

A CADAVERIC STUDY OF INCIDENCE, MORPHOLOGY, PHYLOGENY AND CLASSIFICATION OF EXTENSOR DIGITORUM BREVIS MANUS

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ABSTRACT

Introduction: A rare type of variation of extensor muscles on the dorsum of hand is extensor digitorum brevis manus (EDBM). It is a small muscle rarely present on the dorsum of the hand which can be misinterpreted as a pathological mass on the dorsum of the hand.

Aim: Aim of the present cadaveric study is to observe the incidence, anatomical morphology of EDBM and to study its phylogenetic significance.

Material and Methods: Present study was conducted on 32 adult human cadaveric hands of which 24 were of male and 8 were of female cadavers.

Results: The EDBM was observed in one incidence (3.1%) of the specimens. EDBM was found to be between the tendons of extensor digitorum for index and middle fingers. It was of Anatomical variant type I.

Conclusion: The knowledge of incidence and morphology of EDBM is of greater relevance in clinical practice to rule out any pathological mass on the dorsum of the hand.

KEY WORDS: Extensor digitorum brevis manus, dorsum of hand, incidence, variations.

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INTRODUCTION

The EDBM is a rare variant muscle on the dorsum of the human hand [1]. This muscle is an anatomical variant of extensor musculature of hand and is found in approximately 2-3% of the population [2]. Incidence of occurrence of EDBM is found to be slightly higher in male group of population and is very frequently confused for dorsal hand pathology [3, 4]. EDBM is relatively a rare anomalous muscle considered as a supernumerary muscle found in the fourth

extensor compartment of the dorsum of the wrist [5-7].

Albinus was the first person to note the muscle EDBM as "Musculus extensor brevis digiti indicis vel medii" way back in 1734 [8]. However, since then many other authors have used the term "extensor digitorum brevis Manus", which was coined by Macalister in 1866 [9, 10]. Nakano et al have done extensive research by reviewing about more than 200 articles published on EDBM [11]. To understand the pathology and clinical relevance

of the dorsum of the hand, extensive studies have been conducted in Indian subcontinent and simultaneously reinforced the importance of knowledge about EDBM [12-14]].

The proximal attachment of EDBM muscle is commonly found to be on to the wrist joint capsule, the dorsal radio-carpal ligament, the distal end of radius and carpal bones and dorsal metacarpal surfaces [15, 16]. The distal attachment of EDBM is commonly to the extensor hood of the second digit, extensor hood of second and third digits and may be inserted medial to extensor digitorum tendon of index finger [17].

Ogura et al classified EDBM into three types, depending upon its insertion and relationship with extensor indicis (Table 1)[7]. The current study was conducted to observe the incidence and evaluate the morphology, classification and phylogeny of EDBM, considering the fact that it will be of help in surgeries conducted on hand.

Table 1: Classification of EDBM.

Type	Mode of attachment
I	EDBM inserted onto the dorsal digital aponeurosis of index finger with absence of extensor indicis proprius(EIP)
II	Both EIP and EDBM inserted on the index finger
IIa	A small extensor indicis arises from ulna and gets united with EDBM belly which inserts on index finger
IIb	Distal end of EDBM joins with extensor indicis
IIc	EDBM inserts with a membranous slip to the index finger with normal insertion of extensor indicis
III	EIP inserted on the index finger and EDBM inserted on the long finger with or without a slip from extensor indicis

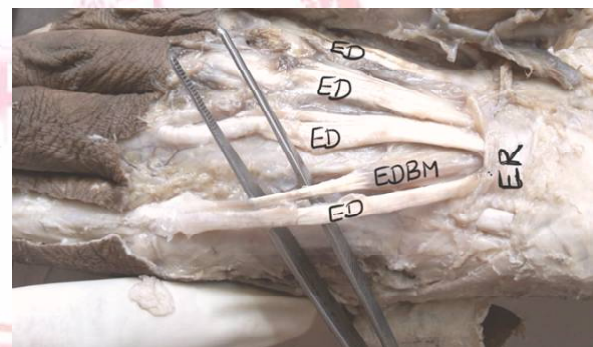
MATERIALS AND METHODS

32 upper limbs of adult cadavers of which twelve were of male cadavers and four were of female cadavers were studied. All the selected upper limb specimens for the study were devoid of any external trauma and deformities. A longitudinal incision was taken on the dorsum of the hand all the way upto the tip of the middle finger and a horizontal incision also was taken at the level of metacarpophalangeal joints and the skin was reflected both on medial and lateral sides of the hand. Specimens were dissected carefully to see the presence of EDBM muscle and its attachments.

RESULTS

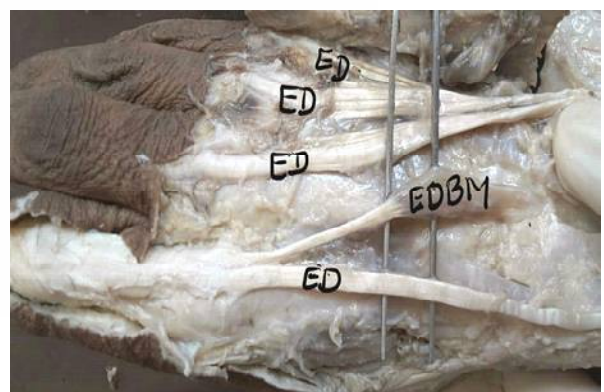
EDBM was observed in the dorsum (Fig. 1,2) of one hand out of thirty two human hands that were studied (3.1%). It was present on the dorsum of right hand of a male cadaver. After the exposure of extensor retinaculum, the muscle EDBM was found to be having a single belly and it was noted in the fourth compartment under the extensor retinaculum, later the EDBM was carefully separated from surrounding structures. Photographs were taken showing its proximal and distal attachments. The EDBM was found to be running obliquely between the extensor digitorum tendons for index and middle fingers.

Fig. 1: EDBM in the right hand, before opening the Extensor retinaculum.



EDBM- Extensor Digitorum Brevis Manus ,
ER- Extensor Retinaculum, ED- Extensor Digitorum tendons

Fig. 2: EDBM in the right hand, after opening the Extensor retinaculum.



EDBM- Extensor Digitorum Brevis Manus,
ED- Extensor Digitorum tendons

The EDBM was found to be originating proximally from the carpal bones joint capsule under the extensor retinaculum. The EDBM was found to be present between the extensor digitorum tendons for index and middle fingers. The EDBM had a fleshy belly of about 3cm long and its tendon was 3.4cm long. Distally the tendon of EDBM was found to be blending from the medial aspect with the extensor digitorum tendon for index finger over the metacarpophalangeal joint of second digit (Fig. 1, 2). A branch of posterior interosseous nerve was found to be supplying the muscle. As the EDBM was getting inserted with the extensor digitorum tendon for index finger with the absence of extensor indicis proprius muscle, it belonged to type I anatomical variant.

DISCUSSION

The extensor muscles and tendons of the forearm and hand show great variability. In the categorical classification of supernumerary and atavistic muscles of the hand, EDBM is one such muscle occurring approximately in 2-3% of population with a slight male preponderance. The EDBM has also been called the "Musculus extensor anomalous" and "Le muscle manieux" [18]. Hence the knowledge of these muscles and tendons in this region has a great clinical relevance in better evaluation of pathology in the hand [19, 20]. Ultrasonography can be effective in diagnosing EDBM was studied by Hugue Ouellette et al [21]. MR imaging can be used to locate EDBM clearly and will be helpful for the clinicians for precise diagnosis [22]. Patel et al studied and proposed the EDBM muscle as a source for tendon transfer in case of damaged extensor pollicis muscle, but its application in clinical practice is limited [23,24]. In the present study the incidence of EDBM was almost the same in comparison to the previous reports of other authors (Table 2).

Table 2: Incidence of EDBM found during dissection by other authors.

Authors	Percentage
Ogura et al.(1987) [7]	3.8% (11/286)
McGregor et al.(1926) [31]	3% (3/100)
Wagenseil et al. (1937) [32]	2.7% (2/75)
Moriya et al. (1956) [33]	2.4% (2/82)
Ranade et al.(2008) [34]	4.2% (4/72)
Present study	3.1% (1/32)

Many case reports have been published in Indian subcontinent showing EDBM. Srinivasa Rao has mentioned EDBM to be inserting into the index fingerhood [25]. Lydia S et al have reported double-bellied EDBM fusing to form a single tendon and getting inserted on to the ulnar side of the dorsal digital expansion of the middle finger [26]. Stith also reported EDBM with two bellies [27]. The present study showed EDBM of type I anatomical variant (Table 2).

Phylogeny of EDBM: In the amphibians the digits are normally controlled by intrinsic muscles because of the presence of ulnocarpal elements of the antebrachial muscle mass [28, 29, 30, 31]. In humans, however, the EDBM may represent a failure of proximal migration of the ulnocarpal elements of the antebrachial muscle mass [28]. The EDBM represents a delaminated muscle of the extensor group as it is supplied by posterior interosseous nerve [15].

CONCLUSION

Even though the occurrence of EDBM may be asymptomatic, it is still essential to have a precise anatomical knowledge of possible variations of extensor tendons in the hand as it will be helpful to prevent diagnostic errors and influence surgical and interventional procedures.

Conflicts of Interests: None

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