



Two cord stage in the infraclavicular part of the brachial plexus

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ABSTRACT

Anatomical variations in the formation, course and distribution of brachial plexus are reported in the literature. We encountered a brachial plexus with two cords – anterior and posterior instead of lateral, medial and posterior cords which were present lateral to axillary artery during routine dissection of embalmed adult cadaver in the left upper limb. The anterior cord was giving off the branches of the lateral and medial cord. The posterior cord was giving off the radial and axillary nerves. The clinical significance and the embryological reasons are discussed. © IJAV. 2010; 3: 128–129.

Key words [two cords] [anterior cord] [posterior cord] [brachial plexus] [axillary artery]

Introduction

Variations of the brachial plexus occurs in the formation of trunks, divisions, and cords; in the origin and/or combination of branches; and in the relationship to the axillary artery and scalene muscles, however the make up of the terminal branches (components of the nerves) is unchanged [1]. The three cords of brachial plexus enter the axilla and are arranged according to their names around the second and third part of axillary artery. But in the first part of axillary artery, the relations are different; the lateral and posterior cords lie lateral to the axillary artery, where as the medial cord lies behind the axillary artery [2].

The three trunks of the brachial plexus incline laterally, and either just above or behind the clavicle each bifurcates into anterior and posterior divisions. The anterior divisions of the upper and middle trunks form a lateral cord that lies lateral to the axillary artery. The anterior division of the lower trunk descends at first behind and then medial to the axillary artery and forms the medial cord, posterior divisions of all three trunks form the posterior cord, which is at first above and then behind the axillary artery [2].

Here a rare variation of two cord stage of the infraclavicular part of the brachial plexus representing anterior and posterior cords situated lateral to the axillary artery is reported. The clinical implications of this finding are discussed.

Case Report

During routine dissection of a 75-year-old embalmed male cadaver for undergraduate medical students in Department of Anatomy, PSG Institute of Medical Sciences and Research, Peelamedu, Coimbatore, India, a rare unilateral variation of the cords of the infraclavicular part of the brachial plexus was observed.

In the left upper limb of the cadaver, the pectoral region, axilla and arm were dissected. The axillary artery, axillary vein and the cords and the branches of the cords in the infraclavicular part of the brachial plexus were observed. Instead of the lateral, medial and posterior cords of the brachial plexus, only two cords, anterior and posterior was present lateral to the axillary artery and the anterior cord was representing the fusion of lateral and medial cords. The musculocutaneous nerve, median nerve, ulnar nerve, medial cutaneous nerve of arm and forearm were all originating from the anterior cord. The radial nerve and axillary nerve were originating from the posterior cord.

Discussion

A more precise knowledge about the distribution, course and the branching pattern of the nerves of the brachial plexus than that found in classical anatomical texts is necessary for clinical investigation and the surgical treatment of peripheral nerve injury [3]. The variation in the formation and branching of the brachial plexus are common and has been reported by Miller [4]. Kerr

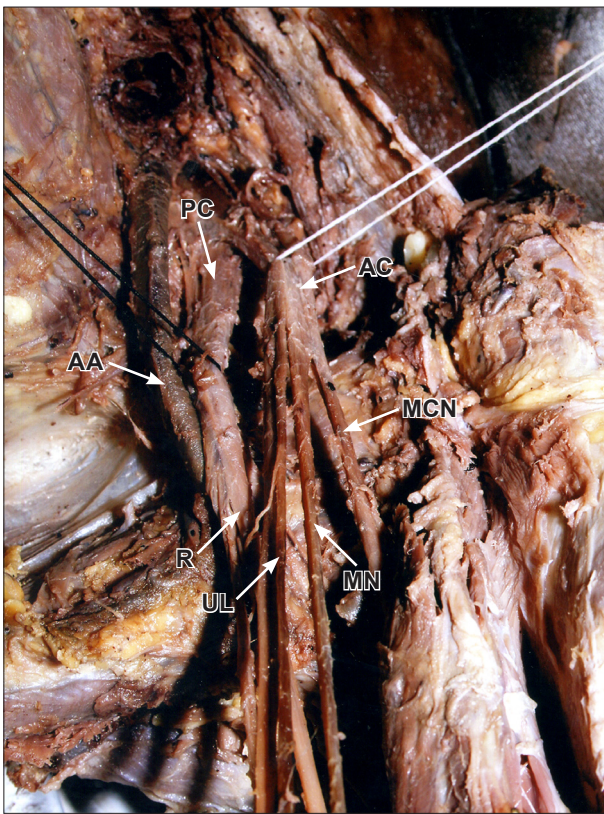


Figure 1. Two cord stage of the infraclavicular part of the brachial plexus. Two cords (*AC*: anterior cord; *PC*: posterior cord) present lateral to the axillary artery (*AA*). Branches from the anterior cord are musculocutaneous nerve (*MCN*), median nerve (*MN*), and ulnar nerve (*UL*). Posterior cord supplying the radial nerve (*R*).

reported that, in three brachial plexus the medial and lateral cords united to form a single cord anterior to the axillary artery so that only anterior and posterior cords were present; the anterior gave off the branches to both the medial and lateral cords [5]. The case reported here is in consonance with the report by Kerr, where there were two cords anterior and posterior situated lateral to the axillary artery and the anterior cord was giving off the branches to both the medial and lateral cords. Olyemi encountered a brachial plexus with two cords as medial and lateral and three unusual communications. The lateral cord sent a branch to the medial cord as the

medial root of median nerve emerged from the latter. A branch from the posterior aspect of the medial cord divided into the radial and axillary nerves [6]. This report is in discrepancy with the present case reported here where there were two cords (anterior and posterior). A rare variation of the cords of the brachial plexus was reported by Singer in a case in which all the roots of the plexus united to form a single cord, and he explained that to be due to the abnormal formation of axillary artery [7]. In one case it was reported that all the three cords namely lateral, medial and posterior cords of brachial plexus were noted to be lateral to the third part of the axillary artery [8]. But in the present case, there were only two cords as anterior and posterior, related laterally to the axillary artery. Embryologically the directional growth of nerve fibers is explained by the theory of neurotropism or chemotropism hypothesis of Ramon and Cajal [8]. The salient features of chemotropism is that axonal growth cones act as sensors to concentration gradients of molecules in the environment and grow up the gradient towards the source, i.e. the target. The variations of the cords of brachial plexus and its terminal branches become important during surgical exploration of the axilla and arm to avoid damage to the important nerves [9].

References

- [1] Moore KL, Dalley AF. Clinically oriented Anatomy. 4th Ed., Philadelphia, Lippincott, Williams and Wilkins. 1999; 714–715.
- [2] Standring S, ed. Gray's Anatomy. 39th Ed. Philadelphia, Elsevier, Churchill Livingstone. 2005; 804, 846–848.
- [3] Linell EA. The distribution of nerves in the upper limb, with reference to variabilities and their clinical significance. *J Anat.* 1921; 55: 79–112.
- [4] Miller RA. Comparative studies upon the morphology and distribution of the brachial plexus. *Am J Anat.* 1934; 54: 143–175.
- [5] Kerr AT. The brachial plexus of nerves in man, the variations in its formation and branches. *Am J Anat.* 1918; 23: 285–395.
- [6] Olyemi KA, Adesanya OA, Ofusori DA, Okwuonu CU, Ukwanya VO, Om'iniaboys FA, Odion BI. Abnormal pattern of brachial plexus formation: an original case report. *The Internet Journal of Neurosurgery.* 2007; 4: Number 2.
- [7] Singer E. Human brachial plexus united into a single cord description and interpretation. *Anat. Rec.* 1932; 55: 411–419.
- [8] Satyanarayana N, Vishwakarma N, Kumar GP, Guha R, Datta AK, Sumitha P. Variation in relation of cords of brachial plexus and their branches with axillary and brachial arteries—a case report. *Nepal Med Coll J.* 2009; 11: 69–72.
- [9] Abhaya A, Khanna J, Prakash R. Variation of the lateral cord of brachial plexus piercing coracobrachialis muscle. *J Anat Soc India.* 2003; 52: 168–170.