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# Morphological Study of Accessory Heads of Deep Flexor Muscle of Forearm

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**Abstract**
**Background:** *The anatomical variations of muscles and nerves in the forearm and wrist are common. Gantzer's muscle is the accessory belly in the flexor compartment of forearm frequently arises from the medial epicondyle and inserted in to the one of the deep muscle of forearm.*
**Material and Methods:** *Present study was conducted in department of anatomy, Institute of medical science, Banaras Hindu university, Varanasi, UP and Indira Gandhi institute of medical sciences, Patna, Bihar. The present study consist of 48 upper limb.*
**Result***: Incidence of accessory muscle belly was detected in 20 (41.66) out of 48 upper limb. 16 of these cases have two accessory belly and 4 have single muscle belly. All are arises from medial epicondyle of humerus below the flexor digitorum superficialis and inserted in to flexor digitorum profundus.*
**Conclusion:** *Knowledge of accessory muscle belly is important not only for anatomist but also for surgeon. Variations of muscle belly kept in mind while approaching the forearm for flexor digitorum superficialis tendon transfer and other surgical procedures in the flexor compartment of forearm and hand.*
**Keywords:** *Flexor digitorum superficialis, Gantzer's muscle.*

## INTRODUCTION

The anatomical variations of muscles and nerves in the forearm and wrist are common. Such variations are reported by two sources- anatomical dissections and clinically reported cases [1]. Since most of the modern book usually do not describe the common variations in the muscles and tendons, students often believe that they have discovered a new muscle or tendon. Therefore the muscle and tendon in the forearm and hand are studied to determine which variations occurs most frequently and to use these findings to supplement textbook description[2]. In 1813, Gantzer described an accessory muscle in the forearm, this muscle could join the one of the deep flexor muscle of forearm[3,4]. However, Kaplan described that this muscle was described almost a century before by Albinus [5].

Gantzer described two accessory belly in the forearm which was named Gantzer's muscle. This muscle mostly arises from the medial epicondyle of the humerus or from the under surface of flexor digitorum superficialis and inserted either in to flexor digitorum profundus or flexor pollicislongus muscle [6]. Gantzer's muscle has clinical importance because it may compress the median nerve or its branch anterior interosseous nerve.

Anterior interosseous nerve syndrome is very rare condition characterised by flexor pollicislongus, flexor digitorum of index and middle fingers and the pronator quadratus muscle of forearm producing a square pinch deformity [7-9].

Knowledge of muscle variations are important not only for the anatomists but also for the surgeons. Such type of variations can lead to error in both diagnosis and treatment. Such variations of muscle belly kept in mind while approaching the forearm for flexor digitorum superficialis tendon transfer and other surgical procedure in the flexor compartment of forearm [6].

## MATERIAL AND METHODS

Present study was conducted in the department of anatomy, Institute of medical science, Banaras Hindu university, Varanasi, UP and Indira Gandhi institute of medical sciences, Patna, Bihar. The present study consist of 48 upper limbs which ware used for undergraduate and postgraduate students. All the limbs were without any obvious pathological deformities. Both the sexes were included in this study. There were 46 males and 2females upper limbs.

The skin was removed from the forearm and hand to expose the superficial fascia. Superficial fascia was removed. Deep fascia was incised and it was reflected to expose the muscles of forearm. Anterior compartment of forearm muscles were arranged in three groups: superficial, intermediate and deep. The muscles of each group were identified from their origin and their tendons were traced for insertion in hand. Superficial muscles were cut through middle to expose the intermediate layer which have only one muscle flexor digitorum superficialis. After cutting the flexor digitorum superficialis, deep layer of muscles was exposed in which flexor digitorum profundus and flexor pollicislongus were lying in the plane and pronator quadratus muscle was identified deep to them.

## RESULTS

In this study we found the accessory belly in 20 (41.66%) out of 48 upper limb. 16 out of these have double muscle belly and 4 have single muscle belly. All the Gantzer muscles arises from medial epicondyle of humerus and lies below the flexor digitorum superficialis. All the Gantzer muscles inserted into flexor digitorum profundus. 16 accessory belly fused with the index finger and 4 with the middle finger of flexor digitorum profundus.

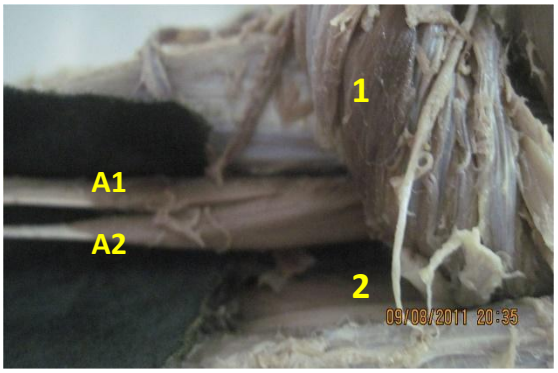


**Fig.1.** Two accessory muscle belly

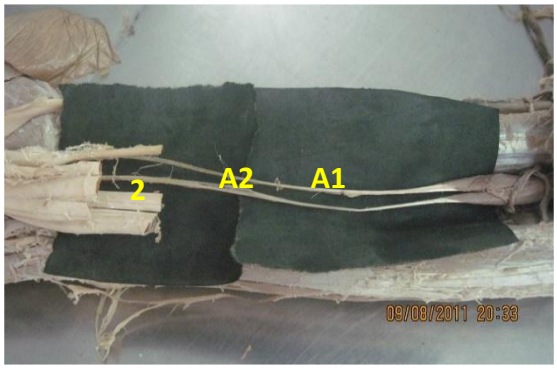


**Fig.2.** Insertion of muscle belly

1. Flexor digitorum superficialis
2. Flexor digitorump rofundus

A1. Lateral belly of accessory muscle

A2. Medial belly of accessory muscle

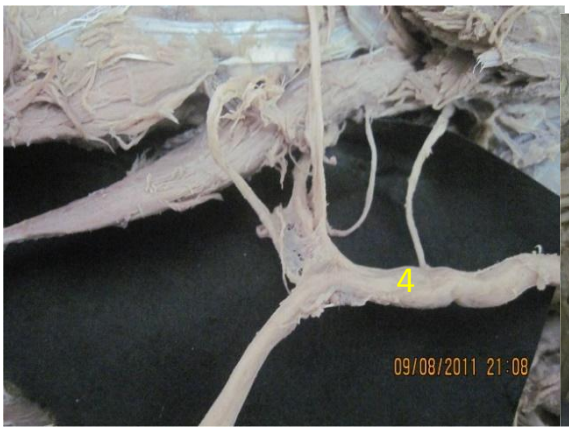


**Fig.3.** Innervation of muscle belly (4- median nerve)

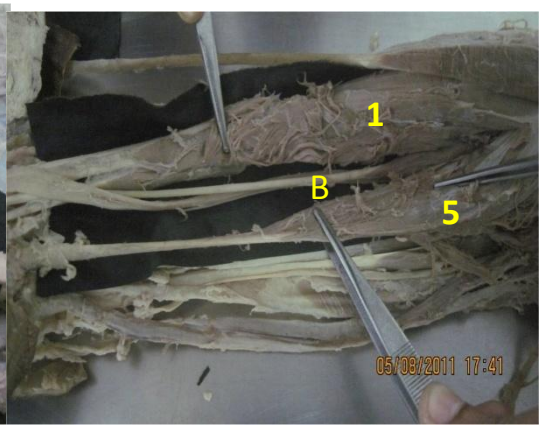


**Fig.4.** Single accessory muscle belly (1- flexor digitorum superficialis 5- palmarislongus)

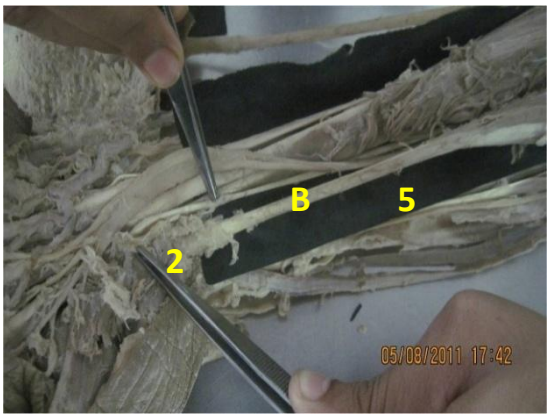


**Fig.5.** Insertion of muscle belly

## DISCUSSION

Occurance of Gantzer muscle is due to incomplete differentiation during development. Initially a common flexor mass is formed in embryo which further differentiates in to superficial, intermediate and deep layer. Superficial layer further develops in to Pronator teres, Flexor carpi radialis and Palmaris longus. Middle layer gives rise to Flexor digitorum superficialis. Deep layer further develops in to the Flexor digitorumprofundus, Flexor pollicislongus and Pronator quadratus [10,11].

In this study, incidence of Gantzer muscle was recorded in 20 (41.66%) out of 48 specimen. This result is very close to percentage observed by Dykes and Anson (53.3%) [12], Malhotra et. al (54.2%) [13], Dellon and Mackinnon (45%) [14], Al Qattan (52%) [15], Jones et al. (55%) [4], Shirali et al. (55%) [16], Gunnal et al. (51.1%) [17] and Temang et al. (43%) [18].

Some authers reported different results regarding the presence of this muscle. Manginiet al. (71%) [19], Hemmady et al. (66.7%) [20] and Oh et al. (67%) [21]. Dykes and Anison in their study showed the distribution of Gantzer muscles to be 28% on the right side and 25% on the left side. In the present study we found 14 (29.16%) muscles on the right side and 6 (12.5%) on the left side.

The result of this study is same of that of most authers who stated the most frequent site of Gantzer's muscles is medial epicondyle of humerus.

In this study, we found the insertion of Gantzer's muscles in flexor digitorum profundus in 100%. Al Qattan reported that in all dissected forearm the Gantzer muscle was inserted in to flexor pollicislongus muscle [15].

## CONCLUSION

Although superficial muscle were reported in the past but they were many rare anatomical variation of flexor digitorum thought to have no clinical significance. In the recent time, these variations

have gained clinical significance due to its close proximity to median nerve and anterior interosseous nerve.

Apart from the anatomical interest the accessory flexor muscle have been implicated in the anterior interosseous syndrome resulting in burning pain.

Knowledge of such variations are important not only for anatomist but also for the surgeon. Such type of variations can lead to error in diagnosis and treatment. Variations of muscle belly kept in mind while approaching the forearm for flexor digitorum superficialis tendon transfer and other surgical procedure in the flexor compartment of forearm and hand.

**REFFERENCES**


1. Al-Qattan MM and Duerksen F (1992). A variant of flexor carpi ulnaris causing ulnar nerve compression-short report. Journal of Anatomy 180 189-90.
2. Perkin RE and Hast MH (1993). Common variations in muscles and tendons of the human hand.Clinical Anatomy 6 226- 31.
3. Wood J. Variations in humam myology. Proc R Soc London. 1868;16:483-525.
4. Le Double AF. Traité des variations du systèmemusculaire de l'hommeet de leur signification au point de vue de l'anthropologiezoologique. Paris: Schleicher Frères; 1897:99-107.
5. Kaplan EB. Anatomiafuncional y quirurgia de la mano. Buenos Aires: Artécnica; 1961:197-250.
6. Takkallapalli Anita1, Sanjay Kalbande, Krishnamurthy Asha, DattatrayDombe and NeeleeJayasree A Unique Variation of Flexor DigitorumSuperficialis Muscle and Its Clinical Significance J Life Sci 2012;4(1):39-43.
7. Spinner, M.; Spencer, P.S. Nerve compression lesions of the upper extremity: a clinical and experimental review. Clin. Orthop., 1974;104:46-67.
8. Hill, N. A.; Howard, F. M. &Huffer, B.R. The incomplete anterior interosseous nerve syndrome. J. Hand Surg., 1985;10A:4-16.
9. Proudman, T. W. &Menz, P. J. An anomaly of the median artery associated with the anterior interosseous nerve syndrome. J. Hand Surg., 1992;17B:507-9.
10. Hollinshead W.H. Anatomy for Surgeons. New York, Harper and Row, 1964;3:412.
11. Jones M, Abrahams PH, Sanudo JR, Campillo M. Incidence and morphology of the accessory heads of the flexor pollicislongus and the flexor digitorumprofundus ( Gantzer's muscle). j. Anat., 1997;191:451-55.
12. Dykes J, Anison BJ. The accessory tendon of the flexor pollicislongus muscle. Anat Rec. 1944;90:83–8.
13. Malhotra VK, Sing NP, Tewari SP. The accessory head of the flexor pollicislongus muscle and its nerve supply. AnatAnz. 1982;151(5):503-5.
14. Dellon AL, Mackinnon SE. Musculoaponeurotic variations along the course of the median nerve in the proximal forearm. J Hand Surg Br. 1987; 12(3): 359-63.
15. al-Qattan MM. Gantzer's muscle. An anatomical study of the accessory head of the flexor pollicislongus muscle. J Hand Surg Br. 1996;21(2):269-70.
16. Shirali, S.; Hanson, M.; Branovacki, G.; Gonzalez, M. The flexor pollicislongus and its relation to the anterior and posterior interosseus nerve. J. Hand Surg., 1998;23B:170-2.
17. Gunnal SA, Sidiqui AU, Daimi SR, Farooki MS, Wabalen RN. A Study on the Accessory Head of the Flexor PollicisLongus Muscle (Gantzer's Muscle). J ClinDiagn Res. 2013;7(3):418-21.
18. Tamang BK, Sinha P, Sarda RK, Shailo P, Murtimanju BV. Incidence and morphology of acessory head of flexor

pollicislongus muscle. An anatomical study. J Evol Med Dental Sci. 2013;2(36):6800-6.
19. Mangini U. Flexor pollicislungus muscle. Its morphology and clinical significance. J Bone Joint Surg Am. 1960;42:467-70.
20. Hemmady MV, Subramanya AV, Mehta IM. The occasional head of the flexor pollicislongus muscle: a study on its morphology and its clinical significance. JPostgrad Med. 1993;39:14-16.
21. Oh CS, Chung IH, Koh KS. Anatomical study of the accessory head of the flexor pollicislongus and the anterior interosseous nerve in Asians. Clin Anat. 2000;13(6):434-8.