Extensor Medii Proprius: A Cadaveric Case Study

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ABSTRACT

During routine dissection of 11 cadavers that originated with the Body Donor Program at PCOM Georgia, a 69-year-old male with bilateral extensor anomalies in the dorsal forearm compartment was encountered. The distinct muscle belly, identified as the extensor medii proprius (EMP), originated from the distal ulna and inserted near the dorsal aponeurosis of the third digit. Manual traction of the right EMP tendon resulted in extension of the third digit, suggesting functional significance of the anomalous muscle. This case study analyzes the EMP found during dissection, its prevalence, embryologic origins, and clinical significance. The presence of the EMP muscle and tendon must be considered when assessing pain in the dorsum of the hand and when preparing for surgical repair or tendon transfer.

INTRODUCTION

The extensor medii proprius (EMP) muscle is an anomalous muscle that is analogous to the extensor indicis proprius (EIP) given its adjacent origin but differing insertion.[1] It is identified as having a muscle belly separable from the EIP and an insertion into the 3rd digit.[1,3] A meta-analytic review of 22 studies with a combined sample size of 3,984 extremities reported the true prevalence of the EMP tendon as 3.7%.[5] The phylogeny and embryological origins of the EMP can be useful in understanding its presence and function.[4] The EMP can be considered a possible source for tendon graft.[6] This case study analyzes the EMP found during dissection, its prevalence, embryologic origins, and clinical significance.

CASE REPORT

During the routine dissection of a 69-year-old male cadaver, the anomalous EMP muscle was identified in the dorsal forearm compartment of the bilateral upper extremities. The origin of the EMP remained constant between extremities but varied by insertion site. The EMP of the right upper extremity inserted into the dorsal aponeurosis of the 3rd digit and induced extension of the 3rd digit at the metacarpophalangeal (MCP) joint upon manual traction of the tendon. The EMP of the left upper extremity inserted into the deep fascia proximal to the MCP joint and did not produce extension of the 3rd digit upon manual traction of the tendon. The tendon of the left EMP muscle was markedly thinner compared to its contralateral counterpart. In addition, a total of 21 upper extremities from 11 different cadavers were examined for the presence of the EMP. The EMP was present in two upper extremities of a single cadaver. The true prevalence of this study was calculated as the number of extremities with an EMP tendon present compared to the total number of extremities available. The true prevalence of the EMP present in this study was calculated to be 9.52%.

$$True\ Prevalence = \frac{n_{extremities\ with\ EMP\ present}}{n_{total\ extremities\ studied}}$$

CASE REPORT CONT.

EMP Muscle & Tendon Dimensions		
	Left upper extremity	**Right upper extremity**
Tendon width (mm)	0.11 (proximally) to 0.80 (distally)	0.30
Tendon length (mm)	10.20	10.40
Muscle body length (mm)	6.00	4.10
Muscle body width (mm)	0.80	1.70

Table 1 – Upper Extremity Dimensions of the EMP Muscles & Tendons

Measurements of the EMP in the left and right upper extremities were taken including tendon width, tendon length, muscle body length and muscle body width of the EMP in the left and right upper extremities. The tendon length was measured from the insertion site to the myotendinous junction. The muscle body length was measured from the myotendinous junction to the closest point of origin. The muscle body width was measured at the widest point. Measurements were taken with a standard ruler.

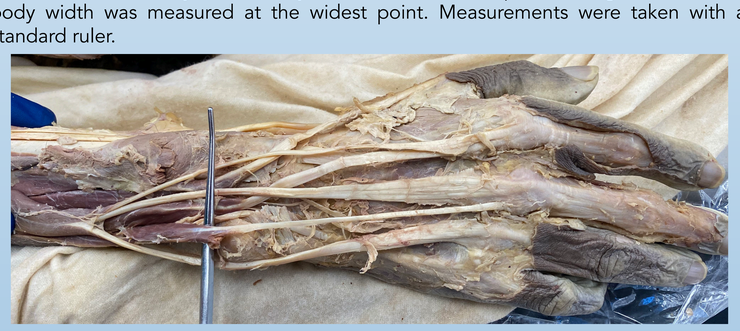

Figure 1 – Cadaveric Image of EMP on the right upper extremity

The EMP, identified by the dissecting probe, originates from the distal ulna and interosseous membrane, distal to the EIP. The EMP tendon inserts into the dorsal aponeurosis of the 3rd digit. Manual traction induced extension of the 3rd digit at the metacarpophalangeal (MCP) joint.

Figure 2 - Cadaveric Image of EMP on the left upper extremity

The EMP, identified by the dissecting probe, originates from the distal ulna and interosseous membrane, distal to the EIP. The EMP inserted into the deep fascia proximal to the MCP joint. Manual traction did not induce extension of the 3rd digit at the MCP joint. The tendon was markedly thinner at the myotendinous junction compared to the EMP tendon of the right extremity.

DISCUSSION

Variations in insertion sites of the EMP have been reported in literature including,

- Insertion into the dorsal aponeurosis of the third finger located palmar and ulnar to the insertion of the EDC tendon of the third finger.[1] This is the most commonly seen variation[1] and is present in the subject of this case study.
- Insertion into the deep fascia proximal to the MCP located radial to the EDC tendon[1]
- Insertion into the intertendinous fascia proximal to the MCP and directly palmar to the EDC tendon[2]

The variability of the insertion site suggests a variability in function of the EMP.[1,2] Depending on its insertion, the EMP can contribute to extension of the 3rd digit at the MCP joint or extension of the 3rd metacarpal at the wrist. The variance in insertion sites between extremities of a single individual, as observed in this study, appears previously unreported in literature.

The EMP can be used in tendon reconstruction to restore abduction of the thumb or extension in the fingers.[6] The 2nd and 5th digits are more likely sources of extra slips/tendons for tendon transfer in surgery as they are more frequently present compared to the EMP.[6] The presence of the EMP rarely causes clinical symptoms due to its narrow width.[3]

The extensor muscles of the forearm differentiate into three distinct layers during early embryologic growth including the radial, superficial and deep layers.[4] Comparative studies suggest that the deep portion appears to be highly unstable and undergoes considerable evolutionary change.[4] It has been suggested that the EMP became redundant and therefore was lost.[1,4] The proximal migration of the distal muscle group, consisting of the deep extensor muscles (EIP, EMP), and the distal migration of the proximal muscle group, consisting of the superficial extensor muscles, resulted in an overlap of the function of the two muscle groups.[4]

CONCLUSION

- The reported prevalence of the EMP ranges from 0-22.2% with meta-analysis showing a true prevalence of 3.7%.[5] The true prevalence of this study is 9.52%.
- Structure is related to function as can be observed through the varying insertion sites of the EMP muscle.
- The EMP has been considered an evolutionary remnant that served a redundant function[1]
- Knowledge of the EMP tendon can influence alternative surgical approaches.

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