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Case Report

A rare variant formation of the median nerve

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ABSTRACT

Brachial plexus, due to its complicated formation frequently shows variations. Many formative variations of median nerve are reported. A variant formation of median nerve was noted in the right axilla and arm of a male cadaver, in the form of three accessory communications between lateral and medial roots of median nerve. All the accessory communications passed from lateral to medial root. Different types of variations of median nerve formation are documented but the one found in present study is rare. There may be compression of axillary artery due to the accessory communication passing around the artery. Also injury in this region may lead to unusual clinical picture. A well-informed clinician must know about the variations usually seen in the brachial plexus and its branches to correctly examine a clinical case and also to explain unusual clinical signs seen when one come across a lesion in a variant brachial plexus. © **IJAV. 2010; 3: 138–140.**

Key words [brachial plexus] [median nerve] [lateral root] [medial root]

Introduction

The brachial plexus consists of roots, trunks, divisions, cords and branches, formed by anastomosis, branching and re-anastomosis of spinal nerves C 5,6,7,8 and T1. The major nerves formed are median, ulnar and radial nerves. The median nerve is formed by union of a lateral root from lateral cord (C 5,6,7) and a medial root from medial cord (C8 & T1) of brachial plexus. Hence the composite root value of median nerve is C 5,6,7,8 and T1. The formation of median nerve occurs around axillary artery where the lateral and medial roots join in front of the artery. The median nerve gives only vascular branches to the brachial artery in the arm. The main area of distribution of the median nerve is forearm (C 5,6,7) where it supplies most of forearm flexors, and hand (C8, T1) where it supplies muscles of thenar eminence.

Some formative variations of median nerve are documented in the past. The present paper deals with one such formative variation of median nerve, not reported earlier.

Case Report

During routine dissection classes of first MBBS students of GSL Medical College, a variant formation of median nerve was observed in the right axilla and arm of a 45-year-old male cadaver. The median nerve was formed by union of two roots, lateral root from lateral cord and medial root from medial cord. But in addition to these two roots there were accessory communications, one each between (i) lateral cord and medial cord, (ii) lateral cord and medial root of median nerve, and (iii) lateral root and medial root of median nerve. A common accessory communication trunk arose from lateral cord at a distance of 5.2 cm from the tip of coracoid process and passed distal and medially superficial to axillary artery. It split after a distance of 1.1 cm into two, forming accessory communications 1 and 2. The accessory communication 1 measuring 0.7 cm in length, joined with the terminal part of lateral cord at 6.1 cm. The accessory communication 2 measuring 1 cm in length, united with the medial root of median nerve at 6.4 cm. Further distally a third accessory communication measuring 0.9 cm in length, arose from the lateral root of median nerve and passed distal and medially to join with the medial root of median nerve at 6.9 cm. The median nerve was formed by union of lateral and medial roots at 8.4 cm. Then the nerve passed anteromedial to the axillary and then brachial artery to the distal part of arm. The further course of the median nerve did not show any deviation from standard pattern. No variation was found in the formation, course and branches of median nerve in the left axilla and arm. Also no anomaly was noted in the neighboring vessels.

Discussion

Due to its complex and composite formation, variations are frequently seen in brachial plexus. Variations in formation of median nerve have been reported by some researchers.

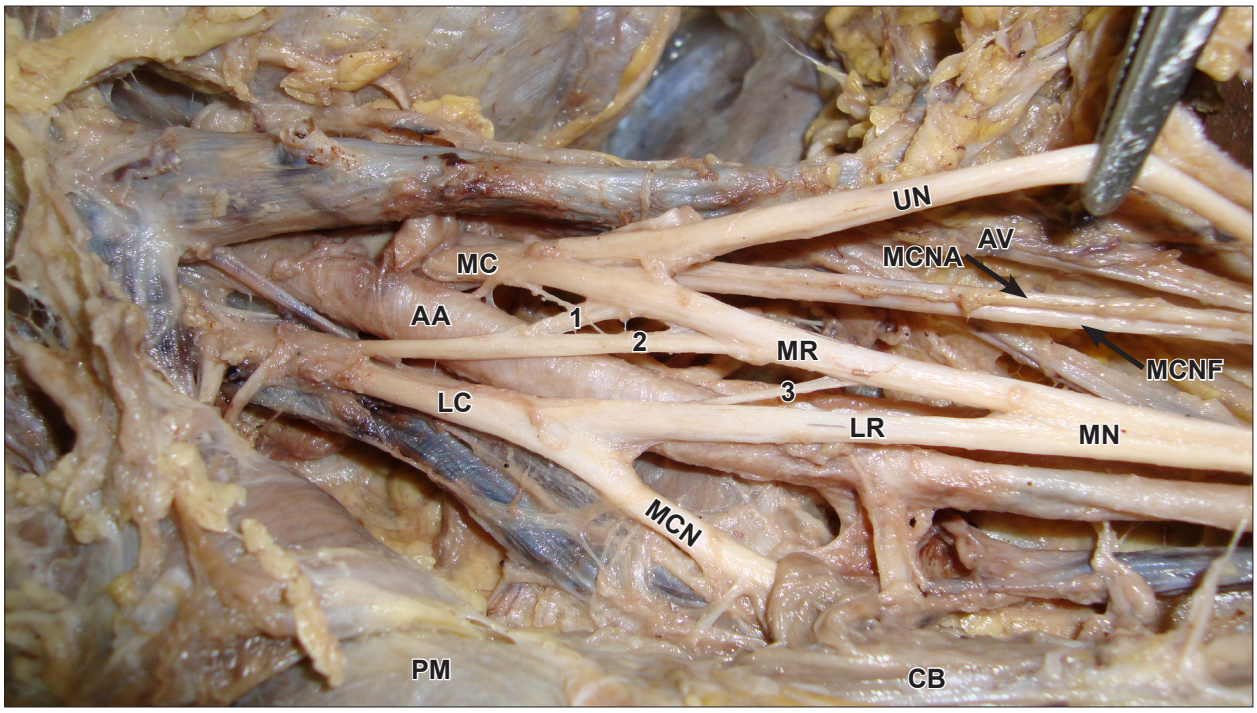

Figure 1. Variant formation of median nerve. *(**AA:** axillary artery; **CB:** coracobrachialis; **UN:** ulnar nerve; **MN:** median nerve; **MCN:** musculocutaneous nerve; **LC:** lateral cord; **MC:** medial cord; **MR:** medial root of median nerve; **LR:** lateral root of median nerve; **AV:** axillary vein; **PM:** pectoralis major –reflected–; **1, 2, 3:** accessory connections between lateral and medial cords in the formation of median nerve; **MCNA:** medial cutaneous nerve of arm; **MCNF:** medial cutaneous nerve of forearm)*

In their study, Pandey and Shukla have dissected 172 cadavers; they found in 4.7% cases that the roots of median nerve joined on medial side of axillary artery, and in 2.3% cases the roots did not join but continued separately [1]. Sargon et al. reported that the median nerve was formed of three branches. Two branches originated from lateral cord of brachial plexus and one branch originated from the medial cord [2]. Eglseder and Goldman also found that the median nerve was formed of two lateraj roots in 14% of their specimens [3]. Uzun et al. found that the median nerve was formed by three branches coming from the lateral cord of brachial plexus and one branch coming from medial cord of brachial plexus [4]. Anrkooli et al., in their case report observed formation of median nerve by fusion of three roots in both the arms of the same cadaver. There were two lateral roots and one medial root [5].

Joshi et al. in their study of variations of lateral cord of brachial plexus have described formation of median nerve by two lateral and one medial roots. They stated formation of median nerve to be occurring in two stages – stage one when first lateral root joined with the medial root and stage two, when the second lateral root joined with the medial root [6]. Hollinshead reported and described about anomalies of nerves accompanied by abnormalities of vessels [7]. The anomalies of brachial plexus were associated with those of subclavian and axillary arteries. In the present study, we found no such associated vascular anomaly.

None of the studies done so far described a variation similar to the one found in the present study. Since the common accessory communication trunk and the first accessory communication passed very close and superficial to the axillary artery, it might be a source of compression to the axillary artery.

Understanding the embryological stages in development of brachial plexus is important for explaining possible anatomical variants. The upper limb bud appears at 26–27 days in the developing embryo and motor axons from the spinal cord enter the limb bud during the fifth week [8]. During histogenesis of peripheral nerves, the normal development of peripheral nerve network depends upon ability of axons to locate and recognize their appropriate target. Developing axons choose specific routes in the embryos during path finding stage followed by growth cones navigating towards their targets. Axons' targets may be far away from their soma and they generally pass through intermediate targets to form axon networks. The terminal enlargement of a growing axon – 'the growth cone', arises from filopodia and leads the growth of an axon along its route. The growth cone is a sensory-motor organ that recognizes and responds to guidance cues that are present along the path in the surrounding environment. The cues are generally molecules, which act as chemoattractants or chemorepellents. Reacting to these cues the axon navigates over long distances to find the correct target [9]. Axons reach distant targets in a series of discrete steps, making decisions at relatively frequent intervals along the way. The axons take variety of paths to reach their destination. Some grow directly

to their termination site; but others make a variety of apparent 'decision mistakes' and then change course or extend new branches. This is because different axons respond differently to a particular chemical molecule. Such corrections imply the existence of positional cues [10]. This probably explains why variations do occur in the course of a nerve and also that the nerve fibers ultimately reach their destination. In doing so, they give rise to many such branches which are not seen usually and are regarded as variations.

In the present case it appears that, some axons running in lateral cord of brachial plexus and lateral root of median nerve which were ultimately destined to form the median nerve, somehow made 'decision mistake' by leaving the nerve trunk in which they were traveling at an inappropriate location but ultimately contributed in the formation of median nerve.

Conclusion

Brachial plexus variations are commonly encountered. A detailed knowledge of the variations is desired to examine a case appropriately for correct diagnosis and treatment. Variations in formation of median nerve are reported. Knowledge of the variations will be of great help to understand the effects of a lesion if one does occur. It will also be helpful to explain a particular pattern of paralysis in the event of such a nerve being damaged. Also it may explain affection of surrounding blood vessels. Embryological explanation for such variations must be sought to understand specific patterns of nerve arrangement and possible associated variations in other nerves and tissues.

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