International Journal of Anatomy and Research,
Int J Anat Res 2020, Vol 8(2.3):7568-71. ISSN 2321-4287
DOI: https://dx.doi.org/10.16965/ijar.2020.164

Original Research Article

AN ANATOMICAL AND MORPHOLOGICAL STUDY ON ACCESSORY HEAD OF FLEXOR POLLICIS LONGUS (GANTZER'S MUSCLES) AND ITS CLINICAL EMPHASIS

M. Khizer Hussain Afroze[1], Umesh S.N *[2], Sangeeta M [3], Varalakshmi KL [4], Suman Tiwari [5].

[1,*2] Assistant Professor, Department of Anatomy, MVJ Medical College & Research Hospital, Bangalore, Karnataka, India.

[3] Professor & HOD, Department of Anatomy, MVJ Medical College & Research Hospital, Bangalore, Karnataka, India.

[4,5] Associate Professor, Department of Anatomy, MVJ Medical College & Research Hospital, Bangalore, Karnataka, India.

ABSTRACT

Objective: This study aims to reveal the incidence of origin, insertion, and nerve supply of Gantzer's muscle and to provide necessary information to surgeons in concern to compartment syndrome.

Material and Methods: 50 embalmed disarticulated upper limbs (23 right & 27 left sides) were dissected and analyzed to find the incidence of Gantzer's muscle along with their sources of origin, the sites of insertion and nerve supply were observed and documented.

Results: The incidence of an accessory head of flexor pollicis longus **(**Gantzer's muscle) was 24 % (12 out of 50 upper limbs). All the incidences of Gantzer's muscles were unilateral, among which, in 5, it was seen on the right side and in 7 on the left side and bilateral occurrence was not found. All the Gantzer's muscles originated from two different sources, one from the medial epicondyle and other from the coronoid process of ulna and the majority of the cases were inserted to the middle third of the tendon of FPL. In the present study, Gantzer's muscle was innerved by the anterior interosseous nerve in all specimens except in one, which was supplied by the median nerve.

Conclusions: The knowledge of which, has to be borne in minds of the operating surgeons for anterior interosseous nerve syndrome and median nerve compression for an effective outcome.

KEYWORDS: Gantzer's muscles, Accessory head of Flexor Pollicis Longus, deep muscles of the forearm.

Corresponding Author: Dr. Umesh S.N,Assistant Professor, Department of Anatomy, MVJ Medical College & Research Hospital, Hoskote, Bangalore. 562114, Karnataka, India.
Phone No: +91-9448619629**E-Mail:** veenaumesh66@gmail.com

Access this Article online	Journal Information
Quick Response code	**International Journal of Anatomy and Research**
	RG Journal Impact: 0.21*
	ISSN (E) 2321-4287 | ISSN (P) 2321-8967
	https://www.ijmhr.org/ijar.htm
	DOI-Prefix: https://dx.doi.org/10.16965/ijar
DOI: 10.16965/ijar.2020.164	**Article Information**
	Received: 08 May 2020 Accepted: 21 May 2020
	Peer Review: 00 Apr 2020 Published (O): 05 Jun 2020
	Revised: None Published (P): 05 Jun 2020

INTRODUCTION

The anatomical variations in the forearm are not uncommon, Gantzer's muscle and accessory muscles associated with Flexor Pollicis Longus (FPL) was first described by Gantzer in 1813 [1,2]. FPL being the chief flexor muscles of the thumb and one of the deep flexor muscle of the forearm takes its origin from the upper 3/4th of the anterior surface of shaft of radius and the adjacent interosseous membrane and gets

inserted into the base of the distal phalanx of the thumb on the palmar surface [3].

The Gantzer's muscle is found to originate usually as a small fusiform or slender belly either from the medial epicondyle of humerus or coronoid process of the ulna or from both [4-6].

It is usually inserted to Flexor Pollicis Longus (FPL) or Flexor Digitorum Profundus (FDP). Gantzer's muscle is generally supplied by the median nerve and its deep branch, anterior interosseous nerve to which it has a close relationship in its course. Due to its close proximity to above said nerves, it may predispose to entrapment of these nerves leading to compartment syndrome which require surgical intervention [7].

The study aimed to assess the incidence of origin, insertion, and nerve supply of Gantzer's muscle and its clinical implication with respect to compartment syndrome.

MATERIALS AND METHODS

The present study was done on 40 free upper limbs & 10 upper limbs from 5 cadavers (23 right & 27 left sides) of unknown sex obtained from the Department of Anatomy, MVJ Medical College and Research Hospital, Hoskote, Bangalore. The flexor compartment of the forearm and hand were carefully dissected according to Cunningham's manual. After reflecting the superficial flexor muscles of the forearm, the occurrence of Gantzer's muscle was noted and photographed. The sources of origin, the sites of insertion, and nerve supply were observed and documented. The length of the Gantzer's muscle belly and the tendon was recorded by the help of a thread, ruler, and Vernier's caliper in cms.

RESULTS

The incidence of Gantzer's muscle was 24 % (12 out of 50 upper limbs). All the incidences of Gantzer's muscles were unilateral (5 on the right side & 7 on the left side)and bilateral occurrence was not found. We observed the origin variability of Gantzer's muscles from two different sources, one from medial epicondyle (figure 1& 2) and other from the coronoid process of the ulna (figure 3 & 4). Similarly, we also observed the variation in the site of insertion in the FPL tendon (table 1).

It was observed in the present study, Gantzer's muscle was innerved by the anterior interosseous nerve in all specimens except in one, which was supplied by the median nerve. In all cases,the median nerve was found to cross the Gantzer's muscle anteriorly whereas anterior interosseous nerve passed posteriorly.

Table 1: Frequency distribution of Origin, insertion & nerve supply of Gantzer's muscles based on laterality.

Gantzer's Muscles	Right (n=23)	Left (n=27)	Total (n=50) n(%)
Origin			
Medial Epicondyle	3	5	8 (16)
Coronoid Process of Ulna	2	2	4 (8)
Flexor Digitorum Superficialis	0	0	0 (0)
Insertion			
Upper third of FPL tondon	1	3	4 (8)
Middle third of FPL tondon	4	3	7 (14)
Lower third of FPL tondon	0	1	1 (2)
Nerve Supply			
Anterior Interosseous Nerve	5	6	11 (22)
Median Nerve	0	1	1 (2)

The mean length of the muscle belly and tendon was 8.03 ± 0.81cm (ranging between 6.5- 9.5cm) and 1.54 ± 0.41cm (ranging between 1- 2.5cm) respectively. The shape of all the Gantzer's muscles was fusiform except one being slender.

Fig. 1: Gantzer's muscle originated from medial epicondyle (Right Side)

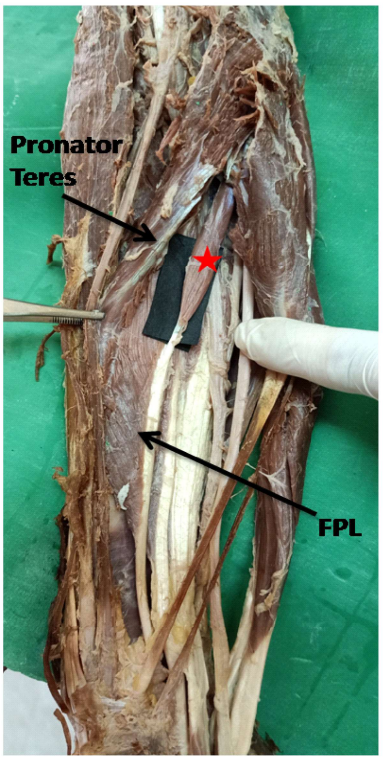

Fig. 2: Gantzer's muscle originated from medial epicondyle (Left Side).

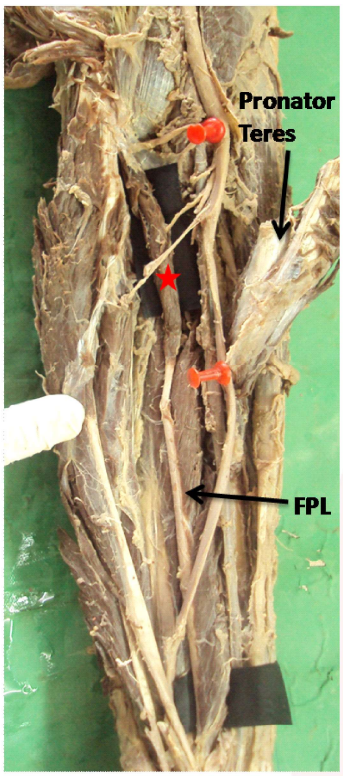

Fig. 3: Gantzer's muscle originated from coronoid process (right Side)

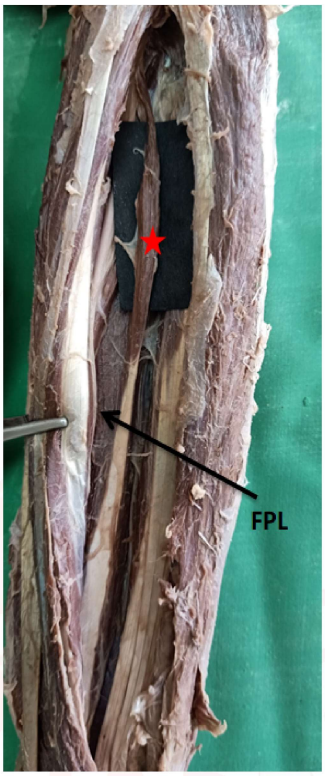

Fig. 3: Gantzer's muscle originated from coronoid process (left Side)

DISCUSSION

Table 2: Showing overall incidence and source of origin of Gantzer's muscles by various authors.

Authors	Incidence	Source of Origin		
		Medial Epicondyle	Coronoid Process of Ulna	Flexor Digitorum Superficialis
Hemmady et al [7] (1993)	66.70%	55.50%	16.60%	-
Al Qattan et al [6] (1996)	52%	-	85%	-
Oh et al [10] (2000)	67%	10.40%	87.50%	2.10%
Mahakkanukrauh et al [11] (2004)	62.10%	74.50%	23.50%	2%
Feray G et al [12] (2006)	51.90%	18.50%	81.50%	-
Gunnal S.A et al [8] (2013)	51.11%	10.86%	82.60%	2.17%
Tamang B K et al [13] (2013)	43%	33.33%	53.33%	-
Jadhav S D et al [9] (2015)	76.31%	22.09%	58.14%	3.48%
Mustafa AY et al [14] (2016)	45%	88.90%	11.10%	-
Desai RR et al [15] (2017)	58.33%	34.28%	42.86%	-
Present Study (2019)	24%	16%	8%	-

Embryologically the flexor muscles of forearm develop from flexor mass of arm buds during the 7th week. This flexor muscle mass will further bifurcate into deep and superficial muscle layers wherein the deeper layer eventually differentiates into flexor digitorum profundus (FDP), flexor pollicis longus (FPL) and pronator quadratus (PQ). Sometimes due to incomplete differentiation lead to the formation of Gantzer's muscles [8]. The percentage of occurrence of Gantzer's muscles was documented by various authors. The highest incidence was reported by Jadhav et al [9] which accounts for 76.31% followed by oh et al [10](67%) and Hemmady et al [6] (66.7%) respectively. The incidence of Gantzer's muscles was found to be less in the present study (24%) as compared to other studies (Table 2).

The source of origin of the Gantzer's muscles according to literature was from the medial epicondyle, from the coronoid process of the ulna and rarely from flexor Digitorum superficialis. The incidence of origin in the present study, as well as other authors, is shown

in table 2. In the present study, the Gantzer's muscle was found to be lying between the median and anterior interosseous nerve in all specimens and was found supplied by the anterior interosseous nerve in 11 specimens and one by the median nerve.

The Gantzer's muscle which acts as an accessory head of flexor pollicis longus contributes to better brachiation movements in gibbons and other primates whereas in humans it is non functional yet it contributes to the anterior interosseous syndrome. The clinical symptoms are characteristic of weakness during pinching movements between thumb and index finger while retrieving small objects gives suspicion of anterior interosseous syndrome due to the presence of Gantzer's muscle. Hence the surgeons should knowthe incidence and nerve supply of Gantzer's Muscle for the positive outcome [16].

CONCLUSION

This study shows the lowest incidence of Gantzer's muscles when compared to others. This disparity may be due to a study conducted on a different population. The occurrence ofGantzer's muscle may be attributed as an additional embryological division of the deep layer of flexor muscle mass. The knowledge of which has to be borne in the minds of the operating surgeons with respect to anterior interosseous nerve syndrome and median nerve compression for an effective outcome.

Conflicts of Interests: **None**

REFERENCES

[1]. Wood J. XVII. Variations in human myology observed during the winter session of 1867-68 at King's College, London. Proceedings of the royal society of London. 1868 Dec 31(16):483-525.

[2]. Le Double AF. Traité des variations du systèmemusculaire de l'homme: et de leur signification au point de vue de l'anthropologiezoologique. Schleicher frères; 1897.

[3]. Williams PL, Bannister LH, Berry MM, Collins P, Dyson M, Dussek JE, et al. Gray's Anatomy. 38th Ed., New York, *Churchill Livingstone.* 1995; 848.

[4]. Mangini U. Flexor pollicis longus muscle: its morphology and clinical significance. JBJS. 1960 Apr 1;42(3):467-559.

[5]. Dellon AL, Mackinnon SE. Musculoaponeurotic variations along the course of the median nerve in the proximal forearm. The Journal of Hand Surgery: British & European Volume. 1987 Oct 1;12(3):359-63.

[6]. Al-Qattan MM. Gantzer's muscle: an anatomical study of the accessory head of the flexor pollicis longus muscle. Journal of Hand Surgery. 1996 Apr;21(2):269-70.

[7]. Hemmady MV, Subramanya AV, Mehta IM. Occasional head of flexor pollicis longus muscle: a study of its morphology and clinical significance. Journal of postgraduate medicine. 1993 Jan 1;39(1):14.

[8]. Gunnal SA, Siddiqui AU, Daimi SR, Farooqui MS, Wabale RN. A study on the accessory head of the flexor pollicis longus muscle (Gantzer's muscle). Journal of Clinical and Diagnostic Research: JCDR. 2013 Mar;7(3):418.

[9]. Jadhav S D, Zambare B R. Accessory head of the flexor pollic longus muscle and its clinical significance. IJCR. 2015; 7(5): 16540-43.

[10]. Oh CS, Chung IH, Koh KS. Anatomical study of the accessory head of the flexor pollicis longus and the anterior interosseous nerve in Asians. Clinical Anatomy: The Official Journal of the American Association of Clinical Anatomists and the British Association of Clinical Anatomists. 2000;13(6):434-8.

[11]. Mahakkanukrauh P, Surin P, Ongkana N, Sethadavit M, Vaidhayakarn P. Prevalence of accessory head of flexor pollicis longus muscle and its relation to anterior interosseous nerve in Thai population. Clinical Anatomy: The Official Journal of the American Association of Clinical Anatomists and the British Association of Clinical Anatomists. 2004;17(8):631-5.

[12]. Feray GU, Gulgun K, Mete E et al. Incidence and morphology of the accessory head of the flexor pollicis longus muscle (Gantzer's muscle) in a Turkish population Neuroscience. 2006; 11 (3):171-74.

[13]. Tamang BK, Sinha P, Sarda RK, Shilal P, Murlimanju BV. Incidence and morphology of accessory head of Flexor pollicis longus muscle—an anatomical study. Journal of Evolution of Medical and Dental Sciences. 2013 Sep 9;2(36):6800-7.

[14]. Mustafa AY, Alkushi AG, Abdullah W, Alasmari M, Sakran AM, Mohammed A. Anatomical study of the accessory heads of the deep flexor muscles of the forearm (Gantzer muscles). Int J Anat Res. 2016;4(4):2984-87.

[15]. Desai RR, Desai AR, Ambali MP. Incidence of Accessory Head Of Flexor Pollicis Longus (Only In Males) and Its Clinical Significance. National Journal of Integrated Research in Medicine. 2017 Jan 1;8(1).

[16]. Zdilla M. J. A Gantzer muscle arising from the brachialis and flexor digitorum superficialis: embryological considerations and implications for median nerve entrapment. Anatomical Science International. 2018 Oct.

How to cite this article: M. Khizer Hussain Afroze, Umesh S.N, Sangeeta M, Varalakshmi KL, Suman Tiwari. AN ANATOMICAL AND MORPHOLOGICAL STUDY ON ACCESSORY HEAD OF FLEXOR POLLICIS LONGUS (GANTZER'S MUSCLES) AND ITS CLINICAL EMPHASIS. Int J Anat Res 2020;8(2.3):7568-7571. **DOI:** 10.16965/ijar.2020.164