in the plantar flexion of the foot and toes and the inversion of the foot).*
- *2 major arteries, Peroneal artery and Posterior Tibial arteries are present in this compartment.*

Wheeless Textbook of Orthopaedics.

Divergent

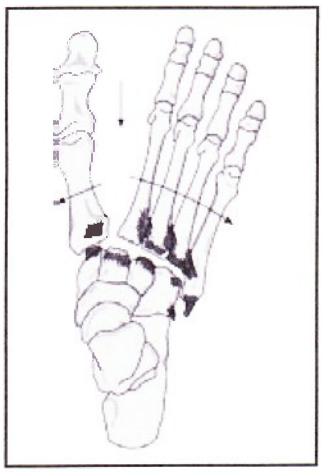


Figure A,B,C illustrate the classification of Lisfranc injuries. It is described by the author using various 'divergent' types.

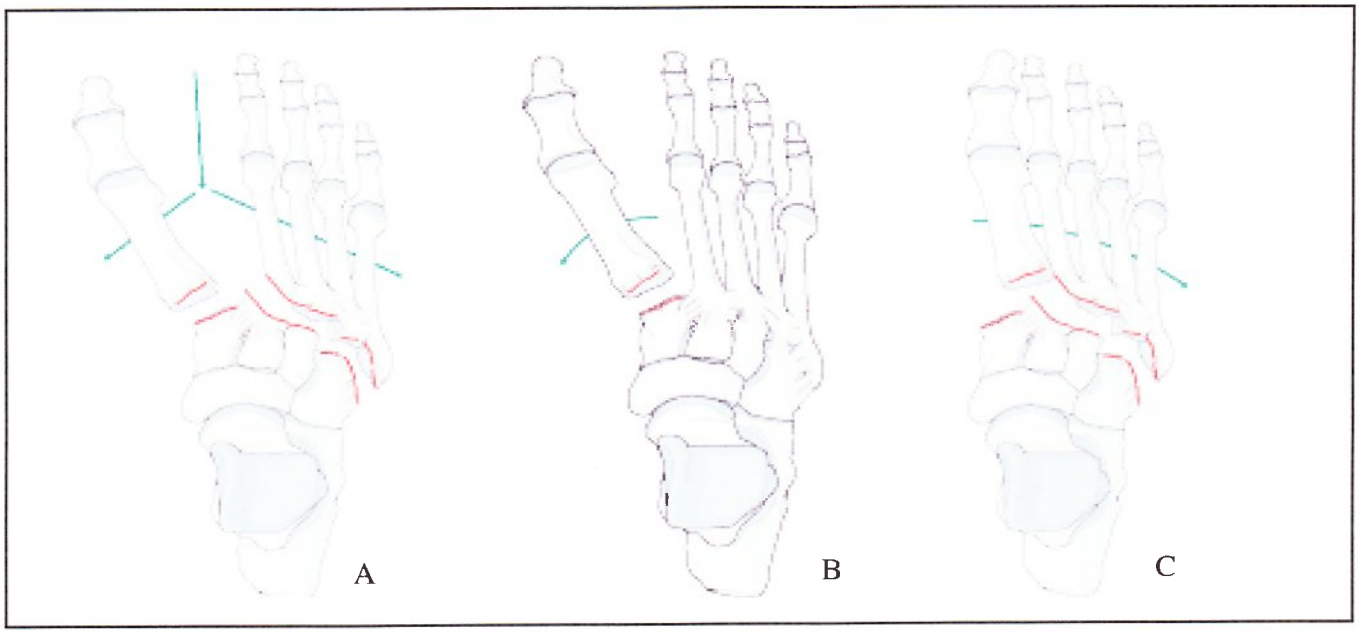
Figure (a) Divergent (complete);

(b) Medial divergent (incomplete)

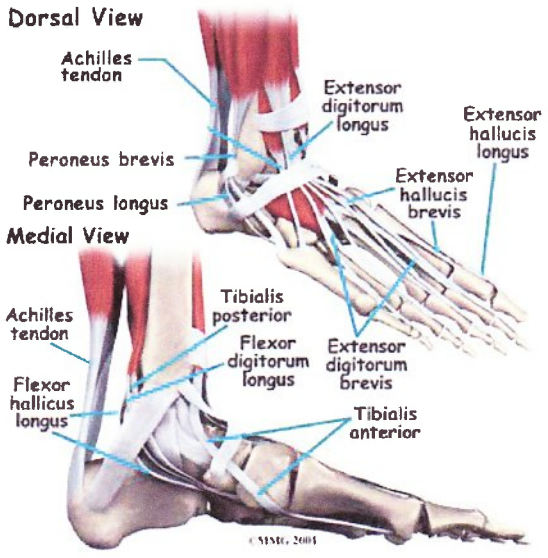
(c) Complete lateral divergent.

http://www2.aofoundation.org/wps/portal/!ut/p/c0/04_SB-8K8xLLM9MSSzPy8xBz9CP0os3hng7BARydDRwN39yB-TAyMvLwOLUA93I4MQE

Classification of Divergent fractures

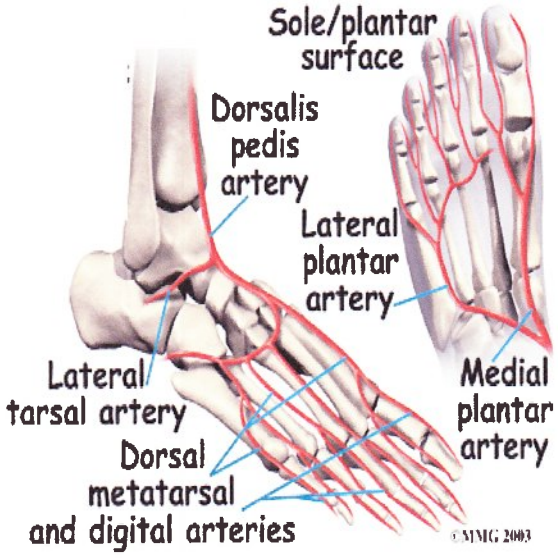


Tendons of the Foot



http://tendonitisfoot.org

Arteries of the Foot



http://citysquarephysiotherapy.patientsites.com/Injuries-Conditions/Ankle/Ankle-Anatomy/a~47/article.html

Symptoms

The top of the foot may be swollen and painful. If injury is severe the patient may not be able to put any weight on the foot. Lisfranc injuries are often mistaken for sprains and are difficult to see on x-ray. As such, a CT or MRI would be necessary to confirm the diagnosis (American Academy of Orthopaedic surgeons AAOS).

Undiagnosed Lisfranc injuries can have serious complications such as joint degeneration and compartment syndrome (ibid).
Image Source Page: http://www.podiatrytoday.com/article/1040

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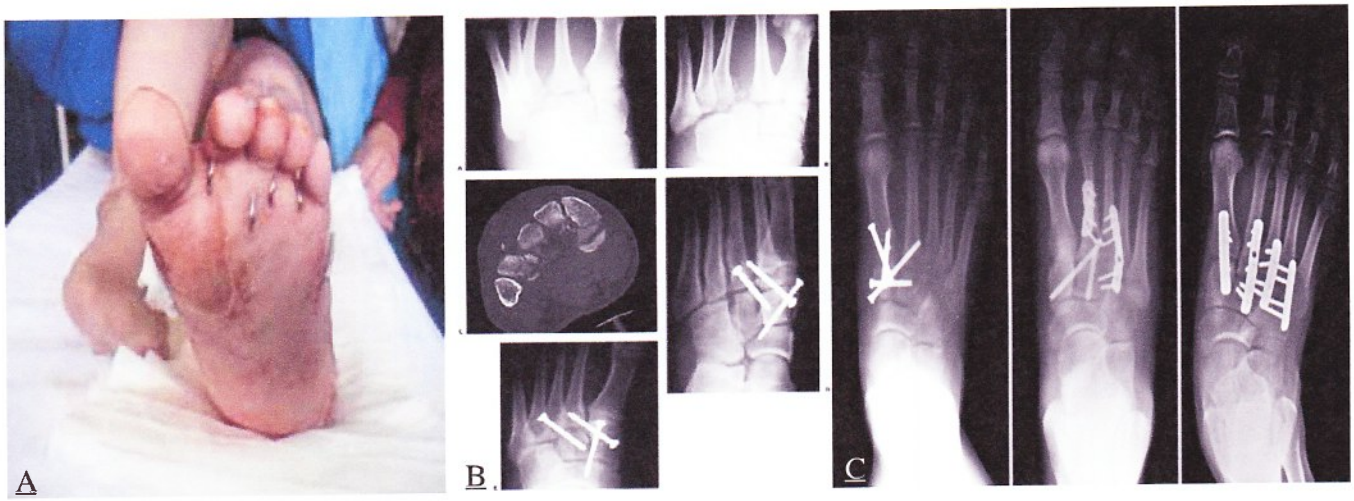
"Lisfranc injuries are often mistaken for sprains and are difficult to see on x-ray."

Treatment

Treatment depends on the severity of the injury. Minimally displaced fractures are likely to be treated in a backslab in the first week or two, this allows for any increase in swelling (swelling of the extremities are common due their bony makeup). Thereafter the patient is treated in a NWB cast for approximately 6 weeks. Fractures that are significantly displaced, arguably 2mm inter-metatarsal separation, would require internal fixation with pins or screws.



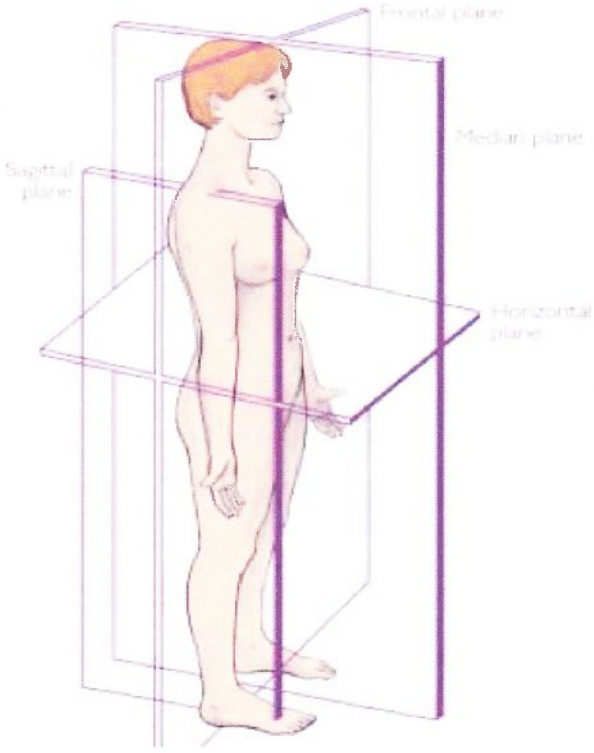
References:
(a)http://1.bp.blogspot.com/_FHFQmaeetgs/Sw1BPlozX5I/AAAAAAAAAHs/SJOQUmSFnig/s1600/PICT2868.JPG
(b) www.msdlatinamerica.com/ebooks/RockwoodGreensFracturesinAdults/sid1498494.html
(c) http://orthoinfo.aaos.org/topic.cfm?topic=A00162

Prognosis

- Susceptibility to late mid foot collapse
- Metatarsalgia
- Post traumatic arthritis and planovalgus* deformity are common and may occur in up to 50% of patients (Wheeless Textbook of Orthopaedics).

Casting/Splinting

Treatment options include operative or non-operative treatment. If the dislocation is less than 2 mm, the fracture may be conservatively managed with a well moulded cast for 6 weeks. After approximately 4-6 weeks the patient is usually placed in a Camboot with a moulded arch support, as they progressively begin to weight bear. The majority of Lisfranc injuries however tend to be displaced and unstable therefore require surgery followed by a period in a full cast. Immediately post-operatively the patient would be placed in a below knee, back slab until swelling subsides, usually 1-2 weeks. At this time the splint can be changed to a non weight bearing circumferential, below knee cast. Some physicians believe immobilization in a cast should be 3 months however this period has been disputed by others in the field (ibid). Again, following a period in a circumferential cast, the patient may be fitted in a Camboot with a moulded arch support to minimize the likelihood of mid foot collapse and planovalgus*.



http://medical-dictionary.thefreedictionary.com/sagittal+plane

About the author;
Ms. Marcela Posteraro is an Orthopaedic Technologist at Western Hospital Melbourne Victoria. Marcela has worked at Western hospital since 2009. Her role requires her to work across three campuses, servicing all wards and departments. The role requires skills in all facets of cast and splint application utilizing materials such as POP, fibreglass, polyester, thermoplastics, off the shelf and custom made bracing.

Glossary

Planovalgus: A condition in which the longitudinal arch of the foot is flattened and turned outward. http://medical-dictionary.thefreedictionary.com/planovalgus.

Sagittal Plane: the anteroposterior (longitudinal) plane, or the section parallel to the median plane of the body.

Coronal: A vertical plane at right angles to a sagittal plane, dividing the body into anterior and posterior portions. Also called frontal plane.

Divergent: Tending to be different and to move apart in different directions.

Neuropathy: Neuropathy is a collection of disorders that occurs when nerves of the peripheral nervous system (the part of the nervous system outside of the brain and spinal cord) are damaged. The condition is generally referred to as peripheral neuropathy, and it is most commonly due to damage to nerve axons. Neuropathy usually causes pain and numbness in the hands and feet. It can result from traumatic injuries, infections, metabolic disorders, and exposure to toxins. One of the most common causes of neuropathy is diabetes. Neuropathy can affect nerves that control muscle movement (motor nerves) and those that detect sensations such as coldness or pain (sensory nerves). In some cases - autonomic neuropathy - it can affect internal organs, such as the heart, blood vessels, bladder, or intestines. http://www.medicalnewstoday.com/articles/147963.php