

Peculiar formation of medial cord and unusual course of fifth cervical nerve root: A case of bilateral variation in brachial plexus

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Abstract

Introduction

Brachial plexus is a network of nerve fibers formed by ventral rami of fifth to eighth cervical nerve and first thoracic nerve. Because of the extensive branching occurring in brachial plexus, variations are very common in this structure.

Methods

We report a case of bilateral variations in 68 years old male cadaver. Result-In 68 year male cadaver fifth cervical nerve root, instead of passing between scalenus anterior and medius was piercing the scalenus anterior, before joining the sixth cervical root to form upper trunk. Seventh cervical nerve root was also contributing to medial cord.

Discussion

Similar anomalies have been reported by various workers in the past.

Conclusion

This type of variation is fairly common and has clinical and surgical significance especially for regional anesthetic blocks, thoracic outlet syndrome, surgeries in this region and interpretation of radiological images.

Introduction

Brachial plexus is the largest and most extensive nerve plexus in human body and supplies superior extremity. It is formed by anterior primary rami of fifth to seventh cervical and first thoracic nerve roots. Roots and trunks of the plexus are situated in the posterior triangle of neck whereas divisions are behind the clavicle and cords & branches in axilla¹. Because of extensive branching and union occurring in the plexus variations are common, many of which have clinical implications².

These variations and anomalies have clinical significance particularly to surgeons who operate in this region, anesthetists who use regional blocks and radiologists who interpret plain and computerized imaging. In addition awareness of these variations is of paramount interest to neurosurgeons, neurologist, vascular surgeons and orthopedic surgeon^{3,4}. We report a set of variations found

in brachial plexus found during dissection carried out for the purpose of medical undergraduate teaching with its clinical significance and embryological basis.

Case Report

During routine dissection on a 68 year old male cadaver, numbers of variations were found bilaterally. Fifth cervical nerve root in both sides was found piercing the scalenus anterior muscle before forming trunks (Figure 1 and Figure 2).

Seventh cervical nerve root continued as middle trunk and contributed to lateral and posterior cord as anterior and posterior divisions as usual. In addition it also issued nerve fibres to medial cord (Figure 1). Origin and course of other roots, cords and branches of Brachial plexus was usual in terms of origin, course and structures supplied.

This work conforms to the values laid down in the Declaration of Helsinki (1964). The protocol of this study has been approved by the relevant ethical committee related to our institution in which it was performed. All subjects gave full informed consent to participate in this study.

In modern era, there is increased use of computer based noninvasive techniques in diagnostic medicine. This makes the knowledge of anatomical variation important to differentiate from pathological conditions. Many times unexplained clinical presentations can be explained on the basis of anatomical variations.



Figure 1: right sided brachial plexus; fifth cervical nerve root can be seen piercing Scalenus anterior; arrow at splitting of fibres of Scalenus anterior muscle. SA: Scalenus anterior; SM: Scalenus medius; C5-T1: ventral rami of spinal nerve roots; UT: upper trunk; MT: middle trunk; LT: lower trunk; NSUB: nerve to subclavius; US: upper subscapular nerve; LS: lower subscapular nerve; LC: lateral cord; MC: medial cord; PC: posterior cord; LP: lateral pectoral nerve; MN: median nerve; RN: radial nerve; UN: ulnar nerve; MUS: musculocutaneous nerve; AN: axillary nerve.

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Figure 2: Left sided brachial plexus; fifth cervical nerve root can be seen piercing Scalenus anterior.

Since neck muscles are derived from a common muscle mass, any faulty cleavage results in an anomaly. Fifth cervical nerve root abnormally passing between fibres of scalenus anterior as in this case may lead to nerve entrapment. This may lead to weakness of muscles supplied by the fibres of this root with sensory alterations in the areas supplied.

Though it is known that Ulnar nerve almost always receives fibres from seventh cervical nerve, it is described to be occurring down below in the axilla and fibres arise from either lateral cord or musculocutaneous nerve ¹.

Similarly, as seventh cervical root is contributing to medial cord; root value of ulnar nerve shall become C7, C8, and T1. Similar anomalies have been reported by various workers in the past. Harry et al reported roots of brachial plexus as lying between Scalenus anterior and medius in 60% cases in a sample of 32 female and 19 male. The most common variation in his sample was penetration of Scalenus anterior by ventral rami of fifth or sixth cervical nerve root. In 15% cases, fifth and sixth cervical nerve roots fused to form upper trunk before piercing Scalenus anterior. The incidence of fifth cervical nerve root alone piercing the belly of Scalenus anterior muscle was 13% ⁵. Natsis et al in 2006 studied 93 cadavers out of which, in 12 cases C5 root was piercing Scalenus anterior muscle ⁶.

Neslihan Cankara et al 2009 reported similar findings as a case report. They reported C5 and C6 nerve roots pierced Scalenus Anterior muscle bilaterally and then formed superior trunk of brachial plexus after emerging on anterolateral aspect ⁷.

Thus, knowledge of these possible variations is important in performing anesthetic blockade to the brachial plexus or in surgical procedures, such as decompression or scalenotomy; otherwise it may invite failure⁴. This variation of superior trunk that is related to scalene muscles may be considered as a predisposing factor for thoracic outlet syndrome. Thoracic outlet syndrome is the common name of the syndromes characterized with

neurogenic and/or vascular symptoms, which are resulted from compression of subclavian vessels and brachial plexus while passing through the cervico-axillary canal ⁷.

References

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