

CASE REPORT

The floating metatarsal. A rare traumatic injury

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The authors report a case of concomitant plantar Lisfranc dislocation and plantar metatarsophalangeal dislocation of the hallux. This is the second case of floating metatarsal described in the literature. When examining patients with Lisfranc joint injuries, one should explore carefully the metatarsophalangeal joints. It is also imperative to adapt the order of reductions to the presumed tension on the plantar fascia.

Open reduction on the proximal side and closed reduction on the distal side, in addition to internal fixation proximally and distally, gave good results in this case.

INTRODUCTION

The floating metatarsal is a unique injury of the foot with concomitant proximal and distal dislocation of the first metatarsal. This exceptional entity was described in 1997 by Leibner *et al* (4) who reported a case of dorsal dislocation.

We discuss in this report a similar composite injury where the dislocations were plantar. This is the second case of floating metatarsal described in the medical literature.

CASE REPORT

A 28-year-old man was admitted 19 days after a traffic accident for an injury of his left foot. On examination, there was swelling, tenderness and a clean scar on the dorsomedial aspect of the mid-foot. There was an obvious deformity of the great toe with the head of the first metatarsal palpably

prominent on the dorsomedial aspect of the foot and the proximal phalanx displaced laterally and plantarly. Radiographs showed fractures of the neck of the second and third metatarsals, latero-plantar dislocation of the metatarsophalangeal joint without sesamoid displacement and lateroplantar dislocation of the base of the first and second metatarsals (fig 1a, b). Under general anaesthesia, closed reduction first on the proximal side was possible but difficult and very unstable. Through a dorsal incision, the first and second tarsometatarsal joints were explored. Small fragments of bone and calcified scar tissue were removed from the joint space. The reduction appeared unstable, so internal fixation using Kirschner wires was performed. More stability was achieved using a staple uniting the first metatarsal to the medial cuneiform. The metatarsophalangeal joint was reduced by closed manipulation consisting in traction with a dorso-medial force direction applied to the base of the proximal phalanx. This was also unstable and was therefore fixed by Kirschner wires. The medial collateral ligament of the first metatarsophalangeal

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Fig. 1. — (a) Anteroposterior and (b) oblique radiographs demonstrating fractures and dislocations of the midfoot and forefoot.

was reattached. Fractures of the neck of the second and third metatarsal were reduced by closed manipulation (fig 2 a, b).

Postoperatively, the foot was immobilised in a cast for six weeks. Kirschner wires were then removed and full weight bearing was permitted. The patient was back to his previous level of ability in his professional and sports activities within 16 weeks. The staple was removed at 42 weeks. Two years after surgery clinical and anatomical results were good (fig 3 a, b).

DISCUSSION

The first metatarsophalangeal joint is intrinsically stable, and all reported cases of its dislocations are in a dorsal direction (1, 2). Garcia Mata *et al* (3) described the only case of plantar dislocation in the literature.



Fig. 2. — (a) Anteroposterior and (b) oblique radiographs demonstrating the reduction and internal fixation.

The Lisfranc joint is inherently stable, and its plantar stability is reinforced principally by the plantar fascia which extends from the calcaneus and inserts at the base of the proximal phalanx (4, 5). Hence, when dislocations of the Lisfranc joint occur, they are usually dorsal; only 12 cases of plantar dislocations have been reported to date (1).

When viewing Lisfranc dislocations, it is a mistake to regard them as isolated. Forces are propagated across the entire midfoot and forefoot, where they can generate various osteo-articular and soft tissue damage (5). English (in 5) demonstrated that, for example, when the first metatarsal is dislocated at its base, tension is applied through its soft-tissue attachments, particularly the interosseous muscles, and this may cause an associated dislocation of the second adjacent metatarsophalangeal joint. The possibility of a bipolar injury of the same metatarsal, which causes a floating metatar-



Fig. 3. — (a) Anteroposterior and (b) oblique radiographs demonstrating the final result at two years.

sal, is now established by the present case and the case reported by Leibner *et al* (4). We corroborate the statement of these authors that when examining patients with Lisfranc joint injuries, one must keep in mind that the deforming force may also damage the metatarsophalangeal joint (4).

In our patient, there was evidence of direct trauma on the dorsomedial aspect of the midfoot. A possible mechanism for the injury is abduction and forceful plantar flexion of the metatarsophalangeal joint causing both fractures of the neck of the second and third metatarsals and lateroplantar dislocation of the proximal phalanx of the hallux. This relieves tension on the plantar fascia and diminishes the plantar stability of the tarsometatarsal joint. Thus, minimal direct force applied to the dorsomedial side of the midfoot may generate lateroplantar dislocation of the base of the first and second meta-

tarsal without significant damage to the skin or other soft-tissue structures.

Leibner *et al* (4) noted that when undertaking reduction of a floating metatarsal, it is indispensable to evaluate the tension on the plantar fascia. In their patient, with dorsal dislocations, reducing first the metatarsophalangeal derangement was imperative to alleviate the tension on the plantar fascia. In the present case, for the same reason, it was necessary to begin reduction on the proximal side.

When there is difficulty with reduction or post-reduction instability of the Lisfranc joint, open reduction and internal fixation are preferred (5). Modalities of reduction of dorsal metatarsophalangeal dislocations of the great toe are well described by Jahss (3). The plantar dislocation reported by Garcia Mata *et al* (2) was easily reduced with closed manipulation as in our patient, but because of persistent medial instability, we preferred to repair the medial collateral ligament and to stabilise the reduction with temporary Kirschner wires.

CONCLUSION

We have reported a case of bipolar dislocation of the first metatarsal that did not correspond to any previously reported injury of the foot. This case represents a variant of the floating metatarsal described by Leibner *et al* (4). It would appear that the order of reduction should be adapted to the presumed tension on the plantar fascia.

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