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Case Report

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Unilateral Absence and Contralateral Communication Between Musculocutaneous and Median Nerve and Its Clinical Significance

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ABSTRACT

Variations and Communications between the branches of different cords is not uncommon. Martin Gruber anastomosis, Berretini anastomosis and Cannieu and Riché anastomosis are few examples of such nerve communications. During routine anatomy dissection of axilla, in a 65 years old female cadaver, we found absence of musculocutaneous nerve in left upper limb. It was found that all the muscles of front of arm were supplied by median nerve on this side. When compared on the right side, there was one communication between musculocutaneous nerve and median nerve. This communicating branch was 75 mm long. All the muscles of anterior compartment of arm were supplied by MCN and the nerve continued afterwards as lateral cutaneous nerve of arm. The knowledge of such variations helps us in neurosurgeries like surgery for Neurofibromatosis. Orthopedic, general surgeons and neurosurgeons must consider the possibility of such variations in the surgery of arm and elbow. Surgeons who perform neurotization procedures of the musculocutaneous nerve to restore elbow flexion should be aware of these anatomical variations Cutting of such communicating branch can lead to altered mobility of limb.

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Introduction

Brachial plexus is derived from C5 to T1 nerve roots. It has three trunks which later forms three cords. In infraclavicular portion of brachial plexus, the cords and its branches and its branches are seen. Variations and Communications between the branches of different cords are not uncommon. Martin Gruber anastomosis which is the nerve communication between the median and ulnar nerve is reported by many authors when reviewed the literature [1]. Berretini anastomosis, nerve communications between sensory branches of median and ulnar nerve in palm while Cannieu and Riché anastomosis between the thenar motor branch of the median nerve and the deep branch of the ulnar nerve in the palm of the hand have been described in many studies [2, 3].

Current case report is about the unique findings of brachial plexus where Musculocutaneous nerve (MCN) was absent in left upper limb while communication between Musculocutaneous (MCN) and Median nerve (MN) was found in the right upper limb in the same cadaver during routine cadaveric dissection of axillary region. The wide frequency of cases of the MCN-MN communication has been reported with a variability of incidence between 2.1 and 63.5% in various studies [4-7]. Such MCN- MN communications can have embryologic basis and many classifications have also been proposed to classify the type of communication. Many authors classified such MCN- MN communications in their study in accordance with the classification by Maeda et al [2].

Knowledge of the existence of the MCN-MN communication in the arm is clinically important; it allows an adequate evaluation and management of upper limb motor disorders caused by peripheral nerve injuries as well as a correct surgical planning and approaches of axilla and arm. Surgeons who perform neurotization procedures of the musculocutaneous nerve to restore elbow flexion should be aware of these anatomical variations [8].

Case Report

During routine anatomy dissection of axilla, in a 65 years old female cadaver, the communication was found between musculocutaneous nerve and median nerve in right upper limb. The communicating branch of 75 mm extended from MCN to MC. The communication was present at the level of middle of arm where MCN had already pierced the coracobrachialis muscle and the nerve was passing between biceps brachii and brachialis muscle. The communicating branch was present between the branch to biceps brachialis muscle. All the muscles of anterior compartment of arm were supplied by MCN and the nerve continued afterwards as lateral cutaneous nerve of arm. When observed for other branches of all cords, it was found that Medial cutaneous nerve of arm and forearm was arising from the common trunk from the medial cord. Medial cutaneous nerve of arm was very thin and was the medial cutaneous nerve of forearm was comparatively very thick. Rest all branches of various cords of brachial plexus were normal without any inter communications.

When compared on left side, it was found that musculocutaneous nerve was absent in left upper limb. All the muscles of front of arm were supplied by median nerve on this side. There were only two branches from the lateral cord- lateral pectoral nerve and lateral root of median nerve. Rest all branches from the different cords of brachial plexus were normal without any inter communications.

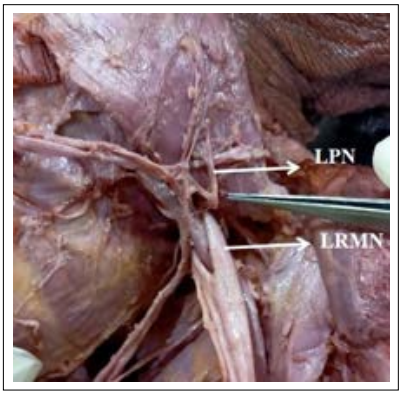

Figure 1: Showing only two branches from lateral cord- LPN -lateral pectoral nerve and LRMN -lateral root of median nerve and absence of musculocutaneous nerve in left upper limb

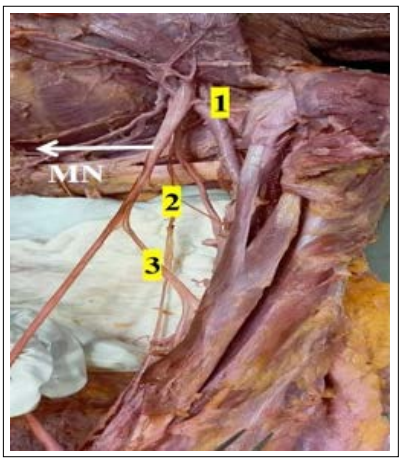

Figure 2: Showing MN -Median nerve, 1-branch to coracobrachialis, 2-branch to biceps brachii, 3 - branch to brachialis in left upper limb

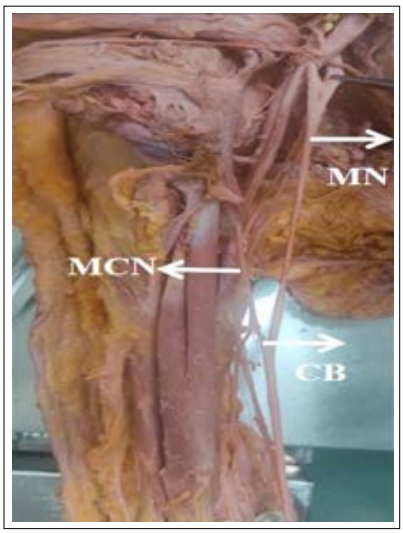

Figure 3: Showing MN -Median nerve, MCN - Musculocutaneous nerve, CB - Communicating branch in right upper limb

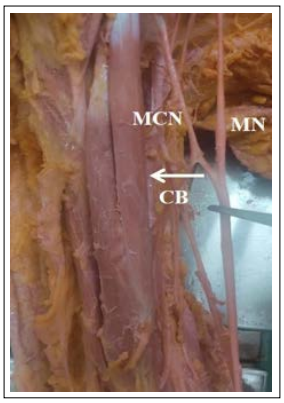

Figure 4: Showing MN -Median nerve, MCN - Musculocutaneous nerve, CB - Communicating branch in right upper limb (closer view)

Discussion

For MCN-MN nerve communications, varied incidence rate was found in review of literature with the greater number of unilateral reports compared to bilateral ones [9, 10]. Few studies reported predominance of left side compared to right [11]. **Le Minor** classified communication between median nerve and musculocutaneous nerve into five types [12].

Type I - No communication between median and musculocutaneous nerve

Type II - Fibres of medial root of median nerve pass through musculocutaneous nerve and join the median nerve in the middle of the arm

Type III- Lateral root of median nerve pass through musculocutaneous nerve and after some distance leave it to form root of median nerve

Type IV- Musculocutaneous nerve fibres join the lateral root of median nerve and after some distance musculocutaneous nerve arises from median nerve

Type V- musculocutaneous nerve absent and entire fibres of musculocutaneous nerve pass out through lateral root and muscles supplied by musculocutaneous nerve branch out from median nerve.

As per Le Minor classification, our case report is Type V in left upper limb where musculocutaneous nerve is absent and all muscles of anterior compartment of arm are supplied by median nerve. Absence of musculocutaneous nerve is also reported by some authors in literature. The findings of author Parchand are similar to our case where as other authors had mentioned associated intercordal communications in the absence of musculocutaneous nerve which is not found in our case [12-15].

Maeda et al classified nerve communication between MCN-MN into basic two types depending upon the location of the communicating branch [2].

Type I when the communication is observed at the mid or distal thirds of the arm. This class was subdivided into 4 subtypes-

Subtype Ia: when the communication arose from MCN in its intramuscular via into the coracobrachialis muscle.

Subtype Ib: when the communicating branch exits from MCN before the biceps muscle branch.

Subtype Ic: when the communication is located between the branches going to Biceps and brachialis muscle.

Subtype Id: when the communicating branch exits after the emergence of Brachialis muscle branch.

Similarly, the occurrence of communicating branches between the MN and the MCN was recorded as **Type II** with 2 subtypes. **Subtype IIa:** the branch from MN reached the segment between the origins of Biceps and Brachialis muscular branches.
Subtype IIb: when the communicating branch was connected with the branch to Brachialis muscle.

When categorized as per classification by Maeda et al, our communication in right upper limb is Type I communication where the MCN-MN communicating branch emerged after MCN pierced Coracobrachialis muscle and it was connected to the MN in an oblique trajectory [2]. On further classification, it is subtype I C where the communicating branch is found between the branch to Biceps brachii and Brachialis muscle. Author Ballesteros had mentioned similar variation in his study. Another novel classification of MCN-MN communications is given by author Mari Hayashia where author had classified communicating branches into five types. Regarding the length of this anastomotic branch, Ballesteros et al. registered a mean of 57.8 mm and Loukas et al. 46 mm, while Elgseder and Goldman reported 18 mm while in our case we reported it as 75mm. The nerve communications between MCN and MN are explained embryologically in various studies. Ballesteros and Uysal mentioned in their study that as the musculocutaneous [16-20].

Nerve and the lateral root of the median nerve originate from the lateral cord of the brachial plexus. It is possible that in embryonic development some nerve fascicles that originally were part of the median nerve were transferred to the musculocutaneous nerve, and through these nerve communications in the arms, these fascicles are recovered by the median nerve.

Appropriate neurophysiological examinations through electroneurography of such communicating branch allow us to identify the specific functions of its fibers, to be useful during surgical procedures. The knowledge of such variations helps us in neurosurgeries like surgery for Neurofibromatosis.

Orthopedic, general surgeons and neurosurgeons must consider the possibility of such variations in the surgery of arm and elbow. Cutting of such communicating branch can lead to altered mobility of limb [21].

References

1. Gruber W (1870) Ueber die verbindung des nervus medianus mit dem nervus ulnaris am unterame des menschen um der saugethiere. Arch Physiol 37: 501-522.
2. Vieira LA, Caetano MB, Yoshi PM, Sabongi Neto JJ, Caetano EB (2002) Estudo anatômico da anastomose entre os nervos mediano e ulnar na palma da mão. Rev Bras Ortop 37: 336-340.
3. Caetano EB (1982) Contribution to the study of the innervation of the thenar region muscles and the Cannieu and Riché anastomosis [thesis]. Sorocaba, SP: Pontifical Catholic University of São Paulo, Faculty of Medical and Health Sciences.
4. Uysal II, Karabulut AK, Büyükmumcu M, Unver Dogan N, Salbacak A (2009) The course and variations of the branches of the musculocutaneous nerve in human fetuses. Clin Anat 22: 337-345.
5. Chiarapattanakon P, Leechavengvoongs S, Witoonchart K, Verpairojkit C, Thunasethakul P (1998) Anatomy and internal topografy of the musculucutaneos nerve The nerves to the biceps and brachiallis muscles. J Hand Surg Am 23: 250-255.
6. Choi D, Rodriguez-Niedenfuhr M, Vazquez T, Parkin I, Sanudo JR (2002) Patterns of connections between the musculocutaneous and median nerves in the axilla and arm. Clin Anat 15: 11-17.
7. Guerri-Guttenberg RA, Ingolotti M (2009) Classifying musculocutaneous nerve variations. Clin Anat 22: 671-683.
8. Bertelli JA, Ghizoni MF (2008) Lesões reumática do plexo braquial. In: Pardini AG, Freitas A, editores. Traumatismos da mão. 4a ed. Rio de Janeiro: Medbook 377-410.
9. Kosugi K, Shibata S, Yamashita H (1992) Supernumerary head of biceps brachii and branching pattern of the musculocutaneous nerve in Japanese. Surg Radiol Anat 14: 175-185.
10. Choi D, Rodriguez-Niedenfuhr M, Vazquez T, Parkin I, Sanudo JR (2002) Patterns of connections between the musculocutaneous and median nerves in the axilla and arm. Clin Anat 15: 11-17.
11. Mehta V, Yadav Y, Arora J, Kumar H, Suri R, et al. (2009) A new variant in the brachium musculature with reinforced innervation from a median-musculocutaneous nerve communication. Morphologie 93: 63-66.
12. Le Minor JM (1992) A rare variant of the median and musculocutaneous nerves in man. Arch Anat Histol Embryol 73: 33-42.
13. Uzel AP, Bulla A, Steinmann G, LaurentJoye M, Caix P (2011) Absence du nerf musculocutané et distribution à partir du nerf médian: à propos de deux cas et revue de la littérature [Absence of the musculocutaneous nerve and its distribution from median nerve: About two cases and literature review]. Morphologie 95: 146-150.
14. Parchand MP, Patil ST (2013) Absence of musculocutaneous nerve with variations in course and distribution of the median nerve. Anat Sci Int 88: 58-60.
15. Sophia MM, Ramachandran KS, Alagesan Anupriya (2014) Unilateral Absence of Musculocutaneous Nerve and a Communication between Medial and Lateral Cord of Brachial Plexus: A Case Report.RRJMHS 3: 43-47.
16. Ballesteros RE, Forero PL, Buitrago ER (2015) Comunicação entre os nervos musculocutâneo e mediano no braço: estudo anatômico e implicações clínicas. Rev Bras Ortop 50: 367-372.
17. Hayashia M, Shionoyaa K, Hayashib S, Hatayamac N, Kawatab S (2017) A novel classification of musculocutaneous nerve variations: The relationship between the communicating branch and transposed innervation of the brachial flexors to the median nerve.Annals of Anatomy - Anatomischer Anzeiger 209: 45-50.
18. Loukas M, Aqueelah H (2005) Musculocutaneous and median nerve connections within, proximal and distal to the coracobrachialis muscle. Folia Morphol (Warsz) 64: 101-108.
19. Eglseder WA Jr, Goldman M (1997) Anatomic variations of the musculocutaneous nerve in the arm. Am J Orthop (Belle Mead NJ) 26: 777-780.
20. Uysal II, Karabulut AK, Büyükmumcu M, Unver Dogan N, Salbacak A (2009) The course and variations of the branches of the musculocutaneous nerve in human fetuses. Clin Anat 22: 337-345.
21. Clarissa Ann Elisabeth Gelmi, Francesca Alice Pedrini () Communication between median and musculocutaneous nerve at the level of cubital fossa - A case report. Elsevier. Transational Research in Anatomy 18: 1-4.