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THE HIDDEN HEAD: A CASE REPORT OF AN ACCESSORY HEAD OF BICEPS BRACHII: ANATOMICAL AND CLINICAL SIGNIFICANCE

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ABSTRACT

Introduction: The biceps brachii muscle typically comprises two heads of origin, long and short head. However, anatomical variations such as the presence of an accessory head have been documented and may have clinical implications during surgical procedures, particularly in relation to neurovascular structures in the arm. **Methods:** During a routine cadaveric dissection of the left upper limb of a 58 years old male cadaver, an unusual muscular slip was observed. Detailed dissection was carried out to study the origin, insertion, course, and relation of this accessory head to adjacent neurovascular structures. **Results**: An accessory head of the biceps brachii was found originating from the anteromedial surface of the shaft of humerus, distal to the insertion of the coracobrachialis. It fused to form the common tendon of the muscle near the distal third of the arm and gets inserted into the radial tuberosity of the radius bone. The musculocutaneous nerve after exiting the coracobrachialis, it runs between the biceps brachii and brachialis muscles and continued its usual course without signs of entrapment or compression. **Discussion**: This case highlights the morphological variability of the biceps brachii muscle. The presence of an accessory head can alter the topographical anatomy of the arm, potentially affecting surgical approaches or neurovascular interventions. Awareness of such variations is essential to avoid intraoperative complications and to accurately interpret radiological images.

KEYWORDS: Biceps brachii, third head, variation, musculocutaneous nerve.

INTRODUCTION

The arm is composed of the anterior and posterior compartments. The biceps brachii, coracobrachialis and brachialis muscles, which flex the forearm and shoulder, are located in the anterior compartment. The triceps brachii muscle, which extends the forearm at elbow and shoulder, is located in the posterior compartment.[1]

The biceps brachii is a large, fusiform muscle. A prominent muscle in the anterior compartment of the arm. Its name comes from the fact that it has two heads of origin proximally, the long head and the short head. It has no attachment to the Humerus, which aid in forearm supination and elbow flexion.[2] However, anatomical variations are common and the existence of accessory head of the biceps brachii is one such well-documented variety, most often Humeral in origin.[3]

Origin - The short head arises from the lateral aspect of tip of coracoid process. The long head arises from the supraglenoid tubercle at the apex of glenoid cavity of scapula and glenoidal labrum within fibrous capsule of shoulder joint and the tendon passes through the bicipital groove thus enters to the front of the arm.[4]

Insertion - posterior rough part of radial tuberosity, tendon gives an extension medially called bicipital aponeurosis, a broad band which passes obliquely downwards & medially inserts into the deep fascia of the forearm.

Relations - The biceps brachii is overlapped above by pectoralis major and deltoid; below it is superficial, being covered only by the fascia and skin. It is anterior to brachialis, the musculocutaneous nerve and supinator.[5]

Nerve supply - innervated by musculocutaneous nerve.[6]
Blood supply - muscular branches of the brachial artery.[7]
Action - Strong supinator forearm, flexor of elbow and arm by ‘spurt action’ & flexes best in supinated posture. Its tendon gives off an extension called bicipital aponeurosis, which helps to draw the ulna medially during supination (turning the palm upward).[8]

The accessory head also referred as the third head, has been reported in various populations with varying incidence, approximately 10%.[9] Among all the variations of the Biceps brachii, the presence of the third head is the most prevalent. Muscle action may be predicted from knowledge of their attachment and this is of considerable importance in the diagnosis of

muscle paralysis - an essential element in determining the presence, site, degree of injury to nerves.[10]

While often asymptomatic and discovered incidentally during cadaveric dissection or imaging. Its presence may have clinical implications in surgical approaches to the arm, nerve entrapment syndromes or reconstructive procedures.

Understanding the morphology, origin, insertion and potential clinical relevance of this accessory head is essential for anatomists, surgeons, radiologists and physiotherapists. This article explores the anatomical background, prevalence, variations, and clinical importance of the third head of the biceps brachii muscle.

CASE REPORT

During the routine cadaveric dissection of upper limb in the department of Rachana Sharira at SDM college of Ayurveda, Udupi, Karnataka, we observed the coexistence of several bilateral variations, one of which was the bilateral presence of accessory head of Biceps brachii muscles.

The accessory head or third head, was a muscular band that measured 14 cm in length and 1.8 cm in width. It was originated from the anteromedial surface of the shaft of humerus, distal to the insertion of coracobrachialis muscle and upper medial to the origin of brachialis muscle in close relation to the medial intermuscular septum of the arm. This belly proceeded inferiorly and deeply with respect to the short head of the biceps brachii muscle; it ended up fusing itself to the common tendon of the Biceps Brachii, next to the bi-epicondylar line. Other heads were taking origin from the normal sites. Consequently, the three muscle heads had a common tendon of insertion on posterior rough part of radial tuberosity. The tendon gave an extension called bicipital aponeurosis which descended medially across the brachial artery to fuse with deep fascia of the anterior forearm. This was observed on both the upper limbs.

This accessory head was innervated by a separate branch of musculocutaneous nerve. The biceps brachii muscle along with its accessory head received its blood supply primarily from the brachial artery.

Fig. 1: Anterior view of right arm showing variation in the origin of Biceps Brachii muscle, Shows accessory origin of biceps brachi.

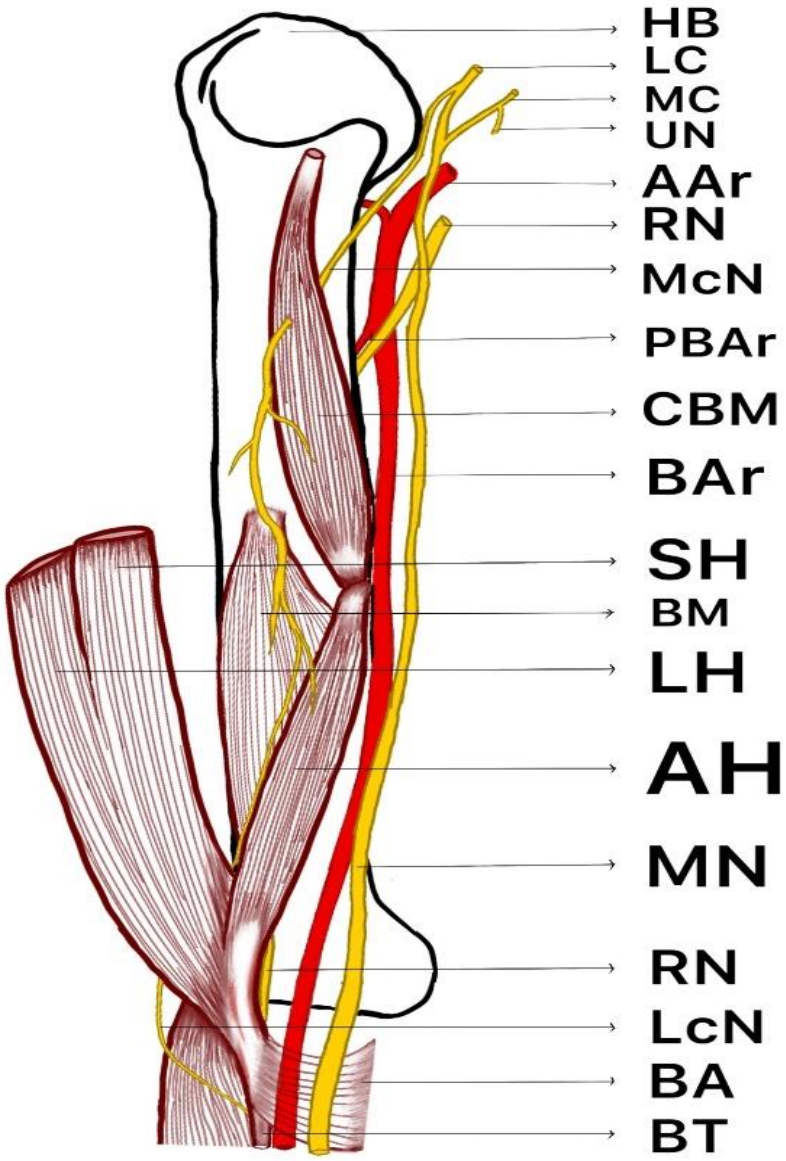

Fig. 2: Schematic drawing of Fig. 1.

DISCUSSION

The biceps brachii muscle, classically described as having two distinct heads - the long and the short. It is well - known for its role in forearm supination and elbow flexion. However, anatomical variations of this muscle are not uncommon, and among them, the presence of an accessory or third head is particularly intriguing. In the present case, we report a bilateral accessory head of the biceps brachii muscles, which was observed during routine cadaveric dissection.

Such variations may be more frequently observed in males and often occur unilaterally. The accessory head commonly originates from the humeral shaft, intermuscular septum, or near the insertion of the coracobrachialis muscle - consistent with the findings in our case.

From a developmental perspective, the presence of an additional head may result from incomplete muscle differentiation or abnormal myogenic fusion during embryogenesis. Mesoderm invades the upper limb bud during the fifth week of development in order to further condense into ventral and dorsal muscle masses. The Triceps and Biceps musculature is derived from the dorsal and ventral muscle masses of the upper limb bud respectively. During this stage of development, the muscle's accessory head might have developed.[11]

Clinically, although most cases are asymptomatic, the presence of an accessory head may have significant implications:

- It may compress nearby neurovascular structures, particularly the median nerve or brachial artery, leading to symptoms such as paraesthesia, weakness, or ischemic pain and also may lead to the variation of normal mechanical action.[12]
- It may pose challenges during surgical interventions, particularly in orthopaedic or vascular procedures involving the arm.
- From a diagnostic imaging standpoint, the unanticipated presence of an additional muscle head could lead to misinterpretation on MRI or ultrasound, if not recognized as a normal variant.[13]
- In sports medicine and traumatic injuries, knowledge of such variations becomes vital when dealing with muscle tears, nerve entrapments or reconstructive procedures. Additionally, its identification may help prevent iatrogenic injury during intramuscular injections, fasciotomies, or tendon repair surgeries.[14]
- Biomechanical contributions of accessory head of biceps brachii may enhance the strength, torque, improved muscle endurance and joint stability.

In our case, the accessory head merged with the main muscle belly proximal to the elbow joint, without any evidence of neurovascular entrapment. However, its robust size and independent origin highlight the potential for clinical relevance in different scenarios.

CONCLUSION

The identification of a third head of the biceps brachii, though rare, underscores the importance of recognizing anatomical variations in both academic and clinical settings. Surgeons, radiologists, and anatomists should remain aware of such muscular variants to avoid diagnostic errors and enhance surgical safety. Further population-based studies and clinical correlations are warranted to better understand the incidence, morphology, and functional impact of this unique anatomical variant.

ABBREVIATIONS

1. HB- Humerus Bone
2. LC- Lateral Cord
3. MC- Medial Cord
4. UN- Ulnar Nerve
5. McN- Musculocutaneous Nerve
6. LcN- Lateral cutaneous Nerve of forearm
7. RN- Radial Nerve
8. MN- Median Nerve
9. AAr- Axillary Artery
10. BAr- Brachial Artery
11. PBAr- Profunda Brachii Artery
12. BT- Biceps Tendon
13. BA- Bicipital Aponeurosis
14. CBM- Coracobrachialis Muscle
15. BM- Brachialis Muscle
16. SH- Short Head of biceps brachii
17. LH- Long Head of biceps brachii
18. AH- Accessory Head of biceps brachii

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