Absence of the musculocutaneous nerve together with unusual innervation of the median nerve*

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INTRODUCTION
Since the brachial plexus is a structure in which several spinal nerves unite and divide, variations its formation are common [1, 8, 9]. There are, however, few reports of the absence of the terminal branches of the brachial plexus [8].

Normally the lateral cord gives its first branch, the lateral pectoral nerve, to the pectoralis major muscle and then divides into the musculocutaneous nerve and the lateral root of the median nerve. The lateral root of the median nerve then joins the medial root from the medial cord to form the median nerve, which lies anterior to the third part of the axillary artery [9].

The anatomical abnormalities and variations of these nerves of the brachial plexus have recently become significant because of new imaging techniques such as computed tomography and magnetic resonance imaging. Moreover, investigation of these variants is important in order to define the anatomical features of each in relation to clinical diagnosis and for surgical procedures.

RESULTS
In our study it was established that the musculocutaneous nerve was absent from the left arm of a 58-year-old male formalin-fixed cadaver of the Anatomy Laboratory of Ondokuz Mayis Medical Faculty. We first determined that the musculocutaneous nerve did not divide from the lateral cord and then that it was in fact absent. A nerve connection leaving the lateral cord divided in front of the brachial artery, uniting the lateral and medial cords and the lateral cord and ulnar nerve separately.

By hyperabducting the upper extremity it was found that the medial and lateral fascicles of the median nerve united 6 cm distal to a line passing from the coracoid process to the lower border of the second costa and that the point of convergence was at the level of the insertion of the pectoralis major muscle to the...
The median nerve gave out a branch which divided from it 8 cm inferior to the junction of the cords and this branch coursed its way to the forearm. Two nerves that divided from this branch innervated the brachialis muscle. This branch became superficial just inferior to a line connecting the humerus (Fig. 1A). At a distance 0.5 cm inferior to the point of union a branch left the median nerve which innervated the coracobrachialis muscle. Another branch of the median nerve, which divided from it 2 cm inferior to the point of union, was found to be innervating the biceps brachii muscle (Figs. 1B, 2).
medial and lateral epicondyles, providing the lateral part of the skin innervation of the forearm.

The major terminal branch of the median nerve passed deep to the two heads of the pronator teres muscle at the cubital fossa and continued its way and the innervation at the forearm. At a distance 7.5 cm inferior to the line connecting the medial and lateral epicondyles the brachial artery, a neighbour of the median nerve, divided into its terminal branches, the radial and ulnar arteries. This differed from the usual point of division.

**DISCUSSION**

Normally the musculocutaneous nerve is given off opposite the lower border of the pectoralis minor muscle. It pierces the coracobrachialis muscle and descends laterally between the biceps and the brachialis muscles to the lateral side of the arm. Just below the elbow it pierces the deep fascia laterally to the tendon of the biceps muscle and continues as the cutaneous nerve of the forearm [9]. Subsequently, in its course through the arm, it supplies the coracobrachialis, biceps brachii and the greater part of the brachialis muscles [6].

Bergman provided a list of variations in the course and distribution of the musculocutaneous nerve. He reported that this nerve arose from the lateral cord (90.5%), from the lateral and posterior cords (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%). Moreover, he reported that it might be doubled, unusually short or absent [2].

In our case the musculocutaneous nerve was found to be absent. Absence of the nerve was also reported by Le Minor, Gumusburun and Adiguzel, Ihunwo et al., Bergman, Sud and Song [2–5, 8, 9]. Nakatani et al., [7] Le Minor [5], Gumusburun and Adiguzel [3] also reported the absence of the musculocutaneous nerve (Fig. 3). In particular Sud’s case...
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was similar to this present instance in that the motor nerve to the muscles of the anterior compartment of the arm arose from the median nerve.

Le minor classified the variations of musculocutaneous and median nerves into five types [5] (Fig. 3). The present case, however, was of a specific type and did not fall within any of these five categories. In this case there is a nerve connection between the medial and lateral cords which originates from the lateral cord with two bundles and relies on the medial cord to unite them.

Another finding in our case was that the cutaneous innervation of the lateral part of the forearm was procured by a thick nerve which divided from the median nerve. Our case differed from previous cases in two different features. One was the unusual innervation of the forearm muscles by the median nerve, while the other was the unusual cutaneous innervation of the lateral part of the forearm by the median nerve.

A further interesting finding was that the brachial artery, which is a neighbour of the median nerve, divided into its terminal branches, the radial and ulnar arteries, 7.5 cm inferior to the line connecting the medial and lateral epicondyles. Normally the brachial artery commences at the lower margin of the tendon of the teres major and passes down the arm, ending about 1 cm below the bend of the elbow, where it divides into the radial and ulnar arteries [6]. Our case introduced for us the notion of a genuine absence of the musculocutaneous nerve rather than that of a conjoined form with the course of the median and the musculocutaneous nerves uniting.

Knowledge of anatomical variations in the brachial plexus such as the absence of the musculocutaneous nerve and of muscles that are innervated by unusual nerves may help clinicians faced with indecipherable clinical signs. This kind of case may provide additional explanation for the unexpected clinical symptoms that depend on different nerve courses and origins. Our case includes not only rare nerve variations but also an arterial variation. We believe that these will be illuminating for surgical procedures.

**REFERENCES**