

An Anomalous Additional Muscle Belly of Flexor Digitorum Profundus: A Case Report with its Clinical Insight

Anju Choudhary

How to cite this article:

Anju Choudhary. An Anomalous Additional Muscle Belly of Flexor Digitorum Profundus: A Case Report with its Clinical Insight. *Ind Jr Anat.* 2024;13(2):71-73.

Abstract

The muscular abnormality in the flexor compartment of forearm is less common compared to that of extensor compartment. The anatomical variations and abnormalities of muscles of the forearm and hand have become significant because of new imaging techniques. An unusual and complete additional flexor digitorum profundus muscle to index finger was found bilaterally during routine dissection of a 61 year old male cadaver. Length of additional muscle was approximately 15 cm with spindle shaped belly and long tendon (belly length 5cm, tendon 10 cm. width of belly was 1cm).

In provisions of Clinical and functional significance; the knowledge of abnormalities of muscles and their tendons are important to the clinician in appropriate detection of etiology for symptoms and management of the patient. Acknowledgment of such variations could be useful for the clinicians, hand surgeons and plastic surgeons.

Keywords: Flexor; Imaging; Surgeons; Belly; Tendon.

INTRODUCTION

The variations of the muscles of the forearm can lead to a variety of clinical disorders that impair forearm and hand function.¹ The flexor digitorum profundus is a muscle of deep compartment in the forearm, which arises deep to the superficial

flexors from upper 3/4th of anterior and medial surfaces of the ulna. It also arises from medial side of coronoid process, upper 3/4 of posterior ulnar border, interosseous membrane and deep fascia of the forearm. About half way down in forearm four long tendons formed that run down the arm and through the carpal tunnel and attach to the palmar side of the phalanges of the fingers. Only that to index finger appears to separate, tendons of other finger interconnected by areolar tissue.² Studies suggest that flexor digitorum profundus (FDP) may be joined by accessory slips from the radius, flexor digitorum superficialis, flexor pollicis longus (FPL), the medial epicondyle or the coronoid process.³ The muscular abnormality in the flexor compartment of forearm is less common compared to that of extensor compartment. The anatomical variations and abnormalities of muscles of the forearm and hand have become significant because of new imaging

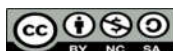
Author's Affiliation: Assistant professor, Department of Anatomy, All India Institute of Medical Sciences, Bathinda 151001, Punjab, India.

Corresponding Author: Anju Choudhary, Assistant professor, Department of Anatomy, All India Institute of Medical Sciences, Bathinda 151001, Punjab, India.

E-mail: anjuchoudhary999@gmail.com

Received on: 17.04.2024

Accepted on: 01.07.2024



This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0.

techniques, such as computed tomography and magnetic resonance imaging. Also, these variations are important in order to identify the anatomical features of each in relation to clinical diagnosis and for surgical procedures. Muscle variations can cause Neurovascular compressions in the forearm. The majority of these variations are exposed during normal anatomical dissections or surgeries. For a clinician to comprehend the atypical symptoms and indications caused by nerve compression, they must have a full understanding and knowledge of these variants.⁴ A wide knowledge of such kind of variations is requisite for radiologists and physicians, as well as hand surgeons for diagnostic purposes while performing corrective surgical procedures.⁵

CASE DESCRIPTION

An unusual and complete additional flexor digitorum profundus muscle to the index finger was found bilaterally during the routine dissection of a 61 year old male cadaver. Muscle was located bilaterally ventral to the flexor digitorum superficialis FDP divided into four tendons normally; independent muscle belly was arising from the origin of the FDP and getting inserted into the distal phalanx of the second digit (Fig. 1). The tendon remained separate along its entire course to its insertion. Length of additional muscle was approximately 15 cm with spindle-shaped belly and long tendon (belly length 5cm, tendon 10 cm. width of belly was 1cm). The morphology of adjacent muscles in the flexor compartment was normal.

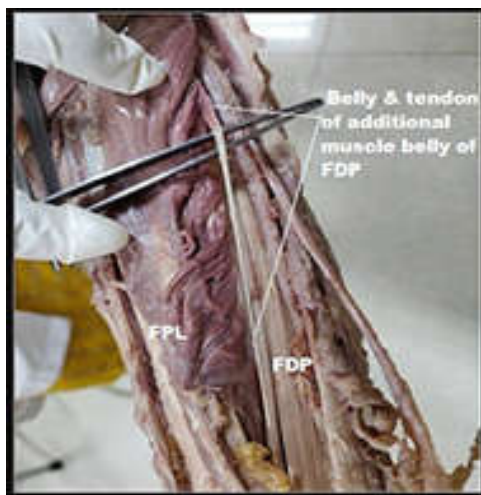


Fig. 1: The forearm showing belly and tendon of additional muscle belly of flexor digitorum profundus. (FPL- flexor pollicis longus, FDP- flexor digitorum profundus).

DISCUSSION

Defining the anatomical characteristics for clinical diagnosis and surgical treatments requires recognizing the imperative anatomical variations. The incidence of anomalous muscles in the forearm's flexor compartment is not very common. Most of the time, these muscles go unrecognized since they do not cause any symptoms. However, sometimes these abnormal muscles may induce functional impairments by compressing the neurovascular structures. In many studies, anatomical variations of the upper limb correlate with nerve entrapment and such compressions are frequently attributed to some type of accessory muscle.⁶

During the fourth week of development, somatic mesoderm invades the limb buds and forms ventral and dorsal condensation. Ventral condensation gives rise flexors and pronators of upper limb.⁷

The flexors of the forearm that develop from flexor mass divide into two layers, superficial and deep. Flexor digitorum superficialis, flexor pollicis longus and flexor digitorum profundus originate from deep layers. The existence of accessory muscles could be explained by incomplete cleavage of deep layer of flexor mass during development, which represents an atavistic character.^{8,9,10}

Unusual origins and insertions for the Flexor digitorum profundus have been described. The flexor digitorum profundus (FDP) may be joined by accessory slips from the radius, from flexor digitorum superficialis, Flexor pollicis longus, the medial epicondyle or the coronoid process of the ulna.^{11,12,13,14,15}

The radial origin of the muscle may extend a considerable distance alongside the long flexor of the thumb.¹⁴ An accessory bundle arising from the coronoid process and forming a tendon that joins the tendon of the middle or index finger is said to be found in about 20% of bodies and is termed the accessory tendon of the FDP.¹²

In our study shape of the anomalous muscle belly was spindle-shaped. Jones et al, in their study, observed that the shape of the accessory flexor digitorum profundus is slender in $54 \pm 5\%$ of specimens, triangular in $36 \pm 4\%$ of specimens, and voluminous $9 \pm 1\%$ of specimens.⁸

A case of anomalous flexor digitorum profundus muscle bellies as a cause of snapping wrist and carpal tunnel syndrome was also reported.¹⁶

Aberrant muscles of the forearm often appear as unusual swellings, especially palmar bellies

commonly exhibiting as painful or painless masses,^{17,18} that may be misdiagnosed as lipomas, ganglia, vascular malformations, or tendon sheath tumors.¹⁹

CONCLUSION

Conclusion & Clinical representation: In provisions of Clinical and functional significance; the abnormalities of muscles and their tendons in the forearm even though not common are important to the clinician in the appropriate detection of etiology for symptoms and management of the patient. Acknowledgment of such variations could be useful for clinicians, hand surgeons and plastic surgeons.

Acknowledgements

Authors declare no conflict of interest regarding this manuscript and no financial grant or assistance has been taken from any financing body towards this work.

REFERENCES

1. Ciftcioglu E, Kopuz C, Corumlu U, Demir MT. Accessory muscle in the forearm: a clinical and embryological approach. *Anat Cell Biol.* 2011; 44:160-3. doi: 10.5115/acb.2011.44.2.160. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
2. Standring S. *Gray's Anatomy - The anatomical basis of clinical practice.* 40th ed. London: Elsevier Churchill Livingstone; 2008:847-848.
3. Biant LC. Elbow and the forearm. In: Standring S, editor. *Gray's anatomy.* 41st ed. Elsevier; Philadelphia: 2016. pp. 837-861. [Google Scholar]
4. Kumar S, Verma R, Mehra RD. An anomalous origin of accessory head of flexor digitorum profundus in forearm: a rare variant. *J Anat Soc India.* 2016;65(Suppl 1):S73-5. doi: 10.1016/j.jasi.2016.04.001.[CrossRef][Google Scholar] [Ref list]
5. Wahba MY, Singh GD, Lozanoff S. An anomalous accessory flexor digiti minimiprofundus muscle: a case study. *Clin Anat.* 1998;11:55-9. doi: 10.1002/(SICI)1098-2353(1998)11:1<55::AID-CA9>3.0.CO;2-R. [PubMed] [CrossRef] [Google Scholar].
6. Orellana-Donoso M, Valenzuela-Fuenzalida J, GoldSemmler M, et al. Neural entrapments associated with musculoskeletal anatomical variations of the upper limb: Literature review. *Transl Res Anat.* 2021; 22: 100094, doi: 10.1016/j.tria.2020.100094.
7. El Domiaty MA, Zoair MM, Sheta AA. The prevalence of accessory heads of the flexor pollicis longus and the flexor digitorum profundus muscles in Egyptians and their relations to median and anterior interosseous nerves. *Folia Morphol* 2008;67(1):63- 71.
8. Jones M, Abrahams PH, Sanudo JR, Campillo M. Incidence and morphology of accessory heads of flexor pollicis longus and flexor digitorum profundus (Gantzer's muscles). *J Anat* 1997;191:451-455. [5].
9. Nayak SR et.al. Multiple muscular anomalies of upper extremity: a cadaveric study. *Romanian Journal of Morphology and Embryology* 2008;49(3):411- 415. [6].
10. Vollala et.al. Multiple accessory structures in the upper limb of a single cadaver. *Singapore Med J* 2008;49(9):e254-e258.
11. MacAlister A (1875) Additional observations on muscular anomalies in the human anatomy. *Transactions of the Royal Irish Academy* 25,1-34.
12. Hollinshead HW (1969) *Anatomy for Surgeons*, 2nd edn, vol. 3, pp. 408-409. Philadelphia: Harper and Row.
13. Williams PL, Warwick R (1980) *Gray's Anatomy*, 36th edn, pp. 576-577. Edinburgh: Churchill Livingstone.
14. Bergman RA (ed.) (1988) *Compendium of Human Anatomic Variation*, pp. 14-15. Baltimore and Munich: Urban andSchwarzenberg.
15. Williams PL, Bannister LM, Berry MM, Collins P, Dyson M, Dussek JE et al. (1995) *Gray's Anatomy*, 38th edn, pp. 847-848. Edinburgh: Churchill Livingstone.
16. Falcon, Spencer MD, Everist, Brian MD, Brubacher, Jacob MD. Anomalous Flexor Digitorum Profundus Muscle Bellies as a Cause of Snapping Wrist and Carpal Tunnel Syndrome.A Case Report. *JBJS Case Connector* 11(4):e21.00311, October-December 2021.
17. Honing ML, Ritt MJ, Bos KE. An anomalous flexor digitorum superficialis to the index finger. *Surg Radiol Anat.* 1995; 17(4): 339-341, doi: 10.1007/BF01795194, indexed in Pubmed: 8896155.
18. Smith RJ. Anomalous muscle belly of the flexor digitorum superficialis causing carpal-tunnel syndrome. Report of a case. *J Bone Joint Surg Am.* 1971; 53(6): 1215-1216, indexed in Pubmed: 5092807.
19. Stephens N, Marques E, Livingston C. Anomalous flexordigitorumsuperficialismusclebellypresenting as a mass within the palm. *Can J Plast Surg.* 2007; 15(1): 44-46, doi: 10.1177/229255030701500103, indexed in Pubmed: 19554131.

