

Emergency Case

Harold Schubert, MD

Triquetrum fracture

QUESTIONS

A 23-year-old rollerblader fell on his outstretched right hand. The wrist is very tender but does not show signs suggesting fracture of the radius or scaphoid. What other carpal bone fracture commonly results from a fall on an outstretched hand? How does the mechanism of injury differ from the mechanism for scaphoid fracture? Is vascular supply a concern? How does treatment differ?

Falling on an outstretched hand frequently results in injury and disability for active, working, young people. The bones commonly fractured in such a fall, in approximate order of frequency, are the distal radius (with or without the ulnar styloid—including Colles' fracture), the scaphoid, the head of the radius, the triquetrum, and the lunate.

The rollerblader in this case said he fell backward, and he presented with pain in his right wrist. Examination of the wrist showed no joint effusion and no tenderness at the distal radius, the anatomical snuffbox, or the scaphoid tubercle. There was some swelling and discrete tenderness at the dorsal ulnar aspect of the wrist. This tenderness was precisely at what has been called "the triquetral point,"¹ the first bony point on the dorsum of the wrist immediately distal to the ulnar styloid.

Types of fractures

Triquetrum fractures are of two types: fractures of the body of the triquetrum and, more commonly, chip (or flake) fractures of the dorsal triquetrum. Chip fractures outnumber body fractures by at least five to one^{1,2}; the true incidence of triquetrum chip fractures is unknown because the injury is often undiagnosed or misdiagnosed as "wrist sprain."

Fractures of the body of the triquetrum result from excessive force to the dorsum of the wrist that compresses the triquetrum against the pisiform bone. This could be from a direct blow to the wrist or from the ulnar styloid striking the dorsal triquetrum during a fall on an outstretched hand.

Mechanism of injury

Chip fractures of the dorsal triquetrum were, for many years, considered avulsion fractures involving the ligaments of the wrist joint and proximal carpal row. This mechanism would require a fall on the hand with the wrist flexed. In fact, the history of some triquetrum fractures has indicated that they resulted from falls on flexed wrists.³

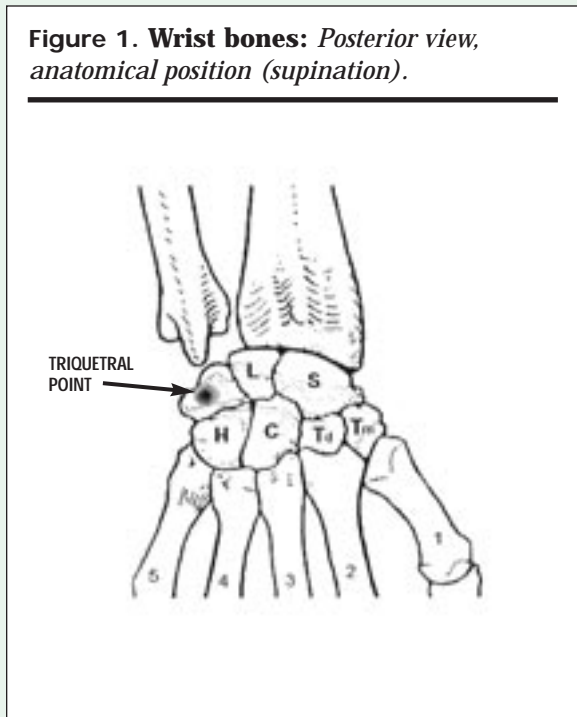
Most authors in the field now believe that dorsal chip fractures are commonly caused by the "chisel" action of the ulnar styloid on the dorsal surface of the triquetrum during a fall on an outstretched, ulnar-deviated hand with the wrist extended.^{3,4} In support of this theory, anatomical studies have demonstrated that the ulnar styloid contacts the dorsal triquetrum during extension of the wrist.⁴ Two studies report that, of a total of 92 patients with triquetrum chip fractures, most had ulnar styloid processes longer than those found in the general population.^{3,4} In one series of triquetrum chip fractures, most patients had fallen backward on their hands with their wrists extended and hands supinated.³

Another minority opinion is that dorsal chip fractures result from chisel action by the proximal dorsal edge of the hamate in falls on outstretched hands.²

The position of the ulnar styloid varies in relation to the triquetrum depending on supination or pronation of the wrist. Check it on your own wrist. The relationship of the ulnar styloid and triquetrum shown in **Figure 1** is accurate only in a supinated wrist. With pronation, the ulnar styloid assumes a position at the

Dr Schubert practises emergency medicine at the University of British Columbia Hospital in Vancouver.

Figure 1. Wrist bones: Posterior view, anatomical position (supination).



ulnar side of the wrist. Given this anatomical variability and the rather strict criteria needed for the ulnar styloid chisel hypothesis, it seems plausible that a variety of mechanisms can result in triquetrum fracture.

X-ray examinations

Standard wrist x-ray examinations include posteroanterior (PA), lateral, and PA oblique (45°) views. The films must be examined for other fractures and to assess the alignment of the carpal bones. Dorsal triquetrum chip fractures are often difficult to see radiographically and are seldom visible on the PA view.⁵ A bone chip might be seen on the lateral view dorsal to the proximal carpal row; clinical correlation with the area of tenderness can identify this as a triquetrum fracture. The PA oblique view might show a triquetrum chip fracture. If a suspected dorsal triquetrum fracture is not seen on any of the standard views, an AP oblique view (45°) might show it.

Triquetrum fractures occur as isolated fractures in 50% to 80% of cases. When other fractures are associated, they are most often of the distal radius (with or without distal ulna) or the scaphoid.²

Triquetrum fractures are common in children.¹ It can be especially difficult to visualize chip fractures in children radiographically because fracture fragments can be mostly or entirely cartilage.

Management

The triquetrum has a rich vascular supply so neither body nor chip fractures warrant concern about avascular necrosis.⁴ Also, neither isolated fractures of the body nor chip fractures of the dorsal triquetrum are associated with ligamentous wrist-joint instability.⁴

Fractures of the triquetrum body should be treated in a short arm cast until clinical and radiographic signs of union appear. This takes 3 to 6 weeks, depending on a patient's age.

Chip fractures of the dorsal triquetrum are nonarticular; the chip might unite with the triquetrum body or, if the gap between them is 2 mm or more, a separate ossicle might form.² In any event, no long-term problems have been reported to result from dorsal triquetrum chip fractures. Only symptom treatment is required.⁵ Light splinting with an elastic wrap or other removable splint to provide cushioning and limit flexion and extension is sufficient. The duration of splinting is as required for comfort. Follow up is optional; in cases where a decision is needed for return to work or other activity, follow up and x-ray examinations at the usual times will suffice.

ANSWERS

Fracture of the triquetrum is the second most common carpal fracture; lunate fracture is a distant third. Triquetrum fracture most commonly results from chisel action of the ulnar styloid on the triquetrum during a fall backward onto an ulnar-deviated hand with the wrist extended. Vascular compromise is not a concern for triquetrum fracture. A common chip fracture of the dorsal triquetrum requires only symptom treatment. ❖

References

- Letts M, Esser D. Fractures of the triquetrum in children. *J Pediatr Orthop* 1993;13:228-31.
- Hocker K, Menschik A. Chip fractures of the triquetrum. *J Hand Surg [Br]* 1994;19B(5):584-8.
- Garcia-Elias M. Dorsal fractures of the triquetrum—avulsion or compression fractures? *J Hand Surg [Am]* 1987;12A(2):266-8.
- Levy M, Fischel RE, Stern GM, Goldberg I. Chip fractures of the os triquetrum. *J Bone Joint Surg Br* 1979;61B(3):355-7.
- DeBeer JdeV, Hudson DA. Fractures of the triquetrum. *J Hand Surg [Br]* 1987;12B(1):52-3.

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