Emergency Department Evaluation and Treatment of Wrist Injuries

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KEYWORDS

• Wrist injury • Dislocation • Carpal bone • Scaphoid

KEY POINTS

- Correct diagnosis of wrist injuries is critical in preventing prolonged pain and dysfunction.
- Plain radiographs cannot diagnose a large percentage of injuries.
- Distal radius fractures are treated by splinting. Colles fractures are splinted in neutral or pronation; Smith's fractures are splinted in supination.
- The scaphoid is the most commonly-injured carpal bone. If fracture is suspected but not seen on radiographs, it should be treated by thumb spica splinting to prevent complications.
- Carpal dislocations are relatively rare, but can lead to significant disfunction if not emergently treated. Emergent orthopedic consultation is warranted.

The wrist, although a comparatively small part of the human body, is complex in its mechanics and function and, when injured, can lead to significant morbidity.

- Approximately 2.5% of all emergency department (ED) visits in the United States are for wrist injuries.[1]
- Approximately 1.5% of all ED visits are for hand and/or forearm fractures.[2]
- Approximately 20% of hand and wrist fractures are carpal bone fractures.[3]
- The elderly have the highest rates of carpal bone injury, with most injuries occurring as a result of accidental falls in the home.[2]
- The scaphoid is the most commonly fractured carpal bone.[3]

Correct diagnosis of wrist injuries is critical in preventing prolonged pain and dysfunction. It is complicated in that plain radiographs cannot diagnose a large percentage of injuries. Wrist sprain is considered one of the most common yet most treacherous ED diagnoses[1] because radiographs do not always rule out all acute injuries. Knowledge of the anatomy, normal physical examination findings, and

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physical examination abnormalities associated with different pathological conditions, is paramount in making the correct diagnosis. This article focuses on the anatomy, diagnosis, and ED management of acute wrist injuries, including fractures and dislocations.

NORMAL ANATOMY, RADIOGRAPHY, AND PHYSICAL EXAMINATION

Normal Anatomy and Radiography

The wrist, from proximal to distal, is comprised of the distal radius, ulna, and 8 carpal bones that are arranged into 2 arching rows (**Fig. 1**).

- The proximal carpal bones (from radial to ulnar direction) include: scaphoid, lunate, triquetrum, and pisiform (a sesamoid bone associated with the flexor carpi ulnaris tendon).[3]
- The distal carpal bones (from radial to ulnar direction) include trapezium, trapezoid, capitate, and hamate.

There is characteristic normal alignment of the 2 rows on posterior-anterior (PA) and lateral projections, with the "three lines of Gilula"[3] and the stacked C-shapes seen on each view, respectively.

- PA view: proximal and distal articular surfaces of the proximal row and the proximal surface of the distal row making up the "3 lines of Gilula" (**Fig. 2**).[4]
- Lateral view: the distal radius, lunate, capitate, and third metacarpal align in C-shapes (**Fig. 3**).[4]
- The radial height and palmar tilt angles are relevant in evaluating the distal radius (**Fig. 4**).[5]

Normal Physical Examination

On physical examination, the scaphoid can be palpated in the so-called snuff box, which is bordered by the tendons of the extensor pollicis longus and abductor pollicis longus.[3] Flexion of the wrist allows the palpation of the lunate just distal to the radius, ulnar to the scaphoid, and in line with the third phalanx. The triquetrum is distal to the ulna and the pisiform is palpated on the volar distal wrist in line with the fifth phalanx. The distal row of carpal bones is palpated just proximal to the metacarpals. The

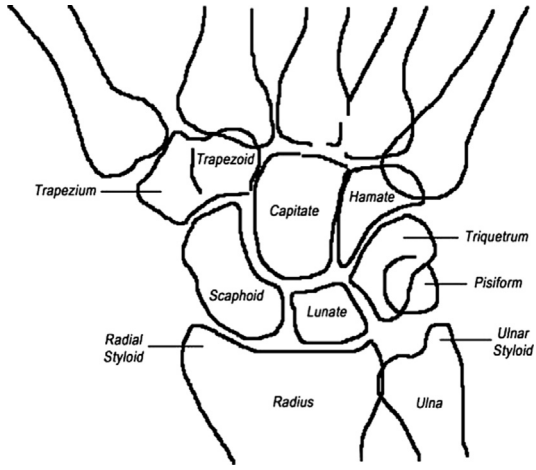

Fig. 1. Bony anatomy of the wrist.