Bilateral variations of median nerve formation and endpoint variation of brachiales veins

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INTRODUCTION

According to the descriptions in the classical books, brachial plexus is formed by the ventral rami of the cervical nerves (C5, C6, C7, and C8) and the first thoracic nerve (T1). In other words, upper trunk C5 and C6, middle trunk C7 and lower trunk C8 and T1 form the brachial plexus. As a variation, it may contain fibres of C4 (a pre-fixed plexus) and T2 spinal nerves (a post-fixed plexus). The divisions, which are formed as a result of the splitting of the trunks in the posterior triangle of the neck, join again in the axilla and form the cords named according to the neighbourhood with the axillary artery. Thus, the lateral cord is formed by the ventral division of the upper and middle trunks; medial cord by the ventral division of the lower trunk and posterior by the posterior division [1-3]. The peripheral nerves, which are responsible for the sensorial and motor innervation of the upper extremity, originate from the brachial plexus. But the nerves, which are responsible for the sensorial innervation of the region close to the shoulder, originate from the cervical plexus. The sensorial innervation of a small region in the medial side of the arm is provided by the intercostobrachial nerve [4,5].

The reported incidence of the brachial plexus variations, which can even differ between the upper extremities of the same person, is 13% and it is most commonly encountered between the median and musculocutaneous nerves. During a routine practice on the brachial plexus of a 65-year old male cadaver, we observed that the musculocutaneous nerve pierced the coracobrachialis muscle after giving the communicating branch in both extremities.

CASE REPORT

During a routine practice on the brachial plexus of a 65-year old male cadaver in our Anatomy Laboratory, we observed a communication extending from the lateral to the median nerve and decided to deepen the dissection. The dissection of the axilla and the arm was carried out with an incision extending through the ventral axillary line. Following the cautious removal of the superficial and deep fasciae, the pectoral muscle was removed in order to expose the vascular and neural structures.

We observed that the musculocutaneous nerve pierced the coracobrachialis muscle after giving the communicating branch in both extremities of our cadaver. Then it innervated the three muscles in the ventral region of the arm and continued as a lateral cutaneous nerve into the forearm.

After the isolation of the tract of the musculocutaneous and median nerves, we measured with the help of a caliper the distance between the lateral root of the median nerve and the communication originating from the musculocutaneous nerve, the thickness of the lateral root and the middle root of the median nerve. The communicating branch originates from the lateral root and innervates the biceps brachii and brachialis muscle after piercing the coracobrachialis muscle and ends in the sensorial branch or in the lateral side of the forearm after innervating these three muscles [3].

Due to the clinical and surgical importance of the brachial plexus, we decided to introduce the variation affecting the median and musculocutaneous nerves, and the concomitant venous variation to the literature, which we observed in the Anatomy Lab of our medical school.

Key Words: Anatomical variation; Brachial plexus; Musculocutaneous nerve; Communicating branch; Basilic vein

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Received: Jul 12, 2019, Accepted: Oct 18, 2019, Published: Oct 25, 2019

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communicating branch and the width of the median nerve before and after the median nerve and communicating branch unite.

The second lateral root on the right side was originating from the lateral cord at a distance of 31.31 mm to the lateral root. The width of the proximal and distal roots was 2.15 mm and 4.17 mm respectively. The diameter of the median nerve before and after it united with this second root was 3.62 mm and 6.24 mm respectively (Figure 1).

On the left side, an anastomotic branch was emerging from the musculocutaneous nerve at a distance of 18.78 mm to the median nerve. The thicknesses of the lateral root of the median nerve and the anastomotic branch were 3.81 mm and 3.08 mm respectively. The diameter of the median nerve before it united with this anastomotic branch was 3.45 mm and 5.37 mm respectively (Figure 2).

According to the recommendation of Buch-Hansen, this branch should be considered as a second lateral root of the median nerve if it is thicker than the proximal nerve and as an anastomotic branch originating from the musculocutaneous nerve if it is thinner than the proximal nerve [1]. From this point of view, we decided that the communicating branch was originating from the lateral cord on the right side and from the musculocutaneous nerve on the left side.

We detected a second variation after the deepening of the dissection. In this bilateral venous variation; the medial brachial vein, which should be terminated into the basilic vein just at the distal of the level of the emergence of the median nerve, was terminating into the basilic vein after passing through two roots of the median nerve, which were joining from the lateral. However, the lateral brachial vein had a normal course on both sides.

DISCUSSION

It was reported that the brachial plexus is a variative part of the peripheral nerve system. The musculocutaneous nerve variations, which have an incidence of 6.25% according to the literature, are mainly divided into two groups: Its absence and the presence of a communication between the musculocutaneous and median nerves [3].

Its absence does not cause any functional loss in the flexion of the arm or in the sensorial innervation of the forearm due to the fibers originating from other nerves. These fibers originate mostly from the median nerve and less frequently from the lateral root of the median nerve or from the lateral cord [6].

The most common one among all brachial plexus variations is the communicating branch between the median and musculocutaneous nerves with an incidence of 1.4%-63.5% [1,11].

The nerve variations are important for the radiologists, anesthesiologists, and surgeons because of their clinical impacts. For example, an undetected absence of the musculocutaneous nerve may mislead a clinician, who tries to examine the results of an electromyography. Regarding the surgical interventions, the fibers of the musculocutaneous nerve may be damaged while the median nerve seems to be intact during the evaluation of the arm after a trauma or during the removal of a flap. The communicating branches affecting the musculocutaneous nerve are also important regarding the approach to the shoulder traumas and the evaluation of the nerve dysfunctions. The median nerve and its roots are close to the axillary vein, which is the upper limit in the axillary lymph node dissection, a routine procedure during the breast surgery.
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The presented anatomical variations have certain benefits regarding clinical practice. The presence of these and similar neural and vascular variations is important in respect of the possible nerve injuries, which may be caused by a piercing or cutting trauma in the upper extremity, and they also enable to explain the symptoms except the known symptoms encountered in the flexor muscles of the elbow or in the sensory function of the forearm and hand.

REFERENCES


