

Case Report

UNILATERAL ABSENCE OF SECOND, THIRD AND FOURTH LUMBRICALS: A RARE CASE REPORT WITH AN EVOLUTIONARY SIGNIFICANCE

Jeneeta Baa ^{*1}, J.S.Prusti ², S.Rath ³.

¹ Senior resident, ² Associate Professor, ³ Professor and Head,
Department of Anatomy, M.K.C.G. Medical College and Hospital, Berhampur, Odisha 760004, India.

ABSTRACT

Lumbricals are the intrinsic muscles of the hand resembling the earthworms. During routine dissection of the hand of a 58 years old male cadaver, we found a rare variation of absence of the second, third and fourth lumbricals of the left hand while the right hand showed no abnormality. Lumbricals act as flexor of the metacarpophalangeal joint and extensor of the interphalangeal joint but owing to their movable attachments, their function is difficult to visualize. Variability of the muscle both in morphology and function indicates the ongoing process of evolution.

KEY WORDS: Lumbricals, Absence, Muscle spindles, Variation, Evolution.

Address for Correspondence: Dr. Jeneeta Baa, Department of Anatomy, M.K.C.G. Medical College and Hospital, Berhampur, Odisha 760004, India. **E-Mail:** drjeneetabaa@gmail.com

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INTRODUCTION

We homosapiens or the wise men have walked through a consistent evolutionary process landing up today as anatomically modern humans. Human hand is a revolution in evolution as it is bestowed with a good number of intrinsic muscles, endowed with precise movements for skillful work.

Lumbricals are four intrinsic muscles of the hand taking origin from the tendon of flexor digitorum profundus and inserting to the radial side of the dorsal digital expansion as the distal wing tendon. In the upper limb they are numbered from lateral to medial. The first and second lumbricals are unipennate supplied by the median nerve whereas the third and fourth are bipennate supplied by a deep branch of the ulnar

nerve. Lumbricals are subjected to variations in its origin, insertion, number, presence of accessory slips and rarely complete absence [1,2,3]. The muscles act as flexors of the metacarpophalangeal joint and extensors of the interphalangeal joint but owing to their movable attachments, their function is difficult to visualize. Leijnse and Kalker suggested lumbrical as a proprioceptive organ because small changes in the flexion of the proximal interphalangeal joints and distal interphalangeal joints correspond with large lumbrical displacements [4].

CASE REPORT

During routine dissection of the hand of a 58 year old male cadaver, it was found that the second, third and fourth lumbricals of the left

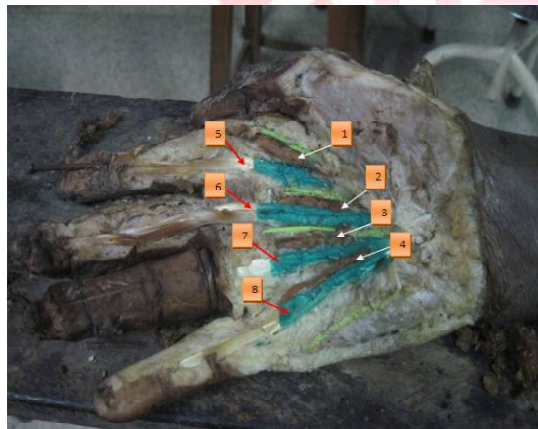
hand was completely absent with an anatomically normal first lumbrical in the same hand. No other neurovascular variation was observed.

Fig.1: Dissected left hand showing the 1st lumbrical.



- 1: 1st Lumbrical
- 2: Tendons of flexor digitorum superficialis and flexor digitorum profundus for the index finger

Fig. 2: Dissected right hand showing all the four lumbricals.



- 1: 1st Lumbrical
- 2: 2nd Lumbrical
- 3: 3rd Lumbrical
- 4: 4th Lumbrical
- 5, 6, 7, 8: Tendons of flexor digitorum superficialis and flexor digitorum profundus for the 1st, 2nd, 3rd & 4th finger respectively.

DISCUSSION

Lumbricals are found in most mammals, both primates and non primates, but in them it plays an important role in locomotion [5,6,7]. In chimpanzees they are relatively larger in size than in humans, indicating the decreasing strength of the muscle from primates to humans [7]. Lumbricals have the smallest physiological cross sectional area and the greatest number of muscle spindles among the muscles of the upper limb and the spindles are more concentrated in the first and second lumbricals [8].

This explains the consistent nature of the first two lumbricals when compared with the others [9]. Even Mehta and Gardner noted the first and second lumbricals of having the most constant anatomy [10].

In the present case we had a very rare anomaly of the left hand showing absence of the second, third and fourth lumbricals but having a normal first lumbrical. In the right hand the lumbricals showed no such abnormality. Variations in lumbrical are common but absence of any one of them is a rare occurrence. Variations of absences were reported in literature, but none of the cases were similar to our observations in the present case. Braithwaite et al found that incidence of accessory belly is more than the absence of muscle. They documented a case with the absence of fourth lumbrical [1]. The absence of the fourth lumbrical was the most frequent absence of the lumbricals [11].

Lumbricals function as flexors of the metacarpophalangeal joint and extensors of the interphalangeal joint. A study conducted on patients with ulnar nerve paralysis, showed loss of 90% of the muscle strength when compared to that in the opposite hand [12], which suggests lumbricals are weak extensors of the proximal interphalangeal joint compared to the interosseous muscle. The interosseous muscle contributes about 22% of flexion of the metacarpophalangeal joint whereas the lumbricals contributes only 2-3% [13]. Thus it can be said that lumbricals have a very limited motor role. So due to its 1) small physiological cross sectional area 2) large number of muscle spindles 3) long fibre length 4) movable attachment from a flexor tendon to an extensor tendon, the proprioception is more marked than the motor function.

CONCLUSION AND EVOLUTIONARY SIGNIFICANCE

Variations indicate that we are still in the process of evolution. Lumbricals are one such example, may it be in origin, mode of insertion, accessory slip, duplication and rarest of all its absence. The gradual decrease in muscle size from primates to human with a shift in function from motor to sensory is suggestive of the change in the use of forelimbs from climbing

and locomotion to a more precise work like internet browsing. Hence, philosophically it may be said that the actions of lumbricals of the hand are the indices of civilization of a race [14].

Lumbricals are often used as muscle flaps for coverage of median nerve and its palmar branches. Therefore awareness among surgeons regarding its absence is necessary to avoid complications. Though it is a case report yet it indicates that with a more developed intricate system of neurons, even the sensory role of this muscle is gradually diminishing in significance, which may be the reason for them to be absent in some individuals.

Conflicts of Interests: None

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