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Original Research Article

VARIATIONS IN LATERAL ROOT OF MEDIAN NERVE

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ABSTRACT

Background: Median nerve is formed in axilla by medial & lateral roots from medial & lateral cords of brachial plexus respectively. Variations of median nerve are not uncommon. Incidences of variations in lateral root are more common than that of medial root. This study was undertaken to find out the different ways by which lateral root contributes in formation of median nerve. These finding will provide anatomical basis for clinical correlation in case of neuropathies & surgeries of upper limb.

Materials and Methods: 80 upper limbs were dissected to find out the variations of the lateral root in the formation of median nerve.

Result and findings: Median nerve was formed in the axilla: - by one medial root & two lateral roots in 16.25% cases, one lateral root was thin & and the other was thick in 2.5% cases, 2nd lateral root joined the median nerve in middle third of arm in 2.5 % cases. In 11.25 % cases median nerve was formed in the middle 1/3rd of arm by medial & lateral root, 2nd lateral root joined it at lower 1/3rd of arm. In 2.5 % cases two small lateral roots joined the medial cord before it branched into ulnar nerve and medial root of median nerve ,a 3rd lateral root joined the medial root to form the median nerve. In 8.75 % median nerve was formed in axilla by one medial & two lateral roots; a 3rd lateral root joined it at lower part of axilla

Conclusion: Though, formation of median nerve by several lateral roots is considered to be a rare variation, in our study we observed 41.25% variations of different types.

KEY WORDS: Median nerve, Lateral root, Axillary artery, Medial root, Brachial plexus.

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INTRODUCTION

The median nerve (MN) is formed by two roots, lateral root (LR) from the lateral cord (LC) and medial root (MR) from the medial cord (MC) of the Brachial Plexus. Its fibers are derived from anterior primary rami of C5 - C8 and T1 spinal nerves. The roots of the median nerve embrace the third part of the axillary artery (AA), uniting either anterior or lateral to the vessel [1].

Median nerve passes between two heads of pronator teres and supplies the flexor muscles in forearm and 3 thenar muscles and 2 lumbricals in the palm [2]. It usually does not supply the brachial muscles [3]. However, the unusual distribution and formation of median nerve in the upper limbs can be found during

routine cadaveric dissection of brachial plexus. The objective of this study was to find variations of lateral root in formation of the median nerve. Nerve variations of the upper limb are described by many authors, these variations may help in interpretation and diagnosis of a nervous compression having unexplained clinical symptoms [4].

MATERIALS AND METHODS

The routine dissection of 80 cadavers, were done in the department of anatomy, M.I.M.E.R Medical College Talegaon, to find out the variations of lateral root in the formation of median nerve. The specimens were carefully dissected and variations were observed and photographed.

RESULT AND FINDINGS

Variation I: (Fig.1) Median nerve (MN) was formed in axilla by one medial root from medial cord, passed between axillary artery and subscapular artery; and joined the lateral root (LR) from lateral cord anterior to axillary artery. The 2nd LR arose from the lateral cord after the musculocutaneou nerve was given off and joined the median nerve medial to the axillary artery. Median nerve was found to be normal in rest of its course and distribution. We observed this type of variation in 16.25% cases (13 of 80 upper limbs).

Variation II: (Fig.2) Median nerve was formed by a medial root and a lateral root in the upper 1/3rd of arm medial to brachial artery. There was 2nd lateral root derived from lateral cord after musculocutaneous nerve was given off and joined the median nerve at the level of insertion of deltoid. We found this type of variations in 11.25 % cases (9 of 80 upper limbs).

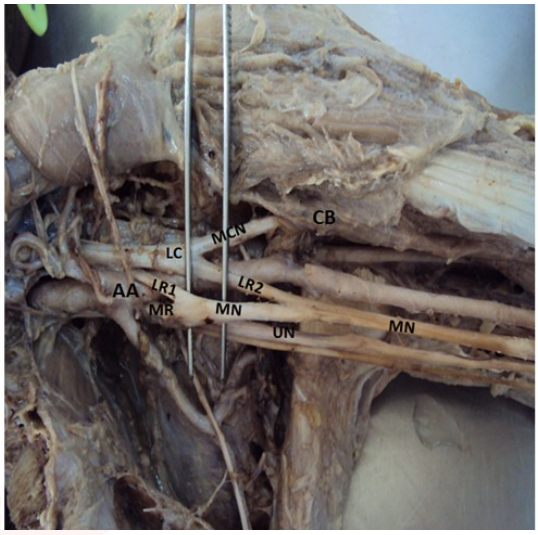
Variation III: (Fig.3) Median nerve was formed as usual by one medial root & one lateral root in axilla .The second lateral root joined the median nerve in middle third of arm about 8 cm below the formation. This variation was bilateral. 2.5 % cases (2 of 80 upper limbs).

Variation IV: (Fig.4) Median nerve was formed lateral to brachial artery in upper part of arm by one medial root & two lateral roots.1st lateral root was thin and anterior to axillary artery and 2nd thick. We observed this type of variation in 6.25 % cases. (5 of 80 upper limbs).

Variation V: (Fig.5) Median nerve was formed as usual by one medial root & one lateral root in axilla. But proximal to its formation two small twigs (LR2 and LR3) from lateral cord crossed the axillary artery anteriorly and joined the medial cord before it divided into ulnar nerve and medial root of median nerve. This variation was bilateral 2.5 % cases (2 of 80 upper limbs).

Variation VI: (Fig.6) Median nerve was formed by one medial & one lateral root (LR3) below the lower border of teres major. Two small twigs (LR1&LR2) from lateral cord joined the medial root. This type of variation was observed in 8.75 % cases. (7 of 80 upper limbs).

Fig. 1: Showing Variation I



MN - Median nerve, **MCN:** Musculocutaneous nerve, **LR –** Lateral root of Median Nerve, **MR –** Medial root of Median Nerve, **UN-** Ulnar Nerve, **AA-** Axillary Artery, **CB-** Coracobrachialis

Fig. 2: Showing Variation II.

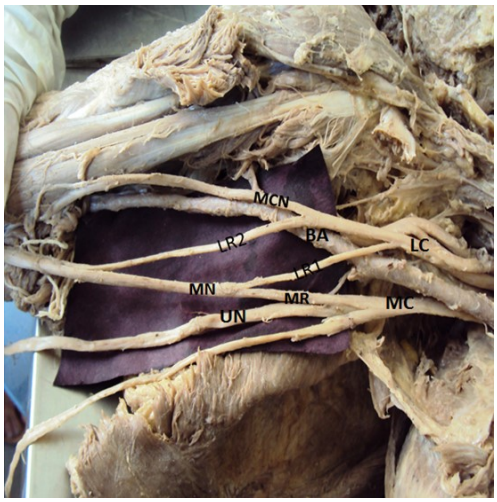


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Fig. 3: Showing Variation III.

MN - Median nerve, **MCN:** Musculocutaneous nerve, **LR –** Lateral root of Median Nerve, **MR –** Medial root of Median Nerve, **UN-** Ulnar Nerve, **AA-** Axillary Artery, **CB-** Coracobrachialis

Fig. 4: Showing Variation IV.

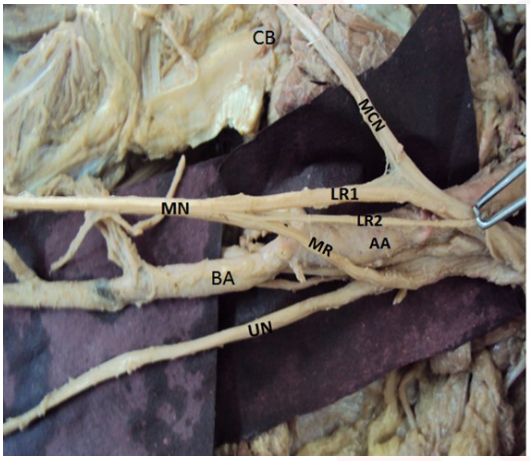

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Fig. 5: Showing Variation V.

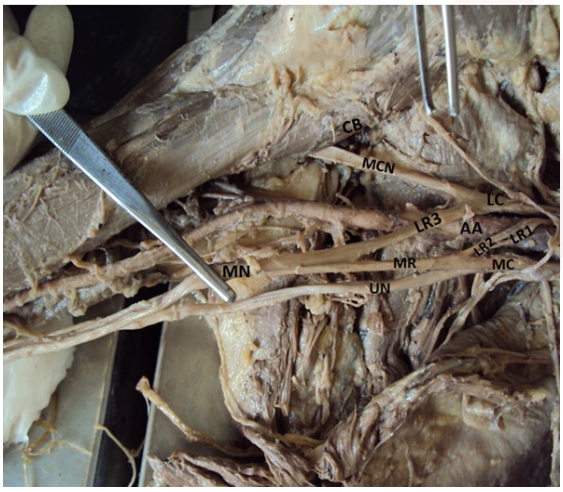

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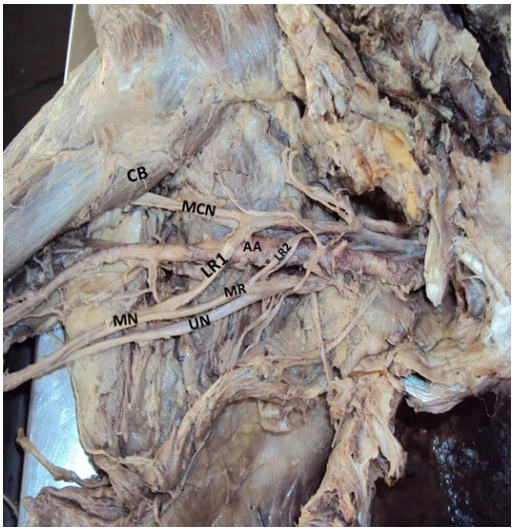
Fig. 6: Showing Variation VI.



MN - Median nerve, **MCN:** Musculocutaneous nerve, **LR –** Lateral root of Median Nerve, **MR –** Medial root of Median Nerve, **UN-** Ulnar Nerve, **AA-** Axillary Artery, **CB-** Coracobrachialis

DISCUSSION

Variations in brachial plexus and the nerves of upper limbs were first described by Walsh (1877) [5]. Thereafter, numerous authors have reported number of cases and incidences of unusual median nerve formation found in their own populations.

In the literatures, it was found that the most incidence of unusual formation of the median nerve was observed in British (46.64 %) and Indians (26.4 %) [6].

In present study we looked for variations of lateral roots in the formation of median nerve in axilla and arm.

Median nerve formation in axilla by two lateral roots and one medial root was reported by Pais etal [7] and Chauhan and Roy [8]. In present study we observed similar findings in 16.25% cases (13 of 80 variation no I).

Formation of median nerve by three roots (two lateral & one medial), one lateral root joining in axilla & 2nd in arm, was reported by Bhanu, Sankar & Susan in 2010 [9] & Sontakke, Tarnekar, Waghmare et al in 2011 [10]. In our study, in 2.5 % cases (2 of 80; variation no III), we found the same variations. In 11.25% (9 of 80 variation no II), median nerve was formed in the middle 1/3rd of arm by one medial & one lateral root, 2nd lateral root joined the median nerve at lower 1/ 3rd of arm. In 2.5 % (2 of 80, variation no IV),

median nerve was formed in lower part of axilla by one medial root & two lateral roots (one thick and one thin LR), these two types of variations have not yet reported in the literature.

Satyanarayan & Guha[11] and Uzun and Seeling (2001) [12] reported formation of median nerve by four roots (3 lateral & 1 medial). In present study we observed two distinct types of variations of median nerve formation by four roots. In 8.75 % cases (7 of 80; variation no VI) two lateral roots joined the medial root in axilla and third lateral root joined the median nerve in upper part of arm, and in 2.5 % cases (2 of 80; variation no V) two small lateral roots joined the medial cord before it branched into ulnar nerve and medial root of median nerve and the third lateral root joined the medial root in the arm to form the median nerve, this type of variation has not yet been reported. Ulnar nerve; a branch of medial cord has root value C7 C8 & T1, but the C7 root does not take part in formation of medial cord. Normally ulnar nerve receives C7 from lateral cord as lateral root of ulnar nerve. [3] In above said variation the lateral root which was joining the medial cord may be contributing C7 to ulnar nerve through medial cord.

CONCLUSION

In our study three types of variations that is variation number 2, 4 and 5 are not yet reported in literature.

Formation of median nerve by several lateral roots though considered to be a rare variation, in our study we observed 41.25% variations of different types. Such anomalies have clinical significance to surgeons, radiologists and anatomists for consideration of clinical applications such as injured nerve transfer and brachial plexus surgery (Choi et al. [13], 2002; Budhiraja et al. [4], 2011a, b & Iamsaard et al. [14], 2012a, b). Knowledge of the possible variations of median nerve with respect to site and root of formation is necessary for the anesthetist, plastic surgeon and oncologist to avoid the mismanagement and consequences. Considering its clinical implications more studies with large sample size have to be done in different regions of our country to find out the incidence of such type of variations.

Conflicts of Interests: **None**

ABBREVIATIONS

MN - Median nerve **AA -** Axillary artery
MR – Medial root **LR –** Lateral root
MC - Medial cord **LC -** Lateral cord

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