

An unusual case report: Dorsal dislocation of the intermediate cuneiform associated with a lateral cuneiform fracture

Chrak Abdellah¹, El Khaymy Khalid^{1,*}, Laffani Mohamed¹, Fadili Omar¹, Bouzid Youssef¹, Kamel Anthony², Sbihi Yasser¹, Eladaoui Oussama¹, Driss Bennouna³ and Fadili Mustapha³

¹ MD, Department of Traumatology and orthopedic surgery, CHU Ibn Rochd Casablanca, Morocco.

² MD, MSc Orthopedic Surgeon-Sports medicine and surgery specialist Paris, Île-de-France, France.

³ Professor, Department of Traumatology and orthopedic surgery, CHU Ibn Rochd Casablanca, Morocco.

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Abstract

Introduction: The intermediate cuneiform, positioned between the medial and lateral cuneiform bones, takes on a wedge shape and is firmly connected to the first metatarsal through robust ligaments. It is recessed at the second metatarsal base and forms the “keystone” of the Lisfranc tarsometatarsal joint complex. An isolated dislocation of the cuneiform is an exceedingly uncommon injury. Dislocation of intermediate cuneiform with non-displaced lateral cuneiform fracture is so rare that is worthy of report.

Case report: A 35-year-old man, presented to the emergency department, after a closed trauma to the left foot resulting from a sport accident, involving a mechanism of plantar hyperflexion. The initial clinical examination of his foot revealed swelling and tenderness on dorsomedial aspect of the left foot. An initial plain radiograph showed dorsal dislocation of the intermediate cuneiform bone and a nondisplaced fracture of the lateral cuneiform.

Discussion: Closed reduction has little chance in these injuries. Although the failure rates of closed reduction are high, it should be attempted before open procedures. In this case, closed reduction was successful. Due to the rarity of this injury and technique, our case adds to the literature a novel reduction method.

Keywords: Cuneiform; Dislocation; Lisfranc; Fracture

1. Introduction

The highly constrained configuration and stability of the midfoot bones give it great resistance to suppurate the body's weight[1], [2]. The most commonly encountered injuries are fractures-dislocations of the Chopart and Lisfranc joints[3].

The intermediate cuneiform, positioned between the medial and lateral cuneiform bones, takes on a wedge shape and is firmly connected to the first metatarsal through robust ligaments. It is recessed at the second metatarsal base and forms the “keystone” of the Lisfranc tarsometatarsal joint complex[2]. An isolated dislocation of the cuneiform is an exceedingly uncommon injury. Dislocation of intermediate cuneiform with non-displaced lateral cuneiform fracture is so rare that is worthy of report. To our knowledge this combination of injury has never been reported in the literature [4], [5], [6]. The primary concern linked to this injury is the risk of instability. We present in this case report as an unusual midfoot injury pattern with dorsally dislocated intermediate cuneiform and non-displaced fracture of lateral cuneiform.

* Corresponding author: El Khaymy Khalid

2. Case Report

This concerns a 35-year-old man, with no known medical history, who presented to the emergency department, two hours after a closed trauma to the right foot resulting from a sport accident, involving a mechanism of plantar hyperflexion. The patient reported pain and total functional impairment. The initial clinical examination of his foot revealed swelling and tenderness on dorsomedial aspect of the right foot, with prominence on the dorsal aspect of the second cuneiform. There was no open injury on foot. An initial plain radiograph showed dorsal dislocation of the intermediate cuneiform bone and a nondisplaced fracture of the lateral cuneiform (figure 1). A complementary computed tomographic scan with 3D reconstruction supported the radiographical findings (figure 2).



Figure 1 Pre-operative X-rays showing intermediate cuneiform dislocation with lateral cuneiform fracture



Figure 2 CT scan images demonstrating the non-displaced lateral cuneiform fracture with 3D reconstruction showing the intermediate cuneiform dislocation

The patient was taken to the operating room under spinal anesthesia, where closed reduction was performed through external maneuvers under fluoroscopy guidance, this involved dorsal flexion of the ankle with midfoot eversion, downward pressure reduction of intermediate cuneiform and Esmarch bandage is applied to withhold the reduction, but it was very unstable as it came out on slight plantar stress. Therefore, fixation of the second cuneiform was achieved using two Kirschner wires (K-wires). The first transverse wire engaged all three cuneiforms, and the second oblique wire ran from the base of the first metatarsal to the cuboid, passing through the second cuneiform. Postoperative X-rays showed proper alignment of the intermediate cuneiform with the first and second cuneiforms, and no displacement of the lateral cuneiform fracture (figure 3). A below knee splint cast was applied without weight-bearing.

K-wires and cast removal took place after 45 days. The active range of ankle motion started at the same time. At 3 months follow-up, radiographs revealed consolidation of the lateral cuneiform without displacement of the intermediate cuneiform (figure 4). At 12 months post-surgery, the patient had a pain-free foot with normal walking and joint ranges of motion.



Figure 3 Postoperative radiographs of the right foot. The intermediate cuneiform dislocation was reduced. followed by K-wire fixation



Figure 4 Radiological assessment at 3 months follow up showing a good alignment

3. Discussion

The cuneiform bones are wedge-shaped, and sit in the middle of the medial column of the foot. The intermediate cuneiform articulates with one-third of the distal navicular proximally and its respective metatarsal distally[5]. The stability of the cuneiform bones is achieved through dorsal and plantar interosseous ligaments. The plantar aspect of the second tarsometatarsal joint has robust ligamentous support compared to the dorsal aspect, which is less supported. The dorsal dislocation is more common due to wedge shape and dorsal base position[7]. Isolated intermediate cuneiform dislocation was first described by Clark and Quint in 1933[8]. Bertoldi revealed in his study that out of 17 documented cases of dislocation of the intermediate cuneiform in the sagittal plane, 10 cases were dorsal, and 7 were plantar dislocations[9]. In our case the dislocation was dorsal.

The majority of intermediate cuneiform dislocations are a result of direct trauma. However, in certain instances, an indirect injury can lead to the dislocation[10]. Nishi et al.[3] conducted an anatomical dissection to elucidate the injury mechanism and resulting patterns. According to their findings, when the midfoot experienced plantar flexion, the intermediate cuneiform exhibited dorsal displacement. Conversely, when similar plantar flexion occurred under dorsal midfoot pressure, the intermediate cuneiform was restrained from dorsal dislocation.

A thorough clinical examination is essential in the presence of pain and swelling in the anterior tarsus after a trauma. A standard radiological assessment should be systematic in cases where there is suspicion of a Lisfranc injury. Including anteroposterior, lateral, and medial oblique views of the foot. A computed tomography with three-dimensional reconstruction helps to determine the direction of dislocation and the displacement of the fracture to prevent overlooking another dislocation or fracture.

Closed reduction has little chance in these injuries. Although the failure rates of closed reduction are high, it should be attempted before open procedures. In this case, closed reduction was successful. The distractor application is a known technique in tarsometatarsal fracture dislocation[11]. Singh et al. applied it for the first time in cuneiform fracture dislocation and recommend it to avoid open reduction[4].

Immobilization and the avoidance of weight-bearing activity should continue for at least 6 weeks after surgery for successful treatment. In our case, weight bearing is resumed gradually at 6 weeks without any splint and patient progressed to full weight bearing at 3 months following injury without any pain.

4. Conclusion

Fracture dislocations of the midfoot are uncommon occurrences, primarily attributed to the inherent stability of joint articulation and ligaments. These injuries necessitate significant trauma to take place. Despite the elevated failure rates associated with closed reduction, it is advisable to attempt this method before resorting to open procedures. To optimize the outcome, it is recommended to proceed with a gradual and delayed approach to weight bearing, aligning with the process of bony union in these cases.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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