PREVALENCE OF COMMUNICATION BETWEEN AXILLARY NERVE AND RADIAL NERVEIN HUMAN ADULT CADAVERS

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Abstract: Axillary nerve and radial nerve are branches from posterior cord of brachial plexus which supply different muscles and skin of different regions in the upper limb. Any communication between them can be credited to alterations in the signaling pathway which induce the formation of those muscles from mesenchymal cells and the neuronal growth factors during embryonic life. Though communication between musculocutaneous and median nerve or ulnar nerve are frequently described reports of communication between axillary and radial nerve are very rare. Therefore the present study was focused on the same to observe the incidence of such type of communication. Twenty upper limbs were used for the present study and observed for normal course as well as any communications of axillary nerve with radial nerve.

Key words: Radial Nerve, Axillary Nerve, Communication, Variations, Brachial Plexus

I. INTRODUCTION

Communication between different branches of brachial plexus have been reported in the literature. The most common being the communication between musculocutaneous (MCN) and median nerve (MN)[1-3] followed by communication between musculocutaneous and ulnar nerve (UN). The present study is focused on the communication between axillary nerve and radial nerve in the arm since it has been very rarely reported in the literature. Radial nerve (RN)and axillary nerve (AN) are branches from the posterior cord of brachial plexus with different root values. Both supply different muscles and have different sensory area of distribution.[4] Radial nerveis the terminal branch of posterior cord supplying the extensor compartments of upper limb. Axillary nerve after its origin from the posterior cord of brachial plexus enters the quadrangular space and winds around the surgical neck of humerus. Here it divides into anterior and posterior branches. Finally, through its branches it supplies the deltoid and teres minor muscles along with the skin of upper part of shoulder.

II. METHODS

Twenty upper limbs which were dissected during gross anatomy dissection class for undergraduate medical students in the department of anatomy, KMC Mangalore were utilized for this study. In these specimens the communication between radial nerve and axillary nerve was observed in the axilla.

III. RESULTS

Among the twenty upper limbs nineteen upper limbs showed the usual course of AN (Figure 1). Whereas, one right axilla showed a communicating branch (**) between AN and RN. Just before theentry of AN into the quadrangular space, a thick branch emerged from it. As it was descending this thick branch crossed the subscapular artery, pierced the upper part of aponeurotic slip of latissimus dorsi (LD)near its insertion. Finally, it was communicated with the RN as shown in Figure 1.

IV. DISCUSSION

Since the LD graft is popularly used as for tendon transfer in rotator cuff injuries or other shoulder injuries its proximity with the AN and RN becomes extremely important.[5] The existence of any deviation in these nerves from its normal anatomy is worth notifying. The relation of any neurovascular bundle must be understood during mobilization of the tendon and its distance from the insertion of the tendon should be identified prior to any surgical procedures of rotator cuff injuries.[6]There are certain variations reported about the radial nerve such as communication between the radial and ulnar nerves on the dorsal surface of the hand and presence of two roots of the radial nerve entrapping deep axillary arch.[7,8]Presence of communication between AN and RN in the human arm has not been reported earlier except the one by Koizumi et al.[9]They observed communication between RN and AN in seven of the upper limb among the 602 Japanese cadavers (1.16%) they studied. In the present study the prevalence of communication between RN and AN is 5% (1 out of 20).The presence of such communications may be attributed to random factors influencing the mechanism of formation of limb muscles and the peripheral nerves during embryonic life. Significant variations in nerve patterns may be a result of altered signaling between mesenchymal cells and neuronal growth cones or circulatory factors at the time of fusion of brachial plexus cords. [10,11]Chiarapattanakom et al. are of the opinion that the limb muscles develop from the mesenchyme of local origin, while axons of spinal nerves grow distally to

reach the muscles and/or skin.[12] They blamed the lack of coordination between the formation of the limb muscles and their innervation for appearance of a communicating branch.

CONCLUSION:

The information regarding the possible occurrence of communicating branch between axillary nerve and radial nerve, especially those which pierce the tendon of LD near its insertion becomes extremely essential during tendon transfer surgeries or for the interpretation of complaints of pain of unknown origin which may be due to nerve entrapment.

REFERENCES

[1] Shukla L, Soni G, Gaur N. Four communications between median and musculocutaneous nerves. International Journal of Anatomical Variations (2010) 3: 186–187.

[2] Sachdeva K and Singla RKJ. Communication between median and musculocutaneous nerve. J MorpholSci 2011, 28(4):246-249.

[3] Linell EA. Th e distribution of nerves in the upper limb, with reference to variability and their clinical significance, Journal of Antomy 1921, 55:79-112.

[4] Standring S, Borley NR, Collins P, Crossman AR, Gatzoulis MA, Healy JC, *et al*. Gray's Anatomy. Pectoral region, shoulder region and axilla. 40th Ed. London: Churchill Livingstone; 2008, p 791-822.

[5] Morelli M, Nagamori J, Gilbart M, Miniaci A. Latissimus dorsi tendon transfer for massive irreparable cuff tears: an anatomic study. J Shoulder Elbow Surg 2008, 17(1):139-143.

[6] Pearle Ad, Kelly BT, Voos JE, Chehab EL, Warren RF. Surgical technique and anatomic study of latissimus dorsi and teres major transfers. J Bone Joint Surg Am, 2006, 88 (7): 1524-1531.

[7] Loukas M, Louis RG Jr, Wartmann CT, Tubbs RS, Turan-Ozdemir S, Kramer J. The clinical anatomy of the communications between the radial and ulnar nerves on the dorsal surface of the hand. SurgRadiolAnat 2008;30:85-90.

[8] Bertha A, Kulkarni NV, Maria A, Jestin O, Joseph K. Entrapment of deep axillary arch by two roots of radial nerve: An anatomical variation. J AnatSocInd 2009,58:40-43.

[9] Koizumi M, Kawai K, Maeda S, Okamoto K, KodamaK. Communication between the axillary and radial nerves in the human upper arm. Annals of Anatomy 1999, 181(2):213-221.

[10] Abhaya A, Bhardwaj R, Prakash R. Dual origin of musculocutaneous nerve. Journal of Anatomical Society of India 2003,52(1): 94.

[11] Kosugi K, Mortia T, Yamashita H. Branching pattern of the musculocutaneous nerve. 1. Cases possessing normal biceps brachii. Jikeakai Medical Journal 1986, (33): 63-71.

[12] Chiarapattanakom P, Leechavengvons S, Witoonchart K, Uerpairojkit C, Thuvasethakul P. Anatomy and internal topography of the musculocutaneous nerve: The nerves to the biceps and brachials muscle. Journal of Hand Surgery 1998, (23A): 250-255.

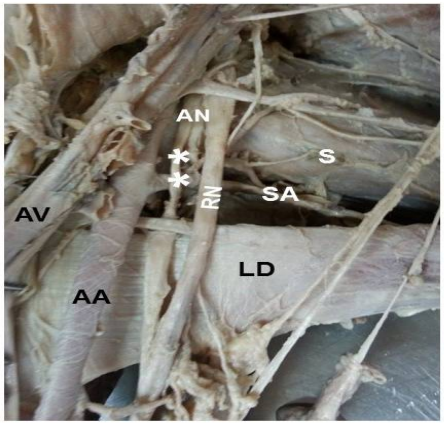


Figure 1: dissected right axilla showing communicating branch between axillary nerve and radial nerve (**). AN-Axillary nerve; RN-Radial nerve; LD-tendon of latissimus dorsi; SA-subscapular artery; S-subscapularis; AA-axillary artery; AV-axillary vein

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