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Research Article

ABSENCE OF MUSCULOCUTANEOUS NERVE – A STUDY OF ITS INCIDENCE AND CLINICAL IMPLICATIONS

***Balachandra N., Vasudha Kulkarni and Ramesh B.R.**
Department of Anatomy, DR B R Ambedkar Medical College, Bengaluru
**Author for Correspondence*

ABSTRACT
Musculocutaneous nerve is a branch from the Lateral cord of the Brachial plexus. It is derived from the ventral rami of 5th to 7th cervical spinal nerves, pierces the Coracocobrachialis muscle and descends laterally between the Biceps brachii and Brachialis muscles, to the lateral side of the arm. Just below the elbow it pierces the deep fascia lateral to the tendon of Biceps brachii muscle and continues as the Lateral cutaneous nerve of the forearm. It supplies the muscles of the anterior compartment of the arm namely the Coracobrachialis, Biceps brachii, and Brachialis. The branch to the coracobrachialis leaves the musculocutaneous nerve before it enters the muscle. In some instances the musculocutaneus nerve may be absent. Sometimes it may arise from the lateral root of the median nerve before piercing the musculocutaneus nerve. Sometimes it may arise from the median nerve itself (Susan Standring, 2006). These variations of the musculocutaneus nerve are of importance to the clinicians especially neurologists, anaesthesiologists, orthopaedicians & surgeons. In the present study we come across variations of the Musculocutaneous nerve.

Keywords: *Musculocutaneous Nerve, Corachobrachialis Muscle, Median Nerve*

INTRODUCTION
Musculocutaneous nerve is a branch from the Lateral cord of the Brachial plexus.

It is derived from the ventral rami of 5th to 7th cervical spinal nerves, pierces the Coracocobrachialis muscle and descends laterally between the Biceps brachii and Brachialis muscles, to the lateral side of the arm.

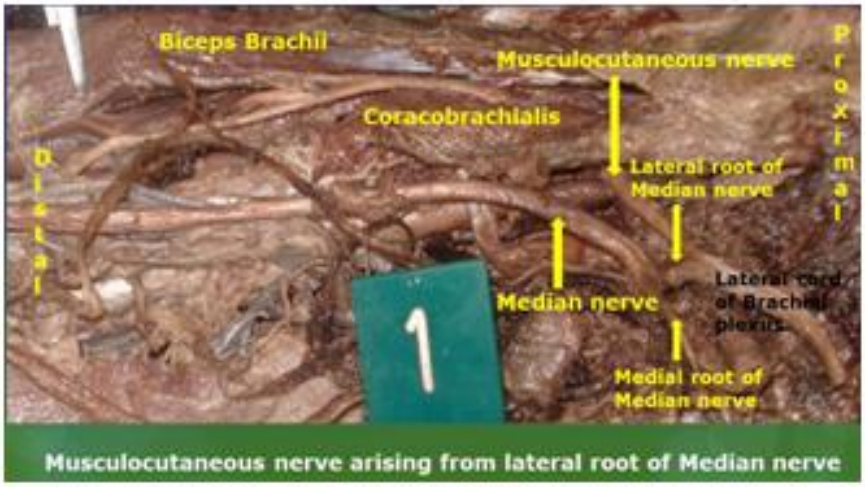
Just below the elbow it pierces the deep fascia lateral to the tendon of Biceps brachii muscle and continues as the Lateral cutaneous nerve of the forearm.

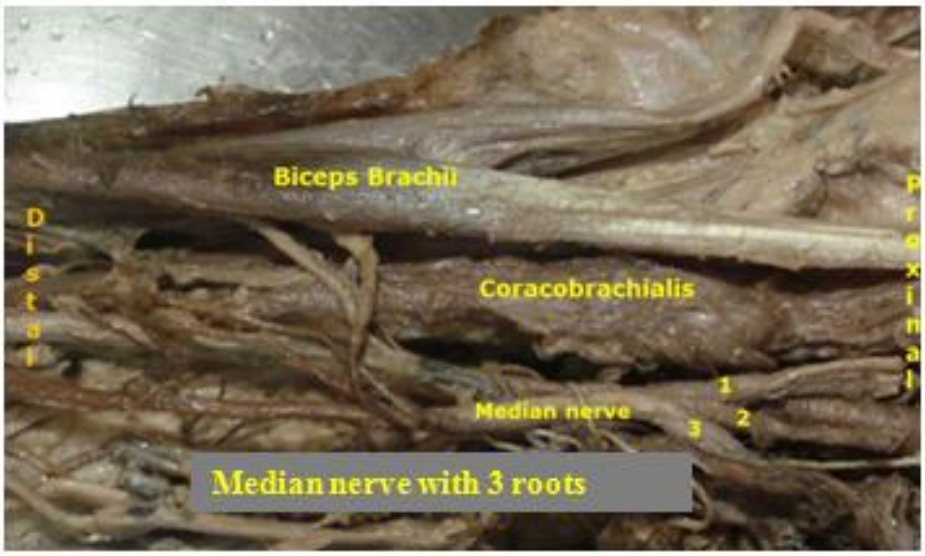
It supplies the muscles of the anterior compartment of the arm namely the Coracobrachialis, Biceps brachii, and Brachialis.

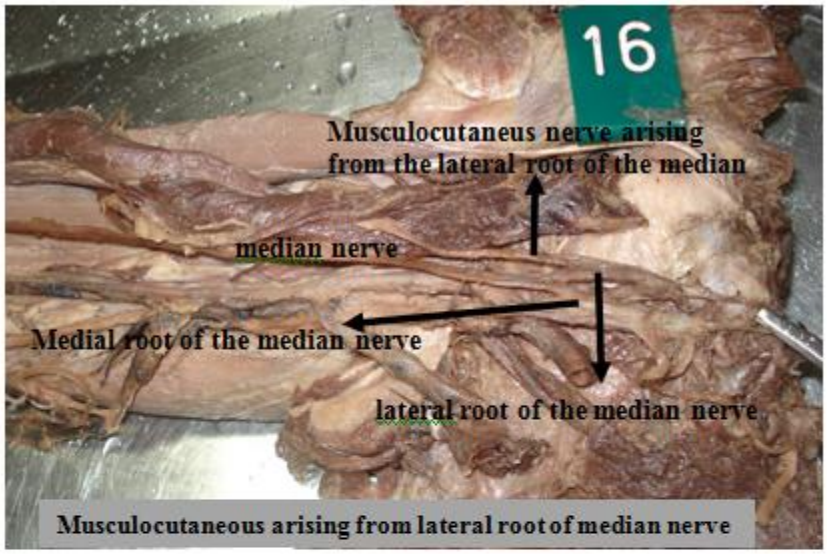
The branch to the coracobrachialis leaves the musculocutaneous nerve before it enters the muscle (Susan Standring, 2006).

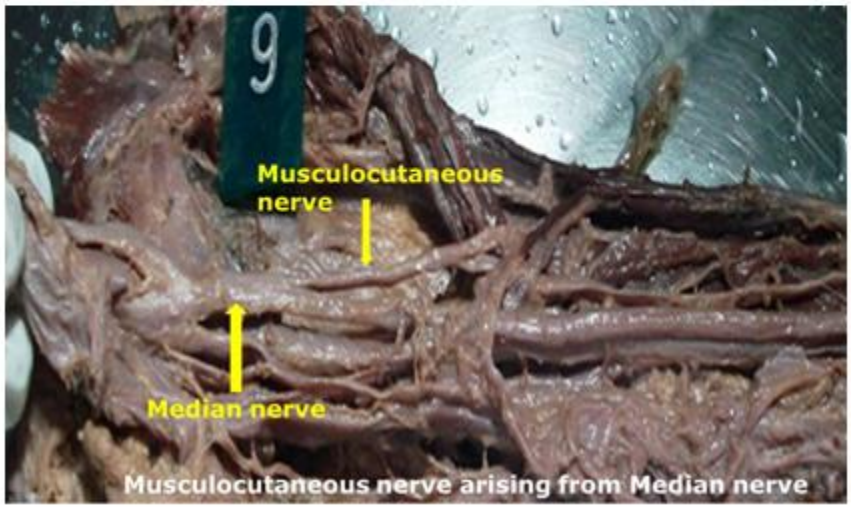
MATERIALS AND METHODS
10 upper limbs (20 sides) were given to I MBBS students of our college for dissection of formalin embalmed cadavers by dissection method.

RESULTS
Of the 20 upper limbs studied (10 right & 10 left) 13(65%) showed normal origin and course of the musculocutaneus nerve.
Of these 8 belonged to the left side while the rest belonged to the right side. In 4(20%) upper limbs the musculocutaneus nerve was seen to be arising from the lateral root of the median nerve. All of these belonged to the right side.
In 1(5%) right upper limb the median nerve had 3 roots with the absence of the musculocutaneus nerve.
In 1(5%) left upper limb the Musculocutaneous nerve was seen arising from the Median nerve.









DISCUSSION

Henry (1982)- Musculocutanous nerve may be the only continuation of the lateral cord, may arise from a single anterior cord, formed by the union of medial & lateral cords; from the anterior division of the upper trunk or from the median nerve or from union of the ulnar and the median nerve (Henry 1982).

Ronald *et al.*, (1988)- This nerve arises from the lateral cord (90.5% of 75 arms), from the lateral and posterior (4%), from the median nerve (2%), as two separate bundles from the medial and lateral cords (1.4%), or from the posterior cord (1.4%). A number of variations in the course and distribution of the musculocutaneous nerve have been reported. Instead of piercing the coracobrachialis muscle, the nerve may adhere to the median nerve for some distance down the arm and then, either as a single trunk or as several branches passes between the biceps and brachialis muscles to supply all three muscles (about 22% of arms). Sometimes only a part of the nerve follows this course; this part then rejoins the main trunk after it transits through and supplies coracobrachialis. The nerve may be absent also (Ronald *et al.*, 1988).

Gumusburun and Audiguzel (2000) - A variation of the brachial plexus characterized by the absence of the musculocutaneous nerve on both sides was observed during the dissection of a 72 year-old female cadaver. The musculocutaneous nerve was absent and two branches from the lateral cord innervated the coracobrachialis muscle. The median nerve innervated the biceps brachii and brachialis muscles in the

arm and also gave off the lateral antebrachial cutaneous nerve. The knowledge of the anatomical variations of the peripheral nerve system can help give explanation when encountering an incomprehensible clinical sign.

They have quoted Le Minors classification of variations of the musculocutaneous and the median nerves, which are of 5 types which are as follows;

Type I: there are no receiving fibers between the musculocutaneous and the median n. as described in classic textbooks. The musculocutaneous n. pierces the coracobrachialis m. and innervates the coracobrachialis, the biceps brachii and the brachialis mm.

Type II: although some fibers of the medial root of the median n. unite the lateral root of the median n. and form the median n., other fibers run into the musculocutaneous n. and after some distance leaving it to join their proper trunk.

Type III: the lateral root of the median n. from the lateral cord runs into the musculocutaneous n. and after some distance leaving it to join their proper trunk.

Type IV: the fibers of the musculacuteneous n. unite the lateral root of the median n., after some distance the musculocutaneous n. arise from the median n.

Type V: the musculocutaneous n. is absent. The fibers of the musculocutaneous n. run into the median n. along its course. The musculocutaneous n. does not pierce the corachobrachialis m. in this type (Gumusburun and Adiguzel, 2000).

Arora and Dhingra (2005)- During dissection of a 55-year-old female cadaver, they observed that three nerve roots contributed to the formation of median nerve in her right upper limb. Along with this variation, absence of musculocutaneous nerve was noticed. The muscles of front of arm i.e. Biceps brachii, brachialis and coracobrachialis received their nerve supply from median nerve. The lateral cutaneous nerve of forearm was derived from median nerve. They have quoted Venieratos and Anagnostopoulou (1998) description of three different types of communication between Musculocutaneous and Median nerve in relation to Coracobrachialis

Type 1: communication between Musculocutaneous and Median nerve is proximal to the entrance of Musculocutaneous into Coracobrachialis.

Type 2: communication between the two nerves is distal to the muscle.

Type 3: neither the nerve nor its communicating branch pierced the muscle (Arora and Dhingra, 2005).

Steven and Scott (2006) We present the case of a 56-year-old man who underwent axillary nerve block for a wrist arthroscopy procedure, with real-time ultrasound and peripheral nerve stimulator guidance. The ulnar nerve and radial nerve were located medial and posterior to the brachial artery, respectively. A large complex structure was noted in the position typically occupied by the median nerve. Contact of this structure with the stimulating needle produced strong biceps contraction, and slight adjustment of the needle resulted in forearm pronation.

After injection of 10 mL of local anesthetic near this structure, it appeared to consist of two separate components on ultrasound. We believe that these components represented the median and musculocutaneous nerves lying together, lateral to the artery. Radial, median, ulnar, and musculocutaneous nerve block ensued, and wrist arthroscopy was carried out uneventfully. Knowledge of this anatomical variation may improve anesthesiologists' ability to provide effective axillary block. The most commonly noted aberration of peripheral nerve organization in the upper extremity is communication of the musculocutaneous with the median nerve, occurring in up to 20% of patients. They also quoted Choi *et al.*, who, in 138 cadaver specimens, described variations in connections between the musculocutaneous and median nerves in 26% of the dissected arms. They organized these variations into three classifications: complete fusion of nerves (19% of variants), one supplementary branch between the two nerves (72%), or two supplementary branches between them (7%) (Steven and Scott, 2006).

Sateesha (2007) reported the absence of musculocutaneous nerve. He observed the formation of the median nerve in the upper part of the arm, in front of the brachial artery. The nerve passed deep to the brachial artery from lateral to medial side. The median nerve supplied the biceps, coracobrachialis and brachialis muscles and gave lateral cutaneous nerve of the forearm. The third part of the axillary artery

was compressed by two abnormal bands connecting medial root of median nerve with its lateral root (Sateesha, 2007).

Joshi *et al.,* (2008)- Studied One hundred and seventy limbs (Rt: 85; Lt: 85) from 85 embalmed cadavers were utilized. This study was carried out over a period of four years. They have observed the absence of Musculocutaneous nerve in 5.5% cases out of 170 upper limbs. The incidence of variations in the formation, branching and communications between the median and musculocutaneous nerves was 37.05% (RT: 38.82; Lt: 35.29%) limbs. In 5.5% (Rt: 7.05%; Lt: 4.7%) the musculocutaneous nerve was absent (did not arise as a branch of lateral cord) and in its place there was a fused median -musculocutaneous nerve. In these cases branch to muscle coracobrachialis was given out from lateral cord or fused median-musculocutaneous nerve.

Musculocutaneous nerve arose from the median nerve either as a single trunk or as several branches to supply the muscles of the arm and to continue further as lateral cutaneous nerve of forearm. In one case musculocutaneous after piercing the coracobrachialis muscle re-joined the median nerve and its muscular and cutaneous branches then arose independently from median nerve. In three cases musculocutaneous pierced the biceps muscle instead of coracobrachialis (Joshi *et al.,* 2008).

Rajendra *et al.,* (2009) Reported unilateral absence of Musculocutaneous nerve on the left side of a 40 yr. old male cadaver (Rajendra *et al.,* 2009).

Present study. Of the 20 upper limbs studied (10 right & 10 left) 13(65%) showed normal origin and course of the musculocutaneus nerve. Of these 8 belonged to the left side while the rest belonged to the right side. In 4(20%) upper limbs the musculocutaneus nerve was seen to be arising from the lateral root of the median nerve. All of these belonged to the right side.

In 1(5%) right upper limb the median nerve had 3 roots with the absence of the musculocutaneus nerve. In 1(5%) left upper limb the Musculocutaneous nerve was seen arising from the Median nerve.

The present study conforms to Type V of Le Minor classification of variations of Musculocutaneous nerve.

Embryological basis of variations in the formation of the Brachial plexus – As suggested by Sannes *et al.,* (2000) that the guidance of the developing axons is regulated by expression of chemoattractants and chemorepulsants in a highly coordinated site specific fashion. Alterations in the signalling between mesenchymal cells and neuronal growth cones or circulatory factors at the time of fusion of brachial plexus cords.

Clinical Importance

Musculocutaneous nerve injury from retractor placed under the coracoid process, coracoid process grafting, shoulder reconstruction, dislocation & frequent arthroscopies may damage both the muscle and the nerve.

Brachial plexus injuries may occur following trauma, traction, compression of nerves & shoulder dislocation during traumatic delivery of infants. Knowledge of variations of the Brachial plexus is of importance when performing neurotisation of Brachial plexus lesions, shoulder arthroscopy by anterior glenohumeral portal & shoulder reconstructive surgery.

These are of value to neurologists, orthopaedicians, & traumatologists in assessing & evaluating the clinical picture in cases of injury to the lateral cord or its branches in the arm. These are also of help to anaesthesiologists in providing effective nerve blocks in the region. Injury to the Median nerve supplying the muscles of the front of the forearm in the absence of Musculocutaneous nerve cause paresis or paralysis of those muscles as well as hypoesthesia of the lateral surface of the forearm.

Conclusion

Absence of the Musculocutaneous nerve is not a common occurrence. Hence Knowledge of this variation of this nerve is of importance to Clinicians particularly, the Anaesthesiologists, Neurologists, Surgeons, traumatologists etc.

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DR B R Ramesh**,** Professor & Head, Dept. of Anatomy, DR B R AMC.

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