

Irreducible Longitudinal Distraction-Dislocation of the Hallux Interphalangeal Joint

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Abstract

Although volar and dorsal dislocations have been described in the literature, dislocation of the hallux interphalangeal joint is a disorder rarely encountered by orthopedic and foot surgeons. In this article, we report a case of a distinct irreducible longitudinal distraction-dislocation that originally presented to the emergency department but required open reduction in the operating room. We also describe the presentation, anatomy, and treatment of this unique disorder.

The hallux interphalangeal (IP) joint is an inherently stable ginglymus joint with static and dynamic stabilizers. The static stabilizers are the collateral ligaments, which pass from the lateral proximal phalangeal head to the dorsal tubercle of the base of the distal phalanx. They are in continuity with the joint capsule, which circumferentially spans the joint, becoming thickened on the volar aspect, forming the volar plate. Dynamic stabilizers are the flexor hallucis longus and extensor hallucis longus that cross the volar and dorsal aspects of the joint, respectively, and insert on the base of the distal phalanx.^{1,2}

Dislocation of the hallux IP joint is a rare disorder. Most cases reported in the literature are dorsal dislocations resulting from hyperextension injuries. Closed reduction should be attempted but is often unsuccessful because of interposition of the volar plate or sesamoids within the joint space.

In this case report, we describe an irreducible longitudinal distraction-dislocation of the hallux with an intact volar plate and absence of an interposed sesamoid.

The patient provided written informed consent for print and electronic publication of this case report.

Case Report

A 19-year-old woman presented to the emergency department (ED) after sustaining a crush injury to her left great toe. A statue weighing about 500 lb had inadvertently been placed on the toe, which she then forcefully pulled out from under the statue. The mechanism of injury described was one of

longitudinal traction at the IP joint. There was immediate and extensive bruising, along with severe pain. The next day, the patient presented to the ED because of persistent pain. Physical examination revealed swelling and ecchymosis throughout the toe, but no open wounds. Extension and flexion of the toe were intact, but limited because of pain.

Radiographs showed increased space at the hallux IP joint (Figures 1A, 1B). There was no radiographic evidence of sesamoids on the volar aspect of the joint or incarcerated within the joint. Attempts to reduce this longitudinal distraction-dislocation were unsuccessful. Open reduction was needed to explore the joint and reduce it appropriately.

At time of surgery, the swelling of the toe was improved, and there was residual ecchymosis. With the patient under anesthesia, closed reduction with C-arm fluoroscopic guidance was attempted but was unsuccessful. A dorsal approach to the IP joint of the hallux was taken. Arthrotomy revealed a ruptured lateral collateral ligament interposed within the joint space (Figures 2A, 2B). There was no sesamoid within the joint, and the volar plate appeared to be intact, though stretched.

The interposed tissue within the joint space was cleared, and under C-arm guidance a Kirschner wire (K-wire) was

Figure 1. Preoperative anteroposterior (A) and lateral (B) radiographs show elongation of hallux interphalangeal joint with anatomical alignment of distal phalanx with respect to proximal phalanx.



Authors' Disclosure Statement: The authors report no actual or potential conflict of interest in relation to this article.

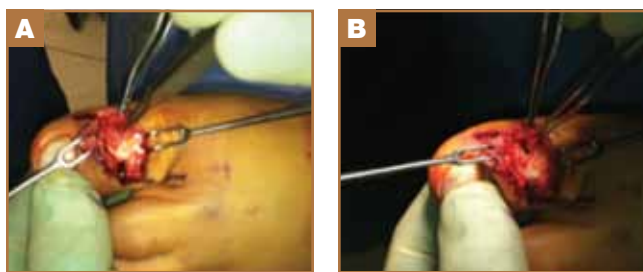


Figure 2. Intraoperative photograph shows torn capsule (A) and collateral ligaments (B) interposed within interphalangeal joint.

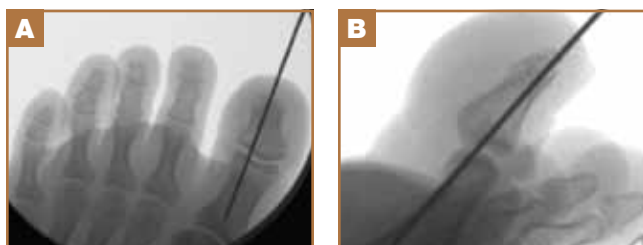


Figure 3. Persistent minimal widening of interphalangeal joint appreciated on anteroposterior view (A). Fluoroscopy-confirmed reduction with Kirschner-wire fixation (B).

placed from the distal phalanx through the proximal phalanx to restore anatomical alignment and immobilize the joint. Reduction was confirmed (Figures 3A, 3B). The collateral ligaments and the joint capsule were repaired over the reduced joint. There was persistent minimal widening of the IP joint, consistent with prior case studies, likely secondary to joint overstretching at time of injury.³ The postoperative course was unremarkable and at 6 weeks, the K-wire was removed (Figures 4A-C). The patient was walking without discomfort and had a satisfactory outcome.

Discussion

Using cadaveric studies, Miki and colleagues⁴ described 2 types of irreducible dislocations of the great toe. In type I, the volar plate, along with its sesamoid, becomes interposed within the IP joint space, resulting in elongation of the toe with good alignment of the phalanges. Radiographs of type I dislocations show a sesamoid within the joint space. In type II, there is complete displacement of the volar plate and sesamoid, dorsal to the IP joint, resulting in the joint locking in hyperextension. Miki and colleagues also demonstrated that the sesamoid in this area is radiographically visible in only 56% to 93% of ambulatory patients.⁴

In our patient's case, there was neutral alignment of the phalanges, similar in appearance to the type I dislocation described by Miki and colleagues.⁴ However, our case differs in that the volar plate was intact, and it was the collateral ligaments that were preventing successful closed reduction. This case is unique in that there was no sesamoid involvement (confirmed with an open approach) as previously reported in this characteristic dislocation. Rather, the collateral ligament, interposed within the joint, was the



Figure 4. Anteroposterior (A), oblique (B), and lateral (C) radiographs at final, 6-week postoperative visit.

main impediment to closed reduction.

When an irreducible dislocation of the IP joint of the great toe is encountered—a rare event—it is important to obtain a clear history to discern the mechanism of injury. Radiographs should be scrutinized for an incarcerated sesamoid bone within the joint. If there is no radiographic explanation for the dislocation, and it fails closed reduction, open reduction allows for evaluation of the disrupted IP joint anatomy. Careful attention must be given to the collateral ligaments and the volar plate. Irreducible dislocations of the IP joint of the great toe can be successfully treated with open reduction and K-wire fixation with a good outcome.

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Am J Orthop. 2013;42(7):329-330. Copyright Frontline Medical Communications Inc. 2013. All rights reserved.

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