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CASE REPORT

Absence of Musculocutanous Nerve and Its Distribution Replaced by the Lateral Cord of Brachial Plexus, Median and Radial Nerves

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Variations in the musculocutaneous nerve are very common. But, the absence of the nerve is rare. One such case of total absence of musculocutaneous nerve which was observed in a male cadaver during routine dissection is reported here. The coracobrachialis muscle which is normally supplied by the musculocutaneous nerve was innervated by a direct branch of lateral cord of brachial plexus, whereas biceps brachii and brachialis muscles are supplied by branches from the lateral aspect of median nerve. Lateral cutaneous nerve of forearm was arising from the lateral aspect of median nerve in common with nerve to brachialis and was partly supplying the area of innervation of a normal lateral cutaneous nerve of forearm. The remaining of its area was supplied by the posterior cutaneous nerve of forearm, a branch of radial nerve. Further, a literature review about the case was done and the surgical and clinical importance of the case was discussed.

Keywords. *musculocutaneous nerve, lateral cord of brachial plexus, median nerve, radial nerve, anatomcal variations, lateral cutaneous nerve of forearm*

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Competing interests
The authors declare no competing interests.

INTRODUCTION

The variation in the median and musculocutaneous nerves in the arm is quite common. According to Prasad and Chaudhary, Choi et al., it can be observed in about 33 percent of cases [1, 2]. However not many reports about absence of musculocutaneous are available. Lateral cord of brachial plexus typically ends in the axilla by dividing into lateral root of median nerve and musculocutaneous nerve lateral to third part of axillary artery and it does not supply any muscles directly. The musculocutaneous nerve enters the front of the arm after piercing the coracobrachialis muscle, passes between the biceps brachii and brachialis muscles and continues as lateral cutaneous nerve of forearm. The lateral cutaneous nerve of forearm then divides into an anterior and a posterior branch to supply the skin over the lateral part of forearm. The median nerve begins in the axilla by the union of the medial root and the lateral root of median nerve lateral to the third part of the axillary artery. It then runs downwards in the anterior compartment of the arm lateral to the brachial artery. Somewhere at the level of insertion of coracobrachialis it crosses in front of brachial artery from lateral to medial side and then passes along its medial side to reach the cubital fossa. Normally it does not supply any structures in the arm [3]. In the present case, the complete lateral cord continued as the lateral root of median nerve and there was total absence of musculocutaneous nerve. The structures, normally supplied by the musculocutaneous nerve were supplied by the lateral cord of brachial plexus, median nerve and the radial nerve.

CASE REPORT

During routine dissection of a left upper limb for undergraduate teaching in the Department of Anatomy, AIMST University, Malaysia, a case of absence of musculocutaneous nerve associated with other variations in the innervation of muscles of front of the arm was observed in a male cadaver of about 60 year age. In the variant limb, lateral cord gave the lateral pectoral nerve to the pectoralis major distal to the first rib and opposite the 2nd part of axillary artery, about 5cm from the outer margin of the first rib it gave a slender branch to the coracobrachialis muscle. It then continued as the lateral root of median nerve to join the medial root in front of 3rd part of axillary artery to form the trunk of the median nerve. There was total absence of the musculocutaneous nerve. The median nerve descended in front of the axillary and brachial arteries up to the middle of the arm. It then passed on the medial side of the radial artery, which in this case originated abnormally at a higher level, to reach the cubital fossa (Figure 1).

Median nerve, in its course through the arm, about 15cm from the outer border of the 1st rib gave branches to the biceps bra-

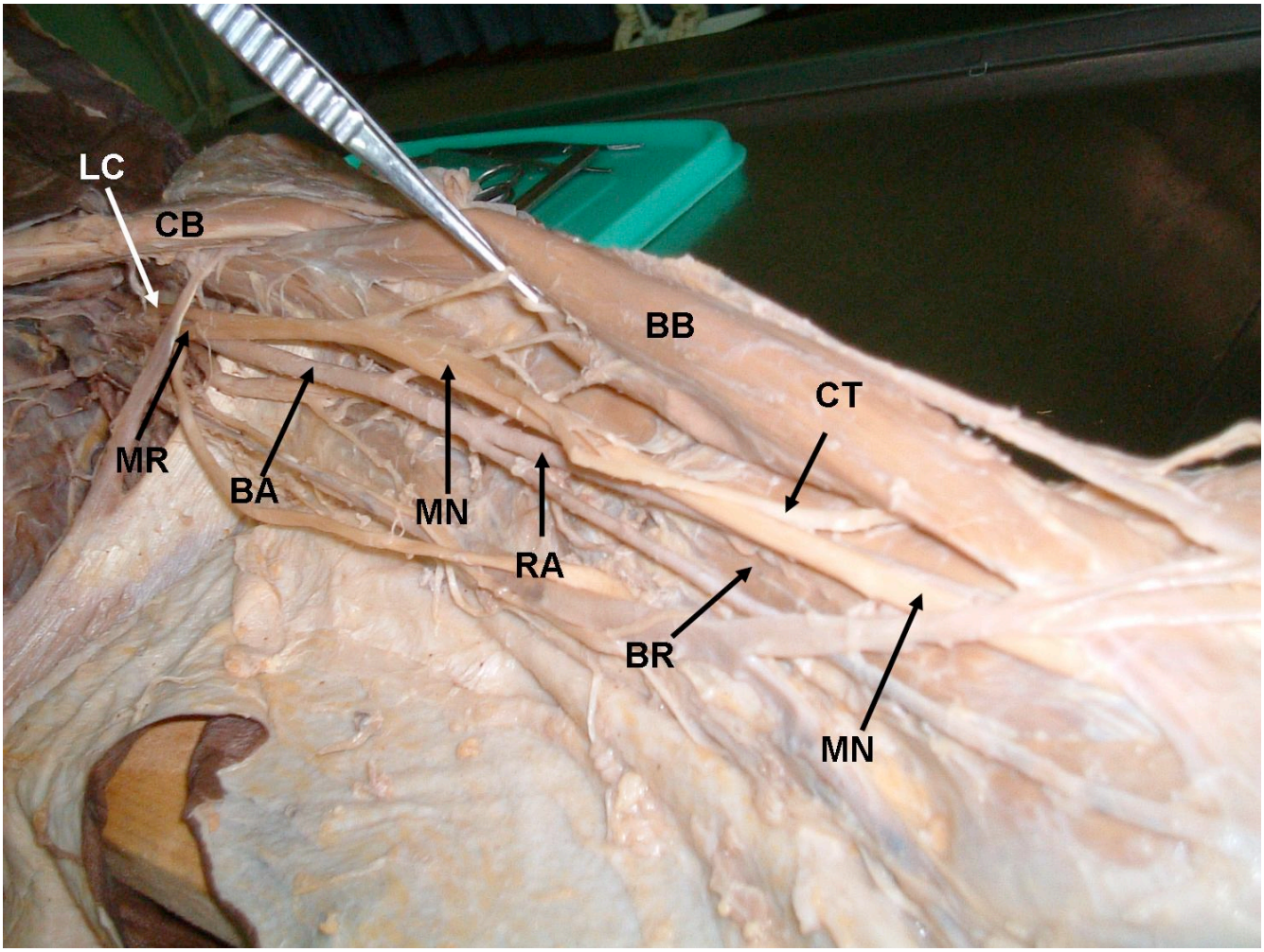

Figure 1. Dissection of the axilla and the anterior aspect of the left arm showing the branches of median nerve (MN) to the biceps brachii muscle (BB) and the common trunk (CT) from median nerve passing deep to the biceps brachii muscle (BB) to supply the brachialis muscle (BR). Note that in the axilla the complete lateral cord (LC) joined with the medial root (MR) of median nerve to form the median nerve (MN). CB- coracobrachialis muscle, BA- brachial artery, RA- high origin of radial artery

chii muscle and then about 2cm distally it gave branch to brachialis muscle. The muscular branch to the brachialis arose as common with the cutaneous branch which passed deep to the biceps emerging at the lateral border of its tendon in the cubital fossa. The cutaneous branch followed the course of the missing anterior branch of the normal lateral cutaneous nerve of the forearm, supplying the skin of lateral part of anterior forearm to the wrist. Skin area typically supplied by the posterior branch of the lateral cutaneous nerve of the forearm here was innervated by the posterior cutaneous nerve of the forearm from the radial nerve (Figure 1 and Figure 2).

DISCUSSION

Musculocutaneous nerve variations are one of the commonest variations of brachial plexus terminal branches. The communication between median nerve and musculocutaneous nerve is by far the most common and frequent of all the variations that are observed among the branches of brachial plexus [4]. The variations of the musculocutaneous nerve and median nerve can be classified into five types according to Le Minor [5]. In type 1, there is no communication between the median and musculocutaneous nerves. In type 2, the fibers of medial root of median nerve pass within the musculocutaneous nerve and join the median nerve in the middle of the arm. In type 3, lateral root of median nerve from the lateral cord, runs in the musculocutaneous nerve and leaves it after a distance, to join the main trunk of median nerve. In type 4, the musculocutaneous nerve fibers join the lateral root of median nerve and after some distance the musculocutaneous nerve arises from median nerve. In type 5, the musculocutaneous nerve is absent. The entire fibers of musculocutaneous nerve pass within the median nerve along its course. Though the present case can be compared broadly with the type 5, it differs in the sensory distribution of the lateral cutaneous nerve of the forearm. In the present case, the lateral cutaneous nerve of the forearm which is arising from the median nerve in common with the nerve to brachialis is supplying the area which is normally supplied by the anterior branch of normal lateral cutaneous nerve of forearm. The cutaneous area supplied by the posterior branch of the normal lateral cutaneous nerve of the forearm was innervated by the posterior cutaneous nerve of the fore-

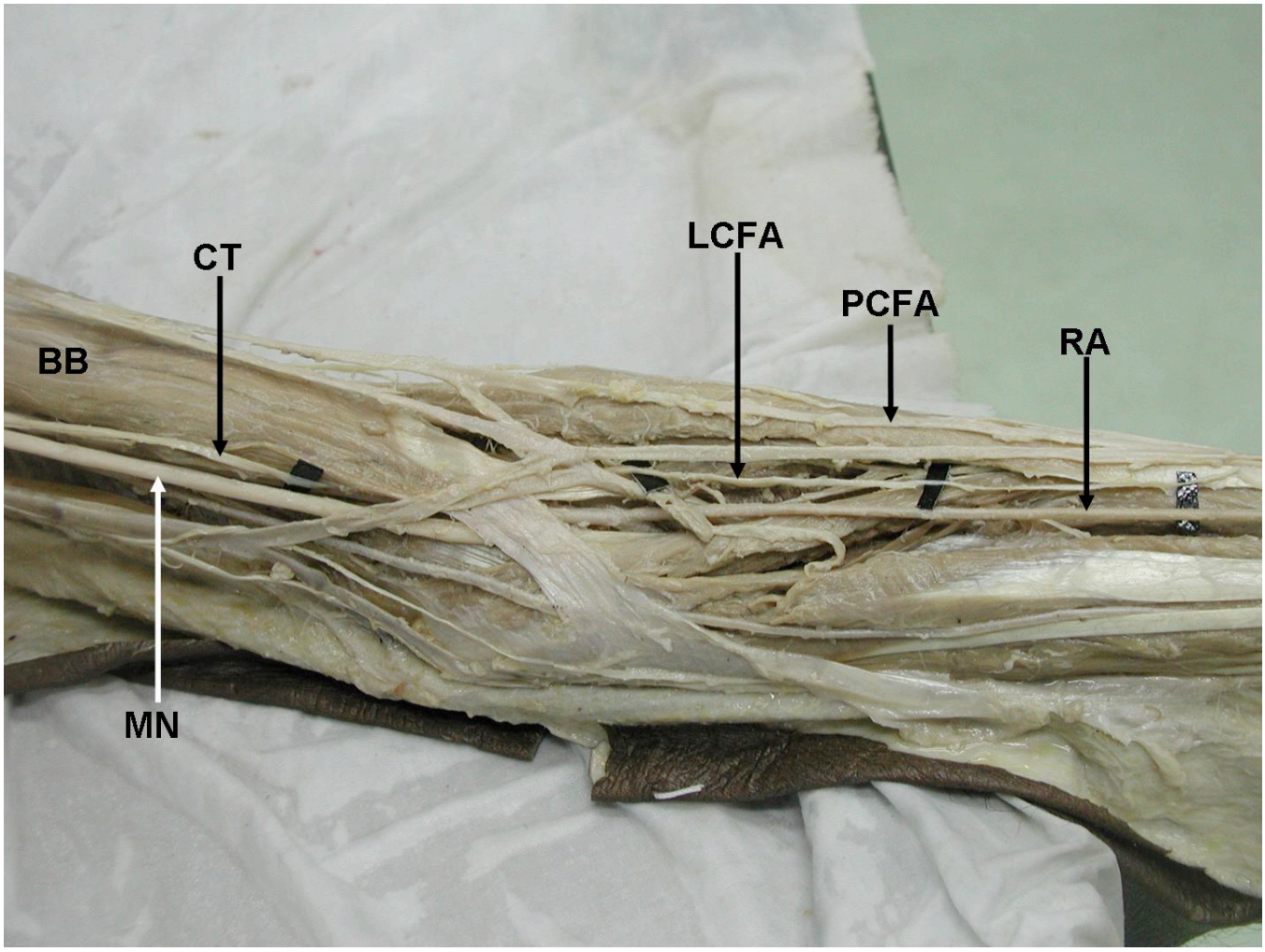

Figure 2. Dissection of the lower part of the anterior aspect of the arm, cubital fossa and upper part of the anterior forearm showing a branch of median nerve (MN) which arises as a common trunk (CT), passes deep to the biceps brachii muscle (BB) and continues as lateral cutaneous nerve of forearm (LCFA) which supplies the anterior aspect of lateral forearm skin. Note that posterior aspect of lateral forearm skin is supplied by the posterior cutaneous nerve of forearm (PCFA) which is a branch of radial nerve. (RA- radial artery)

arm from the radial nerve.

There are many such reports of absence of musculocutaneous nerve. In many cases it is associated with other neurovascular variations [6, 7]. In all reported cases of absence of musculocutaneous nerve, lateral cord or median nerve took over both, its muscular and cutaneous distribution without exception [6,7,8,9,10,11,12]. However, in the present case the lateral cord and median nerve took over the muscular innervation. But, the sensory area (skin over the lateral part of forearm) is supplied by the median and radial nerves, which has not been reported so far.

The variations in the branches of brachial plexus and their distribution are of clinical importance. For clinical investigation and the surgical treatment of peripheral nerve injury, a more precise knowledge of these nerves than what is found in the classical Anatomy texts is necessary [13]. The variations reported in this paper should be considered in patients presenting weakness of forearm flexion and supination associated with symptoms of high median nerve paralysis. Such variations also have importance in posttraumatic evaluation and exploratory interventions of arm for peripheral nerve repair. In patients with such variations, after a trauma to the arm, signs of median nerve and musculocutaneous nerve injury could be observed when lateral cord is damaged in the arm. For the successful result in an exploratory intervention of the arm for peripheral nerve repair in patient with these variations, surgeons have to be aware of such variations and they have to specifically look for their presence. If a surgeon is unaware of such variations, there are possibilities of unexpected nerve damages during flap dissections. Knowledge of such variation is also important in distinctive diagnosis cases of nerve lesions. Further, the unique feature of posterior cutaneous nerve of forearm (a branch of radial nerve) supplying the posterior aspect of the lateral part of forearm skin reported here is of surgical importance while performing the reconstructive surgeries of lateral forearm skin flap. The surgeons have to be aware of such possible variations in the cutaneous innervation while anaesthetizing these areas.

To conclude, lateral cord, musculocutaneous and median nerve variations reported here will add to the long list of variations of these nerves. Knowing the possible

variations of these nerves is essential not only to the anatomists but also to the clinicians and the surgeons.

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