Institute of Experimental Morphology, Pathology and Anthropology with Museum
Bulgarian Anatomical Society

Acta Morphologica et Anthropologica, 32 (3-4)
Sofia ● 2025

A rare case of extensor medii proprius: anatomical and clinical considerations

Stancho Stanchev, Alexandar Iliev, Lyubomir Gaydarski, Nikola Stamenov, Boycho Landzhov*

Department of Anatomy, Histology, and Embryology, Medical University of Sofia, Bulgaria.

*Corresponding author e-mail: stanchev_1989@abv.bg

Anatomical variations of the extensor indicis muscle (EIM) are of particular clinical relevance due to their potential to mimic pathological conditions and their use in tendon grafting. Among these, the extensor medii proprius muscle (EMP) represents a rare accessory muscle in the posterior compartment of the forearm.

Herein, we report a case of an aberrant EMP identified during routine anatomical dissection with origin from the distal portion of the EIM. The variant muscle was supplied by the posterior interosseous artery and nerve, with no additional anomalies detected.

The described EMP demonstrates an atypical origin from the EIM, differing from the commonly reported origin from the distal ulna. This variation highlights the morphological diversity of forearm extensors and supports theories regarding evolutionary and embryological influences on muscle development. Clinically, such variants are important for differential diagnosis of soft-tissue masses, sources of dorsal wrist pain, and surgical planning.

Key words: Variation, Extensor indicis muscle, Extensor medii proprius muscle

Introduction

The classic anatomical description of the forearm muscles suggests the presence of three well-defined compartments – anterior, lateral and posterior. The posterior forearm muscles are further divided into superficial and deep groups [4]. The extensor indicis muscle (EIM) belongs to the deep group. It has a synergic function with the extensor digitorum muscle (ED), providing independent extension of the second finger at the metacarpophalangeal and proximal interphalangial joints, thus contributing to the extension of the hand at the wrist as well [5]. It is innervated by the posterior interosseous nerve and blood supplied mainly by the branches of the posterior interosseous artery [4].

EIM has an important clinical significance as it is commonly used for tendon grafting and transplantations [14, 20]. Review of the literature indicates numerous variations of EIM, including unusual origin and insertion, absence of EIM, presence of additional tendons or supernumerary muscle slips [1, 7, 8, 9, 13, 18]. Moreover, these variations are of great interest to clinicians as they must be discussed in the context of the differential diagnosis of various pathological conditions. For instance, the abnormal anatomy of EIM may provoke dorsal wrist pain and may be incorrectly considered as soft tissue hand mass, synovial cyst, ganglion or tenosynovitis [6, 10, 16]. In addition, the presence of additional tendons passing through the fourth osseofibrous canal may be associated with clinical symptoms [12].

The present case report aimed to describe an aberrant extensor medii proprius muscle (EMP) with origin from EIM – a rare variation with focus on its possible origin.

Case report

During a routine anatomical dissection of the right upper limb of a 75-year-old Caucasian male cadaver, preserved with a 10% formalin-based solution, an abnormal, well-defined muscle bundle was identified in the posterior compartment of the forearm. The specimen originated from autopsy material provided to the Department of Anatomy, Histology and Embryology, Medical University of Sofia, Bulgaria. The dissection was conducted with the approval of the Medical Legal Office and the Local Ethics Committee.

Following the removal of superficial structures and the antebrachial fascia, an additional muscle belly was observed along the ulnar aspect of the tendon of the ED to the fourth finger. This accessory muscle originated from the distal portion of the EIM. It presented as a slightly flattened, fusiform bundle measuring 26 mm in length and 4 mm in width.

Its tendon arose lateral to the ED tendon of the fourth finger but quickly crossed beneath it. Distally, the accessory muscle continued as a thin, band-shaped tendon measuring 126 mm in length. This tendon coursed parallel to those of the EIM and ED, traversed the fourth extensor compartment, and ultimately inserted into the dorsal aspect of the third metacarpophalangeal joint (**Fig. 1**).

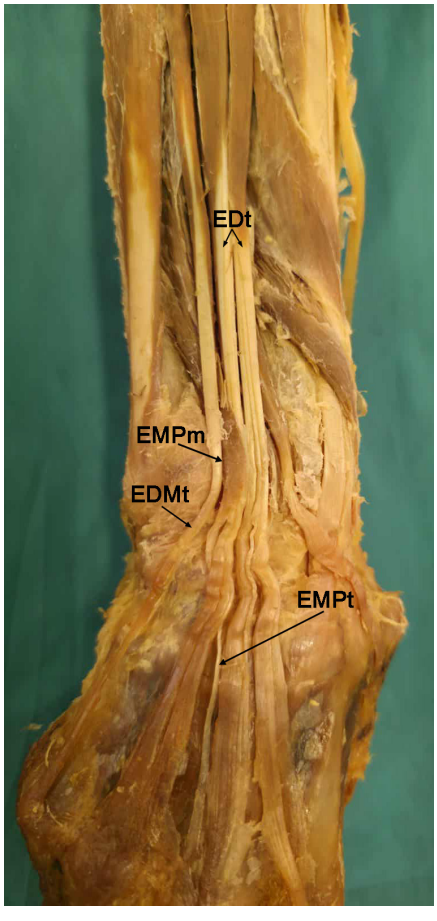

Fig. 1. Photograph of the right upper limb: EDt – extensor digitorum tendon; EDMt – extensor digiti minimi tendon; EMPm – extensor medii proprius muscle; EMPt – extensor medii proprius tendon.

The muscle bundle received vascular supply from branches of the posterior interosseous artery and innervation from the posterior interosseous nerve. No additional muscular variations, traumatic changes, or evidence of prior surgical interventions were noted in the posterior forearm region.

Discussion

The additional muscle belly described in the present case shows morphological similarity to the EMP, a rare variant muscle in the posterior forearm compartment. Indeed, our report suggests an unusual origin of EMP as well-defined muscle bundle from the distal portion of EIM, opposing the described origin of EMP from the distal third of the ulna in the literature. The scientific data indicate its incidence ranges between 0.8% and 10.4% in anatomical examinations [3, 17]. The presence of EMP differs among the population in the continents, but it is relatively low in the European population, thus suggesting a potential role of various factors, including race [18]. Komiyama et al. [11] have classified the variations of the EIM found in Japanese cadavers based on the presence of additional tendon slips and supernumerary muscles. The authors described and extensor indicis radialis as the most frequently observed variant without sex differences or prevalence between right and left upper limbs. According to our data, this is the second time we report the presence of EMP with such an atypical origin from EIP [14]. Yurasakpong et al. [19] have described a unique case of unilateral presence of extensor indicis radialis and EMP. EMP was associated with an unusual fibromuscular slip innervated by the posterior interosseous nerve. Further, the histological examination of the slip revealed it was composed of dense connective tissue and skeletal muscle fibres. The authors claimed this was the first time to describe the presence of a fibromuscular slip associated with the extensor tendon on the dorsal hand region.

The presence of EMP may be under the influence of phylogenetic and evolutionary mechanisms. EMP is described as part of the extensor compartment in primates belonging to the family Cercopithecidae. In contrast, its incidence in species from the family Hominidae is variable, as in the human population [2]. The embryonic development of the forearm muscles is associated with the migration of dorsolateral somite cells to the upper limb around the fourth week. Further, the extensor forearm muscles differentiate into three portions – the radial portion gives rise to the muscle of the mobile wad. Furthermore, the radial portion differentiates into a superficial portion, which forms the extensor digitorum communis, the extensor carpi ulnaris, and the extensor digiti minimi and a deep portion representing abductor pollicis longus and extensor pollicis brevis as well as extensor pollicis longus and EIM [15]. It seems the muscles originating from the superficial portion are dominant and show prominent stability in comparative anatomy studies, while those from the deep group are significantly variable [15].

The existence of variant muscles may not result in symptoms, but they have important clinical significance as they can be used as a donor for tendon grafting and transplantation. Moreover, the presence of accessory muscles may be associated with surgical complications or misdiagnoses of soft-tissue tumours [16, 20].

Conclusion

The present case report suggests an atypical origin of the EMP from the distal portion of the EIM. EMP is a relatively rarely observed muscle in the European population, and we discuss a possible link between its incidence and the potential role of phylogenetic, evolutionary and embryonic factors. Moreover, the described atypical EMP may be an interest to clinicians to avoid misdiagnoses and complications during surgical interventions in the posterior forearm region. Alternatively, the additional muscle can be used for tendon grafting and transplantation.

R e f e r e n c e

1 . Arathala, R., P. K. Sankaran, G. Ragunath, S. S. Harsha, T. S. Sugumar. The extensor indicis brevis – a rare variation and its significance. – J. *Clin. Diagn. Res*., **10**, 2016, AD03-AD04.

2. Ayer, A. A. The anatomy of semnopithecus entellus. – *Indian Publishing House*, 1948, 60-72.

3. Cauldwell, E. W., B. J. Anson, R. R. Wright. The extensor indicis proprius muscle: a study of 263 consequetive specimens. – *Q. Bull. Northwest. Univ. Med. School*, **17**, 1943, 267-279.

4. Chaudhry, M. A., A. M. Hafeez, M. A. Sinkler, A. Arian. Anatomy, shoulder and upper limb, forearm compartments. – In: *StatPearls*, Treasure Island (FL), StatPearls Publishing, 2025.

5. Doyle, J., M. J. Botte. Surgical anatomy of the hand and upper extremity. – Philadelphia, Lippincott Williams & Wilkins, 2003, 134-135, 141-142, 221.

6. Fernandez Vazquez, J. M., R. L. Linscheid. Anomalous extensor muscles simulating dorsal wrist ganglion. – *Clin. Orthop. Relat. Res*., **83**, 1972, 84-86.

7. Georgiev, G. P. Anatomical variations of muscles in the human body and their relevance for clinical practice. – *Int. J. Anat. Var.,* **11**, 2018, 48-49.

8. Georgiev, G. P. Significance of anatomical variations for clinical practice. – *Int. J. Anat. Var.*, **10**, 2017, 43-44.

9. Georgiev, G. P., R. S. Tubbs, A. Iliev, G. Kotov, B. Landzhov. Extensor indicis proprius muscle and its variants together with the extensor digitorum brevis manus muscle: a common classification. Clinical significance in hand and reconstructive surgery. – Surg. Radiol. Anat., **40**, 2018, 271-280.

10. Iliev, A., G. P. Georgiev, I. N. Dimitrova, B. Landzhov. Extensor indicis brevis muscle: anatomical and clinical considerations. – Acta Morphol. Anthropol., **22**, 2015, 75-78.

11. Komiyama, M., T. M. Nwe, N. Toyota, Y. Shimada. Variations of the extensor indicis muscle and tendon. – *J. Hand Surg. Br.*, **24**, 1999, 575-578.

12. Kumka, M. A variant extensor indicis muscle and the branching pattern of the deep radial nerve could explain hand functionality and clinical symptoms in the living patient. – *J. Can. Chiropr. Assoc.*, **59**, 2015, 64-71.

13. Ma, A., J. Kim, C. E. Miller, T. L. Mustapich, J. P. Abraham, S. A. Downie, P. L. Mishall. Pointing in a different direction: a case of bilateral absence of extensor indicis. – *Folia Morphol*. (Warsz)., **81**, 2022, 520-525.

14. Slavchev, S. A., G. P. Georgiev. Ultrasound diagnosis of a ganglionic cyst within an extensor digitorum brevis manus muscle. – *Chir. Main*, **34**, 2015, 269-271

15. Tan, S. T., P. J. Smith. Anomalous extensor muscles of the hand: a review. – *J. Hand Surg.*, **24**, 1999, 449-455.

16. **Vanhoenacker, F. M., M. Eyselbergs, E. Van Hul, P. Van Dyck, A. M. De Schepper.** Pseudotumoural soft tissue lesions of the hand and wrist: a pictorial review. – *Insights Imaging*, **2**, 2011, 319-333.
17. **Von Schroeder, H. P., M. J. Botte.** The extensor medii proprius and anomalous extensor tendons to the long finger. – *J. Hand Surg. Am*., **16**, 1991, 1141-1145.
18. **Yammine, K.** The prevalence of the extensor indicis tendon and its variants: a systematic review and meta-analysis. – *Surg. Radiol. Anat*., **37**, 2015, 247-254
19. **Yurasakpong, L., R. Diogo, A. Chaiyamoon, A. Suwannakhan.** Extensor indicis radialis and extensor medii proprius associated with an unknown fibromuscular slip: a case report. – *SN Compr. Clin. Med*., **2**, 2020, 2456-2459
20. **Zhou, J., C. Frey, N. Segovia, J. Yao.** Anatomic relationship of extensor indicis propius and extensor digitorum communis: implications for tendon transfer. – *World J. Orthop*., **13**, 2022, 978-985.