

A Variation of the Musculocutaneous Nerve Absent

Wu-Chul Song¹, Han-Sung Jung¹, Hee-Jin Kim¹, Chuog Shin², Beob-Yi Lee³, and Ki-Seok Koh³

¹*Division in Anatomy and Developmental Biology, Department of Oral Biology, Oral Science Research Center, College of Dentistry, Brain Korea 21 Project for Medical Science, Yonsei University, Seoul, Korea;*

²*Department of Life Science, College of Liberal Arts and Sciences, Yonsei University, Wonju, Korea;*

³*Department of Anatomy, College of Medicine, Konkuk University, Korea.*

A variation of the brachial plexus, characterized by the absence of the musculocutaneous nerve on the left arm, was found during the dissection of a 28-year old male cadaver. The whole lateral cord was joined to the median nerve, which it met in two points. One was a typical junction of both roots of the median nerve at the level of the coracoid process. The other was a junction of the remaining lateral cord and the median nerve, which was 92 mm away from the typical junction. This case provided some evidence about the absence of the musculocutaneous nerve, rather than a complete fusion of the median and musculocutaneous nerves. As the nerves are named due to their course or innervation, and not from their origin, it is reasonable to assume that the combined nerve was actually the median nerve, and that the musculocutaneous nerve did not exist.

Key Words: Variation, brachial plexus, musculocutaneous nerve, median nerve

INTRODUCTION

Since the brachial plexus is a structure where several spinal nerves unite and divide, variations are common. Previous studies have reported variations in the number of spinal nerves,¹ or communicating branches.² However, there are fewer reports on the absence of the terminal branches. As the motor and/or sensory branches originate from other nerves, the absence of a terminal branch does not influence the movement and sensation of the arm. If ignorance exists

relating to the position of the nerve in the body, it can be difficult to quickly locate a damaged nerve. The musculocutaneous nerve usually innervates coracobrachialis, biceps brachii and brachialis, and branches off the lateral antebrachial cutaneous nerve. In this study, the musculocutaneous nerve was found to be absent during a routine dissection. This variation may provide an explanation for cases where it is impossible to flex the forearm due to median nerve injury.³ In addition, the present report compares similar cases and discusses their differences.

CASE REPORT

During a dissection of a 28-year old male cadaver, the brachial plexus was characterized by the absence of the musculocutaneous nerve in the left arm. As the whole lateral cord entered to form the median nerve, the musculocutaneous nerve did not exist. Generally, the branches of the musculocutaneous nerve innervate the muscles of the anterior compartment of the arm, and branches off the lateral antebrachial cutaneous nerve as a terminal branch. However, in this case, the motor branch to the coracobrachialis arose as two branches from the middle third region of the lateral cord. After the complete median nerve had formed, the motor branches to the biceps brachii and brachialis arose from the median nerve. Furthermore, the lateral cutaneous nerve of the forearm arose from the median nerve (Fig. 1a and b).

The whole lateral cord was connected to the median nerve, but there were two junctions between the lateral cord and the median nerve.

Received May 28, 2003

Accepted July 4, 2003

Reprint address: requests to Dr. Ki-Seok Koh, Department of Anatomy, College of Medicine, Konkuk University, 322 Danwol-dong, Chungju, 380-701, Korea. Tel: 82-43-840-3733, Fax: 82-43-851-9329, E-mail: kskoh@kku.ac.kr

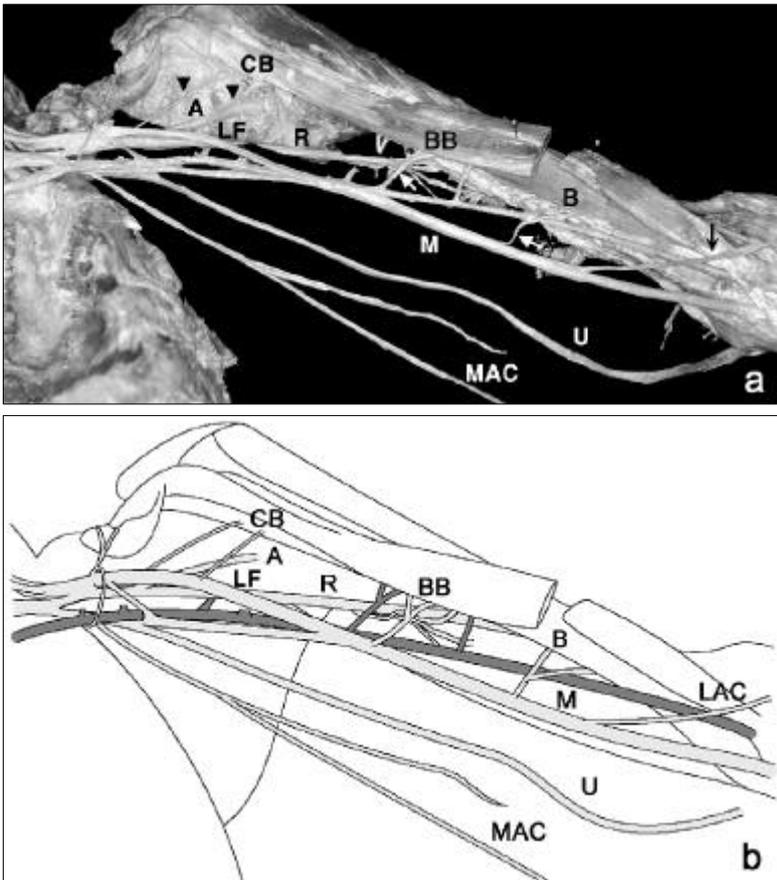


Fig. 1. (a) Photograph of the branches of the lateral cord and median nerve. Two arrowheads indicate the branches to the coracobrachialis. The white arrows indicate the biceps brachii and brachialis, respectively. The black arrow indicates the lateral antebrachial cutaneous nerve. (b) Corresponding drawing. LF, lateral cord; LAC, lateral antebrachial cutaneous n.; MAC, medial antebrachial cutaneous n.; A, axillary n.; M, median n.; R, radial nerve; U, ulnar n.; B, brachialis m.; BB, biceps brachii m.; CB, coracobrachialis m.

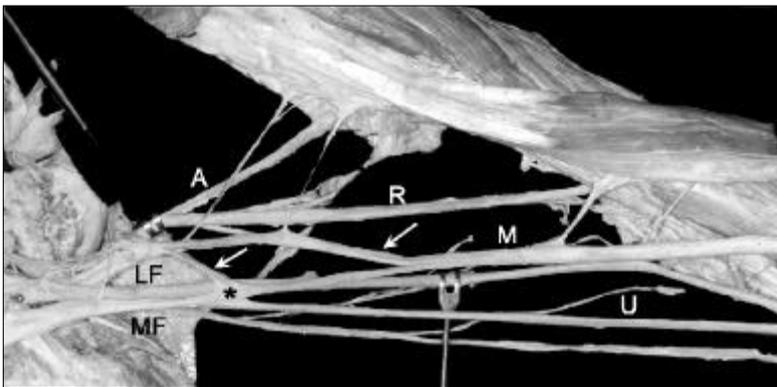


Fig. 2. Photograph of the dissection of the brachial plexus. The posterior cord has been deflected upwards. The white arrows indicate two branches from the lateral cord to the median nerve. The asterisk indicates a typical junction of the medial and lateral root of the median nerve. MF, medial cord; LF, lateral cord; A, axillary n.; M, median n.; R, radial n.; U, ulnar n.

One of these was a typical junction of both roots of the median nerve, and the other a junction of the remaining lateral cord and median nerve. The distance between two junctions was 92 mm (Fig. 2).

Another variation was found at the long thoracic nerve, only including the fibers from C6 to C7. The other trunks, divisions and cords of the brachial plexus were normal, but no anomalies of

the blood vessels were found.

DISCUSSION

Le Minor classified the variations of the musculocutaneous and median nerves into five types.⁴ However, the present case had a specific type not belonging to any of the five types. In comparison

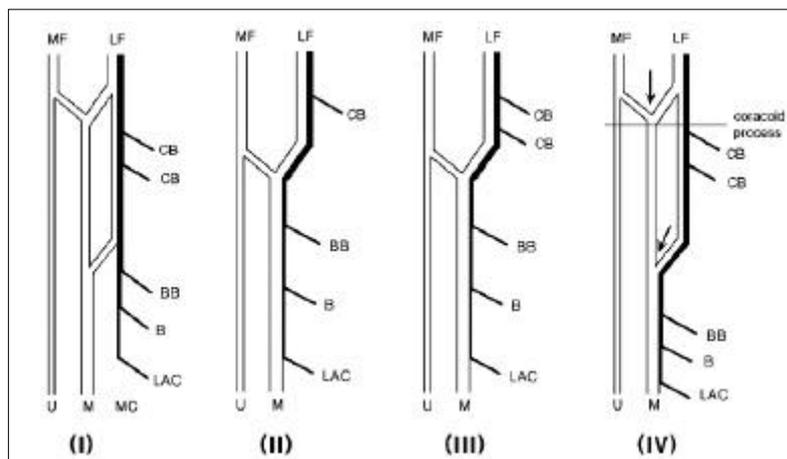


Fig. 3. Schematic illustrations of the variations. MF, medial cord; LF, lateral cord; LAC, lateral antebrachial cutaneous n.; M, median n.; MC, musculocutaneous n.; U, ulnar n.; B, brachialis m.; BB, biceps brachii m.; CB, coracobrachialis m.; arrows, junctions of the lateral cord and the median n.; (I), Kaus & Wótowicz; (II), Lang & Spinner; (III), Gümüşburun & Adigüzel; (IV), Present.

to previous cases, this case had two different features. One of these was a communication of the musculocutaneous and median nerves, and the other an absence of the musculocutaneous nerve.

The communication of the musculocutaneous and the median nerves was divided into three types, from the musculocutaneous to the median, from the median to the musculocutaneous and a combination of both of these together. Their incidences were 15-30%, 3-13% and 0-5%, respectively.² This case had communication from the lateral cord (the musculocutaneous nerve) to the median nerve. Kaus and Wotowicz reported two junctions of the median and the musculocutaneous nerves. Both roots of the median nerve in a typical place forming one junction,⁵ with the other formed by the lateral cord, with a thick branch off to the median nerve, located distally (Fig. 3). However, after branching, the musculocutaneous nerve passed through a normal course, which was different from the present case. This variation was classified in the second type of Le Minor's classification.

Nakatani, et al.,⁶ Le Minor,⁴ and Gumusburun and Adiguzel⁷ reported the absence of the musculocutaneous nerve. In particular, Gumusburun and Adiguzel's case was similar to the present case, in that the motor nerve to the coracobrachialis arose from the lateral cord, and the motor nerve to the biceps brachii and brachialis arose from the median nerve (Fig. 3).⁷ However, their case was different as there was only one junction of the lateral cord and median nerve. Lang and Spinner⁸ reported a similar case,

where a complete fusion of the median and the musculocutaneous nerves, but with no absence of the musculocutaneous nerve existed (Fig. 3). In other words, the entire lateral cord was combined with the medial root of the median nerve, forming a common, or combined median and musculocutaneous nerve. As a result, the combined nerve could not be referred to as either the median or the musculocutaneous nerve.

Although Gumusburun and Adiguzel,⁷ and Lang and Spinner⁸ reported similar cases, each case was described differently. Gumusburun and Adiguzel reported the absence of the musculocutaneous nerve, whereas Lang and Spinner reported that the musculocutaneous nerve was combined with the median nerve.⁷

The present case provided a clue regarding the absence of the musculocutaneous nerve, rather than the complete fusion of the median and the musculocutaneous nerves. As the nerves are named due to the course they pass through, or the innervation, and not from their origin, it is reasonable to assume that the combined nerve was the median nerve, and the musculocutaneous nerve did not actually exist. In conclusion, this variation illustrated the addition of both the formation of the median nerve, as in the case of Kaus and Wotowicz,⁵ with the position of the motor branches being similar to the cases of Lang and Spinner,⁸ and Gumusburun and Adiguzel.⁷

When the musculocutaneous nerve was absent, a communicating branch from the median to the ulnar nerves was found in the forearm, and the long thoracic nerve including the fibers from C5

to C6. However, in present case, no communicating branch with the ulnar nerve was found, and the long thoracic nerve only included the fibers from C6 to C7.

Meals and Calkins reported a case of a man that had been stabbed, with a small screwdriver, in the proximal-medial aspect of his arm, who had not only complete motor and sensory median nerve deficit, but could not contract his biceps brachii or brachialis muscles.³ This case was referred to as communication of the musculocutaneous and median nerves, but the present case will be more appropriate for explain those symptoms.

Knowledge of the anatomical variations in the brachial plexus, such as the absence of a musculocutaneous nerve, may help provide a solution when incomprehensible clinical signs are present.

REFERENCES

1. Moore KL, Dalley AF. Clinically oriented anatomy. 4th ed. Baltimore: Williams & Wilkins; 1999. p.714-7
2. Iwamoto S, Kimura K, Takahashi Y, Konishi M. Some aspect of the communicating branch between the musculocutaneous and median nerves in human. *Okajimas Folia Anat Jpn* 2000;67:47-52.
3. Meals RA, Calkins ER. Anomalous innervation of the upper extremity. In: Gelberman R, editor. *Operative nerve repair and reconstruction*. Philadelphia: Lippincott; 1991. p.199-200.
4. Le Minor JM. A rare variant of the median and musculocutaneous nerve in man. *Arch Anat Histol Embryol* 1992;73:33-42.
5. Kaus M, Wotowicz Z. Communication branch between the musculocutaneous and median nerves in human. *Folia Morphol* 1995;54:273-7.
6. Nakatani T, Tanaka S, Mizukami S. Absence of the musculocutaneous nerve with innervation of coracobrachialis, biceps brachii, brachialis and the lateral border of the forearm by branches from the lateral cord of the brachial plexus. *J Anat* 1997;191:459-60.
7. Gumusburun E, Adiguzel E. A Variation of the brachial plexus characterized by the absence of the musculocutaneous nerve: a case report. *Surg Radiol Anat* 2000; 22:63-5.
8. Lang J, Spinner M. An important variation of the brachial plexus-complete fusion of the median and musculocutaneous nerve. *Bull Hosp Jt Dis Ortho Inst* 1970;31:7-13.