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Case Report

Fracture dislocation of medial cuneiform along with lisfranc injury: A rare case and review of literature

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ABSTRACT

Foot injuries can significantly impact the overall health and mental well-being of patients. The severity of the injury can range from simple to complex. A medial cuneiform-navicular fracture dislocation is an extremely rare injury. We present a case of a 51-year-old male with fracture dislocation of medial cuneiform along with Lisfranc disruption. It was treated with ORIF (open reduction and internal fixation). Post-operatively healing was uneventful. Fracture dislocation of medial cuneiform along with Lisfranc injury is a rare assortment and has never been described in the literature. It is essential to incorporate such injuries in lisfranc injury classification for better diagnosis and treatment plans.

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1. Introduction

The foot has a complex structure that enables us to execute various routine and specialized activities. Foot injuries can affect a patient's overall physical and mental well-being. Studies suggest that polytrauma patients with foot injuries require more attention and aggressive management for better outcomes.¹

The foot can be anatomically divided into the forefoot, midfoot, and hindfoot. The TMT (tarsometatarsal) joint complex serves as the dividing line between the midfoot and the forefoot. The midfoot, also known as the Lisfranc area, is more prone to injuries. It is comprised of five metatarsals and their respective connections with the cuneiforms (medially) and the cuboid (laterally), which collectively provide structural support to the transverse arch.

Lisfranc injury refers to a fracture-dislocation of the tarsometatarsal joint complex. These foot injuries are common due to the strategic location of the bone in the upper portion of the midtarsal, which plays a

crucial role in controlling body weight during walking. Because of the extensive ligamentous support and their anatomical structure, isolated dislocation of the cuneiform-navicular junction is rare. Fracture-dislocation of the medial cuneiform-navicular is extremely rare, and there are no reported cases of this type of injury in the literature. It appears to be part of a significant complex disruption involving most of the midfoot. Additionally, research has shown that pure isolated medial cuneiform fractures account for 1.7% of all tarsal fractures,² and isolated navicular dislocation is also a very rare occurrence.³ Therefore, we are presenting a case of fracture-dislocation of the medial cuneiform with Lisfranc disruption, along with a review of the literature on such injuries.

2. Case Report

2.1. Clinical presentation

A 51-year-old male presented to the emergency department at Maharishi Markandeshwar Medical College and Hospital with pain and swelling in his right foot (Figure 1). The patient arrived two days after sustaining an injury in a road

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traffic accident. At the time of the presentation, the right foot showed significant swelling and the formation of blisters. Upon examination, diffuse tenderness was observed in the right foot, but there was no distal neurovascular deficit. X-rays revealed a fracture of the medial cuneiform with dislocation and lateral translation of the foot through the mid-tarsal joint (Figure 2).



Figure 1:



Figure 2:

A CT scan was performed to rule out injury to other bones in the foot, and to assess the fracture pattern and dislocation (Figure 3). The patient was advised to strictly elevate the limb and apply a cold compress, and subsequently underwent emergency surgery.

The patient was operated in a supine position under spinal anesthesia with side support to the greater trochanter and one support below the foot. This support helps to keep the knee in flexion without any assistance. The initial attempt at a closed reduction was unsuccessful due to poor skin conditions. Subsequently, an open reduction was



Figure 3:

performed by making an incision over the dorsal aspect of the navicular-cuneiform joint while using a tourniquet. During the procedure, it was observed that the tibialis anterior tendon was interposed, and this was resolved by distracting the navicular-cuneiform joint with the assistance of a jess fixator. The fracture and dislocation were fixed using two 4mm cancellous cannulated screws, and a 3mm K-wire was used to fix the lateral translation. One screw was inserted from the medial cuneiform to the 2nd metatarsal to fix the Lisfranc injury and the fracture of the medial cuneiform. Another screw was inserted from the navicular to the medial cuneiform with one k wire to fix the lateral translation of the foot (Figure 4). Lateral stability was checked with pronation and abduction as advised by Meyerson⁴ and was found stable.

The post-operative recovery was uneventful. The patient wore a POP slab for 4 weeks, and then began active movement of the ankle with partial weight bearing at 8 weeks (Figure 5). Full weight-bearing was advised after the removal of the k-wire at 12 weeks. The patient was followed every three months for one year and was comfortable performing routine activities, except for slight discomfort when moving upstairs and downstairs due to restricted terminal dorsal and plantar flexion.



Figure 4:



Figure 5:

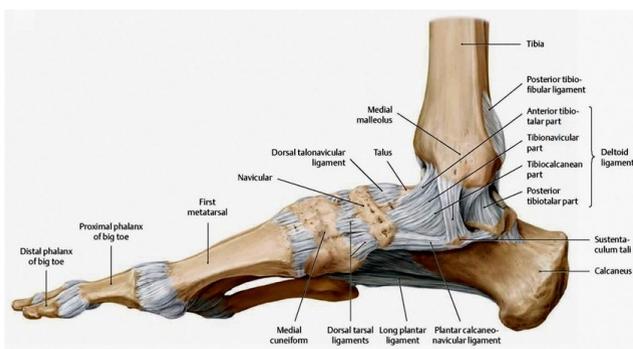


Figure 6:

3. Discussion

The foot contains three wedge-shaped bones known as cuneiforms, which play a role in forming the transverse and medial longitudinal arch of the foot. The medial cuneiform bone connects with the navicular bone at its proximal end and with the first metatarsal bone at its distal end.⁵ It also serves as an attachment site for various ligaments and tendons, such as the peroneus longus and tibialis anterior.⁶ The joints between the cuneiform bones allow for gliding and rotational movements during pronation and supination of the foot. To maintain stability, the cuneiform bones are supported by the deep transverse, dorsal, and plantar ligaments. In cases of extreme plantar flexion, these ligaments can tear, leading to dorsal dislocation of the cuneiform bones.(Figure 6)

There are few reported cases of cuneiform dislocation, which is more common in men involved in automobile accidents. A combination of cuneiform fracture dislocation and Lisfranc injury is rare, with no established classification for these injuries. The sequence of events leading to medial cuneiform dislocation can be explained as follows: The patient's foot was forcefully plantarflexed when it got stuck under the brakes of the vehicle he was driving. When attempting dorsiflexion of the plantarflexed foot, there were disruptions of ligaments around the medial cuneiform, leading to its dorsal dislocation. Furthermore, during an attempt at dorsiflexion, there was a pull of the tibialis anterior, which contributed to the medial cuneiform dislocation. Dorsal dislocations of metatarsals can result in concomitant Lisfranc injury. While closed reduction may be attempted, swelling often makes it difficult, so open reduction is the preferred treatment.⁷

Lisfranc injury of the foot refers to the bony or ligamentous disruption of the tarsometatarsal or intercuneiform joint.^{8,9} The injury may be partial or complete, depending on the severity of the trauma. Common symptoms include generalized pain and swelling in the midfoot, as well as an inability to bear weight. Plantar ecchymosis in the midfoot strongly suggests a Lisfranc injury, so the surrounding soft tissue envelope should be thoroughly examined."

Tenderness to palpation of the midfoot and reproduction of pain with passive motion of the forefoot are indication of a Lisfranc injury. A careful examination of the foot and X-RAY is required to diagnose lisfranc injury. Tenderness upon palpation of the midfoot and pain reproduced with passive motion of the forefoot are indications of a Lisfranc injury. A thorough foot examination and X-ray are necessary to diagnose a Lisfranc injury. Different studies have been conducted to determine the best imaging method for diagnosing Lisfranc injuries.^{10,11} These studies mention the use of ultrasonography, CT scans, and MRI. A radiographic evaluation of several anatomical relationships is required, including anteroposterior, oblique, and lateral

views. In the anteroposterior view, the middle cuneiform's medial border should align with the second metatarsal's. In the 30° oblique view, the lateral cuneiform's medial border should align with the base of the third metatarsal's, and the cuboid's medial border should align with the fourth metatarsal's. In the lateral view, no metatarsal should be positioned above or below the associated tarsal bone.

Any disruption of these connections indicates an injury to the tarso-metatarsal or intertarsal joint. The "fleck" sign indicates an avulsion fracture of the Lisfranc ligament from the base of the second metatarsal, which is a diagnostic radiographic finding for a Lisfranc joint injury. In cases where there are purely ligamentous injuries or the injury pattern is subtle, weight-bearing or stress films can be helpful. However, if such radiographs are not possible due to pain, MRI or CT should be the next imaging modalities used to clarify the presence or severity of an injury.

The initial classification system developed by Quenu and Kuss delineated injuries as homolateral, isolated, or divergent, based on the direction of the displaced metatarsals.¹² Thereafter, Hardcastle et al. further subcategorized Lisfranc injuries into Type A, B, or C, predicated on displacement and incongruity, with the intention of guiding treatment.¹³ Myerson later refined this system based on the direction of dislocation. Despite these multiple classification schemes, the outcome and treatment do not consistently align with any specific injury type. This reported case does not conform to any existing categories.^{4,14}

The complexity of mid-foot injuries makes diagnosis and treatment challenging due to the intricate anatomy and various treatment options. The need to account for forces in different directions adds to the complexity of determining the correct diagnosis and treatment process. A rare combination is the fracture dislocation of the medial cuneiform along with Lisfranc injury, which is not specifically addressed in literature or Lisfranc classification. Therefore, we recommend including such injuries in the Lisfranc injury classification to eliminate diagnostic dilemmas and ensure optimal patient care.

4. Conclusion

In summary, a comprehensive clinical and radiological examination is essential for detecting foot injuries. In cases where a seemingly normal X-ray coincides with abnormal foot pain, Clinician should contemplate the administration of stress X-rays, ultrasound, or MRI scans, as these injuries necessitate an extended period of rest and rehabilitation in comparison to a simple foot sprain. For such injuries, open

reduction stands as the standard treatment.

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6. Conflict of Interest

None.

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