



RESEARCH ARTICLE

STUDY OF ABSENCE OF PALMARIS LONGUS MUSCLE IN SOUTH INDIAN POPULATION

*Dr. Girish V. Patil, Dr. Shishirkumar, Dr. Thejeswari, Dr. Apoorva, D., Dr. Javed Sharif,
Dr. C. Sheshgiri and Mr Sushanth, N. K.

Department of Anatomy, DM- Wayanad Institute of Medical Sciences, Meppadi, Wayanad, Kerala, India

ARTICLE INFO

Article History:

Received 14th May, 2014
Received in revised form
10th June, 2014
Accepted 16th July, 2014
Published online 06th August, 2014

Key words:

Degenerate, Development,
Palmaris longus, Populations, Tendon.

ABSTRACT

The palmaris longus (PL) is one of the most variable muscle reported up to 90% of humans. The characteristic of this muscle is shown by its short belly and long tendon. The belly soon gives way to a long slender tendon of variable length that inserts adherent across the front of the flexor retinaculum to the palmar aponeurosis. This study is done by using 200 upper limbs of 100 cadavers. The overall prevalence of absence was 16% (16 subjects). In the development of the forelimb as a prehensile organ, its function has been taken over by the intrinsic muscles of the hand and the PL has become degenerate. It should therefore necessary to investigate the prevalence of PL in other Asian ethnic groups and perhaps by socio-economic strata in such populations.

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INTRODUCTION

The Palmaris Longus (PL) is one of the most variable muscle. It is classified phylogenetically as a retrogressive muscle (Pai et al., 2008). It is a slender muscle that arises from the medial epicondyle by a common flexor tendon and from adjacent intermuscular septa. The characteristic of this muscle is shown by its short belly and long tendon (McMinn 1994). The belly soon gives way to a long slender tendon of variable length (Ito et al., 2001) that inserts adherent across the front of the flexor retinaculum to the palmar aponeurosis (McMinn 1994; Williams et al., 1993; Palastanga et al., 1998). It lies between flexor carpi radialis laterally and flexor carpi ulnaris medially. Median nerve, at the level of wrist lies between its tendon and flexor carpi radialis. The long slender tendon passes anterior to the flexor retinaculum. It is attached to the distal half of flexor retinaculum and predominantly to the palmar aponeurosis. PL, a weak flexor of the wrist is considered functionally negligible. However, there is a growing interest in the existence of the muscle because its tendon is reported to be most frequently harvested for reconstructive plastic and hand surgery (Sebastin et al., 2005). Furthermore, PL tendon in various combinations is used to repair oncologic defects of head and neck, arthritis of the thumb and ptosis in children (Chauhan 2003). Besides, it had earlier been noted as a stabilizer of superficial structures in the palm in preparation for the abduction of the thumb (Fahrer 1973; Fahrer et al., 1976).

Absence of PL in humans appears to be hereditary but its genetic transmission is not clear. Studies by dissection and clinical testing show bilateral absence of PL in 8-16% of the individuals and unilateral absence in 4 to 14% (Pai et al., 2008).

MATERIALS AND METHODS

This study is done in the department of Anatomy of DM-Wayanad Institute of Medical Sciences, Wayanad Kerala, Srinivas Institute of Medical Sciences, Mangalore and SNMC, Bagalkot by using 200 upper limbs of 100 cadavers. All the upper limbs are dissected as per the dissection manual and observed for presence or absence of the Palmaris longus muscle. All the cadavers belong to the south Indian origin and aged between 28 to 85 years. We excluded subjects with physically disabilities (including those resulting from trauma, be it spine, lower or upper limb), any prior surgery to upper and any upper limb injuries. Among the 100 cadavers 40 are female and 60 were male.

RESULTS

The overall prevalence of absence was 16% (16 subjects) (Table I). In males, PL was found to be absent unilaterally in 7 subjects (11.7%); the distribution on the right and left were 4 (6.7%) and 3 (5%) respectively. Bilaterally (Table 2), this muscle was absent in 3 subjects (5%). The overall prevalence of absence in males was 10 (16.7%). In females, PL was absent unilaterally in 5 subjects (12.5%); the distributions on the right and left were 3 (7.5%) and 2 (5%) respectively (Table 2).

*Corresponding author: Dr. Girish V. Patil

Department of Anatomy, DM- Wayanad Institute of Medical Sciences,
Meppadi, Wayanad, Kerala, India.

Bilaterally, it was 1 (2.5%). The overall prevalence of absence for females was 15% (6) (Table 1). The unilateral prevalence of absence between the males and females showed no significant difference ($p>0.05$, Table 2). However, bilateral prevalence of absence in males was comparatively higher than in females.

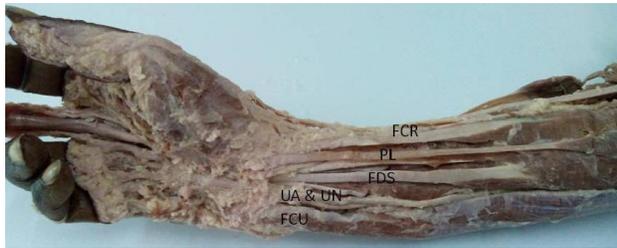


Fig. 1. showing the presence of Palmaris longus muscle. (FCR- Flexor carpi radialis, PL- Palmaris longus, FDS- Flexor digitorum superficialis, UA- Ulnar artery, UN- Ulnar nerve, FCU- Flexor carpi ulnaris)



Fig.2. showing the absence of Palmaris longus muscle. (BRS- Brachioradialis, RA- Radial artery, FCR- Flexor carpi radialis, FDS- Flexor digitorum superficialis, FCU- Flexor carpi ulnaris)

Table 1. The distribution of palmaris longus absence on both sexes

Number of cadavers assessed	Total absence in both sexes	Total absence in male cadavers- 60	Total absence in female cadavers- 40
100	16 (16%)	10 (16.7%)	6 (15%)

Table 2. The distribution of palmaris longus absence on both limbs

Absence of palmaris longus	Right	Left	Bilaterally
Male -60	4 (6.7%)	3 (5%)	3 (5%)
Female - 40	3 (7.5%)	32(5%)	1 (2.5%)
Both sexes -100	6 (6%)	6 (6%)	4 (4%)

DISCUSSION

In the development of the forelimb as a prehensile organ, its function has been taken over by the intrinsic muscles of the hand and the PL has become degenerate. The PL belly is largely replaced by tendon, and the degenerated distal tendon of the palm has become the palmar aponeurosis, which retains the five distal slip of attachment. Most standard textbooks of hand surgery quote the prevalence of absence of palmaris longus at around 15% (Kleinert *et al.*, 1991; Zancolli and Cozzi 1992; Valentine 1981). However, this figure varies considerably in different ethnic groups. A study by Thompson *et al.* (2001) on 300 Caucasian subjects found that palmaris longus was absent unilaterally in 16%, and bilaterally in 9% of the study sample for an overall prevalence of absence of 24%.

Similarly, George (1953) noted on 276 cadavers of European descent that its absence was 13% unilaterally, 8.7% bilaterally for an overall absence of 15.2%. Another cadaveric study by Vanderhooft (1996) in Seattle, USA reported its overall absence to be 12%. Sebastin *et al.* (2006) recently studied 329 Chinese subjects in Singapore and found that palmaris longus is absent unilaterally in 3.3%, bilaterally in 1.2% with an overall absence of 4.6%. In another study of a Chinese population by Wagenseil the figure was cited as 2.8% while Amazon Indians were noted to have a 3.7% absence of palmaris longus (Machado and DiDio 1967). It is clear that prevalence of absence of palmaris longus varies depending on the populations.

Conclusion

We conclude from these results that there is a prevalence of agenesis of PL among the south Indians. The reason for this racial variation is not clear. Palmaris Longus was observed to have differentiated from the distal part of the flexor carpi radialis tendon. Because the flexor carpi radialis tendon was more prominently displayed when there is a absence of the Palmaris longus. It may be due to a decrease in the manual laborers due to the machineries are introduced in the day today works. It should therefore be necessary to investigate the prevalence of PL in other Asian ethnic groups and perhaps by socio-economic strata in such populations.

REFERENCES

- Chauhan R. Atypical innervation of palmaris longus - A case report. *J Anat Soc India* 2003;52(2):171-3.
- Fahrer M, Tubiana R. Palmaris Longus: Anteductor of the thumb. *Hand* 1976;8(3):287-9.
- Fahrer M. Proceedings: The role of palmaris longus muscle in the abduction of the thumb. *J Anat* 1973;116(Pt 3): 476.
- George R. Co-incidence of the palmaris longus and plantaris muscles. *Anat Rec* 1953; 116: 521-3.
- Ito M M, Aoki M, Kida M Y, Ishii S, Kumaki K, Tanaka S. Length and Width of the tendinous portion of the palmaris longus: a cadaver study of adult Japanese. *J Hand Surg (Am)* 2001;26(4):706-10.
- Kleinert HE, Pulvertaft RG, Smith DJ. Flexor tendon grafting in the hand. In: Jupiter JB, editor. Flynn's Hand Surgery. Baltimore: Williams & Wilkins. 1991: 285.
- Machado AB, DiDio LJ. Frequency of the musculus palmaris longus studied in vivo in some Amazon Indians. *Am J Phys Anthropol* 1967; 27: 11-20.
- McMinn RMH. Last's Anatomy Regional and Applied. 9th ed. Edinburgh: Churchill Livingstone; 1994
- Pai MM, Prabhu LV, Nayak SR, Madhyastha S, Vadgaonkar R, Krishnamurthy A, Kumar A. The palmaris longus muscle: its anatomic variations and functional morphology. *Rom J Morphol Embryol.* 2008; 49: 215–217.
- Palastanga N, Field D, Soames R. Anatomy and human movement: structure and function. 3rd ed. Edinburgh: Butterworth-Heinemann Elsevier; 1998.
- Sebastin SJ, Lim AY, Bee WH, Wong TC, Methil BV. Does the absence of the palmaris longus affect grip and pinch strength? *J Hand Surg (Br)* 2005;30(4):406-8.

- Sebastin SJ, Lim AYT, Wong HB. Clinical Assessment of Absence of the Palmaris Longus and its Association With Other Anatomical Anomalies – A Chinese Population Study. *Ann Acad Med Singapore* 2006; 35: 249-5.
- Thompson NW, Mockford BF, Cran GW. Absence of the palmaris longus muscle: a population study. *Ulster Med J* 2001; 70: 22-4.
- Valentine P. Extrinsic muscles of the hand and wrist: An Introduction. In: Tubiana R (ed). *The Hand*. Vol I. Philadelphia: WB Saunders, 1981: 237.
- Vanderhoof E. The frequency and relationship between the palmaris longus and plantaris tendons. *Am J Orthop* 1996; 25:38-41.
- Williams PL. Warwick R, Dyson M, Bannister LH. *Gray's Anatomy*. 37th ed. Edinburgh: Churchill Livingstone; 1993.
- Zancolli EA, Cozzi EP. The retinaculum cutis of the hand. In: Zancolli EA, Cozzi EP (eds). *Atlas of Surgical Anatomy of the Hand*. New York: Churchill Livingstone, 1992: 2.
