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MORPHOMETRIC STUDY OF PALMARIS LONGUS WITH CLINICAL TESTS IN CENTRAL INDIA POPULATION

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ABSTRACT

Background: Palmaris Longus is most variable muscle and is the first choice for tendon transfer. The purpose of our study is to obtain the maximum length of Palmaris Longus tendon and find out most reliable clinical test for assessing the tendon length. **Materials and Methods:** A total of 135 (71 males and 64 females) students and staffs of the college were included. Five clinical tests were performed on each subject and findings were noted. **Results:** We found at least one PL tendon was present in (95.55%) and both the tendons were present in (77.03%). Unilateral agenesis was more common than the bilateral. We found maximum length of PL is 8.1 cm of right side and 7 cm of left side by Thompson test. We found minimum length of PL of right side is 1.1 cm and left side is 0.9 cm. We observed that out of all five tests, Thompson's test and Pushpakumar's test methods are the best to assess and measures the PL and easily understood by the subjects. **Conclusion:** PL agenesis in central India population is similar to the other reports which have been reported in the literature. In our study we used five clinical tests for measuring the maximum length of PL tendon. Thompson's test is most reliable for the measurement and easily understood by the subjects. The present work adds to the existing information regarding the measurement of PL using clinical tests, prior to surgery.

KEYWORDS: Clinical Tests, Palmaris Longus, Tendon.

INTRODUCTION

Palmaris Longus (PL) is most variable muscle of the forearm and classified as a phylogenetically retrogressive muscle i.e. a short belly with a long tendon.[1] Muscle taking origin from the common flexor origin situated at a bony prominence on the lower end of humerus, called as the medial epicondyle. Its course lies between the FCR (Flexor Carpi Radialis) and FCU (Flexor Carpi Ulnaris) muscles.[2] The PL terminates as a thin tendon, which passes superficially over the flexor retinaculum and finally inserting into palmar aponeurosis.[3] Palmaris Longus is a weak flexor of the wrist and a tensor of the palmar aponeurosis. The Palmaris Longus acts in synergy with FCR, FCU and the FDS (Flexor Digitorum Superficialis). Palmaris Longus gets its nervous innervations by the median nerve.

The Palmaris Longus has been considered as a very useful and a dispensable structure. This is because of the fact that the function of the wrist is not significantly affected or altered, even if it is absent in the subject. Thus, the Palmaris Longus finds its utility by orthopedicians and reconstructive surgeons. Palmaris Longus is a frequently utilized tendon for tendon transfers, tendon reconstruction as well as tendon grafting. Palmaris Longus has been frequently used by plastic surgeons for corrective restoration of defects related to lip and chin.[4,16] Moreover Palmaris Longus has also been utilized for correction of ptotic disorders, ptosis correction,[5,6] as well as facial paralysis.[7] According to earlier workers and classical textbooks, the agenesis of PL was seen in 15% of general population but this is variable according to different ethnic groups.[7,8]

AIMS AND OBJECTIVES

The aim of our study is to determine the presence or absence of Palmaris Longus tendon and its maximum length through various clinical tests. Compare the various clinical tests and evaluate the most reliable test.

MATERIALS AND METHODS

The present study will be carried out in the Department of Anatomy, Chirayu Medical College & Hospital, Bhopal. A total of 135 (71 males and 64 females) students and staffs of the college were included, age ranged from 17 to 50 years. Informed consent was taken. They were evaluated with five clinical tests. Palmaris

Longus was identified by clinical tests and inspection, if it is not seen then confirmed by palpation. After confirmation of presence of Palmaris Longus, measure the maximum length of PL tendon through various clinical tests. The length was taken from proximal transverse crease to maximum protuberance of tendon of Palmaris Longus. The exclusion criteria included subjects with trauma, any surgery done prior to the examination and injuries to concerned area.

Following five tests were performed one after another on both the forearms of each student.

1. **Thompson's Test**[10]- Subjects were asked to make a fist and then flex the wrist and finally the thumb is opposed and flexed over the fingers (figure 1).
2. **Schaffer's Test**[9]- Subjects were asked to oppose the thumb to the little finger and then flexes the wrist slightly. If the Schaffer's test failed to demonstrate a PL tendon, it was considered absent (figure 2).
3. **Mishra's Test I**[11]- The metacarpophalangeal joints of all fingers were passively hyperextended by the examiner and subjects were asked to actively flex the wrist (figure 3).
4. **Mishra's Test II**[11]- The subjects were asked to abduct the thumb against resistance with the wrist in slight palmar flexion (figure 4).
5. **Pushpakumar's Test**[12]- The subjects were asked to fully extend the index finger and middle finger, the wrist and other fingers are flexed and finally the thumb is fully opposed and flexed (figure 5).
6. **Analysis and Statistical aspects:** Mean values will be calculated and presented in tabular form.

RESULTS

A total of 135 subjects were included in this study. There were 71 (52.59%) male and 64 (47.40%) female subjects. The age of the subjects ranged from 17 to 50 years. We found at least one PL tendon was present in 129 subjects out of 135 (95.55%) and both the tendons were present in 104 cases out of 135 (77.03%) (table 1).

Overall unilateral absence of PL tendon was 25 out of 31 (80.64%) and overall bilateral absence of PL tendon was 6 out of 31 (19.35) in the population (table 2). Unilateral agenesis was more common than the bilateral.

A total of 104 subjects were taken for measuring the maximum length of PL. All five tests were used to measure the maximum and minimum length of PL tendon. Results of various tests are shown in table-3.

Thompson's test shows maximum length of PL of right side is 8.1 cm and left is 7 cm and minimum length of PL of Right side is 1.1 cm and left is 1.1 cm.

Schaffer's test shows maximum length of PL of right hand is 5.4 cm and left is 5.2 cm and minimum length of PL of right side is 1.2 cm and left is 0.9 cm.

Mishra's test I shows maximum length of PL of right side is 4.9 cm and left is 4.5 cm and minimum length of PL of right side is 1.1 cm and left is 0.9 cm.

Mishra's test II shows maximum length of PL of right side is 4.1 cm and left is 4.4 cm and minimum length of PL of right side is 1.2 cm and left is 0.9 cm.

Pushpakumar's test shows maximum length of PL of right side is 6 cm and left is 5.4 cm and minimum length of PL of right side is 1.1 cm and left is 0.9 cm.

We found maximum length of PL is 8.1 cm of right side and 7 cm of left side by Thompson's test. We found minimum length of PL of Right side is 1.1 cm and left side is 0.9 cm by Mishra's test I and Pushpakumar's test. We observed that out of all five tests, Thompson's test and Pushpakumar's test methods are the best to assess and measures the PL and easily understood by the subjects.

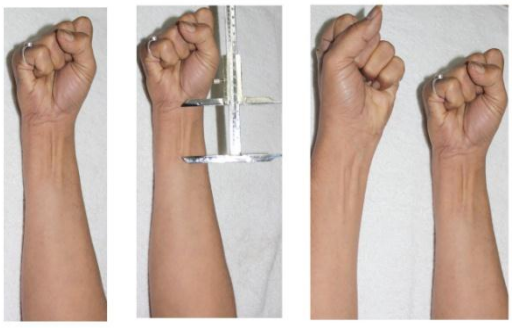


Figure: 1 Thompson's test

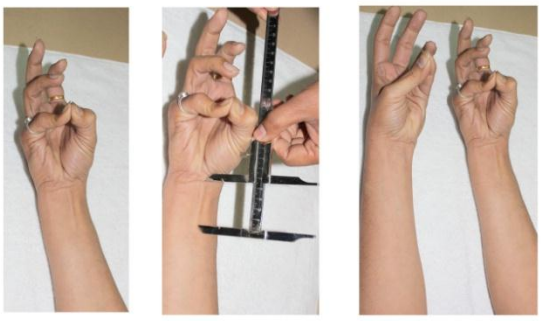
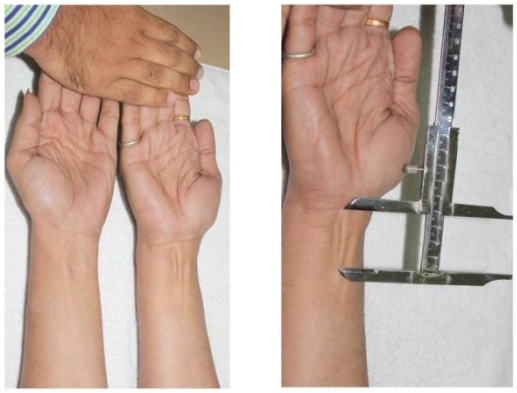
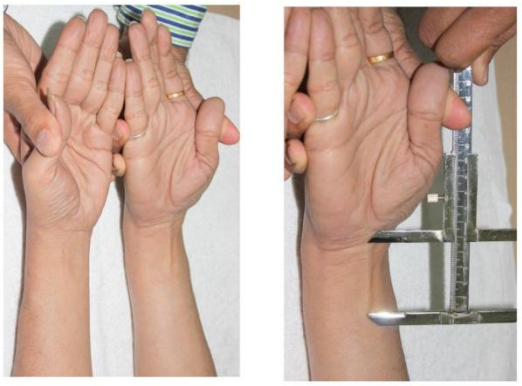


Figure: 2 Schaffer's test



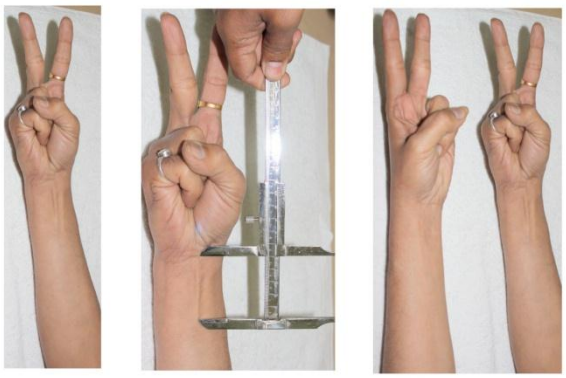
A B

Figure: 3 Mishra I test



A B

Figure: 4 Mishra II test



A B C

Figure: 5 Pushpakumar's test

Table no 1: Showing the findings regarding Absence/Presence of Palmaris Longus (PL).

Subject	PL Absent		PL present	
	Number	%	Number	%
Males (n=71)	17	23.94	54	76.05
Females (n=64)	14	21.87	50	78.12
Total (n=135)	31	22.96	104	77.03

Table no 2: Showing the Unilateral/Bilateral Absence of Palmaris Longus.

Subject	Unilateral Absent		Bilateral Absent	
	Number	%	Number	%
Total Absent (n=31)	25	80.64	06	19.35

Table no 3: Showing the length of Palmaris Longus using various tests.

No.	Name of test	Maximum length in centimeter (cm)		Minimum Length in centimeter (cm)	
		Right	Left	Right	Left
1.	Thompson's test	8.1	7	1.1	1.1
2.	Schaffer's test	5.4	5.2	1.2	0.9
3.	Mishra's test I	4.9	4.5	1.1	0.9
4.	Mishra's test II	4.1	4.4	1.2	0.9
5.	Pushpakumar's test	6	5.4	1.1	0.9

DISCUSSION

Palmaris Longus found only in mammals and is well developed in those where the forelimb is used for ambulation and weight bearing, like orangutan.[7,13] It is variably absent in higher apes like chimpanzee and gorilla.[1,13] It is gradually losing its function and size as the forelimb muscle power was diverted to independent hand functions.[7] The muscle has been considered as the foremost choice as a donor material as it is said to fulfill the required criteria as regards the thickness, length, width, diameter and composition. This muscle is utilized without resulting in any pragmatic deformity.[14] Previous studies on the incidence of the PL tendon show a wide variation from 3% in black people to 64% in Turkish people.[7] Asian subjects have been reported to be 4.8%. The overall absence of the PL muscle in the present study was 22.96 % with more number of females showing the absence. Limitation of study: Variations like insertion of PL below the flexor retinaculum gives absent PL on clinical examination. Hence clinical assessment of presence of PL is not entirely reliable. MRI is the sure way to detect PL, even anomalous tendon. But the strength of this study is that we have used numerous tests to detect the presence and measure the length of PL and thus that increases the chances to detect and measure the PL, single test may give false impression of absence.[15]

CONCLUSION

Palmaris Longus agenesis in central India population is similar to the other reports which have been reported in the literature. In our study we used five clinical tests for measuring the maximum length of PL tendon using sliding vernier calipers. Measurements of the PL have not been reported in the literature. Thompson test is most reliable for the measurement and easily understood by the subjects. The present work adds to the existing information regarding the measurement of Palmaris Longus using clinical tests, prior to surgery.

Conflict of Interest: None.
Ethical Clearance: Yes.
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