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CLINICALLY SIGNIFICANT UNILATERAL VARIATION OF MUSCULOCUTANEOUS NERVE

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ABSTRACT

During routine dissection conducted for undergraduates study in the Department of Anatomy, Kolkata Medical College, variations in the course of musculocutaneous nerve was found in two cadavers. In normal individuals the musculocutaneous nerve arises from the lateral cord of the brachial plexus, passes inferolaterally and then pierces through the coracobrachialis muscle after supplying it. Then it descends between the biceps and the brachialis muscle, sending branches to both the muscle and continues as the lateral cutaneous nerve of the forearm. In our cases we found that the musculocutaneous nerve did not pierce the coracobrachialis muscle and in the middle 1/3rd of arm, it communicates with median nerve. Knowledge about these variations helps surgeons during operation of brachial plexus lesions, arthroscopy of shoulder joints and repair of fracture humerus.

Keywords: Brachial plexus, Coracobrachialis, Median nerve, Musculocutaneous nerve

INTRODUCTION

Musculocutaneous nerve is the terminal branch of lateral cord of brachial plexus and it arises from lateral cord at the lower border of pectoralis minor. It leaves the axilla after piercing the coracobrachialis and then it passes downward between biceps brachii and brachialis muscle in arm. At the junction of middle third and lower third of arm, it appears at the lateral margin of biceps brachii tendon. Here it pierces the deep fascia and passes downward along the lateral aspect of the forearm as the lateral cutaneous nerve of forearm. It supplies three muscles in arm- coracobrachialis, bicep brachii and most of the brachialis. Usually the branch to coracobrachialis is given off before the musculocutaneous nerve pierces the muscle. The musculocutaneous nerve also supplies the shoulder joint and elbow joint.

The distribution, course and branching pattern of the musculocutaneous nerve is important from the clinical point of view, especially for surgeons

dealing with repair of brachial plexus lesions. Variation in the course and branching pattern of the musculocutaneous nerve is not uncommon and mentioned in many literature. In "Gray's anatomy" the musculocutaneous nerve is described as having frequent variations like it may run behind coracobrachialis or pass behind biceps after adhering for some distance to the median nerve. Sometime few fibers of the median nerve may pass to the musculocutaneous nerve, and the median nerve sends a branch to the musculocutaneous nerve. Occasionally it supplies pronator teres and may replace branches of radial nerve to the dorsal surface of the thumb.

MATERIAL AND METHOD

This study was performed from August 2011 to September 2012, on cadavers allotted for routine dissection classes for undergraduate study in the Department of Anatomy, Kolkata Medical College. Cadavers were lying in supine posture and arms were extended and abducted to 90

degree. Dissections were performed as per standard incisions described in Cunningham's manual of Practical Anatomy. The cords and the branches of the brachial plexus were dissected. The variations of the musculocutaneous nerve were noted. Cases were analyzed by comparing with normal standard gross origin, courses, and branches as stated in "Gray's Anatomy"¹⁷.

RESULT

During routine dissection conducted for undergraduate study in the Department of Anatomy, Kolkata Medical College, variations in the course of musculocutaneous nerve was found in two male cadavers; both were aged around 50 years. The variations found were unilateral- one in right side and other in left side. In both cases, the musculocutaneous nerve arises from lateral cord, did not pierce the coracobrachialis muscle and in the middle 1/3rd of arm, it communicates with median nerve [Figure 1]. Later the course was normal. The nerve to coracobrachialis muscle was from the lateral border of the musculocutaneous nerve. In both the cases the nerve was lateral to the brachial artery through out its course in the arm.

DISCUSSION

The limb muscles develop from the mesenchyme of the paraxial mesoderm during the fifth week of intrauterine life. The axons of the spinal nerves grow distally to reach the muscles and skin¹⁹. Thus, a lack of coordination between these two processes due to altered signaling may lead to the development of multiple variations.

Mostafa M El-Naggar reported three cases where musculocutaneous nerve did not pierce coracobrachialis muscle. According his study the course of musculocutaneous nerve has greatly affected the morphology of the muscle. He identified the presence of two heads of origin for the coracobrachialis muscle, which are situated superficial (anterior) and deep (posterior) to the musculocutaneous nerve and it formed of a single

head where the nerve was not piercing the muscle⁷. Studies by Nakatani et al. found three variations in which the musculocutaneous nerve did not pierce the coracobrachialis¹⁵. Jamuna M also reported in one case where musculocutaneous nerve was not piercing coracobrachialis¹⁰. In another study by Jamuna M and Amudha G found three limbs out of fifty where musculocutaneous nerve was not piercing coracobrachialis¹¹. Nayak reported in one case where the origin of the musculocutaneous nerve was very low and it was not piercing coracobrachialis¹⁶. Chitra observed in 2 cases, that the musculocutaneous nerve did not pierce the coracobrachialis⁴.

Various authors reported communicating branches between the musculocutaneous and median nerves at different levels.

Le Minor¹³ described five types of variations:

Type 1: There is no communication between the median nerve and musculocutaneous nerve.

Type 2: The fibers of the medial root of median nerve pass through the musculocutaneous nerve and join the median nerve in the middle of the arm.

Type 3: The lateral root fibers of the medial root of median nerve pass through the musculocutaneous nerve and after some distance, leave it to form the root of the median nerve.

Type 4: The musculocutaneous nerve fibers join the lateral root of the median nerve and after some distance the musculocutaneous nerve arise from the median nerve.

Type 5: The musculocutaneous nerve is absent and the entire fibers of musculocutaneous nerve pass through lateral root and fibers to the muscles supplied by a musculocutaneous nerve branch out directly from the median nerve

Venieratos and Anagnostopoulou²¹ described three different types of communication between musculocutaneous nerve and median nerve in relation to coracobrachialis muscle -

Type I: The communication was proximal to the entrance of the musculocutaneous nerve into coracobrachialis

Type II: The communication was distal to the muscle

Type III: The nerve as well as the communicating branch did not pierce the muscle

Marios Loukas and Haqq Aqueelah¹² classified the communication patterns as follows

Type I (45%): the communications were proximal to the point of entry of the musculocutaneous nerve into the coracobrachialis.

Type II (35%): the communications were distal to the point of entry of the musculocutaneous nerve into the coracobrachialis.

Type III (9%): the musculocutaneous nerve did not pierce the coracobrachialis.

Type IV (8%): the communications were proximal to the point of entry of the musculocutaneous nerve into the coracobrachialis and additional communication took place distally.

The result of our study coincided with type III of Loukas and Aqueelah classification and type III of Venieratos classification, but did not correspond to any of the Le Minor's classification. Choi et al reported variations in connections between the musculocutaneous and median nerves 64 cadavers (46.4%) out of 138, among which 9 bilaterally and 55 unilaterally (26 right and 29 left)⁵. Maheria, Pankaj Band et al. found two cases where musculocutaneous nerve gave a communicating branch to median nerve after piercing the coracobrachialis muscle¹⁴. Basar et al found a connecting branch between the musculocutaneous and the median nerves in one case¹. Bhattarai and Poudel found 3.125% cases where musculocutaneous nerve terminated by joining with median nerve at the level of junction of distal and middle third of medial side of arm².

CONCLUSION

It is very important to be aware of the variations of the musculocutaneous nerve and its relation to surrounding structures during repair of brachial plexus lesions, shoulder arthroscopy and various other surgical and investigation procedure of arm.

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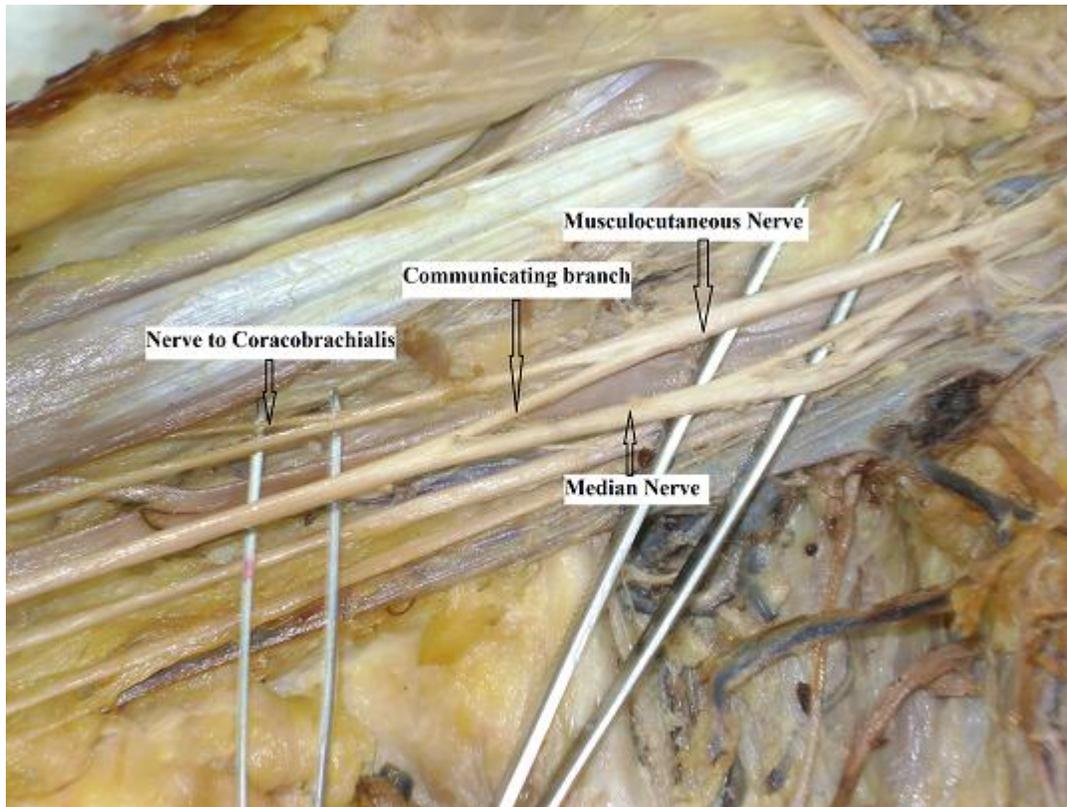


Figure 1: Musculocutaneous nerve not piercing Coracobrachialis and communicating with Median nerve.