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Case report

An anomalous origin of accessory head of flexor digitorum profundus in forearm: A rare variant

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ABSTRACT

Introduction: The muscular variations in the forearm have been recognized as causing neurovascular compressions. These variations are mostly detected during routine anatomical dissections or during operations. A clinician should have a thorough knowledge of these variations for understanding the unusual symptoms and signs due to nerve compression. Here, we report the presence of a rare variant head of flexor digitorum profundus (FDP) muscle in forearm.

Materials and methods: During routine cadaveric dissection done on the upper limb of a 52-year-old male in the Department of Anatomy, HIMSR, New Delhi, a well-developed muscle of anomalous origin was discovered in the flexor compartment of the forearm. The muscles, blood vessels and the nerves of the forearm were dissected carefully following the usual dissection steps. The specimen was studied in detail and photographs were taken.

Observations: The anomalous muscle that appeared to be an accessory belly of FDP was taking origin from the middle two-fourths of radius and from the adjoining interosseous membrane. Distally, it was attached to the lateral aspect of FDP. The anterior interosseous nerve and vessels supplied the accessory belly and traversed deep to it. The FDP displayed the normal attachments and innervations other than this.

Conclusion: Very few cases have been reported on the origin of accessory belly of FDP. Awareness of the possibility of such anomalous muscle is important for neurophysicians and hand surgeons undertaking reconstructive procedures for compression syndromes and tenosynovitis.

1. Introduction

The anterior compartment of the forearm has five superficial and three deep muscles. The superficial muscles are pronator teres, flexor carpi radialis, palmaris longus, flexor digitorum superficialis (FDS) and flexor carpi ulnaris. The deep muscles are flexor digitorum profundus (FDP), flexor pollicis longus (FPL) and pronator quadratus.[1]

The FDP, which is the deep muscle of the forearm, takes origin from the upper three-fourths of the anterior and medial surfaces of the shaft of ulna, adjacent medial half of

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interosseous membrane and also from medial border of olecranon and coronoid processes of ulna. It inserts on the bases of distal phalanges of medial four digits. There are varied reports on origin of FDP and FDS, as both of them have a common phylogenetic origin from pronatoflexor group of Humphrey.[2] The accessory head of deep flexors of the forearm (Gantzer's muscles) has been described as two different small bellies inserting either into FPL or FDP.[3] In most of these studies, the accessory head arises from the coronoid process of ulna or from the medial epicondyle of humerus. The present study reports a well-developed muscle belly, which was taking origin from the middle two-fourths of anterior surface of radius and was inserted onto the muscle belly of FDP. It was supplied by the anterior interosseous nerve and vessels.

2. Case report

During routine cadaveric dissection for undergraduate students in the Department of Anatomy, HIMSR, New Delhi, a variant muscle was discovered in the right forearm of a male cadaver aged around 52 years. The anomaly was unilateral. After reflecting the skin and superficial fascia, dissection of the muscles of superficial group of the forearm displayed normal attachments and innervations. The deeper group of muscles was then dissected, where a well-developed muscle belly appearing as an accessory head of FDP was seen lying between the FPL and FDP. The accessory belly was proximally attached to the medial half of anterior surface of middle two-fourths of radius and the adjoining lateral portion of interosseous membrane. Its fibres ran downwards and medially. The muscle fibres were seen distally getting attached to the lateral side of the muscle belly and tendon of FDP in the distal third of the forearm. The anterior interosseous nerve and vessels were supplying the accessory belly and traversed deep to it. The FDP was attached to the upper three-fourths of the anterior and medial surfaces of the shaft of the ulna, medial portion of the interosseous membrane and medial border of olecranon and coronoid processes of ulna. The insertion of the tendons of FDP was on the bases of the distal phalanges of medial four digits. The FPL and pronator quadratus displayed their usual attachments and nerve supply. The median nerve followed the normal course lying between the FDS and FDP (Fig. 1).

3. Discussion

3.1. *Anatomical variations and clinical implications*

A number of variations are reported in literature but they a majority are related to superficial group of muscles of forearm, and only very few pertain to deep group of muscles. Going through the literature, muscle variants were seen to have a racial relationship, maximum being reported in Blacks (89.3%) and less in Caucasian (33.3%).[4] Most of these variations took origin from the undersurface of FDS, medial epicondyle and the coronoid process of ulna. They got their nerve supply from either the anterior interosseous nerve or directly from the median nerve.[5–7] An unusual bilateral distal and complete additional FDP muscle to the index finger has also been described, which was innervated by median nerve.[8] Yogitha et al. found another variant muscle that took origin from the medial surface of radius beneath the FPL and it inserted on the tendon of FDP.[4] Vishal et al. also reported accessory tendons arising from both FPL and FDP that joined to form a common tendon and got inserted into the tendon of index finger of FDP.[9] The variant being reported here by us took origin from the medial half of middle two-fourths of the radius and the lateral portion of the interosseous membrane. It was inserted onto the lateral portion of FDP. There was no connection between this accessory belly and the FPL muscle. Linburg and Comstock observed chronic tenosynovitis due to variant connection between FPL and FDP in four of their patients. They observed that the incidence rate of this anomaly was unilateral in 31% cases and bilateral in 14% of cases.[10] During radiodiagnostic procedures or surgical approach of the forearm region, such type of origin of muscle variant needs to be kept in mind as these have been implicated in anterior interosseous nerve syndrome.

Apart from the above-mentioned clinical importance of the present case, it is likely that the contraction of the accessory muscle may alter the pull of FDP muscle and thereby affect the movements of the fingers, especially the index finger.

Fig. 1 – Dissection of the front of forearm showing deep group of flexor muscles (flexor pollicis longus is reflected towards radial side with median nerve), AH, accessory head of flexor digitorum profundus; FDP, flexor digitorum profundus; MN, median nerve; UA, ulnar artery; AINV, anterior interosseous nerve and vessel; FPL, flexor pollicis longus; FLEXOR GROUP(S), superficial group of flexor muscles; PQ, pronator quadratus.

3.2. *Embryology*

The flexor muscles of the forearm develop from the flexor mass, which subsequently divides into two layers, superficial and deep. The deep layer gives rise to FDS, FDP and FPL. The existence of accessory muscles that connect the flexor muscles may be explained on the basis of incomplete cleavage of the flexor mass during development and has been put forward by.[4,9]

4. Conclusion

The variant accessory head of muscles of forearm has been reported in primates and other mammals; hence, they may represent phylogenetically and ontogenetically the atavistic character. Apart from academic interest, the neurophysicians and hand surgeons should also be aware of the variant muscle bellies in the forearm. The presence of accessory heads of the deep muscles of the forearm has been implicated in cases of nerve compressions that may be due to entrapment of either anterior interosseous nerve or median nerve. The present study reports an unusual presence of a muscle belly in the forearm, which may help the concerned clinicians in updating the knowledge on differential diagnosis and management of the patients of nerve compression syndromes.

Conflicts of interest

The authors have none to declare.

REFERENCES

1. Standring S, Ellis H, Healy JC, Johnson D, Williams A, Collins P. *Gray's Anatomy: Anatomical Basis of Clinical Practice*. 39th ed. Edinburgh: Elsevier Churchill Livingstone; 2005: 879–881.
2. Mangini U. Flexor pollicis longus muscle: its morphology and clinical significance. *J Bone Jt Surg Am*. 1960;42A:467–470. 559.
3. Jones M, Abrahams PH, Sanudo JR. Case report: accessory head of the deep forearm flexors. *J Anat*. 1997;191: 313–314.
4. Yogitha R, Leelavathy N. A variant muscle of the flexor compartment of forearm: a case report. *J Evol Med Dental Sci*. 2013;2(30):5700–5702.
5. Bergman RA, Afifi AK, Miyauchi R. Muscular system. In: *Illustrate Encyclopedia of Human anatomic Variation. Text, Atlas and Word Literature*. Baltimore: Urban & Schwarzenberg; 1988
6. Hollinshed HW. *Anatomy for Surgeons*. 2nd ed. Philadelphia: Harper and Row; 1969:408–409.
7. Williams PL, Bannister LM, Berry MM, Collins P, Duson M, Dussek JE. *Gray's Anatomy*. 38th ed. Edinburgh: Churchill Livingstone; 1995:847–848.
8. Kopuz C, Gulman B, Baris S. An unusually distal and complete additional flexor profundus muscle to the index finger. *J Anat*. 1997;191:465–467.
9. Vishal K, Naveen NS, Murlimanju BV, Prima SD. A rare muscular variation in the flexor compartment of the forearm. *Int J Anat Var*. 2011;4:115–116.
10. Linburg RM, Comstock BE. Anomalous tendon slips from the flexor pollicis longus to the flexor digitorum profundus. *J Hand Surg Am*. 1979;4:79–83.