Case Report

Unilateral variation in the formation of median nerve

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Abstract

Present study is a case observed in the department of anatomy, Shri Bhausaheb Hire Government Medical College, Dhule. During routine cadaveric dissection of first M,B.B.S students in department of anatomy, a case of unilateral variation in the formation of median nerve was found in an adult male cadaver in left superior extremity. In the present case median nerve was formed by three roots. In addition to medial and lateral roots of median, the third root was a communicating branch from musculocutaneous nerve. Surgeons performing operations in axillary region should be aware of these variations. Damage proximal to the communicating nerve may lead to many sign and symptoms including sensory, motor, vasomotor and trophic changes. This type of variation may also lead to failure of anaesthetic nerve block of brachial plexus.

Keywords: Median nerve, Musculocutaneous nerve, variation.

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INTRODUCTION

The median and Musculocutaneous nerves are two principle nerves of the upper limb, former is giving major motor supply to flexor compartment of forearm and hand while later is a chief motor nerve of front of arm. The musculocutaneous nerve is the branch of lateral cord of brachial plexus. It descends downward and laterally to supply and pierce coracobrachialis muscle. Then it passes between biceps and brachialis muscles, supplies to both of them and continues as lateral cutaneous nerve of forearm.[1] The Median nerve is formed by lateral and medial roots from lateral and medial cords of brachial plexus respectively. It travels downward from axilla in front of axillary and brachial arteries. It provides motor supply to majority of muscles in front of forearm. It also supplies to thenar group and lateral two lumbricals.[1]

There are incidences of abnormal communications between these two nerves which can be explained embryologically. During fifth week of gestation, the mesenchyme of paraxial mesoderm differentiates to form fore limb muscles in human being[2]. The axonal process of spinal nerves descends downward and grow in different direction in the limb bud mesenchyme.[3,4]. During this process of development, these developing axon may grow in different route to form the main trunk. This complex differentiation may give rise multiple possibilities of formation of a nerve with variations.[4] In the present study one such variation is observed in the form of communication between median and musculocutaneous nerves leading to formation of median nerve by three roots. Clinically, these variety of abnormal nervous communications should be kept in mind while diagnosing the entrapment neuropathies. Injury to musculocutaneous nerve proximal to communicating branch between Musculocutaneous and Median nerves can cause weakness of flexors of forearm and thenar muscles.[5]

CASE REPORT

During routine cadaveric dissection of superior extremity for first M,B.B.S students in department of anatomy, Shri Bhausaheb Hire Government Medical College, Dhule, a case of unilateral Variation in the formation of median nerve was found on left superior extremity in an adult formalin fixed male cadaver. After taking routine

incisions of upper extremity, skin flaps were reflected laterally. Clavicular head of Pectoralis major was cut and reflected laterally to its insertion. Loose connective tissue along with fat and lymph nodes were removed from axillary region and its contents were exposed. Short head of biceps and corachobrachialis were identified as originating from coracoid process. Musculocutaneos nerve was identified as piercing corachobrachialis.

(Photograph-1)

Medial to biceps and corachobrachialis, Median nerve was formed in front of axillary artery. There were three roots of median nerve. Medial root of median from medial cord joined with lateral root of median from lateral cord to form nerve trunk. Third root was a communicating nerve from musculocutaneous nerve which travelled laterally and downward in front of axillary artery to join median nerve.

(Photograph-2)

Rest of the course of median as well as musculocutaneous nerve was normal on left side. No abnormality was detected in the formation and course of median nerve on right side.

Figure 1: Photograph 1 showing medial root of median (1), lateral root of median (2), communicating branch (3), median nerve(4) and musculocutaneous nerve (5).

Figure 2: Photograph 2 showing axillary artery (1) and communicating branch (2) between median and musculocutaneous nerves

DISCUSSION

Median nerve is formed by two roots from lateral (C5,6,7) and medial (C8,T1) cords of brachial plexus which embrace the third part of axillary artery and unite anterior or lateral to it. If the lateral root of median is small, the musculocutaneous nerve (C5, 6, 7) communicates with median nerve in the arm.[3] In the present study, we came across a variation in the formation of median nerve during routine cadaveric dissection of superior extremity. Median nerve was formed by three roots. Medial root of median from medial cord joined with lateral root of median from lateral cord to form nerve trunk. Third root was a communicating nerve from musculocutaneous nerve which travelled laterally and downward in front of axillary artery to join median nerve. (Diagram-1)

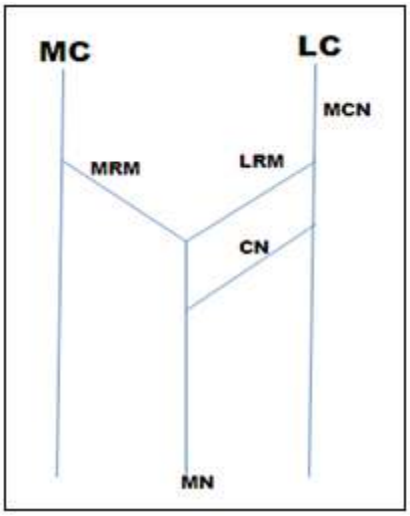

Figure 1: Diagram 1showing formation of median nerve (MN) by lateral root of median (LRM), medial root of median (MRM) and communicating branch (CN) from musculocutaneous nerve (MCN).

These kind of variations can be explained scientifically on the basis of embryology. At seventh week of intra uterine life, mesenchyme condense to form limb musculature near the base of the limb buds. The upper

limb buds are situated opposite to lower five cervical and upper two thoracic segments. After formation of limb bud, the mesenchyme is invaded by ventral primary rami from the spinal nerves. These ventral primary rami divide into dorsal and ventral nerves which innervate extensor and flexor group of muscles respectively. After this rearrangement of nerves, they reach the limb buds and develop contact with mesodermal condensation. For functional differentiation of muscle cells, these contact of nerve with muscle cell is necessary.[6] Ramon cajal (1980) first recognized that in the neuron, the growth cone i,e. expanded end of axon is main sensory organ. Growth cone can be described as an expanding region which is always active, continuously changes shape, extends or withdraws filopodia and lamellipodia to explore the local environment for a perfect surface suitable for extension. The processes get stabilized in the direction of future growth, after consolidation of growth cone its exploratory behavior again begins. This is continuous cycle. Growing axons during their differentiation precisely navigate. During the process, to reach their targets they acquire complex courses. In this process they develop functional contacts with suitable end organs. For growth of axon there is need of factors which are attractive or inhibitory. In response to permissive factors there is extension of axons while negative factors inhibit the progress. When the signals are coming from long range target region, the axons twist in the direction of target and make synapse with it. Concurrent firing of neighboring neurons that have found the correct target region may be entailed in eliciting discharge of factors, therefore reinforcing accurate connections. This mechanism is responsible for numerical communications between the neurons. Sometimes over or under expression of signals may lead to variation in formation, relation and distribution of nerves.[3] Many authors have classified the communication between the musculocutaneous and median nerves. Venieratos and Anagnostopoulou classified this communications into three types, based on its relationship with coracobrachialis muscle. In the type I communication is proximal while in type II it is distal to entry of musculocutaneous nerve in coracobrachialis. In type III musculocutaneous nerve and communicating branch, do not penetrate coracobrachialis at all[7]. According to its relationship with coracobrachialis muscle, Lukas and Aqueelah classified the communications between musculocutaneous and median nerves in four types, In the type I communication is proximal while in type II it is distal to entry of musculocutaneous nerve in coracobrachialis, in type III musculocutaneous nerve do not penetrate coracobrachialis, and in type IV both types I and II coexist.[8] According above mentioned classifications, in the present variation comes under type I category as communication between Musculocutaneous and Median nerves is proximal to entry of former in coracobrachialis muscle. There are several evidences of communicating branches between the musculocutaneous nerve and median nerve . The most common variation is presence of a communicating branch, originated from the musculocutaneous nerve and communicated to the median nerve, at lower third of arm[7]. These variations are generally unilateral[9]. Christina Deborah reported a case in which the median nerve was formed in the axilla by three roots, two lateral and one medial roots.[10] Eglseder and Goldman carried out a study in which 14% cases the median nerve was formed by two lateral roots[11]. Cerda A reported case with bilateral communicating branch between median and musculocutaneous nerves. This variation was associated with a communicating branch between lateral and medial root of median.[12] Chandrika teli *et al* reported a bilateral variant communication between median and musculocutaneous nerve in a cadaver.[13] Kalra S reported a case of unilateral variant communication between lateral and medial root of median along with three headed bicep brachi muscle.[14] Median nerve Formation by fusion of two lateral and one medial roots has been reported[15] Median nerve formation by three roots in both limbs, with two lateral and one medial roots has also been reported[16]. Presence of communicating branch between the Median and Musculocutaneous nerves are common and injury to lateral cord may lead to lesion of both median and musculocutaneous nerves. Clinically, these variety of abnormal nervous communications should be kept in mind while diagnosing the entrapment neuropathies. Injury to musculocutaneous nerve proximal to communicating branch between Musculocutaneous and Median nerves can cause weakness of flexors of forearm and thenar muscles[17]. This type of variation may lead to failure of anaesthetic nerve block of brachial plexus.[18] Surgeons performing operations in axillary region should be aware of these variations. Damage proximal to the communicating branch nerve may lead to many sign and symptoms including sensory, motor, vasomotor and trophic changes.[14] The communicating branch which crosses the axillary artery anteriorly , can compress it leading to ischemia.[19]

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