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Case Report

Variation in the branching pattern of posterior cord of brachial plexus

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ABSTRACT

During the routine dissection in the department of Anatomy, KMC, Manipal, we found a rare and unreported variation in the branching pattern of the posterior cord of brachial plexus. Normally, a single posterior cord is formed by the union of posterior divisions of the trunks of the brachial plexus. All the branches of the posterior cord arise from this single cord. Here we report that, after formation of posterior cord, the cord has divided again into two roots, and enclosed the subscapular artery. Then, these two roots fused to continue as radial nerve. In this report, we also describe the variations in the branching pattern of the posterior cord and clinical relevance of this variation. © **Neuroanatomy. 2008; 7: 10–11.**

Key words [variation] [brachial plexus] [posterior cord]

Introduction

The brachial plexus is a complex network of nerves which extends from the neck to the axilla and supplies motor, sensory, and sympathetic fibers to the upper extremity.

The brachial plexus is formed by the union of ventral rami of the lower four cervical and the first thoracic nerves. The brachial plexus, divided into supraclavicular and infraclavicular parts. The infraclavicular part of brachial plexus consists of three cords, anterior, middle and posterior. Posterior cord is formed by the union of posterior divisions of upper, middle and lower trunks with C5-T1 roots. It runs posterior to axillary and subscapular arteries. It gives the following branches – upper subscapular nerve, lower subscapular nerve, thoracodorsal nerve, axillary nerve and then continues as a large branch, the radial nerve [1].

The brachial plexus has a complex anatomical structure since it originates in the neck and continues in the axillary region. It also has a close relationship to important anatomical structures, which makes it an easy target for variations. Thus, variations in the brachial plexus have clinical and surgical importance.

The variations in the formation of the cords and their relations to third part of axillary artery were studied in detail [2]. Almost 50% of the evaluated plexuses showed variations in their collateral branches [3]. However, the branching pattern of posterior cord and its relation to subscapular artery have not been reported.

Case Report

We studied brachial plexuses from 48 cadavers (40–75 years old) in Kasturba Medical College, Manipal. The cause of death for each cadaver was not known in detail. The cadavers were donated material which relatives have not claimed from the hospital. None of them had any pathological lesions, traumatic lesions or surgical procedures in the neck and the axillary region. The dissections were performed by the authors. The present variation was found only in the right axilla of a 57-year-old male cadaver. In the infraclavicular part of the brachial plexus, the posterior cord was splitting into thick posterior and thin anterior roots, enclosing the subscapular artery near its origin. The two roots, after enclosing the subscapular artery are fused to continue as radial nerve (Figure 1).

The upper subscapular nerve was arising from the main trunk of the posterior cord. Thoracodorsal nerve, lower subscapular nerve and the axillary nerve were originating from thick posterior root of the cord. The radial nerve, which is formed after the fusion of two roots of the posterior cord, gave rise to the nerve to long and medial head of triceps.

On the other hand, in the left axilla, the branching pattern of posterior cord and its relation to subscapular artery was normal. As the two roots of the posterior cord enclosed the right subscapular artery, it appeared larger in size than that of the left side. This enlargement of the

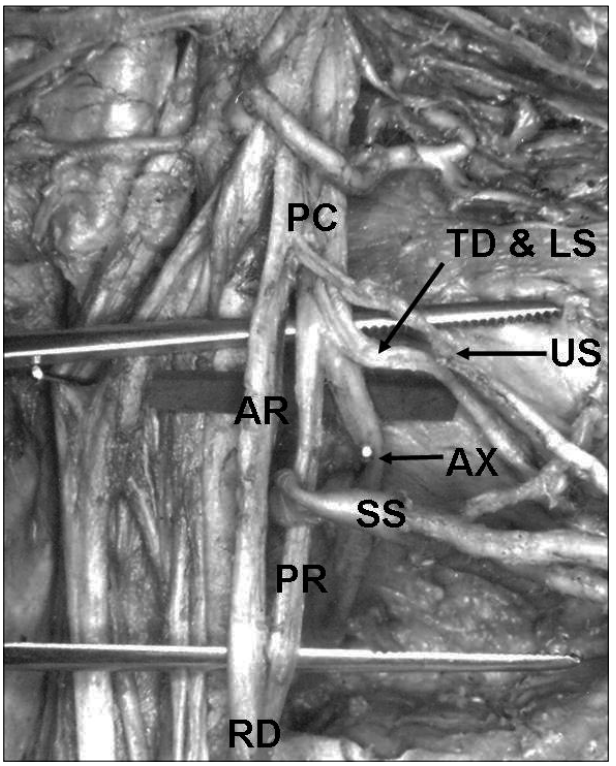

Figure 1. Variation in the branching pattern of posterior cord. *Posterior cord (**PC**) of the brachial plexus, divided into two roots (**AR:** anterior root; **PR:** posterior root) enclosing the subscapular artery (**SS**) near its origin. The branches of the posterior cord, from the main trunk - upper subscapular nerve (**US**); from posterior root – thoracodorsal nerve (**TD**), lower subscapular nerve (**LS**) and axillary nerve (**AX**). After giving these branches, the two roots joined to continue as radial nerve (**RD**).*

artery may be to compensate the occlusion caused by the two roots of posterior cord.

Discussion

Variations in plexus patterns may be due to unusual formation during the development of trunks, divisions, or cords [4]. The more common variations occur at the junction or separation of the individual parts [5,6]. As the embryonic somites migrate to form the extremities, they bring their own nerve supply, so that each dermatome and myotome retains its original segmental innervation. Throughout somite migration, some of the nerves come into close proximity and fuse in a particular pattern, forming a plexus early in fetal life. Variations of the brachial plexus are often accompanied by abnormalities of vessels [7-9]. The axillary artery has an association to the division of the cords [9]. Thus, it appears that, during development, if the axillary artery had abnormal relations to the brachial plexus, the division of the cords would be modified by the presence of the abnormally placed artery.

Knowledge of variations in anatomy is important to anatomists, radiologists, anesthesiologists and surgeons, and has gained more importance due to the wide use and reliance on computer imaging in diagnostic medicine [10]. Also, the presence of anatomic variations of the peripheral nervous system is often used to explain unexpected clinical signs and symptoms. Descriptions of nerve variations are useful in clinical and surgical practice, since an anatomical variation can be the cause of nerve palsy syndromes and vascular problems. In particular, anatomical variations of the human brachial plexus are very important to note during neck dissections, while managing axillary tumors, where these unusual distributions are prone to damage. They may also have clinical importance in diagnosis of injuries of the plexus. In image-processed three-dimensional volume-rendered magnetic nuclear resonance scans, which allow visualization of the entire brachial plexus within a single composite image [11], knowledge of this variation may be useful for surgeons for improved guidance during infraclavicular block procedures and for surgical approaches for brachial plexus region tumors.

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