

**Original article:**

## Variations of median nerve and musculocutaneous nerve: Cadaveric study

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### Abstract:

**Introduction:** Variations in human anatomy are one of the most important challenges. The extremities, particularly upper limbs, are susceptible to traumas, but unfortunately, the anatomical variations of brachial plexus are not rare.

**Material & Methods:**The brachial plexuses were dissected bilaterally and examined for any anatomical variations of the median nerve and musculocutaneous nerve.Level of formation and course of the median and musculocutaneous nerve with branches were dissected meticulously, traced and photographed.

**Results:** Variation in the median nerve was observed in 16(20.0%) plexuses. The median nerve was formed by two lateral roots from the lateral cord and one medial root from the medial cord in 5(6.25%) limbs. Formation of median nerve at lower level was seen in 8(10.0%)limbs. In the other 4(5.0%) limbs, there was communication between median nerve and musculocutaneous nerve.Absence of musculocutaneous nerve in 7(8.75%) limbs.

**Key words:** Median nerve, Musculocutaneous nerve

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### Introduction:

Variations in human anatomy are one of the most important challenges. The extremities, particularly upper limbs, are susceptible to traumas, but unfortunately, the anatomical variations of brachial plexus are not rare.<sup>1</sup> More than 50% of anatomical variations in cadaveric studies of human neural system have been reported to belong to the brachial plexus. The plexus supplies both motor and sensory innervations to the upper limb as well as the extrinsic thoracic muscles.

### Materials& Methods:

The present study was carried out by dissection of 80 (40 Right and 40 Left) upper limbs of 40 human cadavers, in the Department of Anatomy, Grant Medical College, Mumbai.Dissection was done as per Cunningham's manual of practical Anatomy. The brachial plexuses were dissected bilaterally

and examined for any anatomical variations of the median nerve and musculocutaneous nerve formation.Level of formation and course of the median and musculocutaneous nerve with branches were dissected meticulously, traced and photographed.

### Results:

Median nerve was normal in 64(80.0%) limbs. Variation in the median nerve was observed in 16(20.0%) plexuses. The median nerve was formed by two lateral roots from the lateral cord and one medial root from the medial cord in 5(6.25%) limbs. Formation of median nerve at lower level was seen in 8(10.0%)limbs. In the other 4(5.0%) limbs, there was communication between median nerve and musculocutaneous nerve.

In the present study of 80 upper limbs musculocutaneous nerve was present in 73

(91.25%) limbs and all of which originated from lateral cord. After the formation of musculocutaneous nerve, it descended down to pierce coracobrachialis in all the cases where it was

present. Out of 73 limbs where it was present, in 4 limbs (5.4%) there was a communication with the median nerve. Absence of musculocutaneous nerve in 7(8.75%) limbs.



Fig.1: Showing three roots of median nerve



Fig.2: Showing low level of formation of median nerve



Fig.3 Showing absence of musculocutaneous nerve

#### **Discussion:**

The brachial plexus is constituted by the ventral rami of spinal cervical nerves including C5-C8 and the first thoracic spinal nerve. A complex of nerves originating from the neck and axilla shapes the brachial plexus. <sup>2</sup>The brachial plexus extends laterally towards the cervico-axillary canal located below the clavicle, but above the first rib and then enters the axilla through this passage. <sup>3</sup>The brachial plexus provides a network of terminal nerves innervating the upper limb.

Three trunks lie in human brachial plexus, stemming from the spinal roots of C5-T1. The ventral rami of C5 and C6 are joined to make the superior trunk. C7 root continues and becomes the middle trunk, and the inferior trunk is shaped by the union of C8 and T1 roots. <sup>4</sup>

The ulnar nerve typically originates from C8 and T1 roots.

Variation on the median nerve was observed in 22 plexuses. The median nerve was formed by two lateral roots from the lateral cord and one medial root from the medial cord in 6 cadavers. In the other 5 cases, either the musculocutaneous nerve gave a communicating branch to median nerve or

the median nerve took one branch from the posterior cord of the plexus. <sup>5,6</sup>

The anatomical variations of the brachial plexus in human infant and adult cadavers are well documented. Kerr et al listed 29 forms of the brachial plexus among 175 cadaver specimens dissected between 1895 and 1910. Elsewhere, 38 variants of this plexus were observed at the several levels of the network such as trunks, cords and terminal nerves, routing mechanism and branching pattern of the nerve fibers (. Moreover, projection of contributing branches from the fourth cervical (C4) or the second thoracic (T2) spinal root to brachial plexus was seen <sup>7</sup>.

After their origin from the brachial plexus, the median and musculocutaneous nerves pass through the anterior compartment of the arm without receiving any branch from any nerve in the neighborhood. In the arm, the musculocutaneous nerve passes through the coracobrachialis muscle and innervates the coracobrachialis, biceps brachii and brachialis muscles and continues as the lateral cutaneous nerve of the forearm without any communication with the median or other nerves.

Anatomical abnormalities might affect the conduction of the various brachial plexus blockades

that have been extensively utilized as a component of anesthesia for upper extremity surgeries at the last century. Moreover, some variations, surprisingly, cause the damage of the plexus following radical neck dissection and other surgical operations of the axilla and upper arm .

Furthermore, anomalies of brachial plexus could face surgeons to failure during procedures and surgical management of brachial plexus tumors or trauma.

Pandey and Shukla<sup>1</sup> reported in their study of 344 specimens median nerve formation at lower level in 6 (1.7%) limbs. In the present study, formation of median nerve at lower level was seen in 5(6.25%) limbs.

Choi D et al reported variations in connections between the musculocutaneous and median nerves

in the arm. These variations were seen in 64 cadavers (46.4%).

Venieratos and Anagnostopoulou classified the communication between two nerves into 3 types. In present study, communication between median nerve and musculocutaneous nerve 4(5.0%) limbs.

Prasad Rao PV and Chaudhary SC observed two cases of absent musculocutaneous nerve in 24 upper limbs. Median nerve took over the area of supply of the musculocutaneous nerve by giving both muscular and sensory branches. Guttenberg et al. in their study of 56 upper limbs have noticed absence of musculocutaneous nerve in two (3.6%) upper limbs. Present study showed absence of musculocutaneous nerve in 7(8.75%) limbs.

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