



VARIATIONS IN THE FORMATION OF EXTENSOR EXPANSION AND INTRINSIC MUSCLES OF THE LEFT HAND.

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Abstract : Extensor digitorum muscle and its dorsal digital expansion formation have a complex anatomical structure. Knowledge of this complex structure is very important in this era of reconstructive surgeries. During a routine dissection in the Department of Anatomy, we encountered variations in extensor tendons, lumbricals and first palmar interosseous muscle in the left hand. We observed that the extensor digitorum muscle in the left hand had a doubled tendon for middle and ring fingers. Extensor digiti minimi muscle had three tendons. The intertendinous connections between the tendons of extensor digitorum muscle had type 3y in 3rd intermetacarpal space. The proximal end of lumbricals was in the carpal tunnel. The 4th lumbrical was unipennate. First palmar interosseous was absent.

Keyword : Extensor digitorum, Extensor digiti minimi, Juncurae tendinum, Lumbricals, First palmar interosseous.

INTRODUCTION:

Extensor digitorum muscle is one of the extensor muscles in the posterior compartment of forearm which arises from the lateral condyle of the humerus via the common extensor tendon, the adjacent intermuscular septa and the antebrachial fascia. It divides distally into four tendons which pass in a common synovial sheath with the tendon of extensor indicis, through a tunnel under the extensor retinaculum and diverge on the dorsum of the hand as one to each of the medial four fingers except the thumb. Three variable intertendinous connections (juncture tendinae) are found on the dorsum of the hand which is inclined distally and radially. At the distal end of metacarpal bone the extensor tendon will expand to form a hood which covers the sides of the head of metacarpal and proximal phalanx. The tendinous expansion soon divides into 3 bands (i.e) a central slip and 2 lateral bands. The lumbricals, dorsal and palmar interossei insert into the lateral bands(1). There are four lumbricals (resembling the shape of the earthworm) in each hand. Compared to their small size, they play a significant role in the dynamics of the intricate movements of the fingers required for the precision works. The muscle arise from the bare areas of tendons of flexor digitorum profundus about the middle of the palm passes distally along the radial side of the metacarpophalangeal joints anterior to deep transverse metacarpal ligament. The narrow tendon of insertion joins the radial margin of extensor expansion as distal wing tendon. Normally first and second lumbricals are unipennate, third and

fourth lumbricals are bipennate. It is quite unique in its position as it connects the flexors of digits to extensors and both the attachments are mobile (2) Palmar interossei are smaller than the dorsal interossei. The first arises from the ulnar side of the palmar surface of the base of first metacarpal bone and inserted into a sesamoid bone on the ulnar side of proximal phalanx and from there it passes to the phalanx and usually also into the dorsal digital expansion. It lies in front of the lateral head of the first dorsal interosseous and is overlapped anteriorly by oblique head of adductor pollicis. It is often very rudimentary because the thumb has its own powerful adductor. The second arises from the ulnar side of the second metacarpal bone and is inserted into the same side of dorsal digital expansion of index finger. The third arises from the radial side of fourth metacarpal bone and is inserted together with third lumbrical.

The fourth arises from the radial side of fifth metacarpal bone and is attached to the fourth lumbrical and also to the base of proximal phalanx. The attachment of these muscles to the dorsal digital expansions stabilizes the extensor tendons on the convex heads of the metacarpal joints. The interossei show little variation in their arrangement. They are occasionally reduplicated. The juncurae tendinum are of 3 types (type 1,2,3y,3r). Type1 will be in 2nd intermetacarpal space, type2 will be in 3rd intermetacarpal space, and type (3y, 3r) will be in 4th intermetacarpal space (3)

MATERIALS AND METHODS:

In the Department of Anatomy, during routine dissection in an elderly adult male cadaver, variations were encountered in the extensor digitorum muscle of left hand. A detailed study of extensor tendons with the formation of the extensor expansion was performed.

OBSERVATIONS:

Multiple extensor tendons to the medial four fingers took origin from the extensor digitorum under the extensor retinaculum (Fig-1). Extensor digitorum longus originated as a single tendon and splits into two tendons in the middle of dorsum of the hand and inserted as single tendon (Fig-2). Extensor digitorum tendon to ring finger divided into two tendons under extensor retinaculum and one is inserted along with the tendon to middle finger and other as the ring finger tendon (4) (Fig- 3). Extensor digiti minimi took origin as a single tendon and splits into three tendons (Fig-4). The juncurae tendinum in the third

intermetacarpal space was type 3y (Fig-5). First palmar interosseus was absent (Fig-6). The lumbricals has the proximal end near the carpal tunnel (Fig-7). The 4th lumbrical was unipennate (Fig-8).

DISCUSSION:

Prameela Dass et al, stated that in 77% of specimens the extensor digitorum distally had tendons to middle three fingers. In 34% of specimens the extensor digitorum tendon to little finger was present. Extensor digiti minimi showed normal anatomy only in 20% of specimens. Most common types of juncturae tendinum in 2nd, 3rd, 4th intermetacarpal spaces were type 1, 2, 3r respectively (3). As per Shirpa paul, the two tendons of extensor digitorum were observed in the ring and little finger (4). According to Pinar Y et al, the juncturae tendinum were 3 types (type 1, 2, 3y, 3r). The type 1 was observed in 57.4% of the cases in 2nd Intermetacarpal space and 16.7% in 3rd Intermetacarpal space. The type 2 was detected in 59% of the cases in 3rd Intermetacarpal space and 3.7% of the cases in 2nd Intermetacarpal space. The type 3y was encountered in 59% of the cases in the 4th Intermetacarpal space and 14.8% in the 3rd Intermetacarpal space. The type 3r was found in 37% of the cases in the 4th Intermetacarpal space and 5.55% of the cases in the 3rd Intermetacarpal space(5). According to Srijit Das et al, stated that the extensor digitorum muscle had a triple tendon for middle finger, double tendon to ring finger and extensor digiti minimi muscle had double tendon (6). As per Joshi S D et al, in 20% of cases the proximal attachment of this muscle extended into carpal tunnel. In 4% the 4th lumbrical was absent(7). According to Susman R S et al, studies the existence of a pollical (first) palmar interosseous muscle. They examined the thumbs of 20 individuals of African and European origin in the human anatomy lab at University of Witwater strand (Johannesburg) and 15 individuals of European ancestry in the anatomy lab at the university at Stony brook (New York). A pollical palmar interosseous muscle was found in 86% of individuals (17/20 in Witwater strand, 13/15 of Stony brook sample) (8). In the present study, the extensor digitorum had double tendon to middle finger and ring finger. Extensor digiti minimi had three tendons to little finger. Lumbricals had their origin near carpal tunnel and 4th lumbrical was unipennate. First palmar interosseous was absent.

CLINICAL SIGNIFICANCE:

Knowledge about the variation of extensor tendons on the dorsum of the hand and juncturae tendinum in between them is necessary while considering tendon transfer (or) repair in hand reconstructive surgeries. Synovitis of the extensor tendons occurs in 30% of patients with rheumatoid arthritis and rupture of the tendons are more common in the extensor tendons of 4th and 5th tendons and extensor pollicis longus, thus anomalies of extensor tendons of 4th and 5th digits carry more clinical importance while doing surgeries. Anatomical knowledge of the extensor tendons is important while doing tenosynovectomy in De Quervian disease. As proximal attachment of the lumbricals can extend into the carpal tunnel, it may predispose to the development of carpal tunnel syndrome especially in those individuals whose occupation requires repetitive finger movements.

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