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Original Research Article

Pattern study of union of two heads of biceps and its clinical significance

Jyoti Rohilla, Aarti Rohilla, Kamal Singh*, Suresh Kanta Rathee

Department of Anatomy, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences, Rohtak, Haryana, India

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***Correspondence:**
Dr. Kamal Singh,
E-mail: drkamalanatomy@gmail.com

ABSTRACT

Background: Biceps brachii derives its name from its two proximally attached parts or 'heads' that is known as long head and short head. Two tendons form elongated bellies that though closely applied get fused within 7cm or so above the elbow joint. These variations should be kept in mind during surgical and diagnostic procedures done by clinicians.
Methods: A total of 18 cadavers were dissected for two successive years during undergraduate and were observed for different patterns of fusion of two heads of biceps brachii.
Results: The present study showed that frequency of fusion of heads of biceps brachii in its upper one-third part was observed less commonly while it was frequently observed in its middle one-third part.
Conclusions: Variation in union of heads might be significant in causing compression of neurovascular structures because of their close relationship to the brachial artery and median nerve.

Keywords: Biceps brachii, Development, Variations

INTRODUCTION

Biceps brachii muscle is the flexor muscle of arm which crosses both shoulder and elbow joints. Biceps brachii derives its name from its two proximally attached parts or 'heads' that is known as long head and short head. Long head arises within the capsule as a long narrow tendon from supra-glenoid tubercle of scapula at the apex of the glenoid cavity where it is continuous with glenoid labrum. Short head arises by thick flattened tendon from tip of the coracoid process.

Two tendons form elongated bellies that though closely applied get fused within 7cm or so above the elbow joint. At this joint, they end in a flattened tendon which spirals before attaching to the rough posterior area of the radial tuberosity. The tendon can be split without difficulty as far as the tuberosity whence it can be confirmed that anterior and posterior layers receive fibres from short and long head respectively.

Biceps brachii is a powerful supinator especially in rapid and resisted movements. It flexes the elbow with the forearm supinated and also acts as flexor of shoulder joint to some extent. It is innervated by musculocutaneus nerve and vascularised by muscular branches of brachial and anterior circumflex humeral artery. Morphological variations are very commonly found in biceps brachii muscle. Presence of supernumerary fascicles of biceps brachii is known to be the most common anomaly. In approximately 10% of cases, a third head arises from the supero-medial part of brachialis and is attached to the bicipital aponeurosis and medial side of tendon of insertion.[1]

It is usually present behind the brachial artery but sometimes it divides into two slips which descend in front of and behind the artery. Union of two heads of biceps brachii is also variable. Sometimes short and long heads of biceps brachii were observed as unusually separated.[2]

Existence of an anomalous muscle in and around the elbow region may cause high nerve palsy and compression of brachial artery.[3] These variations should be kept in mind during surgical and diagnostic procedures done by clinicians.

METHODS

The present study has been done in the department of Anatomy at Rohtak. A total of 18 cadavers were dissected for two successive years during undergraduate teaching in the dissection hall. Different patterns of fusion of two heads of biceps brachii were noted in all the specimens. First the total length of biceps brachii were noted, then it was divided into three equal parts. Then the fusion of two heads of biceps brachii were observed in upper one-third, middle one-third and lower one-third part of total length of biceps brachii respectively. Measurements were noted by using measuring tape (Figure1).

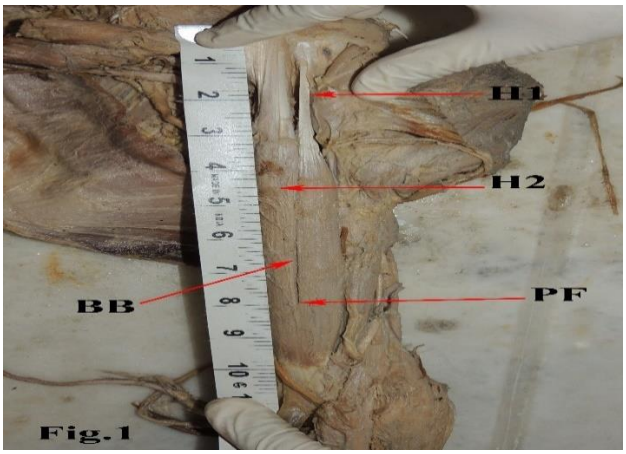

Figure 1: Anterior aspect of left arm region (dissected) showing biceps brachii muscle (BB) with its long head (H1), short head (H2) and their point of fusion (PF).

RESULTS

Out of total 18 specimens studied, eight (44%) were observed to have fusion of two heads of biceps brachii in its middle one-third part, seven (38.9%) of them in its lower one-third while only three (16%) of them were observed to get fused in its upper one-third. Frequency of fusion of heads of biceps brachii in its upper one-third part was observed less commonly while it was frequently observed in its middle one-third part (Table 1).

Table 1: Frequency of fusion of heads of biceps brachii (%).

Total specimens	Upper one-third	Middle one-third	Lower one-third
18	3/18 (16%)	8/18 (44%)	7/18 (38.9%)

DISCUSSION

Biceps brachii is one of the most variable muscles in the human body. In present study, we have look for different patterns of union of two heads of biceps brachii. Such patterns of fusion of biceps brachii were not documented previously in any literature as per best of our knowledge.

Musculocutaneus nerve passes between the two heads of biceps brachii. Intramuscular course of this nerve is a potential site of compression between two heads of biceps may lead to paraesthesia and weakness of its actions.[4]

Such variation in muscle may arise due to genetic composition, disturbed tissue interactions, inheritance from ancestors or may be due to error of embryological development or may be due to mal-union after any trauma or surgery.[5]

During development, limb muscles arise from cells derived from somatic mesoderm. Myogenic cells first form dorsal and ventral common muscle masses which later splits into primordia of individual muscles. Morphogenetic control of muscles resides in the associated connective tissue, rather than in the muscle cells themselves. Later stages in muscle development may involve cell death, the fusion of muscle primordial and the displacement of muscle primordial to other areas.[6] Different patterns of fusion of biceps may be due to fusion of muscle primordial at different level during development.

CONCLUSION

Knowledge of existence of variation of biceps brachii may become significant in preoperative diagnosis and during surgery of upper limbs. Variation in union of heads might be significant in causing compression of neurovascular structures because of their close relationship to the brachial artery and median nerve. Therefore, surgeons should be aware of these anatomical variations of biceps brachii while dealing with clinical cases. Scarcity of data available on this subject potentiates the researchers for further studies in this field.

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