

Brief Report

Unusual nerve supply of biceps from ulnar nerve and median nerve and a third head of biceps

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ABSTRACT

Variations in branching pattern of the brachial plexus are common and have been reported by several investigators. Of the four main nerves traversing the arm, namely median, ulnar, radial and musculocutaneous, the ulnar and median nerve do not give any branches to muscles of the arm. Ulnar nerve after taking origin from medial cord of brachial plexus runs distally through axilla on medial side of axillary artery till middle of arm, where it pierces the medial intermuscular septum and enters the posterior compartment of arm. Ulnar nerve enters forearm between two heads of flexor carpi ulnaris from where it continues further. It supplies flexor carpi ulnaris, flexor digitorum profundus and several intrinsic muscles of hand. We recently observed dual supply of biceps muscle from ulnar and median nerves in arm. Musculocutaneous nerve was absent. Although communications between nerves in arm is rare, the communication between median nerve and musculocutaneous nerve were described from the 19th century which could explain innervation of biceps from median nerve. But no accurate description of ulnar nerve supplying biceps could be found in literature. Knowledge of anatomical variation of these nerves at level of upper arm is essential in light of the frequency with which surgery is performed to transfer nerve fascicles from ulnar nerve to biceps in case of brachial plexus injuries. We also observed third head of biceps, our aim is to describe the exact topography of this variation and to discuss its morphological.

KEY WORDS

Ulnar nerve, biceps, median nerve

INTRODUCTION

Variations in the branching pattern of the brachial plexus are common and have been reported by several investigators.^[1,2] Of the four main nerves traversing the arm, namely median, ulnar, radial and musculocutaneous, the ulnar and median nerve do not give any branches to the muscles of the arm.^[3] The ulnar nerve after taking origin from the medial cord of the brachial plexus, runs distally through the axilla on the medial side of the axillary artery till the middle of the

arm, where it pierces the medial intermuscular septum and enters the posterior compartment of the arm. The ulnar nerve enters the forearm between the two heads of the flexor carpi ulnaris from where it continues further to supply the flexor carpi ulnaris, flexor digitorum profundus and intrinsic muscles of the hand. We recently observed dual supply of biceps muscle from the ulnar and musculocutaneous nerves. No accurate description of the ulnar nerve supplying biceps could be found in the literature. Knowledge of anatomical variation of these nerves at the level of upper arm is essential in light of

the frequency with which surgery is performed to transfer nerve fascicles from ulnar nerve to biceps in case of brachial plexus injuries.

We also observed a third head of biceps which has also been reported by Nakatani *et al*.^[4] and El Naggar *et al*.^[5] Our aim is to describe the exact topography of this variation and to discuss its morphological and clinical significance.

CASE REPORT

The study was conducted in 100 cadavers dissected by the undergraduate students of All India Institute of Medical Sciences, New Delhi. The cadavers were embalmed using 4% formaldehyde solution and preserved in weak formalin solution. The brachial plexus was dissected according to the guidelines of Cunningham's manual. During dissection the variation from normal pattern was noted and photographed. The origin and course of the musculocutaneous and median nerve were seen to be different from normal. In the right upper limb of the female cadaver musculocutaneous nerve was absent. The biceps was supplied by the median nerve and ulnar nerve [Figure 1]. The ulnar nerve had its normal course of origin. It originated from medial cord of the brachial plexus. The ulnar nerve ran through the axilla medial to the axillary artery and between it and the axillary vein. It pierced the medial intermuscular septum and then gave a branch to biceps [Figure 1]. It entered the forearm between two heads of the flexor carpi ulnaris and continued its further course. We also observed third head of biceps brachii [Figure 2].

DISCUSSION

The upper limb dissected in the present case revealed absence of the musculocutaneous nerve and dual supply of biceps, that is from the median and ulnar nerve. Anastomosis between the median and musculocutaneous is by far the commonest and frequent of all variations that are observed among branches of brachial plexus.^[6] This could explain our finding that biceps was supplied by median nerve. But there has been no case reported in the literature, of the biceps being supplied by the ulnar nerve.

In cases of brachial plexus injury, nerve fascicles to biceps are most commonly transferred from the ulnar nerve.^[7] To restore biceps function many donor nerves have been described including intercostals nerves;^[8,9] spinal accessory nerve,^[10] phrenic nerve,^[11] medial pectoral nerve^[12] and portion of ulnar nerve.^[7,13] Among the many donor nerves, the ulnar nerve is nearest to the bicipital branch of the musculocutaneous nerve and direct transfer of one or more fascicles from ulnar to biceps does not waste any donor nerve fibres to sensory part of musculocutaneous as occurs in association with traditional nerve transfers involving intercostal nerves, spinal accessory nerves or phrenic nerves. Second, all of these other nerves are far from the target organ. Therefore the rate of recovery of biceps after transfer of one or more fascicles from the ulnar nerve is faster than after the more classical nerve transfer.^[8,14] Ulnar nerve is the best nerve to be used for transfer as it is the nearest nerve and morbidity after ulnar nerve transfer is the least. Thus once ulnar nerve is selected for nerve

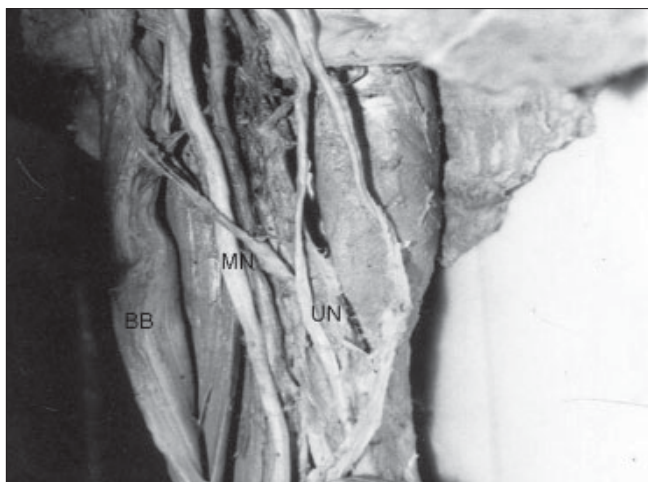


Figure 1: Photograph of the dissected right upper arm showing biceps (BB) being supplied by the ulnar nerve (UN) and median nerve (MN)

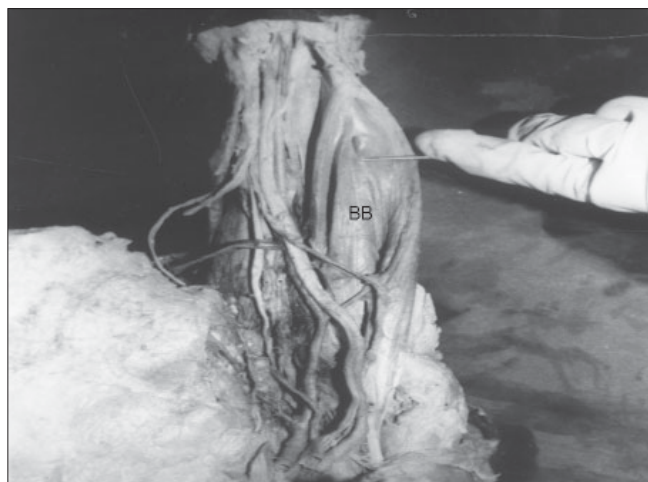


Figure 2: Photograph of the dissected right upper arm. Forceps is placed at the third head of the biceps (BB)

transfer the issue that needs to be addressed is the possibility of motor or sensory deficit in the hand after nerve transfer. Usually, the patient complains of some tingling or parasthesia in the little finger for few days after nerve transfer.^[7,13] These symptoms may be due to intraneural dissection rather than due to sectioning of motor fascicles, because they disappear quite rapidly. After longer follow-up grip strength is restored.^[15] Other authors have also reported the ulnar nerve to be the best for treatment of brachial plexus avulsion injuries with no ulnar nerve morbidity after transfer operations. Though transfer of ulnar nerve to biceps is relatively common for brachial plexus injuries, the variant, that of biceps being supplied by ulnar nerve, has not been reported in the literature. Thus if the frequency of this variant could be reported and also how common it is, it might help hand surgeons to decide the prognosis of brachial plexus injury.

Also, in the same arm we found a third head of biceps. The accessory head of biceps also adds an advantage by recovering some of the functions of the biceps muscle at the elbow joint. In the literature a single case report of the existence of accessory head of biceps is there,^[16-18] but no one has reported this finding coexisting with biceps being supplied by the median nerve and ulnar nerve.

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