ORIGINAL RESEARCH PAPER

Anatomy

THE PREVALENCE OF AGENESIS OF THE PALMARIS LONGUS MUSCLE TENDON BY CLINICAL EXAMINATION. A STUDY ON MEDICAL STUDENTS.

KEY WORDS: Prevalence; Agenesis; Palmaris Longus

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ABSTRACT

Some small muscles in the human body have been found to be absent in a portion of the population. One of these muscles is the palmaris longus muscle. The palmaris longus is a slender fusiform muscle that originates from the medial epicondyle of the humerus, with its long distal tendon inserting into the ligamentous palmar aponeurosis. No functional disability is experienced in whom these muscles are absent. This factor is utilized by the surgeons to consider the Palmaris longus tendon as the1st choice of DONAR TENDON. It fulfils all the necessary requirements of LENGTH, DIAMETER, AVAILABILITY and can be used in RECONSTRUCTIVE SURGERY FOR A WIDE VARIETY OF PROCEDURES INCLUDING LIP AUGMENTATION, PTOSIS CORRECTION AND IN THE MANAGEMENT OF FACIAL PARALYSIS. In the present study, 650 Medical students (360 males and 290 females) of different ages from Gitam institute of medical sciences and research, Visakhapatnam were examined for the presence or absence of the PL tendon, using the conventional four tests, Schaeffer's test, Thompson's test, Mishra's test, Pushpakumakar's two finger sign method. PL agenesis was further analysed statistically for differences in the prevalence and agenesis of PL with regard to sex and side. It was observed in 290 females, the palmaris longus muscle is present in 72.06% (n=209) of the total population. Bilateral absence of the muscle is found in 18.96% (n=55) of the sample. Unilateral absence on the left side was found in 5.86% (n=17) of the cases and on the right side in 3.10% (n=9) of the cases and 360 males, 97.61% (n=351) had the palmaris longus muscle on both the left and the right sides. In the sample population, 0.47% (n=2) had bilateral absence of palmaris longus. The muscle was absent on the left side in 0.95% (n=3) of the cases and on the right side in 0.95% (n=3) of the cases.

1. INTRODUCTION

Palmaris longus is a small vestigial muscle that is phylogenetically degenerating. It is a slender muscle that arises from the medial epicondyle by a common flexor tendon and from adjacent intermuscular Sept. Palmaris longus is a slender, fusiform muscle medial to flexor carpi radialis. It springs from the medial epicondyle by the common tendon, from adjacent inter muscular septa and deep fascia. It converges on a long tendon, which passes anterior (superficial) to the flexor retinaculum. A few fibres leave the tendon and inter weave with the transverse fibres of the retinaculum, most of the tendon passes distally. As the tendon crosses the retinaculum it broadens out to become a flat sheet, which then splits longitudinally to send bundles of ligamentous fibres to the 4 digital rays, with a variable fibre bundle extending towards the thumb. The diverging bundles occupy a triangular area in the mid palm with its apex pointing proximally. The ligamentous structure in this area have been described as the PALMARFASCIS or APONEU ROSIS, a terminology that tends to disguise the precise organization of the fibres into 5 groups of longitudinally oriented fibres (in clinical practice the term PRETENDINOUS FIBERS is used). Palmaris longus has wide insertions into skin and fascia in the distal palm and digital webs.

Palmaris longus has been suggested to be a phylogenetically degenerate meta carpo phalangeal joint (wood jones. 1941). Although consideration of the line of action would suggest an action in carpal flexion, the main function appears to be as an anchor of the skin and fascia of the hand, resisting horizontal shearing forces in a distal direction (as in holding a golf club)which would tend to deglove the skin of the palm.

The palmaris longus muscle has been well studied following the first report of its absence in 1559 by Colombos in De Re Anatomica Libri (Schaeffer, 1909; Thompson *et al.*, 2001). It is one of the most variable muscles in the human body (Brones & Wilgis, 1978). It varies in the incidence of its absence, form, attachment, duplication and its ability of having accessory slips and substitute structures (Reimann *et al.,* 1944). It is supplied by the median nerve. The muscle belly of palmaris longus is supplied by a small branch from anterior ulnar recurrent artery.

2. MATERIAL & METHODS

Determination of the presence of Palmaris longus tendon by clinical tests.

Demonstration of Palmaris longus tendon by clinical tests was undertaken on 650 students of MBBS from Gitam institute of medical sciences and research, Visakhapatnam with informed consent. Out of these 360 students are males and 290 are female students.

The students are examined first by using the standard technique or test-- Schaeffer's test. In those students if the Palmaris longus tendon was not recognized three other tests were performed.

1. Dr. Mishra's test I
2. Dr. Mishra's test II
3. Pushpakumar two finger test.

The results were tabulated separately for male and female students.

SCHAEFFER'S TEST:

Schaeffer's test is used in order to visualize or palpate the palmaris longus tendon. Participants are asked to oppose their thumb and little finger with slight flexion of the wrist. If the palmaris longus tendon is present, it would be visible at the distal aspect of the forearm (see figure 1).

Figure 1: Schaeffer's test, in the left figure the individual have both the palmaris longus muscles and in the right figure the individual has none.

THOMPSON'S TEST:
It involves flexion of the fingers to form a fist followed by flexion of the wrist and finally the thumb is opposed and flexed over the fingers (see figure 2).

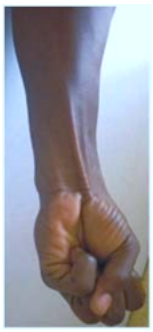

Figure 2: Thompson's (1921) technique for assessing PL.

MISHRA'S TEST:
It involves passive hyperextension of the metacarp ophalangeal joints followed by resisted active flexion at the wrist (see figure 3).

Figure 3: Mishra's (2001) first test for demonstrating PL.

PUSHPAKUMAKAR'S TEST:
It involves extension of the index and middle finger with flexion of the other fingers and the wrist followed by opposition and flexion of the thumb (see figure 4).

Figure 4: Pushpakumakar's (2004) two finger sign method.

3. STATISTICAL ANALYSIS
The result of observation will be statistically calculated with the help of following formula.

FORMULA:-
Mean= ∑X/n
∑X = Sum of observations
n = total no. of observations

2. RESULT
In the sample of 360 males, 97.61% (n=351) had the palmaris longus muscle on both the left and the right sides. In the sample population, 0.47% (n=2) had bilateral absence of palmaris longus. The muscle was absent on the left side in 0.95% (n=3) of the cases and on the right side in 0.95% (n=3) of the cases.

For the 290 females, the palmaris longus muscle is present in 72.06% (n=209) of the total population. Bilateral absence of the muscle is found in 18.96% (n=55) of the sample. Unilateral absence on the left side was found in 5.86% (n=17) of th cases and on the right side in 3.10% (n=9) of the cases.

The prevalence of the palmaris longus muscle is summarized in table.

Table No. 1 showing the the prevalence and agenesis of PL with regard to sex and body side.

Table 1: Current study of palmaris longus muscle

Sex	Male	Female	Total
Subject	360 (55.38%)	290 (44.61%)	650 (100%)
Absent in Both Hand	2 (0.43%)	55 (18.56%)	57 (8.76%)
Absent in Left Hand	3 (0.87%)	17 (5.77%)	20 (3.07%)
Absent in Right	3 (0.87%)	9 (3.13%)	12 (1.84%)
Present in Both Hand	205 (97.58%)	209 (72.01%)	561(86.30%)

5. DISCUSSION
AUTHORS REPORTING ABSENE OF PALMARIS LONGUS.
1. ELIZABETH O'SULLIVAN AND BARRY

S Mitchell J. Anatony (2002) 202 Pp405—408 University of south Hampton; UK.

He stated that demonstration of Palmaris longus tendon in the living arm is easy and the use of this in combination with the other techniques may improve all over reliability. The absence of a Palmaris longus tendon may be a predictor of the pattern of the SPA (superficial palmar arch).

2. Reimann etal examined 1600 extremities and he found12-9% of agenesis variations in a form constituted 50% of these anomalies.

3. Pawan Agarawal; Plastic surgery unit, Dept of surgery NSCB Gout Med. College; Jabal pur; MP; India. Vol 44; Issue 2; Page 212-215, 2010

"Absence of the Palmaris longus tendon in Indian population"

The presence of the Palmaris longus tendon was clinically determined in 385 normal Indian men and women using the standard technique. In subjects with an absent Palmaris longus tendon three other tests were performed to confirm its absence.

The overall uni lateral absence of the tendon was 16.9% and bi lateral absence was in 3.3% .No significant.

M.M GULER. B. CELIKOZ.:
Arch orthop trauma Surgery (1998) 117: 296-297.

In his presentation on "Anomalous Palmaris longus muscle causing carpal tunnel like syndrome" the author came across a case where the patient exhibited signs and symptoms of carpal tunnel syndrome. On exploration the surgeon found that Palmaris longus was tendinous at proximal 1/3rd originating from the medial epicondyle and muscular to the distal2/3rd part inserting into the palmar fascia with a very short tendon.

4. P. Agarwal ; From http//www.ijoonline.com/text asp 2010/44/2/212/61863

Males absence on the right side 7.17% Left side -12.3%, unilateral absence of Palmaris longus tendonis 19.48%

In females right side absence = 4.21%, left side absence = 10% overall absence of one side 14.21%. bilateral absence of the tendon in males is 5.12% and in females is 1.6%.

5. Sandeep J Sebastin MCH (plastic), AymericYT lim, FRCS (glax), Hwer Bee Wong Msc Anm med Singapore 2006: 35: 249-253.

Clinical assessment of Palmaris longus and its association with other anatomical anomalies—A Chinese population study.

The author conducted the prevalence of absence of the Palmaris longus and absence of FDS to the little finger in a Chinese population is much lower compared to previous reports in the literature. There is no association between absence of Palmaris longus and absence of the FDS to the little finger.

Although all techniques of examining for the absence of the Palmaris longus are equally effective, the method the method suggested by Mishra seems the best as it is easily understood by subjects and can be used even when thumb abduction is not possible.

6. SA Roohi, MS (ortho) (UKM), L Choon- Slan, MD. A Shalimar (ortho) (UKM). CH Tan MS (ortho) Malayasian orthopaedic journal 2007 vol 1 no 1

The above authors in their study on the absence of Palmaris longus in a multiracial population stated

According to Roohi MS (ortho)

Frequency of absence of Palmaris longus among ethnic groups

Table I

	Present bilaterally	Absent Unilateral	bilateral	Total
Malay	133 (88.7%)	12(8%)	5(3.3%)	150(100%)
Chinese	141(94%)	7(4.7%)	2(1.3%)	150(100%)
Indian	134(89.3%)	10(6.7%)	6(4%)	150(100%)

Frequency of absence of Palmaris longus between genders

Table II

	Present bilaterally	Absent Unilateral	bilateral	Total
Male	209(92.9%)	13(5.8%)	3(1.3%)	225(100%)
Female	199(88.5%)	16(17.1%)	10(4.4%)	225(100%)

7. Salgado, Christopher J. MD, Licata Lauren MD; Fuller; David a. MD; Chen Hung- chi MD, FACS;

Total penile reconstruction has been performed successfully with the use of vascularised flaps, to the point of obtaining a functioning penis where the patient can urinate voluntarily, having sexual relations.

8. Trussler, &Andrew P.M.D.; Upper Lip Augmentation: Palmaris Longus Tendon as an Autologous Filler

Lip augmentation is used to enhance a thin upper lip or correct lip deficiencies. The palmaris longus tendon, an accessory tendon of the wrist, has been used successfully for upper extremity reconstruction and was used in this case series for upper lip augmentation.

Schaffer's *et al* (1909) studied Caucasian subjects and reported a bilateral absence of 8.7% of the palmaris longus muscle. Unilateral absence of this muscle was noted in 6.7% of the left arm and 9.7% of the right arm. Wehbé and Mawr (1992) reported a bilateral absence of 5% in a sample made up of mainly Caucasian subjects. Another study done on Caucasian subjects reported a bilateral absence of 9.7% of 17.2%; unilateral absence consisted of 6.2% on the left the palmaris longus muscle. This muscle was absent in the side and 3% on the right side. The author noted that the right arm only (2.2%) (Vanderhooft, 1996). method used was not entirely reliable and therefore a weak tendon could be mistaken for an absent tendon.

Since the palmaris longus is an expendable muscle, its absence will not affect the function of the wrist significantly (Roohi *et al,* 2007). However, the congenital absence of this muscle can be seen as a disadvantage when the use of this muscle is indicated for use in reconstructive surgery (White, 1960; Carlson et al., 1993). The prevalence of the palmaris longus muscle has been shown to differ between various population groups (Roohi *et al,* 2007).

6. CONCLUSION

In the present study the prevalence and agenesis of palmaris longus muscle, the females are more prone to Bilateral absence of the muscle (about 18.56%), Unilateral absence on the left side(about 5.77%)and on the right side in (about 3.13%)and present (about 72.01%) in the total population than male. Thus this is the most significant anatomical variation in the human body.

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