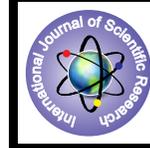


Bilateral Absence of Extensor Indicis Proprius Associated with Presence of Unilateral Extensor Indicis Brevis: a Cadaveric Study



Medical Science

KEYWORDS : Extensor indicis proprius, extensor indicis brevis, variations, clinical importance

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ABSTRACT

Introduction: Variations in the structures of hand has its surgical importance. A rare anatomical variation is bilateral absence of extensor indicis proprius (EIP) associated with presence of unilateral extensor indicis brevis muscle.

Aim: A good knowledge of the extensor tendons of hand has a surgical relevance, especially the tendon of EIP because of its usefulness in tendon transfer reconstructive surgeries.

Material and Methods: Thirty four (34) upper limb specimens of seventeen (17) adult human cadavers were studied to observe the anatomical variation of EIP and its association with the presence of extensor indicis brevis muscle.

Results: EIP was found to be absent bilaterally in one incidence associated with unilateral presence of extensor indicis brevis muscle in the right hand of the same cadaver.

Conclusions: Appreciation of bilateral absence of EIP associated with unilateral presence of extensor indicis brevis has its surgical implications during tendon transfer and reconstructive surgeries.

Introduction

Hand is one of the most frequently used parts of our body. All the precision work to be done depends on good grasp of the hand which in turn depends on both extensor and flexor muscles as well as short muscles of the hand. There is vast literature available which proves the fact that the extensor muscles and tendons of forearm and hand show great degree of variability. Hence, having as good knowledge of muscles and tendons of forearm and hand plays an important roles, especially when surgeries are planned here [1].

Normally the extensor indicis proprius (EIP) arises from the lower part of posterior surface of ulna and the adjoining interosseous membrane and gets inserted into the ulnar aspect of the extensor expansion of the index finger. Few of the authors have reported the complete absence of EIP [2,3,4]. However, many authors have reported many a times regarding EIP having multiple tendons getting attached to the index finger [5-10]. Some authors have also reported about complete duplication of EIP [11]. The presence of extensor indicis brevis with respect to normal EIP and also in the absence of the normal EIP has also been reported earlier [12]. Extensor indicis brevis has been reported as a "short" index extensor originating from the ligament around the scaphoid bone has also been reported as a rare anatomical variant in the form of a tender mass in a patient [10, 13, 14]. The aim of the present study is to observe any variations in the deep extensor muscles of the forearm as well as hand. Having knowledge about potential tendon multiplicity and its variations may be of help in identification and tendon graft reconstructive surgeries.

Materials and Methods

Thirty four (34) formalin preserved upper limb specimens of seventeen adult human cadavers were dissected and studied. The skin, superficial fascia and deep fascia from the extensor compartment of the forearm and hand were excised and studied.

Results

During routine dissection of normal cadavers, it was found that the extensor indicis proprius (EIP) muscle was found to be missing bilaterally from the extensor compartment of the forearm. It was also observed that out of the five deep extensor muscles of the forearm, three muscles, i.e., abductor pollicis longus, extensor pollicis brevis and extensor pollicis longus were found to be arising from the posterior surfaces of radius and ulna along with adjoining interosseous membrane, but the EIP muscle was clearly not seen among the above mentioned deep extensor muscles of the forearm (Fig. 1, 2).

In the same cadaver on the dorsum of the right hand there was a small muscle belly originating from the joint capsule and ligaments of the carpal bones. The muscle was found to be crossing between 2nd and 3rd metacarpal bones in relation to the 2nd dorsal interosseus muscle. The muscle belly was about 4cm long and its tendon was about 4.2cm long (Fig. 3). It was getting inserted by a single tendon on to the ulnar side of the tendon of extensor digitorum for index finger. This small muscle belly with a single tendon to the index finger is named as "extensor indicis brevis".



Fig.1-Lefthand Legend: ED-Extensor Digitorum EPL-Extensor Pollicis Longus, EPB-Extensor Pollicis Brevis, APL-Abductor Pollicis Longus



Fig.2-Right hand Legend: EIB-Extensor Indicis Brevis, EPL-Extensor Pollicis Longus, EPB-Extensor Pollicis Brevis, APL-Abductor Pollicis Longus

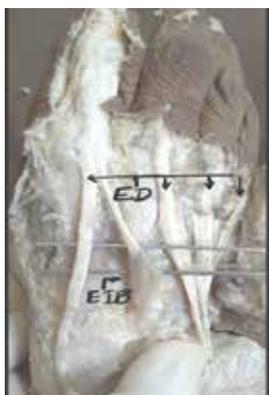


Fig.3-Right hand (Before opening extensor retinaculum) Legend: ED-Extensor Digitorum tendons for medial four fingers, EIB-Extensor Indicis Brevis

Discussion

The precursor extensor muscles of the forearm differentiate into three parts in a developing human embryo. The radial portion differentiates into brachioradialis, the extensor carpi radialis longus and extensor carpi radialis brevis. Later it divides into superficial and deep portions. The superficial part forms the extensor digitorum communis, extensor carpi ulnaris and extensor digiti minimi. Simultaneously, the deep part forms the abductor pollicis longus, extensor pollicis brevis on radial side along with extensor pollicis longus and extensor indicis proprius on the ulnar side [15]. The superficial and radial groups are more stable with the major divisions of the phylum of the animal species, while the deep portion is considered to be highly unstable and undergoes evolutionary changes in its expression in different species of primates [16]. The extensor pollicis longus and extensor indicis proprius develop phylogenetically from extensor pollicis et indicis. The accessory extensor pollicis et indicis coexisting with extensor pollicis longus and extensor indicis proprius occurs in about 2% of population [17]. Normally, the extensor indicis proprius muscle arises from proximal part of distal third of the posterior surface of the ulna, distal to the origin of extensor pollicis longus. Variations in the extensor indicis proprius are rare, including its absence, origin and insertion [18, 19]. The most commonly involved in the injuries is the tendon of extensor indicis proprius and is also the tendon often used as a donor muscle for tendon transfer because of its independent muscle belly and tendon [20]. The extensor indicis proprius or the first tendon of extensor digitorum brings about the extension of the index finger [21, 22, 23]. The in-

dependent extension movements of the index finger will be mildly compromised due to the absence of extensor indicis proprius muscle, simultaneously the independent extension movement of the index finger can be achieved by excision of juncturae tendinum between index and middle fingers [24]. According to the study conducted by El-Badaw MG et al examining the pattern of extensor tendons found on the forearm had observed in one incidence the extensor indicis brevis replacing the extensor indicis proprius muscle [2].

The variations in the extensor muscles of forearm and hand must be borne in mind during surgical procedures including tendon graft surgeries.

Conclusion

The tendon of extensor indicis proprius is commonly used in the tendon transfer surgeries, at the same time it is this tendon involved frequently in hand injuries. Hence, a thorough knowledge of extensor tendons of forearm and hand is important from surgical point of view.

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