

Original Article**Clinical assessment of agenesis of palmaris longus muscle and its association with gender, body sides in western Indian population**

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ABSTRACT

Background: Palmaris longus muscle is a degenerating superficial flexor muscle of forearm. Absence of palmaris longus in different ethnic groups has been frequently encountered in clinical practice.

Aim & Objectives: Present study was done to determine the incidence of unilateral and bilateral absence of palmaris longus and its association with gender and sides of the upper limb in western Indian population.

Methods & Material: The sample constituted 500 healthy subjects (250 males and 250 females) which were examined clinically by standard technique. In subjects with an absence of palmaris longus tendon, three other clinical tests were performed to confirm its absence.

Results: Overall absence of palmaris longus was observed in 91 subjects (18.2%) out of which 48 (9.6%) had unilateral absence and 36 (7.2%) had bilateral absence. Frequency of unilateral (Males: 8.4%, Females: 10.8%) and bilateral (Males: 5.2%, Females: 9.2%) agenesis was higher in females. In males, unilateral (8.4%) agenesis was more common than bilateral (5.2%). In subjects with unilateral agenesis right side (5.2%) was more commonly involved than left side (3.2%) in males whereas in females left side (7.2%) was more commonly involved than right (3.6%). However in present study there was no statistical association observed between absence of palmaris longus and gender or body sides in western Indian population.

Conclusion: Agenesis of palmaris longus, both forms unilateral and bilateral was fairly common in western Indian population in both gender. Females had higher incidence of agenesis than males with unilateral agenesis more common than bilateral.

Keywords: Palmaris longus, Indian population, Tendon anomalies

INTRODUCTION

Palmaris longus is a regressive muscle in higher vertebrate phylogeny and is the most superficial flexor muscle of forearm. It is degenerating muscle as it has a short belly and a long tendon. The origin of muscle is from medial epicondyle by a common flexor tendon and from adjacent intramuscular septa and deep fascia. The tendon passes in front of flexor retinaculum and is continuous with the central part of palmar aponeurosis for its insertion. It is supplied by median nerve. It is a weak flexor of wrist and acts anchor for skin and fascia of hand to tense palmar

aponeurosis by resisting horizontal shearing forces which would tend to deglove the skin of the palm.

Palmaris longus muscle is one of the most variable muscle in human body. Palmaris longus muscle is fully developed at birth [1] and its absence is hereditary but genetic transmission is not known [2]. Occasionally there is double palmaris longus tendon or it can have multiple insertions or an associated aberrant muscle [3]. Palmaris longus is often absent on one or both sides and its prevalence of absence varies in different ethnic group [4-6]. The muscle is reported to be present in 85% of individuals in one

arm and in both arms is 70% [3]. Absence of palmaris longus does not significantly affect function of wrist but its tendon is very useful in various reconstructive surgeries such as flexor tendon repairs, various ligament repairs. It is also useful in restoration of lip and chin defects [7], facial paralysis management [8], ptosis correction [9, 10]. Palmaris longus tendon is a tendon of choice for tendon transfers because it has adequate length about 15 cm, diameter and availability without producing a deformity [3].

MATERIAL AND METHODS

Total 500 healthy Indian subjects of western Indian population were selected randomly. The individuals having any deformities or injuries or previous surgery to hand were excluded from this study. Age, gender of each subject was recorded and subjects were examined for presence or absence of palmaris longus muscle by clinical tests. Associations between unilateral or bilateral absences of muscles with gender and body sides were recorded. Subjects were examined by performing four different clinical methods for assessment of palmaris longus tendon. Initially subjects were examined by performing standard test (Schaeffer's test). Presence or absence of palmaris longus tendon was accessed by clinical inspection or palpation of tendon on volar aspect of wrist as shown in fig.1. In cases where tendon was not visualized or palpable, other three tests were applied to confirm the absence of tendon. All tests were equally effective in determining the absence of tendon.

Fig.1: Schaeffer's test



Schaeffer's test: The subject was asked to oppose thumb and little finger with wrist in slight flexion.

Thompson's test: The subject was asked to make a fist and then flex the wrist with thumb flexed over fingers.

Mishra's I test: Meta-carpophalangeal joints of all fingers were hyper-extended by examiner and subject was asked to actively flex wrist.

Mishra's II test: The subject was asked to abduct thumb against resistance with wrist in slight flexion.

Pushpa kumar's "two finger sign" method: The subject was asked to fully extend index and middle finger with wrist and other finger in flexion and thumb was fully flexed and opposed.

All statistical analyses were done by comparison of proportions using Chi-square test. Results were tested at 5% level of significance.

RESULTS

In present study females had higher incidence of palmaris longus agenesis than in males whether unilateral or bilateral. Unilateral agenesis was more common than bilateral in females but difference also. Unilateral involvement was more frequently encountered in left side. All these differences between male vs. female, unilateral vs. bilateral and left vs. right were statistically not significant ($p > 0.05$).

In males unilateral agenesis was more common than bilateral however difference was statistically not significant ($p > 0.05$). In males incidence of unilateral agenesis was more common in right side. This difference is also statistically not significant ($p > 0.05$).

There were no statistical associations observed between palmaris longus absence with gender or body sides in western Indian population.

DISCUSSION

Palmaris longus is one of the superficial flexor muscles of forearm with clinical importance in reconstructive surgeries. Incidence of absence of palmaris longus muscle varies among different ethnic groups, race, gender, region and side of body [4-6]. Association has been observed between absence of palmaris longus and anomalous superficial palmar arch and weak flexor digitorum superficial muscle [6]. According to literatures palmaris longus is absent in about 15% of Caucasians and less frequently in other populations [11, 1]. Some of the studies suggest that

apart from ethnic variation, its absence was more common in women and bilateral absence was more frequent and unilateral absence was more common on left side [12, 1].

The findings in the present study like most of the studies, reflects the incidence of palmaris longus absence in Indian population. In present study, overall agenesis of palmaris longus muscle was 18.2% in a population of western India. Sankar KD et al [13] reported overall agenesis of palmaris longus muscle was 28% in Andhra population of India while Sharma DK et al [1] reported 16.25% in caucasian subjects of central India region. A study by Agrawal P [6] had reported overall agenesis was 20.2% in Indian population. In a similar study by Kapoor SK et al [14] found that overall agenesis of palmaris longus muscle was 17.2%. Previous studies on the overall incidence of the palmaris longus muscle show a wide variation from 16.25% to 28% in Indian population. In various studies, overall absence of palmaris longus muscle across the globe shown in table 1.

Table 1: Frequency Percentage (%) Distribution Palmaris Longus Agenesis in Both Genders

No. of Subjects	Overall absence in both gender	Overall absence in males	Overall absence in females
500	91 (18.2%)	34 (13.6%)	57 (22.8%)

Table 2: Frequency Percentage (%) Distribution of Palmaris Longus Agenesis in Both Limbs

Absence of PL	Unilateral absence		Bilateral absence
	Right	Left	
Males (250)	13 (5.2%)	21 (8.4%)	13 (5.2%)
	8 (3.2%)		
Females (250)	9 (3.6%)	27 (10.8%)	23 (9.2%)
	18 (7.2%)		
Total (500)	22 (4.4%)	48 (9.6%)	36 (7.2%)
	26 (5.2%)		

In the present study unilateral absence was little more common than bilateral (U/L: 9.6 %, B/L: 7.2%) which was similar with the findings of Kapoor SK et al [14] (U/L: 9.2 %, B/L: 8%), Sankar KD et al [13] (U/L: 70.5%, B/L: 29.5%), Sharma DK et al [1] (U/L: 10%, B/L: 6.25%), Agrawal P [6] (U/L: 16.9%, B/L: 3.3%

Table 3: Frequency Percentage (%) Distribution of Palmaris Longus Agenesis in Different Population of the World

Sr. No	Different population	Percentage of agenesis PL (%)	Authors
1	Yoruba population	6.7	Godwin OM, Adedaya BE
2	East African population	4.4	Kigera JWM, Mukwaya S
3	Chinese population	4.6	Sebastin et al
4	Gaziantep Turkish population	63.9	Ceyhan O, Mavt A
5	Korean population	4.1	Dong-Soo Kyung et al
6	Nigeria population	31.25	Oluyemi KA et al
7	Turkish population	26.6	Ozkan Kose et al
8	Malaysian population	9.3	Roohi SA et al
9	Northern Ireland Caucasian population	25	Thompson NW et al

Abbreviations: PL- Palmaris Longus, M- Males, F- Females, RT- Right hand, LT- Left hand, U/L- Unilateral, B/L- Bilateral

In our study, the left side involvement was more common than right (RT: 4.4%, LT: 5.2%) in unilateral absence of palmaris longus muscle which was in accordance with findings of Sankar KD et al [13] (RT: 48.4%, LT: 51.6%), Agrawal P [6] (RT: 11.38%, LT: 22.3%) while Sharma DK et al [1] reported unilateral palmaris longus absence was more or less equal on both sides (RT: 5.25%, LT: 4.25%).

Gender differences have been observed between unilateral and bilateral absence of palmaris longus muscle. In present study females had more incidence of agenesis whether unilateral or bilateral which was similar with the findings of Sankar KD et al [13] but not in accordance with the findings of Agrawal P [6], Sharma DK et al [1], Kapoor SK et al [14]. Sankar KD et al [13] had reported that overall absence of palmaris longus muscle in males and females was 14.7% and 40.2% respectively while bilateral absence in males was 27.3% and in females was 30.3%. In a similar study by Agrawal P [6] found that males had more incidence of agenesis. Agrawal P had reported unilateral absence in males was 19.48% and in females was 14.21% while bilateral absence in males and females was 5.12% and 1.6% respectively. Sharma DK et al [1] found overall and unilateral

absence was more in males while bilateral was more in females. They found overall absence in males and females was 8.5% and 7.5% respectively while unilateral absence in males was 5.75% and in females was 4.25% while bilateral absence in males and females was 2.75% and 3.5% respectively. In a study by Kapoor SK et al [14] reported, male subjects had a greater likelihood of unilateral agenesis, while female subjects were more likely to have bilateral agenesis.

Assessment of palmaris longus tendon was done by clinical method in present study which may be unreliable. Subjects with anomalous or weak palmaris longus may show absence of palmaris longus on clinical tests. A confirmatory evidence to avoid such misinterpretations is done by doing Magnetic resonance studies of forearm which will detect anomalies of palmaris longus tendon and definitively confirm agenesis. Such study may reveal yet unrecognized variations and may alter the statistics of agenesis given in standard texts and other studies done hitherto. But such studies are often limited by cost considerations for applying it to such a large population and hence clinical examination remains useful way of detecting agenesis of palmaris longus.

CONCLUSION

Agenesis of palmaris longus, both forms unilateral and bilateral was fairly common in western Indian population in both genders. Females had higher incidence of agenesis than males with unilateral agenesis more common than bilateral. In unilateral agenesis, left side was more common than right in females. In males unilateral agenesis was more common than bilateral. In males right side was more common than left.

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