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Palmaris Longus: Self-Identification and through Dissection

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Abstract

Using 8 methods, 337 medical students were asked to examine and to self-identify the presence of the palmaris longus muscle in each of their own arm. On the other hand, during anatomy dissection, a total of 174 cadaver arms were examined for palmaris longus muscle. This study covers the school years 2015 to 2017. The result showed that 97% of the arms of the students and that of the cadavers have the palmaris longus. The methods used to identify the muscle showed varying identification rates; from as low as 62% to as high as >96%. No single method was able to identify the presence of the muscle 100%. Among the students, 95.3% have the bilateral presence of the muscle; while, 94.3% of the cadavers have. Both data from the student and cadaveric studies showed ~3% prevalence of absence of the muscle. Statistical analysis showed that there's no significant difference in terms of prevalence of presence or absence of the muscle between the student study and the cadaveric study. This finding may suggest that combination of methods may be needed for a better clinical identification of the palmaris longus muscle.

Keywords: Palmaris Longus; Muscle; Osteonecrosis, ; Agenesis

Introduction

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. This muscle is also one of the most variable muscles in our body [1]. Meta-analysis of cadaveric studies showed that the overall absence of palmaris longus is 10.3% [2] among humans.

Individuals with palmaris longus tendon are likely to have a median nerve with a greater surface area [3]; a finding that may explain the increased susceptibility of these individuals to carpal tunnel syndrome [4]. While such increased risk could be a disadvantage for individuals to having this muscle, several clinical uses of this muscle could somehow make someone favor having this muscle.

The palmaris longus has received a growing interest for its role in constructive surgery. The palmaris tendon graft has been used in the management of osteonecrosis [5]. Other use of the palmaris longus tendon include that for reconstruction of the eyelid [6], repair of the cicatricial ectropion of lower eyelid [7], blepharoptosis [8], repair of other more functional tendons [9,10], management of radial nerve palsy [11], reconstruction of palatal defect [12], and for suspension of facial paralysis [13].

The palmaris longus is located in the superficial part of the anterior forearm, which makes it relatively easier to identify this muscle whenever present. Several methods had been introduced to evaluate the presence of this muscle. This study aims to use eight different methods to evaluate the presence of this muscle among medical students and compare it with the results of our cadaveric study.

Materials and Methods

Self-identification by medical students using eight different methods

Several methods to clinically evaluate the presence or absence of palmaris longus have been suggested [14]. In this study we employed 8 different methods that are shown in figure 1. Medical students were asked to follow each of the eight methods (from M1 to M8) to evaluate each of their own forearms. They were asked to fill up a form indicating whether they can clearly recognize or not the tendon of the palmaris longus in each arm by employing each of the eight methods.

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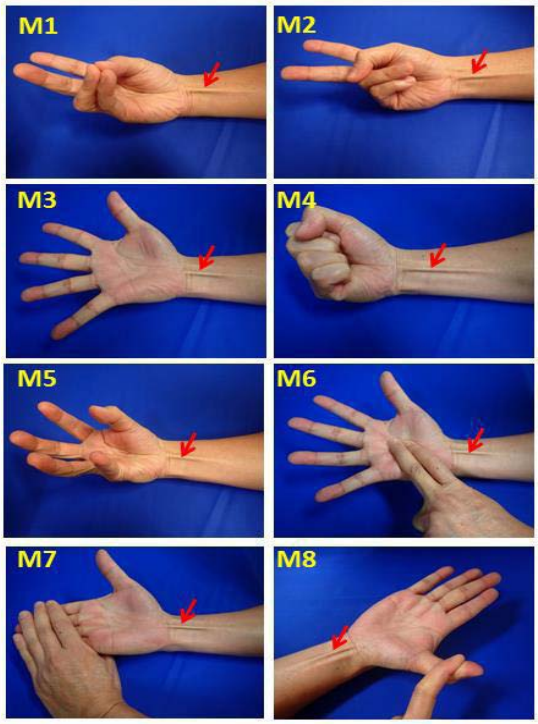

Figure 1: Methods (M1-M8) in identifying presence of palmaris longus muscle. Red arrow indicates protrusion created by the tendon of palmaris longus muscle.

Student profile: A total of 337 Japanese medical students comprised by 201 males and 136 females were the subjects of this study. The subjects are all enrolled in anatomy class during the school years 2015-2017. The ages of the subjects ranges from 18 to 25 years, and with an average age of 20.48 years.

Cadaveric study

In anatomy class, each group of medical students handling a cadaver for dissection is given a form to fill up on the presence or absence of certain muscles. They are then instructed to call a teaching staff when they are to dissect the anterior part of the forearm to monitor proper identification of the muscles in the forearm. That particular teaching staff will then confirm the group's findings regarding the presence or absence of palmaris longus muscle by signing the form. The students' finding that has been confirmed by a teaching staff will undergo a final review by the lead researcher.

Cadaver profile: A total of 87 Japanese cadavers dissected during anatomy classes covering the school years 2015-2017 were included in the study. Fifty one were male cadavers and 36 were females. The average age at the time of death is 78, with ages ranging from 48 to 99 years.

Results

Palmaris longus muscle among medical students

Self-identification by the students showed that 321 out of the 337 students have the bilateral palmaris longus muscle, 9 with right-sided muscle and 3 of them with left-sided muscle. Four students showed bilateral absence (agenesis) of the muscle (see Table 1). Of the 674 arms examined, 654 (97%) were shown to have the palmaris longus muscle.

Table 1: Prevalence of palmaris longus among students (*n*=337).

	Bilateral [R(+)/L(+)]	Right-sided [R(+)/L(–)]	Left-sided [R(–)/L(+)]	Bilateral absence [R(–)/L(–)]
Males	191 (95.0%)	6 (3.0%)	1 (0.5%)	3 (1.5%)
Females	130 (95.6%)	3 (2.2%)	2 (1.5%)	1 (0.7%)
Total	**321 (95.3%)**	**9 (2.7%)**	**3 (0.9%)**	**4 (1.2%)**

Table 2: Identification (ID) rates for each of the eight methods shown in figure 1 in 654 arms with palmaris longus muscle.

Methods	M1	M2	M3	M4	M5	M6	M7	M8
% ID	**95.13**	**92.92**	**88.5**	**93.36**	**91.15**	**96.9**	**62.39**	**81.86**

Table 3: Prevalence of palmaris longus in cadavers (n=87).

	Bilateral [R(+)/L(+)]	Right-sided [R(+)/L(–)]	Left-sided [R(–)/L(+)]	Bilateral absence [R(–)/L(–)]
Males	49 (96.1%)	1 (2.0%)	0	1 (2.0%)
Females	33 (91.7%)	2 (5.6%)	1 (2.8%)	0
Total	**82 (94.3%)**	**3 (3.4%)**	**1 (1.1%)**	**1 (1.1%)**

Of the methods used to clinically examine the arms, M6 showed the highest identification rate of 96.90% while M7 showed the least, 62.39% (see Table 2).

Cadaveric study: Of the 87 cadavers dissected, 82 (94%) have identifiable palmaris longus muscles in both arms, 3 right-sided, 1 left-sided, and 1 with bilateral agenesis (see Table 3). Of the 174 arms dissected, 168 (97%) were shown to have palmaris longus muscle.

Discussion

In comparison, the prevalence of the palmaris longus muscle both in self-identification of the arms of students and in cadaveric study is similar, at 97%. This finding is consistent with previous studies [2,15] showing that the palmaris longus muscle may be absent in 3-4.2% of the Japanese population.

Using chi-square analysis, we compared the prevalence rates among that of the students and that of the cadaveric studies and showed that there's no significant difference between the two groups (x^2, 0.1467; p, 0.7 >> 0.05). This suggests that the methods used to clinically determine the presence of palmaris longus in this study can be reliable.

Of the eight methods used, methods M1 and M6 are able to identify above 95% of cases, while M3, M7 and M8 are the less reliable ones (see Table 2). However, because not one of the methods was able to identify 100% the presence of palmaris longus, combination of these methods might still be useful in getting a better chance of correctly identifying the presence of this muscle.

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