THE FORMATION OF LATERAL CORD OF BRACHIAL PLEXUS AND ITS BRANCHES – A CADAVERIC STUDY

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ABSTRACT

Introduction: The lateral cord of brachial plexus is formed from the anterior divisions of upper and middle trunks, formed from roots C5, C6 and C7. Variations in the formation and branching of lateral cord are not uncommon. Considering its variations, a detailed knowledge is necessary to neurosurgeons, anaesthetists and orthopedicians to avoid complications.

Materials and Methods: The present study was conducted in the Department of Anatomy, Mamata Medical College, Khammam. 70 formalin fixed upper limbs [35 cadavers] were dissected for a period of 5 years. Formation and branching of lateral cord of brachial plexus were observed and variations are taken into consideration.

Observations: Out of 70 limbs dissected, we observed communication between the lateral cord and medial root of median nerve in 10 limbs. In 2 limbs musculo-cutaneous nerve was not formed. In 3 limbs musculo-cutaneous nerve did not pierce the coracobrachialis. In 7 limbs low union of medial and lateral roots of median nerve was observed. In 2 limbs, lateral pectoral nerve arises from upper trunk

Conclusion: The lateral cord and its branches show variations more frequently than medial and posterior cords of brachial plexus.

KEY WORDS: Brachial Plexus, Lateral Cord, Median Nerve, Musculo-Cutaneous Nerve.

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INTRODUCTION

The lateral cord of brachial plexus is formed from the anterior divisions of upper and middle trunks, formed from roots C5, C6 and C7. The lateral root is related lateral to the 2nd part of axillary artery. It gives lateral pectoral nerve, musculo-cutaneous nerve and lateral root of median nerve as branches. Lateral pectoral nerve supplies pectoralis major and minor muscles. Musculo-cutaneous nerve supplies coraco-brachialis, pierces the muscle, supplies biceps brachii, medial part of brachialis and continues as lower lateral cutaneous nerve of forearm. The lateral root of median nerve joins with the medial root from medial cord infront of the 3rd part of axillary artery to form the median nerve [1,2]. When two nerves join, their fibers intermingle and are joined by common epineurium. Sometimes the nerves appear to be joined Naveen Kumar. B, Sirisha. V, Udaya Kumar. P, Kalpana. T. THE FORMATION OF LATERAL CORD OF BRACHIAL PLEXUS AND ITS BRANCHES – A CADAVERIC STUDY.

at higher or at lower level, this may be due to the difference in the density of the connective tissue connecting them [3]. Variations in brachial plexus may occur at any region during its formation, but the components of the nerves reaching the target remain unchanged [4]. Variations in the formation and branching of lateral cord are not uncommon. Injuries to the lateral cord occur due to traction of head and neck from the shoulder [4]. Considering its variations, a detailed knowledge is necessary to neurosurgeons, anaesthetists and orthopaedicians to avoid complications.

MATERIALS AND METHODS

The present study was conducted in the Department of Anatomy, Mamata Medical College, Khammam, Telangana. 70 formalin fixed upper limbs [35 cadavers] were dissected for a period of 5 years. The axilla and posterior triangle of neck were dissected as per the Cunningham's dissection manual guidelines. Formation and branching of lateral cord of brachial plexus were observed and variations are taken into consideration.

OBSERVATIONS ASND RESULTS

Out of 70 limbs dissected, we observed communication between the lateral cord and medial root of median nerve in 10 limbs [4 are bilateral and 2 unilateral] (fig-1). In 2 limbs musculo-cutaneous nerve was not formed, lateral pectoral nerve and nerve to coracobrachialis were branches of lateral cord. The median nerve has given the muscular branches to biceps brachii and brachialis, lower lateral cutaneous nerve of forearm (fig-2). In 3 limbs musculo-cutaneous nerve did not pierce the coracobrachialis. The later is supplied by a branch from the lateral cord [fig-3]. In another limb [left], the musculo-cutaneous nerve ended in biceps brachii after piercing coraco-brachialis and supplying it. The lower lateral cutaneous nerve of forearm originated from median nerve and gave a branch to brachialis and biceps brachii (fig-2). In 7 limbs low union of medial and lateral roots of median nerve was observed. The median nerve was formed in the arm in front of brachial artery (fig-1). In 2 limbs, two lateral pectoral nerves arise from the anterior divisions of upper and middle trunks [fig-4].

Fig. 1: showing formation median nerve in the arm and commun9ication [*] between the lateral and medical root of median nerve.



AA- Axillary artery, BB- Biceps brachii,

CB- Coracobrachialis, LC- Lateral Cord, LR- Lateral Root, MC- Medial Cord, MCN- Musculo Cutaneous Nerve, MCNF- Medical Cutaneous Nerve of Forearm,

MN- Median Nerve, MR- Medial Root, TM- Teres Major, UN- Ulnar Nerve.

Fig. 2: Showing the absence of Musculocutaneous nerve. Lateral pectoral nerve (cut) and nerve to coracobrachialis arising from lateral cord can be seen. Lateral cord continuing as lateral root of median nerve. A communication [*] between lateral cord and medical root of median nerve can be seen.



AA- Axillary artery, BB- Biceps brachii, CB-Coracobrachialis, LC- Lateral Cord, LR- Lateral Root, MC-Medial Cord, MCN- Musculo Cutaneous Nerve, MCNF-Medical Cutaneous Nerve of Forearm, MN- Median Nerve, MR- Medial Root, TM- Teres Major, UN- Ulnar Nerve.

Fig. 3: Showing the musculo coetaneous nerve not piercing the coraco-brachialis, nerve to coracobrachialis arising from lateral cord, we can also observe formation of the median nerve at lower level (in the arm).



AA- Axillary artery, AV- Axillary Vein, BB- Biceps brachii, CB- Coracobrachialis, MN- Median Nerve, PM- Pectoralis Minor, TM- Teres Major, branches are shown by red arrows.

Fig. 4: Showing the lateral pectoral nerve arising from anterior division of upper and midde trunks. Anterior division of middle trunk gives a branch [*] to the medial cord.



AA- Axillary artery, BB- Biceps brachii,

CB- Coracobrachialis, LC- Lateral Cord, LR- Lateral Root, MC- Medial Cord, MCN- Musculo Cutaneous Nerve, MCNF- Medical Cutaneous Nerve of Forearm,

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DISCUSSION

During the formations of plexus, the nerve fibers of different nerve trunks come together. The nerve fibers of the main trunk separate and join with other nerve fibers to form proper nerves supplying the target organs. Sometimes, some of the nerve fibers do not separate from the main trunk to join their proper nerve. In order to correct this error, these nerve fibers form anastomoses or communications [5]. The anomalies of the vessels can be detected by angiographic studies. But in the case of nerves, anomalies can be detected at the time of surgeries or during dissection of cadavers [6].

The lateral cord and its branches show more variations compared to other cords [medial and posterior]. The communication between lateral cord and medial root of median nerve is a common finding [14.28%, n=70]. Gopal et al [7] observed communications in 7.55% [n=40], Sheetal V et al [8] observed in 11.67% [n=60]. Many such communications were reported earlier [9-14]. A communication between musculo-cutaneous nerve and median nerve may be present [7,15,16]. In the present study, no such communication was noted. The absence of musculocutaneous nerve is another variation reported. In the present study, in 2 [3.12%] limbs of the same cadaver mcn is absent. Similar findings were reported earlier by Sheetal V (6.67%, n=60) [8], Jamuna M (6%, n=50), Priti Cowdhary (10%, n=60) [11] and others [14,18,19]. In the absence of musculo-cutaneous nerve, the lateral cord usually supplies coracobrachialis and biceps brachii and lower lateral cutaneous nerve of forearm supplies brachialis. But sometimes the median nerve supplies all the muscles of arm and also gives rise to lateral cutaneous nerve of forearm. In 7 [10%] specimens the median nerve is formed in the arm in front of the brachial artery instead in axilla. Similar findings were reported earlier [8,10,20,12,21]. In the present study, musculocutaneous nerve was found to be not piercing the coracobrachialis in 3 [4.28%] limbs which is similar to the findings of Jamuna M (6%, n=50) [17], Kishore C K (7.5%, n=40) [22], Shiv Goel [9] and Girish V Patil [23]. Two lateral pectoral nerves are found to be arising from anterior divisions of upper and middle trunks in the present study. Similar finding was reported by Prakashchandra [24].

Two lateral pectoral nerves arising from lateral cord were reported earlier, but not from trunks [9,25,26]. The variations in the number and origin of lateral pectoral nerve play an important role in surgeries related to mastectomy. The anomalies of lateral cord can be explained embryologically. The upper limb buds develop opposite the lower five cervical and upper two thoracic segments. Later the ventral primary rami of the spinal nerves penetrate into the mesenchyme of limb bud [19, 27]. The growth as well as the path finding of nerve fibres towards the target is dependent upon concentration gradient of a group of cell surface receptors in the environment. Several signalling molecules and transcription factors have been identified which induce the differentiation of the dorsal and ventral motor horn cells [28]. Mis-expression of any of these signalling molecules can lead to abnormalities in the formation and distribution of particular nerve fibres [7].

CONCLUSION

The lateral cord and its branches show variations more frequently than medial and posterior cords of brachial plexus. The knowledge of the anatomical variations is necessary for anaesthetists, orthopaedicians and surgeons while conducting the procedures.

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