

A case report on multiple anomalies of upper extremity

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ABSTRACT

Any deviation from the normal pattern of the human body is usually studied constantly through surgical findings, electro diagnostic studies and cadaveric dissections. We report the appearance of multiple anomalies of the nerves and muscles in the left upper limb of a 49 year old embalmed male cadaver, encountered during a routine educational dissection study. Anatomical description is achieved by measurements of length, width, attachments, relations and their innervating branches. The knowledge of the concerned anatomical variation may help in explaining the incomprehensible clinical signs. *Neuroanatomy; 2006; 5: 44–46.*

Key words [musculocutaneous nerve] [brachial plexus] [lateral cord] [biceps brachii] [brachialis]

Introduction

Several authors [1-3] claim the anomalous patterns of formation and branching of brachial plexus innervating the upper limb. The lateral cord apparently contains fibres from the ventral rami of C5, C6, and C7 which unite divide and reunite to give out the terminal branches that appear in the axilla, grouping around the axillary artery [3]. From the lateral cord the first branch given is lateral pectoral nerve and then is the musculocutaneous and lateral root of median nerve subsequently. The musculocutaneous nerve passes inferolaterally to supply and then pierce coracobrachialis after which it descends obliquely between biceps brachii and brachialis, innervating their musculature. Later it emerges beneath the lateral border of the tendon of biceps as lateral cutaneous nerve of forearm. Median nerve formed by the union of a lateral root and a medial root (from medial cord) embraces and descends anterior to the third part of axillary artery. In the distal half of the arm it is medially related to the brachial artery. Of the three muscles of the anterior compartment of the arm, a not very uncommon anomaly of the biceps is for it to present three or more heads. On similar grounds brachialis is also subjected to violate the anatomic norm. These muscular and neuroanatomical variations should be considered prior to traumatic evaluations and reconstructive surgeries.

Case Report

During routine anatomical dissection of an embalmed cadaver, the absence of musculocutaneous nerve was

noted in the infraclavicular part of the brachial plexus of the left upper limb. The first branch of the lateral cord, the lateral pectoral nerve, followed the normal pattern and supplied pectoralis major muscle from the deeper surface. On further exploration, it was found that the median nerve had two lateral roots, an upper and a lower. These two roots of the median nerve took over the area of supply of musculocutaneous nerve by providing both muscular and sensory branches. A small twig from the upper lateral root of the median nerve supplied the coracobrachialis, where as the biceps brachii and the brachialis were innervated through multiple twigs by the lower lateral root of the median nerve. Also in the same limb there were supernumerary slips of biceps brachii and brachialis. The noted third head of biceps, originated at the middle one third of the shaft of the humerus at the site of insertion of the coracobrachialis. This muscle fascicle measuring 11.3 cm in length and 1.3 cm in width was inserted into the medial side of the bicipital aponeurosis. It was related anteriorly to the long and short head of biceps brachii, posteriorly to the brachialis, laterally to the long head of biceps and medially to the brachial artery. The accessory slip of brachialis took attachment from the anterolateral surface of the middle one third of the shaft of the humerus, descended downwards beneath the biceps brachii forming a part of the floor of cubital fossa and was inserted into the lateral side of brachialis tendon. This slip of muscle received its nerve supply from radial nerve and measured 16.6 cm in length and 2.1

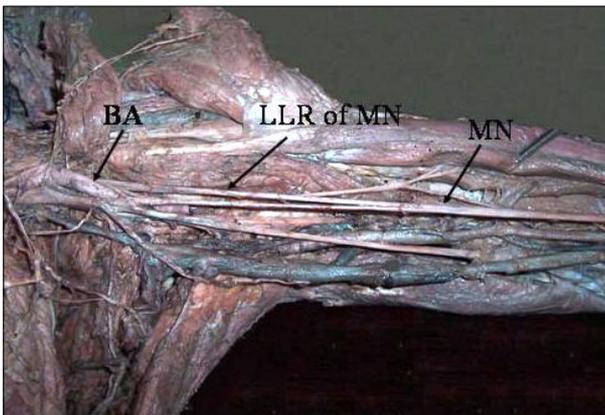


Figure 1. The left upper extremity is seen. The median nerve is formed by joining of the medial root and upper lateral root in front of the brachial artery (BA). The lower lateral root (LLR) of median nerve is joining the trunk of the median nerve (MN) at a lower level, before which it is seen to give branches to the biceps brachii and brachialis. Color version of figure is available online.

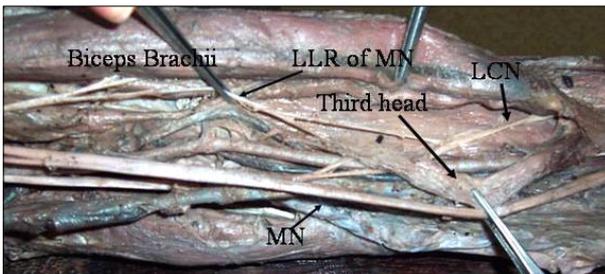


Figure 2. In the lower part of the arm, the third head of biceps (*third head*) is seen which is innervated by a branch from low lateral root (LLR) of median nerve. The lateral cutaneous nerve (LCN) of forearm is formed by the joining of the branches from the LLR and the trunk of median nerve (MN), which is seen to be winding beneath the third head of biceps brachii. Color version of figure is available online.

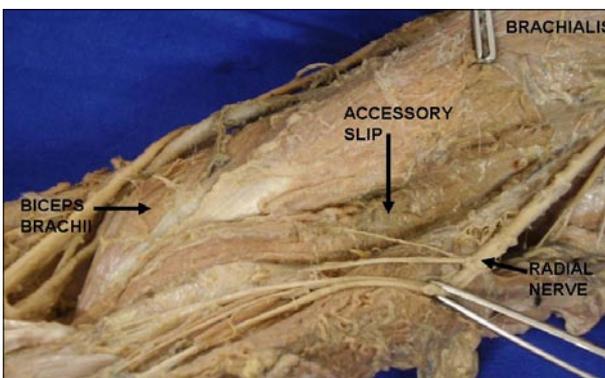


Figure 3. An accessory slip of brachialis receiving its nerve supply from the radial nerve is seen. In this figure the brachialis is retracted medially to give a clear view of this accessory slip. Color version of figure is available online.

cm in width. The multiple filaments that supplied biceps brachii and brachialis muscle joined beneath the third head of biceps to form a single nerve that continued as the lateral cutaneous nerve of the forearm.

Discussion

Knowledge of anomalous branching pattern of brachial plexus such as absence of musculocutaneous nerve and coexisting muscular anomalies may help surgeons during surgical interventions of upper limb to avoid inadvertent consequences. The presence of an accessory head of humeral origin represents the most common deviation from the 'standard', described form of the biceps. However, it has also been noted by various authors [1, 4] that, the presence of a supernumerary head seems to affect the course and branching of nerves supplying them.

Muscles of the upper limb developed from somites which have a specific effect on the position of the developing spinal nerves. These nerve cords are in intimate contact with the differentiating mesodermal condensations that end in a pre-muscle mass. Modification of the primitive segmental arrangement of the nerves entering the limb buds has resulted in the formation of complicated plexus, due to caudal migration of the attachment of the limb bud and intrinsic migration of its individual muscles during development. As suggested by Sannes et al [5] the guidance of the developing axons is regulated in a highly coordinated specific fashion. Any alterations in signaling between mesenchymal cells and neuronal growth cones can lead to significant variations. Once formed, these developmental differences persists postnatally [6].

Several authors [4, 7] have reported the presence of third head of biceps brachii with varying incidence according to the population studied. An incidence of this variation as much as 10% is reported by Bergman et al [8]. It seems that the incidence varies among the ethnic groups and therefore should be reported accordingly. The coexistence of an accessory muscle slip of brachialis along with the third of biceps is not been documented previously.

Absence of musculocutaneous nerve is been reported by various workers [2, 9]. In most of these cases median nerve took over the role of musculocutaneous nerve. So it is in the present case report, the difference being multiple nerve twigs from median nerve innervating biceps brachii and brachialis.

These variations may provide an explanation for cases were it is impossible to flex the forearm due to median nerve injury [9]. Knowledge of the variations come largely from anatomical studies, as in clinical practice it is often impossible to assess accurately the amount of damage to a given nerve or the extent of functional loss in a muscle [3]. The purpose of the present case report is to contribute to the existing knowledge of the variations in the anatomy, in accordance with the critical landmarks and clinical applications.

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