Surgical exposure of the Distal Radius in a patient with a flexor carpi radialis brevis muscle anomaly

Authors: Edward Laugharne and Dominic Power  
Location: University Hospital Birmingham, Birmingham, UK.  
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ABSTRACT:

There are numerous reports of anatomical variants of the muscles of the forearm, particularly the extensors of the wrist and hand. The abnormal deep and short radial wrist flexor (flexor carpi radialis) is rare. There are only two previously reported cases. We present the case of an anomalous ‘flexor carpi radialis brevis’, muscle found intra-operatively during a volar approach to the distal radius and discuss the strategies needed for further exposure in order to complete the procedure.

INTRODUCTION:

There are numerous reports of anatomical variants of the muscles of the forearm, particularly the extensors of the wrist and hand. The abnormal deep and short radial wrist flexor (flexor carpi radialis) is rare. There are only two previously reported cases.

CASE REPORT:

A 57 year-old, right hand dominant woman was referred to the hand surgery unit for operative treatment of her distal radius fracture, sustained three weeks previously. Pre-operative radiographs showed a displaced, comminuted intra-articular fracture of the distal radius. The patient was clinically well, apart from discomfort in the wrist, and had no neurological or vascular deficit in the affected limb. A volar locking plate was planned for definitive management of the fracture. In theatre a volar approach was made to the distal radius with a skin incision over the tendon of the flexor carpi radialis (FCR). The tendon sheath was dissected and the tendon retracted in an ulnar direction. Directly beneath the FCR tendon there was a bulky and longitudinally oriented muscle belly arising from the distal radius and having an oblique origin from the interosseous membrane and the ulna distally (Figure 1).
The muscle belly was quite striking in this predominantly tendinous region. On further exploration, the muscle was found to extend from the proximal insertion of pronator teres in a longitudinal direction towards the wrist, passing within a separate tendon sheath deep to Fiton’s canal. The aberrant muscle extended beyond the field of view in our surgical exposure but could be seen to extend into the carpus. At the distal limit of our exposure the muscle started to become tendinous. Traction on this tendon brought about flexion of the wrist. The muscle did not have any interconnections with other adjacent structures. Although we were unable to see directly where the muscle tendon inserted, a probe inserted along the course of the tendon was seen to end at the base of the middle metacarpal under image intensifier screening (Fig 2).

The muscle belly was then retracted ulnarly to expose the pronator quadratus which was vestigial and predominantly tendinous. The anomalous muscle was mobilised further with release of Fiton’s canal and then the deep tendon sheath on the radial wall of the carpal canal. Only after full release was it possible to mobilise the muscle sufficiently for exposure of the distal radius fracture. The fracture was reduced and a distal radius locking plate applied without complication. The wound was then closed and plaster of Paris back-slab applied. The patient made an uncomplicated recovery and is currently under review in the outpatient clinic where she is making satisfactory progress.

DISCUSSION:

Anomalous flexors of the wrist are an uncommon finding. There has been only one report of a similar intra-operative finding (1), with previous reports based on cadaveric studies (2). This anomalous muscle has been described as a flexor carpi radialis brevis (FCRB) muscle. The proximal origin is from the radius in continuity with the pronator teres insertion and there is a sling of origin over to the distal ulna. The pronator quadratus was vestigial and therefore this muscle appears to represent a distal deep flexor – pronator muscle. An interesting observation of this anomalous FCRB muscle is that it inserts at the base of the middle metacarpal. This
contrasts with the ‘usual’ flexor carpi radialis – which in our case will be referred to as flexor carpi radialis longus (FCRL) – which attaches to the base of the second metacarpal (although the small slip to the third metacarpal is often present). On the dorsum of the wrist the extensor carpi radialis is present in two forms – longus, inserting into the base of the second metacarpal, and brevis inserting into the base of the third. Our findings of an FCRB and FCRL, with their respective insertions, seem to mirror the arrangement of the extensor carpi radialis muscles. The clinical significance of this finding was that it made exposure of the distal radius more difficult and necessitated distal release in order to visualise the fracture site in our case. Future surgeons should bear this in mind when operating in this area. The classic volar approach to the distal radius as described by Henry is commonly used for internal fixation of fractures of the distal radius. This approach utilises the plane between flexor carpi radialis and brachioradialis. The radial artery and superficial branch of the radial nerve are at risk. The sheath of FCR is dissected through and the FCR tendon retracted ulnarly. The dorsal sheath is then incised to reveal the pronator quadratus muscle, which is then reflected off the radius to reveal the underlying bone. There are slight variations in the skin incision but the approach has remained unchanged for many years. An understanding of the anatomy of the wrist is of critical importance for any surgeon intending to operate safely in this region. An awareness of anatomical variations is of use to the surgeon in avoiding uncertainty during surgery and may ultimately reduce the risks of injury to the patient.

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