

# Absence of Musculocutaneous Nerve Associated with Variations of Distribution Patterns of the Median Nerve

Ausencia del Nervio Musculocutáneo Asociada con Variaciones de los Patrones de Distribución del Nervio Mediano

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**SUMMARY:** Variations in the brachial plexus and the distribution patterns of its branches are not uncommon. A communicating branch, which is the most frequent variation, often arises from musculocutaneous nerve to median nerve. However, the branches arising from lateral cord of the brachial plexus and median nerve instead of musculocutaneous nerve are very rare. Detailed description of the abnormalities is important for surgical procedures. Our case study reports the musculocutaneous nerve was absent, a branch from the medial cord innervated the coracobrachialis muscle and two branches from the median nerve innervated the biceps and brachialis muscles, respectively. Moreover, the median nerve gave off the lateral antebrachial cutaneous nerve. This report provides evidence of such possible anatomical variations to surgeons, anesthetists and neurologists during clinical practice.

**KEY WORDS:** Brachial plexus; Musculocutaneous nerve; Median nerve; Absence.

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## INTRODUCTION

The brachial plexus is constituted by union of the anterior rami of spinal nerves C 5–8 and thoracic 1, which consists of roots, trunks, divisions and cords. The superior, middle and inferior trunks are formed by the roots C5-C6, C7 and C8-T1, respectively. Each trunk divides into an anterior and a posterior division. Three cords (lateral, medial and posterior cords) of the brachial plexus arise from the divisions and are related to the middle of the axillary artery (Berry *et al.*, 1995).

The musculocutaneous nerve originates from the lateral cord of the brachial plexus, which supplies the biceps, coracobrachialis and brachialis muscles and its terminal branch as the cutaneous nerve innervates the lateral margin of the skin of the forearm. The median nerve arises from the lateral and medial cords of the brachial plexus and passes into the arm anterior to the brachial artery. Although the median nerve usually does not have muscular branches in the arm, it gives off articular branches to the elbow joint and vascular branches to the brachial artery (Johnson, 2008). Previous reports showed that the prevalence of variations of the musculocutaneous nerve is 6.25% and its absence ranging from 1.7 to 15% (Bhattarai & Poudel, 2009). The branches

arising from medial cord of the brachial plexus and median nerve instead of musculocutaneous nerve are very rare although the variation of the musculocutaneous nerve has been reported in some studies (Beheiry, 2004).

In our case report, we observed a rare case of absent musculocutaneous nerve associated with variations of distribution patterns of the median nerve, this report may provide valuable evidence to surgeons, anesthetists and neurologists during clinical practice.

## CASE REPORT

During dissection for medical undergraduate students, a variation of the brachial plexus was found in the left upper limb of 58-year-old Asian female cadaver, in the Department of Anatomy, Zunyi Medical College, Guizhou, China. This cadaver was routinely fixed in formalin for two years and had no surgical procedures or traumatic lesions to the upper limb. The skin and subcutaneous tissue of the upper limb and shoulder were removed, the specimen was dissected in

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detail while taking extreme care not to damage the cutaneous and muscular branches of the brachial plexus. During the dissection, we carefully observed the course of terminal branches and measured the length of the extramuscular and main nerve branches using digital calipers.

In our case report, the positional relationship of lateral, medial and posterior cords of the brachial plexus was normal, but the musculocutaneous nerve was absent. The lateral cord gives off the lateral pectoral nerve (LPN) and the branch of coracobrachialis (BC). The coracobrachialis is supplied by the BC, which entered the muscle from the middle part, the length of this branch is 5.11 cm, and the LPN innervated the pectoralis minor (Fig. 1). The median nerve was formed by the union of the lateral and medial cords. During its course toward the upper part of the arm, it divides into two main branches. The first main branch, namely the branch of the biceps (BB) arises from the lateral part of the median nerve at a distance of 10.2 cm below the medial margin of the scalenus posterior, which entered the biceps at proximal 1/3 part of the muscles. The length of the branch is 6.7cm. The second main branch arises from the rear part of the median nerve at a distance of 16.2 cm below the medial margin of the scalenus posterior. During its course through the upper arm, it sub-divides into cutaneous nerve and the branch of the brachialis muscle (BBM) like a y-like appearance. The cutaneous nerve (CN) innervates the lateral margin of the skin of the forearm and the BBM to supply the brachialis muscle, the length of the BBM is 2.34 cm (Fig. 1).

## DISCUSSION

In general, the partial nerve fibers of the musculocutaneous and median nerves arise from the lateral cord of the brachial plexus, two nerves with homology on the neural origin. Therefore, the musculocutaneous nerve may be absent or variation from theoretical point of view. Related variation or absence of the musculocutaneous nerve has been reported in the literature (Fregnani *et al.*, 2008; Pacholczak *et al.*, 2011; Tomar & Wadhwa, 2012).

Previous studies showed that there are five types variations between the musculocutaneous and the median nerves (Le Minor, 1992). In brief, type i: there are no communications between the musculocutaneous and the median nerves (Arinci, 1997), the musculocutaneous nerve arises from the lateral cord and divides into three branches to supply the biceps, coracobrachialis and brachialis muscles; type ii: the median nerve is formed by the medial cord and some nerve fibers of the lateral cord, remaining nerve fibers of the lateral cord form the musculocutaneous nerve and

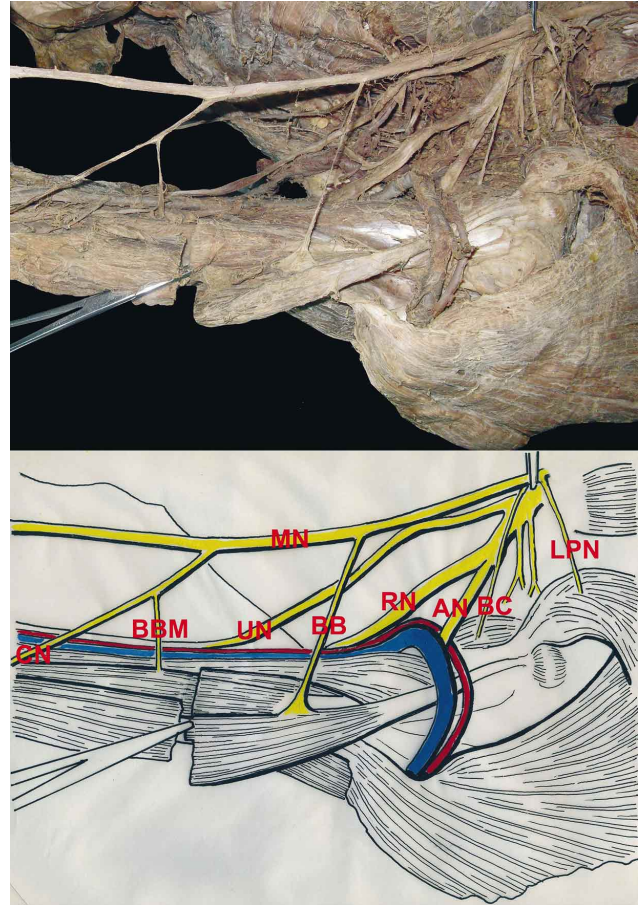


Fig. 1. Dissection of axilla and arm (left side), drawing showing an unusual muscular branches innervating anterior compartment of muscles in the arm which arising from lateral cord of the brachial plexus and median nerve. MN= median nerve, LPN= lateral pectoral nerve, BC= branch of the coracobrachialis, BB= branch of the biceps, BBM= branch of the brachialis muscle, CN= cutaneous nerve, UN= ulnar nerve, AN= axillary nerve, RN= radial nerve.

then give off communicating branches to join the median nerve; type iii: the lateral cord form the musculocutaneous nerve and then give off communicating branches to join the median nerve which is formed by the medial cord; type iv: the musculocutaneous nerve arises from the median nerve and divides into three branches to innervate the biceps, coracobrachialis and brachialis muscles; type v: the musculocutaneous nerve is absent.

In the present report we observed the rare case of absent musculocutaneous nerve associated with variations of distribution patterns of the median nerve. Although our report and the type V have similar features, the BC from the medial cord innervated the coracobrachialis muscle and the BB, BBM and CN which supplied the biceps, brachialis muscles and the lateral margin of the skin of the forearm arose from the me-

dian nerve. Parchand & Patil (2013) reported that there is a complete merging of musculocutaneous nerve into the median nerve, but the coracobrachialis, biceps and brachialis muscles were innervated by the branches of the median nerve. Prasada Rao & Chaudhary (2001) observed absence of musculocutaneous nerve in 8% of 24 upper limbs. However, large-scale study showed that the absence of musculocutaneous nerve in only 0.3–2% (Le Minor). During clinical practice, variations of the musculocutaneous and median nerves are interest for surgeons. Anatomical variations could be prone to damage in surgical practice. Therefore, surgeons should take into consideration these possible variations during shoulder and upper arm reconstruction procedure.

Our present study reported a rare case of absence of musculocutaneous nerve associated with variations of distribution patterns of the median nerve, which provides evidence of such possible anatomical variations to surgeons, anesthetists and neurologists during clinical practice.

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**RESUMEN:** Las variaciones en el plexo braquial y los patrones de distribución de sus ramos no son infrecuentes. Un ramo comunicante, que es la variante más frecuente, a menudo surge desde el nervio musculocutáneo al nervio mediano. Sin embargo, los ramos que surgen del fascículo lateral del plexo braquial y nervio mediano en vez de nervio musculocutáneo son muy raros. La descripción detallada de las anomalías es importante para procedimientos quirúrgicos. En nuestro caso el nervio musculocutáneo estaba ausente, un ramo del fascículo medial inervó el músculo coracobraquial y dos ramos del nervio mediano inervaron los músculos bíceps y braquial, respectivamente. Por otra parte, el nervio mediano originó al nervio cutáneo antebraquial lateral. Este informe proporciona evidencia de algunas variaciones anatómicas útiles para cirujanos, anestesistas y neurólogos durante la práctica clínica.

**PALABRAS CLAVE:** Plexo braquial; Nervio musculocutáneo; Nervio mediano; Ausencia.

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