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## STUDY OF VARIATIONS IN THE MUSCLES AND NERVES IN THE ARM

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### ABSTRACT

Aim to study the variations in the muscles and nerves in the arm. 100 upper limbs of 50 donated embalmed cadavers (45 males & 5 females) of age group ranging from 70 to 80 years were dissected in the department of Anatomy at K. J. Somaiya Medical College, Sion, Mumbai, INDIA. The variations in the muscles and nerves in the arm were observed in 2 specimens. The vascular pattern in the arm was also observed. The photographs of the variation of the formation of median nerve were taken for proper documentation. The variations in the muscles and nerves in the arm was observed in 2 specimens. The median nerve was found passing through supernumerary head of biceps brachii muscle. The short and long heads have their normal origin, supernumerary head had originated from the anteromedial surface of the superior part of the shaft of the humerus. The common tendon then got inserted into the posterior rough part of the radial tuberosity. The knowledge of such variations is important for anatomists and clinicians especially for plastic surgeons in flap surger.

**Key Words:-** Biceps brachii muscle, Supernumerary head of biceps brachii, Median nerve, Plastic surgeons.

### INTRODUCTION

The biceps brachii is a muscle with two heads in the flexor compartment of the arm. The short head arises from the tip of coracoid process along with the coracobrachialis and, the long head from the supraglenoid tubercle of scapula. The origin of long head is intracapsular and extra synovial. The tendon of the long head then descends on the humerus lying in the bicipital groove. The two heads of the muscle fuse in the middle of the arm forming a common tendon and inserts on the radial tuberosity and into the deep fascia on the medial aspect of the forearm by an aponeurotic band named bicipital aponeurosis (also called lacertus fibrosis). The muscle is the prime supinator of the forearm and a

powerful flexor of the elbow joint as well. It is also a weak flexor of the shoulder joint. The biceps brachii muscle is innervated by the musculocutaneous nerve (Williams, 1989; Snell, 2004). Many authors have documented variations of biceps brachii muscle (Kosugi et al., 1992). It is well known that a Supernumerary Head may extend from the superomedial part of the brachialis to the bicipital aponeurosis and medial side of the tendon in 10 % of the cases.

### MATERIALS AND METHODS

100 upper limbs of 50 donated embalmed cadavers (45 males & 5 females) of age group ranging from 70 to 80 years were dissected in the department of Anatomy at K. J. Somaiya Medical College, Sion, Mumbai, INDIA. The variations in the muscles and nerves in the arm were observed in 2 specimens. The vascular pattern in the arm was also observed. The photographs of

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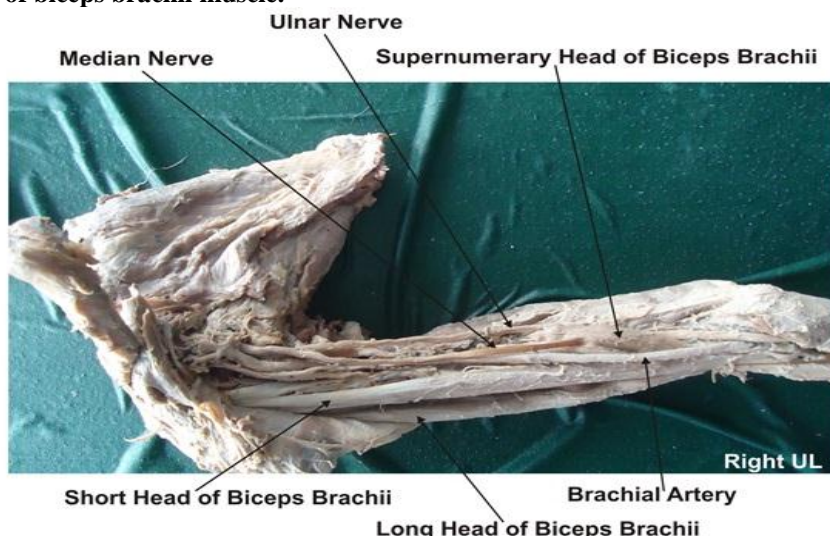
the variation of the formation of median nerve were taken for proper documentation.

### OBSERVATIONS

The variations in the muscles and nerves in the arm was observed in 2 specimens. The median nerve was found passing through supernumerary head of biceps brachii muscle. The short and long heads have their normal origin, supernumerary head had originated from the anteromedial surface of the superior part of the shaft of

the humerus. The common tendon then got inserted into the posterior rough part of the radial tuberosity. After piercing the accessory head the median nerve descends over the brachialis muscle and enters to the forearm passing between the two heads of pronator teres in its usual course. It was observed that the accessory head was innervated by the muscular branches of musculocutaneous nerve as the main two heads. The vascular supply of this third head was also the brachial artery.

**Figure showing the photographic presentation of the unusual course of the median nerve passing through supernumerary head of biceps brachii muscle.**



### DISCUSSION

The variations of the biceps brachii muscle are very common (Asvat et al., 1993). According to some authors the most frequent variations of biceps brachii was in the number of the bellies (Bergman et al., 2000). Supernumerary heads of the biceps brachii can be three-, four-, five or even seven headed biceps brachii (Swieter MG & Carmichael, 1980). Supernumerary third head of Biceps brachii is frequently reported in literature (Rodriguez-Niedenführ et al., 2003). Racial difference is found in the number of supernumerary heads i.e. in 8% of Chinese, 10% of European populations, 12% of African blacks, and 18% of Japanese population (Bergman et al., 1984). A high incidence of the third head has also been reported in South African Blacks (20.5%), as compared to the African Whites (8.3%). Though some of the authors claim that there were no clear racial differences, some of them mention significant differences between the populations (Nakatani et al., 1998). As found in literature it has been concluded that in the white race the incidence of the accessory heads of the biceps brachii muscle was

relatively rare, high in the yellow race and intermediate in Blacks (Khaledpour, 1985). No significant differences in the prevalence of variations has been reported between male and female or between left and right sides, but the variation was high unilaterally. Classification of the accessory heads is according to their location as superior, infero-medial, and infero-lateral humeral heads. The most commonly seen one was the infero-medial humeral head (9%) in which the accessory head was continuous with the insertion of the coracobrachialis muscle and closely related to medial intermuscular septum and brachialis muscle. According to the literature the three principal origins of the accessory head of biceps brachii muscle were the humeral shaft inferior to and common with the insertion area for the coracobrachialis muscle, a brachial origin where the muscle originated distally from the medial humeral shaft, adjacent to and in common with the brachialis muscle or a dual origin where the medial fibers originated from the short head of biceps brachii muscle and the lateral fibers from the deltoid fascia and the insertion area of this muscle. In another study, an

accessory head has been reported arising from the distal part of the pectoralis major muscle (Sargon et al., 2006). In another study an accessory head was seen originating from the anterior surface of the humerus distal to the crest of the lesser tubercle and was lying behind the long and short heads of biceps brachii. The accessory third head of biceps brachii observed in the present study arises from the anteromedial surface of humeral shaft just lateral to the insertion of coracobrachialis as it was in the study by many authors. It lies just between the bellies of biceps brachii and brachialis muscles and inserts into the posterior aspect of the common biceps tendon as reported in literature, but the dual origin of the accessory head in the present study should be emphasized; a few fibers from the medial side of the accessory head arise from the fascia of brachialis muscle. Those fibers have been seen crossing the median nerve before inserting into the common tendon of biceps brachii. In other words the median nerve was piercing the accessory head before entering into the forearm.

#### CLINICAL SIGNIFICANCE

The presence of accessory head of the muscle may cause compression on the median nerve since it passes between the fibers of the accessory head. So, information on such a variation is of importance for the differential diagnoses of the other compression causes such as enlarged veins or a fibrovascular band. Biceps brachii is without doubt a considerable component in plastic surgery but it is known that accessory heads of biceps brachii would be expandable and possibly has more

value in flap surgery rather than the two main heads. In the cases such as presented in this study the nerve or the vascular structure piercing the accessory head would probably cause difficulty during elevating or transferring the flaps.

#### CONCLUSION

The knowledge of such variations is important for anatomists and clinicians for preventing untoward complications during surgery especially for plastic surgeons in flap surgery.

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#### COMPETING INTERESTS

The author declares that he has no competing interest.

#### AUTHORS' CONTRIBUTIONS

SPS drafted the manuscript, performed the literature review & obtained the photograph for the study.

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