

LISFRANC FRACTURE-DISLOCATION: A CASE REPORT.

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ABSTRACT

The tarsometatarsal joint is an anatomic area where a wide spectrum of injuries can occur. Regarding the damage mechanism, indirect injuries are more frequent and usually occur during bending or twisting movements applied to the midfoot. This mechanism is very common in sports but also possible in household accidents and falls. Patients can present with pain localized in the midfoot which can include swelling and functional disability to bear weight after trauma. Due to the diversity of injuries, there is no single evidence-based policy for treating all Lisfranc injuries in a similar manner. The goal of initial presentation of these injuries is directed towards improving the overall alignment of the foot. The diagnosis can be made by evaluating anteroposterior, lateral and 30° oblique X-rays of the foot bearing weight because in some cases the instability will only be evident after load is placed on the feet; minor displacement and smaller fractures may only be detected with CT or MRI. The diagnosis can be difficult and it is missed in up to one third of cases. It is important to recognize these injuries early and start treatment promptly because delayed treatment can lead to chronic pain, functional disability and, in some cases, to medical liability. This case illustrates a traumatic Lisfranc injury misdiagnosed at initial evaluation, which led to chronic pain and permanent functional disability. The aim of this paper is to raise awareness of this rare injury for orthopedic surgeons to avoid cases of malpractice claims and medical liability.

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1. Introduction

Injuries involving the TMT (tarsometatarsal) joint are infrequent, occurring at a rate of 1 per 55,000 to 60,000 annually [1]. The Lisfranc joint is an anatomic area where a broad spectrum of injuries from subtle distensions to open fracture dislocations can occur. Injuries to the Lisfranc joint occur most often during the third decade of life and men are 2 to 4 times more likely to suffer from these injuries than women [2]. Concerning the damage mechanism, indirect injuries are more common and occur during bending or twisting movements applied to the midfoot; instead injuries caused by direct force are often induced by a heavy object falling on top of the foot or by crushing injuries, such as in motor vehicle accidents [2]. The diagnosis, usually made by clinical and radiological evaluation, can be difficult and it is missed in up to one third of cases [1]. Operative treatment, including anatomic reduction and fixation, is required in almost all cases to achieve the best satisfactory result¹. Conservative treatment, which includes midfoot stabilization and movement restriction, is usually reserved for non-displaced injuries [3].

If untreated or inadequately treated, Lisfranc injury can lead to chronic pain, arthritis, malformation and instability of the joint. The authors report a case of a traumatic Lisfranc injury, which led to permanent outcomes such as arthritis, chronic pain and functional disability of a 60-year old woman.

2. Case presentation

A 60-year old female patient presented to the emergency department (ED) with a complaint of pain in her right foot; she reported accidentally falling during a walk due to the presence of irregularities in the road surface. Initial clinical examination of the right foot revealed tenderness and swelling on palpation though the skin was intact. A non-weight bearing radiograph of the right foot showed no pathological findings; subsequently a CT-scan was performed that showed a non-dislocated fracture collocated at the base of the IV metatarsal bone associated with another fracture involving the III cuneiform bone.

The right leg was put in a short leg-walking cast for 17 days with the prescription to keep the leg elevated. She was advised to come back the following week in order to perform a clinical and radiological re-evaluation. During the following months, she was submitted to several sessions of fysiokinesitherapy and tecartherapy due to the presence of chronic pain, functional disability and a persistent linfoedema involving the right foot and ankle. A reassessment of the radiological images, performed 7 months after the accident (Figures 1 and 2), allowed to diagnose a Lisfranc fracture-dislocation in the right midfoot in association with a reduction of the calcic tone on the same foot. The clinical examination performed some months after revealed pain and tenderness of the right midfoot with edema of the right ankle. The patient was advised to perform some electrotherapy sessions. Written informed consent obtained from the patient. Data publishing according to the journal is under permission of the Italian Data Protection Authority (Guidelines for Judicial data information, Italian G.U. n.2 4/01/2011, linked with article). The privacy of the patient is safeguarded.



Figure 1. Radiographic aspect of the fracture seven months after trauma with the patient placed in orthostasis.



Figure 2. Radiographic aspect of the fracture seven months after trauma, 30° oblique X-Rays.

3. Discussion

Named after Jaques Lisfranc, an eighteenth century surgeon in Napoleon's army who performed the first foot amputation at the tarsometatarsal (TMT) joint, the Lisfranc joint is an anatomic area where a broad spectrum of injuries from subtle distensions to open fracture dislocations occur [2]. In the normal Lisfranc joint complex, the first 3 metatarsal bases articulate with their respective cuneiforms, and the lateral 2 metatarsals articulate with the cuboid. It can be divided into 3 parts named "columns". The medial column is formed by the first cuneiform and the first metatarsal, the median column by the second and third cuneiform and the second and third metatarsals and the lateral column is formed by the cuboid and fourth and fifth metatarsals. The second metatarsal is known as the "keystone" of the Lisfranc joint. It is recessed between the medial and lateral cuneiform bones and attached to the medial cuneiform by the oblique Lisfranc ligament. This solitary ligament is 1 cm long and 0.5 cm thick and connects the first ray to the middle and lateral columns of the foot; injury to this small ligament can result in instability [2]. The incidence of Lisfranc injuries is estimated to be 1/55000 per year and they are believed to account for 0.2% of all fractures. They are often misdiagnosed and mismanaged as it has been evaluated that approximately 20 to 24% of these fractures are missed at initial evaluation [2]. Injuries of the joint can range from complete tarsometatarsal displacement with associated fractures and ligamentous tears to partial sprains with no displacement. Lisfranc injuries can arise from a variety of situations and mechanisms, with both direct and indirect injuries possible. Direct injuries are due to a force applied to the dorsum of the foot; motor vehicle accidents, crushing injuries and falls from high being prominent mechanisms. Often, there are associated soft tissue injuries, vascular compromise and other fractures, however, about one-third of Lisfranc injuries are caused by indirect trauma, which are more commonly missed, such as in the present case. The main mechanism of indirect injury is axial force through the foot or twisting on a plantar flexed foot. Forced external rotation of the foot is another documented mechanism. These mechanisms are all very common in sports (eg. football and equestrian activities), but also possible in household accidents and falls [4]. It is important to recognize these injuries early and start treatment promptly because failure to recognize and treat them will lead to midfoot arthritis, chronic pain, and functional instability. Even when recognized and treated promptly, there is still a high risk for chronic disability and complications, for instance, osteoporosis may occur because of long-term antalgic gait without weight-bearing. Patients can present with pain localized in the midfoot, swelling and functional disability to bear weight after the trauma. The foot may appear deformed and plantar ecchymosis can be detected. The most accepted classification of Lisfranc dislocation-fracture is that of Hardcastle et al, which was modified from Quenu and Kuss, which divides Lisfranc injuries into types A, B and C. Type A, also known as total incongruity, is characterized by complete derangement of the Lisfranc joint in one plane. This may result in lateral or dorsoplantar displacement. Type B1 consists of medial displacement of the first tarsometatarsal joint, and Type B2 consists of lateral displacement of all, or a combination of, the remaining joints. Type C is a divergent displacement involving some or all of the tarsometatarsal joints [5]. The diagnosis can be made by evaluating anteroposterior, lateral and 30° oblique X-rays of the foot bearing weight because in some cases the instability will only be evident after load is placed on the feet [6].

The most common radiographic finding is diastasis of the base of the first and second metatarsals; however, any fracture of the base of the first three metatarsals is cause for suspicion of a Lisfranc joint injury. Any displacement of more than 2 mm between the base of the first and second metatarsals merits further evaluation for a Lisfranc injury and a comparison view with the uninjured foot. Also, on radiographs, the medial cortex of the second metatarsal should line up perfectly with the medial border of the second cuneiform. Other clues on radiographs may include the “fleck” sign, a bony fragment seen in the space between the first and second metatarsal bases, which represents an avulsion of the second metatarsal base at the attachment of Lisfranc’s ligament [7]. Minor displacement and smaller fractures may only be detected with CT or MRI. CT has several advantages over radiography, including rapid imaging without special positioning of the patient, ability to demonstrate subtle fractures and increased accuracy of diagnosis. CT is more powerful and sensitive compared to radiography, which has been found to have a sensitivity of only 25-33% for midfoot fractures [7]. Although it is well-documented that a precise anatomic reduction is important for optimum results, the goal of initial presentation of these injuries is directed towards improving the overall alignment of the foot. This avoids prolonged pressure to the skin and the associated soft tissues and will help to correct the distortion of the blood vessels, which ultimately leads to an overall improvement in the circulation of the extremity [8]. Due to the diversity of injuries, there is no single evidence-based policy for treating all Lisfranc injuries in a similar manner. Nowadays, there is strong consensus that in dislocated injuries it is crucial to achieve exact anatomic reduction and stable internal fixation, which is best obtained with open reduction and screw fixation (ORIF). The treatment of non-dislocated injuries, in turn, is controversial. Some stable injuries might need activity modification only, but surgery is often recommended for even minimally displaced injuries. There is general agreement that poor functional results are commonly correlated with a delay in diagnosis or with an inadequate treatment of unstable or dislocated injuries [2] and, in some cases, it can lead to medical liability [9 -11]. In general, it can be affirmed that Orthopedics and Traumatology, together with General Surgery and Gynecology, are some of the medical specializations most involved in malpractice claims in Italy. Frequent causes of claims against orthopedic surgeons are ascribed to surgical errors, improper treatment, misdiagnoses, as in the presented case report, and communication errors; the latter frequently involving failure to obtain an adequate informed consent from patients. In economic terms, as published before by Tarantino et al., it has been estimated that a total of €12,361,755 was paid in compensation in cases involving orthopedics’ judgements in Rome between 2004 and 2010, with an average of €71,594 per case [12]. From the analysis of these data, it appears clear that it is of crucial importance to investigate and further understand medical errors in order to improve clinical care and to avoid cases of malpractice claims.

4. Conclusions

Injuries to the Lisfranc joint complex are difficult to appreciate both clinically and radiographically. The physician should suspect it in every

patient presenting with swelling of the foot and an inability to bear weight. In order to avoid permanent functional disability and anatomic deformity, it is of utmost importance to achieve an early diagnosis and to perform appropriate treatment, usually based on surgical intervention.

Poor functional results are commonly correlated with a delay in diagnosis or with an inadequate treatment and, in some cases, it can lead to medical liability.

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