

Distal Ulna Fractures

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In isolation, distal ulna fractures are rare. They are often found in conjunction with distal radius fractures, and the complexity of the interaction of the distal ulna with the radioulnar joint and triangular fibrocartilage complex makes understanding and treatment of distal ulna fractures challenging. Fixation of distal ulna fractures can be problematic owing to comminution making reduction challenging. A thin soft tissue can lead to hardware prominence and necessitate implant removal. In this Current Concepts article, we review the anatomy, pathology, and treatment of distal ulna fractures as well as potential complications and salvage procedures. (*J Hand Surg Am.* 2014;39(2):385–391. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Distal ulna, ulna fractures, distal radioulnar joint, forearm fractures, wrist fractures.

DISTAL ULNA FRACTURES are relatively uncommon in isolation, but they are frequently associated with distal radius fractures in the form of ulnar styloid fractures. When distal ulna fractures are isolated, direct trauma causing the so-called “nightstick” fracture, occurring from a focal blow against the soft tissue–deficient ulnar border, is the prevailing mechanism. Other injured structures may include the interosseous membrane (IOM), distal radioulnar joint (DRUJ), and triangular fibrocartilage complex (TFCC). The complex interaction between these structures is what creates a challenging diagnostic and treatment algorithm.

The ulna is the stable unit of the forearm proximally, around which the radius rotates. Distally, the ulna becomes a narrow straight bone that supports the radius and the hand. Along its length, it is tethered to the radius by the IOM. At its most distal extent, it is made up of the head, fovea, and styloid process. The ulnar head acts as a keystone maintaining stability at the DRUJ. Disrupting the keystone architecture through resection of the ulnar head results

in realignment of the forearm joint axis of rotation and may negatively influence wrist stability and strength.¹ The ulnar head has 2 parts: the dome directed toward the carpus and the seat, which articulates with the radius at the sigmoid notch where it is covered with approximately 130° of articular cartilage.² The ulnar styloid is the bony projection of the distal ulna and provides the attachment for the superficial component of the dorsal and ulnar DRUJ ligaments (Fig. 1). The fovea is the center axis of ulnar head rotation and serves as the attachment for the deep components of the DRUJ ligaments and deep fibers of the TFCC. The biomechanics at the wrist demonstrate a variable load across the ulnocarpal joint, depending on the rotational position of the wrist and grip. With the wrist in neutral rotation, the ulnocarpal joint bears nearly 20% of the load across the wrist with a relative increase in ulnar length and loading as the forearm moves into pronation and with grip.^{3,4}

DIAGNOSIS

Imaging and workup for suspected fractures of the distal ulna should focus on the location of maximal pain and tenderness. However, radial head dislocations or other concomitant injuries proximal and distal to the fracture site must be considered. Dedicated x-rays of the elbow may be indicated to avoid missing an injury to this region. Standard radiographs of the wrist should be obtained, with consideration given to obtaining computed tomography (CT) scans to accurately define fracture fragments. It is unclear what the associations are between

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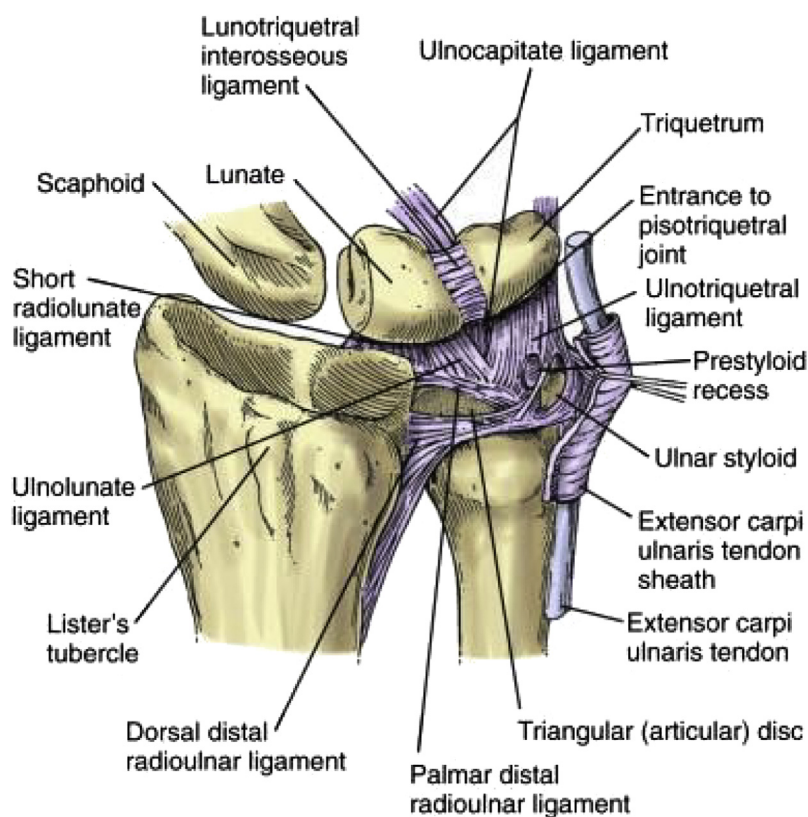


FIGURE 1: Distal ulna and distal radioulnar joint with TFCC. (Reprinted with permission from Rynders SD, Chhabra AB. Triangular fibrocartilage complex injuries. In: Miller M, Hart J, MacKnight MD, eds. *Essential Orthopedics*. Philadelphia: Saunders; 2010:321–325. Copyright © 2012 Elsevier Limited. Reprinted by Permission of Elsevier Limited.)

isolated distal ulna fractures and TFCC injuries. Akinci and colleagues⁵ found a significant correlation between TFCC injuries diagnosed by magnetic resonance imaging (MRI) and distal radius fractures with intra-articular extension into the DRUJ and ulnar styloid fracture (Frykman types VI and VIII). If a TFCC injury or ligamentous disruption of the DRUJ is suspected, MRI may be considered. A systematic review has demonstrated that magnetic resonance arthrography is more accurate than MRI in diagnosing full-thickness TFCC tears.⁶ We have found MRI most useful in the setting of distal ulna fractures where a TFCC tear is suspected. The MRI is helpful in differentiating peripheral from central tears, which aids in operative planning and preoperative patient counseling.

CLASSIFICATION

Classification of distal ulna fractures is based on location and pattern type. The most frequently cited classification system is the AO Comprehensive Classification of Fractures—distal ulna fractures associated with distal radius fractures are classified with the Q modifier.⁷ Biyani et al⁸ also described a

classification scheme for distal ulna metaphyseal fractures in the setting of distal radius fractures (Fig. 2).

TREATMENT

Ulnar styloid fractures

Isolated ulnar styloid fractures are uncommon and should raise suspicion for associated TFCC injury or DRUJ instability. Much more commonly, ulnar styloid fractures occur in the setting of distal radius fractures. Approximately 55% to 70% of styloid fractures will go on to nonunion^{9,10}; however, performing fixation of the styloid has been debated given the uncertain significance of the fracture in the clinical recovery of most patients and the associated risk of hardware prominence, nerve irritation, scarring, and added operative time. The evidence to date suggests that functional outcomes are not negatively impacted by the presence of an ulnar styloid fracture or failure to repair it in the setting of distal radius fractures.^{9–11} If the DRUJ is stable after distal radius fracture volar plate fixation, Wysocki and Ruch¹² prefer not to perform operative fixation or immobilization of the ulnar styloid regardless of the degree

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