

Extensor Tendon Rupture in Ulnar Impingement Syndrome: A Case Report

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Abstract

Ulnar impingement syndrome is caused by a shortened ulna impinging on the distal radius and causing a painful, disabling pseudoarthrosis. Vaughan-Jackson syndrome is characterized by a disruption of the digital extensor tendons, beginning on the ulnar side with the extensor digiti minimi (EDM) and extensor digitorum communis (EDC) tendon of the small finger. While ulnar impingement and Vaughan-Jackson syndrome are not uncommon, it is rare to observe the two conditions occurring simultaneously. We report a unique case of ulnar impingement syndrome presenting with Vaughan-Jackson syndrome, revealing that the degenerative changes from ulnar impingement syndrome can cause attrition rupture of the EDM and EDC tendon of the little finger. This entails increased clinical significance of ulnar impingement, because in addition to its potential to cause debilitating pain, there is also consequence of functional deficits if extensor tendon rupture were to occur due to progressive degenerative changes. The surgical management of distal radioulnar joint (DRUJ) arthritis arising from ulnar impingement may include various intra-operative techniques to prevent post-operative extensor tendon rupture.

Keywords: Wrist, Hand, Extensor tendon, Tendon rupture, MRI, Vaughan-Jackson syndrome, Ulnar impingement syndrome

Introduction

Ulnar impingement syndrome is caused by a shortened ulna impinging on the distal radius and causing a painful, disabling pseudoarthrosis [1]. The short ulna may be congenital, due to premature fusion of growth plates, or as a result of prior surgery, such as Darrach ulnar-shortening surgery, Madelung corrective surgery, or surgery for rheumatoid arthritis [2]. Less commonly, ulnar impingement may occur in *de novo* negative ulnar variance or premature fusion of the distal ulna secondary to prior trauma [3].

Vaughan-Jackson syndrome is characterized by a disruption of the digital extensor tendons, beginning on the ulnar side with the extensor digiti minimi (EDM) and extensor digitorum communis (EDC) tendon of the small finger [4]. Several causes of wrist extensor tendon rupture have been described, with the most common association being rheumatoid arthritis. Other etiologies which result in abnormalities of the ulnar head have also been attributed, such as traumatic subluxation, Madelung's deformity, and bony prominences [4]. There have

also been sporadic reports of osteoarthritis of the distal radioulnar joint (DRUJ) in association with extensor tendon rupture [5].

While ulnar impingement and Vaughan-Jackson syndrome are not uncommon, it is rare to observe the two conditions occurring simultaneously. We describe a unique case of ulnar impingement syndrome presenting with Vaughan-Jackson syndrome, where attrition rupture of the EDM and EDC tendon of the little finger was caused by degenerative changes in the DRUJ.

Case Report

A 76-year-old Chinese male presented with a one-week duration of inability to extend his right little finger. The weakness, accompanied by mild finger pain, prevented his usage of chopsticks. There was no documented history of trauma, rheumatoid arthritis, or previous hand surgeries. He was right hand-dominant and worked as a general manager for a food company.

His physical examination revealed right little finger drop, with inability to extend at the fifth metacarpophalangeal joint. The Power and range of motion of the other digits of his right hand were unaffected.

Radiographs of the right hand and wrist demonstrated negative ulnar variance, with severe osteoarthritic changes of the DRUJ evidenced by marginal osteophytes, joint-space narrowing, and subchondral sclerosis on either side of the joint (**Figures 1 and 2**). Mild deformity of the distal ulna also raised the possibility of previously unrecalled trauma.

Magnetic resonance imaging (MRI) study of the right wrist and hand revealed osteoarthritis of the DRUJ with a prominent

osteophyte projecting dorsally and causing impingement of the EDM tendon at the level of the DRUJ, which is attenuated. These findings were consistent with ulnar impingement syndrome. Complete rupture of the EDM tendon with tenosynovitis was noted distal to the DRUJ to the level of the first row of carpal bones (**Figure 3**). Distally, the tendon was noted to be intact. The EDC tendon to the little finger was not visualized and presumed to be torn. The EDC tendons to the rest of the fingers were observed to be intact.

The patient was offered surgical tendon reconstruction of the EDM and little finger EDC tenodesis with the right ring finger, with a consideration for removal of the DRUJ osteophytes. He however opted for conservative management as he felt that



Figure 1. Anteroposterior radiograph of the right wrist, demonstrating negative ulnar variance. The blue horizontal line drawn from the carpal joint surface of the distal radius towards the ulna demonstrates that the distal edge of the ulna is proximal to the distal articular surface of the radius. Mild deformity of the distal ulna may be related to previous unrecalled trauma.

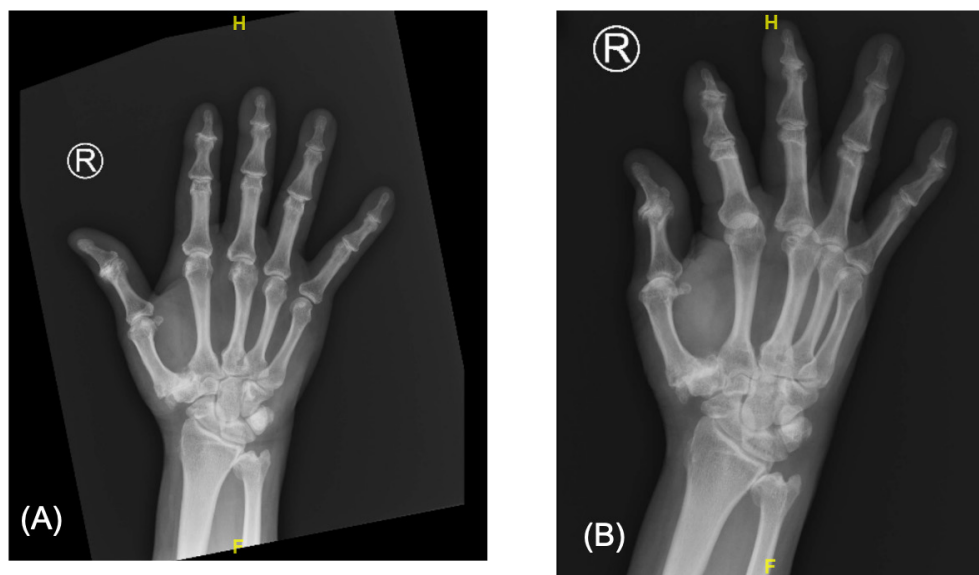


Figure 2. Posteroanterior and oblique radiographs of the right hand demonstrating severe osteoarthritic changes of the DRUJ, with marginal osteophytes, joint-space narrowing, and subchondral sclerosis on either side of the joint. There were also severe osteoarthritic changes visualized in the carpometacarpal and interphalangeal joints of the thumb.

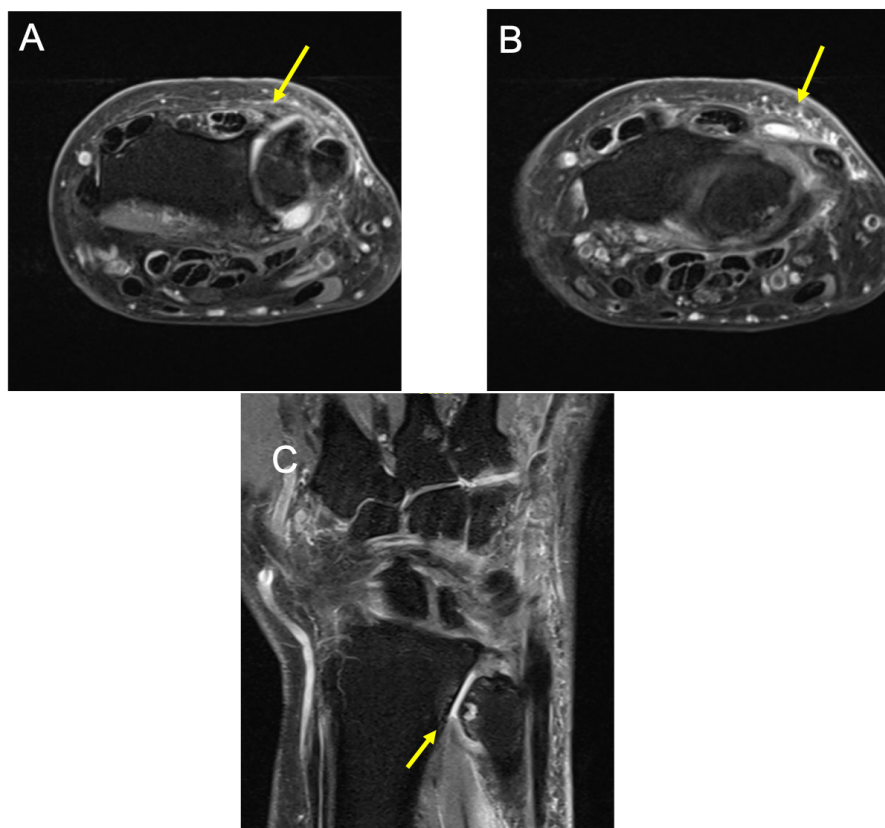


Figure 3. (A) Axial PD fat-saturated MRI sequence at the level of the DRUJ demonstrates prominent dorsal osteophyte causing impingement of the EDM tendon, which is attenuated. (B) More distally, there is complete rupture of the EDM tendon at the level of the proximal carpal row. (C) Coronal PD fat-saturated image demonstrates negative ulnar variance with osteoarthritic changes at the DRUJ, with subchondral cysts and oedema, and small joint effusion.

he was able to cope with the little finger drop and had learned to use chopsticks in a modified way.

Discussion

In the patient presented, ulnar impingement is thought to be a result of negative ulnar variance, either *de novo*, or due to premature fusion of the distal ulna secondary to prior trauma.

The degree of variance is determined by projecting a line from the carpal joint surface of the distal end of the radius toward the ulna and measuring the distance in millimeters between this line and the carpal face of the ulna. There is negative variance when the distal edge of the ulna is proximal to the distal articular surface of the radius, as seen in this patient (**Figure 1**). When the distal ulna is shortened, the contraction of the extensor pollicis brevis, abductor pollicis longus and pronator quadratus muscles and the effect of the interosseous membrane with the loss of the buttress effect of the radioulnar joint causes approximation and thereafter contact of the lower ends of the radius and ulnar [4].

The radiographic features of ulnar impingement syndrome include erosive cortical changes at the corresponding level of the radius that appear as scalloping. By the time such changes are seen, the condition would usually have been present for many years. Early changes on MRI include marrow oedema, cortical thinning and bony remodeling of the radial cortex, with progressive degenerative changes at the pseudoarthrosis developing later. The patient presented had likely been experiencing ulnar impingement for some time, and the complication of extensor tendon rupture and its accompanying functional deficit was the tipping factor for him to seek medical advice.

The prominent osteophytes seen projecting dorsally at the DRUJ are likely progressive degenerative changes as a consequence of the long-standing ulnar impingement. Idiopathic osteoarthritic changes [5] or previously unrecalled trauma may also be contributory factors. The main mechanism of tendon rupture is likely attrition between the distal ulnar and the osteophytes during pronation and supination [6]. A retrospective study by Yamazaki et al. showed that wrists with associated tendon ruptures had significantly more severe osteoarthritic changes than the contralateral wrists in those patients with unilateral ruptures [7]. Osteophytes in the DRUJ make contact with and abrade the extensor tendon of the little finger, which has an ulnar location in the extensor tendon sheath. The neighboring extensor tendon of the ring finger may also subsequently be affected.

The original description of Vaughan-Jackson syndrome was of the rupture of extensor tendons of the little and ring fingers caused by attrition at an arthritic inferior radioulnar joint [8]. While Vaughan-Jackson syndrome is more commonly associated with rheumatoid arthritis, this

case report depicts that ulnar impingement, which is fairly represented in literature, can also lead to Vaughan-Jackson syndrome as a complication. A study by Bell et al. revealed that seven out of 11 patients with ulnar impingement had suffered pain sufficiently disabling them from working [1]. Ulnar impingement is indeed of clinical significance, not only because of its potential to cause debilitating pain, but also functional deficits if extensor tendon rupture were to occur due to progressive degenerative changes.

DRUJ arthritis arising from ulnar impingement syndrome may be treated conservatively or surgically, and our patient presented had opted for the former. Surgical intervention may be considered following the failure of conservative treatment. This typically involves partial or complete distal ulnar resection and may be performed in combination with tendon reconstruction if extensor tendon rupture had occurred, as in our patient presented. There have also been case reports of extensor tendon rupture occurring post-operatively [9]. Fletcher et al. recommend various intra-operative steps that may be undertaken to minimize the risk of this complication. This includes ensuring that the resected distal ulnar stump is smooth, that the DRUJ is free of bony prominences, that any capsular deficiencies are reconstructed, that the distal ulna and DRUJ are stabilized intra-operatively, and that the extensor tendons are able to move freely [9].

Conclusion

While ulnar impingement and Vaughan-Jackson syndrome are not uncommon, it is rare to observe the two conditions occurring simultaneously. This unique case of ulnar impingement syndrome presenting with Vaughan-Jackson syndrome shows that the degenerative changes from ulnar impingement syndrome can cause attrition rupture of the EDM and EDC tendon of the little finger. This entails greater clinical significance of ulnar impingement, because in addition to its potential to cause debilitating pain, there is also consequence of functional deficits if extensor tendon rupture were to occur due to progressive degenerative changes. The surgical management of DRUJ arthritis arising from ulnar impingement may include various intra-operative techniques to prevent post-operative extensor tendon rupture.

Conflicts of Interest

None.

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