

# Traumatic Dislocation of the First Metatarsophalangeal Joint with Tibial Sesamoid Fracture

## *A Case Report of a Type III B Dislocation*

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We present a case report about traumatic dislocation of the first metatarsophalangeal joint and patterns of injury. We are unaware of previous reports in the literature describing this unusual variant. (*J Am Podiatr Med Assoc* 98(2): 149-152, 2008)

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Traumatic dislocation of the first metatarsophalangeal joint is a rare injury. The great toe is reported to be the most common site for traumatic metatarsophalangeal joint dislocation. Injuries of the first metatarsophalangeal joint have usually been associated with motor vehicle accidents<sup>1</sup> or falls from a height.<sup>2</sup>

Jahss<sup>3</sup> has described three different types of dislocations (I, II A and B, and III). Copeland and Kanat<sup>4</sup> then described a new class of dislocation of the first metatarsophalangeal joint (type II C) in which there is a complete disruption of the intersesamoid ligament and a fracture of the tibial or fibular sesamoids. Jahss<sup>5</sup> then proposed a type III dorsal dislocation in which complete disruption of the plantar plate from the proximal phalanx was found. Type III injuries have since been broken down into types III A and III B.<sup>6</sup> Type III A is described as complete soft tissue disruption of the entire plantar plate from the base of the proximal phalanx without a sesamoid fracture. Type III B occurs when there is complete disruption of the plantar plate associated with a sesamoid fracture.

### Case Report

A 41-year-old woman fell down six steps at her home and landed at the bottom with her right leg extended. Her right foot was plantarflexed, and her great toe

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was forced into dorsiflexion. Upon arrival to the hospital, the right hallux was fixed in dorsiflexion and the patient was unable to bear weight on the right foot. On physical examination, the head of the first metatarsal protruded plantarly and was easily palpable on the plantar surface. Ecchymosis was present on the medial aspect of the first metatarsophalangeal joint. A skin crease was also noted on the dorsal aspect of the first metatarsophalangeal joint, indicating that a dislocation had occurred (Fig. 1). The neurovascular status was intact. The patient's medical and family history was unremarkable.

On radiographic analysis, the base of the proximal phalanx was noted to be dislocated in the dorsolateral direction (Fig. 2). There was a transverse fracture of the tibial sesamoid, with the most distal fragment following the base of the proximal phalanx dorsally. The fibular sesamoid and the most proximal portion of the tibial sesamoid remained plantar to the first metatarsal, indicating that a major portion of the intersesamoid ligament remained intact (Fig. 3). The medial phalangeosesamoid ligament avulsed the distal portion of the tibial sesamoid, causing the distal tibial sesamoid fragment to follow the base of the proximal phalanx. Radiographs of the contralateral foot were taken, which demonstrated the absence of a bipartite tibial sesamoid (Fig. 4).

Anesthesia was obtained with local anesthesia and intravenous sedation. The dislocation was reduced by applying pressure on the dorsum of the proximal phalanx and bending the metatarsophalangeal joint plantarly while using continuous longitudinal traction on the hallux.



**Figure 1.** Medial view of the left foot at initial presentation. Note the skin crease on the dorsal aspect of the foot just proximal to the first metatarsophalangeal joint, the taut skin plantarly, and flexion at the interphalangeal joint.

Postreduction radiographs were obtained, and significant diastasis was noted between the two tibial sesamoid fragments (Fig. 5). Significant proximal migration of both the proximal tibial sesamoid fragment and the entire fibular sesamoid was apparent due to the complete conjoined tendon/plantar plate rupture. The hallux was splinted in a plantarflexed position and a Jones compressive dressing was applied. The patient was then placed in a fracture brace, given



**Figure 2.** Radiograph of the left foot demonstrates superimposition of the proximal phalanx on the first metatarsal with noticeable fracture of the tibial sesamoid and diastasis between fragments.

crutches, advised to remain nonweightbearing and to follow-up in the Foot and Ankle Institute (Pittsburgh, Pennsylvania) in 2 days. The patient was seen in the office 2 days after the injury, and it was noted that



**Figure 3.** Lateral radiograph of the dislocated left first metatarsophalangeal joint. The base of the proximal phalanx is situated on the dorsal aspect of the first metatarsal, with the distal portion of the tibial sesamoid being displaced by the proximal phalanx. The rest of the sesamoid apparatus remains in anatomical position on the plantar aspect of the first metatarsal.



**Figure 4.** Anteroposterior radiograph of the right foot showing the absence of a bipartite tibial sesamoid.



**Figure 5.** Anteroposterior radiograph of the left foot showing adequate reduction of the first metatarsophalangeal joint. Tibial sesamoid diastasis is noted with a 9-mm gap between the fragments. Also note the proximal migration of the fibular sesamoid and proximal fragment of the tibial sesamoid.

she was extremely edematous and complaining of moderate pain on the affected side. Her fracture brace was already prematurely broken down from excessive ambulation. Unfortunately, the patient was lost to follow-up after the initial office visit.

## Discussion

Traumatic dislocation of the first metatarsophalangeal joint is a rare occurrence. There is inherent stability of the first metatarsophalangeal joint because of its multiple ligamentous attachments. The plantar surface of the joint is composed of a fibrocartilaginous plate that strongly reinforces the first metatarsophalangeal joint. The fibrocartilaginous plate is firmly attached to the plantar surface of the base of the proximal phalanx via the phalangeosesamoid ligaments and is weakly attached to the neck of the first metatarsal via the metatarsosesamoid ligaments.<sup>7</sup> The sesamoids are positioned on the plantar surface of the first metatarsal and are connected by the intersesamoid ligament. Ligaments from the extensor hood, which include the metatarsosesamoid ligaments and the collateral ligaments, also add to the stability of the joint. The flexor hallucis brevis, adductor hallucis, and abductor hallucis all contribute to make up the

sesamoid apparatus. The medial slip of the flexor hallucis brevis combines with the tendon of the abductor hallucis to insert into the tibial sesamoid and distally into the base of the proximal phalanx. The lateral slip of the flexor hallucis brevis along with the conjoined tendon of the adductor hallucis and deep transverse intermetatarsal ligament unite to insert into the fibular sesamoid and distally into the proximal phalanx. When traumatic dorsal dislocation occurs, some of the ligamentous structures are disrupted.<sup>8</sup>

Jahss<sup>3</sup> created the initial classification scheme for first metatarsophalangeal joint dislocations. He has described three types of dislocation patterns. A type I dislocation occurs when the hallux dorsally dislocates on the metatarsal, the attachment of the proximal portion of the plantar plate to metatarsal neck is torn, and the base of the proximal phalanx dislocates dorsally without disruption of the sesamoid complex. This type of dislocation is irreducible by closed reduction. Type II dislocations are further divided into two subgroups, II A and II B. Type II A dislocations are classified as rupture of the intersesamoid ligament without fracture of the sesamoids. Type II B dislocations involve a fracture of one of the sesamoids where the intersesamoid ligament remains intact. Unlike type I dislocations, types II A and II B can be closed reduced. Copeland and Kanat<sup>4</sup> added to the Jahss classification by presenting type II C, which is a combination of an intersesamoid ligament tear and sesamoid fracture (II A + II B). Good et al<sup>9</sup> and Isefuku et al<sup>8</sup> also reported type II C dislocations. Later, Jahss<sup>5</sup> described a type III dislocation where a combination of the conjoined tendons and the phalangeosesamoid ligaments ruptured, allowing the hallux to dislocate dorsally, thus leaving the entire sesamoid apparatus in anatomical position with the metatarsal head. Giannikas<sup>1</sup> and Killian<sup>10</sup> also described this type of dislocation. Early<sup>6</sup> further classified type III dislocations into III A and III B. Type III A dislocations include a complete plantar plate rupture off of the base of the proximal phalanx without sesamoid fracture. Type III B dislocations include complete rupture of the plantar plate with sesamoid fracture.

In our patient, the sesamoid apparatus remained in anatomical position with the exception of the distal portion of the tibial sesamoid. There was complete rupture of the short lateral phalangeosesamoid ligament/plantar plate, partial disruption of the intersesamoid ligament, and a transverse fracture of the tibial sesamoid, with dorsal transposition of the most distal fragment (Fig. 3). The medial phalangeal sesamoid ligament remained intact to the distal fragment of the tibial sesamoid, which avulsed dorsally. The rest of the sesamoid apparatus remained plantar to the meta-

tarsal and retracted a few millimeters proximal, indicating complete rupture of the tendinous attachments. This would classify our patient as having a type III B metatarsophalangeal joint dislocation as diagrammed by Early.<sup>6</sup> This injury would most closely resemble that described by Hall et al,<sup>11</sup> whose patient had a bipartite tibial sesamoid diastasis; our patient had a tibial sesamoid fracture. Hall et al<sup>11</sup> stated that their case was a variant of the type II B dislocation that Jahss<sup>5</sup> described and the type II C dislocation described by Copeland and Kanat.<sup>4</sup> Unlike Hall et al, we believe that the dislocation we are presenting is a variant of the type III dislocation for two reasons. First, the intersesamoid ligament was only partially ruptured, as part of its integrity was maintained with the proximal portion of the tibial sesamoid, indicating that the medial portion of the plantar plate was still adhered to the base of the proximal phalanx. Second, the fibular sesamoid and the proximal portion of the tibial sesamoid remained plantar to the first metatarsal rather than displacing dorsally with the proximal phalanx. Jahss<sup>5</sup> discovered that a type III dislocation occurs when the medial and lateral conjoined phalangeal sesamoid tendon completely ruptures. We believe our case is classified specifically as the type III B dislocation Early<sup>6</sup> described as opposed to the type II variant Hall et al<sup>11</sup> had previously described. Ours appears to be the first case of a type III B metatarsophalangeal joint dislocation reported in the literature.

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