

Prevalence of Congenital Absence of Palmaris Longus Tendon in Healthy Volunteers - A Cross Sectional Study

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ABSTRACT

Background: Palmaris Longus though thought to be having no active function when present is useful for tendon transfers and as free tendon graft. Many studies have been done in the past on various ethnic groups to see the prevalence of its absence. There have been none as yet in Pakistani population. This is a small scale study on this subject.

Methodology: It was an observational, prospective, cross sectional analysis to see congenital absence of Palmaris Longus tendon among healthy volunteers in two Orthopedic out patients departments in Lahore. Scheaffer's test was used to screen all the subjects for absence of the muscle. All those with pathologies and injuries affecting the forearm/hand were excluded.

Results: In all 610 volunteers were tested finding 12.95% unilateral absence and 34.17% bilateral absence was recorded in the study group.

Conclusion: The percentage of congenital absence of Palmaris Longus tendon in Pakistani population falls well within the range found for the other ethnic groups in the region reported in the past literature.

Key words: Absence, Palmaris Longus.

INTRODUCTION

The slender Palmaris Longus tendon lies superficial to the flexor retinaculum across the wrist. It is also known as musculus palmaris longus in Latin. It has an origin in medial epicondyle of humerus (common flexor tendon) and inserts in palmar aponeurosis. It is nourished by the ulnar artery, innervated by the median nerve and it flexes the wrist. The Palmaris longus is seen as a small tendon between the flexor carpi radialis and the flexor carpi ulnaris, although it is not always present. The muscle is absent in many people, the reported prevalence varies between 10-25 percent of the population, though it has been seen to vary with ethnicity^{1,7,8,9,13}. Absence of palmaris does not have any known effect on grip strength⁷. The muscle belly may be absent or distally/centrally placed^{7,10,13}. However K Natis et al have reported a triple belly variation in 2006¹⁰. This may be significant when considering the suitability of patients for hand surgery which involves interruption to the vascular supply to the hand, e.g. harvesting upper limb vessels for coronary artery grafting². The Allens test and/or Doppler ultrasound are both unreliable². Demonstration of a Palmaris longus tendon in the living arm is easy and the use of this in combination with the other techniques may improve overall reliability². Ruengsakulrach et al. (2001) commented that even though a typical Superficial Palmar Arch (SPA) was present in only 5/50 hands there were nevertheless major arterial communications between the radial and ulnar arteries in 50/50 cadaveric hands they examined^{2,3}. Their findings indicate that if the palmaris longus tendon was absent then in 47% of the hands it was associated with an abnormal SPA³. AIH Moss studied the simultaneous absence of Palmaris Longus and Plantaris in 150 cadavers and found no correlation of the two⁶. S.J. Sebastin, studied 329 Chinese men and women and found Palmaris longus to be absent unilaterally in 3.3%, and bilaterally in 1.2%, with an overall prevalence of absence of 4.6%^{4,6}. They further point out that the prevalence between various races is different^{4,5}. In order to understand the local prevalence of this anomaly present small scale study was conducted in the orthopedic out patients department so that the prevalence could be recorded in Pakistani population.

MATERIALS & METHODS

All adult patients coming to orthopedics outpatients department of Lahore General Hospital and Avicenna Medical College were asked to undergo this non interventional observational study. Those with previous surgery/injury to the hands/forearms were excluded along with those patients who suffered from neurological deficits limiting their capacity to understand/follow instructions during the observation. All those who consented verbally after counseling were asked to make a pinch with the tip of the thumb and little fingers flexing the wrist moderately (Schaeffer's test). The Palmaris Longus tendon was considered to be absent when it was not seen or palpated to be prominent. Those with absent tendons were asked to perform one of the three tests mentioned by Pawan Agarwal (Mishra's I & II and Pushpakumar's tests)⁵. Those failing in this test were noted as having an absent Palmaris Longus Tests. A simultaneous weakness of Flexor Digitorum Superficialis for little finger was not done like Pawan Agarwal⁵. All observations were done by two authors (FNH, TM) and the results were finally tabulated by an independent observer (KAB).

RESULTS

In all 610 volunteers were studied between the age range of 18-74 years. Data collection was done in two different hospitals by two different observers (FNH & TM) who had practiced their methodology previously. The results were entered manually on a performa which were compiled by the third observer (KAB). All the results were compiled manually and were analyzed with descriptive statistics.

Table 1: Results

Parameter	Number	Percentage/ratio
Total Volunteers	610	100
Male:Female ratio	378:228	1.67:1
Absent PL 79	79/610	12.95
Hand Affected 65	R 20 L 32 Bil 27	R 25.31 L 40.50 Bil 34.17
Male 48	R 15 L16 Bil 17	R 31.45 L 33 Bil 35.41
Female 31	R 7 L14 Bil 10	R 22.58 L 45.61 Bil 32.25

Table 2: Comparison between results of Pawan⁵ & Ceyhan et al⁸.

Parameter	Pawan Agarwal ⁵	Ceyhan O, Mavt A ⁸
Total Volunteers	385	7000
Male:Female ratio	190:195 0.97:1	4621:2379 1.94:1
Absent PL	M38+F27=65 16.9%	5856 63.91%
Hand Affected	R+L= 16.9% Bil 3.3%	R+L=1450 Bil=3027
Male	R 14 L 12 Bil 10	R 247 L 301 Bil 1078
Female	R 8 L 27 Bil 03	R347 L 555 Bil 1949

DISCUSSIONS

Although Palmaris Longus muscle has no active function which could lead to a form of disability if the muscle was found absent yet its importance has long been recognized by surgeons. It is used in tendon transfers, as free tendon graft and as a lead to a possible clue to a 'SPA. Being a superficial muscle it is easy to test for its absence through Scheaffer's test or any of its alternatives⁵. Thomson et al examined 300 Caucasian subjects (150 males, 150 females) aged 18-40 years to assess the incidence of Palmaris Longus absence by clinical inspection. Forty-nine subjects had unilateral absence of Palmaris Longus (16%). The tendon was absent bilaterally in 26 subjects (9%). Unilateral and bilateral absence was more common in males, however this was not statistically significant (p = 0.25 and 0.56 respectively). In those

subjects with unilateral absence, the right side was found to be more commonly affected however no statistical significance was evident ($p = 0.25$)¹. In 22/25 hands with anomalous superficial palmar arches Elizabeth O'Sullivan and Barry S Mitchell found that there was no palmaris longus tendon, whereas in only 3/22 hands with anomalous palmar arches was a palmaris longus tendon present. This is a highly significant difference ($\chi^2 = 26.41$, $P = 0.0005$), indicating a significant association between the two anatomical features². Both these studies were done on Caucasian and Chinese races.

Ceyhan et al in their study upon Indian population also suggested that agenesis is more frequent in white race than yellow and black race and carried as a dominant character⁸. According to Gate's studies it was 2.2% in Chinese, 3.2% in Indian, 3.4% in Japanese, in Middle African Blacks, 4.8% in American Blacks, 12.7% in Russian, 14.1% American whites, 15.3% in European whites, 8.6% in Polish, 19.5% in Jewish, 25.4% in French⁸. Karatay suggested in Turks agenesis ratio to be 20.5%^{8,9}. Recently Pawan Agarwal conducted a similar study in 385 Indian medical students and found out his cohort to show congenital absence of Palmaris Longus tendon in 19.48% males with 7.17% involving the right side and 12.30% showed absence on left side. The females showed 4.21% had right sided absence compared to the left side as 10% with an overall absence as 14.21%⁵. The unilateral absence was 16.9% in the group with bilateral absence being 3.3% Table no 1⁵. Our results about the Pakistani volunteers are not very different from the earlier studies and can be termed close to the results seen in Indian Population^{2,3,4,5} except with those of Ceyhan et al whose findings differ a lot from other reports^{5,8}. Ceyhan et al argue that agenesis ratio is increasing in their population, while it is rapidly diminishing muscle in Turks.^{8,9} Carpal tunnel syndrome is associated with increased intracarpal canal pressure. The effect of tendon loading on intracarpal canal pressures is documented in biomechanical studies yet none of the studies recorded any of these symptoms¹¹. Our cohort shows a very high prevalence of bilateral absence of Palmaris Longus tendon as compared to Indian population. We have no explanation for this observation except that our sample size may be inadequate in numbers leading to erroneous percentages. SJ Sebastian et al have worked on an even smaller sample showing even lower figures for Chinese population¹². Sudhir K Kapoor et al in 2005 concluded the prevalence of palmaris longus agenesis was found to be 17.2% (8% bilateral and 9.2% unilateral). The prevalence of agenesis was significantly more common on the left side. Male subjects had a greater likelihood of unilateral agenesis, while female subjects were more likely to have bilateral agenesis¹³. There is a wide variation of Palmaris longus absence between most of the ethnic racial groups in the literature.

CONCLUSION

From this limited small scale study we can conclude that the prevalence of Palmaris Longus tendon is likely to be well within the range reported in earlier studies. A large scale multicenter study may be able to give a more realistic picture.

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