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Case Report

A Patient with Tarsometatarsal Luxation - A Case Report

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Abstract

Background: Injuries to the TMT or Lisfranc joint complex are very rare but can occur in widely varying patterns and degrees of severity. They may be widely displaced derangements of the foot or may be among the subtlest and most easily overlooked of foot injuries. Treatment of these injuries has evolved significantly in recent years, with the importance of anatomic reduction and fixation. Improvement in diagnostic evaluation, especially computed tomography (CT) and magnetic resonance imaging (MRI) scans, has contributed to an increased appreciation for the frequency with which injuries to this joint complex occur.

Case Description: The 25 year old male patient was administered in out hospital after falling in the yard on the stairs. The mechanism of injury was indirect force of the foot from body weight to the posterior heel causing plantar hyper flexion of the forefoot. During the physical examination we noticed pathologic deformity of the right foot, swelling on the dorsal side, pain on palpation and lack of mobility. The patient underwent diagnostic radiologic imaging including X-ray and MSCT with post processing which included 3D reconstruction and a volume rendering technique, where Lisfranc joint complex injury was shown. Emergency operation was performed - open reduction and internal fixation. After a 6 month follow-up we noticed accomplishment of total rehabilitation and a complete functional recovery.

Conclusion: Misdiagnosis of Lisfranc injuries may lead to poor functional outcome with chronic pain. In most of the cases, advanced imaging is required in order to rule out this kind of injuries.

Keywords: *Tarsometatarsal Injury; Foot Luxation; Lisfranc; 3D Reconstruction*

Introduction

Injuries to the TMT or Lisfranc joint complex are very rare but can occur in widely varying patterns and degrees of severity. They may be widely displaced derangements of the foot or may be among the subtlest and most easily overlooked of foot injuries. Yet the critical role that stability of this complex plays in the biomechanics of the foot may cause even innocuous injuries to lead to long term disability if not properly treated. Treatment of these injuries has evolved significantly in recent years, with new emphasis on the importance of anatomic reduction and fixation. As late as the early 1980s, Lisfranc injuries were believed to be fairly rare. Prior reports have stated the incidence as 1 in 55,000 persons per year, or about 0.2% of all fractures [1,2]. It has been reported an under diagnosis rate of up to 20%, especially in

cases of multiply injured patients. Improvement in diagnostic evaluation, especially computed tomography (CT) and magnetic resonance imaging (MRI) scans, has contributed to an increased appreciation for the frequency with which injuries to this joint complex occur [2-7]. As with most traumatic injuries, the prevalence in males is two to four times higher than in females, mostly in young adults [1].

Case Report

The 25 year old male patient was administered in out hospital after falling in the yard on the stairs. He indicated the pain in his right foot. The mechanism of injury was indirect force (longitudinal loading) of the foot from body weight to the posterior heel causing plantar hyper flexion of the forefoot, as described in the previous articles [1,4,5,7-11].

During the physical examination we noticed pathologic deformity of the right foot, swelling on the dorsal side, pain on palpation and lack of mobility. The patient underwent diagnostic radiologic imaging including X-ray (Figure 1) and MSCT with post processing which included 3D reconstruction and a volume rendering technique (Figure 2 and 3). The foot X-ray in non weight bearing position showed Lisfranc joint complex injury which consisted of the medial luxation of MT II. and lateral *en block* luxation of MT III.-V (Figure 1). There was also a suspicion of an intraarticular cuboid fracture which was later excluded on the MSCT. MSCT revealed a subluxation of I. MT in comparative evaluation to the other foot and verified a bizarre bone position of the MT II. in the transversal plane in a relation to the cuneiform bones which was more plantar opposing to the MT III.-V. complex luxated more dorsally (Figure 4 and 5).

Figure 1: *Non weight bearing position, midfoot luxation, MT II., III., IV. and V. bone, Lisfranc joint complex injury.*

Figure 2: *MSCT with postprocessing (3D reconstruction, volume rendering technique); "en block" lateral luxation of MT II.-V. bones; bizzare bone positioning in the transversal plane: MT II. subluxated more plantar, MT III.-V. luxated more dorsal in relation to cuneiforme bones.*

Figure 3: *Comparative evaluation to the other foot: suspicion of a small, triangle shaped, "stable" fragment near the MT II noted on the 3D reconstruction is not confirmed as a fracture avulsion with the VR technique.*

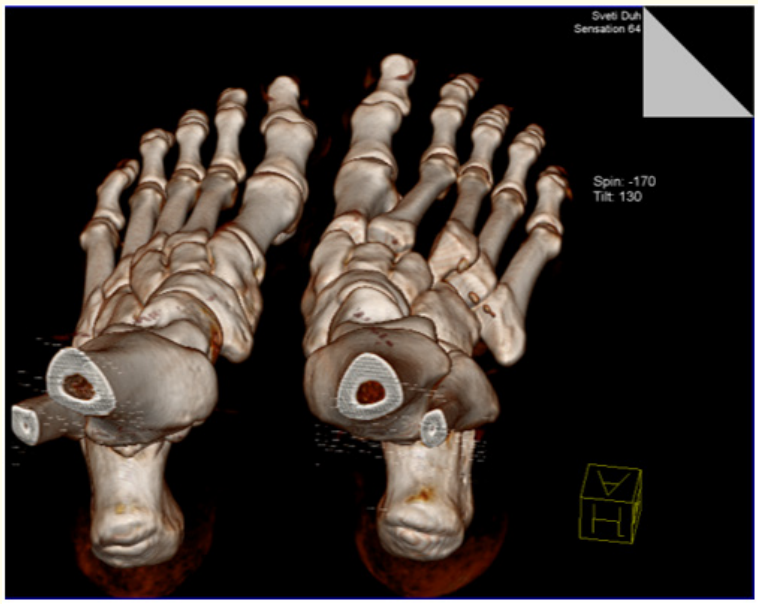

Figure 4: *Lisfranc joint complex instability.*
Osteochondral lesion (IV degree) in the zone of the cuneiform medial fracture. Degenerative process and tendinopathy with an exostosis like deformation of the lateral basal part of MT III on the plantar side as resulting from possible earlier static reasons. Dominant dorsal soft tissue oedema.

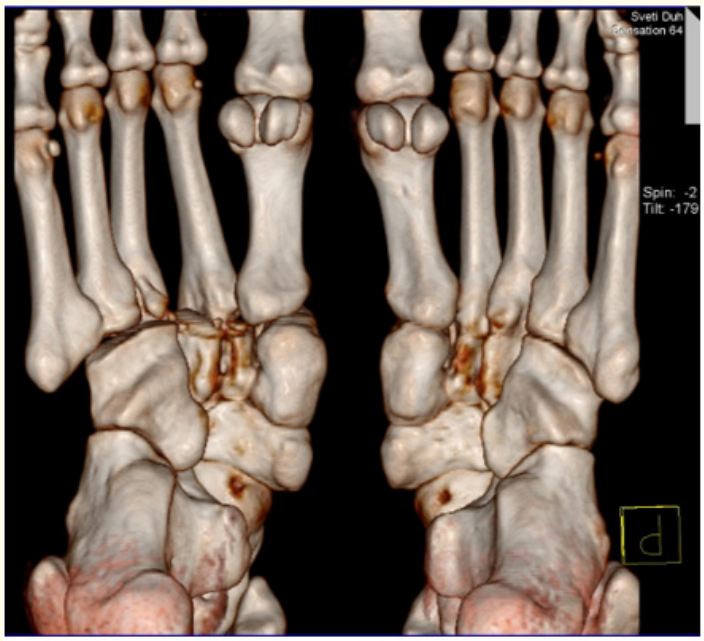

Figure 5: *Lisfranc joint complex instability; 3D MSCT reconstruction; posterior view.*

There was clearly a problem of Lisfranc complex instability so the patient underwent an emergency operation. The operation was performed in regional anaesthesia with a patient positioned on his back. Three separate incisions on the dorsal side of the foot were made to access the MT I., II. and III. and ORIF was performed. The MT I. was internally fixated with 2 K-wires which were positioned in the medial cuneiform bone, MT II. with 1 K-wire positioned in the intermedial cuneiform bone and the MT III.-V. complex with another K-wire positioned in the lateral cuneiform bone. Finally, two transfixational malleolar screws were used for additional stabilization of repositioned bones, one of which was positioned throughout the bases of MT I., II. and III., and the other throughout the heads of MT I and II (Figure 6 and 7). After the operation the cast for protective immobilization was used primary to reduce swelling and was removed on the 7th postoperative day. The whole postoperative period went without complications and the wound healed per primam. After the removal of the cast, physical therapy started on ward which was continued after the demission from the hospital which occurred on the 10th postoperative day.

After a 6 month follow-up we noticed accomplishment of total rehabilitation and a complete functional recovery.

Figure 6: *Postoperative X-ray image, AP view.*
MT I. - reposition (repositio cruenta); retention with 2 K-wires in medial cuneiforme bone; MT II. - reposition; retention with K-wire in intermedial cuneiforme bone; MT III. - "en block" reposition with MT IV. and V.; retention with K-wire in lateral cuneiforme bone; transfixational malleolar screws throughout the bases of MT I., II. and III. and heads of MT I. and II.

Figure 7: *Postoperative X-ray image, side view.*

Discussion

In most of the cases, because of the complexity of Lisftanc's joint, the mechanism of injuries may be very difficult to identify. Grossly, they can be divided into direct and indirect force injuries. Direct injuries are those resulting from crushing force acting on the foot (motor vehicle accidents, crush, sports injuries, falls from ground level) and may produce dorsal or plantar dislocations depending on the point of impact. Indirect injuries are more common and they are often result from a longitudinal force acting upon a foot, usually combined with rotation, forcing the foot into plantar hyperflexion [1,8-11]. The result is rupture of the dorsal ligamentous structures first and twisting forces cause abduction of the forefoot, creating fractures of the second metatarsal base and often crush fractures of the cuboid. Indirect forces commonly produce displacement pattern injuries. Indirect injuries are most common and they are those resulting from a longitudinal loading of the foot either from body weight or from the external force to the posterior heel leading to plantar hyperflexion of the forefoot [1,2,5,8-10,12].

Diagnosis of Lisfranc injury starts with history and clinical examination and extends to radiographic findings. The most common findings during the clinical examination are soft tissue oedema, inability to bear weight due to extreme pain and deformity. Increased pain with passive abduction and pronation of the forefoot is highly suspicious for Lisfranc injury [4,5]. Routine X-ray of the foot with the comparison with the other foot should be done (with weight bearing if possible) but sometimes is insufficient to clearly show Lisfranc injury. If there is enough clinical suspicion and if the X-ray findings show neither fracture nor dislocation, advanced radiograph imaging is required including MSCT scan and/or MRI. MSCT is superior to MRI for detection of TMT injury. MRI or ultrasound could be method of choice to additionally clear and evaluate ligament and other soft tissue injuries [2-4,6,7,13].

Early studies have shown that primary arthrodesis of the medial 3 rays has performed equally well or better than open reduction with internal fixation (ORIF) for the displaced primarily ligamentous and severe injuries [4-7,12].

Conclusion

Misdiagnosis of Lisfranc injuries may lead to poor functional outcome with chronic pain. Early diagnosis and proper management can prevent this outcome. In most of the cases, advanced imaging is required in order to rule out this kind of injuries (CT scan, MRI). If not treated properly or misdiagnosed, TMT injuries can lead to irreversible loss of function and the patient could suffer from chronic pain and long term disability. Numerous complications can occur such as Charcot foot, chronic pain, osteoarthritis and chronic instability. Anatomic reduction of joint surfaces and restoration of column length and ligament integrity are important factors in order to achieve the best functional outcome following severe fracture dislocations. After stable fixation, prolonged immobilization in a cast and further protection in an orthosis is necessary. Despite appropriate treatment, there is potential for poor outcome following these injuries.

Declaration of Conflicting Interests

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