

## [ Orthopaedic Surgery ]

# Non-FOOSH Scaphoid Fractures in Young Athletes: A Case Series and Short Clinical Review

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**Context:** The scaphoid is the most commonly fractured bone in the wrist and can often be difficult to treat and manage, making healing of this fracture problematic.

**Evidence Acquisition:** A search of the entire PubMed (MEDLINE) database using the terms *scaphoid fracture management* and *scaphoid fracture evaluation* returned several relevant anatomic and imaging references.

**Results:** Wrist fractures most commonly occur in the scaphoid, which is implicated approximately 60% of the time. The most common mechanism of injury leading to a scaphoid fracture is a fall on an outstretched hand (FOOSH), causing a hyperextension force on the wrist. The following 2 cases, which occurred within 3 months of each other, highlight the difficulty of managing patients with possible scaphoid fractures. Neither patient had a typical FOOSH-related mechanism of injury, and neither was initially tender over the scaphoid.

**Conclusion:** Differential diagnoses should include a scaphoid fracture with any hyperextension traumatic injury (FOOSH or non-FOOSH), even in the absence of scaphoid tenderness and when initial radiographic findings are normal.

**Keywords:** scaphoid; fracture; evaluation

The scaphoid is the most commonly fractured carpal bone in the wrist, implicated approximately 60% of the time.<sup>1,2,5</sup> The most common mechanism of injury leading to a scaphoid fracture is a fall on an outstretched hand (FOOSH), causing a hyperextension force on the wrist.<sup>1,2,4,5</sup>

The problematic nature of scaphoid fracture diagnosis and healing is well documented.<sup>4</sup> Scaphoid fractures may initially be occult (approximately 10%), as preliminary radiographs are often unremarkable.<sup>3</sup> While computed topography (CT) scans or magnetic resonance imaging (MRI) would be more sensitive, these advanced imaging techniques may not be cost-effective for many recreational athletes. In such cases, appropriate management for a patient following trauma to the wrist resulting in “snuff-box” tenderness (scaphoid) may include wrist immobilization in the form of a cast or brace, followed by repeat radiographs approximately 2 weeks following injury if the tenderness remains.<sup>1</sup>

The following 2 cases, which occurred within 3 months of each other, highlight the difficulty of managing patients with possible scaphoid fractures. Neither patient had a typical

FOOSH-related mechanism of injury, nor was either initially tender over the scaphoid.

## CASE 1

A 23-year-old college student-athlete sustained an injury to his left wrist while playing goalie in a club team handball game. His wrist was forced into extension by blocking a handball. He did not dive or fall during the goal save; however, he was unable to continue playing secondary to wrist pain. He presented the following morning to a direct access physical therapy clinic complaining of pain along the radial aspect of the wrist. He had localized edema and approximately 40° of extension and flexion range of motion (ROM) limitation due to pain. Wrist strength was normal. He was tender at the distal radius without snuff-box pain.

Because of a possible fracture, he was placed in a thumb spica splint and referred for plain radiographs (posterior/anterior, lateral, and scaphoid views), which were normal

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Figure 1. A posterior/anterior radiograph of the left wrist with navicular view taken the day after the injury and was read as normal.

(Figure 1). A wrist sprain appeared most likely at this time. An occult scaphoid fracture was not likely given the non-FOOSH mechanism of injury and lack of tenderness in the snuff-box region. Initial management was a thumb spica splint for 1 week.

He returned 4 days later feeling much better and enrolled in a physical education combative course. ROM was normal with the exception of 15° to 20° loss of wrist extension without snuff-box pain. The splint was recommended for his physical education course with decreasing use for other activity as long as the wrist continued to improve.

Approximately 4 weeks later, he completed his physical education course with minimal difficulty but was unable to do push-ups secondary to wrist pain. He still lacked 10° to 12° of wrist extension due to pain. He did not have pain to palpation over the snuff-box region. MRI was obtained to assess scapholunate injury and showed a waist fracture of the scaphoid (Figure 2). He was placed in a thumb spica cast for 6 weeks but showed limited healing, requiring continued immobilization and a bone stimulator for 30 minutes daily for an additional 6 weeks. Subsequent bone healing was evident on CT scan following 12 weeks of immobilization without surgical fixation.

## CASE 2

A 20-year-old college student-athlete had global wrist pain for 4 weeks after playing goalie in a recreational soccer game. His

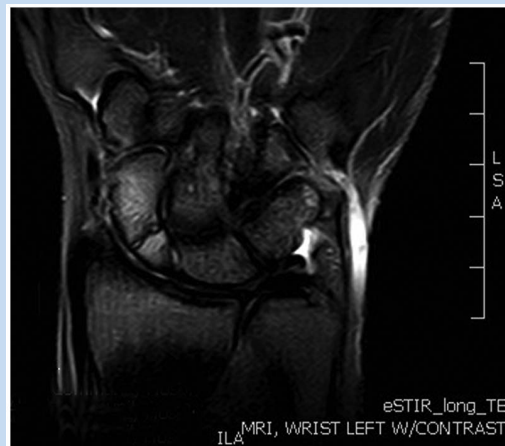


Figure 2. MRI with contrast (coronal image [short-tau inversion recovery]), which depicts a nondisplaced waist fracture of the scaphoid.



Figure 3. A posterior/anterior radiograph of the right wrist with navicular view, demonstrating a nondisplaced fracture of the proximal pole of the scaphoid, taken approximately 4 weeks after injury.

wrist was forced into extension by blocking a soccer ball. He did not dive or fall. The only thing that bothered him at that time was wrist hyperextension. The athletic trainer thought he had sprained his wrist. No radiographs were obtained.

After 2 or 3 days, he returned to his regular exercise routine and soccer. He did not lift heavy weights but did pull-ups and modified push-ups, keeping his wrist in a neutral position. While playing soccer 2 weeks later, he had a similar "shot

block” event that reinjured his wrist. Because he continued to have wrist pain, he decreased his “load-bearing” exercises and began swimming.

He did not have localized edema and had full wrist ROM except for an 8° to 10° loss of wrist extension due to wrist pain. The only objective test that reproduced his wrist pain was the push-up. Plain radiographs demonstrated a nondisplaced fracture of the proximal pole of the scaphoid (Figure 3). Following 6 weeks of immobilization, healing was present.

## DISCUSSION

These 2 cases present a dilemma faced by health care practitioners in determining the appropriate assessment and follow-up care for patients with wrist pain following a hyperextension injury. The possibility of a scaphoid fracture in these cases was perhaps underestimated due to the atypical mechanism of injury (non-FOOSH), the lack of specific scaphoid tenderness, and the relatively high functional ability shortly following initial injury.

Management of wrist pain resulting from a FOOSH injury that is accompanied by snuff-box tenderness, even in the absence of positive radiographic findings for a scaphoid fracture, is fairly straightforward. In high-profile athletes, team physicians would most likely opt for advanced imaging, such as MRI or CT scan, to definitively rule out a scaphoid fracture.<sup>3</sup> In recreational athletes, immobilization of the wrist in a thumb spica cast for approximately 2 weeks, followed by a repeat physical examination and radiographs, is practical.<sup>1</sup>

Management of wrist pain from a non-FOOSH injury that is not accompanied by snuff-box tenderness in the absence of positive radiographic findings is not straightforward. Advanced imaging is typically not warranted. Immobilization in these cases, however, may lead to “overtreating” many patients

who do not have a fracture and may thus lead to decreased productivity, lost work days, and other potential costs.<sup>6</sup>

These 2 patients were college students in a military academic environment that required physical education courses plus several hours per week of physical exercise. These requirements and their high-level activity could explain their delay in medical follow-up.

The differential diagnoses should include a scaphoid fracture with any hyperextension wrist injury even in the absence of scaphoid tenderness or radiographic abnormality. The safest treatment is a thumb spica cast for 2 weeks followed by repeat examination and imaging. A follow-up examination 1 to 2 weeks following injury may be most important. Repeat radiographs or advanced imaging (MRI or CT scan) may be indicated if the patient continues to experience tenderness or pain when placed in a provocative position (push-up).<sup>3</sup>

Clinical judgment may be clouded by patients that continue functioning at a high level, obscuring a fracture. Increased awareness of the occult scaphoid fracture may prevent further loss of function and potential long-term disability.

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