Case Report

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Flexor Digitorum Superficialis Annularis: A Unique Progressive Variation in the Forearm

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Abstract

Atypical separation of long flexor tendons of the forearm is contemplated as progressive variation. Flexor digitorum superficialis annularis muscle of the ring finger was observed in the superficial strata of the forearm flexor compartment. Its origin, insertion, nerve supply, morphology and morphometry are described in this report. Awareness about the incidence of such rare variant muscle is critical for operating surgeons and anatomists.

Keywords: Flexor Digitorum Superficialis; Flexor Digitorum Superficialis Annularis; Progressive Variation.

Introduction

The conventional anatomical description of the flexor digitorum superficialis (FDS) muscle states that it forms the intermediate layer of the forearm flexor muscle mass. It arises by two heads, the humero-ulnar head and the radial head, reunites and divides into four tendons in the distal third of the forearm. These tendons pass through the carpal tunnel and diverge towards the medial four digits. Close to the digits, each superficial tendon splits to allow the tendon of flexor digitorum profundus (FDP) to pass and insert on the base of middle phalanx of the respective finger [1]. Various retrogressive anomalies of the FDS and its tendons of the little [2] and index fingers [3] have been reported. Occasional separation (up to their origins) of individual muscle bellies of FDS has been considered a progressive variationin the phylogeny [4]. This report discusses a case of a flexor digitorum superficialis annularis (FDSA) muscle of the ring finger, an extremely rare progressive variation, which to our knowledge has not previously been reported in the literature.

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Case Report / Observation

An independent, fleshy, muscle belly originating from the medical epicondyle of the right humerus was observed in a middle-aged male cadaver. The muscle was positioned between Palmaris longus (PL) and Flexor carpi ulnaris (FCU) in the superficial strata of the forearm (Figure 1) and supplied by a direct branch from the median nerve. Its tendon was found traversing under the flexor retinaculum along with tendons of FDSfor index, middle and little finger, Flexor Digitorum Profundus (FDP) and median nerve to reach the proximal phalanx of ring finger. Further,

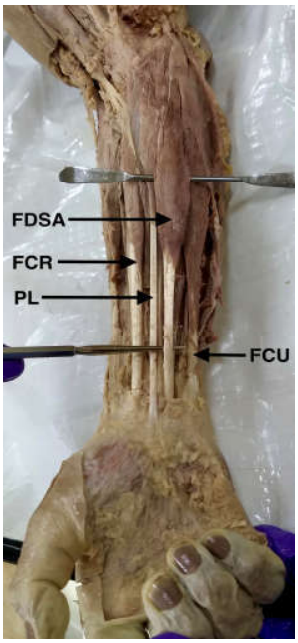

Fig. 1: Flexor digitorum superficialis annularis (FDSA) muscle positioned between Palmaris longus (FL) and Flexor carpi ulnaris (FCU) in the superficial strata of the forearm

it splits into two slips to allow the passage of tendon of the flexor digitorum profundus and gets inserted into the sides of the shaft of middle phalanx of the ring finger (Figure 2). The variant muscle therefore substituted completely for the slip to the ring finger from FDS, which was absent. The muscles of the flexor compartment of the right forearm and hand were carefully dissected and the variant muscle to the ring finger was measured using a flexible measuring tape. The muscle belly and its tendon measured 110 mm & 265 mm in length and 45 mm & 12 mm in width respectively. No such variation was observed on the left upper extremity.

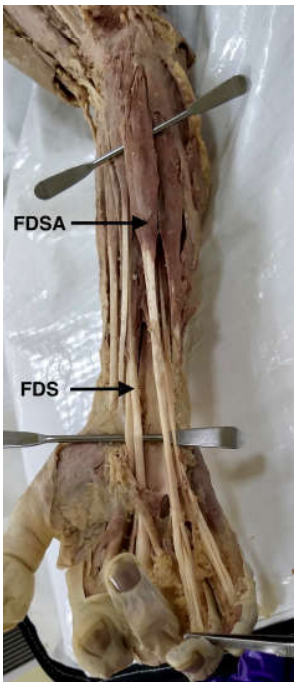

Fig. 2: FDSA tendon insert into the sides of the shaft of middle phalanx of the ring finger

Discussion

Anomalous forearm and hand muscles are rare. However, it is important to recognize these normal variants in order to facilitate diagnosis and appropriate management. The flexor digitorum superficialis (FDS) muscle has been shown to have several variations [4]. A review of published literature shows that the variations of the FDS are mainly associated with the tendon tothe little finger [5-6]. Reports of a rare accessory FDS indicis muscle have been described [7-8]. However, absence for FDS tendon to the ring finger and replacement of the same by an independent Flexor Digitorum superficialis annularis (FDSA) muscle has never been reported.

A summary of all FDS variations describes five concise categories [9].

Type 1: FDS tendon to FDS tendon attachment,

Type 2: Flexor retinaculum to FDS tendon attachment.

Type 3: Digastric muscle in the FDS tendon,

Type 4: Distal extension of the FDS muscle belly,

Type 5: Anomalies of the FDS in the forearm. But, none of the above categories fits into the variation that weobserved making ours unique.Recent observation of an unusual dual tendon and muscle belly arising from FDS and inserting individually on the right and left side of the middle phalanx of the ring finger respectively was reported [10]. For the same, use of a Type 6 category which includes variations that span along the distance of the FDS from forearm to digits wasrecommended [10]. FDSA muscle observed in the present study partially falls into Type 6 category except for the fact that it originates separately from the medial epicondyle of the humerus and not from FDS.

Anatomical variations can be classified into 3 types; progressive, retrogressive and atavistic [11]. The muscles which have a tendency to become increasingly complex, represent the progressive type of muscles. The deep flexor muscles of the forearm belong to the progressive group of variations. The muscles which undergo degeneration with a subsequent loss of functions represent the retrogressive type of muscles. Examples of this type are the palmaris longus and the plantaris muscles. The atavistic muscles are the muscular elements which have been lost completely, during the course of evolution and they make an abrupt appearance again. The axillary arch muscle, a remnant of the panniculus carnosus, is an example of the atavistic type of muscles. In the continuous process of human evolution, forearms and hands are currently in the transition from being essentially prehensile organs to specialized organs of dexterity. FDSA muscle showed extensive separation from FDS muscle and significant migration to the superficial strata representing progressive variations expected with evolution.

Presence of variant muscles can alter the normal anatomical relationship in the region. It is therefore essential to know the common and less common variant. Knowledge of FDSA muscle becomes imperative for surgeons while preforming fasciotomy for acute compartment syndrome, compression neuropathy, tendon transfer and repair of tendon lacerations [12].

Conclusion

Presence of anomalous muscle bellies in the forearm and hand represents retrogressive and progressive variations. Flexor digitorum superficialis annularis (FDSA) muscle reported in this report is unique and represents a progressive variation in the flexor group of muscles. Hence, this variant muscle has to be taken into account by the anatomist during cadaveric dissection and by surgeons during procedures involving the forearm and hand.

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