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A Coincidental Anterior Interosseous Nerve Palsy after Volar Plate Fixation of a Distal Radius Fracture Diagnosed by 3D-CT

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A case presented dysfunctional flexion of the thumb and index fingers after volar plate fixation for of distal radius fractures was diagnosed anterior interosseous nerve palsy and confirmed by 3D-CT. 3D-CT was useful to confirm the continuities of tendons, which excluded the most common complication of tendon ruptures after volar plate fixation. Also, it was superior to needle electromyography which is unreliable due to the accompanying damage of the pronator quadratus following volar plate fixation.

INTRODUCTION

In the past decade or so, volar locking plate fixation of distal radius fractures is becoming the gold standard procedure for this common injury. Although low-profile locking plates are designed to rigidly hold the fracture fragments and prevent tendon irritation, rupture of the flexor tendon can occur (1-5) as a complication. The rupture of the flexor pollicis longs (FPL) tendon is the most common among the tendon ruptures (1-7). Further, Cross et al. reported FPL and flexor digitorum profundus index (FDP II) tendons ruptures presented a similar disfunctionality to that of anterior interosseus nerve (AIN) palsy (4). Since AIN palsy usually presents as FPL and FDP (II) palsy or isolated FPL or FDP (II) palsy (8), frequently it is hard to diagnose, especially after locking plate fixation of distal radius fractures.

We present here a case of AIN palsy after volar fixation of a distal radius fracture, where 3D-CT was the most practical to confirm the continuity of the FPL and FDP (II) tendons over the plate and discuss the merits of this approach.

A CLINICAL CASE

A 74 year-old female with a right distal radius fracture injury underwent surgery to affix a volar plate (Synthes VA-LCP plate). From day 1 postoperatively, she started an active fingers exercise programme, however at 3 weeks, she complained of the absence of active

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flexion of her thumb (interpharengeal joint) and index finger (distal interpharangeal joint) with difficulty in pinching and writing. She was first aware of discomfort in her right forearm at 2 weeks. She did not have any pain at the wrist, at the 3 week presentation nor did she exhibit tenderness over the FPL, FDP (II) and the plate and there was no accompanying sensory deficit. Radiographs showed the plate was well attached to the bone with the correct position proximal to “watershed line” discussed by Obey et al. (9). MRI, ultrasonography and 3D-CT were performed immediately. In MRI, there was no tumor in the forearm but the continuities of the FPL and FDP (II) tendons over the plate were not clear due to an artifact by the plate. Ultrasonography demonstrated the continuity of the FPL tendon and its dynamic passive motion, however, the demonstration of FDP (II) tendon was blur because of anatomical location at the wrist. 3D-CT was the most practical to confirm the continuity of the FPL and FDP (II) tendons over the plate (Fig. 1). From those findings, it was clear that AIN palsy could be diagnosed and was coincidental, following plate fixation for the distal radius fracture. Needle electromyography was not performed as it was considered that the results would be unreliable due to the damage to the pronator quadratus after the volar approach. Under conservative treatment for the full 5 months, symptoms abated with full active flexion of FPL and FDP (II) returning.

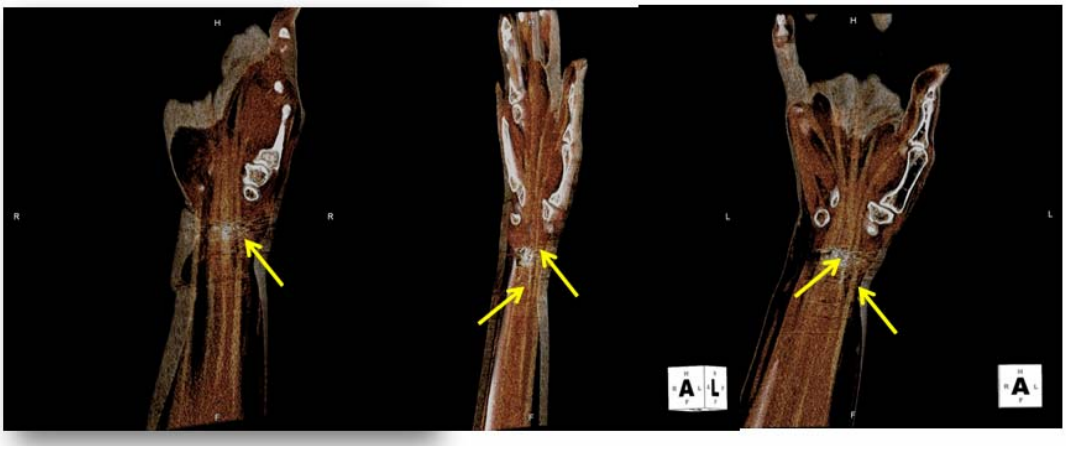

Figure 1. 3D-CT showing the intact continuity of FPL tendon (left, middle and right) and FDP (II) tendon (middle and right)

DISCUSSION

Volar locking plates are commonly used to stabilize distal radius fractures. Although low-profile plates are designed to rigidly hold the fracture fragments and prevent tendon irritation, rupture of the flexor tendon can occur (1-7). Rupture of the FPL tendon is the most common among the tendon ruptures with a complication rate of 1.9-12% occurring 2 days to 30 years postoperatively (1-7). Cross reported 2 cases of rupture with FPL and FDP (II) tendons finding them presenting with a similar dysfunction to AIN palsy (4). The ruptures presented 6 and 8 months after surgery with a new onset of wrist pain, with tenderness over the plate and absence of FPL and FDP (II) function. They diagnosed the FPL and FDP (II) tendons ruptures by clinical symptoms and confirmed by re-exploration in a secondary operation.

In our case, the dysfunction of FPL and FDP (II) suggested tendon ruptures or AIN palsy. Clinically, there was no any initial wrist pain or tenderness and when forearm discomfort presented without any sensory deficit, a diagnosis of AIN palsy seemed appropriate. To confirm this diagnosis, MRI, ultrasonography and 3D-CT were performed as 3D-CT was the most practical and definitive.

Keogh et al (10) reported 6 cases of AIN palsy after plate fixation of radius fractures. They presented as an isolated loss of FPL function from day 1 to 10 postoperatively. In all 6 cases nerve conduction tests of the median nerve were performed. This however did not confirm AIN palsy because the nerve conduction test is usually normal in AIN palsy and we suggest that abnormality of a needle electromyogram in the pronator quadratus could have been more useful to provide a definite diagnosis (8). Without objective examination, one case underwent re-exploration. Nothing abnormal was detected. They recommended a “wait and see” policy when AIN palsy was suspected after the operation of radius fractures and did not propose a diagnostic solution.

In this study, we introduced 3D-CT examination for the diagnosis of AIN palsy by confirming the condition of the FPL and FDP (II) tendons objectively. It is simple and easy to diagnose AIN palsy after volar plate fixation for distal radius fractures.

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