CASE REPORT

RJME
Romanian Journal of Morphology & Embryology
http://www.rjme.ro/

Bilateral extensor medii proprius with split tendon of extensor indicis proprius, a rare anatomical variant

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Abstract

The extensor medii proprius (EMP) is anomalous extensor muscle of the hand. During the routine dissection of a 78-year-old Chinese male cadaver, bilateral EMP and extensor indicis proprius (EIP) were observed in the upper limbs. The EMP originated from the distal third of the ulna and its tendon was inserted into the dorsal aponeurosis of the middle finger on both hands. The tendon of EIP was split into two slips on the dorsum of hand and inserted to the radial and ulnar side of the extensor digitorium communis (EDC)-index, respectively. Awareness of such anatomical variations in the extensor compartment of the forearm could help in the identification and repair of these structures.

Keywords: extensor medii proprius, extensor indicis proprius, variant, clinical significance.

Introduction

Variations of the extensor tendons of the hand are not uncommon [1]. EMP is one of the examples of those variants [2, 3]. The EMP is an anomalous muscle originating from the dorsal compartment of the forearm and inserting into the dorsal aponeurosis of the third finger. It is commonly separated from the analogous extensor indicis muscle. Variation of the EIP may be discovered during cadaveric dissections, including its origin and insertion [4].

This case is a multivariation of the hand extensor muscles, the bilaterally EMP and split tendons of EIP which has not been reported previously.

Materials and Methods

The present study involved forearm dissection of a 78-year-old male cadaver in the Department of Anatomy of Jining Medical University, Shandong, China. After the removal of the skin and superficial fascia of each forearm, the extensor retinaculum was longitudinally opened to expose the extensor tendons. The EIP, EDC, EMP and all the aberrant tendons were inspected with particular attention to the number of tendons or slips inserting into the extensor hood of the fingers. The cadaver was preserved by the injection of formalin-based preservative (10% formalin) and stored at -4^{0}C. The dissection was approved by a suitable constituted Ethics Committee of the University and the study was conformed to the previous Declaration of Helsinki (1964).

Results

The EIP originated from the distal third of the ulna and extended obliquely to the radius. After passing the fourth extensor compartment and the dorsum of the carpometacarpal joint, the tendon of EIP was divided into two slips. The slips were inserted into the deep fibrous tissue of the metacarpophalangeal joint, radial and ulnar side of the EDC-index. The EIP was observed bilaterally (Figure 1).

On the left hand, the EMP was found attaching to the dorsum of the ulna, just distal to the attachment of EIP. The muscle belly was fusiform, measuring 4.7 cm in length and 4.3 mm in width at the midpoint of its length. The tendon of EMP was inserted to the dorsal aponeurosis, palmar to the tendon of EDC-middle. There were no tendinous connections between the EMP and other extensor tendons (Figure 1A).

On the right hand, the EMP took origin from dorsal surface of the lower part of the ulna, just distal to the origin of EIP and also inserted to the dorsal aponeurosis, palmar to the tendon of EDC-middle. The muscle belly was fusiform, measuring 5.1 cm in length and 4 mm in width at the midpoint (Figure 1B).

Discussion

The EIP muscle often arises from the proximal part of the distal third of the posterior surface of the ulna, media and distal to that of the extensor pollicis longus, from the corresponding area of the interosseous membrane, and from the septum between it and the extensor pollicis longus. Most commonly, the EIP tendon is inserted as a single tendon and located ulnar to the EDC-index [5], but occasionally positioned to the radial side [6–8].

The EIP may have the following variations [9–13]: (1) EIP was absent; (2) EIP with a doubled tendon; (3) the muscle was doubled with a single tendon; (4) EIP had a slip from EDC; (5) EIP arose from the radius,

carpus and interosseous ligaments; (6) EIP with a doubled tendon and an accessory slip from EDC; (7) EIP was inserted into the back fascia of hand, or the posterior annular ligament; (8) A digastric indicator, whose second belly was on the back of the hand. Higher incidence of multiple EIP tendons was also revealed [6, 14, 15].

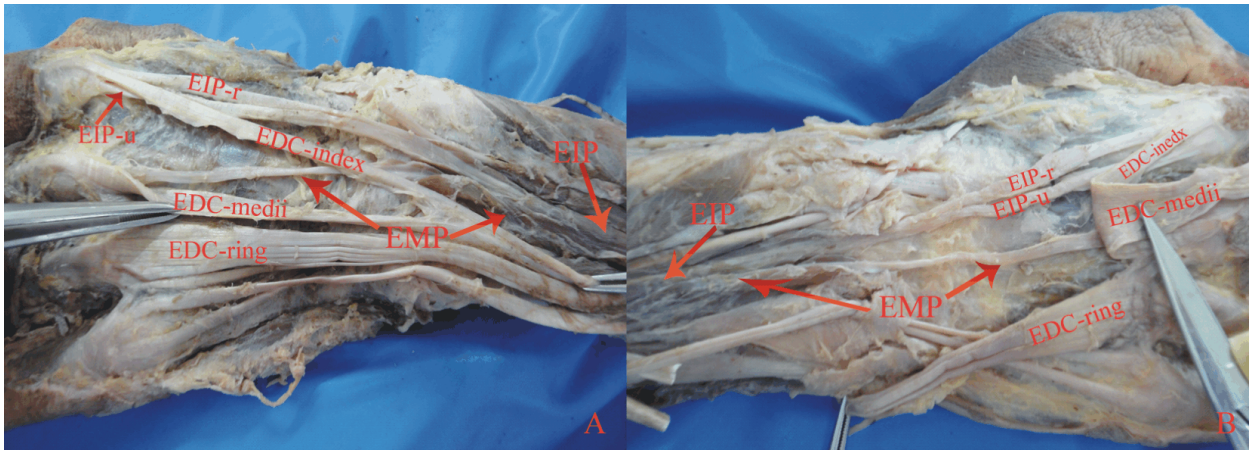

Figure 1 – ***Dissection of the dorsum of hands, showing the extensor medii proprius and extensor indicis proprius. (A)Dorsum of the left hand; (B) Dorsum of the right hand. EMP: Extensor medii proprius, EIP: Extensor indicis proprius, EDC-index: Extensor digitorum communis to index finger, EDC-medii: Extensor digitorum communis to middle finger, EDC-ring: Extensor digitorum communis to ring finger, EIP-radial: Extensor indicis proprius-radial, EIP-ulnar: Extensor indicis proprius-ulnar.***

The variant EIP of the present case was familiar to the doubled tendons inserting with the index and middle fingers described by Cauldwell EW *et al.* [16], but the tendon to index was further divided into two slips after passing the dorsum of the wrist joint, inserting into the dorsal aponeurosis, radial and ulnar side of the EDC-index respectively.

If the tendon of EIP was doubled, one of the slips would pass more commonly to the middle finger. The slip, forming an EMP, may occur as a separate muscle arising from the ulna, or the posterior ligament of the wrist joint. Therefore, the EMP was considered a differentiated portion of EIP. The variant muscle appeared to be less frequent in females compared with males [6, 17] and it has an incidence from 0.8% to 12% [6, 16, 18–20]. In the present cadaver, the EMP was a separated muscle from EIP and its single tendon was inserted to the deep fibrous tissue proximal to the metacarpophalangeal joint.

The extensor indicis et medii communis (EIMC) is an EIP muscle that splits to insert into both the index and middle fingers. It has an incidence between 2% and 6.5% [16, 20, 21]. The middle finger, in addition to the normal EDC tendon, receives an aberrant EMP or EIMC tendon with an incidence of 13.8% [21]. Recent dissections [22] discovered four cases of EMP and seven cases of EIMC respectively, an incidence of 9% and 16%. Slips from an EIP to all the index, middle, and ring fingers, or both the index finger and the thumb, have also been encountered rarely [16, 23].

The extensor digitorum brevis manus muscle (EDBM) was coined by Macalister A [24] in 1866, although it was first described by an anatomist [25] in 1734. Since the reported incidence in dissection studies was between 1% and 9% [16, 26–30]. Gama C [31] reported a 1.1% incidence in 3404 subjects clinically examined. It occurred bilaterally in approximately one third of cases [27, 32, 33] and there was no difference in the incidence between left and right hands or between genders [31, 32]. The capsule and ligament of the wrist joint [27, 29] and the carpal bones [34, 35] were most commonly reported as the site of muscle origin, while the radius and metacarpals [36] less frequently. In a careful detailed study of 559 Japanese cadaver dissections by Ogura T *et al.* [32], the EDBM was found to arise from the posterior radiocarpal ligament near the lunate and frequently as far proximal as the distal margin of the radius, but without direct attachment to the carpal bone. Insertion of the EDBM was similar to that of the EIP [16]. Variation of the EDBM and EMP in one cadaver was also reported [3]. Origin and insertion of the EMP of this case were quite different when compared with EDBM.

Other studies described the variation of extensor pollicis et indicis [37–39]. Nayar R and McArthur P [40] reported a tendon lay between the extensor indicis proprius and the extensor pollicis longus tendons and inserted into the dorsal surface of the base of the proximal phalanx of the thumb, creating a “Y” shape.

The bilateral occurrence of EMP and split tendons of EIP are indeed quite rare as in previous reports.

Conclusions

A good knowledge of the anatomical features of the hand region may help the patient return to his active life in a short time and lead a quality life. Understanding the numerous anatomical variations in the extensor compartment of the forearm might aid with surgical planning.

Acknowledgments

The project was subsidized by the Youth Scientific Research Foundation 2012, Jining Medical University.

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Received: April 5, 2013

Accepted: July 1, 2013