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CASE REPORT

Flexor carpi radialis brevis: a rare accessory muscle presenting as an intersection syndrome of the wrist

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Abstract
The flexor carpi radialis brevis (FCRB) is a rare accessory muscle of the forearm and wrist. It is typically asymptomatic, but has been discovered either incidentally during cadaveric studies or at the time of surgery in patients with distal forearm injury. Rarely, the FCRB muscle is associated with pain. We report a patient with wrist pain related to intersection between the tendon of the FCRB muscle and the tendon of the flexor carpi radialis (FCR) muscle, with an associated longitudinal split tear of the FCR tendon, documented by magnetic resonance imaging (MRI). To our knowledge, this is only the second report in the English literature of this intersection syndrome.

Keywords Flexor carpi radialis brevis (FCRB) · Accessory muscle and tendon · Tendon intersection syndrome

Introduction

Accessory muscles are anatomic variants that have been described in the anatomic, surgical, and radiologic literature [1–7]. The majority of such muscles do not lead to clinical manifestations and are found incidentally during cadaveric dissection, surgical exploration, or imaging examinations. In some cases, however, these accessory muscles may be accompanied by pain (e.g., when compressing a nearby nerve, vessel, or tendon) or swelling or a mass, simulating a tumor.

The FCRB is a rare accessory muscle of the forearm and wrist. It was first described by Fano in 1851 [8] and, since then, has also been referred to as the flexor carpi radialis brevis vel profundus muscle [1] and short radiocarpal flexor muscle [3]. The prevalence of the FCRB muscle has been reported to be 2–8% [3, 9, 10], although the true frequency of this muscle may be higher, often encountered as an incidental intraoperative finding during volar plating of distal radial fractures [10–12].

Symptomatic FCRB muscles or tendons are rare, with only five previously reported cases [13–17]. Further, to our knowledge, our case report is only the second to describe an intersection syndrome between the tendons of the FCRB and FCR muscles, which in our patient was accompanied by tenosynovitis and a split tear of the FCR tendon as confirmed by MRI.

Case report

A 51-year-old right-hand-dominant woman presented with a 3-month history of pain and swelling localized to the voloradial aspect of the left wrist; she worked as an administrative assistant and, although her symptoms were intermittent, they interfered with both her work and the activities of daily living. On physical examination, there was ill-defined soft tissue swelling and tenderness at the voloradial aspect of the wrist. Her pain was aggravated by resisted palmar flexion, but the results of both Tinel and Phalen's tests of the median nerve were negative.

Patcharee Hongsmatip and Edward Smitaman contributed equally to this work.

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MRI of the wrist (Fig. 1) demonstrated an accessory muscle at the voloradial aspect of the distal radius, situated between the pronator quadratus (PQ) muscle and the FCR tendon. The tendon of the accessory muscle coursed along the deep aspect of the FCR tendon, then crossed over the FCR tendon in an ulnar to radial direction within the FCR tunnel, and inserted into the trapezium. Portions of this tendon distally were U-shaped. There was also a longitudinal split tear of the FCR tendon, and tendinosis and extensive tenosynovitis of the FCR and FCRB tendons centered at their intersection. The clinical and imaging findings were consistent with an intersection syndrome related to the tendons of the FCRB and FCR muscles. The patient was treated with physical therapy and non-steroidal anti-inflammatory drugs for 3 weeks with marked improvement in pain, and she was able to return to work and had no difficulties with activities of daily living.

Discussion

The FCRB is a rare accessory muscle of the forearm and wrist. It originates from the voloradial aspect of the distal third of the radius, distal to the origin of the flexor pollicis longus muscle and proximal to the origin of the PQ muscle [3]. The FCRB is composed of a fusiform muscle belly that passes superficial to the PQ muscle proximally and deep to the FCR muscle and flexor retinaculum distally [5, 6]. At the level of radiocarpal joint, it forms a relatively short tendon [3, 10] that parallels and lies radial to the FCR tendon within the FCR fibro-osseous tunnel [5, 10, 16, 18, 19]. The tendon of the FCRB muscle may insert into the second, third, or fourth metacarpal bases; the radial aspect of a carpal bone, such as the trapezium or capitate; or retinacular septum within the FCR fibro-osseous tunnel (Fig. 2) [1, 2, 6, 10, 16, 20, 21]. The FCRB muscle is

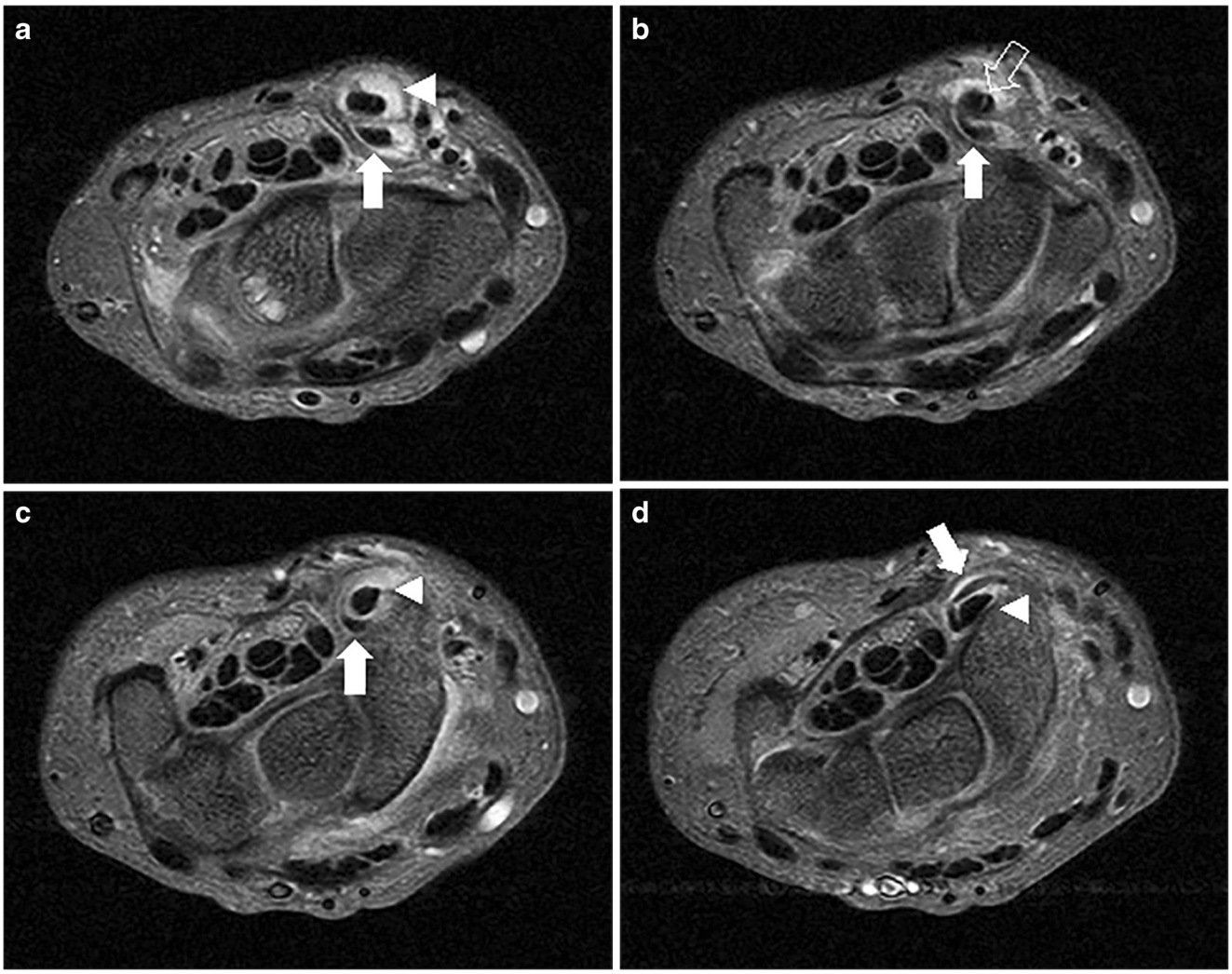

Fig. 1 Tendon intersection syndrome between the tendons of the FCRB and the FCR muscles. Axial (**a** [proximal] through **d** [more distal]) fluid-sensitive fat-suppressed sequences demonstrate tendinosis of the FCRB tendon (*closed arrows*) as it crosses over the FCR tendon (*arrowheads*) in an ulnar to radial direction with associated tenosynovitis within the FCR tunnel and an accompanying longitudinal split tear of the FCR tendon (*open arrow*)

innervated by the anterior interosseous nerve and is supplied by a branch of the anterior interosseous artery [2–4]. Its function has been reported to be radial wrist flexion without thumb or finger flexion by tension application [5, 10, 22].

A symptomatic FCRB is rare; there was only one other case report in which the tendon of the FCRB muscle was associated with symptoms and signs consistent with a tendon intersection syndrome [16]. Although surgical exploration was not performed in our patient, the imaging findings are akin to those of the patient described by Peers et al. [16], who had involvement of the FCRB and FCR tendons and accompanying tenosynovitis. Another case report, by Smith and Kakar [14], describes a patient with wrist pain associated with FCRB tenosynovitis and a complete tear of the FCR tendon without a clear description of an accompanying intersection syndrome [14].

Although tendon intersection syndromes theoretically may occur at any site in the human body at which tendons cross each other, most descriptions have emphasized their occurrence in the forearm and wrist, either proximally (between the first [abductor pollicis longus and extensor pollicis brevis] and second [extensor carpi radialis and brevis] extensor tendon compartments) or distally (between the second and third [extensor pollicis longus] extensor tendon compartments) [23–27]. The pathophysiology of tendon intersection syndromes remains unclear [28] but clinical manifestations are believed to be secondary to overuse [29] or mechanical friction related to repetitive flexion and extension of the wrist [25]. The pathophysiology of an intersection syndrome between the tendons of the FCRB and FCR muscles may relate, at least in part, to irritation by adjacent scapho-trapezio-trapezoid osteophytes [26].

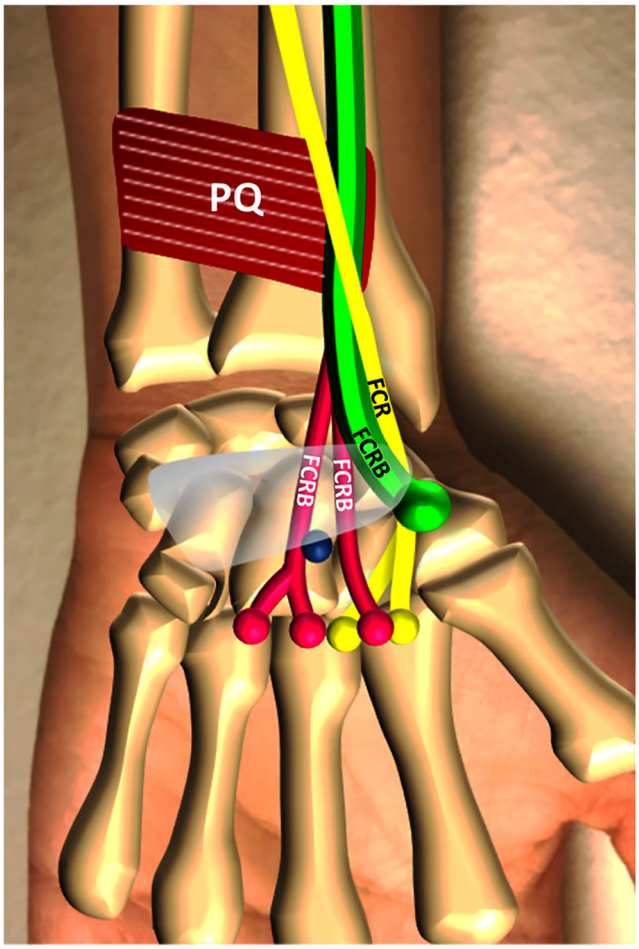

Fig. 2 Schematic of the volar wrist demonstrates the possible courses and insertions of the FCRB tendon: trapezium or retinacular septum (*green dot*), capitate (*blue dot*; please note, that a corresponding blue tendon to the capitate was omitted to maintain image clarity), or 2nd through 4th metacarpal bases (*red dots*)

Additionally, an accessory FCRB muscle may cause hypoplasia of the PQ muscle when it occupies the radial insertion of the PQ muscle [4, 5] or it may result in compressive neuropathy of the anterior interosseous nerve and downstream muscle denervation when the FCRB muscle is hypertrophied [4, 18, 30, 31]. Furthermore, the FCRB muscle can also be injured during minimally invasive volar-sided fixation of a distal radial fracture [32].

Our case report, in common with others, serves as a reminder that an accessory muscle or its tendon may cause clinical manifestations, including those associated with an intersection syndrome.

Compliance with ethical standards

Disclosures None.

Conflict of interest None.

Grant support None.

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