

Immediate Percutaneous Pinning as a Salvage Technique in Severe Open Lisfranc Dislocation for an Athlete: A Case Report

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Abstract

Case Report

Introduction: Open Lisfranc dislocation is a rare but severe midfoot injury characterized by disruption of the tarsometatarsal joint complex associated with significant soft tissue damage. Frequently overlooked during the initial assessment, it represents a major therapeutic challenge because of the high risk of instability, soft tissue complications, and infection. **Case Presentation:** We report on the case of a 23-year-old athletic patient who sustained a high-energy trauma following a fall from a significant height with direct impact to the midfoot. The patient presented severe pain and immediate functional impairment. Clinical examination revealed a 5-cm dorsal open wound associated with an obvious midfoot deformity and bone exposure, without neurovascular compromise. Radiographic assessment confirmed a complex open Lisfranc dislocation. **Management and Outcome:** Emergency surgical management was undertaken, including copious irrigation, antibiotic therapy, meticulous debridement, and anatomical reduction followed by percutaneous fixation using Kirschner wires. Postoperatively, the patient was immobilized in a cast with strict non-weight-bearing protocol. Follow-up demonstrated maintenance of satisfactory alignment with progressive functional recovery, without evidence of infection or major complications. **Conclusion:** Immediate percutaneous pinning represents a valuable salvage option in severe open Lisfranc injuries, providing rapid stabilization while minimizing additional surgical trauma to the soft tissues. In athletic patients, this minimally invasive approach may promote earlier functional recovery and improve the likelihood of returning to sports activities.

Keywords: Dislocation, Fracture, Lisfranc, Columbo-Spatular, Pinning, Athlete.

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INTRODUCTION

Lisfranc injuries, corresponding to tarsometatarsal fracture-dislocations, are defined as displacement of the metatarsals relative to the tarsus, sometimes associated with fractures involving the tarsometatarsal complex. The Lisfranc joint complex, first described by Jacques Lisfranc de Saint-Martin, plays a crucial role in maintaining midfoot stability through a complex osteoligamentous architecture connecting the midfoot to the forefoot [1].

These injuries are relatively uncommon but potentially severe, as they may result in significant morbidity and major functional impairment when inadequately managed. Their incidence is estimated at approximately 1 case per 55,000 persons annually. However, the rate of missed diagnosis remains high,

reaching up to 20–25%, particularly in purely ligamentous injuries or in polytrauma settings. Advances in imaging modalities, especially computed tomography (CT) and magnetic resonance imaging (MRI), have significantly improved diagnostic accuracy.

The management of Lisfranc injuries has evolved considerably over time, shifting from conservative treatment toward predominantly surgical management. Nevertheless, the optimal therapeutic strategy remains controversial, particularly in complex open injuries where soft tissue management represents a major challenge [2].

We report the case of an athlete presenting with a severe open Lisfranc dislocation secondary to a sports-related trauma, treated with surgical debridement followed by immediate percutaneous pinning. This case

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highlights the value of rapid and minimally invasive stabilization in the setting of severe soft tissue injury.

CASE PRESENTATION

This was a 23-year-old athletic male patient with no significant past medical history who sustained a high-energy sports-related trauma involving a direct impact to the right foot, resulting in immediate severe midfoot pain associated with complete functional impairment.

On admission, clinical examination revealed an obvious deformity of the midfoot with marked swelling and severe tenderness over the tarsometatarsal complex. An open wound was noted on the medial aspect of the right foot, measuring approximately 5 cm in length, with bone exposure, reflecting the severity of the soft tissue injury (Figure 1,2). Distal neurovascular examination showed no deficits, with palpable dorsalis pedis and posterior tibial pulses and preserved sensory function.

Standard radiographic assessment, including anteroposterior, lateral, and oblique views of the foot, demonstrated major disruption of the tarsometatarsal alignment with diastasis between the first and second rays, highly suggestive of a Lisfranc injury (Figure 3).

Computed tomography (CT) confirmed dislocation of the tarsometatarsal complex associated with fracture lesions, allowing accurate evaluation of the articular involvement and improved preoperative planning (Figure 4).

Given the open nature of the injury and the severe soft tissue damage, emergency surgical management was indicated. Following meticulous surgical debridement and copious irrigation, reduction of the dislocation was achieved, followed by immediate percutaneous Kirschner wire fixation of the tarsometatarsal joints under fluoroscopic guidance (Figure 5), providing stable fixation while minimizing additional soft tissue insult.

The postoperative course was uneventful, with no infectious or vascular complications. Satisfactory wound closure and soft tissue healing were achieved (Figure 6).

Clinical follow-up demonstrated progressive pain relief and gradual functional improvement. At the 12-month follow-up, after hardware removal, the patient had achieved satisfactory functional recovery with progressive return to sporting activities and no evidence of residual foot malalignment (Figure 7,8)



**Figure 1: Initial clinical presentation showing a medial open wound of the right foot with bone exposure (lateral view).
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**Figure 2: Initial clinical presentation showing a medial open wound of the right foot with bone exposure (frontal view).
Mohammed VI University Hospital of Oujda, Department of Trauma Surgery B.**

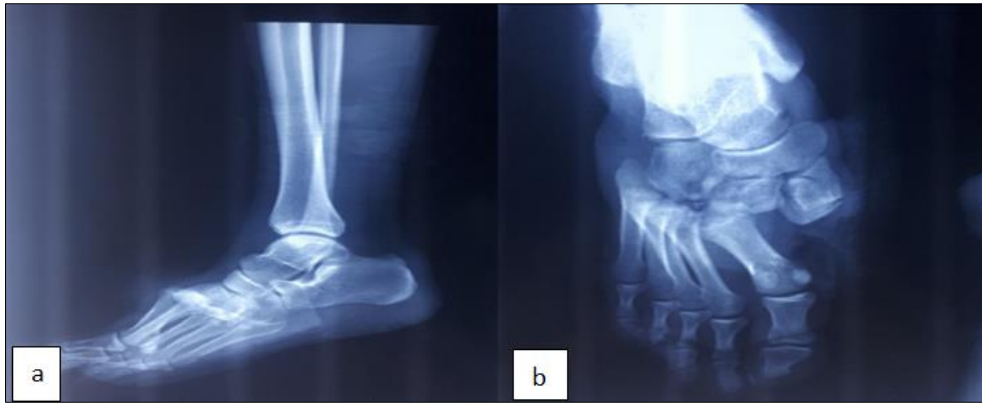


Figure 1: Preoperative anteroposterior and lateral radiographs demonstrating disruption of the tarsometatarsal alignment. Mohammed VI University Hospital of Oujda, Department of Trauma Surgery B.

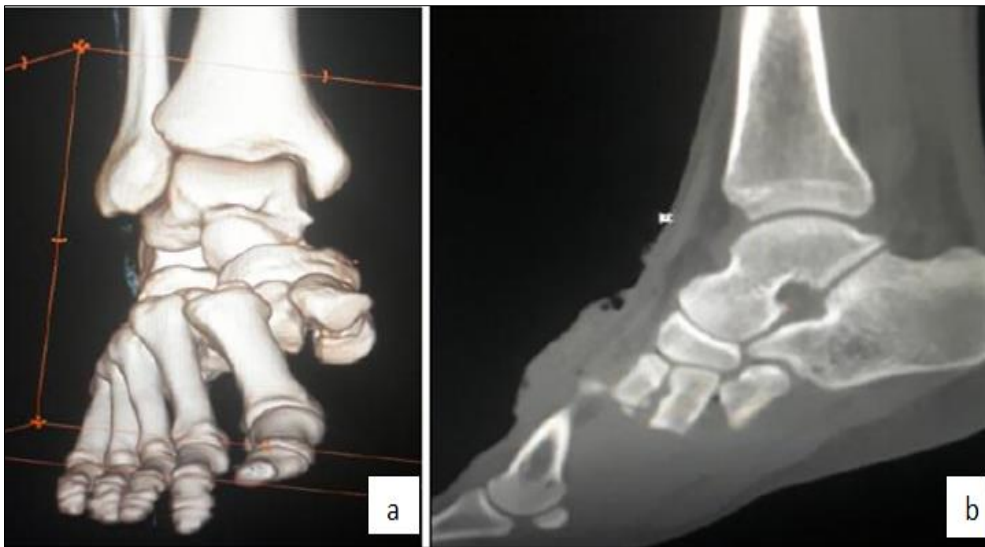


Figure 2 : CT scan of the right foot demonstrating a pure homolateral column-spatula Lisfranc dislocation (a: 3D reconstruction, b: 2D images). Mohammed VI University Hospital of Oujda, Department of Trauma Surgery B.

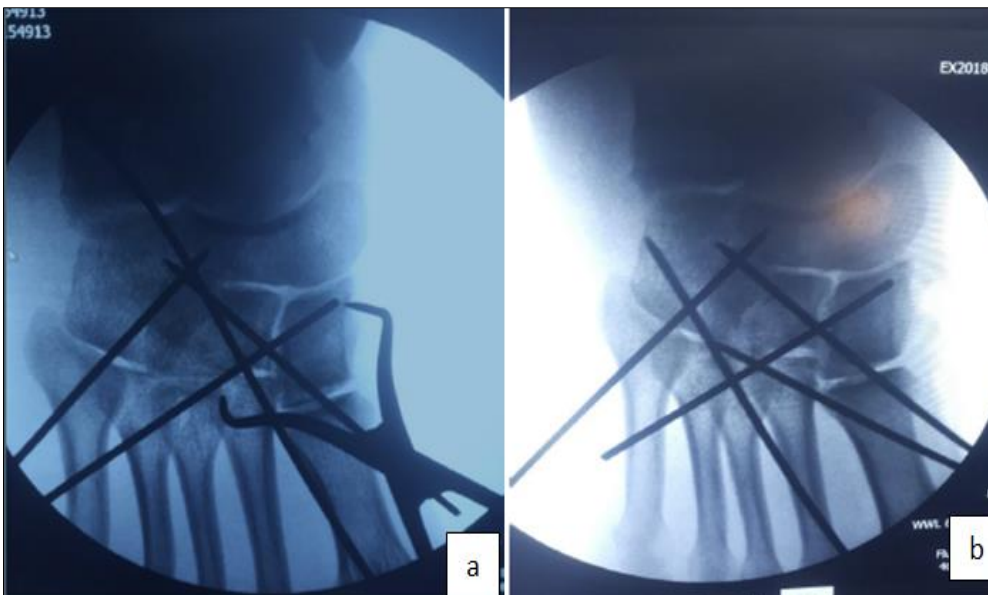


Figure 3 : Intraoperative fluoroscopic control showing (a) reduction using reduction forceps and (b) fixation with Kirschner wires. Mohammed VI University Hospital of Oujda, Department of Trauma Surgery B.

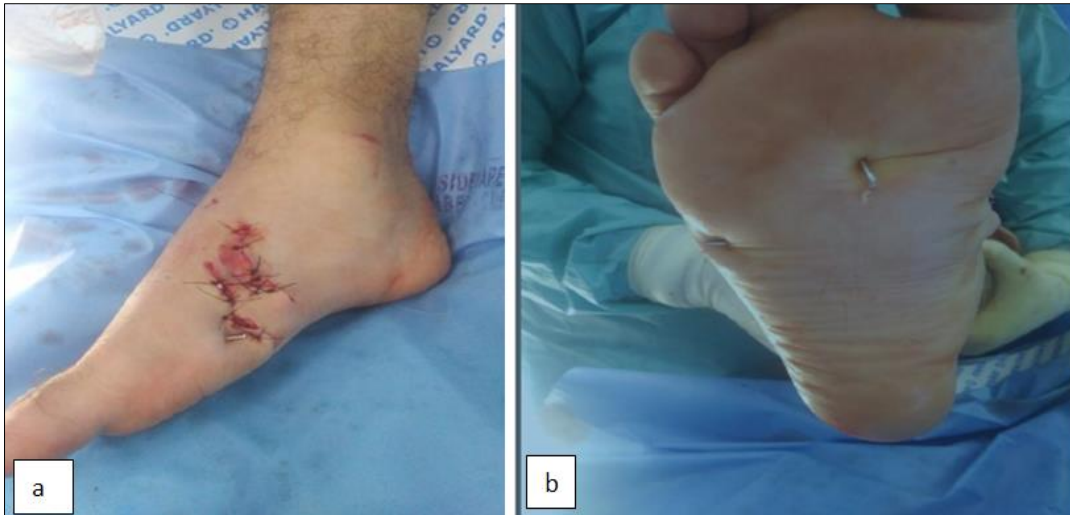


Figure 4 : Postoperative clinical appearance showing (a) wound closure and (b) percutaneous Kirschner wire fixation. Mohammed VI University Hospital of Oujda, Department of Trauma Surgery B.

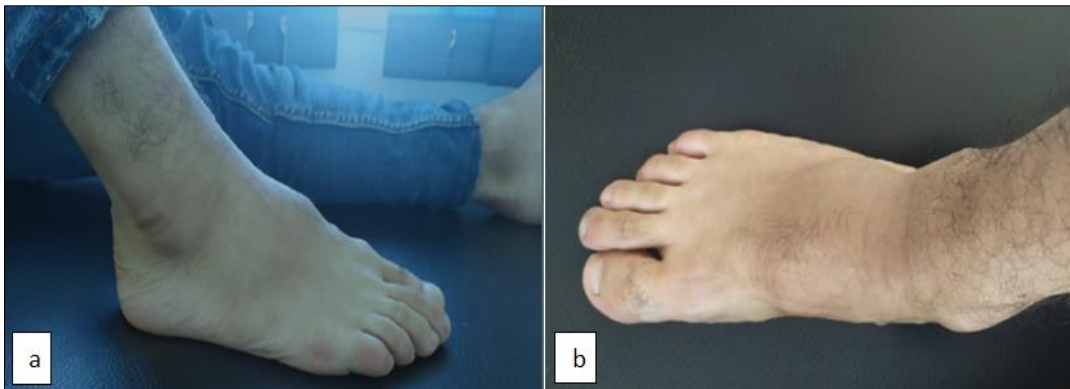


Figure 5 : Functional outcome at 21-month follow-up showing (a) lateral view and (b) frontal view. Mohammed VI University Hospital of Oujda, Department of Trauma Surgery B.

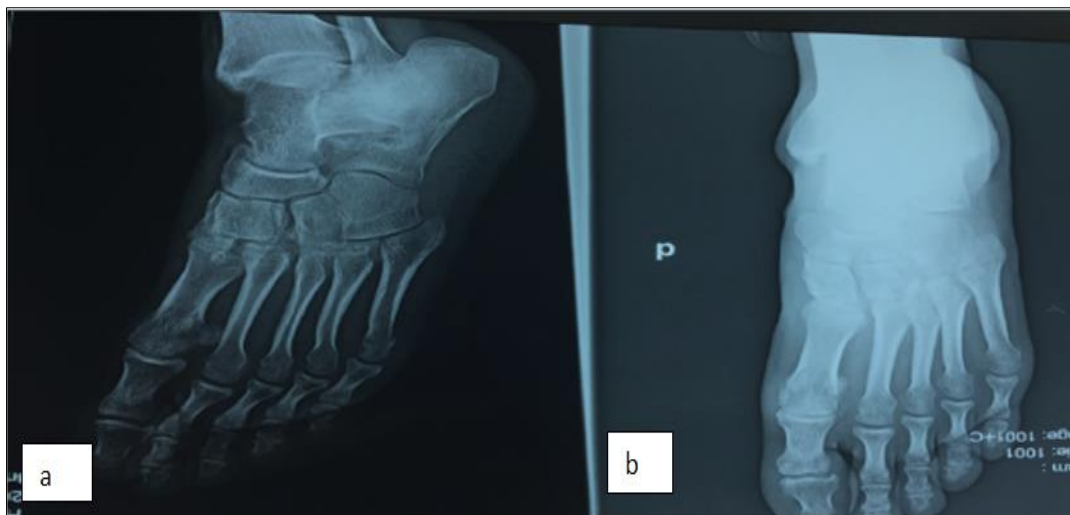


Figure 6: Radiological outcome at 12-month follow-up showing (a) lateral view and (b) anteroposterior view. Mohammed VI University Hospital of Oujda, Department of Trauma Surgery B.

DISCUSSION

The primary role of the tarsometatarsal joint complex is to ensure the stability of the midfoot [4]. The metatarsal bases form an arch-like structure, with the second metatarsal acting as the keystone. Lisfranc

injuries are more common in men, with a reported male-to-female ratio of 4.25:1 [5]. These injuries may result either from a direct high-energy trauma or from an indirect low-energy mechanism, generally involving an axial load applied to a plantar-flexed foot combined with

a medial or lateral rotational force. The most frequent high-energy mechanism is motor vehicle accidents, followed by motorcycle accidents [6].

High-velocity Lisfranc dislocations rarely pose a diagnostic challenge [7], except in polytrauma patients, in whom these injuries may be overlooked because attention is focused on more life-threatening lesions. The predominant clinical signs include swelling, particularly over the dorsal aspect of the foot [8], and ecchymosis. Tarsometatarsal dislocations may constitute a surgical emergency because the neurovascular supply to the midfoot and forefoot may be compromised. Injury to the dorsalis pedis artery and severe soft tissue edema may lead to the development of compartment syndrome [9].

Radiological assessment mainly relies on standard radiographs, computed tomography (CT), and magnetic resonance imaging (MRI) [10]. Conventional radiography generally remains the first-line imaging modality [11, 12]. However, plain radiographs may underestimate traumatic lesions because of the intrinsic limitations of projection imaging, which is less precise than cross-sectional imaging. In emergency settings, radiographs may also fail to meet optimal technical standards [12]. Missed subtle injuries of the tarsometatarsal joint have long been recognized and extensively reported in the literature [13, 14].

The most common radiographic sign is diastasis between the bases of the first and second metatarsals; however, two principles are fundamental. First, any fracture involving the base of the metatarsals should raise suspicion for an associated Lisfranc injury and warrant a meticulous assessment. Second, there should be perfect alignment between the medial cortex of the second metatarsal and the medial border of the second cuneiform [15]. CT scanning is useful to confirm diastasis and to identify subtle subluxations and associated occult fractures [16].

One of the most widely used classifications for Lisfranc injuries is the Quénu and Küss classification [17], which categorizes these injuries into types A, B, and C. Type A corresponds to a homolateral dislocation in which all metatarsals are displaced in the same direction. Type B lesions involve a partial incongruity, affecting either the first metatarsal or the lateral four metatarsals. Type C represents a divergent displacement in which the first ray and the lateral four metatarsals are displaced in opposite directions. The so-called “column-spatula” dislocation is a particular pattern involving both the medial column (first cuneiform and first metatarsal) and the lateral metatarsal rays. This type of injury is often complex because it is frequently associated with fractures of the tarsal bones and metatarsals [18].

Regardless of injury severity, the primary goal of treatment is to restore a stable and painless foot. Maintenance of anatomical alignment remains the most

important factor for achieving satisfactory outcomes. Conservative treatment with cast immobilization alone is insufficient [19], to maintain stable anatomical reduction, which has led to the widespread adoption of surgical management [20]. Surgical treatment generally consists of open reduction and internal fixation (ORIF), which may either preserve the joint [21] or involve primary arthrodesis in severe cases [22].

According to Mulier *et al.*, [23], primary arthrodesis should be reserved for the most severe injuries and considered a salvage procedure for the forefoot, as the functional consequences and complications associated with emergency arthrodesis are often poorly tolerated in young patients. Some authors advocate reduction with temporary Kirschner wire fixation [24], whereas others prefer fixation using cortical screws [25]. Nevertheless, most authors agree that supplementary cast immobilization for 6 to 8 weeks is necessary [24, 25].

Several complications have been reported in the literature. Forefoot deformity (valgus deformity), loss of propulsion strength, and post-traumatic osteoarthritis are among the most poorly tolerated complications and may significantly impair functional outcomes [26].

CONCLUSION

Open tarsometatarsal (Lisfranc) dislocations are rare but potentially devastating injuries because of their high risk of chronic instability, post-traumatic osteoarthritis, and long-term impairment of gait and foot function, particularly in missed, neglected, or inadequately treated cases. Early diagnosis and prompt emergency management are therefore essential to optimize anatomical and functional outcomes. In severe open Lisfranc injuries, immediate percutaneous pinning represents an effective salvage strategy, providing rapid stabilization of the tarsometatarsal complex while minimizing additional surgical trauma to compromised soft tissues. In athletic patients, this minimally invasive approach may facilitate earlier functional recovery and improve the likelihood of returning to sports activities. When recognized and appropriately managed in a timely manner, these complex injuries can evolve favorably with satisfactory functional outcomes and a reduced rate of complications.

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