Anatomical Variation in Musculocutaneous Nerve –A Cadaveric Study

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Abstracts: **Introduction:-**Variation in origin, branching pattern, course and termination of musculocutaneous nerve are common. These anatomical variations important for anatomist, clinicians, anaesthetics and surgeons for avoid unexpected complication. **Material & method**:- Detailed study of 50 upper limbs of cadavers carried out in last 3 year. **Result** –in this study 4% cases there is absence of musculocutaneous nerve. Musculocutaneous nerve not piercing coracobrachialis and communicate with median nerve in 4% cases and musculocutaneous nerve rejoins with median nerve in 2% cases. **Conclusion**:- In this study we found significant variation in musculocutaneous nerve which is important for surgeons, while planning surgery in axilla and arm to avoid injury. [Bhojak N NJIRM 2014; 5(1) : 92-95]

Key Words: Lateral Cord, Median Nerve, Musculocutaneous Nerve, Variations

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Introduction: A Variation in formation of brachial plexus and its branching pattern is reported by several authors. Knowledge of variation is important for anatomist and clinicians. Normally the musculocutaneous nerve arises from the lateral cord (C5-7) it pierces coracobrachialis. It supplies coracobrachialis, both head of biceps and most of brachialis muscle. Just below the elbow it pierces the deep fascia and continues as the lateral cutaneous nerve of the forearm. The branch to coracobrachialis is given off before the musculocutaneous nerve enters the muscle: its fibres are from the seventh cervical ramus and may branch directly from the lateral cord. Branches to biceps and brachialis leave after the musculocutaneous has pierced coracobrachialis: the branch to brachialis also supplies the elbow joint. The musculocutaneous nerve supplies a small branch to the humerus, which enters the shaft with the nutrient artery[1].

Variation of musculocutaneous nerve (MCN) reported by several authors[1]. Reported cases include nerve not pierce corachobrachialis by Nakatani et al[2] and complete absence of musculocutaneous nerve by Prasada rao[3] and in case of complete absence of musculocutaneous nerve muscle which normally supplied by it were innervated by median nerve reported by Mane U.W.[4] Such variation may be encountered during surgery or during clinical practice. Knowledge of the variation is essential for anatomist, anaesthetics, orthopaedics and trauma surgeon.

Material and Methods: 50 upper limbs of 25 embalmed cadavers dissected for study during period of 2 years. The pectoral region, axilla and arm dissected carefully. Cord and branches of cord traced up to forearm to see musculocutaneous nerve and its branches. Origin, number, course and communication of it with median nerve and relation to coracobrachialis were observed.

Observation & Results:- Variations found in 5 limbs, remaining limbs have normal anatomy of musculocutaneous nerve.

Case 1: There is absence of musculocutaneous nerve in right side of upper limb. In this case lateral cord after giving lateral pectoral nerve continue as lateral root of median nerve which join with medial root of median nerve and form median nerve. Nerve to coracobrachialis arises from lateral cord directly and nerve supply of biceps and brachialis derived directly from median nerve. One branch of median nerve became continues as lateral cutaneous nerve of forearm as shown in Fig-1.

Case 2: In second case, absence of musculocutaneous nerve and median nerve formed by fusion of lateral root and median root of median nerve. Nerve to coracobrachialis arises from median nerve below the union of two roots. In further course before insertion of coracobrachialis muscle one common trunk originate from median nerve which give one branch to biceps and one to brachialis and then

Fig-1 MN- median nerve, NCB-nerve to coracobrachialis, NBB-nerve to biceps, NB-nerve to brachialis, LCNF-lateral cutaneous nerve of forearm

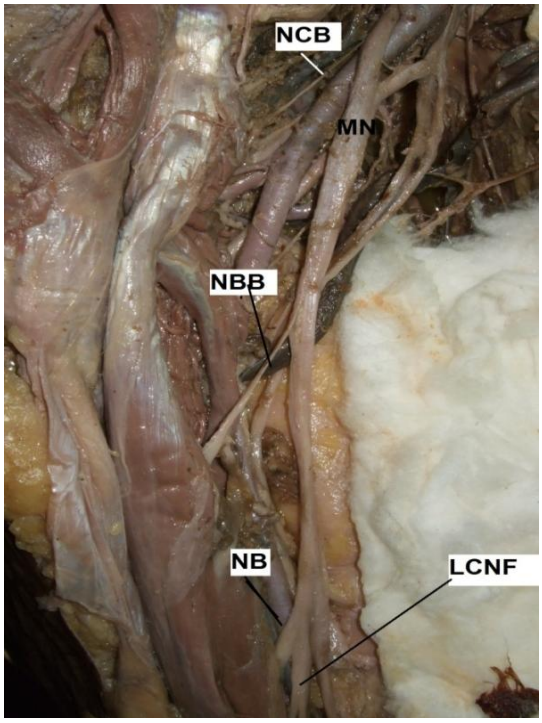


Fig-2 MN- median nerve, NCB-nerve to coracobrachialis, NB-nerve to brachialis, CT-common trunk, NBB – nerve to biceps brachii

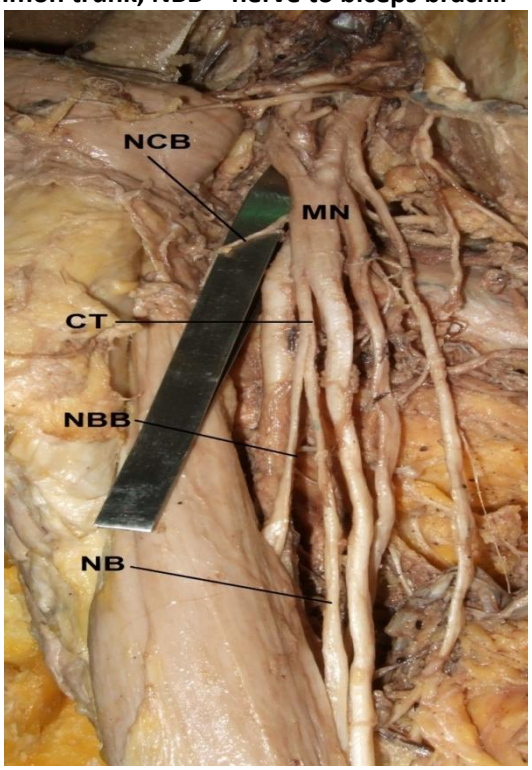


Fig -3 MN- median nerve, MCN-musculocutaneous nerve, LPN-lateral pectoral nerve, UN- ulnar nerve, AA-axillary artery, MCNF-median cutaneous nerve of forearm, R-musculocutaneous nerve rejoining median nerve

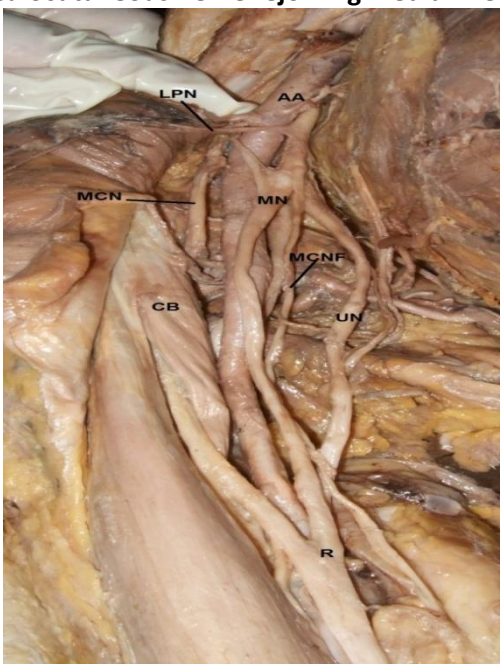
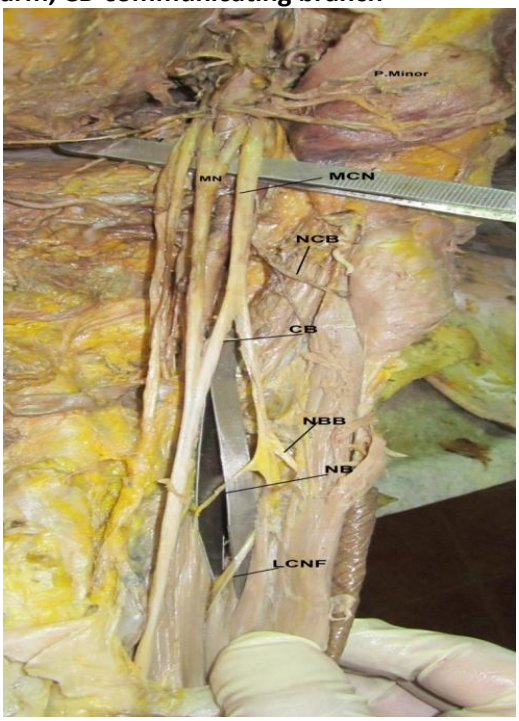


Fig -4 MN- median nerve, MCN-musculocutaneous nerve NCB-nerve to coracobrachialis, NBB-nerve to biceps, NB-nerve to brachialis, LCNF-lateral cutaneous nerve of forearm, CB-communicating branch



continues as lateral cutaneous nerve of forearm as shown in Fig-2

Case 3: Third case is of right sided upper limb where lateral root from lateral cord and medial root from medial cord unite to form median nerve. Musculocutaneous nerve derived from lateral cord after that pierces the coracobrachialis muscle and rejoins the median nerve as shown in Fig-3.

Case 4:- In fourth case right side of upper limb, lateral cord after giving lateral root of median nerve continues as musculocutaneous nerve which is not pierces the coracobrachialis muscles but giving one branch to it. In further course it give one communicating branch to median nerve and then supply biceps and brachialis muscles and then continue as lateral cutaneous nerve of forearm as shown in Fig-4. Similar variation present on left side in this cadaver

Discussion:- Musculocutaneous nerve is a mixed variety of peripheral nerve which supply muscles of anterior compartment and continued as lateral cutaneous nerve of forearm[1]In present study, absence of musculocutaneous nerve found in 2 cases, where there is unilateral absence of 2 cases. Prasad Rao[3] reported 2 cases and Jamuna M[5] reported 3 cases of absence of musculocutaneous nerve from lateral cord. Mane U.W.[4] observed absence of Musculocutaneous nerve along with presence of accessory head of biceps brachii. Two muscular branches arises from median nerve and supplied biceps brachii and brachialis muscles. Branch which supplied brachialis continued as lateral cutaneous nerve of forearm.

The coracobrachialis muscle was supplied by nerve that arises from lateral root of median nerve. In present study, near to similar case found but there is absence of accessory head of biceps brachii muscle. Jamuna M.et[5] al also found similar case. Jamuna M et al[5] found one case in which common branch arise from median nerve and which supplies muscles of anterior compartment. In present study we found nerve to coracobrachialis arise from median nerve below the union of two root. In further course before insertion of coracobrachialis muscle one common trunk originate from median nerve which give one branch to biceps and one to brachialis then continues as lateral cutaneous nerve of forearm.

In present we found in one case that Musculocutaneous nerve after piercing coracobrachialis rejoin to median nerve. Similar cases also reported by Jamuna M.[5], Joshi[6] and in 3.125% of the cases which was reported by Bhattarai[7]. In some cases musculocutaneous nerve perforates not only coracobrachialis but also short head of biceps or brachialis observed by Bergman et al[8]. This variation is not observed in present study.

Some time nerve does not pierce the coracobrachialis muscle and only muscular branch pierce the coracobrachialis and nerve passes behind or between coracobrachialis and biceps. Jamuna et al[5] and Chitra et al[9] reported similar cases.In present study, we found one case which shows bilaterally similar variation that musculocutaneous nerve instead of piercing coracobrachialis it give one muscular branch to it and in further course it give one communicating branch to median nerve and then supply biceps and brachialis and continue as lateral cutaneous nerve of forearm. Similar case observed by Sachdeva K et al[10].

Variation in communication between median and musculocutaneous have been categorized by Li Minor[11] in following five types:-
Type-1: No communication between median and musculocutaneous nerve.
Type-2: Fibres of lateral root of median nerve pass through the Musculocutaneous nerve and join the Median nerve in the middle of the arm.
Type-3: Lateral root fibres of medial root of median nerve pass through the Musculocutaneous nerve and after some distance, leave it to form the root of the Median nerve.
Type 4: The Musculocutaneous fibres join the lateral root of the Median nerve and after some distance the Musculocutaneous arise from the median nerve.
Type 5: The Musculocutaneous nerve is absent and the entire fibres of Musculocutaneous pass through lateral root and fibres to the muscles supplied by Musculocutaneous nerve branch out directly from Median nerve.

In our study we found type -2, type-4 and type 5 of Li Minor et al[11].

Venieratos and Anagnostopoulou[12] also described 3 types of communication between Musculocutaneous and Median nerve in relation to Coracobrachialis; Type 1: communication between Musculocutaneous and Median nerve is proximal to the entrance of Musculocutaneous into Coracobrachialis. Type 2: communication between the two nerves is distal to the muscle. Type 3: neither the nerve nor its communicating branch pierced the muscle. In our study we found type 3 of Venieratos and Anagnostopoulou[12] (1998).Iwata et al[13] explained that human brachial plexus appeared as single radicular cone in upper limb bud, Ventral and dorsal segment form after division of upper limb bud. The ventral division give roots to ulnar and median nerve. Musculocutaneous nerve arises from median nerve. Disturbances in this process lead to anatomical variation.Identification and palpation of musculocutaneous nerve is important during shoulder surgery as it is vulnerable to injury during coracoids process grafting and arthroscopies may lead to damage to nerve.

Conclusion:- Brachial plexus and it branches and axillary and its branches important for every medical professional who need to explore axilla during operative procedure or for treatment and for dissection. Knowledge of variation of musculocutaneous nerve may prove valuable information in traumatology of arm as well as in plastic and reconstructive repair operation.

References

1. Standring S., Gray's anatomy the anatomical basis of clinical practice, 40th ed. London: Churchill Livingstone; 2008.pp. 791–822.
2.Nakatani T, Mizukami S, Tanaka S: Three cases of the musculocutaneous nerve not perforating the coracobrachialis muscle. Acta Anat Nippon 1997a; 72:191-4.
3.Prasada Rao PVV, Chaudhary SC. Absence of the musculocutaneous nerve: Two case reports. Clin Anat 2001; 14:31-5.
4. Mane U.W., Pandhare S.R., Absence of Musculocutaneous Nerve Along With Accessory Head of Biceps Brachii. International Journal of Recent Trends in Science And Technology, E-ISSN 2249-8109, Volume 1, Issue 2, 2011 pp 45-48
5. Jamuna M. and Amudha G., A Cadaveric Study on the Anatomic Variations of the Musculocutaneous Nerve, Journal of Clinical and Diagnostic Research. 2011 November (Suppl-1), Vol-5(6): 1144-1147
6. Joshi SD, Joshi SS, Athavale SA: Hitch –hiking fibres of the lateral cord of the brachial plexus in search of their destination. J. Anat. Soc. India 2008; 57: 26-9.
7. Bhattarai C, Poudel PP: Unusual variations in the musculocutaneous nerves. Katmandu University Medical Journal 2009; V0l. 7, No.4, 28:408-10.
8. Bergman RA, Thompson SA, Afifi AK, Saadeh FA: Compendium of the human anatomic variation. Urban and Schwarzenberg, Baltimore.1988; 138-43.
9. Chitra R. Multiple bilateral neuroanatomical variations of the nerves of the arm. Neuroanatomy 2007; 6:43-5
10. Sachdeva K.,Singla R.K, Communication between median and musculocutaneous nerve. J.Morphol. Sci.,2011,vol.28,no.4,p.246-249.
11. Le Minor JM. A rare variant of the median and musculocutaneous nerves in man. Archieves Anatomy Histology Embryology 1992; 73: 33-42.
12. Venierators D and Anangnastopoulou S classification of communication between the musculocutaneous and median nerves. Clincal Anatomy. 1998; 11: 327-331.
13. Iwata H. Studies on the development of the brachial plexus in Japanese embryos. Rep Dept Anat Mie Prefect univ Sch Med 1960; 13:129-44.
14. Flatow EL, Bigliani LU, April EW: An anatomic study of the musculocutaneous nerve and its relationship with the coracoids process. Clin Orthop Relat Res 1989; 244:166-71

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