Extensor Indicis Proprius and Extensor Digitorum Communis Rupture after Volar Locked Plating of the Distal Radius
A Case Report

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Abstract
Distal radius fractures are among the most commonly encountered fractures in the extremities. Volar plating of distal radius fracture has gained popularity in recent years with the introduction of the locked plating system. Complications of volar plating include extensor and flexor tendon rupture. Here we present a case report of an extensor indicis proprius and extensor digitorum communis to index finger tendon rupture after open reduction and internal fixation of distal radius fracture with locked plate.

Case Report
A 74-year-old, right hand dominant female sustained a comminuted displaced left distal radius fracture four years prior to her evaluation. She underwent open reduction and internal fixation with a volar distal radius locking plate at an outside institution. After fracture healing, she regained pain-free function of her left hand and wrist.

Six months prior to evaluation, she began to have dorsal radial wrist pain. Oral nonsteroidal antiinflammatory medications were recommended.

Five days prior to evaluation, she noted inability to actively extend her index finger. Physical examination of the left wrist revealed a well healed volar radial incision. She was unable to actively extend the index finger. There was no pain with resisted long, ring, and little finger extension. Radiographic evaluation of the left wrist revealed a healed fracture of the distal radius in satisfactory position. One of the volar locking screws was protruding through the dorsal cortex (Fig. 1). Surgical exploration revealed rupture of the extensor indicis proprius (EIP) and the extensor digitorum communis (EDC) to the index finger. Attenuation of the EDC to the long finger was also observed. This finding made tenodesis of the ruptured distal stumps to this tendon a less desirable option. A locking screw was found to be protruding through the dorsal cortex into the floor of the fourth extensor compartment (Fig. 2). The plate and screws were removed through the previous volar incision. The attenuated EDC tendon to the long finger was repaired. An extensor digiti minimi (EDM) to EIP transfer was performed using a Pulvertaft weave method of tendon transfer (Fig. 3).

On follow-up examination, the patient was noted to have painless independent extension of the previously affected extensor digiti minimi to the ruptured tendons, a method not previously described.
index finger and of the small finger, the digit from which the tendon transfer was obtained.

Discussion

Extensor pollicis longus (EPL) and flexor pollicis longus (FPL) rupture have been described as complications associated with locked volar plate fixation of distal radius fractures. Arora and associates reported a 2% incidence of FPL and EPL rupture in their retrospective review of 141 patients. When including tenosynovitis with tendon rupture, this value increased to 17%. Al-Rashid and colleagues retrospectively reviewed 35 patients with distal radius fractures and found an 8.6% incidence of extensor tendon injuries, most commonly the EPL tendon. This is compared with a 0.07% to 0.88% incidence of EPL ruptures in conservatively treated patients. EDC and EIP tendon ruptures are far less common but can occur after volar plate fixation when the screws are prominent dorsally. There are two prior reports of similar ruptures. Al-Rashid and colleagues reported extensor tendon injuries, which included EIP and EDC injury, in JBJS British in 2006. Rampoldi and Marisco reported on this injury in Acta Orthopaedica Belgica in 2007.

Jupiter and coworkers concurred that it is essential to avoid penetration of the dorsal cortex with the distal screws to avoid extensor tendon complications. The locked construct does not rely on the screw-bone purchase for fixation but rather the screw-plate interface for its strength. Placing the locked screw into the dorsal cortex is not required for stability of fracture fixation. Maschke and associates found in a cadaveric and radiographic evaluation of distal radius plating that AP and lateral fluoroscopic images are inadequate for determining dorsal cortical penetration. They recommend using pronation and supination views to more adequately evaluate screw placement, especially near Lister’s tubercle.

Persistent dorsal or volar wrist pain after radiographic fracture union may indicate flexor or extensor tenosynovitis or impending tendon rupture. Clinical examination may demonstrate tenderness along the flexor or extensor tendons with swelling or painful digit flexion or extension. Removal of hardware should be strongly considered to avoid the potential complication of tendon rupture requiring tendon transfer.
A CT scan also may be considered to assess screw length and dorsal prominence in these patients. Because of the potential complication of proud screws in the dorsal cortex of the distal radius, we recommend drilling to, but not through, the dorsal cortex and subtracting 2 mm from the measured depth to avoid penetration. If intraoperative determination requires a screw of a certain length to capture a comminuted dorsal fragment, then planned early removal of hardware after fracture healing may be considered.

Disclosure Statement
None of the authors have a financial or proprietary interest in the subject matter or materials discussed, including, but not limited to, employment, consultancies, stock ownership, honoraria, and paid expert testimony.

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