

## Case Report

# An accessory brachialis muscle associated with abnormal arrangement of structures in the cubital fossa

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## ABSTRACT

An unusual variation of brachialis muscle was reported in the left superior extremity of a 61 year old North Indian female cadaver during routine dissection classes. It was observed that an additional belly of the accessory brachialis muscle was originated from the anteromedial surface of the shaft along with the medial supracondylar ridge of the left humerus. This additional muscle belly merged with the fibres of pronator teres in the cubital fossa & finally inserted on the lateral surface of the shaft of the radius, which was supplied by the musculocutaneous nerve. In the upper arm, the median nerve lies along the lateral side of brachial artery but at the middle of the arm the nerve did not cross from lateral to medial side rather it continue along the lateral side of the brachial artery. In the lower part, they passed superficial to the brachialis muscle but lie deep to this additional slip of muscle. After separating the fibres of muscles it was found that median nerve was present just lateral to the brachial artery in the cubital fossa, its contents from medial to lateral side were brachial artery, median nerve, accessory brachialis muscle, biceps tendon and radial nerve just under cover of brachioradialis. The knowledge about these variations is helpful to physicians while facing the patients of compression neuropathy of median nerve. Before planning the surgery around the elbow joint these variations should be considered to minimize the complications. These information are also useful to interventional cardiologist while performing brachial catheterization & radiologist also who performed various radio diagnostic procedures & angiographic studies around the cubital fossa.

**Keywords:** Accessory slip of brachialis, Median nerve, Brachial artery, Cubital fossa, Variation

## INTRODUCTION

Brachialis is a powerful flexor of elbow joint, which is commonly known as workhorse of elbow joint. It is present in the forearm underneath the biceps brachii. It arises from the lower half of shaft of the humerus, starting on either side of the insertion of the deltoid muscle & from intermuscular septa also, more from the medial side than the lateral. It is separated from the lateral intermuscular septum by brachioradialis along with extensor carpi radialis longus. The fibres of brachialis converge over the anterior aspect of the elbow

joint into a thick & broad tendon which get attached to the ulnar tuberosity as well as on a rough impression present on the anterior aspect of the coronoid process of ulna. Sometimes it may be divided into two or more different parts which may be fused with pronator teres, biceps brachii or brachioradialis. It may send a tendinous slip to the bicipital aponeurosis or the radius.<sup>1</sup> The motor nerve supply of the muscle comes from the musculocutaneous while proprioceptive fibres derived from radial nerve. Brachial artery which is the continuation of third part of axillary artery is superficial throughout its entire course in the arm. It lies normally lateral to the median nerve and anterior to brachialis when it enters in the cubital fossa. It is separated from

median cubital vein by bicipital aponeurosis. In the upper arm, the median nerve lies along the lateral side of brachial artery while at the middle of the arm the nerve crosses lateral to medial side and then it continues below along the medial side of the brachial artery. In cubital fossa it rest on the brachialis muscle beneath the bicipital aponeurosis. Usually the sequence of structures from medial to lateral side in cubital fossa are median nerve, brachial artery, biceps tendon and radial nerve just under cover of brachioradialis. Many authors have reported about the presence of accessory slip of the brachialis muscle but simultaneous occurrence of accessory brachialis muscle along with lateral location of median nerve in respect to the brachial artery in the cubital fossa are very rarely reported in literature.

## CASE REPORT

During our routine dissection classes of first year MBBS students in the Department of Anatomy of Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India, we found some interesting variations in left superior extremity of a 61 year old North Indian female cadaver. This case was photographed by HTC Desire mobile phone and findings were noted.

An observation showed, some fleshy muscle fibers arises from distal part of the brachialis, crosses in front of the elbow joint and finally get inserted into the forearm. The origin of this additional slip of the accessory brachialis muscle was from the anteromedial surface of the shaft along with the medial supracondylar ridge of the left humerus. This additional muscle belly merged with the fibres of pronator teres in the cubital fossa & finally inserted on the lateral surface of the shaft of the radius. This accessory slip of brachialis was supplied by the musculocutaneous nerve. In the upper arm, the median nerve lies along the lateral side of brachial artery but at the middle of the arm the nerve did not crossed from lateral to medial side rather it continue along the lateral side of the brachial artery. In the lower part, they passed superficially to the brachialis muscle but lies deep to this additional slip of muscle. After separating the fibres of muscles it was found that median nerve was present just lateral to the brachial artery in the cubital fossa (Figure - 1), its contents from medial to lateral side were brachial artery, median nerve, accessory brachialis muscle, biceps tendon and radial nerve just under cover of brachioradialis. Below the cubital fossa, median nerve and brachial artery had normal course and distributions. The right upper extremity was completely normal.

## DISCUSSION

The presence of accessory slip of brachialis muscle in the arm is not very uncommon in literature. Many authors reported these but accessory brachialis muscle with lateral location of median nerve in respect to the brachial artery in the cubital fossa are very rarely reported. Only one such case of accessory brachialis muscle was

reported by Biswas S et al,<sup>2</sup> in the literature which was also associated with abnormal arrangements of structures in the cubital fossa i.e. from lateral to medial side sequence of structures were tendon of biceps brachii, median nerve and brachial artery. Krishnamurthy A et al,<sup>3</sup> observed a case of accessory brachialis muscle which was also originated from anteromedial surface of shaft as well as medial supracondylar ridge of humerus. This additional muscle belly also fused with the pronator teres before insertion and 6 cm above the medial epicondyle of humerus the median nerve pierced this belly and supplied them. They also reported a vascular anomaly in the same cadaver i.e. 17.5 cm above the medial epicondyle the brachial artery divided into radial & ulnar arteries. The median nerve along with the ulnar artery passed beneath this accessory slip of brachialis muscle.

Our findings were very much similar to that of Loukas et al,<sup>4</sup> who observed a case of an accessory brachialis muscle that originated from the medial side of the mid shaft of the humerus along with the medial intermuscular septum. It crossed both the brachial artery and the median nerve during its course. The distal part of the muscle splitted & surround the median nerve and after that it was inserted into the common tendon of the antebrachial flexor compartment muscles. Vadgaonkar R et al,<sup>5</sup> observed an accessory brachialis muscle which formed a fibro muscular tunnel after joining with the medial intermuscular septum in lower arm just 4 cm above the elbow joint. That tunnel contained the brachial artery as well as median nerve. The fibres of that accessory brachialis muscle descended downwards and laterally forming one of the content of the cubital fossa and entered in the forearm under cover of bicipital aponeurosis & finally joined with fibres of pronator teres and inserted on the middle part of lateral surface of radius. In this case they also reported absence of musculocutaneous nerve. So, all the brachial flexors along with this additional brachialis muscle was supplied by the median nerve. While Pai et al,<sup>6</sup> reported a case of accessory brachialis muscle that originated from the lateral aspect of brachialis as well as lateral intermuscular septum. During its course it crossed over the radial nerve and finally splitted into two slips. The medial slip covered the ulnar artery and merged with the deep fascia which covered the pronator teres while lateral slip was inserted on the fascia of the supinator. Bilecenoglu B et al,<sup>7</sup> reported seven possible sites of compression for the median nerve in upper extremity i.e. brachialis, bicipital aponeurosis, struther's ligament, pronator teres, vascular structures, flexor digitorum superficialis & accessory head of flexor pollicis longus (Gantzer's muscles). They also observed that the accessory tendon of the brachialis muscle compressed the median nerve above the elbow in 10% of cases. George & Nayak<sup>8</sup> also reported an abnormal slip of brachialis which originated from the distal one third of muscle and merged with the superficial flexors of forearm & medial aspect of the olecranon process of the ulna. During its course it passed over the median nerve & brachial artery and causing entrapment

of nerve as well as artery. In our case the median nerve and brachial artery were also prone to compression by the accessory slip of brachialis muscle. Paraskevas et al,<sup>9</sup> also observed a variant of brachialis muscle which arised from the medial border of brachialis and after passing over the brachial artery & the median nerve, merged with the medial intermuscular septum. That additional belly of muscle was also supplied by the musculocutaneous nerve.

In carotid and vertebral angiography, the percutaneous brachial approach is frequently used. Since median nerve present just adjacent to the brachial artery in the cubital

fossa although the complication rate of median nerve injury in these procedures are very low. The maximal prevalence recorded was 0.6% in brachial catheterization by brachial arteriotomy & arterial cut down.<sup>10</sup> In the present case in which median nerve lying lateral to the brachial artery in the cubital fossa, this increases the possibility of injury of median nerve during the different therapeutic maneuvers. Therefore, the physicians must know about these variations to prevent complications during the procedures & sonographically guided brachial arterial puncture should be considered.<sup>11</sup>



**Figure 1: Accessory slip of brachialis muscle along with median nerve which was present lateral to the brachial artery in the left cubital fossa.**

### **Embryological explanations**

The different variations in shape, size, and number of accessory bellies, sites of origins and insertions of muscles can be better understood on the basis of embryology. In human being, during the fifth week of intrauterine life the forelimb muscles develop from the mesenchyme of the para axial mesoderm. Embryologically, the myotomes of the somites are precursor of the musculoskeletal lineage. Several growth factors secreted by the cells in the proximal limb buds stimulate the myoblasts to migrate into developing limb buds. These upper limb buds lies just opposite to the lower five cervical & upper two thoracic segments. The different adhesion molecules that are expressed by these premuscle cells play an important role in the proper distribution of these growth factors throughout the limb. The muscle primordia which are present in different layers of arm, at a certain stage of development fuse to form a single muscle mass.<sup>12</sup> Any alteration in the structure of the myotome or the somite, or in the distribution of the different adhesion molecules which are present in the

premuscle cells may be a causative factor for the presence of the accessory belly of brachialis.

### **CONCLUSION**

The knowledge about these variations of accessory belly of brachialis associated with the lateral location of median nerve in respect to the brachial artery in the cubital fossa is helpful to physicians while facing the patients of compression neuropathy of median nerve. Before planning the orthopedics surgeries around the elbow joint these variations should be considered to minimize the complications. This information is also useful to interventional cardiologist while performing brachial catheterization & radiologist also who performed various radio diagnostic procedures & angiographic studies around the cubital fossa.

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