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Absent musculocutaneous nerve with trifurcating median nerve: A case report

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Abstract
Knowledge of variations in the course of musculocutaneous nerve is very important for surgeons to prevent iatrogenic injuries during post traumatic evaluation of fracture and reduction of fracture of proximal and distal humerus and while administering nerve block in the supraclavicular, infraclavicular and axillary regions. This report describes a unique variation in a 50-year-old male cadaver where the musculocutaneous nerve was absent and compensated by the branches from the median nerve. The lateral cord of brachial plexus gave off a small twig to the coracobrachialis muscle. Median nerve, formed by the medial and lateral roots, descended down medial to coracobrachialis without piercing it. Moreover it trifurcated into three branches which further gave rise to muscular branches for the biceps brachii and brachialis muscles, and lateral cutaneous branch of the forearm.

Keywords: biceps brachii, brachialis, brachial plexus, coracobrachialis, median nerve, variations

Introduction
Variations in the formation of median and musculocutaneous nerve (MCN) are common. A number of MCN variations regarding course and distribution have been reported [1]. Reporting variations in MCN is important to create awareness among surgeons while interpreting diagnostic surgical procedures, nerve blocks and also important in preventing iatrogenic complications of musculocutaneous nerve lesions [2, 3]. Knowledge of such variations may be helpful during surgical intervention especially peripheral nerve injuries due to fracture dislocations of proximal and distal humerus. We report a unique case which was not reported earlier and have discussed its clinical implications.

Case report
Variation in the branches of lateral cord of brachial plexus was observed during routine dissection of upper extremity of a 50-year-old male cadaver for undergraduate teaching purpose. The lateral cord of brachial plexus gave off a small twig to the coracobrachialis muscle just above the union of the lateral and medial root of median nerve. The formation of the median nerve was normal and in the middle of the arm, it trifurcated into three branches: lateral, middle and medial branches. The lateral branch supplied the biceps brachii muscle from it's under surface. The middle branch further divided into two subdivisions (Fig.1). Lateral subdivision descended between the brachialis and biceps brachii muscles to emerge in front of the cubital fossa lateral to the tendon of biceps brachii muscle and medial to the pronator teres muscle. The nerve then pierced the deep fascia in front of the cubital fossa to enter the superficial fascia as the lateral cutaneous nerve of forearm. The medial subdivision of the middle branch gave off two twigs to brachialis muscle from its anterior surface and medial border. The medial branch continued as the median nerve following its normal course.

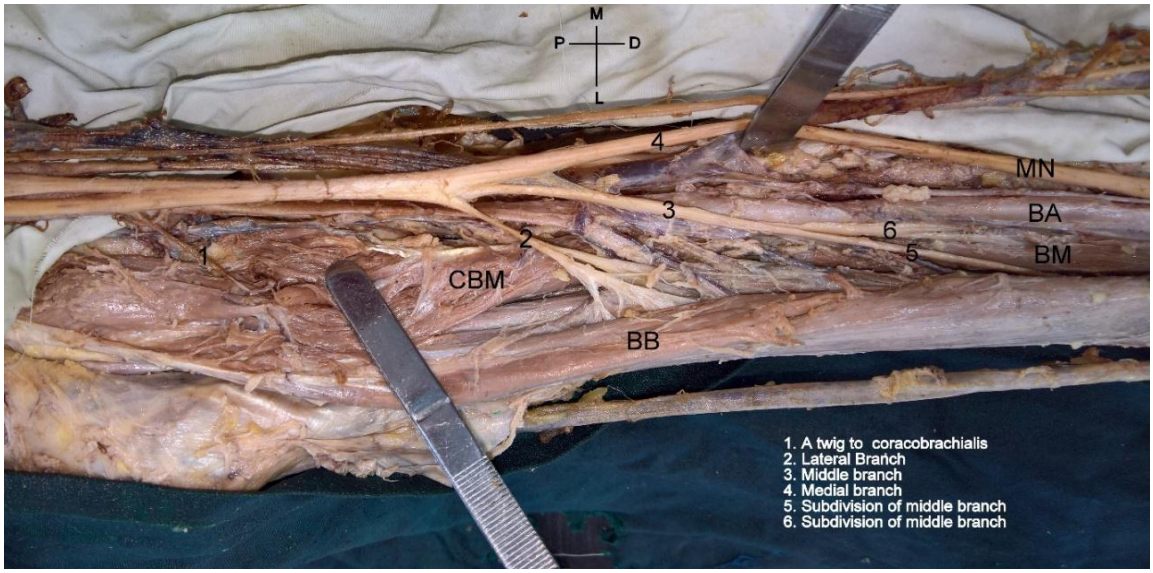

Fig 1: Figure illustrating the twig to coracobrachialis muscle below the lower of teres major (1), the trifurcating branches of median nerve (2, 3 & 4) and the lateral and medial two subdivisions of middle branch (5&6).
CBM: Coracobrachialis muscle; BM: Brachialis muscle; BB: Biceps brachii; MN: Median nerve.

Discussion

The MCN (C5-C7), a mixed peripheral nerve, arising from the lateral cord of the brachial plexus in the axilla, runs behind coracobrachialis muscle (CBM) by piercing it [1]. innervates the anterior compartment of the arm and then continues as the lateral cutaneous of the forearm. In some cases it may not pierce the CBM but pass between the CBM and biceps brachii muscle (BB), and in others, the MCN itself may be absent and the muscles of the anterior compartment of the arm receive innervations directly from median nerve [2, 3].

Nascimento *et al.* [4] observed an anatomical variation of MCN that originated from lateral cord, passed beneath CBM and emerged lateral to it, without piercing the muscle. After giving off three branches, nerve to the BB, lateral cutaneous nerve of forearm and nerve to the brachialis muscle, it united with the median nerve in the middle of the arm. Similar variation has also been reported with the MCN piercing the CBM by Rao *et al.* [5] Bilateral absence of MCN was also observed by Bhanu *et al.* [6] and Ravishankar *et al.* [7] and they reported that muscles of front of arm were supplied by branches that arised from median nerve. Absence of MCN was observed in 6% of cases in a study done on 50 upper limbs of 25 embalmed cadavers by Jamuna *et al.* [8].

In the present case, MCN was not evident as a separate nerve and was compensated by trifurcating branch of median nerve. A small twig from the lateral aspect of the median nerve supplied the coracobrachialis muscle from its lateral aspect. This is a deviation from the normal anatomy where the coracobrachialis muscle is supplied by the MCN which pierces the muscle to emerge on its lateral aspect. Furthermore, the median nerve after the union of lateral and median roots trifurcated into three branches, of which the medial most branch took the normal course of the median nerve and the lateral two branches took the variant course of the MCN. The lateral cutaneous branch was unusually deeply located within the cubital fossa between the brachioradialis and pronator teres lateral to the upper part of the median cubital vein.

Sarkar *et al.* reported a similar case in which MCN was bilaterally absent and a small nerve from lateral cord of brachial plexus innervated the CBM. The muscles of the front of the arm received innervations from median nerve [9]. The present variation is partly similar to the Type-V variation as per the classification described by the Le Minor *et al.* [10]. where the MCN is absent and the muscles of the anterior compartment of the arm are innervated by the median nerve. Yet, it is different from Type-V variation in that the muscular branches are not from a single nerve but arise as trifurcation of the median nerve from medial and lateral cord of brachial plexus.

Knowledge of development of brachial plexus provides a clue towards understanding the variations of origin and course of MCN. The upper limb buds appears at 26-27 days and formation of brachial plexus appear is evident from 34-35 days in the developing embryo [11]. Development of upper limb muscles from paraxial mesoderm during 5th week is augmented by local expression of five Hox D genes. Chemoattractants such as brain-derived growth factors, c-Kit ligand, neutrin -1, neutrin -2 attract and support viability of growth cones of developing axons [11, 12, 13]. Around 46-48 days, all the peripheral nerves of upper limb attains the orientation and arrangement similar to those present in adult life [13, 14].

This significant anatomical variation in nerve pattern occurs as a result of abnormal signaling between mesenchymal cells and neuronal growth cones at the time of formation of cords of brachial plexus or due to over expression of one or more multiple transcription factors which are responsible for these variations [14].

Conclusion

The present case describes the absence of MCN and trifurcated median nerve innervating the muscles of the front of the arm. Such a variation is not reported earlier. This case report will fill the gap in knowledge about the variations of MCN and aid the surgeons to make accurate conclusions while encountering the nerve during surgeries Awareness about the variant anatomy of the brachial plexus, in its course and distribution of branches, is important during brachial plexus block, exploratory interventions for peripheral nerve repair in the arm and reconstructive surgeries and fracture-reduction involving shoulder region.

References

1. Standring S. Grays Anatomy: The anatomical basis of clinical practice. 41st ed. Elsevier. 2016; pp. 100.
2. Babu J, Pillai J, Priyanka D, Jalaja Y, Kumar S. A Study on variations of Musculocutaneuos Nerve in Adult cadavers. IOSR-JDMS. 2016; 15(5):14-7.
3. Nasrabadi HT, Abedelahi A, Shoorei H, Shokoohi M, Salimnejad R, Dolatkhah MA, *et al.* A variation of Musculocutaneous nerve without piercing the coracobrachialis muscle while communicating to the median nerve: A case report and literature review. Int J Surg Case Rep. 2017; 41:453-5.
4. Nascimento SRR, Ruiz CR, Pereira E, Andrades L, Cirqueira de souza C. Rare Anatomical variation of the Musculocutaneous nerve – Case report. Rev Bras Ortop. 2016; 51(3):366-9.
5. Rao SR, Swamy G. Anatomical variation in the branching pattern of Musculocutaneous nerve & Its clinical importance –A case report. AJCRS. 2018; 1(1):1-4.
6. Bhanu S, Sankar D. Bilateral absence of musculocutaneous nerve with unusual branching pattern of lateral cord and median nerve of brachial plexus. Anat Cell Biol. 2012; 45:207-10.
7. Ravishankar MV, Jevoor PS, Shala L. Bilateral absence of musculocutaneous nerve. J Sci Soc. 2012; 39(1):34-6.
8. Jamuna M, Amudha G. A cadaveric study on the Anatomic Variations of the Musculocutaneous nerve in the infraclavicular part of the brachial plexus. J Clin Diagn Res. 2011; 5(6):1144-7.
9. Sarkar A, Saha A. Bilateral absence of musculocutaneous nerve: A case report. J Clin Diagn Res. 2014; 8(9):6-7.
10. Le Minor JM. A rare variation of the median and musculocutaneous nerves in man. Arch Anat Histol Embryol. 1990; 73:33-42.
11. Yogesh AS, Maratha RR, Pandit SV. Musculocutaneous nerve substituting for the distal part of Radial Nerve: A case report and its embryological basis. J Neurosci Rural Pract. 2011; 2(1):74-6.
12. Sharma P, Sharma S, Chauhan S, Sharma N. A case study of Musculocutaneous nerve variations. Int J Res Med Sci. 2015; 3(12):3779-81.

13. Suseelamma D, Krishna Chaitanya K, Sharada HR, Deepthi S. Radix formation between Median Nerve and Musculocutaneous Nerve: embryological, morphological & clinical correlation. Int J. Res Med Sci. 2013; 1(3):101-4.
14. Chaudhary P, Kasey G, Singla R, Arora K. Communication between Musculocutaneous nerve and Median nerve – Different types & their incidence in North Indian Population. IJCP. 2013; 24(4):364-71.