RADIOLOGY FOR THE SURGEON

Musculoskeletal case 43

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Presentation

A 57-year-old man presented with chronic ulnar-sided right wrist pain. Plain radiographs were nondiagnostic (not shown). We performed magnetic resonance imaging (MRI). Coronal T_1-weighted (Fig. 1), coronal fast short tau inversion recovery (Fig. 2) and coronal gradient-refocused acquisition in the steady state (Fig. 3) images are shown. What is the most likely diagnosis?

Diagnosis

Ulnar impaction syndrome

The T_1-weighted MRI showed focal intermediate signal intensity (Fig. 1) and the fast short tau inversion recovery image showed high signal intensity (Fig. 2) on the radial aspect of the triangular fibrocartilage most consistent with a tear. The triangular fibrocartilage also showed diffuse altered signal intensity on T_1-weighted imaging, indicating mucoid degeneration. The lunate displays increased signal intensity on fast short tau inversion recovery (Fig. 2), especially on the ulnar side, in keeping with marrow edema.

Fig. 1. T_1-weighted magnetic resonance image showing intermediate signal intensity on the radial aspect of the triangular fibrocartilage.

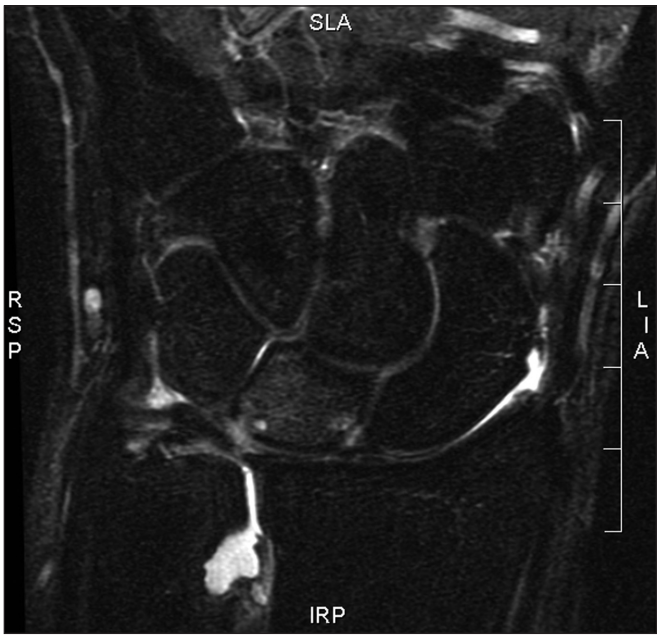

Fig. 2. Fast short tau inversion recovery image showing high signal intensity on the radial aspect of the triangular fibrocartilage, diffuse altered signal intensity on the triangular fibrocartilage, increased signal intensity on the ulnar side and early subchondral cyst formation as fluid signal intensity on the ulnar aspect of the lunate.

We observed early subchondral cyst formation as fluid signal intensity on the fast short tau inversion recovery image (Fig. 2) on the ulnar aspect of the lunate. We also noted a focal cartilage defect on gradient-refocused acquisition in the steady state (Fig. 3), indicating the presence of lunate chondromalacia. There was also a small joint effusion in the distal radioulnar joint.

Ulnar-sided wrist pain is a common clinical presentation for a variety of underlying pathologies. This clinical scenario has long been a diagnostic dilemma for radiologists and hand surgeons. It has been called the "low-back pain of the wrist" because of difficulties in diagnosing and managing the condition. The differential diagnosis is long, and up to 44 different conditions have been described.[1] In this article, we will focus on 1 of the common conditions, ulnar impaction syndrome.

Ulnar impaction syndrome, also known as ulnar abutment or ulnocarpal impaction syndrome, is a chronic and degenerative condition[2–4] that may result in triangular fibrocartilage degenerative tears; chondromalacia of the lunate, triquetrum and ulnar head; degenerative tear of the lunotriquetral ligament and osteoarthritis of the distal radioulnar joint and ulnocarpal joint.[1,2,4,5]

The mechanical load across the wrist joint is determined by the relative lengths of the distal articular surfaces of the radius and ulna; this is referred to as ulnar variance or the radioulnar index. The ulnar variance may be neutral (ulna and radius are the same length), positive (ulna is longer) or negative (ulna is shorter). In neutral ulnar variance, 80% of the load is transmitted by the radius and 20% by the ulna through the radiocarpal and ulnocarpal joints, respectively. A change in the ulnar variance by 1 mm can change the mechanical load by more than 25%.[1–3,6]

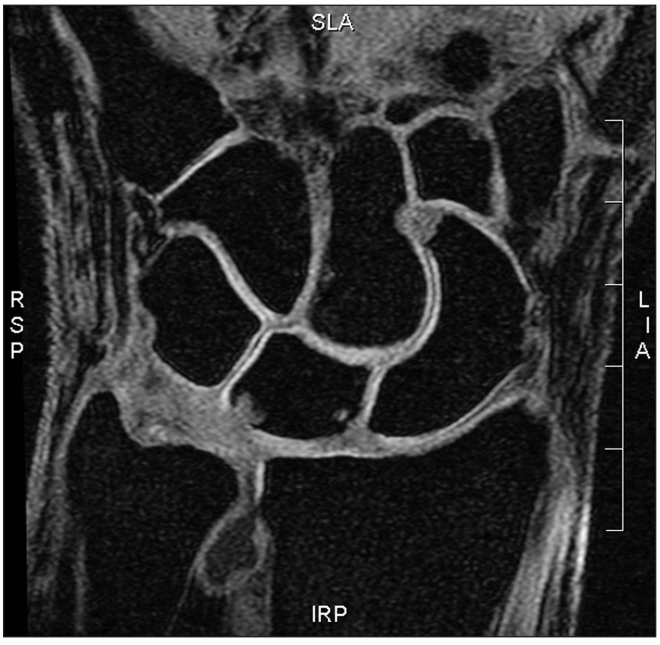

Fig. 3. Gradient-refocused acquisition in the steady state showing focal cartilage defect.

Clinically, chronic ulnar-sided wrist pain and restriction of motion are by far the most common symptoms associated with ulnar impaction syndrome.[1–4,6] That pain is exacerbated by activity and certain positions, such as pronation and ulnar deviation, that increase the ulnar mechanical load. There may be swelling and tenderness at the location of the pain.

Radiographically, positive ulnar variance is usually present; however, ulnar impaction syndrome may affect people with neutral and negative ulnar variance because of some daily activities that cause excess load on the ulnar aspect of the carpus.[1–3] For accurate assessment of ulnar variance, the wrist and distal forearm should be imaged in neutral forearm rotation with 90° elbow flexion and 90° shoulder abduction.[1] Other abnormalities that result in a short radius, such as impaction fracture, malunion or premature closure of the distal radial growth plate, may be observed. Because ulnar impaction syndrome is degenerative in nature, osteoarthritic changes, such as narrowing joint space, sclerosis, cystic changes and spurs, can be seen along the ulnocarpal joint.[1,2,5] These findings may not be apparent early in the disease process.

Magnetic resonance imaging is the method of choice[6] for diagnosing ulnar impaction syndrome, especially in situations with a strong clinical background and negative or subtle radiographs. Marrow edema and synovitis are frequent MRI findings associated with ulnar impaction syndrome. Marrow edema is described as specific[6] and typically affects the ulnar aspect of the lunate with or without involvement of the adjacent (radial) aspect of the triquetrum and ulnar head. Subchondral cystic changes appear as low signal intensity on T_1-weighted images and high signal intensity on T_2-weighted images. If sclerosis is present, low signal intensity on T_1- and T_2-weighted images will be seen. Degenerative tears of the triangular fibrocartilage may also be present. Accompanied cartilage abnormalities such as irregularities, softening and defects are best seen with MRI.[2,4] The diagnosis of ulnar variance using MRI is not accurate because it is difficult to obtain true anatomic position in the magnet gantry.[1]

Simple partial débridement of the triangular fibrocartilage is not enough to treat ulnar impaction syndrome because the goal of treatment is to decrease the load across the ulnar side of the wrist.[1,4] More extensive treatment options such as wafer procedure, arthroscopic wafer, Darrach procedure and formal ulnar shortening are suggested.[1,2,4] The choice of surgical procedure depends on several factors, including the age of the patient, the underlying cause of the condition and the integrity of the distal radioulnar joint. Nonunion, instability of the ulnar stump and distal radioulnar joint incongruity are the potential complications.[1]

References

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Competing interests: None declared.