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Absence of Palmaris Longus: A Study in Eastern Nepal

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Abstract The Palmaris longus is one of the most variable muscles in the body which flexes the wrist and tenses the palmar fascia. It is used as a source of tendon graft. It has been seen that there is association between prevalence of Palmaris longus with race, sex and body side. The prospective study was conducted during May- June 2015 to determine the incidence of the absence of the Palmaris longus in Nepalese population in the Eastern Region using three common clinical tests among patients attending OPD of Nobel Medical College and Hospital, Biratnagar, Nepal. The overall incidence of absence was 11.8% with bilateral absence at 3.5% and unilateral absence at 8.2%. The overall difference between dominant and non-dominant and males and females was statistically significant ($p < 0.05$). The study findings are similar with most studies done in the Asian population. The incidence of absence of Palmaris longus was more in non dominant hand. One of the explanation in favor of above findings is that the dominant hand is more involved in manual activities and hence less likely to degenerate due to disuse as compared to the non dominant hand.

Keywords: *Palmaris longus, absence, Eastern Region, Nepal*

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1. Introduction

The Palmaris longus (PL) is a small vestigial muscle of forearm. The muscle is one of the most variable muscles in the body. It may vary in position and may have duplicate tendon and accessory slips. Various studies have documented that the prevalence of the muscle varies across races [1,2,3].

Its absence is hereditary but genetic transmission is not clear [4]. The Palmaris longus functions as a weak flexor of the wrist joint and it also tenses the palmar fascia. [5] An understanding of its variations is important because it is often used in reconstructive plastic surgery mainly for tendon grafting. It has also been used for a wide variety of procedures like lip augmentation [6], ptosis correction [7,8] and in the management of facial palsy [9].

The incidence of PL agenesis in different ethnic groups shows that the absence of PL is significantly associated with the sex and side of the limb; however, some remains controversial [10].

There is no reported study on absence Palmaris longus in Nepalese population. Aim of the study was to determine whether the incidence of the absence of the Palmarislongus was different from other reported populations in Asia and the rest of the world and any relationship with sex and hand dominance so as to have a baseline data of Nepal.

2. Methodology

400 patients who attended the Orthopedics outpatient clinic in Nobel Medical College in the Eastern part of Nepal, between May 2015 to June 2015 were included in the study.

To detect the presence of the Palmaris longus, the subjects were evaluated with 3 tests. The subject must have a negative test for all 3 tests to consider an absence of a Palmaris longus, If a subject had a positive result for any one of the 3 tests, the subject was considered to have a Palmaris longus. In Schaeffer's test, patients were made to steady their forearm at 90 degree asked to oppose the thumb to the little finger with the wrist partially flexed [11]. Mishra's 1st test, passive hyperextension of the metacarpophalangeal joints was done along with mild active flexion of the wrist [12]. In Thompson's test, a fist was made followed by flexing the wrist against resistance with the thumb flexed over the fingers [13].

2.1. Inclusion Criteria

Patients who attended the Orthopedics outpatient clinic in Nobel Medical College between May 2015 to June 2015.

2.2. Exclusion Criteria

Patients having obvious hand and wrist deformities, previous surgery to the hand and/or wrist and previous hand and wrist injuries were excluded. Participants who refused to give written informed consent were also excluded from study.

2.3. Ethical Clearance

Clearance from ethical review committee of the institution was obtained .Participants were explained and

informed consent was taken and in case of patients aged below 18, consent was taken from parents.

2.4. Statistical Analysis

Data was collected by a questionnaire and analyzed by chi square test using SPSS 16.0 statistical software.

3. Results

Out of 400 patients, there were 167 (41.8%) males and 233 (58.2%) females. Age of the subject's ranged from 13 to 93 years with a mean age of 40 years .sixteen subjects were left handed(4%).

The overall agenesis of PL was 47(11.8%), in which there were 34 females (14.5%) and 13 males (7.8%). Unilateral agenesis was seen in 33 (8.2%) and bilateral in 14 (3.5%) subjects. (Table 1).

Table 1. Overall Absence

Absence in Rightside	Absence in Left side	Absence bilaterally	Total absence
9(2.2%)	24(6.0%)	14(3.5%)	47(11.8%)

Out of total 24 (6%) subjects with the left-side agenesis, there were 20 females (8.5%) and 4 males (2.4%). The right-side agenesis was seen in 9 (2.2%) subjects; of which 5 (2.1%) were females and 4 (2.3%) were males. Out of 14 (3.5%) bilateral agenesis, there were 9 (3.8%) females and 5 (3%) males. (Table 2) Absence of Palmaris longus is significantly more in left hand in female than the male(p=0.01) . The overall difference between males and females in terms of agenesis of a Palmaris longus was statistically significant (p = 0.037).

Table 2. Distribution of Palmaris Longus Absence

	Both Hand			Right Hand		Left Hand		Palmaris Longus	
Gender	**Unilateral Absent**	**Bilateral Absent**	**Bilateral Present**	**Present**	**Absent**	**Present**	**Absent**	**Present**	**Absent**
Male	8 (4.8%)	5 (3%)	154 (92.2%)	163 (97.6%)	4 (2.4%)	163 (97.6%)	4 (2.4%)	154 (92.2%)	13 (7.8%)
Female	25 (10.7%)	9 (3.9%)	199 (85.4%)	228 (97.8%)	5 (2.2%)	213 (91.4%)	20 (8.6%)	199 (85.4%)	34 (14.6%)
	Pearson Chi square = 4.880 df =2, P > 0.05 (0.087) not significant			Pearson Chi square = .027 df =1, P > 0.05 (0.868) not significant		Pearson Chi square = 6.605 df =1, P < 0.05 (0.01) significance strong evidence of relationship between gender and left hand absence		Pearson Chi square = 4.348 df =1, P < 0.05 (0.037) significant	

In both right and left handed people PL agenesis was more common in non-dominant hand but it was statistical significant only in right handed people at p- value 0.01. (Table 3).

Table 3.Overall Palmaris Absence by Hand Dominance

Absence of PL	Right Handed(%)	Left Handed(%)
Present bilaterally	343(89.3%)	10(62.5%)
Absence in Rt side	6(1.6%)	3(18.7%)
Absence in Lt side	23(6%)	1(6.3%)
Absence bilaterally	12(3.1%)	2(12.5%)
Total	384(100%)	16(100%)

PL-Palmris Longus, Rt- right, Lt-left.

4. Discussions

Absence of the Palmaris Longus in our study was 11.8% which is lower when compared with Indian people (28%) [18]. There is wide variation in incidence of Palmaris longus agenesis in different population of world. Its absence has been reported in 25% of in various Caucasian, 4.5% of the Chinese population, 37.5% of the Serbian population and 28% of Indian population [14,15,16,17,18]. A study done in black population of Uganda [16] showed a much lower value of 1.02%. This indicates that there is strong racial variation of agenesis of the PL muscle.

The unilateral absence was higher in females (10.7%) than in males (4.7%) in this study which is correlated with most previous reports [3,17] except for the report on black Ugandan population [16]. The difference between the unilateral and bilateral absence of the muscles was significant. The much lower incidence of bilateral agenesis is consistent with other studies [14,16] but differs markedly from study done by Ceyhan and Mavt [17] in Turkish population. It has been noted there was significant difference in overall absence of PL muscle in both sexes. There was strong correlation of agenesis was only in left limbs of males and females. Furthermore, although the left side was affected more commonly in unilateral absence this did not prove to be statistically significant (p=0.44).

Although statistically significant only in right handed people, this study also shows a trend of subjects being more likely to have absence of PL in the non-dominant hand in comparison to the dominant hand. This is correlated to a study done by Eric et al [19]. This finding may be due to the fact that the dominant hand is more involved in manual activities and therefore it is less likely to degenerate due to disuse as compare to the non dominant hand.

It is necessary for surgeons in every region to know about the local incidence of agenesis before planning for utilization of this tendon for grafting or other reconstructive purposes. Although the study population did not represent the whole country of Nepal, this study gives an idea to surgeons working in this region their likelihood of finding the Palmaris longus tendon for tendon grafts or various reconstructive procedures. In absence of Palmaris longus the median nerve is more vulnerable to injury. Hence in this population, injuries to the nerve at the wrist could potentially be fewer.

One of the weaknesses of this study was that only clinical examination was used to detect the presence of a Palmaris longus which can be examiner dependent as compared with other methods like cadaveric study and using ultrasonography and MRI.

Nevertheless, the strengths of this study was the large sample size and the use of more than one tests to detect

the presence of Palmaris longus, which decreases the chance of missing to identify Palmaris longus.

5. Conclusion

In summary, the Palmaris longus tendon is often regarded as phylogenetically degenerating but the ideal tendon donor. Clinical testing revealed an incidence of unilateral absence of 8.2% and a bilateral absence of 3.5% in the people of eastern region of Nepal. There were statistically significant correlation between tendon absence gender wise and by hand dominance.

6. Limitations

Only clinical test was used in the study to determine absence of Palmaris longus.

7. Declaration of Conflicting Interests

The authors declare that there is no potential conflicts of interest with respect to the research, authorship and /or publication of this article.

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