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Case

A 52 years old female with medical history of fall and injury for impacting her wrist in hyperextension against a hard surface consults for pain and in physical examination she shows limitation in flexion-extension of the wrist. She is evaluated with anterior-posterior and lateral wrist X-rays, which are interpreted as "normal" (Figure 1). She receives immobilization for seven days, but after such time pain remains and, at day 10, she finds it impossible to extend her thumb ("fallen finger"). Her diagnostic process continues with the indication of MRI of wrist and forearm.

Findings and interpretation of imaging studies

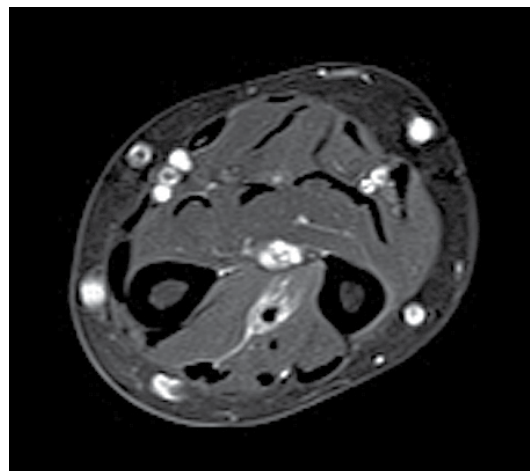
In MRI images there are two outstanding findings—On the one hand, there is edema in the distal end of the radius (Figure 2). Bone edema is an unspecific finding in the MRI images of bone conditions; however, the patient's medical history leads to think about trabecular fracture in the first place. On the other hand, there is a key finding that has to do with signal changes involving selectively a muscle on the posterior compartment of the forearm with preferential affectation of the myotendinous junction (Figure 3).



▲ **Figure 1.** Anterior-posterior and lateral X-rays. There is no evidence of bone injury.



▶ **Figure 2.** DP FatSat coronal section. There is a dim increase in the signal in the bone marrow of the distal radius suggesting edema.



▶ **Figure 3.** DP FatSat transverse section of the distal third of the forearm. Change in the signal on the dorsal compartment surrounding a tendinous structure.

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SECOND PART

Diagnosis

Extensor pollicis longior (EPL) tear as a complication of the distal radius fracture.

Discussion

Fractures of the distal end of the radius are among the commonest injuries in the upper limb. According to some publications, 75% of the forearm fractures imply radius fractures.

Rupture of the distal tendon of the EPL is a well documented complication of the fractures of the distal radius whose incidence goes from 0.2 to 4%. Although statistics vary, studies have found a greater incidence of such injuries in non-displaced fractures (vs. displaced fractures) and they often occur 6 to 8 weeks after the initial injury, although this period also varies. It has been proved that they are more frequent when the extensor retinaculum remains intact. Ruptures of the EPL following distal radius fractures are more frequent in females.

The first description of the EPL rupture is ascribed to Duplay in 1876. As of the decade of the 1930s, several case reports started associating fractures of the distal radius with ruptures of the EPL.

Several factors have been blamed for ruptures of the EPL as complications of distal radius fractures, and most probably these injuries result of a combination of mechanic and vascular factors. This way, it has been suggested that the tendon is lacerated by a bone spicule, that it is injured during reduction, that the injury of the local blood vessels causes thrombosis, that local adhesences play a role or some other disruptions in blood supply. Along these lines, the vascular theory is based on a marginal or less vascularized area called “watershed area” around the Lister’s tubercle, where there is microangiographic evidence of a 5 mm-segment of the tendon without mesotendon and poor vascularization. In this area, the tendon may depend on synovial diffusion for nutrition, but the hematoma in the synovial sheath can displace the synovial fluid hampering the nutrition of the tendon. There is also the secondary increase of pressure within the third dorsal compartment of the wrist if the extensor retinaculum remains intact, what threatens further the vascularization of the tendon. The combination of an intact compartment and an overload of volume can be compared to the events verified in the compartment syndrome. That is why, sometimes, it is possible to perform decompression and release of the third dorsal compartment as a prophylactic option when there are prodromal signs of rupture of the tendon of the EPL after a radius fracture. A less invasive option consists of decompression with a needle. However, reported results of these preventive procedures are not conclusive. Moreover, there are reports indicating injury due to a direct mechanism in the case of wrist hyperextension (with or without bone injury) in which the tendon is trapped between the styloid process in the base of the third metacarpal bone and the Lister’s tubercle, as in a “nutcracker”.

Although the ruptures of the EPL are rare, their consequences are far-reaching and, in general, they require reconstructive procedures; the technique most widely used is the extensor indicis transference.

In the case that we present the non-displaced fracture line on the sagittal plane—Colles type distal radius fracture— (Figure 4), the retraction of the proximal tendinous end of the EPL (Figure 5) and the filiform segment at the level of the Lister’s tubercle (Figure 6) are quite clear.



Figure 4. T1 sagittal section. There is the main fracture line that joins the volar and dorsal cortices. There is another fracture line in the volar area of the epiphysis that can be seen as a lineal hypointense image reaching the volar cortex with no displacement.



Figure 5. DP FatSat coronal section. Distal third of the forearm. There is retraction and thickening of the proximal end of the torn tendon of the extensor pollicis longior (arrow) surrounded by inflammatory changes.

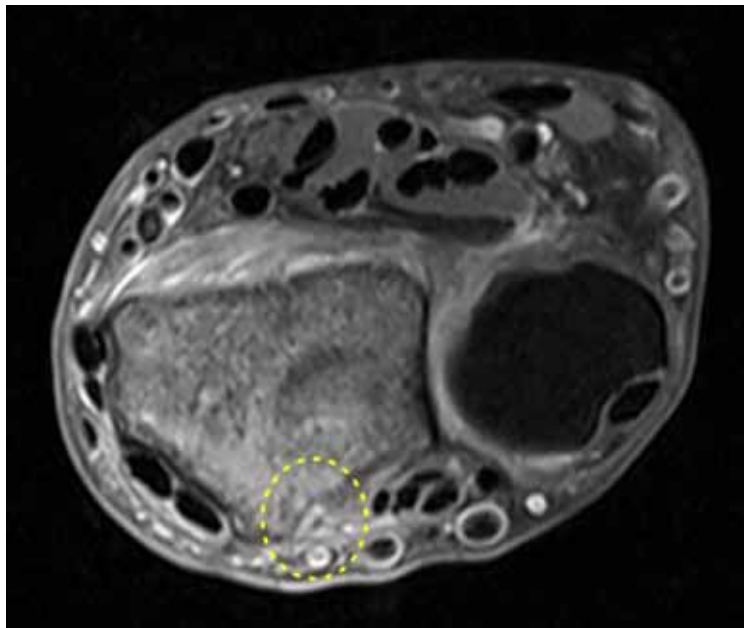


Figure 6. DP FatSat transverse section. Immediately medial to the Lister's tubercle there is a filiform segment of the tendon of the extensor pollicis longior of the thumb that can be seen as a point-like image of changed signal (dotted-lined circle). Compare with the thickness of the tendons in the remaining compartments.

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