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Case Report

An accessory branch of musculocutaneous nerve joining median nerve

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Necdet KOCABIYIK
Bulent YALCIN
Fatih YAZAR
Hasan OZAN

Department of Anatomy Gulhane Military Medical Academy (GATA), Etlik Ankara–Turkey.

Necdet Kocabiyik, MD
Department of Anatomy, Gulhane Military Medical Academy (GATA), 06018 Etlik Ankara–TURKEY
☎ 90-312-304 35 08
90-312-304 21 50
nkocabiyik@gata.edu.tr

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ABSTRACT

During the educational gross anatomy dissections of the axilla and brachium of a 50-year-old male cadaver in our laboratory, we encountered a neuroanatomical variation. The lateral cord of brachial plexus and its branches, had a different configuration. The nerves forming the letter 'M' was normal right under the pectoralis minor muscle. The musculocutaneous nerve passed through the coracobrachialis muscle, and gave branches to biceps brachii and brachialis muscles.

The anomalous branch of the musculocutaneous nerve originated approximately at the mid point level of the brachial region, and 2.8 cm above the distal end of deltoid tuberosity. It coursed inferiorly between the biceps and brachialis muscles about 12.6 cm and joined the median nerve 5.6 cm superior to the interepicondillary line. Giving its accessory branch and the nerve to the biceps brachii and brachialis muscle, the musculocutaneus nerve coursed normally as a lateral antebrachial cutaneous nerve.

This variation has clinical importance in median nerve lesions and its distinctive diagnosis. Lesions of the median nerve, If lesion was proximal to this accessory branches, muscles and cutaneous innervations related to this branch was normal. ***Neuroanatomy; 2005; 4: 13–15.***

Key words [coracobrachialis muscle] [musculocutaneous nerve] [brachial plexus] [median nerve] [communicating branch]

Introduction

We observed an accessory branch of the musculocutaneous nerve. This variation has clinical importance in median nerve lesions and its distinctive diagnosis. The coracobrachialis muscle is usually supplied by the musculocutaneous nerve. Its innervation pattern exhibits a considerable variation [1]. The change in the innervation of the coracobrachialis muscle is reported to be closely correlated with the change of course of the musculocutaneous nerve [2, 3]. The musculocutaneous nerve usually arises from the lateral cord of the brachial plexus, pierces and innervates the coracobrachialis muscle [2, 4]. However, the course and branching anomalies of the musculocutaneous nerve and its relation to the coracobrachialis muscle have been documented in the literature by Koizumi [2], Buch [5], Flatow et al. [6], and Le Minor [7]. On the other hand, the distribution, course and branching of the musculocutaneous nerve is important from the clinical point of view, especially in compression neuropathies due to vigorous activity and stretch injuries seen in various surgical interventions [8–10].

Case Report

During the educational gross anatomy dissections of the right axilla and brachium of a 50-years-old male cadaver in our laboratory, we encountered neuroanatomical variation. The lateral cord of brachial plexus and its branches had a different configuration. The nerves forming the letter 'M' were normal on the right side under the pectoralis minor muscle. The musculocutaneous nerve passed through the coracobrachialis muscle, and gave branches to biceps brachii and brachialis muscles.

The abnormal branch of the musculocutaneous nerve originated approximately at the mid point level of the brachial region, and 2.8 cm above the distal end of the deltoid tuberosity. It coursed inferiorly between the biceps brachii and brachialis muscles for about 12.6 cm and joined the median nerve 5.6 cm superior to the interepicondillary line. Giving its accessory branch and the nerve to the biceps brachii and brachialis muscle, the musculocutaneous nerve coursed normally as a lateral antebrachial cutaneous nerve (Figure 1). The course of the musculocutaneous nerve was normal in the forearm region. Other branches originating from the brachial plexus were also normal (Figure 2).

In the left brachial region of the same cadaver, the nerve to the coracobrachialis muscles was seen to originate from the musculocutaneous nerve which arose normally from the lateral cord of the brachial plexus and pierced the coracobrachialis muscles as usual.

Discussion

The musculocutaneous nerve usually arises from the lateral cord of the brachial plexus (C5, C6 and C7), pierces the coracobrachialis muscles and then passes downward between the biceps and the brachialis muscle. It appears at the lateral margin of the biceps tendon and runs down the lateral aspect of the forearm as the lateral

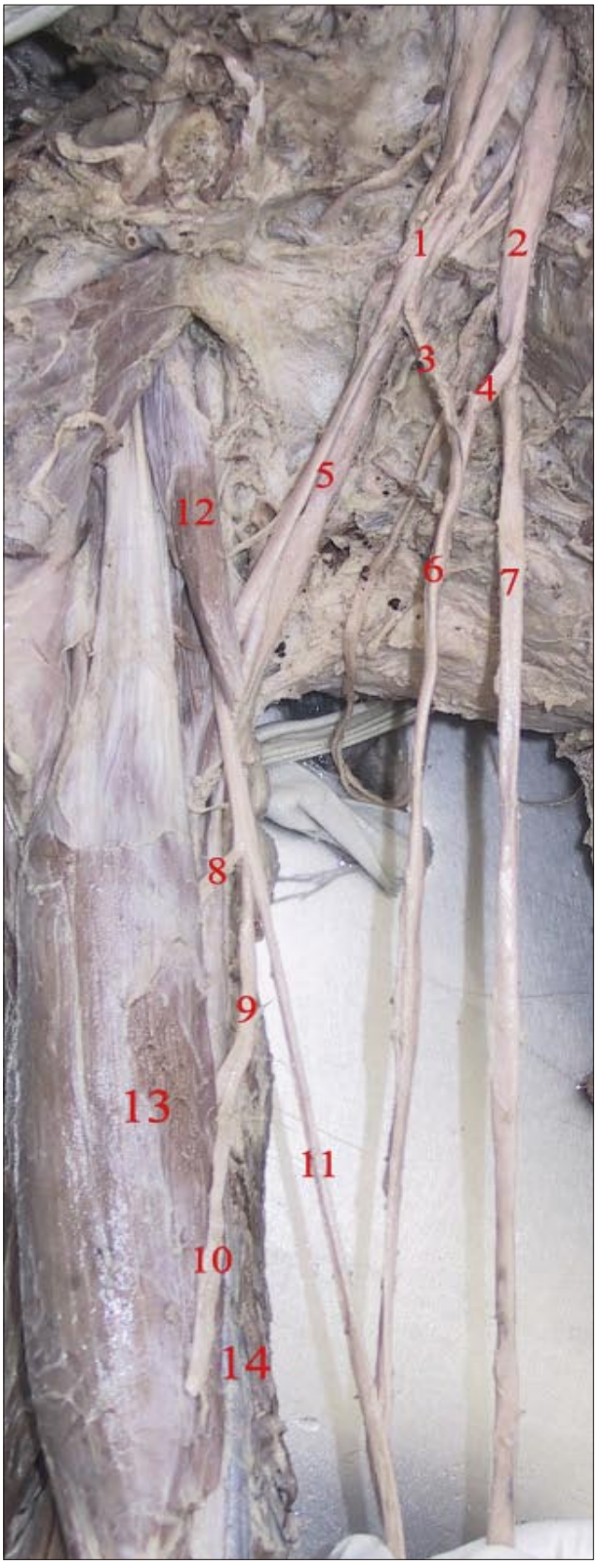

Figure 1. Showing the accessory branch from the musculocutaneous nerve to the median nerve. *(**1:** lateral cord; **2:** medial cord; **3:** lateral root of median nerve; **4:** medial root of median nerve; **5:** musculocutaneous nerve; **6:** median nerve; **7:** ulnar nerve; **8:** nerve to biceps brachii; **9:** nerve to brachialis; **10:** lateral cutaneous antebrachial nerve; **11:** accessory branch; **12:** coracobrachialis muscle, **13:** biceps brachii muscle, **14:** brachialis muscle.)*

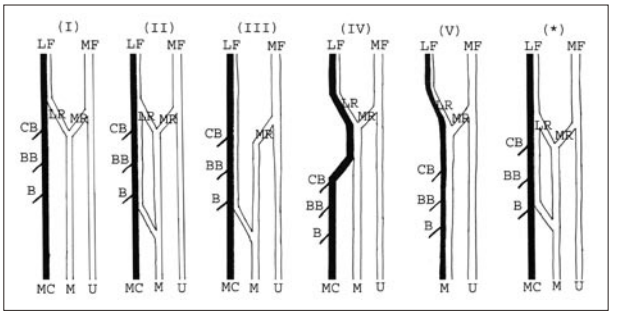

Figure 2. Showing illustrations of five types of the musculocutaneous and the median nerves (I-V) and our case (*). *(**LF:** lateral cord; **MF:** medial cord; **MC:** musculocutaneous nerve; **M:** median nerve; **U:** ulnar nerve; **CB:** coracobrachialis muscle; **BB:** biceps brachii muscle; **B:** brachialis muscle; **LR:** lateral root of median nerve; **MR:** medial root of median nerve)*

cutaneous nerve of the forearm after piercing the fascia just above the elbow. It sometimes shows wide distribution to the skin. Appleton [11] showed a case of complete absence of the cutaneous branch of the radial nerve, to the hand, and replacement by the musculocutaneous nerve. The distribution and the course and the branching of the musculocutaneous nerve is important from the clinical viewpoint. Linell [12] advised that for clinical investigation and the surgical treatment of peripheral nerve injury, a more precise knowledge than that found in classical anatomical texts was necessary, because the musculocutaneous nerve sometimes runs a different course and supplies some branches to the median nerve, a communicating branch. According to Hollinshead [13], this is usually interpreted as meaning that fibers that should have run through the lateral root of the median nerve failed to do so, but entered the musculocutaneous and rejoined the median nerve. Iwamoto [14] analyzed the root of communicating branch with the median nerve, and described the communicating branch, consisting of fibers arising from C5 and C6. There have been many reports of the occurrence of a communication between the musculocutaneous nerve and the median nerve [3, 5, 14–17]. Communication between the musculocutaneous and the median nerve was considered as a remnant from the phylogenic or comparative anatomical view point.

The median nerve has two roots from the lateral and medial cords. The medial root of the median nerve crosses the axillary artery at an oblique angle to join the lateral root, thus forming the median nerve. The nerve to coracobrachialis muscle lies close to the axillary artery but than usually pierces the coracobrachialis muscle and passes laterally and obliquely to lie between the biceps brachii and brachialis.

The variations of the musculocutaneous and median nerve may be classified in five types [7] (Figure 2).

Type I: there are no connecting fibers between the musculocutaneous and median nerve as described in classic textbooks [18, 19]. The musculocutaneous nerve pierces the coracobrachialis muscle and innervates the coracobrachialis, the biceps brachii and brachialis muscle.

Type II: although some fibers of the medial root of the median nerve unite with the lateral root of the median nerve and form the main trunk of median nerve, remaining medial root fibers run in the musculocutaneous nerve leaving it after a distance to join the main trunk of median nerve.

Type III: the lateral root of the 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.

Type IV: the fibers of the musculocutaneous nerve unite with the lateral root of the median nerve. After some distance, the musculocutaneous nerve arise from the median nerve.

Type V: the musculocutaneous nerve is absent. The fibers of the musculocutaneous nerve run within the median nerve along its course. In this type the musculocutaneous nerve does not pierces the coracobrachialis muscle.

According to Le Minor, the variation of Type V was described by Broca in 1888 and its incidence ranged 0.3-2% [7]. Kerr in his study covering 175 brachial plexuses found this variation in only 3 cases (1.7%) [1]. Watanabe et al. Found 2 cases (1.4%) of fusion of the musculocutaneous and median nerve among 140 upper limbs [3]. Although our case is similar to Type II, the accessory branch of musculocutaneous nerve united with the lateral root of the median nerve, and joined the median nerve 5.6 cm superior to the interepicondillary line.

The musculocutaneous nerve has rather constant anatomical features, that is, originating from the lateral cord of the brachial plexus and piercing the coracobrachialis muscle. However, Buch [5] reported that, in his cadaveric study, the musculocutaneous nerve originated from the median nerve in 3-6% and from the posterior cord in 1-5% of cases. Le Minor [7], Spinner and Winkelman [20] observed in their case that the lateral cord, without giving off the lateral root of the median nerve, passed through the coracobrachialis muscle and innervated the coracobrachialis, biceps brachii and brachialis muscles. On the other hand, the musculocutaneous nerve does not pierce the coracobrachialis muscle in some instances (according to Buch, up to (14%) or even might be absent in rare cases because to musculocutaneous nerve joins the median nerve [2]. In our case, the musculocutaneous nerve pierced the coracobrachialis muscle.

In conclusion, the presence of this variation should be considered when a high median nerve paralysis exists in the axilla or proximal arm in a patient presenting weakness of forearm flexion and supination. The variant course of the musculocutaneous nerve should be kept in mind as a possible way of treatment in recurrent compression neuropathies.

This variation has clinical importance in median nerve lesions and its distinctive diagnosis. In median nerve lesions proximal to the accessory branches, motor and sensory innervation remains normal.

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