The case:

A right-hand-dominant golfer in her mid-twenties presented with left forearm pain.

Figure: Axial T2-weighted magnetic resonance image of the left wrist. A skin marker was placed on the dorsum of the wrist marking the area of pain.

Your diagnosis?

For answer see page 225
Intersection Syndrome of the Wrist

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A right-hand-dominant elite golfer in her mid-twenties reported a 3-month history of left forearm pain; 2 months previously, she had undergone an injection of steroids for De Quervain’s tenosynovitis. On examination 2 months following injection, swelling was observed on the radial side of the distal forearm proximal to the radial styloid. Finkelstein’s test (ulnar deviation of the hand while the thumb is flexed) was mildly positive. Magnetic resonance imaging (MRI) of the wrist showed subcutaneous edema and tenosynovitis at the crossover point of the first and second extensor compartments (Figure 1).

The patient was treated conservatively with splinting, using a custom orthotic that included the thumb, wrist, and forearm. Intersection syndrome is an inflammatory overuse syndrome of the forearm characterized by painful swelling on the radial side of the distal forearm 4 to 8 cm proximal to Lister’s tubercle. The first description was attributed to Velpau in 1841 and the name intersection syndrome to Dobyns. This condition has also been called crossover syndrome, peritendinitis crepitans, oarsmen’s wrist, squeaker’s wrist, Bugaboo forearm, adventitial bursitis, subcutaneous perimyositis, chronic synovial tendonitis, hydropsia of the tendon, and abductor pollicis longus syndrome. The reported incidence of intersection syndrome as a cause of distal forearm pain is low, but the true incidence is likely underreported because many cases are self-limited, respond quickly to conservative therapy, or go unrecognized. Symptoms occur where the tendons of the first extensor compartment (abductor pollicis longus and extensor pollicis brevis) cross from medial to lateral superficial to the tendons of the second extensor compartment (extensor carpi radialis longus and extensor carpi radialis brevis).

This syndrome may develop after participation in a variety of occupational and sporting activities, including manual farming, landscaping, hammering, mechanical work, skiing, racket sports,
The most common cause appears to be repetitive dorsiflexion and radial deviation of the wrist, often after new modification in a sport or job or after unusually strenuous or lengthy periods of a particular motion. Intersection syndrome has also been reported after trauma.

Although the exact pathophysiology of this syndrome has been debated, 3 leading theories have emerged: (1) friction between the muscle bellies of the first extensor compartment and the tendon sheath of the second extensor compartment may produce localized inflammation at the site of crossover; (2) stenosis and entrapment of the tendons of the second extensor compartment; or (3) muscular hypertrophy of the abductor pollicis longus and extensor pollicis brevis.

**CLINICAL PRESENTATION**

Patients with intersection syndrome usually present with localized pain in the dorsal aspect of the radial side of the distal forearm. Most patients have associated swelling (73%) and audible crepitus (40%) with flexion and extension of the wrist. Erythema, edema, and tenderness to palpation are often present. This syndrome can be differentiated from DeQuervain’s tenosynovitis during clinical examination. With DeQuervain’s tenosynovitis, pain and tenderness usually occur along the abductor pollicis longus and extensor pollicis brevis tendons at and distal to the radial styloid, and pain with Finkelstein’s test may be felt at the site of tendon crossover (4-8 cm proximal to Lister’s tubercle).

**IMAGING**

Imaging is not usually required to diagnose intersection syndrome. However, MRI or ultrasound can confirm the diagnosis when clinical findings are unclear. The MRI findings have been described previously, and the anatomy of the first and second extensor compartment crossover on MRI has been well demonstrated in a study by de Lima et al (Figure 2). Fluid-sensitive sequences (short tau inversion recovery, fat-suppressed proton density, and T2-weighted MRI sequences) are especially useful in assessing intersection syndrome. The MRI finding most indicative of intersection syndrome is periarticular edema or fluid surrounding the first and second extensor compartments; tendinosis, muscle edema, tendon thickening, loss of the normal comma shape of the tendon, and juxta cortical edema may also be seen (Figure 1).

When MRI examination is scheduled for this indication, it is important to order a forearm examination or clearly describe the region to be imaged because the intersection zone is outside of the area covered by a standard wrist MRI. Intravenous contrast is not necessary to diagnose intersection syndrome on MRI; however, postcontrast MRI examinations have been described in the literature, most often when MRI was performed because of a suspected abscess or soft tissue tumor.

Ultrasoundography is an excellent modality for evalu-
ing tendon abnormalities, and several studies have described ultrasound findings in patients with intersection syndrome.\textsuperscript{12-14} In patients with this condition, sonography may demonstrate findings equivalent to those seen with MRI, including peritendinous edema, fluid-filled tendon sheaths, tendon thickening, tendinosis, subcutaneous edema, and muscular edema at the crossover point of the first and second dorsal extensor compartments (Figure 3). Synovial hyperplasia with hyperechoic nodules within the tendon sheaths may also be seen.\textsuperscript{12-14} The edema may produce an interruption of the hyperechoic plane that normally separates the 2 groups of tendons.\textsuperscript{13} Because ultrasound is an interactive examination, this modality can be targeted directly to the point of the patient’s symptoms and dynamic maneuvers can be performed, which is an advantage over MRI.

**TREATMENT**

Management of intersection syndrome is similar to that of other overuse syndromes, with conservative measures used as first-line therapy. Cessation of provocative activities, use of nonsteroidal anti-inflammatory drugs, and splinting are usually the first line of treatment. If the symptoms persist for more than 2 to 3 weeks, injection with an anesthetic and steroid or with a long-acting steroid alone at the site of maximum swelling or in the second dorsal compartment may provide relief.\textsuperscript{2,4} Symptoms may abate quickly, especially when treatment is initiated shortly after the onset of pain.\textsuperscript{1} Reported responses to nonoperative measures vary from 60\% to 100\%;\textsuperscript{1,5} this variance may be the result of differing patient populations or symptom duration. For nonresponders, surgery with tenosynovectomy and fasciotomy to decompress the area of intersection may be considered.\textsuperscript{2,11}

**CONCLUSION**

Intersection syndrome is a well-defined but relatively uncommon overuse syndrome that is associated with sports activity and occupations that require repetitive wrist flexion-extension and radial deviation. A detailed medical history and careful examination are usually adequate for diagnosis. When needed, ultrasound and MRI can be used to confirm the diagnosis. Because the region of abnormality is not usually included on standard wrist MRI protocols, the site of suspected abnormality should be defined when the MRI is ordered to ensure the proper imaging examination is performed.

**REFERENCES**