

Rare Origin of Two Accessory Bellies from the Undersurface of the Flexor Digitorum Superficialis Muscle

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Proper knowledge of muscular variations is essential not only for anatomists but also for surgeon's. Accessory bellies and the tendons of the muscles are surgically noteworthy. Such variant structures can lead to error in both diagnosis and treatment. Forearm flexors are known to exhibit such variations. Some of the variations are, the accessory heads of the deep flexors of the forearm (Gantzer's muscles) have been described as 2 different small bellies which insert either into Flexor pollicis longus (FPL) or Flexor digitorum profundus (FDP). In 1813 Gantzer described 2 accessory muscles in the human forearm which bear his name (14,26) and these have subsequently been reported with variable attachments (6,11,12,14-16,19,24-26). But there are no previous reports which have mentioned the existence of two accessory bellies arising from the undersurface of the flexor digitorum superficialis (FDS) and inserting into two deep flexors of the forearm as in the present case.

In the routine dissection of right upper limb of 52 years old male cadaver in Department of Anatomy, K.M.C, Manipal, we observed a case of the flexor digitorum superficialis muscle giving two accessory bellies (A1,A2), which took their origin from the under surface of flexor digitorum superficialis just digital to the origin of this muscle from medial condyle. On further dissection we have noticed that, the accessory belly (A1) was running downwards to the

medial aspect of the tendon of flexor pollicis longus for its insertion. The insertion was seen at the junction between proximal 1/3rd and middle 1/3rd of forearm; where as the other belly (A2) was running towards the lateral aspect of the tendon for the middle finger of flexor digitorum profundus for its insertion. The insertion of this belly was seen deep to the flexor retinaculum. The following are appropriate sizes of parts described. A1: Muscle length 5.9 cm, Tendon length 3.2 cm, Muscle width 0.6 cm, Tendon width 0.2 cm. A2: Muscle length 7.2 cm, Tendon length 16.7 cm, Muscle width 0.8 cm, Tendon width 0.3 cm. The nerve supply for both muscle bellies came from the median nerve (Figure 1).

Although many rare anatomical variations of FDS muscle were reported in the past, most of them appear to have no clinical significance. In recent times the variants have come to the notice because of their relationship with clinical problems requiring surgery (7). The FDS has been used as a motor for a wide variety of tendon transfer operations in the hand.

The accessory heads of the deep flexors of the forearm (Gantzer's muscles) have been described as two different small bellies which insert either into FPL or FDP. There are previous reports which have mentioned the existence of one accessory muscle which arose from the undersurface of the flexor digitorum superficialis and inserted into both FPL and FDP (10). Anomalies of the flexor digitorum Superficialis have been reported (1-4,8-10,14,21,23). The incidence of the accessory head of the FPL has been reported to range from 39±2% (26) to 73±7% (16) and that for the accessory head of the FDP from 2±9% (16) to 35±2% (11). These accessory muscles have been observed to arise from the coronoid process, the medial epicondyle via fibres of the flexor digitorum superficialis, or a combination of the two (6, 11, 14-17, 22, 26).

The accessory head of FPL has been observed anterior (16) or posterior to the anterior interosseous nerve (5). The accessory bellies described here are anterior to both the anterior interosseous nerve and vessels. 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 the flexor digitorum superficialis, FDP and FPL (13). The existence of accessory muscles which connect the flexor muscles could be explained by the incomplete cleavage of the flexor mass during

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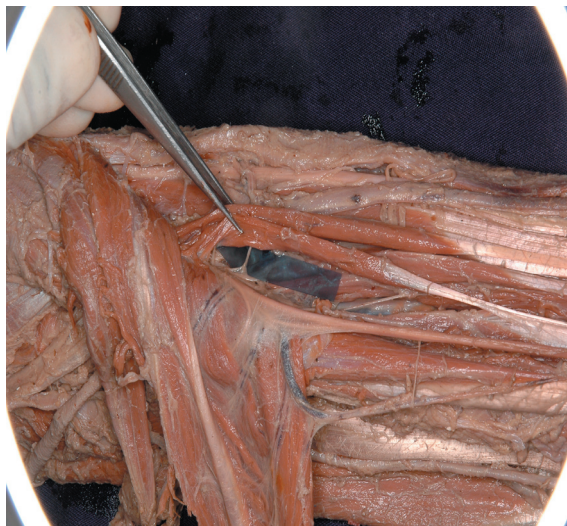


Figure 1. The photograph showing the origin of two accessory bellies (A₁,A₂) from the undersurface of the Flexor digitorum superficialis muscle. FDS-Flexor digitorum superficialis muscle, Mn-Median nerve,Un-Ulnar nerve,Ua-Ulnar artery

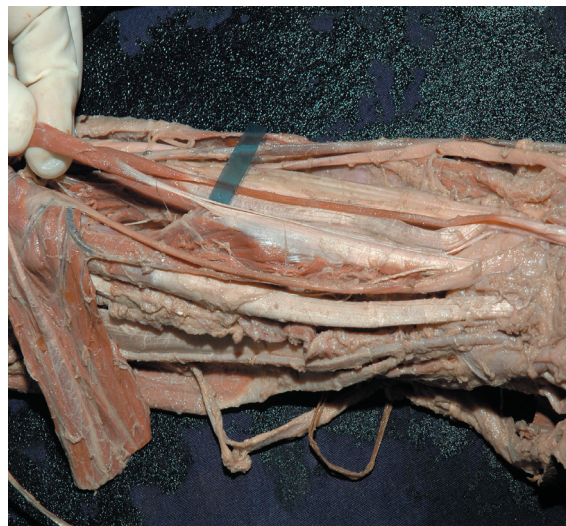


Figure 2. Photograph showing the insertion of accessory bellies. A₁ is inserting to the Flexor pollicis longus, A₂ is inserting to the flexor digitorum profundus right deep to the flexor retinaculum. FDS-Flexor digitorum superficialis, Mn-Median nerve, FPL-Flexor pollicis longus, FDP-Flexor digitorum profundus

development. Apart from its anatomical interest, the accessory heads of the flexor muscles have been implicated in the anterior interosseous syndrome (5, 20) or as a cause of restricted movement of the FDP and FPL that can result in burning pain in the lower third of the forearm via a muscle-tendon shearing action (18).

We conclude that such anomalous muscle bellies should be kept in mind while approaching the forearm for FDS tendon transfer and other surgical procedures around it.

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REFERENCES

1. Austin GJ, Leslie BM, Ruby LK. Variations of the flexor digitorum superficialis of the small finger. *J. Hand Surg. [Am]* 1989;14A:262-7
2. Baker DS, Gaul JS, Williams VK, Graves M. The little finger superficialis—clinical investigation of its anatomic and functional shortcomings. *J. Hand Surg. [Am]* 1981;6: 374-8
3. Bergman RA, Afifi AK, Miyauchi R. Illustrated encyclopedia of human anatomic variation: Opus I: Muscular system: Flexor digitorum superficialis. Available at <http://www.anatomyatlases.org/AnatomicVariants/MuscularSystem/Text/F/17Flexor.shtml> (accessed June 2006)
4. Case DB. A Pseudotumour of the Hand. *Postgrad Med J* 1966;42:574
5. Dellon AL, Mackinson SE. Musculoaponeurotic variations along the course of the median nerve in the proximal forearm. *Journal of Hand Surgery* 1987;12B:359-63
6. Dykes J, Anson BJ. The accessory tendon of the flexor pollicis longus muscle. *Anatomical Record* 1944;90:83-9
7. Elliot D, Khandwala AR, Kulkarni M. Anomalies of the flexor digitorum superficialis muscle. *J. Hand Surg [Br]* 1999;24:570-4
8. Fromont. Anomalies musculaires multiples de la main. Absence du flechisseur propre du pouce. Absence des muscles de leminence thenar. Lombricaux supplementaires. *Bulletins de la Soc Anat de Paris* 1895; 70e ann
9. Graper L. "Eine sehr seltene Varietät des m. flexor digitorum sublimis." *Anat Anz Bd* L1917
10. Jones M, Abrahams PH. Incidence and morphology of accessory heads of flexor pollicis longus and flexor digitorum profundus (Gantzer's muscles). *J Anat* 1997;191:451-5
11. Kida M. The morphology of Gantzer's muscle with specific reference to morphogenesis of the flexor digitorum superficialis. *Kaibogaku-Zasshi* 1988;63:539-46
12. Le Double AF. *TraiteU des Variations du Systeme Musculaire de l 'Homme* (vol 2), Paris: Schleicher Freres, 1897; pp. 95-107

13. Lewis WH. The development of the muscular system. In *Manual of Human Embryology* (ed. Keibel F, Mall FP), Lippincott. Philadelphia: J. B. 1910; vol. 1, pp.492-3
14. Macalister A. Additional observations on muscular anomalies in human anatomy (3rd series). With the catalogue of principal muscular variation hitherto published. *Transactions of the Royal Irish Academy* 1875;25:1-130
15. Malhotra VK, Sing NP, Tewari SP. The accessory head of the flexor pollicis longus muscle and its nerve supply. *Anatomischer Anzeiger* 1982;151:503-5
16. Mangini U. Flexor pollicis longus muscle: its morphology and clinical significance. *J Bone Joint Surg* 1960;42A:467-70
17. Martin BF. The oblique cord of the forearm. *J Anat* 1958;92:609-15
18. Ryu J, Watson HK. SMB Syndrome (symptomatic supernumerary muscle belly syndrome). *Clin Orthop Relat Res* 1987;216:195-202
19. Schafer EA, Thane GD. *Quain's Elements of Anatomy* (vol. 2, part 2), 1884; pp. 227-228. London: Longmans, Green
20. Spinner MD. Anterior interosseous nerve syndrome with special attention to its variations. *J Bone Joint Surg* 1970;52A:84-94
21. Stein A, Lemos M, Stein S. Clinical evaluation of flexor tendon function in the small finger. *Ann Emerg Med* 1990;19:991-3
22. Testut L. *Les Anomalies Musculaires chez l'Homme*, 1884; pp.454-489. Paris: Masson
23. Thompson NW, Mockford BJ, Rasheed T, Herbert KJ. Functional absence of flexor digitorum superficialis to the little finger and absence of palmaris longus – is there a link? *J Hand Surg [Br]* 2002;27:433-4
24. Tountas CH, Bergman R. *Anatomic Variations of the Upper Extremity*, New York: Churchill Livingstone 1993; pp. 147-156.
25. Turner. Notes on the dissection of a second Negro. *J Anat* 1879;16:244-51
26. Wood J. Variations in human myology. *Proceedings of the Royal Society of London*. 1868;16:483-525