

## Plantar Dislocation of Lateral Tarsometatarsal Joint: A Case of Subtle Lisfranc Injury

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### Abstract

**Introduction:** We present a rare case of plantar dislocation of the cuboid, fourth and fifth metatarsal joints. Fracture-dislocation in the midfoot region may be subtle and difficult to recognise at the emergency department. **Clinical Picture:** A 16-year-old girl presented with lateral foot pain and swelling following a fall from a height of 3 m. Initial radiograph revealed a third metatarsal shaft fracture; however, additional views revealed a plantar direction of fourth and fifth metatarsal dislocation from the cuboid. **Treatment:** Open reduction and internal fixation with Kirschner wires followed by immobilisation in plaster was performed. **Outcome:** She made an uneventful recovery and the wires had since been removed. **Conclusion:** This case was unusual in that there was lateral tarsometatarsal disruption with neither diastasis between the first and second metatarsals nor injury to either the first or second tarsometatarsal joints. The plantar direction of dislocation was also unusual as these injuries are usually dorsal.

Ann Acad Med Singapore 2004;33:362-4

**Key words:** Cuboid, Foot trauma, Metatarsal dislocation, Midfoot fracture, Open reduction internal fixation foot

### Introduction

Lisfranc fracture dislocations are uncommon injuries and the diagnosis may be easily missed. There are several variations and we present one such variant. This report describes a lateral tarsometatarsal disruption (cuboid with fourth and fifth metatarsal dislocations) with neither diastasis between the first and second metatarsals nor injury to the first, second or third tarsometatarsal joints. Dislocations of lateral tarsometatarsal joints are rare and are almost always dorsal or lateral. The patient reported sustained plantar cuboid 4/5 dislocation and a third metatarsal shaft fracture. Fracture dislocation in the tarsometatarsal region may be subtle and difficult to recognise on standard radiographic projections, resulting in a long delay between injury and diagnosis. This may lead to long-term disability.

### Case Report

The patient is a 16-year-old girl who first presented with a 4-day history of left lateral foot pain and swelling following a fall from a height of 3 m. She recalled landing on both feet and was able to partially weight bear on the injured left foot

initially. However, her symptoms became worse and she sought treatment a few days later. There were no other complaints except for the pain in her left foot. Clinical examination revealed a slim young lady who limped with an antalgic gait, hardly able to bear weight on her left foot. Bruising of the sole of the left foot was noted. The plantar ecchymosis sign was positive.<sup>1</sup> Maximal tenderness was elicited over the base of her fourth and fifth metatarsals. Anteroposterior (Fig. 1) and oblique radiographs of her left foot showed a minimally displaced fracture of shaft of the third metatarsal. The cuboid 4/5 injury was not recognised and she was treated with below knee Plaster of Paris backslab and asked to non-weight bear. She was referred to the foot and ankle clinic for further care. She was seen 8 days later (12 days post-injury) and re-examined by the second author. There was suspicion of a cuboid, fourth and fifth metatarsal plantar dislocation in addition to the third metatarsal shaft fracture. Extra views, including true lateral radiograph (Fig. 2) and comparison view of both feet (Fig. 3), were ordered which confirmed the 4/5 plantar dislocation.

The patient underwent open reduction through an incision

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Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

Fig. 1. Anteroposterior radiograph of the left foot showing cuboid 4/5 dislocation.

Fig. 2. True lateral radiograph of the left foot showing plantar direction of cuboid 4/5 dislocation.

Fig. 3. Comparison oblique radiographs of both feet showing cuboid 4/5 dislocation in the left foot.

Fig. 4. Post anteroposterior and oblique views of the left foot showing post-reduction and fixation of the fracture dislocation.

over the dorsolateral aspect of the left foot overlying the cuboid 4/5 joint. Care was taken not to damage the sural nerve. The fourth and fifth metatarsals were found to be dislocated plantar to the cuboid bone. There was some degree of chondral injury to the articular surface of the cuboid. The dislocation was reduced utilising traction on the fourth and fifth toes and using a Freer elevator (Miltex Inc, York, USA) between the cuboid and fourth and fifth metatarsals to aid in the reduction. The cuboid 4/5 joint was stabilised by 2 1.6-mm Kirschner wires (Bäramed instrument, Schweningen, Germany) passing from the metatarsals into the cuboid. Intraoperative radiographs (Fig. 4.) confirmed the reduction. The wound was closed and a below knee splint applied. There was no immediate postoperative complication.

**Discussion**

Lisfranc injury is rare with a reported incidence of 1 per 55,000 individuals a year and the diagnosis is easily missed.

The mechanisms of injuries vary from low impact injuries, such as a twisting injury, to high impact injuries, such as motor vehicles accidents and falls from height. In one series, the initial radiographic diagnosis was reported to be inaccurate in 23 out of 59 patients.<sup>2</sup> Other studies estimated that 20% were missed on presentation to the emergency department.<sup>2,3</sup>

The standard anteroposterior and oblique radiographs of the foot done during the patient’s initial consultation at the emergency department were inadequate. True lateral radiograph of the foot is not a routine at our accident and emergency department. The literature would suggest that foot trauma series should include anteroposterior, lateral and oblique radiographs.<sup>4</sup> Further stress views, including weight bearing and a comparative view with the other foot, should be taken if there is any doubt.<sup>4-6</sup> In some cases, computed tomography scans and magnetic resonance imaging may be necessary to detect comminution and subtle malalignment.<sup>5</sup>

A review of the literature yields the likely mechanisms of injury of this unusual dislocation. Chiodo and Myerson<sup>1</sup> classified tarsometatarsal injuries according to the columnar theory, emphasising the motion segments of the midfoot. They considered the foot to have 3 columns mechanically; the medial column comprises the first tarsometatarsal and medial cuneiform-navicular joints; the middle column

includes the second and third tarsometatarsal joints and articulations between the middle and lateral cuneiform bones and the navicular bone; and the lateral column consists of the articulations between the fourth and fifth metatarsals and the cuboid bone. Not only is this classification simple and precise anatomically, but in their experience the metatarsals within a column often function as a unit. They concluded that it is unusual for one (fourth metatarsal) to dislocate while the other (fifth metatarsal) remains in an anatomic position. This was clearly demonstrated in our patient.

The plantar direction of the dislocation in our patient is plantar hyperflexion combined with axial foot compression. In their work on 8 cadavers, Charrois et al<sup>7</sup> reported on the plantar direction of a fracture dislocation of the tarsometatarsal joint. They observed that the injury axis followed the scapho-cuneiform joint on the inner border of the foot and the cuboido-metatarsal joint on the lateral side, so that both tibialis muscles were fixed on the distal fragment. As the tibialis posterior muscle is more powerful, the direction of the dislocation is plantar. We wish to emphasise that in our patient, the injury is different from plantar dislocation of the tarsometatarsal joint secondary to direct load bearing on the dorsum of the foot, which usually results in severe skin and vessels injuries. Destabilisation of the lateral Lisfranc joints was secondary to the fracture through the third metatarsal shaft.

The literature is divided over specific recommendations for treatment of these subtle injuries. However, an important determinant of outcome in the treatment of injuries of the tarsometatarsal joint has been shown to be accurate anatomic reduction.<sup>8,9</sup>

Proponents of Kirschner wire<sup>10</sup> and screw fixation<sup>2,11,12</sup> are found in the literature. During open reduction, we noted damage over the cuboid articular surface. To avoid further damage, we opted for Kirschner wires fixation after open reduction in this particular case. We then protected our fixation with cast and strict instruction for non-weight bearing post-surgery for 3 months.

Since this injury carries a high incidence of chronic pain and disability, early diagnosis is imperative. The anatomic relationship of the tarsal/metatarsal joint should be examined carefully in any patient with a suspicious clinical examination and history. There should be a high index of suspicion when managing such patients, as the injury is not as uncommon as previously thought.

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