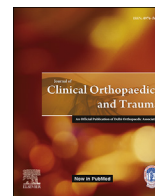




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## Fracture of the ulnar sesamoid bone of the thumb with a concurrent ulnar collateral ligament tear: A case report

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## ABSTRACT

While the ulnar sesamoid bone of the thumb and the ulnar collateral ligament (UCL) are in close anatomic proximity, concurrent injury to these structures has not been reported. We report a case of such an injury in a 53-year-old male after an altercation. He was treated with surgical repair of the UCL, postoperative immobilization, and a graduated rehabilitation program consisting of range of motion and strengthening exercises. After review of the literature, we recommend that clinicians consider not just a volar plate injury, but also a UCL injury, in patients presenting with radiographic evidence of a sesamoid fracture. Clinicians should have a low threshold for advanced imaging in these patients to confirm any suspected ligamentous injury.

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## 1. Introduction

The sesamoid bones of the thumb are ossifications within tendons which serve to decrease friction and provide protection to the tendon. Almost all individuals have two sesamoid bones on the volar aspect of the thumb metacarpophalangeal (MCP) joint. The flexor pollicis brevis muscle inserts on the radial sesamoid, while the adductor pollicis inserts on the ulnar sesamoid.<sup>1</sup> Patients with sesamoid injuries typically present with point tenderness over the injured sesamoid, as well as pain and ecchymosis on the flexor surface extending to the thenar eminence.<sup>2</sup> The ulnar collateral ligament (UCL), along with the radial collateral ligament and volar plate, is one of the primary stabilizers of the thumb MCP joint. Injury to the UCL is relatively common. These patients typically present with soft tissue swelling, ecchymosis, and tenderness along the MCP joint ulnarly. In one review of 1000 thumb MCP joint injuries, trauma to the UCL made up 86% of the cases.<sup>3</sup> Injury to the sesamoid bones of the thumb is rare, with only about 40 cases reported in the literature since 1915.<sup>1</sup> While volar plate injuries have been reported concurrently with sesamoid fractures, we could not find any reported cases of a sesamoid fracture with a concurrent UCL rupture. We report a case of a 53-year-old male with an ulnar

sesamoid fracture and UCL rupture following a physical altercation, as well as review of the current literature regarding this fracture and concurrent ligamentous injury.

## 2. Case report

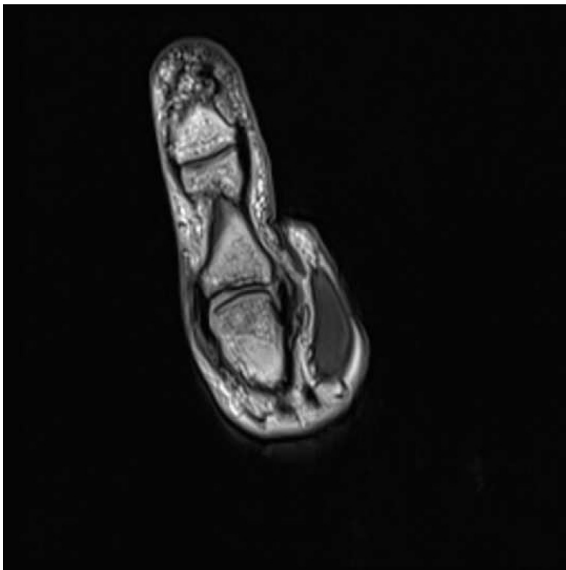
A 53-year-old, right hand dominant, male presented to our hand surgery clinic 5 days following an assault. He stated that he was thrown to the ground. He sustained an injury only to his thumb, and was unsure of the exact mechanism of injury. Initial evaluation in the emergency department on the day of injury revealed only a fracture of the ulnar sesamoid bone of the thumb MCP joint. Upon evaluation in our clinic, the patient had tenderness over the ulnar sesamoid, which extended along the ulnar aspect of the MCP joint. He had no tenderness over the volar plate or radial collateral ligament. He did not have any hyperextension at the MCP joint to suggest a volar plate injury. The flexors and extensors were intact. He did have lateral instability with stress testing of the UCL in both full extension and with the MCP joint in 30° of flexion. Repeat radiographs confirmed the fracture of the ulnar sesamoid (Fig. 1). At that time, we elected to attempt non-operative management and the patient was placed in a short arm thumb spica cast. He followed up after 6 weeks of casting with persistent pain along the ulnar aspect of the thumb MCP joint, as well as laxity to stress testing. MRI of the thumb was subsequently obtained and confirmed a grade 3 rupture of the UCL off the proximal phalanx (Fig. 2) and an

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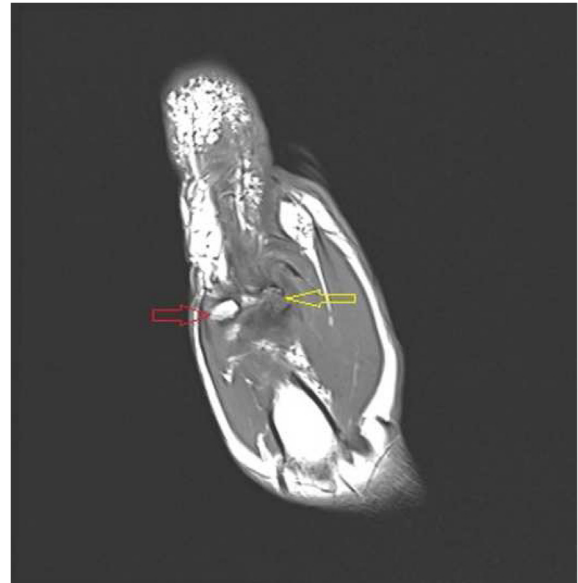


**Fig. 1.** Anteroposterior radiograph of the thumb demonstrating a transverse fracture of the ulnar sesamoid bone of the thumb MCP joint.



**Fig. 2.** Coronal, T2 weighted MRI of the thumb demonstrating rupture of the ulnar collateral ligament off of the proximal phalanx.

ulnar sesamoid bone fracture (Fig. 3). The patient underwent a direct surgical repair of the UCL utilizing an internal brace technique with synthetic graft. Following surgery, he was immobilized in a hand-based thumb spica splint with the IP joint free. Gentle range of motion was started 2 weeks after surgery. Return to activities was achieved at 8 weeks from the day of surgery. At his final office visit at 6 months, he demonstrated no instability of the MCP joint. He was non-tender over the ulnar sesamoid. He deferred repeat thumb radiographs due to cost. He demonstrated MCP extension of  $0^\circ$ , and flexion of  $60^\circ$ . This was symmetric to the contralateral thumb. Grip strength was 80 pounds bilaterally, and lateral pinch was 15 pounds bilaterally. The patient was lost to follow up after this time. The patient was informed that data regarding the case would be submitted for publication, and he provided verbal consent.



**Fig. 3.** Coronal, T1 weighted MRI best demonstrates the fractured ulnar sesamoid bone (yellow arrow). Radial sesamoid is identified and intact for reference (red arrow).

### 3. Literature review

The first sesamoid fracture was described in the literature in 1915, and since then approximately 40 cases have been reported.<sup>4</sup> The age range of patients with sesamoid fractures reported in the literature is between 16 and 75 years old. The ulnar sesamoid appears to be involved in three-fourths of cases, while the radial sesamoid makes up the remaining fourth of patients.<sup>1</sup> Sesamoid fractures are typically diagnosed on standard anteroposterior, oblique, and lateral radiographs of the thumb. Volar plate and collateral ligament injury can be diagnosed clinically. However, advanced imaging (i.e. ultrasound or magnetic resonance imaging) may be utilized to confirm the diagnosis.

Stener was the first to identify concurrent volar plate injury in some sesamoid fractures in 1963.<sup>5</sup> Only 5 of the 40 previously reported cases had a volar plate injury with instability. Stener recommended operative repair in these patients due to their hyperextension instability at the MCP joint. Intraoperatively, he found the volar plate to be ruptured at the site of the sesamoid fracture.<sup>5</sup> Sesamoid fractures without volar plate injury/hyperextension instability have traditionally been treated with immobilization of the thumb in  $30^\circ$  of MCP joint flexion for 2–4 weeks, followed by early range of motion.<sup>2,6–8</sup> Excision of the sesamoid is reserved for intractable pain.<sup>9</sup> Patients typically recover fully from these injuries and return to previous level of function around 8 weeks.<sup>1,6–8</sup> Like volar plate injuries with hyperextension instability, surgical management is recommended for grade 3 UCL ruptures to restore stability to the MCP joint.

A classification for sesamoid fractures was proposed by Patel et al., in 1990.<sup>2</sup> Type 1 injuries are isolated sesamoid fractures, without volar plate injury and normal flexion posture of the MCP joint. Type 2 injuries involve a concurrent volar plate injury with the MCP joint assuming a hyperextended posture.

### 4. Conclusion

Fractures of the sesamoid bones involving the thumb are a rare entity, and even more rarely involve the volar plate or collateral ligaments. Despite the rarity of concurrent ligamentous injury, it is

**Table 1**Shows the suggested modification of the classification of sesamoid fractures of the thumb Originally proposed by Patel et al.<sup>2</sup>

Type	Associated Findings
Type 1 Sesamoid fracture	<ul style="list-style-type: none"> <li>• Isolated sesamoid fracture on radiographs.</li> <li>• Normal flexion posture of the MCP joint.</li> <li>• Intact flexion and extension of the thumb.</li> </ul>
Type 2 Sesamoid fracture with volar plate injury	<ul style="list-style-type: none"> <li>• Sesamoid fracture on radiographs.</li> <li>• Thumb MCP joint assumes hyperextended posture.</li> <li>• Unstable with hyperextension of the MCP joint.</li> <li>• Decreased flexion of the MCP joint.</li> </ul>
Type 3 Sesamoid fracture with collateral ligament injury (radial or ulnar)	<ul style="list-style-type: none"> <li>• Sesamoid fracture on radiographs.</li> <li>• Normal flexion posture of the MCP joint.</li> <li>• May have radial or ulnar deviation of the thumb at the MCP joint.</li> <li>• Lateral instability with stress testing (no instability with hyperextension).</li> <li>• Intact flexion and extension of the thumb.</li> </ul>

important for clinicians to adequately assess these structures in patients with radiographic evidence of a sesamoid fracture. Clinicians should have a low threshold for ordering advanced imaging if there is any concern for injury to the volar plate or collateral ligaments, especially as there may be significant guarding by the patient due to pain from their fracture, making adequate evaluation difficult. We believe a third type of injury could be added to the previous classification by Patel et al. (Table 1). This third type of injury being a sesamoid fracture with concurrent radial or ulnar collateral ligament rupture and associated lateral instability, and no volar plate injury. With type 2 injuries the volar plate tear seems to propagate from the sesamoid volarly. However, in potential type 3 injuries, we believe abduction or adduction of the thumb MCP joint in addition to the hyperextension nature of the injury may instead cause a tear to extend laterally from the injured sesamoid to the ipsilateral collateral ligament. Like in type 2 injuries, these patients would require surgical repair of the injured ligament to restore stability to the MCP joint. With appropriate treatment of these injuries patients can typically expect return to normal activities within a relatively short time frame.

#### Declaration of competing interest

The authors whose names are listed immediately below certify that they have NO affiliations with or involvement in any

organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

#### References

1. Naald MVD, Naald NVD, Velde DVD, Schuurman AH. Fracture of the sesamoid bone of the thumb. *JBJS Case Connect.* 2019;9(1).
2. Patel M, Pearlman H, Bassini L, Ravich S. Fractures of the sesamoid bones of the thumb. *J Hand Surg.* 1990;15(5):776–781.
3. Moutet F, Guinard D, Lebrun C, Bello-Champel P, Massart P. Metacarpophalangeal thumb sprains based on experience with more than 1,000 cases. *Ann Chir Main.* 1989;8(2):99–109.
4. Skillern PG. On fractures of the sesamoid bones of the thumb. *Ann Surg.* 1915;62(3):297–301.
5. Stener B. Hyperextension injuries of the metacarpophalangeal joint of the thumb. *Acta Chir Scan.* 1963;57:619–621.
6. Dong PR, Seeger LL, Shapiro MS, Levere SM. Fractures of the sesamoid bones of the thumb. *Am J Sports Med.* 1995;23(3):336–339.
7. Ishizuki M, Nakagawa T, Ito S. Hyperextension injuries of the MP joint of the thumb. *J Hand Surg.* 1994;19(3):361–367.
8. Deabate L, Garavaglia G, Lucchina S, Fusetti C. Fracture of the radial sesamoid bone of the thumb: an unusual fracture. *Chin J Traumatol.* 2011;14(5):309–311.
9. Hansen CA, Peterson TH. Fracture of the thumb sesamoid bones. *J Hand Surg.* 1987;12(2):269–270.