International Journal of Anatomy and Research,
Int J Anat Res 2015, Vol 3(4):1655-59. ISSN 2321- 4287
DOI: http://dx.doi.org/10.16965/ijar.2015.307

Case Report

BILATERAL MULTIPLE VARIATIONS IN THE UPPER EXTREMITY OF A HUMAN CADAVER: A CASE REPORT

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ABSTRACT

Background: A rare case of bilateral multiple anatomical variations in the upper extremity, was found in a male cadaver, during routine dissection in the Anatomy department at TN Medical College, Mumbai.

Observation: The variations included absence of Musculocutaneous nerve of right arm and communication of Musculocutaneous nerve with median nerve in the left arm, bilateral three heads of Biceps Brachii muscle and bilateral multiple tendons of Abductor Pollicis Longus muscle in both the arms.

Conclusion: Medical significance of an absent Musculocutaneous nerve and the presence of three heads of Biceps Brachii lies in the fact that it can cause traumatic nerve compressions or complications in anaesthetic block etc. Anatomic variations of tendons of abductor pollicis longus are significant in assessment of hand injuries and surgeons performing hand reconstructive surgery.

KEYWORDS: Abductor pollicis longus, Biceps brachii, Median nerve, Musculocutaneous nerve.

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Access this Article online

Quick Response code

DOI: 10.16965/ijar.2015.307

Web site: International Journal of Anatomy and Research
ISSN 2321-4287
www.ijmhr.org/ijar.htm

Received: 30 Oct 2015 Accepted: 24 Nov 2015
Peer Review: 30 Oct 2015 Published (O): 31 Dec 2015
Revised: None Published (P): 31 Dec 2015

INTRODUCTION

Anatomic variations of upper limb are common but coexistence of bilateral multiple variations are rare. Since, several spinal nerves unite and divide to form the Brachial plexus, variations are common. Normally Musculocutaneous nerve (C5,6,7) arises from the lateral cord of brachial plexus, pierces coracobrachialis muscle and supplies muscles of flexor compartment of arm. After piercing the lateral intermuscular septum, it continues as lateral cutaneous nerve of the forearm. Communication between the Musculocutaneous nerve and the Median nerve is very frequently noted variation among the branches of the brachial plexus [1]. Nakatani et al (1997) [2] observed that the branches from the lateral cord directly supplied the anterior compartment muscles of the upper arm and there was no musculocutaneous nerve arising from the lateral cord of the brachial plexus.

Biceps brachii normally has two heads- long head from supra-glenoid tubercle and short head from the tip of coracoid process. Sometimes a third head, may extend from superomedial part of the brachialis to the bicipital aponeurosis and medial side of tendon in 10 % of cases [3].

Supernumerary heads are confusing for a surgeon and are liable for compression of neurovascular structures in upper limb [4].

The tendon of abductor pollicis longus muscle normally takes origin from the posterior surface of radius, ulna and interosseus membrane and is inserted as a single tendon on the first metacarpal. The variations of tendon have been noted by many researchers.

CASE REPORT

During the routine dissection of a male cadaver in Anatomy department of TN Medical College, Mumbai, we observed interesting bilateral multiple variations of superior extremity. Specimen was dissected, cleaned and painted carefully. Photographs were taken.

OBSERVATIONS

A case of multiple, bilateral variations was observed during routine dissection of superior extremity of a male cadaver.

In the right arm as shown in figure 1, musculocutaneous nerve was absent and the lateral cord continued as the lateral root of median nerve. Before joining the medial root, 2 small twigs were given– one to coracobrachialis and the other as a proximal communication with the medial root. The other muscles of flexor compartment were supplied by branches from the median nerve as shown in figure 2 and one of them continued as lateral cutaneous nerve of the forearm.

However, in the left arm as shown in figure 3, the musculocutaneous nerve was present and about the middle of arm, it communicated by a small twig with the median nerve.

In the same cadaver, as shown in figure 4, biceps brachii had three heads of origin, bilaterally. The long and short heads arose normally, while the accessory third head arose from the midshaft of humerus, near the insertion of coraco-brachialis muscle.

We also found three tendons of Abductor pollicis longus muscle near its insertion. Of these, two were inserted on the base of first metacarpal and one continued with the belly of the abductor pollicis brevis muscle, as shown in figure 5.

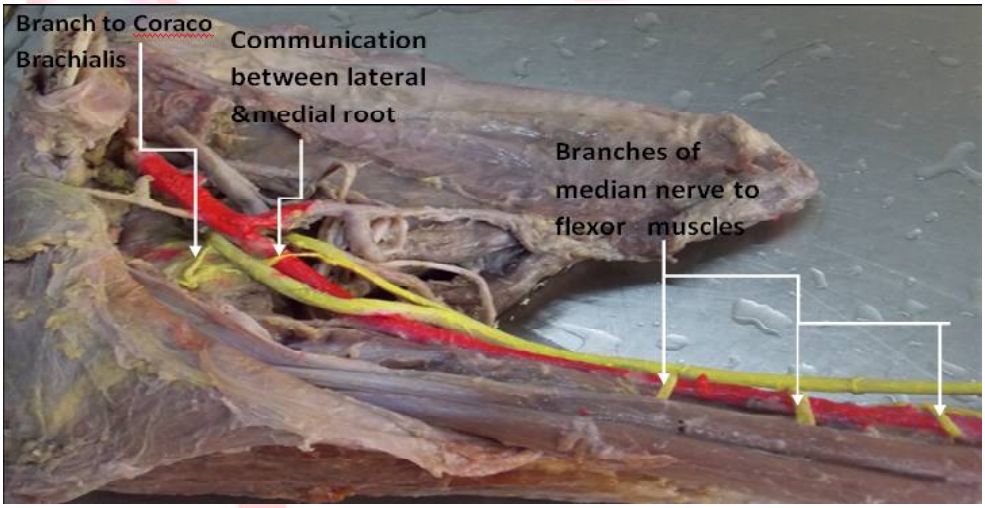

Fig. 1: Diagram showing absent Musculo Cutaneous Nerve in right arm.

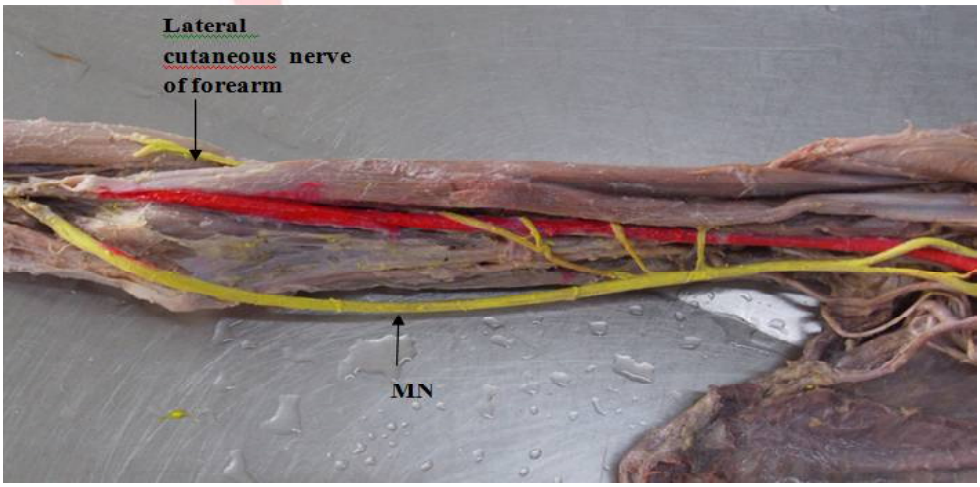

Fig. 2: diagram showing lateral cutaneous of forearm, continuation of branch of median nerve.

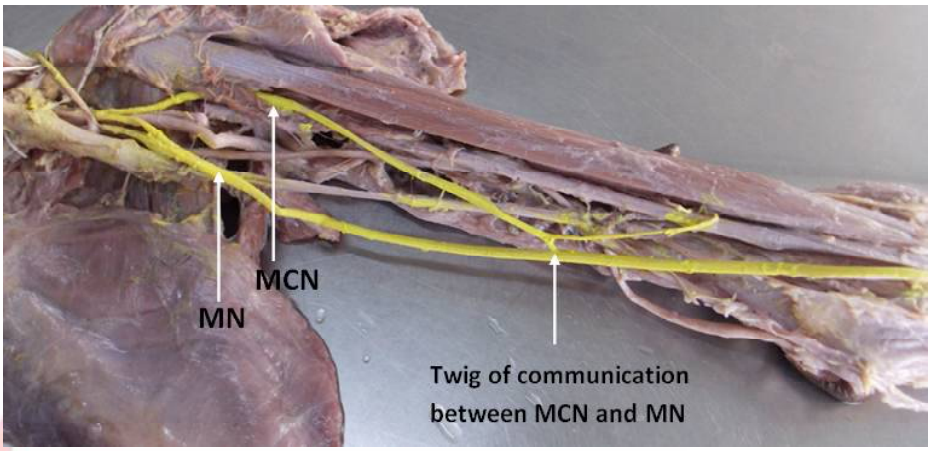

Fig. 3: Diagram showing the communication between MCN (musculocutaneous nerve) and MN (median nerve) in left arm.

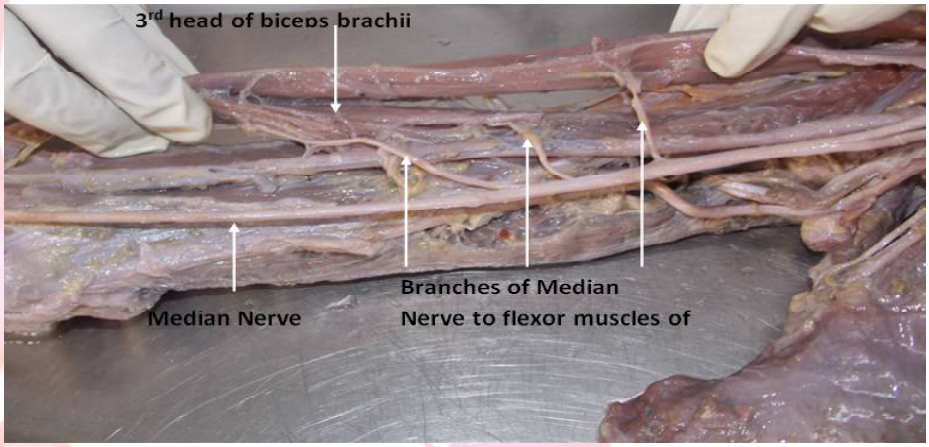

Fig. 4: Diagram showing 3rd head of biceps brachii.

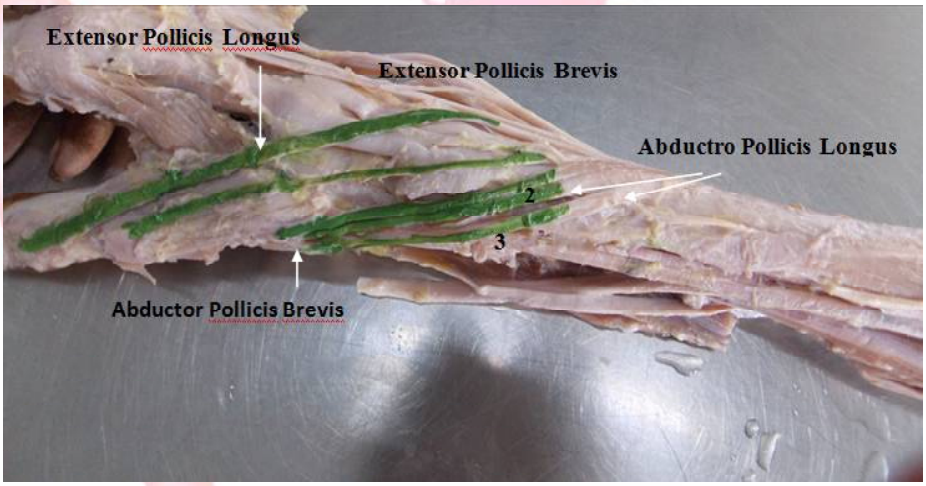

Fig. 5: Diagram showing multiple tendons of abductor pollicis longus (APL), extensor pollicis longus(EPL), extensor pollicis brevis(EPB), abductor pollicis brevis (APB) .

DISCUSSION

Variations of musculocutaneous nerve are commonly found during upper limb dissection. Buch-Han-sen (1955) (cited by Mane, Pandhare 2011) observed these variations in 65.3% of cases [5]. Musculocutaneous nerve is a mixed peripheral nerve. Guerri-Guttenberg RA (2009) performed a systematic literature study and provided current classifications of Musculocutaneous nerve variations. Communications were seen between the musculocutaneous and median nerves in 53.6% of the dissections from which 84.6% were proximal, 7.7% distal, and 7.7% had one proximal and one distal communication to the point of entry of the musculocutaneous into coracobrachialis muscle. In six out of 54 dissections, where the musculocutaneous was present, the nerve did not pierce the coracobrachialis muscle. In two cases, the musculocutaneous nerve was absent and in one case the musculocutaneous and the median nerve had a distal origin [6].

Le Minor (1992) (as cited by Sachdeva, Singla R.K., 2011) classified these variations in to five types.

Type 1: no communication between the median and musculocutaneous nerve.

Type 2: the fibers of medial root of median nerve pass through the musculocutaneous nerve and join the median nerve in the middle of the arm.

Type 3: fibers of the lateral root of the median nerve pass through the musculocutaneous nerve and after some distance leave it to form lateral root of median nerve.

Type 4: the musculocutaneous fibers join the lateral root of the median nerve and after some distance it arise from the median nerve.

Type 5: The musculocutaneous nerve is absent and the entire fibers of musculocutaneous pass through lateral root of median nerve and fibers to the muscles supplied by musculocutaneous nerve branch out directly from median nerve. In this type the musculocutaneous does not pierce the coracobrachialis muscle [7].

Our case report shows the type 5 variation in the right arm.

In the previous studies, Biceps Brachii is known to present a wide variety of variations. The most common is presence of third head. This third head may have its orgin from coracoid process/ pectoralis minor tendon or proximal head of humerus. The one arising from humerus, known as the humeral head of biceps brachii muscle is most common. According to Hitendra et al (2008) presence of humeral head varies in different population namely Chinese 8%, European white 10%, African black 12%, Japanese 18%, South African Blacks 20.55% and 37.5% in Columbians [8]. In the present case, third head arises from the shaft of humerus, close to the insertion of coracobrachialis on both the sides. Presence of this third head of biceps brachii muscle is liable for compression of musculocutaneous or median nerve [9]. As biceps acts during flexion of elbow joint and rapid supination of forearm in a mid-flexed position, an additional biceps head may increase the power of flexion and supination [8].

Abductor pollicis longus muscle is the most important muscle of hand, required for everyday skillful movements. Knowledge about its variation is necessary for reconstructive surgeries. Though we found only 3 tendons, a maximum of 9 tendons have been reported by Mansure et al (2010) [10]. During surgery, existence of multiple tendons can confuse the surgeon. Abductor pollicis longus is known to have split insertions in chimpanjees, gorillas and gibbons [11]. As reported by Rayan and Mustafa (1989), one of the slip of abductor pollicis longus had its insertion into an anomalous thenar muscle [12]. Many times, there is inadequate surgical decompression of De Quervain's Syndrome because of deficient anatomical knowledge. Presence of such variations also reveals anthropological importance. Extra tendons of Abductor pollicis longus may increase the force component [10]. Additional tendons may also be used for reconstructive surgeries.

CONCLUSION

Various anomalies are common in upper limb, but presence of multiple anomalies in the same cadaver is not only rare, but of considerable medical significance.

LIST OF ABBREVIATIONS:

MCN - Musculocutaneous nerve
MN - Median Nerve
APL - Abductor pollicis longus
EPL - Extensor pollicis longus
EPB - Extensor pollicis brevis
APB - Abductor pollicis brevis

ACKNOWLEDGEMENTS

I thank head of department, teachers, colleagues and staff members for their guidance and support. No grant or funding was taken for the research.

Conflicts of Interests: None

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How to cite this article:

Soniya A Gupta, Saiprasad P Bhavsar, Medha V Ambiye, Seema N Khambatta. BILATERAL MULTIPLE VARIATIONS IN THE UPPER EXTREMITY OF A HUMAN CADAVER: A CASE REPORT. Int J Anat Res 2015;3(4):1655-1659. **DOI:** 10.16965/ijar.2015.307