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### STUDY OF VARIANT LUMBRICALS OF HAND IN 50 DONATED CADAVERS

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#### ABSTRACT

Aim to study the variant lumbricals of hand. 100 upper limbs of 50 donated embalmed cadavers (45 males & 5 females) of age group ranging from 70 to 80 years were dissected in the department of Anatomy at K. J. Somaiya Medical College, Sion, Mumbai, INDIA. The variant lumbricals were observed in 3 specimens. The neurovascular pattern in the palm was also observed. The photographs of the variation of the lumbricals were taken for proper documentation. We observed an accessory belly of second lumbrical originating from the radial side of the flexor digitorum superficialis in one specimen, an accessory belly of first lumbrical originating from the radial side of the most radial tendon of the flexor digitorum profundus (corresponding to the index finger) in the second specimen and the high origin of the first and second lumbrical from the flexor digitorum profundus. In all the specimens lumbricals got inserted in to the extensor digital expansion near the metacarpophalangeal joint. The existence of two bellies of first lumbrical should be kept in mind by surgeons operating on hand.

**Key Words:** Lumbricals, Accessory Belly, Intrinsic Muscles, Flexor Digitorum Profundus, Hand Surgeons.

#### INTRODUCTION

The lumbricals are intrinsic muscles of the hand that flex the metacarpophalangeal joints and extend the interphalangeal joints [1]. There are four of these small, worm-like muscles on each hand. These muscles are unusual in that they have no bony attachment. Instead they attach proximally to the tendons of flexor digitorum profundus and distally to the extensor expansions [2]. The first lumbrical is unipennate. It originates from the radial side of the most radial tendon of the flexor digitorum profundus (corresponding to the index finger). It passes posteriorly along the radial side of the index finger to insert on to the extensor expansion near the metacarpophalangeal joint. The second lumbrical is also unipennate. It originates from the radial side of the second most radial tendon of the flexor digitorum profundus (which corresponds to the middle finger). It passes posteriorly along the radial side of the middle finger and inserts on to the extensor expansion

near the metacarpophalangeal joint. The third lumbrical is bipennate. One head originates on the radial side of the flexor digitorum profundus tendon corresponding to the ring finger, while the other originates on the ulnar side of the tendon for the middle finger. The muscle passes posteriorly along the radial side of the ring finger to insert on its extensor expansion. The fourth lumbrical is bipennate. One head originates on the radial side of the flexor digitorum profundus tendon corresponding to the little finger, while the other originates on the ulnar side of the tendon for the ring finger. The muscle passes posteriorly along the radial side of the little finger to insert on its extensor expansion. The first and second lumbricals (the radial two) are innervated by the median nerve. The third and fourth lumbricals (the ulnar two) are innervated by the deep branch of the ulnar nerve. This is the usual innervation of the lumbricals (occurring in 60% of individuals). However 1:3 (median:ulnar - 20% of individuals) and 3:1 (median:ulnar - 20% of individuals) also exist. The lumbrical innervation always follows the innervation pattern of the associated muscle unit of flexor digitorum profundus (i.e. if the muscle units supplying the

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tendon to the middle finger are innervated by the median nerve, the second lumbrical will also be innervated by the median nerve) [3]. There are four separate sources of blood supply for these muscles: the superficial palmar arch, the common palmar digital artery, the deep palmar arch, and the dorsal digital artery. The lumbrical muscles, with the help of the interosseous muscles, simultaneously flex the metacarpophalangeal joints while extending both interphalangeal joints of the digit on which it inserts.

The lumbricals are used during an upstroke in writing. As a part of the intrinsic musculature, the lumbricals are important for delicate digital movements. They are said to flex the metacarpophalangeal joints and extend the interphalangeal joints. These are quite unique in their position as they connect the flexors of the digits to the extensors and that both of its attachments are mobile. These play a vital role in the precision movements of the hands, along with thenar, hypothenar, and interossei muscles. There are also lumbrical muscles of the foot that have a similar action, though these are of less clinical concern.

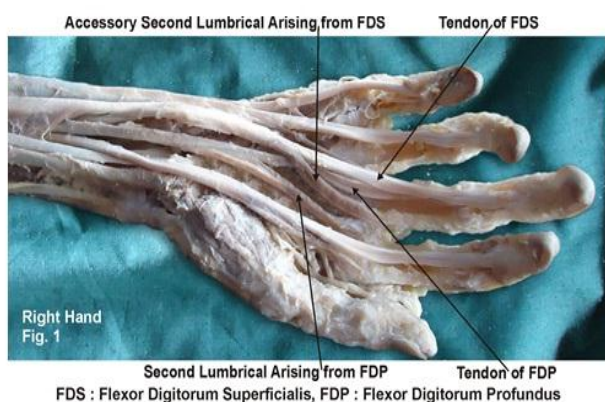
## MATERIALS AND METHODS

100 upper limbs of 50 donated embalmed cadavers (45 males & 5 females) of age group ranging from 70 to 80 years were dissected in the department of Anatomy at K. J. Somaiya Medical College, Sion, Mumbai, INDIA. The variant lumbricals were observed in 3 specimens. The neurovascular pattern in the palm was also observed. The photographs of the variation of the lumbricals were taken for proper documentation.

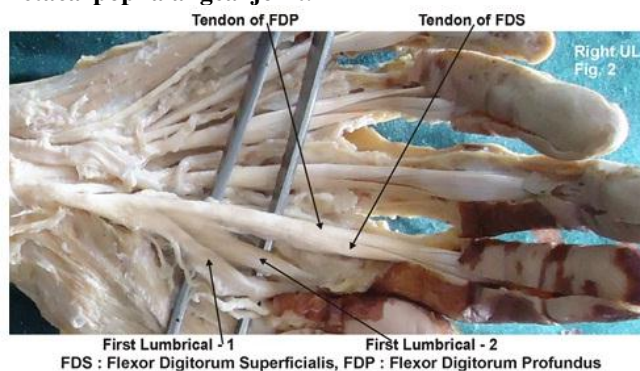
## OBSERVATIONS

We observed an accessory belly of second lumbrical originating from the radial side of the flexor digitorum superficialis in one specimen, an accessory belly of first lumbrical originating from the radial side of the most radial tendon of the flexor digitorum profundus (corresponding to the index finger) in the second specimen and the high origin of the first and second lumbrical from the flexor digitorum profundus. In all the specimens lumbricals got inserted in to the extensor digital expansion near the metacarpophalangeal joint.

**Figure 1. Showing photographic presentation of an accessory belly of second lumbrical originating from the radial side of the flexor digitorum superficialis.**



**Figure 2. Showing photographic presentation of The two bellies of the first lumbrical joined with each other to insert on the extensor expansion at the metacarpophalangeal joint.**



**Figure 3. showing photographic presentation of the high origin of the first and second lumbrical.**



## DISCUSSION

Much of the versatility of the human hand depends upon its intrinsic musculature. The lumbrical muscles constitute an important part of the intrinsic musculature of the hands. Lumbricals as a part of the intrinsic musculature are important for its delicate digital movements. Variations in the origin and insertion of the lumbricals are common [4].

Lumbrical muscle variation has been reported in the literature by various authors [5-9]. Mehta et al described the anomalous origin of first lumbrical in 2.7% cases they studied [10]. In the present study we observed an accessory belly of the first lumbrical originating from the radial side of the tendon of the flexor digitorum profundus to index finger which merged with the first lumbrical for insertion into the radial side of the index finger into the dorsal digital expansion. Additional lumbricals occurring more frequently than a reduction in their number. Origin of lumbricals may be displaced proximally arising from flexor carpi radialis, flexor digitorum superficialis, flexor digitorum profundus or flexor pollicis longus. Accessory belly of first lumbrical may arise from flexor pollicis longus, flexor digitorum superficialis, first metacarpal, opponens pollicis or palmar carpal ligament [11]. In literature it has been found that the additional fibers from the forearm merged at varying points with the belly coming from the palmar origin and in no case reached the insertion of extensor expansion independently. Hence these are termed as additional forearm origin and not as double lumbricals [10]. In the present study the first lumbrical had an accessory belly originating from the radial side of the tendon of the flexor digitorum profundus to index finger hence termed as double lumbricals [10]. First lumbrical and the distal muscle belly for the index finger of the flexor digitorum superficialis have an intimate relationship with each other and have a common phylogenetic origin [12]. The articular system in the digits is connected by mechanical links and lumbrical muscles are one of the links of this system that

produces dynamic controlled extension of interphalangeal joints [1]. Potu BK et al studied an anomalous origin of the lumbrical muscles on South Indian cadavers [13]. Haines studied flexor muscles of the forearm and hand in the mammals and lizards; he suggested that the FDS in mammals is homologous with the intrinsic muscles of the palm, and that it shifts its origin proximally in forearm [14]. Furthermore Koizumi et al. mentioned that the first lumbrical muscle and the distal muscle belly for the index finger of the FDS have an intimate relationship with each other, and have a common phylogenetic origin [12]. From the above discussion it is quite clear that the additional muscle belly for the first lumbrical as observed in the present study has a phylogenetical significance.

## CONCLUSION

Clinicians and hand surgeons should be aware of such variations of first lumbrical while dealing with the hand, during various surgical procedures.

## COMPETING INTERESTS

The author declares that he has no competing interest.

## AUTHORS' CONTRIBUTIONS

SPS draft the manuscript, performed the literature review & obtained the photograph for the study.

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