



ADDITIONAL DIGASTRIC MUSCLE IN THE FLEXOR COMPARTMENT OF FOREARM.

Ashok K R*

Professor, Department of Anatomy, BGS Global Institute of Medical Sciences, Bengaluru, Karnataka, India. *Corresponding Author

Rohini K R

Associate Professor, Department of Anatomy, Chitradurga Medical College and Research Institute, Chitradurga, Karnataka, India.

ABSTRACT Muscles in the anterior flexor compartment of forearm are arranged in superficial and deep groups. There are five superficial muscles and three deep muscles. All the five superficial muscles have common origin from medial epicondyle of humerus. Additional muscle in the forearm, presence of accessory heads or absence of a muscle is not a rare entity. Bipedal gait has set the forelimbs free from weight bearing activity which might result in variations in the muscles of forearm. During routine dissection for undergraduate students' additional muscle was noted in the right forearm of a female cadaver aged around 60 years. This additional muscle had two bellies – proximal and distal – connected by an intermediate tendon. Proximal belly had two heads of origin – humeral and ulnar. Intermediate tendon was anchored to the anterior oblique line by fibrous strands. Tendon of the distal belly entered the carpal tunnel superficial to the median nerve and merged with the deep fibres of flexor retinaculum. Presence of additional tendon in the carpal tunnel will compromise the space available for the median nerve. Knowledge about such additional muscle and tendons should be kept in mind while evaluating carpal tunnel syndrome.

KEYWORDS : Flexor Muscle, Additional Forearm Muscle, Carpal Tunnel Syndrome

INTRODUCTION

Muscles in the anterior flexor compartment of forearm are arranged in superficial and deep groups. There are five superficial muscles and three deep muscles.

Pronator teres, flexor carpi radialis, palmaris longus, flexor digitorum superficialis and flexor carpi ulnaris forms the superficial layer. Of these, flexor digitorum superficialis is also considered as a intermediate layer muscle¹.

All the five superficial muscles have common origin from medial epicondyle of humerus.

Pronator teres and flexor carpi ulnaris have additional heads from ulna, flexor digitorum superficialis has additional fibres from ulna and radius².

Flexor pollicis longus, flexor digitorum profundus and pronator quadratus are the deep flexor muscles which arise either from ulna or radius or from both bones¹.

Presence of accessory heads, additional muscle in the forearm or absence of a muscle has been reported in the literature³.

Bipedal gait has set the forelimbs free from weight bearing activity which might result in variations in the muscles of forearm.

Case Report

During routine dissection for undergraduate students' additional muscle was noted in a female cadaver aged around 60 years. Additional muscle was present in the flexor compartment of right forearm deep to the flexor digitorum superficialis.

Muscle had two bellies – proximal and distal, connected by an intermediate tendon. Proximal belly had two heads of origin. Humeral head originated from the medial epicondyle of the humerus in common with other superficial flexor muscles. Ulnar head originated from medial margin of coronoid process of ulna.

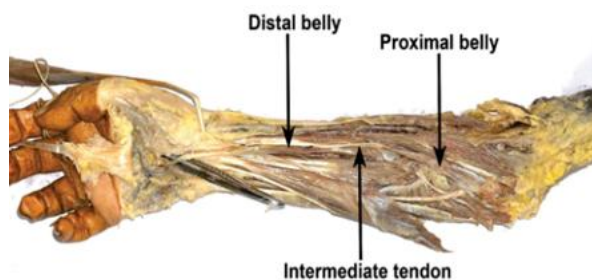


Fig 1: Two Bellies with Intermediate Tendon

The two fibrous head united to form a muscle belly which crossed the upper part of forearm from medial to lateral side and formed an intermediate tendon which was present distal to the anterior oblique line of radius.

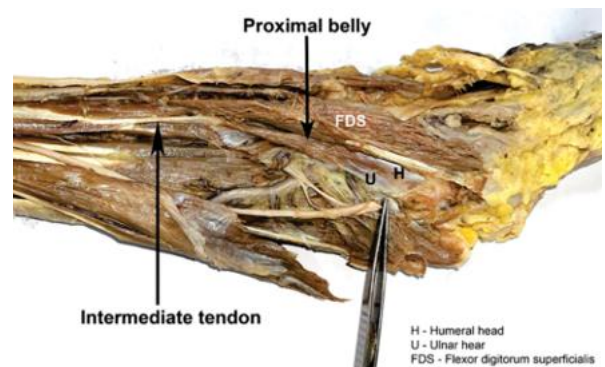


Fig 2: Humeral and Ulnar Head of Proximal Belly

Intermediate tendon was anchored to the anterior oblique line by few fibrous strands.

Distal belly continued from intermediate tendon which passed in front of flexor pollicis longus muscle and was replaced by a tendon in lower part of forearm. This tendon entered the carpal tunnel superficial to the median nerve and merged with the deep fibres of flexor retinaculum.

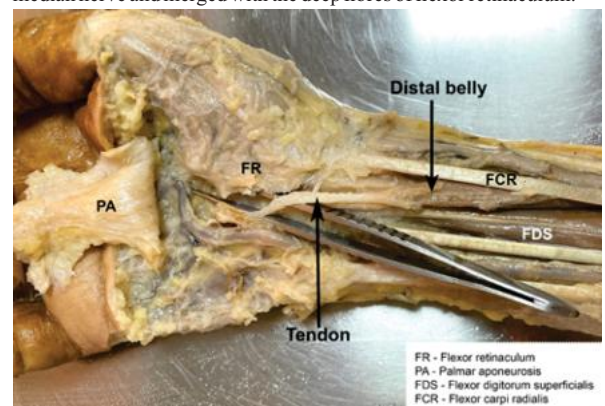


Fig 3: Tendon of Distal Belly Merging with Flexor Retinaculum

The muscle was supplied by a branch of the median nerve which entered the proximal belly.

DISCUSSION

Variations in the muscles of the flexor compartment of forearm is not uncommon¹. Variations of flexor digitorum superficialis can be in the form of separate muscle for index finger, additional heads of origin, communicating fibres with flexor pollicis longus or absence of tendons for little finger³.

Macalister et al reported a case of separate index flexor muscle arising from the coronoid process of ulna. They also reported digastric nature of the muscle⁵.

Muscle arising from the anterior surface of radius along the flexor digitorum superficialis and inserting partly into the deeper surface of flexor retinaculum and merging with palmar aponeurosis has been reported. This muscle has been named as radiopalmaris².

In the present case we noted digastric bellies – proximal and distal, but in contrast to the findings of Macalister the insertion didn't extend to the index or any other finger. The distal belly is comparable to the radiopalmaris owing to the attachment to flexor retinaculum.

The additional muscle in the present case could be a failed attempt in forming an additional flexor for index finger.

Flexor muscles of forearm develop from small superficial muscle mass and a larger deep muscle mass. Superficial muscle mass splits to form flexor carpi radialis, pronator teres and palmaris longus. Deep muscle mass splits at an early stage of development to form flexor carpi ulnaris. The remaining deep muscle mass cleaves to form flexor digitorum superficialis, flexor digitorum profundus and flexor pollicis longus⁵. Partial division of the muscle masses results in presence of communicating slips between the muscles. Additional cleavage of the muscle mass might result in the formation of additional muscle belly⁶. The additional muscle in the present case was deep to flexor digitorum superficialis and was supplied by a branch of median nerve. So we might consider that this additional muscle arose from deep muscle mass which was destined to form the flexor digitorum superficialis.

Presence of additional muscles usually remains asymptomatic⁷. These additional muscles have been implicated in compartment syndrome of forearm⁶. If these additional muscles or their tendons pass through the carpal tunnel they can reduce the space available for the median nerve resulting in carpal tunnel syndrome. These additional muscles in the carpal tunnel can present as soft tissue mass. Javed S et al reported a case of aberrant muscle belly arising from the flexor digitorum superficialis tendon for index finger causing median nerve compression which was relieved by carpal tunnel decompression⁷. Clinically detectable palpable mass causing compression of the median nerve was first reported by Smith RJ⁸. The mass was identified as additional muscle during surgery and was excised to relieve the pressure on median nerve. Presurgical evaluation using ultrasonography or MRI helps in identifying the additional muscles.

CONCLUSION

Digastric muscle with proximal and distal belly was found in the flexor compartment of right forearm. Proximal belly originated from medial epicondyle of humerus and coronoid process of ulna, intermediate tendon was anchored to anterior oblique line of radius, distal belly was inserted into the flexor retinaculum. The muscle was supplied by a branch of median nerve.

Presence of additional tendons or muscle in the carpal tunnel will compromise the space available for the median nerve. Knowledge about such additional muscle and tendons should be kept in mind while evaluating carpal tunnel syndrome and soft tissue masses in the wrist region.

REFERENCES

1. Datta AK. Essentials of human anatomy – Superior and inferior extremities. 3rd ed. Kolkate: Current books international; 2007. p 68
2. Rodrigues V, Nayak SB, Rao MK, Vollala V, Somayaji N, Rao AS. Abnormal muscle in the anterior compartment of the forearm: a case report. *Cases journal*. 2009 Dec;2(1):1-4
3. Tubbs RS, Shojja MM, Loukas M, editors. *Bergman's comprehensive encyclopedia of human anatomic variation*. John Wiley & sons; 2016 Jul 12:301
4. Bernardes A, Melo C, Pinheiro S. A combined variation of Palmaris longus and Flexor digitorum superficialis: Case report and review of literature. *Morphologie*. 2016 Dec 1;100(331):245-9
5. Keibel F, Mall FP. *Manual of human embryology*. Volume 1; JB Lippincott Company; 1912:492-493
6. Kumar V, Naveen NS, Murlimanju BV, D'souza PS. A rare muscular variation in the flexor compartment of the forearm. *International Journal of Anatomical Variations*. 2011;4:115-6
7. Javed S, Woodruff M. Carpal tunnel syndrome secondary to an accessory flexor digitorum superficialis muscle belly: case report and review of the literature. *Hand*. 2014 Dec;9(4):554-5

8. Smith RJ. Anomalous muscle belly of the flexor digitorum superficialis causing carpal-tunnel syndrome. *J Bone Joint Surg Am*. 1971;53(6):1215-6