

Carpal Fractures

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Planners

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Learning Objectives

- List the relative frequency of 7 carpal fractures.
- Discuss the mechanism of injury for each carpal fracture.
- Review the clinical presentations of carpal fractures.
- Identify the best imaging modalities for diagnosing carpal fractures.
- Offer surgical and nonsurgical treatment options for each carpal fracture.

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Carpal fractures are exceedingly rare clinical entities and are often associated with concomitant injuries. In this review, we focus on fractures of the carpus, excluding the scaphoid, and provide an update on the current consensus as to mechanism, diagnosis, management, outcomes, and complications after such injuries. (*J Hand Surg Am.* 2014;39(4):785–791. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Carpal fracture, hamate, lunate, trapezium, triquetrum.

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FRACTURES OF THE CARPALS OTHER than the scaphoid are exceedingly rare and comprise approximately 1.1% of all fractures.¹ The mechanism of injury, most frequently a fall onto an outstretched hand, often dictates the fracture pattern. The injuries can be divided into 3 main groups: perilunate injuries, axial injuries, and avulsion/impaction injuries.² Clinical suspicion should be high and a detailed physical examination must be undertaken, because the clinical signs may be subtle and standard radiographic



FIGURE 1: Plain radiograph demonstrating a triquetrum fracture (arrow).

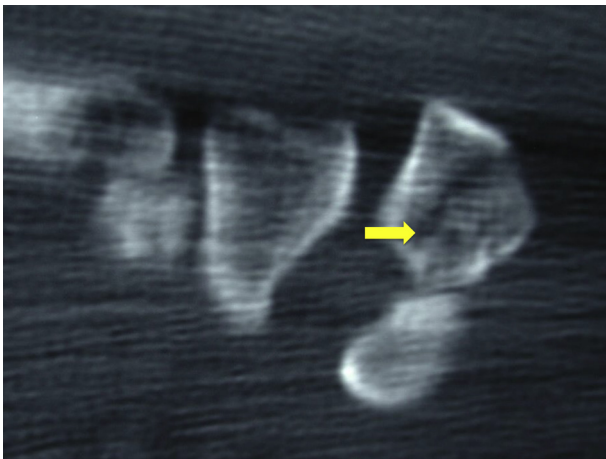


FIGURE 2: Corresponding CT image showing a fracture of the triquetrum (arrow).

examination is frequently insufficient to demonstrate a clear fracture. Therefore, given the unique osseous and ligamentous anatomy of the individual carpals, an understanding of each bone is required to best manage these rare injuries. In this review, we discuss the more common fractures involving the individual carpals, excluding the scaphoid, and outline their presentation and subsequent management.

TRIQUETRAL FRACTURES

Triquetral fractures are the second most common isolated carpal fracture after scaphoid fractures (about 15%) (Figs. 1, 2).^{3,4} Three main patterns have been described: (1) dorsal cortical fractures, (2) triquetral body fractures, and (3) volar avulsion fractures.⁵ Various theories have been proposed to describe the different patterns of fracture propagation; most

commonly, wrist dorsiflexion and ulnar deviation precipitates fractures of the dorsal cortex of the triquetrum.^{3,6} Although considered by some authors as a compression fracture from a prominent ulnar styloid or hamate, they are typically avulsion fractures from the attachments of the radiotriquetral (dorsal radiocarpal) and triquetrosaphoid (dorsal intercarpal) ligaments at their apex and are the most common type of triquetral fracture.^{3,7,8}

Focal tenderness over the dorsum of the triquetrum is suggestive of a triquetral avulsion fracture in the context of a fall onto an outstretched hand. Lateral radiographs and/or 45° pronated oblique views profile the bony avulsion fragment. Management is usually nonsurgical. Because the injury is a hallmark of avulsion of the important dorsal wrist ligaments, cast immobilization of the wrist for 3 to 4 weeks is recommended to facilitate ligament healing, followed by progressive return to range of motion and strengthening of the wrist. Reduction in pain generally occurs within 6 to 8 weeks with good return of wrist motion and minimal residual functional deficit.⁸

The next most common fracture is a triquetral body fracture that can occur in a variety of fracture patterns, largely depending on the mechanism of injury. Sagittal fractures are associated with crush injuries or axial dislocations, medial tuberosity fractures are from a direct blow, transverse fractures are associated with perilunate injuries, and comminuted fractures are from high-energy trauma.^{2,6} Other carpal fractures or lunotriquetral ligament injuries may be present.

Focal triquetral tenderness is the hallmark of the injury. Although fractures may be seen on plain posteroanterior (PA), lateral, and 45° pronated radiographs, computed tomographic images (CT) may be required to further delineate the extent of the fracture and any associated injuries, and help determine subsequent management. The degree of fracture displacement and the presence of associated injuries will determine operative versus nonsurgical treatment. Rare nonunions of the triquetrum requiring future operative intervention have been reported in the literature; however, immobilization for an isolated body fracture for 4 to 6 weeks is the treatment of choice.^{9,10}

Given the mechanism of injury, the examiner should maintain a high index of suspicion for an associated lunotriquetral ligament injury. If disrupted, pinning across the lunotriquetral interval is recommended. For body fractures that are notably displaced, open reduction internal fixation with a compression screw and/or Kirschner wires may be required. Literature results are sparse and often obscured by associated injuries.

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