

# Assessment the Extensor Indicis Muscle Variation in Iranian Female Cadaver

Tajik MH, Malekzade M, Rezaei Rashnoudi AM, Heidari S, Heidarian E, Mehrannia K and Ebrahimzade M\*

Department of Anatomy, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

## Abstract

During routine dissection of an approximately 60-year-old female cadaver for training the Master students of the Anatomical Sciences at school medicine of Tehran University of Medical Sciences, we came across a variation in tendon of extensor indicis muscle. In this case extensor indicis muscle origin from posterior surface of ulna bone, and its tendon distribute to bifurcate tendon that one tendon of it insertion to medial side of tendon of second of extensor digitorum muscle and other tendon of it insertion to third metacarpophalangeal joint.

## Introduction

The posterior forearm muscles or extensor muscles are muscles that are classified into two superficial and deep layers. The superficial layer muscles are mostly derived from the outer epicondyle of the humerus and the inner layer from the surfaces of the radius and ulna bones and the inter-costal membrane. The extensor muscle is one of the five deep layer muscles that originate from the posterior surface of the ulna bone below the origin of the Longus polycystic extensor muscle and from the adjacent interosseous membrane. This muscle has several variations in the area. It is the source and destination, the prevalence of which varies between men and women, or left and right. In the sample found in the anatomy department of Tehran University of Medical Sciences, an Indicis extensor muscle variation, which has the highest probability among other variations, was observed in the left hand of an Iranian woman's body. Due to the clinical use of this muscle in tendon transplant surgery, its tendon can be used for surgical purposes and the fact that so far there has been no report of variation of this muscle in Iranian staff in the postgraduate department of anatomy group to research in this case was investigated. This report is based on the observation of variance of the extensor muscle tendon of the extensor in the left hand of an Iranian woman's body. In generally it originated from the posterior surface of the ulna bone (distal to the long abductor pollicis muscle) and the adjacent interosseous membrane, led to the tendon, that insertion to the more medial tendon pointing to the index finger and in the metacarpophalangeal joint to the indicis tendon of the extensor digitorum muscle (Figure 1). But this our observation the extensor indicis muscle origin from posterior surface of ulna bone, and its tendon distribute to bifurcate tendon that one tendon of it insertion to medial side of tendon of second of extensor digitorum muscle and other tendon of it insertion to third metacarpophalangeal joint.

## Case Presentation

In routine extensor indicis muscle origin from posterior side of ulna bone and some part of interosseous membrane then its insertion to medial side of second tendon of extensor digitorum muscle (Figure 1). But during routine dissection of an approximately 60-year-old female cadaver (summer of 2020) for training the Master students of the Anatomical Sciences at school medicine of Tehran University of Medical Sciences, we came across a variation in tendon of extensor indicis muscle. In this case extensor indicis muscle origin from posterior surface of ulna bone, and its tendon consist of two tendon that one tendon of it insertion to medial side of tendon of second of extensor digitorum muscle and other tendon of it insertion to third metacarpophalangeal joint (Figure 2 and 3).

## Discussion

The posterior part of the forearm consists of extensor muscles and is located in two superficial and deep layers in studies conducted by Straus (1941), the forearm extension area was divided into three sections: 1-brachioanti brachial, 2- antibrachio-manual, 3-manual (Table 1).

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### \*Correspondence:

Mohammadreza Ebrahimzade,  
Department of Anatomy, School of  
Medicine, Tehran University of Medical  
Sciences, Tehran, Iran.

Tel: 88953008

E-mail: mreanatomy@gmail.com

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**Table 1:** Three compartment of extensor muscle of forearm according study that conducted by Straus in year 1941.

| Group                | Muscle                                                                                                                                  |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Brachio Antebrachial | Brachioradialis<br>Ext.carpi.rad.longus<br>Ext.carpi.rad.brevis<br>Supinator<br>Ext.dig.communis<br>Ext.carpi.ulnaris<br>Ext.dig.minimi |
| Antebrachio Manual   | Abd.Poll.longus<br>Ext.poll.brevis<br>Ext.poll.longus<br>Ext indicis                                                                    |
| Manual               | Ext dig brevimanus                                                                                                                      |

Group 1: Muscles contract from the posterior region of the humerus and attach to the anti-brachial bones, causing movement in the elbow joint.

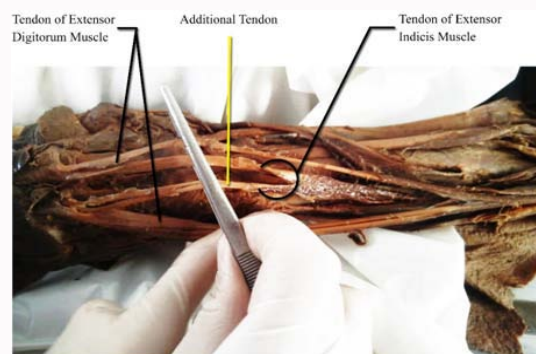
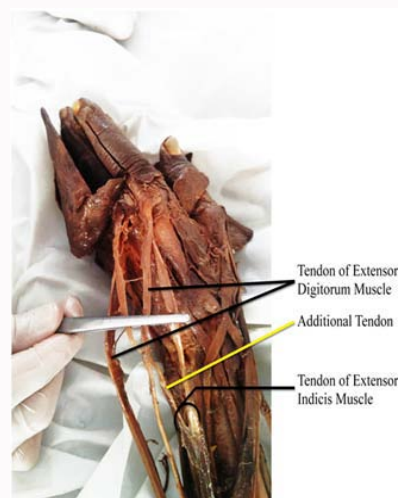
Group 2: Muscles originate in the posterior region of the anterior brachial and interosseous membrane and attach to the bones of the hand, mainly moving in the wrist joint.

Group 3: Muscles originate in the posterior region of the carpal and metacarpal and attach to the fingers and cause the fingers to move [1].

Also, in studies conducted by Kosugi (1989), the muscles behind the forearm were divided into two groups, one of which includes muscles that have multiple variations and includes: extensor indicis, extensor carpi radialis longus and brevis, and extensor digiti minimi and the muscles that are stable and called stable differentiated muscles, which include: extensor pollicis longus and extensor carpi ulnaris [2]. The extensor indicis muscle is a thin muscle in the posterior region of the ulna that is more distal and internalized than the long extensor muscle [3]. They have several variations in origin and insertion. For example, in the studies of Cauldwell, Anson and Wright (1943) on 363 bodies, the extensor indicis muscle had 3 abnormal origins: 1. In 1 sample, the muscle had a natural origin from the bone. It was ulna who became a tendon and again became another muscular ventricle that originated in the bones of the wrist. 2-a muscle with a rudimentary origin at the normal site was inserted into a second muscle arising from two heads from the proximal carpal bones 3-a short muscle was only present, arising from the distal end of the radius [4]. In some cases there was no extensor indicis muscle [5]. In studies conducted by Kosugi, the probability of variation in the extensor indicis is 20%, of which 18 different types have been described [2], the most common of which include: accessory slips, accessory tendons (Kosugi, 1984; Yoshida, 1990) [2,6]. In other studies by M Komiyama et al., Abnormal extensor indicis muscle variations were divided into four general categories:

1. The muscle has a muscular ventricle and the tendon of this muscle in the distal area is divided into two tendons and is connected to the index finger.
2. The muscle has two tendons at the beginning, both of which attach to the index finger.
3. An extra tendon on the side of the ulna that connects to the middle finger.
4. In this type, a muscular ventricle has 3 tendons.

One of the rarest variations in 2-3% of people is Bruce's extensor, which originates in the form of a muscular ventricle in the back of

**Figure 1:** True position of extensor indicis muscle.**Figure 2:** Additional tendon of extensor indicis muscle that origin from medial side of muscle and insertion to second metacarpophalangeal joint in Iranian female cadaver.**Figure 3:** Dorsal view of forearm that show extensor digitorum muscle and Extensor indicis muscle(with additional tendon) in Iranian female cadaver via dissection.

the hand, from the lunate bone, and from the dorsal ligaments of the carpal radio [5,7,8]. And may be mistaken for ganglion or mass [9] Type 3 (A), which has the highest probability among other variations and according to M Komiyama studies in men and women, has the same probability but the probability of this possibility in the left hand compared to the right hand is 5: 3 (5 to 3), But in another study, it was stated that the frequency of the specific tendon of the middle finger is higher in women and in the right hand [10]. According to studies by Swee T. Tan and colleagues, type 1 had a common extensor indicis (EIMC), which has two tendons and is common in chimpanzees and gorillas, but in type 2. The tendon that goes to the middle finger and forefinger contains the muscular ventricle of their own, the Extensor

MediiProprius and the Extensor Indicis proprius, and is more common in older monkeys [11]. In a study conducted by anatomy graduate students at Tehran University of Medical Sciences on the left hand of an Iranian woman, variation of type 3 (A) and in the form of EIMC, in which the muscle tendons of the extensor extensor muscle pointed to the extensor extensor finger and the other tendon as The branches were attached to the third metacarpophalangeal joint capsule. Due to the fact that the extensor muscle is an auxiliary muscle and its operation is performed by the finger extensor muscle, tendons of this muscle can be used in transplant surgeries instead of short thumb extensions and thumb appendages and long extensor extensions that have functional or dysfunctional disorders. It is used so that no significant weakness is observed after transplantation, although poor finger function has been observed in some cases [12,13].

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