ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 9 | September - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

INTERCOSTOBRACHIAL NERVE-AN UNUSUAL COURSE AND INNERVATION PATTERN

Anatomy

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ABSTRACT

During routine cadaveric dissection, we observed bilateral absence of medial pectoral nerve and variation in innervation pattern of lateral cutaneous branch of 2nd and 3rd intercostal nerve. On the right side, the lateral cutaneous branch of 2nd intercostal nerve was mixed nerve having both sensory and motor component. The motor component supplied both pectoralis major and minor and sensory component supplied floor of axilla and the medial side of arm. On the left side 2nd intercostal nerve supplied both pectoralis major and minor. The floor of axilla and medial side of arm was supplied by 3rd intercostobrachial nerve. The knowledge of such variations is important, as an accidental injury of these nerves, may occur while performing axillary lymphadenectomy, radical mastectomy, breast augmentation surgeries which may lead to both sensory and motor deficit.

KEYWORDS

Medial Pectoral Nerve, 2nd Intercostal Nerve, 3rd Intercostal Nerve, Pectoralis Minor

INTRODUCTION:

The anatomical study of medial and lateral pectoral nerve and its supply to Pectoral major and minor is important as it plays vital role in the stabilization of pectoral girdle and contributes to the movements of the arm. The lateral pectoral nerve is larger than the medial, and arises from the lateral cord of brachial plexus (C5,6&7). It crosses anterior to the axillary artery and vein, pierces the clavipectoral fascia and supplies the deep surface of pectoralis major. It sends a branch to the medial pectoral nerve, forming a loop in front of the first part of the axillary artery to supply some fibres to pectoralis minor. The medial pectoral nerve is derived from medial cord of brachial plexus (C8&T1) and curves forwards between the axillary artery and vein. Anterior to the artery it joins a ramus of the lateral pectoral nerve, and enters the deep surface of pectoralis minor, which it supplies. Two or three branches pierce pectoralis minor and others may pass round its inferior border to end in pectoralis major. The lateral cutaneous branch of 2nd intercostal nerve i.e. intercostobrachial nerve pierces external intercostal muscle and serratus anterior and crosses axilla to supply skin of the floor of the axilla together with part of the upper medial aspect of the arm. Occasionally the lateral branch of the third intercostal nerve contributes to the supply of skin in the floor of the axilla.[1]

In the literature, reports on variations of medial and lateral pectoral nerves are available but reports on variation of intercostobrachial nerve are very rare. An unusual union between the medial pectoral nerve and the intercostobrachial nerve in an 87-year-old female was observed.[2] A unique case where there, pectoralis major and minor muscles were supplied by a large branch of intercostobrachial nerve along with duplication of the medial and lateral pectoral nerve has also been reported.[3] Although there are studies reporting variations in the branching and innervation pattern of lateral pectoral nerve, medial pectoral nerve and intercostobrachial nerve. The highlight of the current case study is unique branching pattern of the intercostobrachial nerve with the bilateral absence of medial pectoral nerve which has not been reported with the best of our knowledge earlier. The knowledge of such variations is important as accidental injury of these nerves, penetrating the substance of pectoral muscles, may occur while performing axillary lymphadenectomy, radical mastectomy, breast augmentation surgeries. As injury of these nerves may lead to sensory or motor deficit, the sound knowledge of such variations can prevent such iatrogenic injuries.

CASE REPORT:

During routine cadaveric dissection of the Upper limb in the Department of Anatomy, KGMU, Lucknow, India for undergraduate teaching we observed bilateral variation in the innervation of pattern of pectoral muscles and cutaneous supply of upper arm in a 65 year old male cadaver. The pectoral region and upper arm was dissected carefully to expose the pectoral muscles, medial and lateral pectoral nerves and intercostobrachial nerves. The surrounding structures were carefully delineated and the specimen was studied in detail and photographed were taken.

Lateral pectoral nerve pierced clavipectoral fascia and supplied pectoralis major on both side. The medial pectoral nerve was not found on either side. On the right side, intercostobrachial nerve split into two branches in the costal groove and both pierced external intercostal and serratus anterior muscle at single point. The upper branch then pierced pectoralis minor and supplied both pectoralis major and minor. The lower branch went to supply the medial side of upper arm (Fig.1). On the left side, the lateral branch of intercostobrachial nerve pierced the external intercostal and serratus anterior muscle and then entered pectoralis minor to supply both pectoral muscles. The lateral cutaneous branch of 3rd intercostal nerve emerged from the 3rd intercostal space and supplied the medial side of upper left arm (Fig. 2)

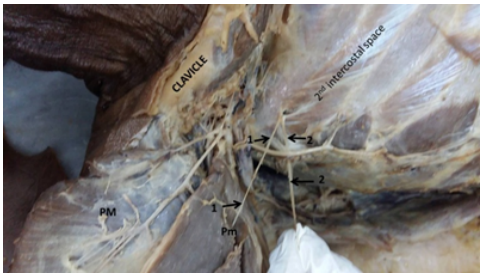

Figure1: Showing right side of pectoral region and upper arm. Intercostobrachial nerve split into two branches: 1-Upper branch of Intercostobrachial nerve, 2-Lower branch of Intercostobrachial nerve, PM-Pectoralis Major, Pm- Pectoralis minor.

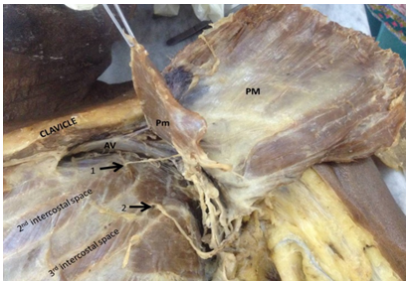

Figure 2: Showing left side of pectoral region and upper arm. 1-lateralcutaneous branch of 2nd intercostal nerve, 2- lateral cutaneous branch of 3rd intercostal nerve, PM-Pectoralis Major, Pm- Pectoralis minor, AV- Axillary vein.

DISCUSSION:

By the fifth week, the upper limb bud consists of mesenchymal core, derived from the parietal layer of lateral plate mesoderm opposite the lower five cervical and upper two thoracic segments which differentiate into muscle, skeletal elements and connective tissue. As soon as the bud forms, ventral primary rami from the appropriate spinal nerve penetrate into the mesenchyme. At first, each ventral ramus enters with dorsal and ventral branches in their respective divisions begin to unite to form large dorsal and ventral nerves. The spinal nerve not only play important role in differentiation and motor innervation of limb musculature but also provide sensory innervation for the dermatome. While the muscles are formed, the various muscle primordia fuse to form a particular muscle. In certain cases, some primordia disappear as a normal event of development. If there is failure in degeneration of such primordia, we might find accessory muscles and nerves piercing a muscle.[4,5]

In the literature, there are reports on variation of lateral and medial pectoral nerves but variations in innervation by intercostobrachial nerve are very rarely documented. The single medial pectoral nerve and a duplicated lateral pectoral nerve have been reported previously.[6] An unusual union between the medial pectoral nerve and intercostobrachial nerve in an 87-year-old female has also been reported.[7] Another case again reported in a 73-year-old Caucasian female where the intercostobrachial nerve gave an additional medial pectoral branch, which partially innervates the pectoralis minor muscle, as well as the abdominal head of pectoralis major muscle.[2] In another study it was noted that the intercostobrachial nerve penetrated pectoralis major and minor muscles in two separate cases and also supplied the skin of the arm.[8] Mehta et al.2012 observed that both medial pectoral nerve and third thoracic spinal nerve supplied the pectoralis minor muscle.[9] There was documentation of duplication of the medial and lateral pectoral nerves along with a muscular branch of intercostobrachial nerve to pectoralis major and minor muscles.[3] The current case is unique as bilateral absence of medial pectoral nerve and both pectoralis major and minor muscles were supplied by lateral pectoral nerve and a branch of intercostobrachial nerve. The sensory supply to the medial side of arm on the left side is from the lateral division of 3rd intercostobrachial nerve while on the right side is from lower lateral division of 2nd inter costobrachial nerve.

CONCLUSION:

Although there are previous reports on variations of innervation pattern of medial pectoral nerve and intercostobrachial nerve, we are reporting unusual situation where a branch of intercostobrachial nerve took the role of medial pectoral nerve in absence of medial pectoral nerve. In addition sensory supply to the floor of axilla and medial side of arm, on the right side was from 2nd intercostobrachial nerve and on the left side from 3rd intercostobrachial nerve. The knowledge of course, distribution and innervation pattern of lateral pectoral nerve, medial pectoral nerve and intercostobrachial nerve is important for plastic surgeon while raising medial pectoral nerve flaps.[10] During radical mastectomy or cosmetic breast surgeries, denervation of pectoralis major frequently occurs.[11] In 25% to 60% patients there will be neuropathic pain after breast cancer surgery which may be due to injury of these nerves.[12] Hence, a thorough knowledge of course, distribution and variations of all these nerves is quite important.

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