Incidence of Accessory Head Of Flexor Pollicis Longus (Only In Males) and Its Clinical Significance

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Abstracts: Background & objectives: Accessory muscle slips may arise from coronoid process of ulna or medial epicondyle of humerus and it joins to flexor pollicis longus muscle. This accessory muscle slip is known as accessory head of flexor pollicis longus or Gantzer's muscle. It runs downward and obliquely to join the flexor pollicis longus. While coursing it may compress median, ulnar and anterior interosseous nerves and produce neurological conditions. Aim of our study was to observe incidence of accessory head of flexor pollicis longus in adult. Method: We studied 60 upper limbs (rt: 30; lt: 30) of adult male Indian cadavers. Each forearm was dissected carefully to see the presence of accessory heads of the flexor pollicis longus and its relations with nearby structures. Results: Accessory head of flexor pollicis longus was observed in 35 upper limbs out of 60 (58.33%). It was present in 31.66 % (19) in right side and 26.66% (16) in left side upper limbs. We observed that, the median nerve ran over the accessory head of flexor pollicis longus while the anterior interosseous nerve ran posteriorly. Conclusions: Incidence of accessory head of flexor pollicis longus was high and its relation to the median nerve, anterior interosseous nerve and ulnar artery is important. Therefore, precise knowledge about this muscle is essential which will help the clinician, surgeon and radiologist to determine the exact cause of entrapment. [R Desai NJIRM 2017; 8(1): 88-91]

Key words: Flexor pollicis longus, accessory head of flexor pollicis longus, median nerve, anterior interosseous nerve and ulnar artery

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Introduction: Forearm muscles play an important role in movements of forearm and wrist. Flexor pollicis longus (FPL) belongs to the deep layer of flexor compartment of the forearm. It is absent in primates such as gorilla and chimpanzee in whom a well-developed flexor hallucis longus perform the same function as that of flexor pollicis longus performs in man[1]. The FPL chiefly arises from the anterior surface of the shaft of the radius intervening between radial tuberosity and to the upper attachment of pronator quadratus muscle and from the adjacent interosseous membrane. In addition the FPL muscles may have additional head which arises from the medial border of the coronoid process of the ulna or from the medial epicondyle of the humerus, such accessory head is known as accessory head of flexor pollicis longus or Gantzer's muscle[2]. Accessory head of flexor pollicis longus (AHFPL) is considered an anatomical variation. Its incidence varying greatly according to the authors of the works analyzed[3].The relation of AHFPL muscle with the anterior interosseous nerve and the median nerve is controversial. According to some researchers, AHFPL muscle passes posterior to the median nerve and anterior to the anterior interosseous nerve[1, 4]. But other researchers stated that it is always situated posterior to the median nerve and anterior to the interosseous nerve[5, 6]. Presence of such muscular variations may influence the biomechanics of wrist and hand at the same time may cause entrapment neuropathy or may simulate soft tissue tumors[2]. Clinically presence of AHFPL muscle is important because it may compress the median nerve and its branch anterior interosseous nerve[7, 8]. Considering the clinical relevance of the AHFPL, we decided to investigate the incidence of the AHFPL.

Methods: Sixty forearms (rt: 30; lt: 30) of adult male Indian cadavers were used for present study. Their ages ranged between 46 and 73 years old. Forearm deformed by trauma, malformations and scars were excluded from our study. Upper limbs were partly dissected by medical students and further dissection with reflection or removal of superficial flexor muscle was done. Each forearm examined carefully to see the presence of accessory head of the flexor pollicis longus and its relations with nearby structures. All anatomical variations found were noted and photographed.

Results: Accessory head of flexor pollicis longus was observed (Fig.1, 2) in 35 upper limbs out of 60 (58.33%). It was present in 31.66 % (19) in right side and 26.66% (16) in left side upper limbs. It was

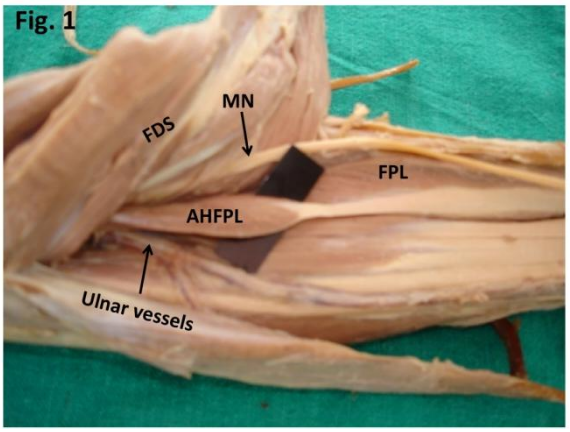
present bilaterally in 28.57% (10).Table 1 shows the details of origin, insertion of AHFPL.

Table 1: showing incidence of origin and insertion of AHFPL (Accessory Head of Flexor Pollicis Longus) muscle

AHFPL	Male (n=60; Rt- 30, Lt-30)		
	Right n= 19	Left n=16	Total n= 35
Origin			
Medial border of coronoid process of ulna	01	02	03(08.57%)
Lateral border of coronoid process of ulna	07	05	12(34.28%)
Medial epicondyle	06	06	12(34.28%)
Medial epicondyle and coronoid process of ulna	05	03	08(22.85%)
Insertion			
Upper third of flexor pollicis longus tendon	12	10	22(62.85%)
Middle third of flexor pollicis longus tendon	07	05	12(34.28%)
Lower third of flexor pollicis longus tendon	0	01	01(2.85%)

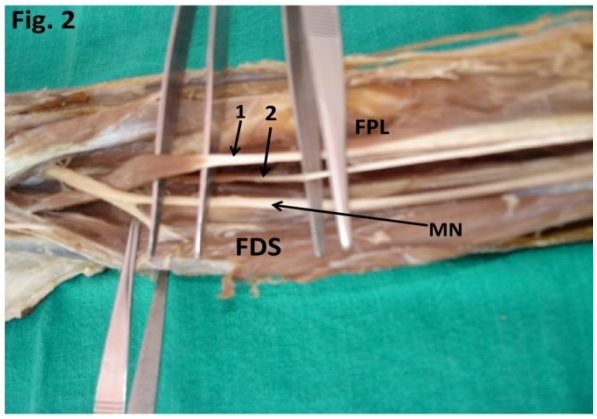
In one case we observed two accessory heads of flexor pollicis longus muscle (Fig.1). Also, it was observed that, the median nerve ran over the accessory head of flexor pollicis longus while the anterior interosseous nerve ran posteriorly in 70 % of cases (Fig.2, 3).

Fig 1: Showing AHFPL and its close relationship with ulnar vessels



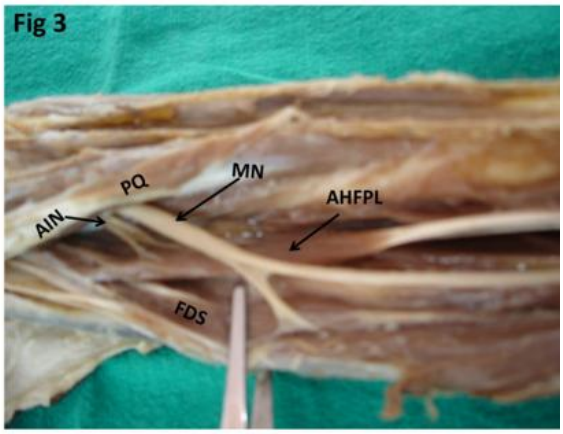
AHFPL- Accessory head of flexor pollicis longus; FPL- Flexor pollicis longus; MN- Median Nerve; FDS- Flexor digitorumsuperficialis

Fig 2: Showing two accessory heads of flexor pollicis longus muscle



FDS- Flexor digitorumsuperficialis;MN- Median Nerve;FPL- Flexor pollicis longus

Fig 3: Showing the nerve supply to the AHFPL by AIN



AHFPL- Accessory head of flexor pollicis longus
AIN- anterior interosseous nerve; PQ- Pronator quadrates, MN- Median nerve;FDS- Flexor digitorumsuperficialis

Discussion: Muscular variation in the forearm flexors is well known. There are multiple reports of single and double heads of AHFPL is available in literature. Somatic mesoderm give rise to upper limb muscles in the fourth week of development. The mesoderm invades the limb buds to form dorsal and ventral condensations and it give rise to the upper limb pronators and flexors, respectively. Further a flexor mass divides into superficial and deep layers to give rise flexors[9]. Flexor pollicis longus, flexor digitorum profundus and flexor digitorum superficialis develops from deep layer and incomplete cleavage of the flexor mass during development has been thought to give rise to the accessory muscle[10]. Various theories have been put forward for additional heads or accessory muscles. Muscle variations occur primarily due to [11, 12]

- ✓ An inheritance carried over from ancient origins.

- ✓ Some are errors of embryologic developmental timing.
- ✓ Persistence of an embryologic condition.
- ✓ Incomplete cleavage of the muscles during development.

The prevalence rates of AHFPL vary significantly among populations examined by different studies (Table 2). Jadhav and Zambare along with Mangini et al. reported higher incidence of this muscle. Present study reported its percentage in 58.33% cases. AHFPL was present bilaterally in 28.57% cases in our study but Jadhav and Zambare reported it in 53.84%. Domiatey et al. observed that AHFPL arose mainly from the under surface of flexor digitorum superficialis[8], Oh et al reported it mainly from coronoid process of ulna[13]. We also observed higher incidence of origin of AHFPL from coronoid process of ulna. Our study reported insertion of AHFPL mainly in upper third of the FPL tendon. Most of the authors reported the same[4,9,13,19].

An additional head of FPL muscle usually passes posterior to the median nerve and posterior or (occasionally) anterior to the anterior interosseous nerve has been described in the literature[5, 6]. Several researchers studied the relationship between AHFPL and anterior interosseous nerve[1, 5, 6]. AHFPL has been suspected to be responsible for the Kiloh Nevin syndrome[5].

Table 2: Incidence of Accessory head of flexor pollicis longus reported by various authors

Author	Percentage
Mangini et al [1]	71
Hemmady et al [4]	66.7
Oh et al. [13]	67
Dykes and Anson [14]	53.3
Malhotra etal [15]	54.2
Dellon and Mackinnon [5]	45
Al Qattan [6]	52
Jones et al [16]	35
Shirali et al [17]	55
Temang et al [18]	43
Jadhav and Zambare [19]	76.31
Present study	58.33

Tabib et al[20] reported a case of Kiloh Nevin syndrome which was due to presence of AHFPL which was running posteriorly (deep) to the median nerve and the anterior interosseous nerve (AIN). Present study noted that, median nerve was present between the AHFPL muscle and deep surface of the FDS muscle (Fig. 1) in six specimens and such abnormal course of the median nerve may leads to median nerve compressive neuropathies or vascular compressions. Therefore such neuromuscular variations are clinically important.

The architecture of the whole muscle is important in determining muscle function, structural variations affect not only the overall shape and size of the muscle but also function of the skeletal muscle especially range of motion[21]. AHFPL muscle is made of fusiform muscle fibers whereas the flexor pollicis longus is made of unipennate muscle fibers. The function of fusiform muscle fiber is in direct opposition to unipennate fibers. This could in turn lead to loss of precise and skillful movements[22]. Presence of accessory muscles or tendons in the forearm may confuse surgeon during surgical procedures. Also, muscular variations may lead to error in diagnosis and treatment [23]. Therefore detail knowledge of AHFPL is mandatory for physician, orthopedic surgeons.

Conclusion: Presence of AHFPL is the more common phenomenon. It may play an important role in clinical syndromes such as Kiloh Nevin or pronator syndromes, due to its close association with the median and anterior interosseous nerves. It may change the function of the flexors compartment, and induce pathology in the forehand and hand. Therefore precise knowledge of this anatomical variation is clinically significant in operative procedure like tendon transfer and correction of hand deformities also diagnosis of various forearm syndromes.

References:

1. Mangini U. Flexor pollicis longus muscle-its morphology and clinical significance. The Journal of Bone and Joint Surgery, 1960, 42, 467-70.
2. Kosuri Kalyan Chakravarthi. Unusual Unilateral Muscular Variations of the Flexor Compartment of Forearm and Hand- A Case Report. Int J Med Health Sci. 2012; 1: 93-8.
3. Kaplan EB. Anatomia funcional y quirurgia de la mano. Buenos Aires: Artécnica; 1961. p. 197-250.
4. Hemmady MV, Subramanya AV, Mehta IM. Occasional head of flexor pollicis longus muscle: a

study of its morphology and clinical significance. J Postgrad Med. 1993; 39(1):14-6.
5. 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.
6. Al-Qattan MM. Gantzer's muscle. An anatomical study of the accessory head of the flexor pollicis longus muscle. J Hand Surg Br. 1996; 21(2):269-70.
7. Pai MM, Nayak SR, Krishnamurthy A, Vadgaonkar R, Prabhu LV, Ranade AV et al. The accessory heads of flexor pollicis longus and flexor digitorum profundus: Incidence and morphology. Clin Anat 2008; 21:252–58.
8. Bilecenoglu B, Uz A, Karalezli N. 2005. Possible anatomic structures causing entrapment neuropathies of the median nerve: An anatomic study. Acta Orthop Belg 71:169–176. Eid N, Otsuki Y. A case of double Gantzer's muscle and its possible role in nerve entrapment. Clin Anat 2009; 22:881-82.
9. 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 Morph. 2008**;** 67(1):63–71.
10. Kara A, Elvan O, Yildiz S, Ozturk H. Accessory head of flexor pollicis longus muscle in fetuses and adult cadavers and its relation to anterior interosseous nerve. Clinical Anatomy.2012; 25(5):601–608.
11. Soubhagya R Nayak, Suranjali Sharma, Hasi Dasgupta, Kalyan Bhattacharya. Presence of Triple Gantzer's Muscle - A Rare Anatomical Variation. NUJHS 2013, 3, 69-71.
12. Campos D, Nazer MB, Bartholdy LM. Anatomical variation of the accessory muscle of the forearm (Gantzer's muscles) and his relationship with the median nerve: a case report in human. Braz J Morphol Sci 2009, 26, 39-41.
13. Oh CS, Chung IH, Koh KS. Anatomical study of the accessory head of the flexor pollicis longus and the anterior interosseous nerve in Asians. Clin Anat. 2000; 13(6):434-8.
14. Dykes J, Anson BJ. The accessory tendon of the flexor pollicis longus muscle. Anat Rec. 1944; 90:83-9.
15. Malhotra VK, Sing NP, Tewari SP. The accessory head of the flexor pollicis longus muscle and its nerve supply. Anat Anz. 1982; 151(5):503-5.
16. Jones M, Abrahams PH, Sañudo JR, Campillo M. Incidence and morphology of muscles). J Anat. 1997; 191(Pt 3):451-5.
17. Shirali S, Hanson M, Branovacki G, Gonzalez M. The flexor pollicis longus and its relation to the anterior and posterior interosseous nerves. J Hand Surg Br.1998; 23(2):170-2.
18. Tamang BK, Sinha P, Sarda RK, Shailo P, Murtimanju BV. Incidence and morphology of acessory head of flexor pollicis longus muscle. An anatomical study. J Evol Med Dental Sci. 2013; 2(36):6800-6.
19. Jadhav S D, Zambare B R. Accessory head of flexor pollicis longus muscle and its clinical significance. International Journal of Current Research 2015; 7(5): 16540-16543.
20. Tabib W, Aboufarah F, Assilineau A. Compression du nerf interosseux antérieur par le muscle de Gantzer. Chir Main 2001; 20: 241-246.
21. Levangie PK, Norkin CC. Joint Structure and Function: A Comprehensive Analysis. 4th Ed., Philadelpia, F. A. Davis Company 2006:120-21.
22. Shanmuga Sundaram Mani, Vishnumaya G, Madhan Kumar SJ. Accessory head of flexor pollicis longus and its significance in anterior interosseus nerve neuropathies and precision handling. International Journal of Anatomical Variations. 2010; 3: 46-8.
23. Kosuri Kalyan Chakravarthi. Anatomical Variations of Brachioradialis Muscle In Relation to Radial Nerve. a cadaveric study. International Journal of Chemical and Life Sciences 2013, 02 (4), 1156-8.

Conflict of interest: None

Funding: None

Cite this Article as: R R Desai, A R Desai, M P Ambali. Incidence Of Accessory Head Of Flexor Pollicis Longus (Only In Males) And Its Clinical Significance. Natl J Integr Res Med 2017; 8(1):88-91