

THE RELATIONSHIP BETWEEN THE PALMARIS LONGUS AND PLANTARIS MUSCLES EMPLOYED AS FLAPS IN RECONSTRUCTIVE SURGERY

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Introduction

White¹ reported that the plantaris (P) muscle should be present in about half of those who do not have the palmaris longus (PL) muscle. He further stated that the absence of the PL appears to be related with the absence of the P muscle.

It is reported that the bilateral absence of both muscles were only found in 1.4% of the time². Vanderhooft³ reported that if both the PL muscles were absent, one or both of the P muscles were present in 11% of the cadavers. If both the P muscles were absent, one or both of the PL muscles were present in 11.3%³. The literature stated that there is no significant relationship between the absence of the PL and P muscles^{2,3}.

The selection of a tendon graft can be based on tendon size, width, or length all according to the surgeon's needs⁴, although tendons with a width of less than 2 mm are unsuitable for grafting⁵. However, nothing is said for the ideal tendon length. Carlson and co-workers⁶ stated that the length of the P tendon is twice as long as the PL tendon.

Although the frequency, structure and function of these muscles have been well described in the literature, little attention has been given to the description of the simultaneous occurrence of the PL and P muscles. The PL and P muscles remain the key choices for tendon harvest. If length of the tendon is favoured, P muscle is used, and the PL muscle is preferred when width is important⁴.

Aim

1. To determine if the absence of PL correlates with an absence of P, in the same individual.
2. To compare the macroscopic structures of PL and P in a South African population and to compare the data found to that reported in the literature.

Materials and Methods

The muscles were dissected out along their entire course in a sample of 151 cadavers (105 male and 46 female, aged between 19 and 99 years-of-age), from the Departments of Anatomy at the University of Pretoria and the University of Limpopo (MEDUNSA Campus).

The prevalence of the PL and P muscles was documented for each cadaver. A McNemar-test for symmetry was used to determine whether the presence or absence of the PL muscle will predict the presence or absence of P in the same individual (see Figures 1 and 2).

Figure 1: The palmaris longus muscle, dissected

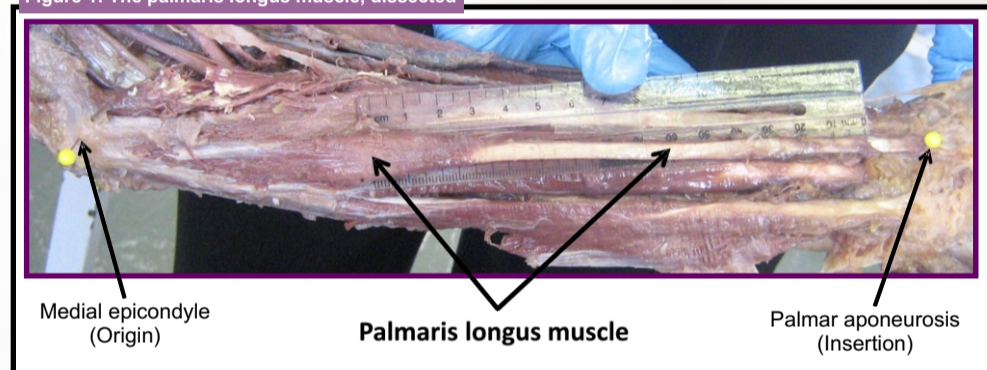
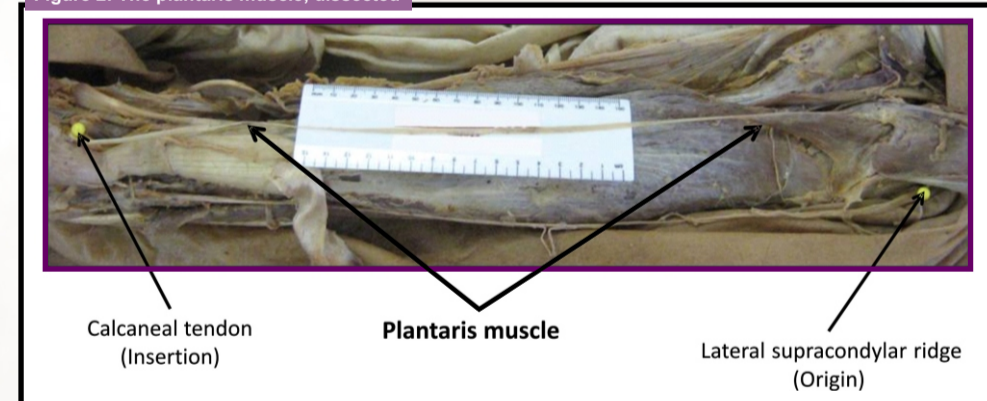


Figure 2: The plantaris muscle, dissected



The length and width of these tendons as well as that of the fleshy belly of the muscles were measured. The demographic information for each cadaver was also recorded (See Figures 3 and 4).

Figure 3: Measurements taken for the palmaris longus muscle: (A) length of the belly, (B) length of the tendon, (C) width of the belly and (D) width of the tendon

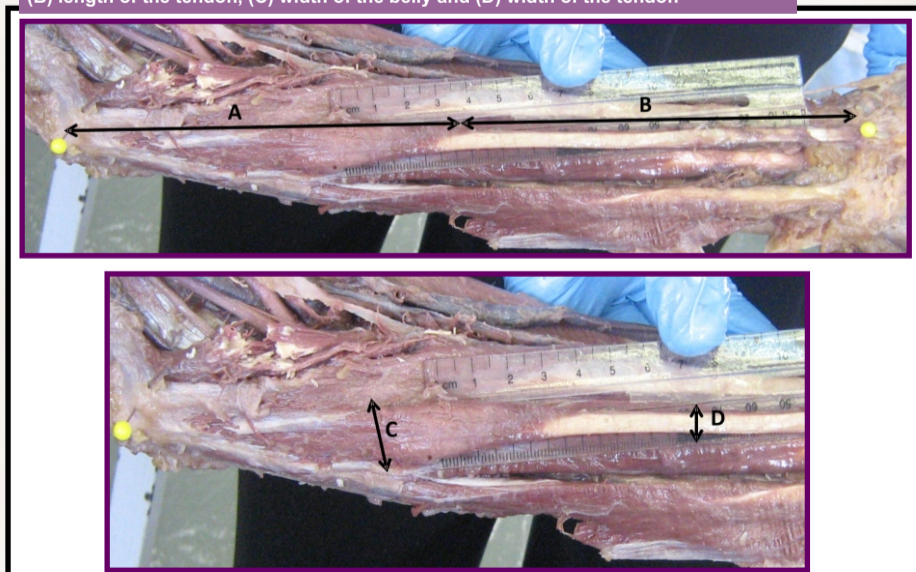
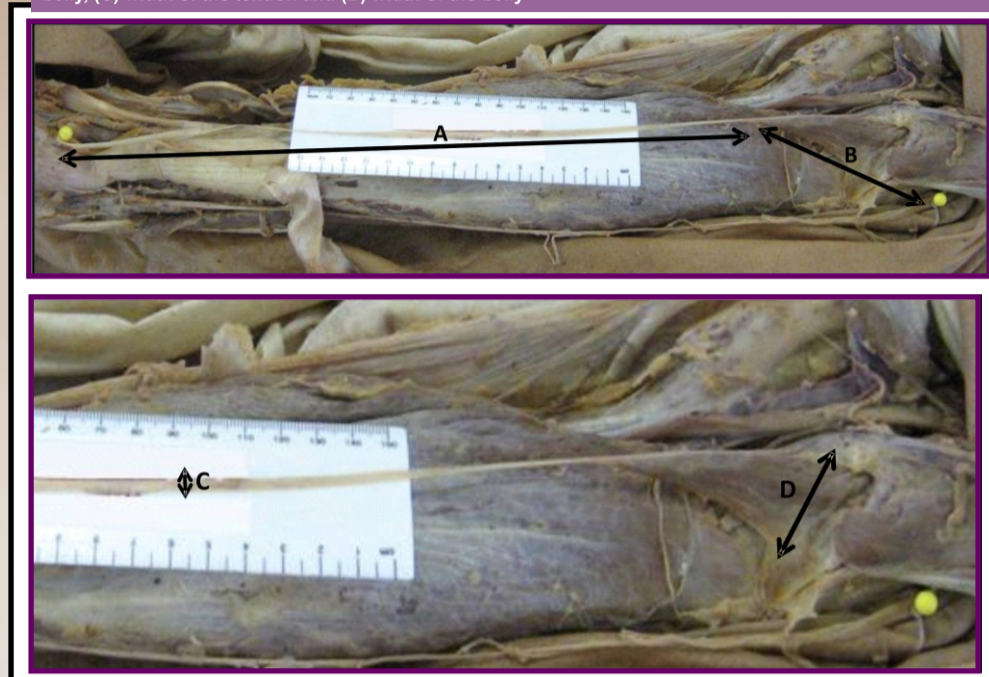


Figure 4: Measurements taken for the plantaris muscle: (A) length of the tendon, (B) length of the belly, (C) width of the tendon and (D) width of the belly



Results

Table 1: A comparison in the prevalence of the palmaris longus and plantaris muscles

	Palmaris longus		Plantaris	
	n	%	n	%
Bilateral presence	124	82.12	129	85.43
Bilateral absence	16	10.60	13	8.61
Absent left	9	5.96	5	3.31
Absent right	2	1.32	4	2.65

Table 2: Simultaneous occurrence of the palmaris longus (PL) and plantaris (P) muscles, on the left and right side respectively

PL (left)	P (left)		Total PL	PL (right)	P (right)		Total PL
	Absent	Present			Absent	Present	
absent	3	22	25	absent	1	17	18
present	15	111	126	present	16	117	133
Total P	18	133	151	Total P	17	134	151

Table 3: A comparison in the morphology of the palmaris longus and plantaris muscles (measurements taken in mm)

	Palmaris longus		Plantaris		Significant difference
	Average	Sd	Average	Sd	
Tendon length	157.08	21.04	268.20	45.56	√
Tendon width	4.94	0.93	3.88	1.29	√
Belly length	129.14	25.01	88.17	18.04	√
Belly width	12.93	3.22	15.13	5.42	√
Total length	284.52	37.20	341.04	86.65	√

Only one cadaver (a 54 year old male) in the entire sample did not have any PL or P muscles at all, while 105 had both the PL and P muscles in the left and right limbs. The McNemar-test for symmetry yielded a p-value of 0.25 for the left limbs, and a p-value of 0.72 for the right limbs. This indicates that there is no significant relationship between the simultaneous occurrence of the PL and P muscle in any given individual of this study.

Discussion and Conclusion

Vanderhooft³ reported only a 2.2% (n=4) absence of both the PL and P muscles, while the present study found an absence of 0.66% (n=1). This study could not demonstrate a significant relationship in either the simultaneous presence or absence of the palmaris longus and plantaris muscles in the same individual.

Wehbé⁴ suggested that one should consider that a difference between a 2 and 3mm wide tendon, could have a significant influence in the strength of the tendon. The results of this study suggest that the PL tendons would be of ideal width and strength for use as grafts in reconstructive surgery. However, the tendons of the P muscle are preferable when a longer tendon is required.

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