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Case Report

Bilateral variant branching pattern of posterior cord of brachial plexus

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ABSTRACT

Objective: Variant branching pattern of the cords of brachial plexus has been an area of concern for surgeons opting to explore this region. Anaesthetic blocks and surgical approaches are the highlights of these interventions, where a keen familiarization of the anatomy of this region is mandatory.
Material and methods: The present case description reports a bilateral variant branching pattern of the posterior cord in an adult male cadaver.
Observations: Right posterior cord gave upper subscapular nerve and did not give the lower subscapular nerve. Axillary nerve arises proximal to the thoracodorsal nerve. After giving thoracodorsal nerve, posterior cord continued as radial nerve. There is an unusual branch from right axillary nerve, which supplied teres major and sent twig to lower fibres of subscapularis muscle. Left upper subscapular nerve divided into two branches and supplied the subscapularis muscle. Left axillary nerve enclosed by some fibre of subscapularis muscle, within the fibres of subscapularis axillary nerve, gave an unusual branch to teres major and then it continues in quadrangular space.
Discussion: In spite uncountable reports on variations of brachial plexus, descriptions regarding anomalous branching patterns hold enormous clinical significance for the radiologists, anaesthetists and surgeons, besides being of academic interest for the anatomists.

1. Introduction

The hallmark of the axillary region is the brachial plexus, which is a plexiform arrangement of the anterior primary rami of the lowest 4 cervical and first thoracic spinal nerves. It is disposed in two parts, the supraclavicular and infraclavicular. The supraclavicular part consists of the roots and the trunks, whereas the infraclavicular part has the cords placed in relation to the axillary artery. The plexus is intimately related to neurovascular structures, both in the cervical and the axillary regions. There have been innumerable descriptions of brachial plexus variations, particularly pertaining to the plexus as a whole. The nerves of brachial plexus are oriented in two planes: anterior and posterior. The anterior plane consists of the branches of the medial and lateral cords. It has been stated earlier that connections and variations are frequently found in the anterior plane.[1,2] An astonishing part of the current case report is the presence of anomalies in both planes, anterior and posterior. We are in total agreement with a prior statement that the variations of cords and the individual branches are rarer and uncommonly reported in anatomical literature.[3] The present investigation strives to report a bilateral occurrence of a variant branching pattern of the posterior cord of brachial plexus.

2. Case report

We detected an unusual organization and branching pattern of the bilateral brachial plexus during the course of a routine preclinical educational dissection of a 55-year-old adult male cadaver. The right posterior cord gave upper subscapular nerve and did not give the lower subscapular nerve but lower fibres of subscapularis was supplied by a twig of nerve to teres major; axillary nerve arose proximal to the thoracodorsal nerve and divided into nerve to teres major and axillary nerve proper (Fig. 1). Then it gave the thoracodorsal nerve and continued as radial nerve. Left posterior cord in the present study gave upper subscapular nerve, which soon divided into two twig, and then lower subscapular nerve; then axillary nerve arose and it was enclosed by some fibre of subscapularis (Fig. 2), which within the fibres of subscapularis axillary nerve gave the nerve to teres major and then it continues in quadrangular space (Fig. 3). The posterior cord gave the thoracodorsal nerve and continues as radial nerve. No other

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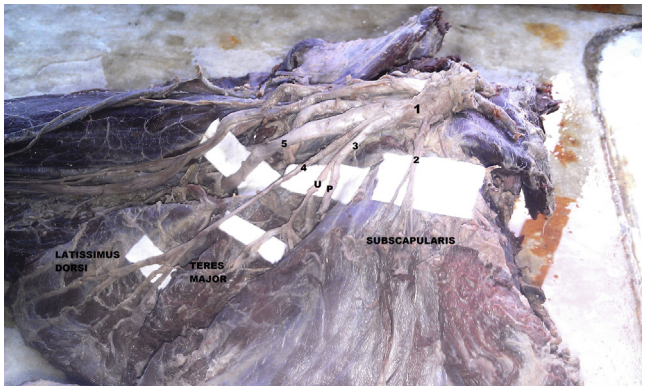

Fig. 1. Right posterior cord. 1 – Right posterior cord. 2 – Upper subscapular nerve. 3 – Axillary nerve. U – Unusual branch of axillary nerve supplying teres major. 4 – Nerve to latissimus dorsi. 5 – Radial nerve.

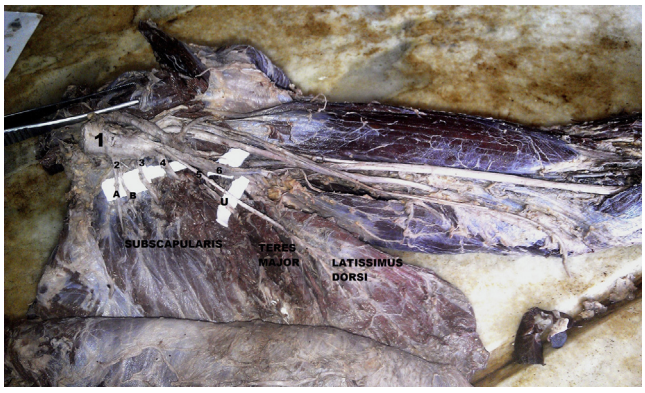

Fig. 2. Left posterior cord. 1 – Left posterior cord. 2 – Upper subscapular nerve. A – First branch. B – Second branch. 3 – Lower subscapular nerve. 4 – Axillary nerve. U – Unusual branch of axillary nerve teres major. 5 – Nerve to latissimus dorsi. 6 – Radial nerve.

neural variations were noted. In addition, the vessels and musculature revealed no departure from the normal.

3. Discussion

Volumes of anatomical literature have been written on the variations of the brachial plexus. A thorough survey of the archives revealed that communication between the median and musculocutaneous nerves are the most frequent anomalies reported.[4] However, variations pertaining to the roots and cords are relatively uncommon. Anomalies in the formation of brachial plexus cords have been reported with varying frequencies of 6.2%,[5] 5.8%,[3] 0.57%[6] and 3%.[7] Present variations, i.e. bilaterally teres major supplied by axillary nerve instead of lower subscapular nerve and absence of right lower subscapular nerve, are not reported in literature till date. Left axillary nerve passing deep to fibres of subscapularis may get entrapped and lead to deltoid, teres minor and teres major paralysis and dysfunction of shoulder joint.

A credible embryological elucidation has been offered for neural variations of the upper limb. It is already an established fact that as soon as the upper limb buds are formed, the ventral primary rami of the spinal nerves penetrate the mesenchyme of the bud. Each ventral ramus then divides into ventral and dorsal branches, which later unite to form the known peripheral nerves for the flexors and extensors of the upper extremity, respectively. The contact between the nerves and the differentiating mesodermal condensations is mandatory for accomplishing the functional

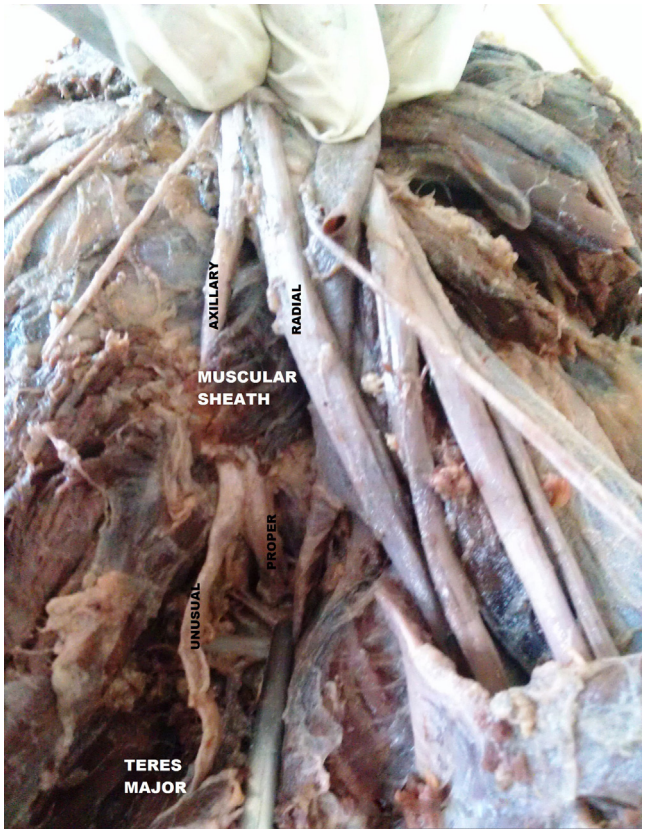

Fig. 3. Deep dissection.

differentiation.[8] Lack of coordination between these processes may lead to inter-neural deviations from the usual branching pattern.[9,10]

A relation between the neural anomalies and variant arterial branching pattern has been stated previously, although our case report did not reveal any vascular abnormality.[11] The shoulder and axillary regions are often approached by anaesthetists, and orthopaedic and plastic surgeons. The infraclavicular approach for the brachial plexus block is effective. It produces reliable anaesthesia and is associated with minimal complications and side effects.[12] It is relevant to suggest, therefore, that clinicians be conscious of the branching and topographical relations of the brachial plexus and their possible anomalies. Lack of knowledge of these neural variations may lead to inadvertent intra-operative and post-operative complications resulting in sensory, motor and tropic signs and symptoms. The knowledge of these neural variants may be employed to explicate arbitrary clinical signs and symptoms. Moreover, these anomalies may be responsible for several nerve palsies and vascular pathologies. Acquaintance of these variations may be successfully used by clinicians while performing image processed 3-D magnetic nuclear resonance scans in which a single composite image of the brachial plexus is visualized. This could allow surgical manoeuvres in the axillary region to be improvised.

4. Conclusion

The anatomy and topographical relationship and branching pattern of the brachial plexus cords should be the subject of much consideration when diagnosing clinical conditions, especially neuropathies. Surgeons, radiologists and anaesthetists need to be careful before attempting to approach this vital region.

Conflicts of interest

The authors have none to declare.

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