

A rare variant of the posterior cord of the brachial plexus

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SUMMARY

In the dissection of a 67-year-old Chinese male cadaver, a variant of the posterior cord was observed. The posterior cord was consisted of two parts. The upper posterior cord was the continuation of the posterior division of the upper trunk. It gave off the suprascapular nerve, the subscapular nerve, a communicating branch and then continued as the axillary nerve. The lower posterior cord was formed by the posterior divisions of the middle and lower trunks. After giving off the thoracodorsal nerve, the lower posterior cord fused with the communicating branch and continued as the radial nerve.

Key words: Variant – Posterior cord – Brachial plexus

INTRODUCTION

The posterior cord of the brachial plexus is formed by the union of the posterior divisions of the upper, middle and lower trunks. It usually gives off the upper subscapular, thoracodorsal and lower subscapular nerves in the axilla, and terminates as the axillary and radial nerves. However, in a detailed study of 54 upper extremities (Fazan et al., 2013), the posterior cord was formed by the posterior divisions of the superior and middle trunks in 9%. In the dissection of 68 Kenyan cadavers (Muthoka et al., 2011), 89.3% posterior cords showed the variant branching pattern. 43 (57.3%) lower subscapular, 8 (10.3%) thoracodorsal and 8 (10.3%) upper subscapular nerves came from

the axillary nerve instead of directly from the posterior cord. Rastogi et al. (2013) found that the posterior cord was formed by union of posterior divisions of c5 and c6 roots with posterior divisions of the middle and lower trunks in 16.2% of upper extremities. The axillary nerve originated from posterior division of the upper trunk in 10.8%, and the thoracodorsal nerve arose from the axillary nerve in 22.9% of upper extremities. When an unusual branch of the brachial plexus coursed closely with the axillary artery, the blood supply of the upper extremity may be decreased because of the compression of the nerve. Moreover, certain surgical treatment failures of brachial plexus lesions were related to the presence of the anatomical variations. Knowledge of the variations of posterior cord of the brachial plexus is useful not only in the anaesthetic blocks, but also for the neck and axilla operations. (Ballesteros and Ramirez, 2007).

CASE REPORT

On the right side of the upper arm, the brachial plexus was consisted of five roots: the ventral rami of the fifth, sixth, seventh, eighth cervical and the first thoracic nerve. The upper trunk was formed by union of ventral rami of the fifth and sixth cervical nerves and it split into the anterior and posterior divisions. The posterior division of the upper trunk (upper posterior cord) gave off the suprascapular nerve, the subscapular nerve and a communicating branch, then continued as the axillary nerve. The lateral cord was formed by the union of anterior divisions of the upper and middle trunks. The median nerve was formed by

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the union of lateral root from the lateral cord and medial root from the medial cord. The lower posterior cord was formed by the posterior divisions of the middle and lower trunks. After giving off the thoracodorsal nerve, the lower posterior cord fused with the communicating branch and continued as the radial nerve (Fig. 1).

DISCUSSION

Variations in the posterior cord of the brachial plexus are not uncommon (Hirasawa, 1931; Hovelacque, 1927; Bergman et al., 1996). Villamere et al. (2009) reported the rami of c5 and c6 independently divided into anterior and posterior divisions, which joined the lateral and posterior cords, respectively. The posterior cord was formed by the posterior divisions of c5 and c6, the posterior divisions of middle and inferior trunks.

Chaudhary et al. (2011) reported the presence of four trunks in brachial plexus, namely I, II, III and IV in 3 cases of upper extremities and in all the 3 cases posterior cord was formed by union of posterior divisions of I, II and III trunks having root value from c5 to c8. Miller (1932) observed patterns of the roots, trunks, cords and branches of brachial plexus in different vertebrates, but reported no trunk formation in amphibians, reptiles and dogs. In the study of Fazan et al. (2013) and Gupta et al. (2004), the posterior cord was formed by the union of posterior divisions of upper and middle trunks. In those cases, the radial nerves may not receive fibres

from the eighth cervical and first thoracic nerves, as usually described.

According to the standards of the textbooks of anatomy, the three cords of the brachial plexus enter the axilla and are arranged according to their names around second and third parts of the axillary artery. There were reports where the posterior cord was present lateral to the second part of the axillary artery (Satyanarayana et al., 2009; Rastogi et al., 2013; Jamuna, 2010).

Terminal branches of the posterior cord are the axillary and radial nerves. Jamuna (2010), Bhat and Grijavallabhan (2008) reported cases where the posterior cord split into the anterior and posterior divisions, and the axillary nerve took origin from the posterior division. Bertha et al. (2009) discovered an axillary arch, a muscular strip enclosed by two roots of radial nerve and the posterior cord was observed as two parts. There were also reports where the axillary nerve arising from the posterior division of upper trunk (Matejcik, 2003; Chaudhary et al., 2011; Rastogi et al., 2013), which was similar to the axillary nerve presented here.

Knowledge of this variation may be useful for improved guidance during infraclavicular block procedures and for surgical approaches for brachial plexus region tumours.

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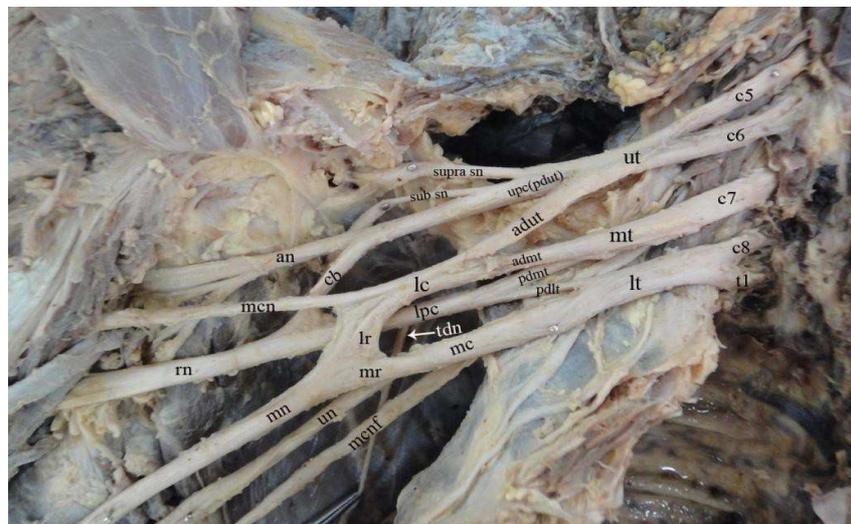


Fig. 1. Dissection of the right axilla, showing the brachial plexus and its terminal branches. c5: ventral ramus of the fifth cervical nerve; c6: ventral ramus of the sixth cervical nerve; c7: ventral ramus of the seventh cervical nerve; c8: ventral ramus of the eighth cervical nerve; t1: ventral ramus of the first thoracic nerve; ut: upper trunk; mt: middle trunk; lt: lower trunk; upc (pdut): upper posterior cord (posterior division of the upper trunk); adut: anterior division of the upper trunk; adm: anterior division of the middle trunk; pdmt: posterior division of the middle trunk; pdlt: posterior division of the lower trunk; lpc: lower posterior cord; lc, lateral cord; mc: medial cord; lr: lateral root of the median nerve; mr: medial root of the median nerve; supra sn: suprascapular nerve; sub sn: subscapular nerve; mn: median nerve; mcn: musculocutaneous nerve; un: ulnar nerve; cb: communicating branch between the upper and lower posterior cords; an: axillary nerve; rn: radial nerve; tdn: thoracodorsal nerve; mcnf: medial cutaneous nerve of the forearm.

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