



## Variant branches of brachial plexus - a case report

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### Abstract

During routine dissection of brachial plexus we observed two upper subscapular nerves. These two upper subscapular nerves, lower subscapular nerve and axillary nerve arose from posterior division of upper trunk. Posterior cord gave thoracodorsal nerve and continued as radial nerve. We also found that anterior division of middle trunk divided into two branches; anterior division-a and anterior division-b. Anterior division-a joined anterior division of upper trunk to form the lateral cord. Anterior division-b joined medial root-1 of median nerve to form medial root-2 of median nerve. This medial root-2 joined with lateral root of median nerve to form median nerve. The anterior division-b carrying fibers from C7 primary ramus, contributed fibers to form medial root-2 of median nerve and then joined with the ulnar nerve. Presence of C7 root in ulnar nerve was clearly seen in our case, which is seldom visualized in routine dissection. © *Int J Anat Var (IJAV)*. 2012; 5: 5–7.

**Key words** [posterior cord] [median nerve] [ulnar nerve] [nerve variations]

### Introduction

The brachial plexus is the union of roots which are ventral primary rami of C5 to C8 and T1. These roots of brachial plexus join with each other to form three trunks, each of which bifurcates into anterior and posterior divisions. These divisions reorient themselves to form lateral, medial and posterior cords, and these cords give rise to different nerves of the upper limb. Variations in the formation and branching of the brachial plexus are common and have been reported by several investigators [1–3]. The brachial plexus has a complex structure and is in close relationship with the important anatomical structures. Thus, variations of the brachial plexus have significant clinical and surgical importance. During routine dissection, we found variant branching pattern of brachial plexus, which is being reported here. We further discussed its relevant information and clinical significance.

### Case Report

The present variations were found during routine undergraduate dissection of brachial plexus at Shri Vasantnao Naik Government Medical College, Yavatmal. Variations were observed unilaterally on right side of a 68-year-old female cadaver. All three trunks divided into anterior and posterior divisions. Posterior cord was formed by union of posterior division of all the three trunks. Posterior division of lower

trunk was much thinner than the others (Figure 1). Variations were found in the branches of posterior cord (Figures 1, 2). We found two nerves arising from posterior division of upper trunk and piercing the upper part of subscapularis muscle. Thus we got two upper subscapular nerves. These two upper subscapular nerves along with lower subscapular nerve and axillary nerve arose from posterior division of upper trunk. Posterior cord gave a thin nerve to latissimus dorsi (thoracodorsal nerve) and then continued as a thick radial nerve.

Other variations were found in relation with median and ulnar nerves (Figures 2, 3). Middle trunk divided into anterior and posterior divisions. Anterior division further divided into two branches; anterior division-a and anterior division-b. Anterior division-a of middle trunk joined with anterior division of upper trunk to form lateral cord. Anterior division-b of middle trunk joined with medial root-1 of median nerve to form medial root-2 of median nerve with possible root values C7, C8 and T1. Then this medial root-2 of median nerve travelled towards the arm and in the arm, anteromedial to distal portion of 3rd part of axillary artery, it was joined by lateral root of median nerve given by lateral cord to form median nerve with possible root values C5-8 and T1. Ulnar nerve arose from medial cord. Anterior root-b of middle trunk after contributing fibers to medial root-2 of median nerve

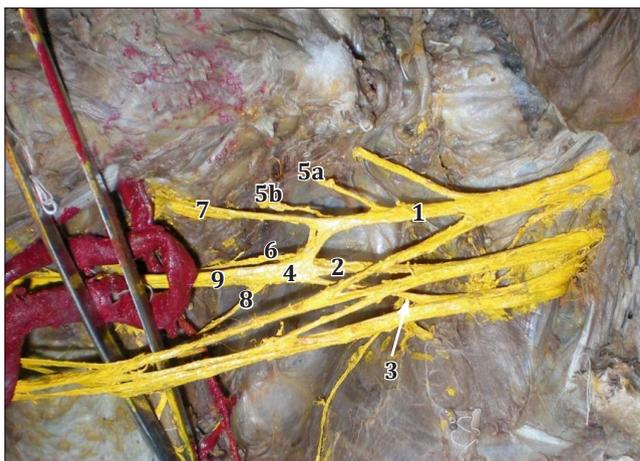
also gave fibers which joined ulnar nerve. Hence we clearly visualized fibers of C7 ramus joining the ulnar nerve. Other branches of brachial plexus were found to be as usual.

### Discussion

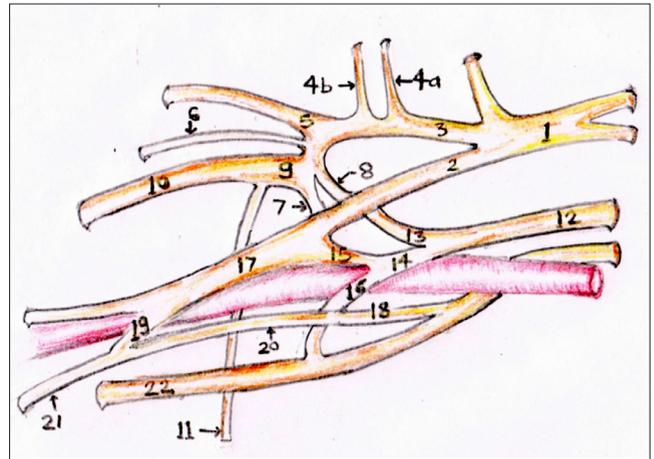
Variations in the branching pattern of brachial plexus can be due to unusual formation in the development of trunks, divisions and cords [3]. Explanation of anatomical variations of brachial plexus can be traced by understanding normal embryological development of it. Its development starts at 34th to 35th day of intrauterine life and definitive adult pattern is evident by 46th to 48th day of intrauterine life [4]. Axillary artery has an important association to the divisions of the cords [5]. Thus during development, if axillary artery had variant relation to brachial plexus, the divisions of the cords would be modified.

In the present case, we found thin posterior division of lower trunk and two upper subscapular nerves. Similar variations were mentioned in Gray's Anatomy [1]. We found two upper subscapular nerves along with lower subscapular nerve and axillary nerve, arising from posterior division of upper trunk instead of posterior cord. Earlier, Priti et al. [6], Kerr [7] and Fazan et al. [8] had come across with such variant origin in their dissection. Priti et al. [6] and Fazan et al. [8] reported this variation to be more common in males and on left side. But we found above-mentioned variation on right side of female cadaver, which make this report significant.

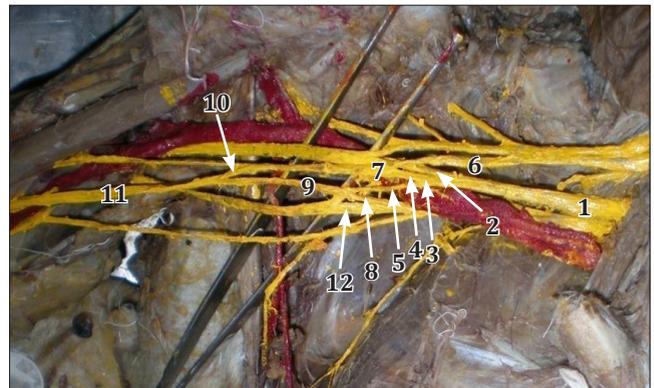
The nerves supplying upper limb are having their specific root values. But all these roots cannot always be traced during routine dissection. Ulnar nerve has root values C7, C8 and T1. Presence of C7 root in ulnar nerve is seldom visualized in the routine dissection. It has been documented that C7 root of ulnar nerve emerges from lateral cord, either through



**Figure 1.** Variant branches of posterior cord, after reflecting the axillary artery. (1: posterior division of upper trunk; 2: posterior division of middle trunk; 3: posterior division of lower trunk; 4: upper subscapular nerve-1; 5a: upper subscapular nerve-2; 5b: upper subscapular nerve-2; 6: lower subscapular nerve; 7: axillary nerve; 8: thoracodorsal nerve; 9: radial nerve)



**Figure 2.** Schematic diagram showing variant branching pattern of brachial plexus. (1: upper trunk; 2: anterior division of upper trunk; 3: posterior division of upper trunk; 4a: upper subscapular nerve-1; 4b: upper subscapular nerve-2; 5: axillary nerve; 6: lower subscapular nerve; 7: posterior division of lower trunk; 8: posterior division of middle trunk; 9: posterior cord; 10: radial nerve; 11: thoracodorsal nerve; 12: middle trunk; 13: posterior division of middle trunk; 14: anterior division of middle trunk; 15: anterior division-a of middle trunk; 16: anterior division-b of middle trunk; 17: lateral cord; 18: medial root-1 of median nerve; 19: lateral root of median nerve; 20: medial root-2 of median nerve; 21: median nerve; 22: ulnar nerve)



**Figure 3.** Variant formation of median and ulnar nerves. (1: middle trunk; 2: posterior division of middle trunk; 3: anterior division of middle trunk; 4: anterior division-a of middle trunk; 5: anterior division-b of middle trunk; 6: anterior division of upper trunk; 7: lateral cord; 8: medial root-1 of median nerve; 9: medial root-2 of median nerve; 10: lateral root of median nerve; 11: median nerve; 12: ulnar nerve)

roots of median nerve [1] or as an independent fascicle, the lateral root of ulnar nerve in axilla [9]. Our finding of anterior division-b of middle trunk which contributed fibers to medial root-1 of median nerve and then joined ulnar nerve can be conveniently considered as lateral root of ulnar nerve. We found, anterior division-b of middle trunk joined with medial root-1 of median nerve to form medial root-2 of median nerve, which later joined in the arm by lateral root of median nerve

to form median nerve slightly distal to its usual location. Similar findings were observed by Bharat et al. [10]. But their report differed from our study as they found that fascicle contributing fibers to ulnar nerve and median nerve arose from lateral cord; however, in our case, it started as a branch from anterior division of middle trunk.

In our case the close relationship of the variant anterior division-b of middle trunk with axillary artery may result

in arterial compression leading to ischemic pain or arterial insufficiency during certain postural maneuvers of the shoulder joint [10]. These variant nerves are usually prone for injuries and entrapment neuropathies [10]. So knowledge of these variations in the branching pattern of brachial plexus may be useful to surgeons, physicians, anesthetists, radiologists and most importantly for anatomists.

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