Incidence of Extensor Digitorum Brevis Manus Muscle

Anu V. Ranade · Rajalakshmi Rai · Latha V. Prabhu ·
V. Rajanigandha · Prakash · Jiji P. Janardhanan ·
Lakshmi Ramanathan · M. D. Prameela

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Abstract The extensor digitorum brevis manus, a supernumerary muscle in the fourth extensor compartment of the dorsum of the wrist, is a relatively rare anomalous muscle. Extensor digitorum brevis should be included in the differential diagnosis of soft tissue masses on the dorsal aspect of the hand as it may mimic cystic, neoplastic, inflammatory, and infectious masses arising in the dorsum of the wrist. Seventy-two upper limbs of male and female cadavers were dissected and examined to study the pattern of extensor tendons of the index finger. In the present study, we observed three cases (4.2%) of the extensor digitorum brevis manus on the left side. In one cadaver (0.72%), there was an additional tendon arising from the extensor indices which was inserted to the radial side of the dorsal digital expansion of the index finger. The extensor digitorum brevis manus muscle (EDBM), an anatomic variant of the extensor muscle of the dorsum of the hand, is found in approximately 2% to 3% of the population. This variation is, therefore, clinically and surgically relevant because the EDBM may be the only muscle responsible for the independent extension of the second digit. The aim of the present

study is to report the incidences of this muscle thereby creating awareness of its existence and of its characteristic appearance to surgeons.

Keywords Supernumerary muscle · Accessory muscle · Variation · Anomalous muscle · Aberrant finger extensor

Introduction

The extensor digitorum brevis manus muscle (EDBM) is an aberrant finger extensor occurring on the dorsum of the hand [19]. This muscle, being an anatomic variant of the finger extensor musculature, is found in approximately 2% to 3% of the population with a slight male predominance and is easily mistaken for other dorsal hand pathology [16, 17, 19]. Although usually asymptomatic, the patient may present with a painful dorsal wrist mass, particularly in individuals performing repetitive movements of the wrist and hand [7]. The origin of EDBM has been described as being at the distal end of the radius, the dorsal radiocarpal ligament, or the wrist joint capsule [6, 16]. Its insertion has been described as being in the extensor hood of the index, middle, ring, or little finger, although multiple insertions into more than one finger has been reported [6, 16]. The most common insertion is said to be into the index finger, followed by the middle, and then the index and middle fingers [17]. The nerve supply and blood supply of EDBM has been confirmed to be from the posterior interosseous nerve and artery [17]. During clinical examination, the EDBM may be confused with abnormal processes such as ganglion, cysts, or soft tissue tumors thereby mimicking numerous abnormal entities which when misdiagnosed may

A. V. Ranade (✉) · R. Rai · L. V. Prabhu · V. Rajanigandha ·
J. P. Janardhanan · L. Ramanathan · M. D. Prameela
Department of Anatomy, CBS,
Kasturba Medical College,
Bejai,
Mangalore, Karnataka 575004, India
e-mail: anuranade@yahoo.co.in

Prakash
Vydehi Medical Sciences and Research Centre,
Bangalore, India

Figure 1 The EDBM consisting of a single muscle passing medial to the tendon of the EI and inserting into the extensor hood of the index finger just above the insertion of the EI.

lead to unnecessary surgery [1, 17]. Therefore, this study was conducted to evaluate the percentage of the existence of the extensor digitorum brevis manus, which may help hand surgeons during their surgeries.

Materials and Methods

Seventy-two bilateral upper limbs of adult cadavers (54 male and 18 female) were studied. They were carefully

Figure 2 The tendon of EIMC passing deep to the tendon of the extensor digitorum and inserting to the dorsal digital expansion of the index finger from its radial side.

inspected and ruled out from signs of external trauma and deformities. The specimens were then dissected and examined for the extensor tendons of the index finger in the forearm and hand.

Results

The standard anatomical description about the attachment of the extensor digitorum and extensor indicis (EI) was observed in 68 (94%) hands where a single slip of the extensor digitorum and a single slip of the EI are seen running to the index finger. The EI lies on the ulnar side of the extensor digitorum.

EDBM was observed in the hands of three cadavers (4.2%) on the left side. It originated deep to the extensor retinaculum from the distal radioulnar joint, carpal ligaments, and carpal joint capsule and was seen running within the compartment for the extensor digitorum. The tendon of this muscle then passed medial to the tendon of the EI and was inserted into the extensor hood of the index finger just above the insertion of the EI (Fig. 1).

In one of the hands (0.72%), the EI divided into two separate tendinous slips. One of the slips showed a normal attachment to the dorsal digital expansion of the index finger onto its ulnar side. However, the other tendon passed deep to the tendon of the extensor digitorum and was inserted to the dorsal digital expansion of the index finger from its radial side (Fig. 2).

Discussion

The extensor digitorum brevis manus has also been called the “m. extensor anomalus” and “le muscle manieux” [9, 18]. This muscle was first reported by Albinus in 1734. Since then, approximately 295 cases of extensor digitorum brevis manus have been reported [14]. Bunnell [2, 3] and Souter [20] described that EDBM may represent a failure of proximal migration of ulnocarpal elements of the antebrachial muscle mass in humans, which is found normally in amphibians. This muscle generally consists of a single belly, but cases with two bellies with variable sizes also have been reported [16, 21]. EDBM is commonly said to arise from the dorsal carpal ligaments, the joint capsule, or the carpal bone, particularly the scaphoid and the lunate [10]. However, other origins, including the distal radius, ulna, and metacarpals, have been reported [16]. Its insertion is commonly on the ulnar side of the extensor digitorum communis tendon of the index finger, the second most common being the middle finger (Fig. 3).

Paraskevas et al. [8] reported that EDBM was found on the dorsum of the right hand originating from the wrist

Figure 3 The attachments of the EDBM and the normal EI.

capsule deep to the extensor retinaculum and inserted into the ulnar side of the base of the proximal phalanx of the index finger. They presented different theories on the development of the EDBM. The EDBM was found in three of the 128 cadavers studied by Rodriguez-Niedenführ et al. [17]. In his study, it occurred in two of the 59 male cadavers and one of the 69 female cadavers. In the present study, EDBM was observed on the left side only in male cadavers. It was present in three of the 72 upper limbs studied. The incidence of EDBM occurring bilaterally is reported in approximately one third of cases, and no

difference in incidence between the right and left hands or between the genders has been reported [16]. This variant muscle originated from the distal end of the radius, carpal ligaments, and carpal joint capsule and inserted on the tendon of the extensor digiti medii proprius as stated by Cigali et al. [4].

Apart from EDBM, there are other variant extensor muscles seen running to the index finger from the dorsum of the forearm and hand. These are the extensor pollicis et indicis accessorius (EPI) [13] and extensor indicis et medii communis (EIMC) [24]. Komiyama et al. [12] classified the variant tendons of the EI muscle into four types: type 1, an additional tendon slip from the EI tendon; type 2, an extensor indicis radialis or extensor pollicis et indicis accessorius; type 3, an extensor medii proprius with or without extensor medii brevis; and type 4, an extensor indicis radialis and extensor medii proprius. The EIMC is an EI muscle with an additional tendon, which is inserted into both the index and long fingers; its incidence being 2.0% and 6.5% in the previous studies [22, 23] and 3.4% and 4.6% in the recent past studies [24, 25]. Yalçın et al. [27] reported the incidence of EIMC in three of the 62 hands he studied. In the present study, we found this anomalous muscle in one of 72 hands. The presence of these additional muscles in the fourth compartment of the extensor retinaculum, as in the present case, may lead to a condition called “fourth-compartment syndrome,” which is manifested by chronic dorsal wrist pain of the fourth compartment. The increased pressure within this compartment may compress the posterior interosseous nerve directly or indirectly [11]. The EDBM can be surgically treated by releasing the extensor retinaculum, which decompresses the dorsal wrist compartment [12], or by resection of the EDBM [5]. Anatomical knowledge of the variant muscles present in the extensor compartment may be also helpful in identifying and planning tendon transfer or graft surgeries [15]. EI muscle is considered as the best substitute for surgical reconstruction of the abductor pollicis longus [26]. Therefore, the knowledge of these variant muscles may be important when one is assessing the traumatized or diseased hand for differential diagnosis by transillumination method.

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