

Neuromuscular variations in the forearm-cadaveric study

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Abstract

Three different types of variations among the muscles and nerves in the forearm were found in the present study which includes pronator teres, on flexor aspect and abductor pollicis longus and radial nerve on extensor aspect. Compression of Median nerve or usefulness of multiple tendons of thumb muscle are important for surgeons.

Keywords: Median nerve, Pronator teres, Abductor pollicis longus, Radial nerve.

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INTRODUCTION

Man is the supreme among all living creatures; undoubtedly it is true because man has got the most advanced brain and execution of his brain is done in most efficient ways by man's hand. A detailed study of the structures of hand is the basic requirement of all aspiring hand surgeons¹. Recent developments in the era of plastic surgery are peripheral nerve repair, nerve grafting, autogenous vein grafting² etc. So it is obvious that the neuromuscular variations in the forearm and hand- what we have done in this study, presents a challenging study.

AIMS AND OBJECTIVES

It is proposed to study. Variations in the muscles of forearm and hand if any presence of accessory/absence of muscles Variations in the neuromuscular supply

Purpose of study

Awareness of the presence of accessory muscles/absence of muscles in the forearm and hand is essential for Anatomists and surgeons.

A plastic surgeon may be benefited by the knowledge of variations while repairing a nerve injury or tendon transplantation³.

MATERIALS AND METHODS

Fifty upper limbs of formalin fixed cadavers from the Dept of Anatomy, Burdwan Medical College, Burdwan, West Bengal comprised the material for study. These were labelled from 1 to 50 with letters(R) or (L) corresponding to right or left limbs respectively.

The limbs were dissected meticulously following classical incisions and dissection procedures as per Cunningham's manual. Photographs were taken regularly and whole study was completed within one year starting from June 2013 to May 2014.

1) We found Pronator teres having three heads(two humeral and one ulnar) in 4% cases, where Humeral head 1 was laterally placed, humeral head 2 was intermediate and ulnar head was placed medially. Median nerve was seen passing between the two humeral heads of pronator teres (**Figure no: 1**). This variation was found in the limbs which were right sided.

2) Abductor pollicis longus was found having three tendinous slips with same insertion. The slips were seen getting fused with each other and inserted at the base of 1st meta- carpal bone. Muscle fibres seen upto the level of insertion (**Figure no: 2**). It was found in 2% of the limbs.

3) Radial nerve trunk was found giving a branch dividing again into three branches supplying extensor carpi radialis brevis (**Figure no: 3**). This was observed in 2% of the limbs(Right sided).

Figure No. 1

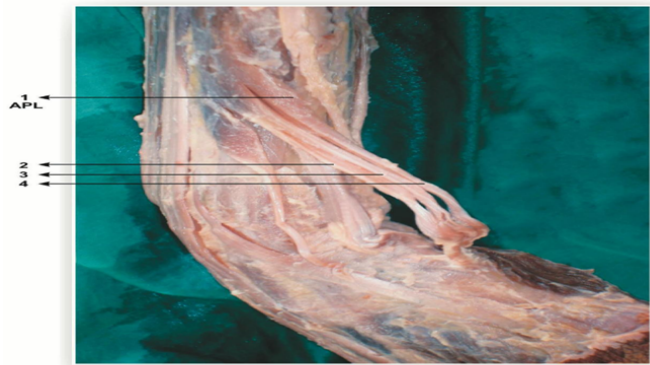
Three heads of pronator teres. Median nerve is passing between the humeral heads.



- 1 - Median nerve.
- 2 - Humeral head of pronator teres laterally placed.
- 3 - Humeral head of pronator teres which is intermediate.
- 4 - Ulnar head of pronator teres which is placed medially.

Figure No. 2

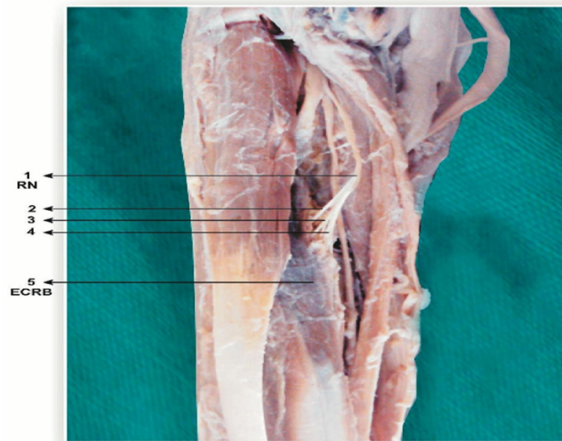
Abductor pollicis longus having three tendinous slips with same insertion. Muscle fibres seen upto the level of insertion.



- 1 - Abductor pollicis longus muscle itself.
 - 2, 3 & 4 - Three tendinous slips of abductor pollicis longus.
- Found in 2% of limbs in the present study.

Figure No. 3

Radial nerve trunk giving a branch dividing again into three branches, supplying extensor carpi radialis brevis.



- 1 - Radial nerve trunk.
- 2, 3, 4 - Three slender branches arising from the trunk of radial nerve.
- 5 - Extensor carpi radialis brevis muscle itself.

Found in 2% of limbs in the present study.

DISCUSSION

Pronator Teres

An additional (third and separate) head of Pronator teres was found by J.H. Barrett et. al in (1984)- Median nerve was seen passing through the humeral head of Pronator teres by Dean G. Sotercanos. Unusual high origin of pronator teres (2.5cm above the elbow joint) was seen by Braddon, Randall L. et al. in 1994. In our study Pronator teres was seen having three heads—two humeral and one ulnar. First humeral head was lateral, second one was intermediate and ulnar head was medially placed. Median nerve was found, passing between intermediate humeral head and laterally placed humeral head, instead of passing between humeral and ulnar heads—found in 4% of limbs. Pronator teres may sometimes produce Pronator teres syndrome in which median nerve gets compressed by two

heads of this muscle. This muscle is clinically significant in that way.

Abductor Pollicis Longus

This muscle originated from the posterior ulnar surface, distal to anconeus and middle of posterior surface to radius. It was inserted at the palmar side of the base of the 1st metacarpal bone along with extensor pollicis brevis—stated by A. Ayd and Irodou et. al. in 1998. Four tendons of abductor pollicis longus were found, inserted at the base of the 1st metacarpal bone and trapezium—found by Paul S. et. al. in Jan. 2006. Six tendons of Abductor Pollicis Longus were found out of which two (medial), were inserted into the trapezium and remaining into the base of 1st. metacarpal bone found by Vandana Mehta et. al. In 2009. Abductor Pollicis Longus was seen by Dil Islam Mansur et. al. in 2010—having nine tendons, inserted

at the lateral and anterolateral sides of the base of 1st metacarpal bone, opponens pollicis and trapezium.

In the present study Abductor pollicis longus was seen having tendinous slips- getting fused with each other and inserted at the base of the 1st metacarpal bone. Muscle fibres were seen upto the level of insertion. Abductor pollicis longus is clinically important as it can be used in the purpose of tendon grafting.

Radial Nerve

Abnormal communication was seen between radial nerve and medial cutaneous nerve of forearm. R. R. Marathe *et al* in 2010.

In the present study radial nerve trunk was seen giving a slender branch at the level of elbow joint- which was seen again dividing into three slender branches, all supplying extensor carpi radialis brevis. As normally, extensor carpi radialis brevis is supplied by posterior interosseous nerve, so, if there is an injury, involving posterior interosseous nerve, because of the presence of these slender branches from radial nerve, extensor carpi radialis brevis muscle will survive- found in 2% of the limbs.

CONCLUSION

This study may help orthopaedic surgeons and plastic surgeons during tendon transplant, grafting procedures

etc. In this way the Anatomists may contribute a lot in the field of clinical surgery.

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