

Research Article

Study of morphology, phylogeny, classification and clinical relevance of extensor digitorum brevis manus

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Abstract

Introduction and objectives: Variations in structures of hand are of clinical and surgical importance. A rare variation of the extensor musculature on the dorsum of hand is extensor digitorum brevis manus (EDBM). Presence of EDBM on the dorsum of hand can be confused for many dorsal hand mass lesions. In the present cadaveric study, an attempt was made to delineate the anatomical morphology and morphometry of EDBM and evaluate its phylogenetic significance and clinical relevance.

Methodology: Study was conducted on 78 human hands in the department of anatomy. A longitudinal incision was performed on the dorsum of hand along the axis of middle finger, skin flaps were raised both on radial and ulnar side. A transverse incision was taken at metacarpophalangeal joints from second to fifth fingers.

Results: We found EDBM in two incidences. In both the cases it was extending from the distal end of radius, dorsal aspect of wrist joint and from the extensor indicis tendon. Muscle was medial to extensor indicis tendon. Insertion was into the dorsal digital expansion of middle finger. In both the cases it was classified as type III anatomical variety.

Conclusion: Appreciation of such variant muscle on the dorsum of the hand is of great significance during clinical and surgical evaluation of mass lesions on the dorsum of hand.

Keywords: Extensor digitorum brevis manus; dorsum of hand; variations

1. Introduction

During migration of myotomes into the prospective upper limb, there can be various rearrangements giving rise to deviations from perceived normal structures. Such variations are frequent and are of clinical significance. One variation in dorsum of hand is extensor digitorum brevis manus (EDBM). It's a variant of finger extensor musculature found in nearly 2 % of general population.¹ Though it's a small muscle on the dorsum of the hand, it can be easily confused for ganglion, tendon sheath cyst, tenosynovitis or exostosis or soft tissue tumor on the dorsum of hand. This structure can be distinguished from others as it is muscular.

EDBM is one of the rare anatomical variations of dorsum of hand. The first notification of such muscle on the dorsum of hand was by Albinus way back in 1734.² The term Extensor digitorum brevis manus was first used by Macalister in 1866.³ Less than 300 articles were noted in published literature worldwide in an extensive review conducted by Nakano et al.⁴ Studies from Indian subcontinent have echoed the global prevalence numbers and reinforced the need to identify such variations in order to understand the dorsal hand pathology and surgical intervention.^{5, 6, 7}

The origin of EDBM has been described by several authors as being from dorsal radiocarpal ligament, posterior aspect of distal end and from dorsal aspect of capsule of wrist joint.^{8, 9} Commonly its insertion is described as into the dorsal extensor hood of middle and ring fingers.^{8, 9} But it can extend into all fingers except thumb.¹ Based on the insertion it is named as extensor indicis brevis, extensor digiti III brevis, extensor medii brevis, extensor brevis digiti indicis vel medii, extensor medii and annularis brevis.¹ Though muscle with two bellies has been reported, it usually has a single belly. The nerve supply and blood supply of EDBM has been confirmed to be from the posterior interosseous nerve and artery.¹

Based on the insertion and relationship to extensor indicis, Ogura et al classified EDBM into three types. Type I – EDBM inserted onto the dorsal aponeurosis of index finger with absence of Extensor indicis proprius (EIP). Type II – both EIP and EDBM inserted on the index finger. This type is further subdivided into three types. In type IIa, a small extensor indicis arises from ulna and gets united with EDBM belly which inserts on index finger. In type IIb, the distal end of EDBM joins with extensor indicis. In type IIc, EDBM tendon inserts with a membranous slip to index finger along with normal insertion of extensor indicis. Type III – EIP inserted on the index finger and EDBM inserted on the long finger with or without a slip from extensor indicis.

The current study was taken up to evaluate the occurrence, morphology, classification of EDBM and to review its phylogenetic and clinical significance.

2. Methodology

In the present study, 78 human hands were dissected at Department of Anatomy, Azeezia Institute of Medical Sciences, Kollam, during the period from July 2012 to Dec 2013. A longitudinal incision was performed on the dorsum of hand along the axis of middle finger, skin flaps were raised both on radial and ulnar side. A transverse incision was taken at metacarpophalangeal joints from second to fifth fingers.

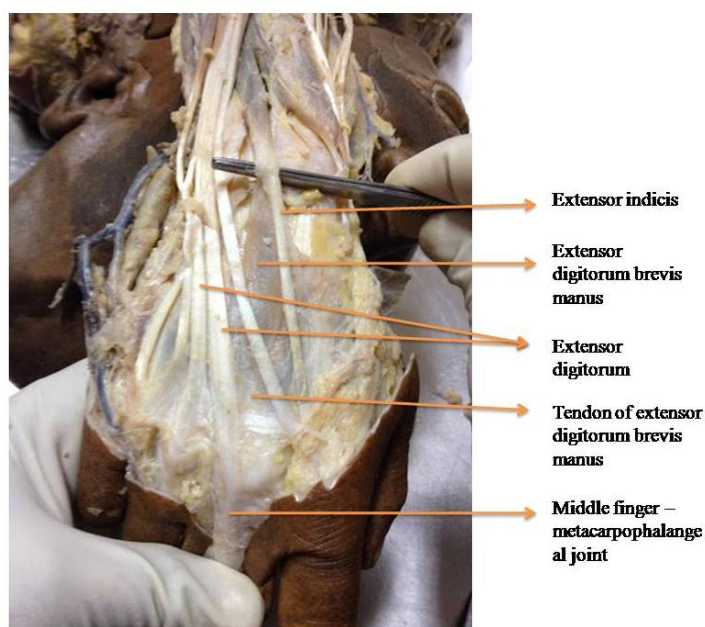
3. Results

The extensor digitorum brevis manus muscle was observed in two hands in one of the cadavers. On the dorsum of wrist and hand after exposure of extensor retinaculum, the muscle EDBM was noted in the fourth compartment and it was carefully delineated from other structures. Photographs were taken showing its proximal and distal attachments.

In both the hands, EDBM was arising from the distal end of radius and adjoining part of dorsal wrist joint capsule and from tendon of extensor indicis. The fleshy part of the muscle was on ulnar side of the extensor indicis partially covered by extensor digitorum tendon of index finger. EDBM had 4.2 cm of fleshy fibres and 2.4 cm of tendinous connective tissue fibres. The fibres were running towards base of middle finger. Progression of fleshy part to tendon was just like any other skeletal muscle. Distally the tendon of muscle was inserted into dorsal digital expansion of middle finger (figure 1). Fibres were seen progressing to the metacarpophalangeal joint. A transverse connective tissue expansion was also noted from middle finger to index finger hood.

A branch of posterior interosseous nerve traced to the fleshy fibres of EDBM. A branch entering the dorsal part of wrist capsule was also noted from posterior interosseous nerve. EDBM had 2.2 cm width at its centre. As the insertion of EDBM was to the middle finger, it belonged to type III anatomical variety. It can also be referred as extensor digiti III brevis as it is inserted to the middle finger.

Figure 1: Photograph of dorsum of right hand of a cadaver showing the extensor digitorum brevis manus extending from wrist joint to middle finger hood.



4. Discussion

The EDBM is a supernumerary, atavistic muscle of the dorsum of wrist seen in approximately 2–3% of the population, with a slight male predominance. EDBM is functionally, clinically and surgically important because the extensor digitorum brevis manus muscle may be the only muscle responsible for independent extension of the concerned digit. The extensor digitorum brevis manus muscle may mimic many surgical conditions in the dorsum of the wrist particularly cystic, neoplastic, inflammatory, and infectious masses. Soft-tissue lesions account for 70% of tumours about the wrist, and ganglion cysts account for nearly two third of soft-tissue wrist masses.¹⁰ Therefore the knowledge of anatomical variations in this region are of importance in better evaluation of dorsum of hand pathology.

Hugue Ouellette et al studied EDBM and showed that ultrasonography can be effectively used in diagnosing it.¹¹ Anderson has shown that MR imaging can clearly delineate this muscle and help clinicians to arrive at the diagnosis.¹² This muscle has been proposed as a source for tendon transfer for damaged extensor pollicis. But clinical experience is limited.¹³

There are many case reports from Indian subcontinent citing EDBM. Srinivasa Rao have noted EDBM inserting into index finger hood.¹⁴ Daksha Dixit has also reported a similar EDBM going to middle finger which is fleshy in its entire length.⁵ Paraskevas and Stith have reported EDBM with two bellies.^{15,16} The present study showed EDBM of type III anatomical variety. Anu Ranade has reported EDBM muscle getting inserted into index finger hood.⁶ Surekha has reported 4 EDBM muscles, all four getting inserted to index fingers.¹⁷

4.1 Phylogeny of EDBM

The digits are controlled solely by intrinsic muscles in amphibians. In humans, however, this muscle has disappeared in the upper limbs, its function being taken over by forearm muscles with long tendons to the digits. Most investigators believe that the EDBM is atavistic, representing parts of the old extensor brevis, a throwback to the intrinsic amphibian extensor due to failure of proximal migration of the ulnocarpal elements of the antebrachial muscle mass.¹⁸ Bunnell^{19,20} and Souter²¹ suggested that this atavistic structure, found normally in amphibia, may represent in the human a failure of proximal migration of ulno-carpal elements of the antebrachial muscle mass. It may also be an atavistic, intrinsic, metacarpal extensor. Glasgow favoured the view that the muscle represents a delamination of the extensor group as it is supplied by posterior interosseous nerve.²²

5. Conclusion

Appreciation of EDBM, a variant extensor muscle on the dorsum of the hand is of great significance during clinical and surgical evaluation of mass lesions on the dorsum of hand.

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