



A CADAVERIC STUDY OF BICEPS BRACHII MUSCLE – CLINICAL AND EVOLUTIONARY CORRELATIONS

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ABSTRACT

Introduction: Knowledge of anatomical variations of the muscles is required during diagnosis with various imaging techniques. Literature mentions variations of additional heads of biceps brachii muscles.

Aim: To find incidence and variations of additional heads of biceps brachii muscle. Methodology – Meticulous dissection of 50 limbs for variation of origin, insertion and heads of biceps brachii muscle.

Results: We found 5 (10%) limbs showing accessory head of biceps. Bilateral variation was seen in one cadaver. One cadaver showed additional head taking origin from deltoid.

Conclusion: Role of evolution can be the cause of additional heads. Knowledge of the variations in the morphology of biceps brachii muscles is of immense importance in preoperative diagnosis and planned surgeries

Non-surgical treatment plays an important role in the treatment of primary liver cancer, which includes transcatheter arterial chemoembolization, percutaneous ablation therapy, radiation therapy, chemotherapy, etc

Key Words: Biceps brachii, Accessory head of biceps brachii, Additional head of biceps brachii, Supernumerary head of biceps brachii

INTRODUCTION

The biceps brachii muscle is described as arising by a long head originating from supraglenoid tubercle and a short head from the coracoid process. Both heads unite in the upper arm and insert through a common tendon into the bicipital tuberosity of the radius, with an aponeurosis (lacertus fibrosus). The biceps brachii muscle is one of the most variable in the human body in terms of morphology and number of heads.¹ Extra head of biceps may help in strong supination. Knowledge of anatomical variations is important during diagnosis using various imaging techniques. Variations like extra head of biceps have been documented in literature. Additional head, accessory head, third head, supernumerary head are terms used for the extra head of biceps brachii.

Observations

Methodology – Meticulous dissection of 50 upper limbs of cadavers fixed in 10% formalin was done. All upper limbs were observed for variations of origin, insertion and number of heads of biceps brachii muscle.

Results – Accessory head of biceps was seen in 5 limbs (10%). 4 bodies showed accessory head on right side. One body showed bilateral variation. 4 additional heads had humeral origin (fig 1,2) while one was taking origin from deltoid.(fig3) Musculocutaneous nerve was supplying the additional heads of biceps. No other variation was observed.

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Figure 1: Biceps Brachii with three heads.

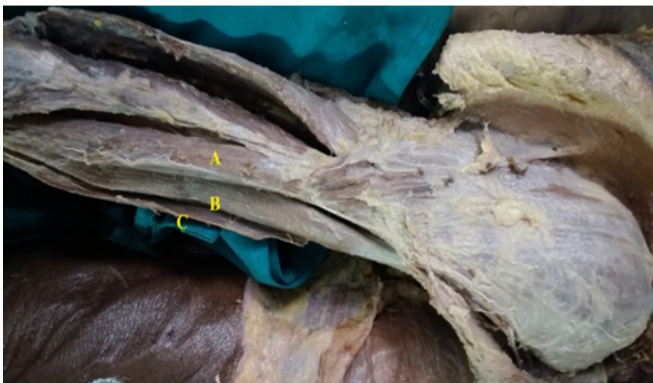


Figure 2: Biceps brachii (third head from deltoid).



Figure 3: Biceps brachii (third head from humerus).

Figure 1, 2, 3 Showing
 A – Additional head of Biceps brachii
 B- Long head of biceps brachii
 C- Short head of biceps brachii

DISCUSSION

In Gray's Anatomy – The anatomical basis of clinical practice, David Johnson describes biceps brachii as having two proximally attached parts or heads. Short head arising as a thick flattened tendon from coracoids process of scapula

and long head as a long narrow tendon from supraglenoid tubercle of scapula. He gives a 10% incidence of third head of biceps brachii muscle arising from superomedial part of brachialis. Additional head may also arise from lateral aspect of humerus and intertubercular sulcus. Musculocutaneous nerve (C5,6) innervates biceps brachii with separate branch for each head.²

In a MR Arthrography guided study Gheno et al¹ mentioned a 20% incidence of accessory head of biceps brachii muscle. In conclusion they state that anomalous muscles are one of the more frequent anatomic variations around the shoulder. Familiarity with these structures is important not only because of the clinical symptoms that they can cause by compressing the adjacent neurovascular bundles but also for correct identification at the time of imaging or surgery.

Pakhale et al³ gave evolutionary importance of biceps brachii. Lemures have a single headed biceps, apes and humans have muscle with two heads while gibbons have more than two heads for biceps brachii. They state a 3.75 % incidence of accessory head of biceps brachii. This incidence rate (3.75%) is less than our study (10%). Neurovascular compression is a possibility with this variation due to close proximity with additional head.

Avadhani et al⁴ say that accessory heads of biceps will be significant in producing strong flexion and supination. They give 16.66 % incidence of third head of biceps which is more than our study (10%) Close relationship of medial nerve and brachial artery with biceps brachii may lead to compression in case with additional heads.

In a study of biceps brachii in African population R.Ashwat et al⁵ report the incidence of third head as 20.5% in African black and 8.3% in African white population. They state presence of a additional head will help in stronger supination and flexion.

Bharambe et al⁶ give a 13.3% incidence of third head and state that variations of biceps brachii are a reflection of its late development in human phylum. Accessory heads can cause neurovascular compression, change the kinematics at the elbow joint and misinterpretation as muscle tears on MRI. Author classified the extra heads of biceps brachii as capsular, humeral or brachial heads.

Kumar H et al⁷ reported 3.3% incidence of third head of biceps brachii muscle which is less than reported in our study (10%). All cases showed third head having Humeral origin while our study showed 80% humeral origin for third head.

Balasbramanian⁸ mentions that with evolution humans have lost the long head of coracobrachialis. The third head of biceps brachii which arises in continuity with the insertion of coracobrachialis may represent a remnant of

long head of coracobrachialis the ancestral hominoid condition. Embryological studies described the variation as a portion of brachialis muscle where its distal insertion has been translocated from ulna to the radius. In population who show continuous, moderate physical activity the accessory head can be a specific functional adaptation.

Paudel PP and Bhattarai C⁹ in a study of Nepalese population found 12.5 % incidence of accessory head of biceps brachii. They state 100 % incidence of humeral heads exclusively in right hand.

Rodriguez et al¹⁰ gave a 15.4% incidence of accessory head of biceps brachii. Unilateral variation was seen in 81% cases. 70 % variations were seen on right side.

Cheema and Singla gave a very low incidence (2.3%) of additional head of biceps brachii in North Indian population. The variation was seen in left hands. Phylogenetically, additional head was explained as a remnant of a “tuberculo-septate” third head is present in hylobates but not in humans and anthropoids. Also considered a remnant of the long head of the coracobrachialis, an ancestral hominoid. Humeral head of biceps will contribute to strong pronation of forearm.¹¹

CONCLUSION

Additional head of Biceps has been documented by various researchers. Extra head should help in strong flexion and supination actions. A humeral head will also contribute to pronation. Evolutionary role of long head of coracobrachialis and part of brachialis shifting its insertion to radius can be the cause for additional head of biceps brachii. Compression of neurovascular bundle by the additional head should be considered. Knowledge of this variation is beneficial during preoperative diagnosis for planned elbow and shoulder surgeries.

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