CASE REPORT

Lisfranc Injury Associated With Calcaneocuboid Dislocation - A Very Rare Injury

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Abstract

Injuries to Lisfranc complex are infrequent, usually a result of high energy trauma. Upto 20% of these go unrecognized initially and can have significant long term consequences. Complete isolated dislocation of cuboid is extremely rare. When present, it is usually in conjunction with the complex injuries of hindfoot and midfoot.We report a case of 30yr old male, presenting to the emergency room after having sustained a motor vehicle accident with injury to right foot and ankle region.The injury was diagnosed to be Lisfranc injury with associated cuboid dislocation, the latter part was missed initially. Lisfranc injury is most commonly associated with second metatarsal fracture but rarely it can also be associated with cuboid dislocation which can be easily missed on initial evaluation. High suspicion of this type of injury should be present following high energy trauma as it can result in prolonged recovery and significant long term morbidity.

Key Words

Lisfranc complex, Cuboid, Dislocation, Tarsometatarsal Injuries

Introduction

Injuries to Lisfranc complex are infrequent, usually a result of high energy trauma. Upto 20% of these go unrecognized initially and can have significant long term consequences (1). Complete isolated dislocation of cuboid is extremely rare. When present, it is usually in conjunction with the complex injuries of hindfoot and midfoot (1).

The spectrum of tarsometatarsal injuries encompasses stable sprains to clinically apparent, grossly unstable deformities. Any injury of the Lisfranc complex can result in prolonged recovery and significant long-term morbidity. It is important to recognize and treat these injuries early and aggressively for best results. Up to 20% injuries are missed initially. High suspicion for these type of injury should be present following motor vehicle trauma. Significant disruptions occur which can undergo spontaneous reduction,thus masking the underlying instability.

Case Report

A 30yr old male presented to us in the emergency room after a motor vehicle accident with injury to right foot. There was no associated injury to any other part of the same or any other extremity. There was marked swelling of the foot with inability to bear weight on right foot. On examination, swelling along with ecchymosis was present on the plantar aspect of the midfoot. The tenderness was present over and around the midfoot. The patient's limb was adequately splinted and he was sent for radiographic examination. AP and Lateral views of the right foot were taken, on which the diagnosis of Lisfranc fracture dislocation was made (*Fig 1*). Patient was shifted to operating room and open reduction and internal fixation was done with 3.5 Self-tapping Cortical Screws(STCS) and K-wires. Postoperative check x-rays were done on which dislocation of calcaneocuboid joint was noticed (*Fig 2*). Patient was again shifted to operating room and calcanoecuboid joint was fixed with two K-wires after 2 days of initial surgery (*Fig 3*).

Discussion

The Lisfranc complex is made up of both bony and ligamentous elements that provide structural support to the transverse arch of the midfoot.The three most common mechanisms described for injury to Lisfranc joint aretwisting of the forefoot, axial loading of thefixed foot and crush injury (1).The direct mechanism of injury usuallyinvolves a crush injury with dislocation resulting in displacement of the metatarsalbases in either a plantar

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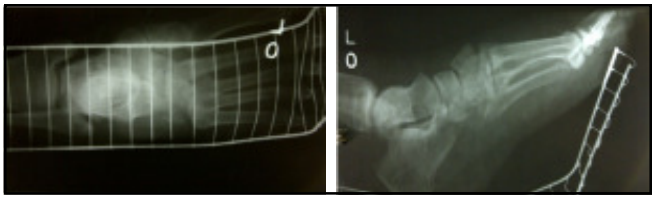

Fig. 1 Anteroposterior and Lateral Radiograph Showing Disruption of the Lisfranc Complex

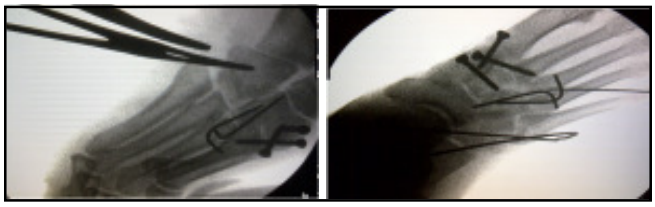

Fig. 3 Intraoperative Fluoroscopic Views Showing Reduction of Calcaneo-cuboid Dislocation & Fixation with K-wires

or dorsal directiondepending on the forces applied.Indirect trauma is more common and iscaused by rotational forces applied to the forefoot or axial loading of the plantarflexedand fixed foot. Examples include pedestrianor motorcycle accidents in which theforefoot is trapped and forcefullyplantarflexed and abducted on the tarsalbone: motor vehicle accidents in which theplantarflexed foot is braced against thefloorboard with the force of body weightcausing hyperplantarflexion of the foot at the dorsal aspect of the tarsometatarsal jointand stepping off a kerb or missing a step with the ankle in extreme equinus, the toeshyperextended and the vertical forcedirected to the metatarso-cuneiformligaments causing rupture of the dorsalligaments of the Lisfranc joint.Lisfranc's joint represents the transition between the midfoot and forefoot. It consists of the three cuneiform-metatarsal articulations and the two cuboid-metatarsal articulations of the fourth and fifth rays (2).The alignment and stability of this joint line are critical for normal function of the foot. The medial-to-lateral cascade of the distal articular surfaces of the cuneiforms and cuboid provide for the transverse arch of the foot. The metatarsals, with the distal heads placed for forefoot weight bearing, comprise the distal half of the longitudinal arch. The rigid arch complex provides the plantar structures with an area free from constant compressive forcesthat can compromise neurovascular structures. This arch stiffness permits the smooth transfer of the center of motion during weight bearing from the ankle to the forefoot. This rigidity allows for smooth heel lift and weight transfer to the opposite leg.

The inherent stability of Lisfranc complex is the result in part to the recessed second metatarsal base but even

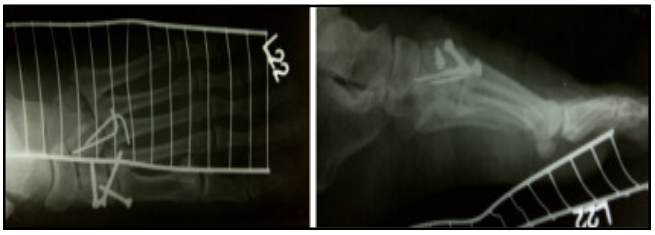

Fig 2. Anterioposterior and Lateral Radiographs Showing Fixation of Lisfranc Complex with MissedCalcaneo-Cuboid Dislocation

to a greater degree to the numerous strong ligamentous attachments across each tarsometatarsal joint and between each ray. The important characteristics to note are (a) the plantar ligaments are significantly stronger than the dorsal ligaments, (b) the multiple ligamentous overlap among the joints of the lesser four tarsometatarsal joints, and (c) the Lisfranc ligament, which is the largest and strongest ligament of this joint complex, represents the only ligamentous support between the medial leg and the middle and lateral legs in the forefoot.

Any injury resulting in midfoot tenderness and swelling merits a careful physical and radiographic examination. Although grossly displaced fracture-dislocations are obvious on examination, care should be taken with subtle injuries to palpate each articulation for tenderness and swelling, especially the medial cuneiform-first metatarsal joint, which often appears undisplaced on radiographs. Trevino and Kodros described a "rotation test," in which stressing the second tarsometatarsal joint by elevating and depressing the second metatarsal head relative to the first metatarsal head elicits pain at the Lisfrancjoint.They noted as many as 20% of Lisfranc joint injuries were missed upon initial examination (3). Careful observation of the plantar aspect of the foot may reveal a small ecchymosis indicating a significant injury. The inability to bear weight on the foot is another sign of potential instability.

Radiographs must be obtained with the patient bearing weight. If the radiograph reveals no displacement, and the patient cannot bear weight, a short leg cast should be used for 2 weeks, and the radiographs should be repeated with weight bearing (4). Evaluation should be directed to the following areas:

The medial shaft of the second metatarsal should be aligned with the medial aspect of the middle cuneiform on the anteroposterior view.

1. The medial shaft of the fourth metatarsal should be aligned with the medial aspect of the cuboid on the oblique view.

2. The first metatarsal-cuneiform articulation should have no incongruency.

3. A "fleck sign" should be sought in the medial cuneiform-second metatarsal space. This represents an avulsion of the Lisfranc ligament.

4. The naviculo-cuneiform articulation should be evaluated for subluxation.

5. A compression fracture of the cuboid should be sought.

6. Associated fractures in thephalanges, metatarsal, midfoot and ankleshould be sought.

To better discern the presence and extent of fractures in a Lisfranc injury and to further investigate radiographically stable injuries, a CT scan can be obtained.

Potter et al. and Preidler et al. described MRI of the Lisfranc ligament in the acute setting and if the level of injury cannot be determined by plain radiographs (5).

The key to successful outcome in Lisfranc injuries is anatomical alignment of the involved joints. Closed, undisplaced (<2 mm) injuries can be treated with a non-weight bearing cast for 6 weeks followed by a weight bearing cast for an additional 4 to 6 weeks. Repeat radiographs should be obtained to ensure that no displacement is occurring in the cast. Displaced fractures should be treated operatively.

The literature confirms that the ability to obtain and maintain an anatomical reduction of a fracture-dislocation is associated with improved outcome over non-anatomical reduction.The presence of instability in this region requires anatomical reduction (3,6,7,8,9).These injuries can be severely debilitating and require a long recovery period (10,11). Kuo *et al* (7). in their evaluation of open reduction and internal fixation in 48 patients with Lisfranc injuries with an average follow-up of 52 months, found that the non-anatomical reduction was associated with the presence of post-traumatic arthrosis in 60%of the patients. In patients with anatomical reduction, post-traumatic arthrosis occurred in only 16% (7). Recent studies also tend to show that injuries that are purely ligamentous have a tendency toward chronic pain and instability even with initial anatomical reduction and stable fixation (7). Coetzee and Ly (12) advocated that this subgroup of tarsometatarsal injury without fracture may best be treated with acute fusion to hold the anatomic reduction. Recently primary partial arthrodesis as atreatment of both primarily ligamentous and combined osseous and ligamentous lisfranc injuries produced good clinical and patient-based outcomes (13). Use of headless compression screws has also been described in acute Lisfranc injuries (14,15)

Conclusion

We describe a case of Lisfranc injury associated with calcanoecuboid dislocation. The diagnosis was not obvious clinically but theradiographs illustrate many of the radiological signs of Lisfranc injury. As has been stated the injury isfrequently missed and previous authors havesuggested that this incidence may be reduced by radiographical examination of any footwith pain and swelling from trauma. Fracture of the base of a metatarsal boneshould be seen as an indicator of possibleLisfranc injury. Fracture of the metatarsal bones and other midfoot and hindfoot fractures/dislocations should also be seen carefully and managed accordingly.

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