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Ulnocarpal Impingement and Triangular Fibrocartilage Complex Tears

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Ulnocarpal impingement syndrome is a common reason for ulnar-sided wrist pain in athletes. Clinical history, imaging, and physical examination are important when diagnosing and formulating a management plan. Gymnasts and baseball and racket playing athletes are at higher risk for ulnocarpal (UC) impingement because of repetitive wrist pronation and gripping. Overloading of the UC joint can progress to ulnar head chondromalacia, triangular fibrocartilage complex tears, and lunotriquetral ligament damage. Treatment options for UC impingement range from rest and splinting to operative intervention. Splints that limit wrist pronation and supination prevent the ulna from being driven distally into the lunate. Ulnar shortening osteotomy remains the gold standard for UC joint unloading, but other interventions including arthroscopic debridement with the ulnar wafer procedure can be effective. Recovery time and complication rates vary between each operative procedure and should be taken into consideration when managing athletes.
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Introduction

Ulnar-sided wrist pain in a competitive athlete can have profound effects on performance. Although athletes who use their hands can be affected, gymnasts, baseball players, and athletes participating in racket and stick handling sports are most commonly affected.[1] Pain is exacerbated with repetitive power grip and pronation. Ulnocarpal impingement syndrome (UIS) with resulting degenerative tears of the triangular fibrocartilage complex (TFCC) is a common cause for ulnar-sided wrist pain in athletes. These lesions in the TFCC result from overloading the ulnocarpal (UC) joint. Increased loads across the UC joint drive the ulna distally and can create a central or radial tear of the articular disc. Over time, continued load between the ulnar head and carpus can lead to articular degeneration of the lunate and ulnar head, as well as attritional wear of the lunotriquetral (LT) ligament. The Palmer classification is still the most commonly referenced classification for TFCC tears. Degenerative tears are classified as A-E depending on TFCC perforation and existing UC chondromalacia and arthritis.[2]

Ulnar variance is implicated as a main cause of UIS. Although ulnar-positive wrists are involved most frequently, cadaver studies have demonstrated a high rate of TFCC degeneration in ulnar-neutral and ulnar-negative wrists.[3,4] Dynamic UC abutment occurs in ulnar-negative or ulnar-neutral wrists with frequent pronation and grip activities, and must be considered in athletes with "normal" ulnar variance on static radiographs.[5-7]

This article reviews the biomechanics, diagnosis, treatment, and outcomes for UC impingement with a special focus on the competitive athlete.

Clinical Presentation and Physical Examination

The UIS in athletes commonly presents as insidious, atraumatic, and progressive ulnar-sided wrist pain. It is helpful to obtain a detailed history including location of pain, duration of symptoms, and factors that exacerbate the symptoms. Previous surgical procedures on the hand, forearm, and elbow may have a bearing on the etiology of an athlete's pain. Traumatic injuries to the wrist and elbow are significant factors when

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Figure 1 Posteroanterior (PA) view of the wrist after distal radius fracture resulting in loss of radial height and positive ulnar variance. Subchondral cysts and sclerosis at the proximal ulnar corner of the lunate due to UIS.

diagnosing and treating UIS. Injuries that decrease radial height or forearm longitudinal stability can influence ulnar variance such as distal radius fractures or Essex-Lopresti injuries (Fig. 1). Chronic, compressive forces across the distal radius physis, as seen in gymnasts, can also progress to UIS.[8]

The UIS symptoms are frequently aggravated during athletic events and periods of prolonged training. A decrease in athletic performance with ulnar deviation, pronation, and grip activities are seen in baseball players when swinging a bat. Gymnasts are required to perform repetitive axial loading of the UC joint, which can also increase symptoms.[9] In addition to pain, patients may incur intermittent ulnar-sided swelling, loss of wrist flexion, extension, (ulnar or radial?) deviation, and forearm rotation.[10] Athletes who present with painful, ulnar-sided wrist clicking during forearm rotation may have a torn TFCC. Although uncommon in UIS, examination for distal radioulnar joint (DRUJ) instability, ulnar nerve pathology, and vascular insufficiency can further delineate the etiology of pain.[11]

Several provocative tests can be performed when evaluating for suspected UIS. A positive Lester press test is concerning for a TFCC tear if pain is reproduced at the UC joint while pushing up in a chair from a seated position.[12] The UC stress test is performed with the affected wrist in ulnar deviation and the elbow resting on a flat surface. An axial load is placed on the wrist while the forearm is rotated through a full arc of motion. Reproduction of symptoms is suggestive of UIS.[13] Documentation of wrist active and passive range of motion, grip strength, and forearm rotation is useful for evaluating treatment outcomes.

Differential Diagnosis

The possibilities to consider include the following:

(1) Isolated TFCC tear.
(2) LT instability.
(3) Distal radioulnar ligament injury.
(4) Kienböck disease.
(5) Extensor carpi ulnaris subluxation or tenosynovitis.
(6) Hamate, pisiform, or triquetral fractures.
(7) Pisotriquetral arthritis.
(8) UC ligament injury.
(9) Interosseous ganglia or cyst.
(10) DRUJ instability or arthritis.
(11) Midcarpal instability.
(12) UC synovitis.
(13) Ulnar neuropathy.

Imaging

Ulnar variance is the relative length of the distal ulnar articular surface in comparison with the radial lunate fossa on a standard posterior-anterior (PA) wrist radiograph. Tangential lines from the lunate fossa and from the distal articular surface of the ulna are made perpendicular to the radial and ulnar shaft. When the ulnar articular line is at the same level, distal, or proximal to the lunate fossa line, the patient is ulnar neutral, positive, or negative, respectively. Radiographic evaluation of ulnar abutment can be determined by standard PA, lateral, and oblique views of the wrist. Palmer et al. described a 90 × 90 neutral rotation view for evaluation of ulnar abutment syndrome. This PA view is taken with the wrist in neutral rotation, the elbow flexed to 90°, and the shoulder abducted to 90°.[14] A high suspicion of UIS should be considered in patients who are clinically symptomatic and are ulnar positive or neutral on this view. Radiographic findings in UIS include sclerosis with subchondral cysts in the proximal ulnar corner of the lunate, the distal ulna, and occasionally in the triquetrum (Fig. 2). Athletes who are ulnar negative or neutral but have ulnar-sided wrist pain should be assessed radiographically for dynamic UIS

Figure 2 The PA view of left wrist in a patient with ulnar-sided wrist pain. The radiograph demonstrates classic findings of UIS with positive variance, lunate sclerosis, and subchondral cyst formation.