ISSN: 2394-0026 (P)
ISSN: 2394-0034 (O)

Case Report

Additional root of median nerve: A case report

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How to cite this article: Billakanti Prakash Babu, Jitendra Singh Yadav. Additional root of median nerve: A case report. IAIM, 2015; 2(1): 112-115.

Available online at www.iaimjournal.com

Received on: 19-12-2014 **Accepted on:** 24-12-2014

Abstract

Anomalies of the brachial plexus and its terminal branches are common. During routine dissection in an adult male cadaver in the right upper limb a rare variation in the formation of median nerve was observed. Median nerve was formed by three roots, one from medial cord and two from lateral cord of brachial plexus. The additional root originated from lateral cord 3 cm below the lateral root and had an oblique course in front of axillary artery and joined with the median nerve in the upper third of arm. However, the distribution of the anomalous median nerve was normal in arm, forearm and palm and arterial pattern was also normal. Presence of additional lateral root of median nerve though rare is of great academic and clinical significance in Orthopedics, Anaesthesiology, Sports medicine and Physiotherapy.

Key words

Median nerve, Additional lateral root, Anomalies.

Introduction

Brachial plexus is formed by ventral rami of lower four cervical (C5–C8) and first thoracic (T1) nerves. The brachial plexus has roots, trunks, divisions, cords and their branches. From the cords arise terminal branches including the musculocutaneous (MCN), median (MN), ulnar, axillary, and radial nerves. MN is formed by joining of lateral root (C5, C6, C7) and medial root (C8 and T1) to form composite nerve (C5-C8 and T1) which embrace third part of axillary artery and unite in front or lateral to it [1].There are reports about many variations in the branching pattern of brachial plexus but variations in the formation of roots, trunks and cords are rare. Amongst the several variations noted, the communication of the MN with the MCN has been noted to be the commonest. In

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the present case, we observed unilateral additional lateral root of MN on right side in relation to axillary artery that is rarely reported in cadaveric studies. Knowledge of variable anatomy of the nerve could help to avoid iatrogenic injuries during surgery, e.g. in radical neck dissection. Sometimes an additional root may compress the blood vessels in the axilla, leading to diminished blood supply.

Case report

During routine dissection of an adult male cadaver in the Department of Anatomy, Kasturba Medical College, Manipal, anomalous median nerve with regard to its formation was found in right axilla. Median nerve was formed by three roots, two from lateral cord and one from medial cord. Lateral root of median nerve and additional lateral root were arising from lateral cord and passing obliquely in front of axillary artery and joining individually with the medial root of median nerve and forming trunk of the median nerve. **(Photo - 1)** Further distribution of the anomalous median nerve in the arm, forearm and palm was normal and arterial pattern was also normal. The left median nerve was also normal.

Discussion

The MN has two roots from lateral (C5, C6, C7) and medial (C8, T1) cords of brachial plexus which surround third part of the axillary artery. Variations in the formation of MN were reported by some earlier workers and were related to variant relationship between MN and MCN. Study done by Satyanarayana and Guha found a four rooted MN with three lateral and one medial root [2]. Pandey and Shukla have found in 4.7% cases that the roots of MN joined on medial side of axillary artery, and in 2.3% cases the roots did not join but continued separately [3]. Budhiraja V, et al. reported that anterior division of upper trunk continues as lateral cord along with variant formation of median nerve [4]. Study done by Eglseder and Goldman investigated that the MN nerve was formed of two lateral roots in 14% of their specimens [5]. Chauhan and Roy reported formation of MN by two lateral and one medial roots [6]. Badawoud reported a communicating branch from upper part of a lateral root to lower part of the medial root of median nerve, in one out of four anomalies found in a series of 48 dissected limbs [7]. A study done by Nene, et al. reported a rare posterior union of the two roots, with the thus formed MN coursing behind the axillary and brachial arteries till the cubital fossa [8]. Itoo M S, et al. reported a rare anomaly of brachial plexus, on the right side of an Indian male cadaver, where medial and lateral cords of brachial plexus joined and formed a common anomalous nerve. This nerve then divided into medial and lateral components. The lateral division further gave origin to a smaller branch proximally which pierced coracobrachialis muscle and continued as a large branch which supplied other muscles of the Flexor compartment of arm. The larger medial branch continued as MN [9]. Studies on fetuses by Uysal, et al. reported the variations of the brachial plexus to be more common in females and on the right side [10]. According to Hollinshead, anomalies of nerves are accompanied by abnormalities of vessels [11]. The variations of brachial plexus were associated with those of subclavian, axillary and brachial arteries [12] but in the present study, we found no such associated vascular variation. So many studies are done but in rare cases such type of variation of the formation of MN by two roots from lateral cord of brachial plexus which are surrounding the axillary artery are less found.

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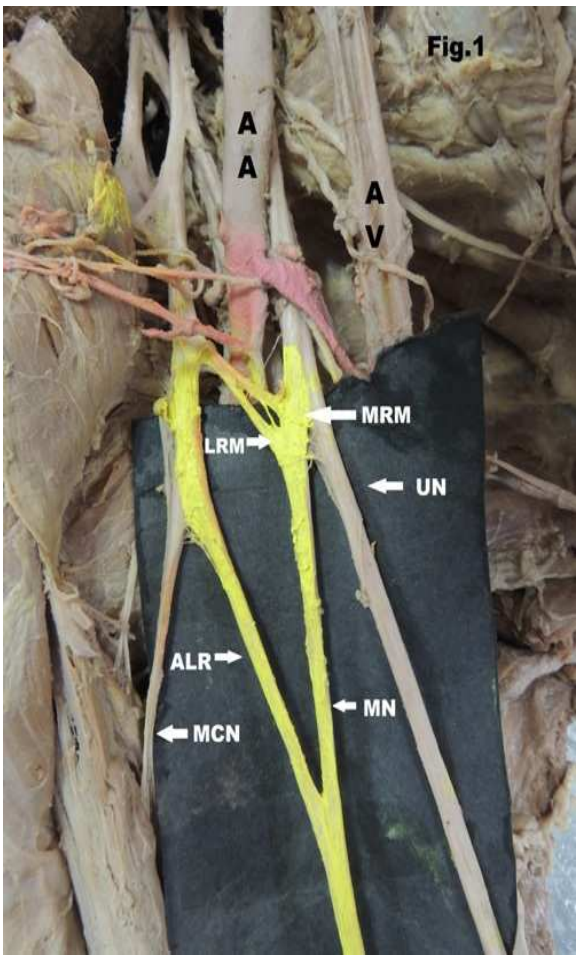
Photo - 1: Formation of right median nerve by three roots, one from the medial cord and two from the lateral cord of brachial plexus. The medial and lateral roots join in front of the third part of axillary artery to form the median nerve. The additional lateral root joins separately with the median nerve distal to the lateral root in the upper third of arm.



(LRM - Latera root of median nerve, MRM - Medial root of median nerve, ALR - Additional lateral root, MN - Median nerve, MCN - Musculocutaneous nerve, UN - Ulnar nerve, AA - Axillary artery, AV - Axillary vein)

Embryology

At the 7th week of development limb musculature first observed as condensation of mesenchyme near the base of the limb buds. After elongation of the limb buds, these muscle splits into flexor and extensor compartments. The position of upper limb buds are opposite the lower five cervical and upper two thoracic segments. As soon as the buds form, ventral primary rami from these spinal nerves penetrate into the mesenchyme. At first, each ventral ramus enters with isolated dorsal and ventral branches, but soon these branches unite to form large dorsal and ventral nerves. Median nerve which supplies flexor musculature is formed by combination of ventral branches. Immediately after the nerves have entered the limb buds, they establish an intimate contact with the differencing mesodermal condensation, and the early contact between the nerves and muscle cells is prerequisite for their complete functional differentiation. Although the original dermatome pattern changes with growth of extremities, an orderly sequence can still be recognized in adults. Miss expression of any of these signaling molecules can lead to abnormalities in the formation and distribution of particular nerve fibers. Once formed, any developmental differences would obviously persist postnatal.

Conclusion

The anomalies of MN though rare have definite embryological basis and diverse clinical presentations. Thus a sound knowledge of these anomalies is essential for academicians, clinicians and anesthetologist performing a surgical procedure to prevent postoperative complications. The MN with extra roots is more likely to be involved in entrapment syndromes and while performing orthopaedic and other surgical interventions and may lead to sensory, motor, vasomotor and trophic changes. It is also very difficult for anesthetists to give infra clavicular and other nerve blocks in presence of these variations. Orthopaedicians also find it difficult to operate and manipulate shoulder

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joint in presence of these nerve anomalies. It is also important for neurosurgeons in tumors of nerve sheath like schwannomas and neurofibromas. Such variations are also clinically very important in post-traumatic evaluations and exploratory interventions of the arm for peripheral nerve repair.

References

1. Williams PL, Bannister LH, Berry MM, et al. Gray'sAnatomy. In: Nervous System. 38th edition. London Churchill Livingstone, 1999; p. 1270.
2. Satyanarayana N, Guha R. Formation of median nerve by four roots. J Coll Med Sci., 2008; 5: 105–107.
3. Pandey SK, Shukla VK. Anatomical variations of the cords of brachial plexus and the median nerve. Clin Anat., 2007; 20: 150–156.
4. Budhiraja V, Rastogi R, Khare S, Jain S. A rare variation in the formation of the lateral cord and median nerve of brachial plexus - A case report. People's journal of scientific research, 2009; 2(1): 17-18.
5. Eglseder WA Jr, Goldman M. Anatomic variations of musculocutaneous nerve in the arm. Am J Orthop (Belle Mead NJ), 1997; 26: 777–780.
6. Chauhan R, Roy TS. Communication between the median and musculocutaneous nerve – A case report. J Anat Soc India, 2002; 51: 72–75.
7. Badawoud MHM. A study on the anatomical variations of median nerve formation. Bahrain Medical Bulletin, 2003; 25(4): 1-5.
8. Nene AR, Gajendra KS, Sarma MVR. Variant formation and course of the median nerve. IJAV3, 2010, 93-94.
9. Itoo M S, et al. Anomalous origin and branching pattern of median and musculocutaneous nerve. KMJ, 2010; 4(2).
10. Uysal II., Seker M., Karabulut AK., Ziylan T. Brachial plexus variations in human fetuses. Neurosurgery, 2003; 53(3): 676-684.
11. Hollinshead WH. Anatomy for Surgeons. Philadelphia, Harper & Row, 1982; p. 220–223.
12. Sargon MF, Uslu SS, Celik HH, Aksit D. A variation of the median nerve at the level of brachial plexus. Bull Assoc Anat (Nancy), 1995; 79: 25–26.

Source of support: Nil **Conflict of interest:** None declared.

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