

Communication between radial nerve and medial cutaneous nerve of forearm

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ABSTRACT

Radial nerve is usually a branch of the posterior cord of the brachial plexus. It innervates triceps, anconeus, brachialis, brachioradialis, extensor carpi radialis longus muscles and gives the posterior cutaneous nerve of the arm, lower lateral cutaneous nerve of arm, posterior cutaneous nerve of forearm; without exhibiting any communication with the medial cutaneous nerve of forearm or any other nerve. We report communication between the radial nerve and medial cutaneous nerve of forearm on the left side in a 58-year-old male cadaver. The right sided structures were found to be normal. Neurosurgeons should keep such variations in mind while performing the surgeries of axilla and upper arm.

Key words: Medial cutaneous, nerve of forearm, radial nerve

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Introduction

Keeping in mind the medical and surgical aspects, the nerve supply of arm is very important. The brachial plexus is the network formed by the communication between the anterior rami of the fifth to eighth cervical nerve roots and first thoracic nerve root. Almost every muscle of the upper limb is supplied by nerves derived from the brachial plexus, as is most of its overlying skin. The radial nerve is a terminal branch of the posterior cord of the brachial plexus. It is the largest branch of the plexus, supplying majority of the posterior and extensor components of the arm and forearm. The medial cutaneous nerve of forearm arises from the medial cord of the brachial plexus, initially lying between the axillary artery and vein. A ramus breaches the deep fascia to supply the skin overlying biceps. Travelling distally, it lies medial to the brachial artery, and pierces the deep fascia at the midpoint of the upper arm adjacent to the basilic vein. Here it divides into two branches - the anterior branch passes anterior to the median cubital vein, lays anteromedially in the forearm and supplies skin to the wrist. The posterior branch has an oblique course anteriorly, lying medial to the basilic vein, becoming posterior distal to the medial epicondyle of the humerus to descend on the posteromedial border of the forearm towards the wrist; it supplies a smaller area of the posteromedial forearm.^[1]

Although communication between the nerves in the

arm are rare, communication between median nerve and musculocutaneous nerve is being described since the 19th century.^[2] Anatomical variations of peripheral nerves are important to medical personnel, especially to orthopedic surgeons, neurophysicians, physiotherapist and radiologists. Such comprehension is useful in nerve grafting and neurophysiologic evaluation to diagnose peripheral neuropathies. The present variation was observed during routine dissection at the Anatomy department of Medical College and Rural Hospital.

Case Report

In a 58-year-old male cadaver, the brachial plexus was exposed after excising pectoralis major and pectoralis minor muscles. Fat was cleared carefully to get a clear view of contain of the axilla. A communication between the radial and medial cutaneous nerves of forearm on left side was found [Figure 1]. The communicating nerve was found to be arising from the medial cutaneous nerve of forearm. The communicating nerve was seen crossing the third part of the axillary artery on its medial side and running downward backward, laterally, to join the radial nerve. This nerve was related medially with the axillary vein and laterally to the axillary artery and ulnar nerve. The dissection was continued to expose the entire brachial plexus from the origin and was found to be normal. Right sided structures were found to be normal.

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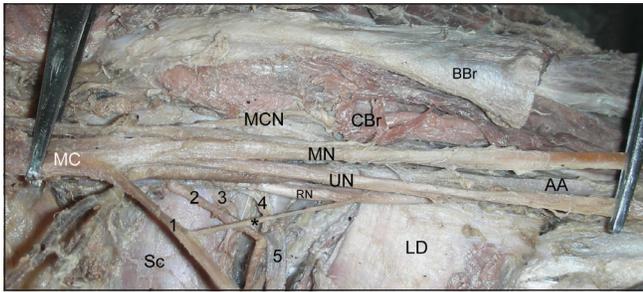


Figure 1: Communication between radial nerve and medial cutaneous nerve of forearm. (AA: Axillary artery; BBr: Biceps brachii; CBr: Coracobrachialis; LD: Latissimus dorsi; MC: Medial cord; MCN: Musculocutaneous nerve; MN: Median nerve; RN: Radial nerve; SC: Subscapularis muscle; UN: Ulnar nerve; *Communication between radial nerve and medial cutaneous nerve of forearm; 1: Medial cutaneous nerve of forearm; 2: Nerve to Latissimus dorsi; 3: Lower subscapular nerve; 5: Subscapular region)

Discussion

In the present case report, we report the communication between the radial and medial cutaneous nerves of forearm on the left side in an adult male cadaver. The right sided structures were found to be normal. The surgeon should keep such variations in mind as while performing operations of the region of axilla (specifically constructive shoulder arthroplasty and treating shoulder dislocations). The resultant muscles and/or cutaneous supply could, otherwise, get affected. Many researchers have reported communication of radial nerve with other nerves in axilla. Masahiro *et al.* report communication between the radial and axillary nerve in eight of the 602 brachial plexus.^[3] Marios *et al.* report the presence of communication between the radial and ulnar nerves on the dorsal surface of the hand.^[4] Bertha *et al.* report the presence of two roots of the radial nerve entrapping deep axillary arch.^[5] Das S and Paul S report an unusual communication between ulnar and medial cutaneous nerves of the forearm.^[6] However, development into the cutaneous branches has no distinct inclination. The existence of this variation, described in our case report, may be attributed to the random factors influencing the mechanism of formation of limb muscles and the peripheral nerves during embryonic life. In the context that ontogeny recapitulates phylogeny; it is possible that the variation seen in the current study is the result of developmental anomaly.

In human beings, forelimb muscles develop from the mesenchyme of paraxial mesoderm in the fifth week of intrauterine life.^[7] The radial extensor muscles of

the forearm have a different origin from other extensor muscles of the forearm. Regional expression of five Hox D (Hox D 1 to Hox D 5) genes is responsible for upper limb development.^[8] The motor axons arrive at the base of limb bud; they mix to form brachial plexus in upper limb. The growth cones of axons continue in the limb bud.^[7] The guidance of the developing axons is regulated by the expression of chemo-attractants and chemo-repulsant in highly coordinated sight specific fission. The tropic substances attract the correct growth cones or support the viability of the growth cones that happen to take the right path. Tropic substances include brain-derived neurotropic growth factor, *c-kit ligand*, *neutrin-1*, *neutrin-2* etc.^[9] Significant variations in nerve pattern may be result of altered signaling between mesenchymal cells and neuronal growth cones or circulatory factors at the time of fission of brachial plexus cords.

Clinical significance

Meticulous knowledge of possible variations of medial cutaneous nerve of the forearm and the radial nerve may provide valuable help in the management of traumatology of shoulder joint and arm; help the surgeon in circumventing iatrogenic damage during repair operations of these regions.

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