



ORIGINAL RESEARCH PAPER

Anatomy

VARIANT FORMATION OF MEDIAN NERVE IN NORTH INDIAN POPULATION: A CADAVERIC STUDY

KEY WORDS:

Chaudhary S*	Assistant Professor, Department of Anatomy, Kanti Devi Medical College Mathura, India *Corresponding Author
Ray S.	Assistant Professor, Department of Anatomy, Kanti Devi Medical College Mathura, India
Ashoka R. K.	Professor and Head, Department of Anatomy, Kanti Devi Medical College Mathura, India
Mishra A. B.	Assistant Professor, Department of Anatomy, Kanti Devi Medical College Mathura, India
Parasher V.	Associate Professor, Department of Anatomy, Kanti Devi Medical College Mathura, India
Jagdish P.	Assistant Professor, Department of Anatomy, Kanti Devi Medical College Mathura, India

ABSTRACT

Twenty upper limbs were studied. We encountered variation of formation of median nerve by four where two extra roots were arising from lateral cord of brachial plexus and third root came from musculocutaneous nerve roots and In another cadaver, variant median nerve formed in lower one third of arm. Such variations are significant in nerve compression syndromes in axilla. Such variations need to be assessed while operating in surrounding areas during surgeries around axilla. These variations may relate to embryological or evolutionary process. Such variations are important in drainage of axillary abscess. Such extra roots may give false reading in nerve stimulation tests and physiological assessment tests. Axillary region is important for breast cancer surgeries which makes this area open to further research and exploration. Variations of median nerve formation at the level of brachial plexus are important in nerve compression syndromes .The surgeons should be aware of such anomalies while operating around axilla and upper one third of arm.

INTRODUCTION

In classical description the median nerve (labourer's nerve) originates by two roots from the lateral (C5, 6, 7) and medial cords (C8, T1) of brachial plexus. These roots join in the form of letter 'Y' and embrace the third part of axillary artery. The nerve enters the arm first lateral to the brachial artery and then crosses from lateral to medial side of this vessel by passing anterior to it near the insertion of coracobrachialis, further it descends medial to it and proceeds towards the cubital fossa where it lies posterior to the bicipital aponeurosis and anterior to the brachialis. It usually enters the forearm between the humeral and ulnar heads of Pronator teres muscle. (1)

MATERIAL AND METHODS

Twenty upper limbs were included for study variant median nerve by routine dissection.

OBSERVATIONS

The purpose of present study is to study a variant formation of median nerve in twenty upper limbs. We found median nerve formed by four roots in 50 yr old male cadaver (figure 1) and formation of median nerve in lower one third of arm in a 45 yr old cadaver (figure 2) .During dissection median nerve was recognized as having an unusual formation by four roots out of which two roots were arising from lateral cord of brachial plexus and R 3 arose from musculocutaneous nerve. R 4- root 4 arose from medial cord of brachial plexus. In both cases median nerve was formed anterior to brachial artery and was normal in rest of the course and distribution. The arterial pattern was normal in distribution in both cases. The median nerve and brachial artery was also normal in course and distribution. Incidence of variant median nerve was found to be as high as 16.66 %.



Figure- 1 showing four roots of median nerve

R 1, R2-Roots 1 and 2 arising from lateral cord of brachial plexus,
 R3-Root 3 arising from Musculocutaneous nerve (MCN),
 MR- Medial Root arising from medial cord of brachial plexus, (R 4)
 MN- Median Nerve,
 BA- Brachial Artery,
 UN- Ulnar nerve,
 MCNFA- Medial Cutaneous Nerve of Forearm.

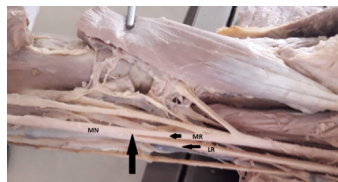


Figure 2 -Showing Formation of median nerve in lower one third of arm.

MR- Medial Root of median nerve
 LR- lateral root of median nerve
 MN- Median Nerve,

DISCUSSION

The MN has two roots from the lateral and medial cords of the brachial plexus, which embrace the third part of the AA, uniting anterior or lateral to it (2). The medial root crosses in front of the AA. Ultimately, MN trunk is formed at the lower border of the axilla (3). Apart from the usual detected MN's pattern of formation, MN may be formed by the union of three roots, two lateral and one medial (4, 5). Such an incidence has been noticed in 11.7% (6), 14% (7), 26% (8) or as high as 52% (9).

Kolagi et al. (11) observed three roots from the lateral cord of the brachial plexus to be passing obliquely anterior to the AA and joining separately with the medial root of the MN. (10)

Pandey et al. mentioned the existence of one or two communicating branches from the lateral cord to the medial root of MN in 2.3% of their cases (11) In some instances there are additional roots of MN derived from the lateral cord of the brachial plexus or the MN's lateral root communicating either with the medial cord of the brachial plexus or with the MN's medial root that have been termed "intercordal neural communications"(12)

Sargon et al (5) reported the formation of the median nerve by three roots in that one of the lateral cord roots was located with a very close course over the axillary artery. This variation was present in 18.75% .

The anatomical variations of the musculocutaneous(MCN) and the median nerve(MN) in the arm have been classified into 5 types by Le Minor JM (13).

Type 1: There are no communicating fibres between the musculocutaneous and the median nerves. The musculocutaneous nerve pierces the coracobrachialis (CB) muscle and innervates the coracobrachialis, biceps brachii and brachialis muscles.

Type 2: Although some fibres of the medial root of the median nerve unite with the lateral root of the median nerve to form the median nerve, some leave to run within the musculocutaneous nerve and after some distance leave it to join their proper trunk.

Type 3: The lateral root of the median nerve runs into the musculocutaneous nerve and, after some distance, leaves it to join its proper trunk.

Type 4: The fibers of the musculocutaneous nerve unite with the lateral root of the median nerve and, after some distance, emanate from the median nerve.

Type 5: The musculocutaneous nerve is absent. Its fibers run within the median nerve along its course.

Our variation appeared to be type 3 type where fibres of lateral root runs into MCN and after some distance joins MN.

Third root of MN by MCN was carried from 3 cm distance of CB and was separated from MCN but instead of joining MN in the beginning it pierced CB and passed out the muscle at a point close to the entrance to CB muscle and joined to MN in Middle of arm.(14)

right median nerve was formed by three roots, two coming from lateral cord and one from medial cord of brachial plexus.(15)

The median nerve was formed by five roots; three roots originated from the lateral cord of the brachial plexus joined individually the median nerve's medial root. The latter (fourth) root was united with the lateral (fifth) root of the median nerve forming the median nerve distally in the upper arm(16)

Injury to such a variant nerve in the proximal arm may lead to a galaxy of manifestations including sensory, motor, vasomotor and trophic changes.(17)

CONCLUSION

Preoperative awareness of such variations on the part of the surgical team is extremely important to avoid iatrogenic arterial injury, particularly in light of the increasing number of laparoscopic interventions. Such variations could be the reason for compression of axillary artery. Such variations could be responsible for false reading in various nerve conduction tests. Further research should be done to find out the cause of such anomalies. The number of nerve conduction

studies performed are gradually increasing; therefore, knowledge of variant anatomic features has become more important than in the past. Every practicing radiologist and surgeon must have in-depth knowledge of this topic for better knowledge of clinical conditions associated with the nerve.

REFERENCES

1. Standring S. Gray's Anatomy. 38th Ed. Elsevier Churchill Livingstone. 2000; 1270-72
2. Williams PL . Gray's Anatomy. The anatomical basis of Medicine and Surgery.38th edition. Edinburgh: Churchill Livingstone 1995: 1270.
3. McMinn R. Last's Anatomy. Regional and Applied. 8th edition. Edinburgh : Churchill Livingstone 1990 :82
4. Goyal N, Harjeet, Gupta M. Bilateral variant contributions in the formation of median nerve. Surg Radiol Anat 2005;27:562-565
5. Sargon MF, Uslu SS, Celik HH, Aksit D. A variation of the median nerve at the level of the brachial plexus. Bull Assoc Anat 1995; 79:25-26.
6. Nasr AY. Morphology and clinical significance of the distribution of the median nerve within the arm of human cadavers. Neurosciences 2012; 17(4): 336-344.
7. Egleseder E, Goldman M. Anatomical variations of the musculocutaneous nerve in the arm. Am J Orthop 1997;26:777-780.
8. Channabasaganouda, Shrish P, Shinde V, Jevoor PS, Nidoni M. A study of anatomical variations of median nerve in human cadavers. IJBR 2013; 4(12): 682-690
9. Fazan VPS, Amadeu AdS, Caleffi AL, Filho OAR. Brachial plexus variations in its formation and main branches. Acta Cir Bras 2003; 18(5): 14-18.
10. Kolagi SI, Rairam GB, Herur A. Multiple variations of median nerve with persistent median artery. A case report and review of literature. Anatomica Karnataka 2010; 4(1):44-46
11. Pandey SK, Shukla VK. Anatomical variations of the cords of brachial plexus and the median nerve. Clin Anat 2007;20: 150-156
12. Baliyan R, Mehta V, Arora J, Nayyar AK, Suri RK, Rath G. Unilateral intercordal neural communication coexistent with variant branching pattern of posterior cord of brachial plexus. Acta Medica (Hradec Králové) 2011;54(3): 131-134
13. Le Minor JM. A rare variation of the median and musculocutaneous nerves in man. Arch Anat Histol Embryol. 1990; 73: 33-42. Sargon MF, Uslu SS, Celik HH, Ak it D. A variation of the median nerve at the level of brachial plexus. Bull Assoc Anat (Nancy). 1995;79(246):25-6.
14. Mohammad Sadeq Gholami Farashahi 1, Rahimeh Seifali 1*, Ali Arab Kheradman 2 Case Report: Formation of Median Nerve by Three Roots A Aug 2014, 11(3):155-57
15. N. Satyanarayana1, C.K. Reddy2, P. Sunitha3, N. Jayasri4, V. Nitin5, G. Praveen6, R. Guha7, A.K. Datta8, M. M. Shaik9 Formation of median nerve by three roots: A case report Journal of College of Medical Sciences-Nepal, 2010, 6(1): 47-50
16. Konstantinos Natsis, George Paraskevas, Maria Tzika Five Roots Pattern Of Median Nerve Formation Acta Medica (Hradec Králové) 2016; 59(1):26-28
17. Saeed and Rufai, A. A.-Median nerve and musculocutaneous nerves: variant formation and distribution. Clinical Anatomy. 2003; 16: 453-7.