



Unilateral variation of branches of brachial plexus supplying anterior compartment of arm

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Abstract

Brachial plexus has been reported to show different variations which include its formation, course, branches and distribution patterns. One such variation was observed during routine dissection in the department of Anatomy, R.G. Kar Medical College, Kolkata showing unilateral (right) absence of musculocutaneous nerve, and branches from median nerve after supplying all the muscles of front of arm continued as lateral cutaneous nerve of forearm. The distribution of median nerve was found to be normal in forearm and palm. On left side, no variations was detected. Considering clinical importance, recognition and knowledge of such possible anatomical variation will be definitely helpful in the field of neurology, anesthesia and surgery.

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Key words [variation] [median nerve] [musculocutaneous nerve]

Introduction

Variations of formation, branches and distribution pattern of brachial plexus are common and reported by many authors. Usually, three cords of brachial plexus enter into the axilla and named as lateral, medial and posterior according to their position with respect to second and third part of axillary artery. Musculocutaneous nerve (MCN) after arising from lateral cord, supplies coracobrachialis and pierces it. Then it supplies other flexor muscles of arm, namely biceps brachii and major part of brachialis. After that it is continued as lateral cutaneous nerve of forearm after piercing deep fascia below the elbow. The trunk of median nerve (MN) is formed in front of third part of axillary artery by union of lateral root derived from lateral cord and medial root from medial cord. It does not provide any muscular branch in the arm except nerve to pronator teres above elbow [1].

The aim of our study is to present a report of unilateral (right) absence of musculocutaneous nerve, and branches from median nerve after supplying all the muscles of front of arm continued as lateral cutaneous nerve of forearm.

Case Report

During routine dissection of upper limb involving pectoral region, axilla and front of arm of an approximately 70-year-

old female cadaver for 1st year MBBS students, the following unusual findings were encountered.

In right axilla, cords of brachial plexus were exposed after retracting pectoral muscles. MCN was found to be completely absent. The nerve to coracobrachialis was arising as a small branch directly from lateral root of median nerve. After that, the lateral root and medial root coming from either side of axillary artery joined to form MN proper in front of the artery and was seen passing between biceps brachii and brachialis muscles and ultimately crossed brachial artery to come on the medial side to appear in the cubital fossa. In the middle of arm, two branches were seen coming from lateral side of MN: one branch supplied biceps brachii; the other branch divided into 2, one supplied brachialis and other long branch continued as lateral cutaneous nerve of forearm supplying lateral side of skin of forearm (Figure 1). On further dissection, the distribution of median nerve was found to be normal in forearm and palm. No such variation was detected on left side.

Discussion

Study of anatomical variation involving nerves of brachial plexus is of great clinical significance. MCN and MN are two main nerves of anterior compartment of arm in which



Figure 1. Photograph of right axilla and front of arm showing absence of musculocutaneous nerve and variant branches of median nerve (MN) supplying coracobrachialis (CBR), biceps brachii (BB) and brachialis (BR) muscles and continued as lateral cutaneous nerve of the forearm (LCNF).

several variations have been reported [2–6]. It was observed that in cases where MCN are found to be absent, it is the unusual pattern of lateral root of MN, which takes over the role of MCN to supply the muscles of anterior compartment of arm, and ultimately continued as lateral cutaneous nerve of forearm. In some other studies, MN was found to be formed by additional roots other than usual lateral and medial roots [3, 7, 8]. However, in the present case, we did not get such type of finding.

According to Le Minor's description [9], there are five types of variations: Type 1: No communication between MN and MCN; Type 2: The fibers of the medial root of the MN pass through the MCN and join the MN in the middle of the arm; Type 3: The fibers of the lateral root of the MN pass through the MCN

and after some distance leave it to form the lateral root of the MN; Type 4: The MCN fibers join the lateral root of the MN and after some distance the MCN arise from the MN; Type 5: The MCN is absent and all the MCN fibers pass through lateral root of MN; fibers to the muscles supplied by MCN branch out directly from MN. In this type, the MCN does not pierce the coracobrachialis muscle. In our study, lateral root of MN substituted MCN indicating type 5 of Le Minor's variant.

Different variant communicating fibers between MN and MCN have also been described in various studies [4, 10, 11]. Based on the sites of communication between MCN and MN, another type of classification has been described by Venieratos and Anagnostopoulou. Type I: the communication was proximal to the entrance of the musculocutaneous nerve into coracobrachialis; Type II: the communication was distal to the muscle; Type III: Neither the communicating branch nor the nerve pierces coracobrachialis muscle [12]. But we did not come across such communication during our dissection.

Variations of nerves supplying upper limb can be explained on developmental ground of upper limb muscles. In lower vertebrates, only one trunk representing MN has been reported to be present for thoracic limb which can explain the absence of MCN and all anterior compartment muscular supply only by MN [5]. In human, upper limb muscles develop in 5th week of intrauterine life from paraxial mesoderm regulated by five Hox D gene expression and motor axons unite at the base of developing limb bud to form brachial plexus which then continue to grow under influence of several chemical modulators in a highly specific manner. Any deviation either in the signaling pathway between mesenchymal cells and developing neuronal growth or circulatory factors at the time of fission of cords of brachial plexus may result into possible variation of branching pattern of brachial plexus [2].

Considering the immense clinical importance, recognition and knowledge of such structural variation is really worthwhile as it could interfere during diagnosis of unusual presentation of clinical symptoms as well as while administering neuromuscular block in axillary region and also for surgical approach to shoulder and adjoining region of upper limb.

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