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Anomalous branching pattern of the lateral cord of brachial plexus: A case report

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Abstract: Ventral rami of spinal nerves from C5 to T1 form brachial plexus. The lateral cord of brachial plexus gives three branches namely lateral pectoral, musculocutaneous and lateral root of median nerve. Lateral pectoral nerve pierces clavipectoral fascia and supplies pectoralis major. Musculocutaneous nerve pierces the coracobrachialis muscle and supplies flexor muscles of arm and continues as lateral cutaneous nerve of forearm. Lateral root of median nerve joins medial root to form median nerve. There were two anomalous branching pattern observed related to lateral cord of brachial plexus of right upper limb from different cadavers in the Department of Anatomy, Sree Narayana Institute of Medical Sciences, Chalakka, Ernakulam. CASE-I: During routine dissection for first year MBBS students, the musculocutaneous nerve descended medial to coracobrachialis without piercing the muscle and muscular branch to coracobrachialis was given from the lateral cord directly. Few fibres from musculocutaneous nerve were communicating with the median nerve at the level of insertion of deltoid muscle. CASE-II: The lateral cord of brachial plexus gave nerve to coracobrachialis and lateral pectoral nerve and a common trunk passed medial to coracobrachialis till the middle one third of arm where it divided into musculocutaneous nerve proper and lateral root of median nerve. Knowledge about the origin, course, branching pattern & variants of brachial plexus would be helpful while planning reconstructive flap surgeries and treatment of fractures of upper end of humerus.
Keywords: Variations; Median nerve; Musculocutaneous nerve; Brachial plexus; Coracobrachialis.

INTRODUCTION

Variations in the origin and course of musculocutaneous nerve are not uncommon. Ventral rami of spinal nerves from fifth cervical to first thoracic forms the brachial plexus. Their formation starts in posterior triangle of neck and they give terminal branches in axilla. Fifth and sixth cervical roots join to form upper trunk, seventh root continues as middle trunk and eight cervical and first thoracic roots join to form lower trunk. These trunks located in the posterior triangle of neck divide into anterior and posterior division so that three anterior and three posterior divisions are formed. The anterior divisions of upper and middle trunk join to form lateral cord. Cords are seen in axilla and named according to their relation with second part of axillary artery. Branches from the cords are given around third part of axillary artery. Branches of lateral cord include lateral pectoral, musculocutaneous and lateral root of median nerve. Musculocutaneous nerve gives muscular branches to coracobrachialis, biceps and brachialis muscles, articular branches to shoulder and elbow joint and cutaneous branches to skin over anterolateral aspect of forearm till the base of thenar eminence [1].

OBSERVATION / CASE REPORT:

Two anomalous branching patterns were observed related to the lateral cord of brachial plexus from different cadavers on right side used for routine dissection purpose for 1st MBBS Students in the dissection hall, Department of Anatomy, Sree Narayana Institute of Medical Sciences, Chalakka, Ernakulam.

CASE-I: The lateral cord of brachial plexus was observed for anomalous branching pattern in the right upper limb. The branches observed from lateral cord were lateral pectoral nerve, nerve to coracobrachialis, communicating branch to medial root of median nerve, communicating branch to ulnar nerve, lateral root of median nerve and musculocutaneous nerve. The nerve to coracobrachialis was direct branch from lateral cord instead from musculocutaneous nerve. Two communicating branches from lateral cord to medial root of median nerve and ulnar nerve respectively were observed. The musculocutaneous nerve passed medial to coracobrachialis without piercing the muscle. Few fibres from musculocutaneous nerve communicating with the median nerve at the level of middle one-third of arm were observed. The further course of musculocutaneous nerve was normal as it supplied

brachialis muscle and continued as lateral cutaneous nerve of forearm.

CASE-II: In the axilla, the lateral cord of brachial plexus gave nerve to coracobrachialis, lateral pectoral nerve and a common trunk which passed medial to coracobrachialis till the middle one third of arm where it divided into musculocutaneous nerve proper and lateral root of median nerve in the right upper limb. The musculocutaneous nerve later supplied biceps brachii, brachialis and continued in the forearm as lateral cutaneous nerve of forearm. The lateral root of median nerve joined with the medial root of median nerve to form trunk of the median nerve distal to middle one third of arm and passed along with the brachial artery. The further course and branching pattern of median nerve was observed to be normal in pattern.

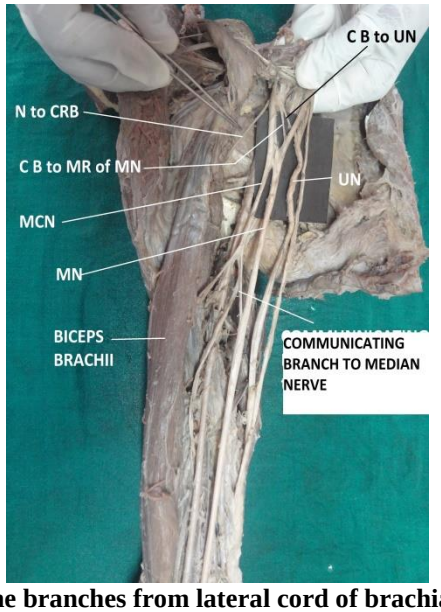

Fig-1: Showing the branches from lateral cord of brachial plexus

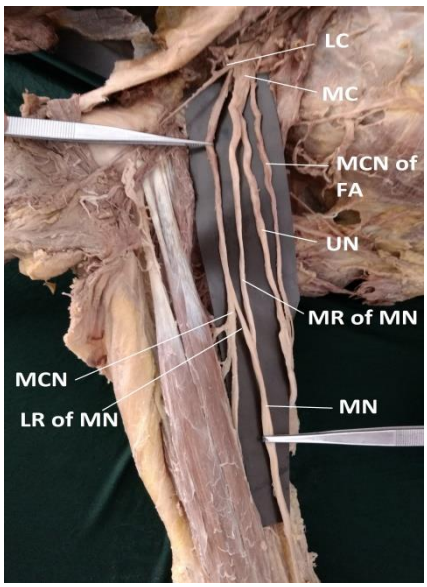

Fig-2: Showing the branches from lateral and medial cord of brachial plexus

Abbreviations: MN- Median nerve, MCN- Musculocutaneous nerve, UN- Ulnar nerve, N to CB- Nerve to coracobrachialis, CB to MR of MN- Communicating branch to medial root of median nerve, CB to UN- Communicating branch to ulnar nerve. LR of MN- Lateral root of median nerve, MR of MN- Medial root of median nerve, MCN of FA- Medial cutaneous nerve of forearm.

DISCUSSION

Multiple variations of brachial plexus have been documented by Henry Hollinshead [2]. El Naggar observed the musculocutaneous nerve not piercing coracobrachialis and passed medial to the muscle in one case and in another case musculocutaneous nerve has short course after which it united with median nerve without piercing coracobrachialis [3]. Mohammed H.

Badawoud reported that the musculocutaneous nerve did not pierce coracobrachialis and passed downwards medial to muscle in 3 cases [4]. Chitra R reported one case of musculocutaneous nerve descended without piercing the coracobrachialis muscle in the right arm [5]. Le Minor classified these communications between median and musculocutaneous nerve into five types [6]. Type I: There is no communication between the median and musculocutaneous nerve; Type II: The fibres of the medial root of the median nerve pass through the musculocutaneous nerve and join the median nerve in the middle of the arm; Type III: The lateral root fibres of the median nerve pass along the musculocutaneous nerve and after some distance, leave it to form the lateral root of the median nerve; Type IV: The musculocutaneous nerve fibres join the lateral root of the median nerve and after some distance the musculocutaneous nerve arises from the median nerve; Type V: The musculocutaneous nerve is absent and the entire fibres of the musculocutaneous nerve pass through the lateral root and fibres to the muscles supplied by musculocutaneous nerve branch out directly from the median nerve. Connection between the musculocutaneous and median nerves in Case-I could not be compared with any of the types described by Le Minor and it can be assumed as the fibres of lateral root of median nerve passing along with musculocutaneous nerve, later joins the trunk of median nerve and Case-II variant belongs to Type-III classification by Le Minor. Venieratos and Anangnostopoulou [7] described three types of communications between musculocutaneous and median nerve in relation to the coracobrachialis muscle. Type I: Communication between musculocutaneous and median nerve is proximal to the entrance of the musculocutaneous nerve into the coracobrachialis; Type II: Communication is distal to the muscle; Type III: Neither the nerve nor its communicating branch pierced the muscle. According to this classification the communication noted in present cases cannot be placed in type III, as the musculocutaneous nerve nor did not communicating fibres to median nerve pierce coracobrachialis. The interpretation of the nerve anomaly of the arm requires consideration of the phylogeny and development of the nerves of the upper limb. Communication between the musculocutaneous and median nerve is considered as a remnant from the phylogenetic or comparative point of view. Imokawa (cited from Kosugi et al. 1986) [8, 9] reported that there was only one trunk equivalent to the median nerve in the thoracic limb of the lower vertebrates (amphibians, reptiles and birds). In the context that ontogeny recapitulates phylogeny, it is possible that the variation seen in the present case is the result of developmental anomaly. In man, the forelimb muscles develop from the mesenchyme of the para-axial mesoderm during fifth week of embryonic life [10]. The axons of spinal nerves grow distally to reach the limb bud mesenchyme. The peripheral processes of the motor and sensory neurons grow in the mesenchyme in different directions. Although it is unclear why neuronal processes assemble to form a mixed nerve, in this complex developmental event there are multiple possibilities for the route taken by developing axons and thus for their arrival at the main trunk. Once formed, any developmental differences would obviously persist postnatally [11]. As the guidance of the developing axons is regulated by expression of chemoattractants and chemorepulsants in a highly coordinated site specific fashion any alterations in signalling between mesenchymal cells and neuronal growth cones can lead to significant variations [12]. Specifically, such developmental abnormalities for axonal guidance in the coracobrachialis muscle could readily produce a situation where the musculocutaneous nerve does not pass through the coracobrachialis muscle, as seen in present cases. Alternatively, the variation could arise from circulatory factors at the time of fusion of the brachial plexus cords [9]. Lesions of the communicating nerve may give rise to patterns of weakness that may impose difficulty in diagnosis. Clinical implication of this could be that injury of musculocutaneous nerve proximal to the anastomotic branch between musculocutaneous and median nerve may lead to unexpected presentation of weakness of forearm flexors and thenar muscles [13].

CONCLUSION:

The musculocutaneous nerve not piercing the coracobrachialis muscle have clinical importance during flap dissections, post traumatic evaluation of arm and exploratory interventions of arm for peripheral nerve repair. Presence of such variants as in present case must be kept in mind while testing of muscle after administration of neuromuscular block. Knowledge about the origin, course, branching pattern & variants is helpful while planning reconstructive flap surgeries, treatment of fractures of upper end of humerus.

REFERENCE

1. Williams PL, Bannister LH, Berry MM, Collins P, Dyson M, Dussek JE, Ferguson MW. Skeleton System In: Gray's Anatomy. 38th Edition, Churchill Livingston, Edinburgh. 1995:1266-1274..
2. Henry Hollinshead W; Anatomy for Surgeons. 2nd Edition. Volume 3. NewYork, Evanston, San Francisco, London, Harper and Row, 1969: 303-306.
3. El-Naggar MM. A study on the morphology of the coracobrachialis muscle and its relationship with the musculocutaneous nerve. Folia Morphologica-Warszawa-English Edition-. 2001 May 29;60(3):217-24.
4. Badawoud MH. Study of the anatomical variations of the musculocutaneous nerve. Neurosciences (Riyadh, Saudi Arabia). 2003 Oct;8(4):218-21.
5. Chitra R. Multiple bilateral neuroanatomical variations of the nerves of the arm. Neuroanatomy. 2007;6:43-5.
6. Le Mnior J. A rare variant of the median and musculocutaneous nerve in man. Archives of

Anatomy, Histology & Embryology. 1990;73:33-42.
7. Venieratos D, Anagnostopoulou S. Classification of communications between the musculocutaneous and median nerves. Clinical Anatomy. 1998 Jan 1;11(5):327-31.
8. Chauhan R, Roy TS. Communication between the median and musculocutaneous nerve–a case report. J Anat Soc India. 2002;51(1):72-5.
9. Kosugi K, Mortia T, Yamashita H. Branching pattern of the musculocutaneous nerve. 1. Case possessing normal biceps brachii. Jikeikai Med J. 1986;33:63-71.
10. Larsen WJ; Human Embryology. In: Development of limbs. 2nd Edition, Churchill Livingstone. Edinburgh. 1997: 311-339.
11. Brown MC, Hopkins WG, Keynes RJ; Axon guidance and target recognition, In: Essentials of neural development. Cambridge University Press. Cambridge. 1991: 46-66.
12. Sannes HD, Reh TA, Harris WA. Development of the nervous system In: Axon growth and guidance. Academic Pres. New York. 2000:189-97.
13. Sunderland, S.; Nerves and Nerve Injury. In: The Median Nerve: Anatomical and Physiological features. 2nd Edition, Churchill Livingstone. Edinburgh. 1978: 672-677, 691-72.