A RARE VARIATION OF ACCESSORY FLEXOR CARPI ULNARIS MUSCLE: A CASE REPORT

Anatomy

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ABSTRACT

Normally flexor carpi ulnaris arises as two heads one from humerus and another from ulna. During the routine dissection of undergraduate medical students a rare variation of flexor carpi ulnaris was found. A fully developed additional muscle belly was found on the flexor compartment of the left forearm. The additional muscle belly was found medial to flexor carpi ulnaris and it had a fleshy part and a tendinous part. Fleshy part was coming from ulnar head of flexor carpi ulnaris and the tendon was getting inserted to flexor retinaculum. There was no separate nerve and blood supply to the accessory muscle fibers. Variations in the forearm muscles are of utmost importance both anatomically as well as clinically and may be anticipated to avoid complications during reconstructive surgical procedures.

KEYWORDS

Flexor carpi ulnaris, Humeral head, Ulnar head, Accessory muscle

INTRODUCTION

Variations of muscles of the upper limb are not uncommon & it is been well documented but variations of flexor carpi ulnaris are rarely expressed. Flexor carpi ulnaris is the most medial of the superficial muscle of the forearm. Normally it arises from the small humeral head and large ulnar head and gets inserted to pisiform, a hook of hamate & base of the fifth metacarpal bone. Variations of flexor carpi ulnaris are aberrant proximal/ distal attachments, various numbers of muscle bellies and accessory muscle¹. Accessory FCU is a rare presentation with few reported cases². Sometimes there is a slip from the coronoid process and forms a thick tendon along anterolateral border of its distal half. The tendon is attached to the pisiform and then extended to the hamate and fifth metacarpal. The attachment to the flexor retinaculum and fourth or fifth metacarpal bones is significant at times³. Awareness of the variations of flexor carpi ulnaris is anatomically as well as clinically significant in hand surgeries. Knowledge regarding this not only helps the surgeon to be oriented in the operative field but also helps in managing the conditions wherever FCU tendon transfer is needed⁴.

Case Report:

During the routine dissection classes of undergraduate medical students in the department of Anatomy, JSS Medical College, Mysuru, a rare variation of flexor carpi ulnaris was found in the left upper limb of a male cadaver aged around 60 years. A fully developed additional muscle belly was found on the flexor compartment, medial to flexor carpi ulnaris. It had a short fleshy part and a long slender tendinous part (Fig 1). Fleshy part was coming from ulnar head of flexor carpi ulnaris and the tendon was getting inserted to flexor retinaculum (Fig 2). The accessory muscle fibers were situated in between the flexor carpi ulnaris muscle and the palmaris longus. The flexor carpi ulnaris muscle measured a total length of 30 cm with muscle belly of 23.5 cm and width 5 cm. Accessory muscle measured total length of 26 cm with a muscular belly of 10 cm. The tendon with 16 cm of length and 0.3 cm of thickness was getting inserted to flexor retinaculum. There was no separate nerve and blood supply to the accessory muscle fibers.

Figure 1: Accessory head of FCU

DISCUSSION:

Flexor carpi ulnaris muscle is an important muscle in the forearm as it not only flexes the wrist and helps in ulnar adduction but also used for flap surgeries. Bhardwaj's classification based on a thorough literature review distinguishes three types of FCU (Fig 3).

Type I: Single muscle with two tendons⁵.

Type II: Consists of two heads each forming a separate muscle (Digastric FCU)

Type III: Supernumerary muscle in addition to the usual FCU (Accessory FCU)

Vojtech Kunc further modified the Bhardwaj's classification and divided the Type III into Subtypes A and B according to the supernumerary muscle insertion:

Type III A: FCU like insertion (pisiform, triquetral and abductor digiti minimi muscle)

Type III B: Palmaris Longus like insertion (flexor retinaculum, palmar aponeurosis).

The Type IIIA was previously described in 11 cases, Type IIIB in 2 cases⁴. The present case fits in type III B category.

Figure 2: Accessory head inserting to flexor retinaculum

Engin et al reported that the accessory muscle belly (AFCU) originated from the medial epicondyle approximately 1 cm posterolateral to the origin of normal FCU and inserts to the triquetral, hamate bones and flexor retinaculum³. In one case the accessory belly of FCU separated from its proximal part and inserted to the flexor retinaculum at the usual insertion site of the palmaris longus muscle (PL), which was absent^{4,6}. We also observed the same variation of FCU except that the PL was present. The anomalous FCU muscle arising from the medial

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epicondyle along with the common tendon, and proximally the muscle belly split into two parts and gets inserted to pisiform, hamate and proximal part of the fifth metacarpal bone anterior to flexor retinaculum like FCU⁷.

Campo et al noted flexor carpi ulnaris muscle with a total length of 26.5 cm and an accessory muscle with

Figure 3: Types of Flexor carpi ulnaris Variation

total length of 14.5 cm. The accessory muscle with the tendon of 2.5 cm of length and 0.3 cm of thickness is located between the flexor carpi ulnaris muscle and the palmaris longus and crosses the flexor retinaculum in its own tunnel and penetrates the abductor digiti minimi medial to ulnar nerve⁸. FCU arising as two separate bellies from the medial epicondyle of humerus and olecranon process of the ulna and they remained separately throughout and continued with their tendons in the distal part of the forearm. Two bellies joined together just above the wrist and inserted to pisiform bone⁹.

Incidence of an additional head can be explained with reference to the embryonic development of the muscles. Myogenic precursor cells from somites migrate to the limb buds. Differentiated myogenic cells, guided by the connective tissue framework, coalesce to form two principal dorsal and ventral muscle masses to form the limb muscles. Four fundamental phases have been described in the ontogenesis of muscle patterns. The accessory muscle described here could have been formed during phase 3 when muscle primordia from different layers fuse to form a single muscle. Some of the muscle primordia disappear due to cell death by apoptosis even after the cells within them have differentiated to myogenic cells. Persistence of some cells between the FDS and FCU or persistence of some cells on FDS may account for the anomalous muscle slip in the case described here^{2,3,10}. Usually limb muscles can be identifiable by 7th week. One more school of thought is that limb muscles usually formed as two separate elements and then unite to form one muscle. The occurrence of accessory muscle may be due to improper fusion of 2 elements⁹.

To find the neurovascular bundle in forearm both in surgery and diagnostic techniques, the FCU is an important anatomical guideline and it can be easily palpated in its distal course if the wrist is flexed and adducted⁵. The ulnar tunnel located at the proximal part of the hand radial to the pisiform bone and carpal tunnel contains ulnar nerve & artery. Compression of the ulnar nerve in this tunnel due to trauma, cysts, fractures and muscle variations is often reported. The knowledge of variations of the muscles in this region is important for surgeons⁸.

The significance of FCU variants is recently proven in a patient with Volkmann's contracture in which transposition of a double tendon of the FCU was used to improve thumb opposition and index finger flexion⁴. The anatomical variations of forearm muscles have recently become substantial because of the new imaging techniques. It is also important to describe the anatomical features of each with the clinical diagnosis and surgical procedures. Knowledge of the existence of muscle anomalies as well as the location of compression is useful in determining the pathology and appropriate treatment for compressive neuropathies³.

CONCLUSION:

The variation of the accessory muscle of the flexor carpi ulnaris muscle described in our study differs moderately from those reported in our literature review. Most of the reported cases belong to type I/ II/ III A and very few reported cases of type III B. The present case being one of

the rare variations is very significant surgically. However the specific anatomical variations explained may be anticipated and recognized by surgeons, hence increasing the effectiveness and safety of the surgical procedures.

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