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STUDY OF VARIANT BRACHIALIS MUSCLE

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ABSTRACT

Aim to study the variant brachialis muscle. 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 variant brachialis muscle was observed in 10 specimen. All the upper limbs were thoroughly and meticulously dissected to note the variation of the brachialis muscle. The arterial pattern in the arm was also observed. The photographs of the variation of the brachialis muscle were taken for proper documentation. We found a variation in the insertion pattern of brachialis and entrapped median nerve and brachial artery due to the superficial position of the muscle, in relation to the neurovascular bundle. The brachialis was found to have an additional thick slip from the distal third of the muscle. The accessory slip partly merged with the origin of superficial flexors of the forearm and partly inserted to the medial aspect of olecranon process. The median nerve and brachial artery passed under this additional slip of brachialis. Knowledge of variation in the pattern of muscle insertion and possible neurovascular entrapment is important for orthopedic surgeons, plastic surgeons and physiotherapists. The abnormality reported here might result in neurovascular compression symptoms in upper limb and some mechanical advantages or disadvantage in the flexion of elbow joint.

Key Words:- Median Nerve, Brachialis Muscle, Brachial Artery, Entrapment.

INTRODUCTION

Brachialis muscle lies beneath the biceps brachii and arises from anteromedial and anterolateral surfaces of the lower half of the shaft of humerus. A few fibers take origin from lower part of spiral groove and medial intermuscular septum also. The broad muscle covers the anterior part of elbow joint and converges to form a flat tendon which is inserted into the anterior surface of coronoid process and tuberosity of ulna. The major part is supplied by musculocutaneous nerve and the small lateral part by radial nerve. Brachialis flexes the elbow joint. The brachial artery begins as a continuation of the axillary artery and is superficial throughout its course in the arm. When it enters the cubital fossa it lies anterior to brachialis and lateral to median nerve. At the cubital fossa it is crossed by the bicipital aponeurosis which separates the artery from the median cubital vein. The median nerve descends along the lateral side of the third part of axillary artery and proximal part of brachial artery. At the middle of the arm opposite the insertion of coracobrachialis the nerve crosses from lateral to medial, usually in front of the artery and then accompanies along the medial side of the brachial artery. It appears in the cubital fossa beneath the bicipital aponeurosis and rests on the brachialis. The nerve leaves the cubital fossa through a gap between the superficial and deep heads of pronator teres.

We saw variation of insertion of brachialis and course of median nerve and brachial artery in the right upper limb.

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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 variant brachialis muscle was observed in 10 specimens.

All the upper limbs were thoroughly and meticulously dissected to note the variation of the brachialis muscle. The arterial pattern in the arm was also observed. The photographs of the variation of the brachialis muscle were taken for proper documentation.

Observations: In 4 specimens from the distal third of brachialis muscle a few fleshy fibers diverged and merged with superficial flexors of the forearm after an oblique course. Some of the fibers were inserted to the medial aspect of olecranon process of ulna (Figure 1).

In 6 specimens from the distal third of brachialis muscle a few fleshy fibers diverged and merged with pronator teres muscle (Figure 2). The median nerve and brachial artery were found to be normal in the upper part of their course in the arm. In the lower one third, instead of passing superficial to brachialis, both of them passed deep to the accessory slip of brachialis. Rest of their course and relations were normal.

Figure 1. Showing photographic presentation of variant brachialis muscle inserted into the medial aspect of olecranon process of ulna.

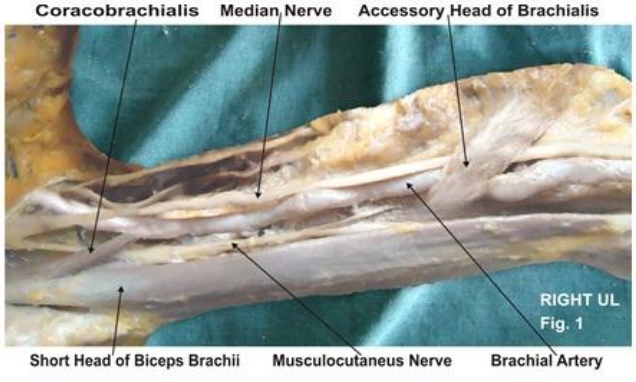
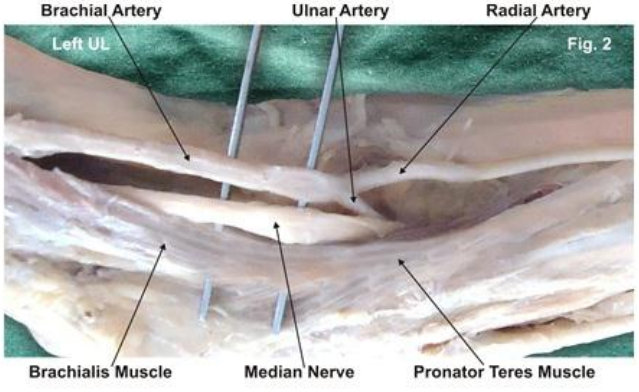


Figure 2. Showing photographic presentation of variant brachialis muscle merged with the pronator teres muscle.



DISCUSSION

Several cases on the presence of accessory brachialis muscle in the arm have been reported. Dharap observed an unusual muscle that passed obliquely from the middle of the humerus anterior to the median nerve and brachial artery, forming a tunnel for them, before inserting with the common origin of the forearm flexor muscles (Standring, 2008; Dharap, 1994). Loukas et al. reported an accessory brachialis muscle originating from mid shaft of humerus and medial intermuscular septum. During its course medially, toward the elbow, the AcBr crossed both the brachial artery and the median nerve. The distal tendon split to surround the median nerve before inserting into the brachialis tendon and the common tendon of the antebrachial flexor compartment muscles (Loukas *et al.*, 2006). Paraskevas et al. have described a variant muscle on the left side arising from the medial border of brachialis muscle and after bridging the median nerve, the brachial artery and vein; it was fused with the medial intermuscular septum. The muscle was innervated by musculocutaneous nerve (Paraskevas *et al.*, 2008). George and Nayak have described few fleshy fibers of brachialis arising from the distal third of the muscle and merging with superficial flexors of the forearm and to the medial aspect of olecranon process of ulna (George and Nayak, 2008). Rajanigandha et al. reported the occurrence of an accessory brachialis muscle that formed a fibro-muscular tunnel after blending with the medial intermuscular septum (Vadgaonkar *et al.*, 2008). Although causes no symptoms most of the time, such structures have the potential to compress the median nerve with consequent functional impairment. Such accessory muscle slips may also compress the underlying arteries viz., brachial artery in the present case.

Developmental Basis

Embryologically, the intrinsic muscles of the upper limb differentiate in situ, opposite the lower six cervical and upper two thoracic segments, from the limb bud mesenchyme of the lateral plate mesoderm. The formation of muscular elements in the limbs takes place shortly after the skeletal elements begin to take shape. At a

certain stage of development, the muscle primordia within the different layers of the arm fuse to form a single muscle mass (Arey, 1960). Langman stated, however, that some muscle primodia disappear through cell death despite the fact that cells within them have differentiated to the point of containing myofilaments (Langman, 1969). Failure of muscle primordia to disappear during embryologic development may account for the presence of the accessory muscular bands reported in this study.

Clinical Significance:

Compression of the median nerve and brachial artery by various types of structures leading to clinical neurovasculopathy has been reported (Gessini *et al.,* 1983; Nakatani *et al.,* 1998). On contraction, these muscles can compress the median and ulnar nerves, leading to further irritation of the nerves. Contraction of these muscles can compress both the brachial artery and brachial veins. Also, these muscles should not be mistaken for tumors on MR imaging of the arm.

CONCLUSION

The existence of such variation of the brachialis muscle should be kept in mind by the surgeons operating on patients with high median nerve palsy and brachial artery compression, by the orthopaedicians dealing with fracture of the humerus, the radiologists while doing radiodiagnostic procedures e.g.CT scan, MRI of the arm and angiographic studies and also by the physiotherapists. These accessory fibres of brachialis may be used as a transposition flap in deformities of infraclavicular and axillary areas and in postmastectomy reconstruction. The accessory fibres of brachialis may prove significant and lead to confusion during surgical procedures or cause compression of neurovascular structures.

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Competing Interests

The author declares that he has no competing interest.

Authors' contributions

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

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