

A VARIANT COURSE OF LATERAL ROOT OF MEDIAN NERVE: EMBRYOLOGICAL BASIS

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ABSTRACT

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During routine dissection of the right arm of 50 year old male cadaver, we observed that the lateral root of median nerve was piercing the coracobrachialis muscle before joining the medial root of median to form the median nerve. The lateral root of median nerve did not give any branch within the muscle and no communication was observed between musculocutaneous nerve and lateral root of median nerve within the coracobrachialis muscle or in the later course of these two nerves. The same muscle was being pierced by musculocutaneous nerve which was giving branches to the muscle. These variations are important for the anesthetists, surgeons, neurologists during surgery and anatomists during dissection in the region of axilla.

Key words: Median nerve, nerve variation, coracobrachialis muscle.

"For shoulder reconstructive surgeries, the surgeons need to know the normal and variant anatomy of coracobrachialis muscle as well as the structures piercing it"

INTRODUCTION

Nerve variations of the upper limb are very important in routine surgery and during radical neck dissections where these variations are more prone to injury.¹ These variations may also help in interpretation of a nervous compression having unexplained clinical symptoms.²

Anomalies related to the formation, relations and distribution of median nerve are fairly common. Normally the union of the ventral rami of the fifth, sixth, seventh and eighth cervical nerves and first thoracic nerve form the brachial plexus. These rami unite, divide and reunite to form the trunks, anterior and posterior divisions and the cords of brachial plexus and ultimately these cords and their branches appear in the axilla grouped around the axillary artery.³ The median nerve is normally formed by the union of two roots: lateral root of median nerve, coming from the lateral cord (C5, C6, C7) of brachial plexus and medial root of median nerve, coming from the medial cord (C8, T1) of brachial plexus. The two roots embrace the third part of the axillary artery, uniting anterior or lateral to it. Near the insertion of the coracobrachialis, it crosses in front of (rarely behind) the artery, descending medial to it, to the cubital fossa, where it is posterior to the bicipital aponeurosis and anterior to the brachialis, separated by the latter from the elbow joint. It usually enters the forearm between the heads of the pronator teres, crossing to the lateral side of the ulnar artery and separated from it by the deep head of pronator teres.⁴

CASE REPORT

During routine dissection of the right upper limb of a 50 year male cadaver in Department of Anatomy, King George's Medical University, UP, Lucknow, we found that the coracobrachialis muscle was pierced by lateral root of median nerve approximately 4cm from its origin. The part of the nerve which was traversing the muscle was approximately 5cm in length. After emerging out from the muscle on its medial side, it joined the medial root of median nerve to form the median nerve lateral to the axillary artery (Fig 1 & 2). The lateral root of median nerve did not give any branch within the muscle and no communication was observed between musculocutaneous and lateral root of median nerve within the coracobrachialis muscle or in the later course of these two nerves. The same muscle was being

pierced by musculocutaneous nerve also approximately 1cm before the entrance of lateral root of median nerve. The muscular branches to coracobrachialis were coming from musculocutaneous nerve. The relations of all the three cords of brachial plexus with the second part of axillary artery and the further course, branching and termination of musculocutaneous and median nerve in arm, forearm and hand followed the normal pattern. The left arm of the cadaver did not show any such variation of the lateral cord and was absolutely normal in relation, formation and branching pattern of brachial plexus. No other arterial or muscular variation was observed in either of the limbs.

DISCUSSION

Median nerve is one of the terminal branches of the brachial plexus. It is formed by union of two roots, lateral root and medial root coming from lateral and medial cord respectively. Formation of median nerve occurs lateral to axillary artery in axilla.

Pandey and Shukla reported median nerve formation proximal to the insertion of coracobrachialis muscle but the nerve was medial to third part of axillary artery.⁵ In the present case report, we also observed that median nerve was formed proximal to the insertion of coracobrachialis muscle but lateral to the axillary artery.

Kaus & Wotowicz, Williams et al, reported that the fibres from the median nerve may accompany the musculocutaneous as it transits the coracobrachialis muscle.^{4,6} According to Le Minor, very rarely the lateral cord pierces the coracobrachialis and then divides into musculocutaneous and the lateral root of median nerve.⁷ Approximately similar findings were observed in the present case in which the lateral root was accompanying the musculocutaneous nerve and piercing the muscle.

The interpretation of the anomaly of atypical course of lateral root requires consideration of the development and innervation of upper limb musculature. Muscles of the limbs are derived from somatic precursor muscle cells from the ventrolateral edges of the somites opposite the developing limbs, which lie lateral to the neural tube and causes bulge in the overlying ectoderm. Somites have a specific effect

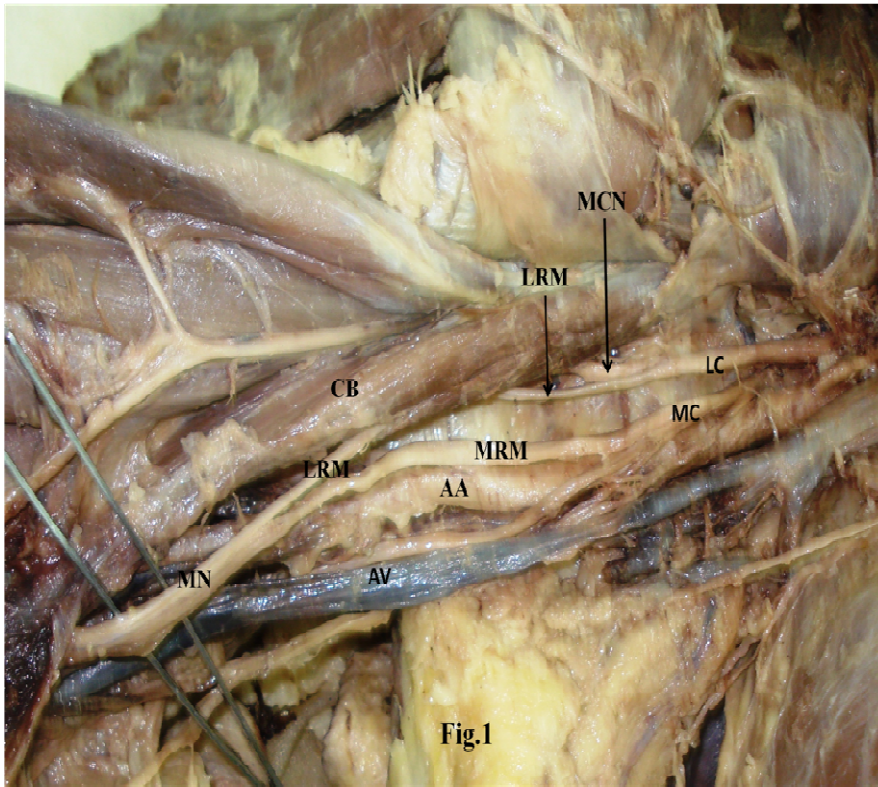


Figure 1: Photograph showing lateral root of median nerve piercing coracobrachialis muscle. (**CB:** coracobrachialis muscle; **MC:** Medial cord; **LC:** Lateral cord; **MCN:** Musculocutaneous nerve; **LRM:** Lateral root of median nerve; **MRM:** Medial root of median nerve; **MN:** Median nerve; **AA:** Axillary artery; **AV:** Axillary vein).

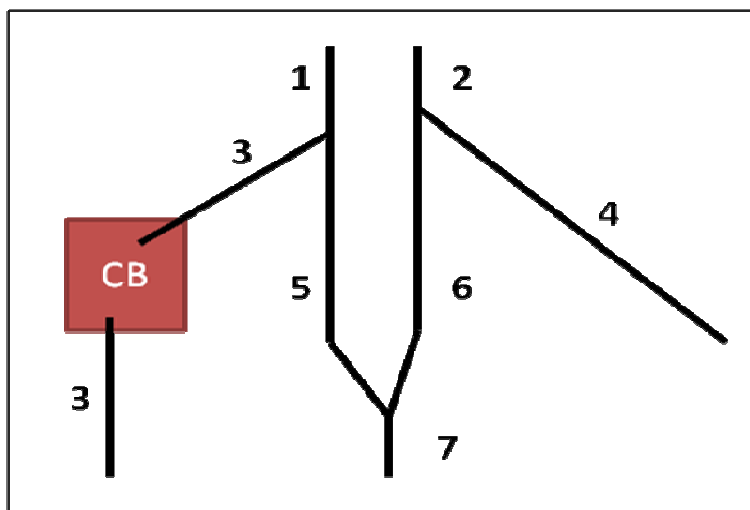


Figure 2: Schematic diagram showing (a) normal course of lateral root of median nerve (1: Lateral cord; 2: Medial cord; 3: Musculocutaneous nerve; 4: Ulnar nerve; 5: Lateral root of median nerve; 6: Medial root of median nerve; 7: Median nerve; CB: Coracobrachialis muscle).

Fig. 2(a)

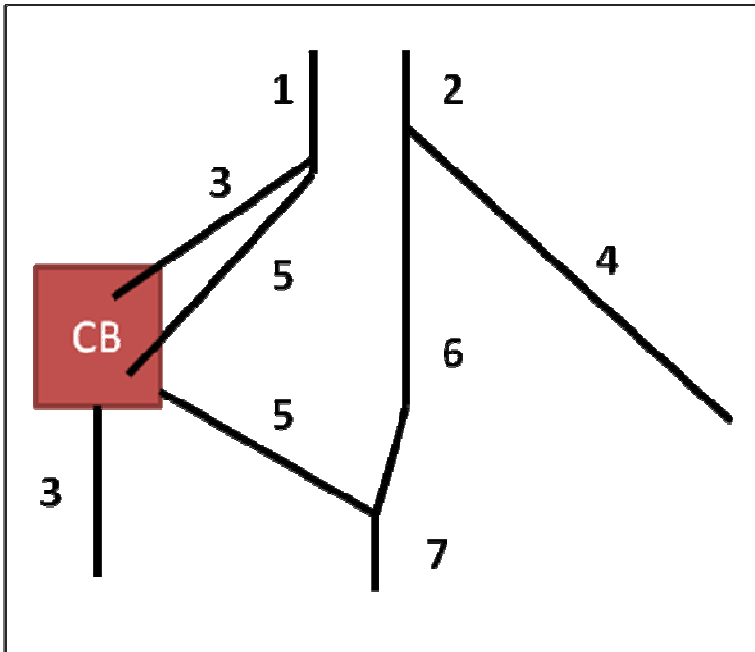


Figure 2: Schematic diagram showing (b) variant course of same nerve in the present case. (1: Lateral cord; 2: Medial cord; 3: Musculocutaneous nerve; 4: Ulnar nerve; 5: Lateral root of median nerve; 6: Medial root of median nerve; 7: Median nerve; CB: Coracobrachialis muscle).

Fig. 2(b)

on the position of the developing spinal nerves, which preferentially grow through the cranial half of sclerotome. Spinal nerves are derived from two sources, the motor nerve from the neural tube and the sensory nerves from the neural crest.⁴

The nerve cords from the spinal nerves that correspond to the early extent of limb buds grow distally to establish an intimate contact with the differentiating mesodermal condensations into intermuscular spaces and end in a pre-muscle mass. As suggested by Sannes et al, that the guidance of the developing axons is regulated by expression of chemoattractants and chemorepulsants in a highly coordinated site specific fashion.⁸ Any alterations in signaling between mesenchymal cells and neuronal growth cones can lead to significant variations and probably it might have caused the lateral root to pass through the coracobrachialis muscle in the present case. Once formed, any developmental differences would persist postnatally.⁹

Coracobrachialis is a flexor muscle of the arm and

during shoulder reconstructive surgery, the surgeons need to place retractors under the coracoid muscles and this makes the coracobrachialis muscle vulnerable to injury. Recurrent dislocations of shoulder are operatively managed by coracoid graft transfers and such operations and shoulder arthroscopies could be the source of lesions to the structures piercing the muscle.¹⁰

The knowledge of the course and distribution of the lateral cord of brachial plexus, keeping in mind the variations in anatomy and the level of penetration are important while performing neurotization of the brachial plexus lesions, shoulder arthroscopy by anterior gleno-humeral portal and shoulder reconstructive surgery. Thus, the present case report is important as well as different and rare because till now none such case has been reported in literature in which lateral root of median nerve was piercing the coracobrachialis muscle.

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AR²: Data collection, Photograph preparation, Figure sketching and Discussion.

AR³ & JC: Data collection and language corrections.

A.K.S. & P.K.S: Discussion writing and final corrections.

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