

A Study on the Accessory Head of the Biceps Brachii in Indians which was Done during Cadaver Dissections

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ABSTRACT

Introduction: The variations in the flexor muscles of the arm, especially the biceps brachii, are very common. The biceps brachii sometimes shows accessory or supernumerary heads which are attached to different parts of the arm. The presence of an accessory head may affect the branching course of the musculocutaneous nerve. This knowledge may be helpful during surgery of the upper limb. This study was undertaken to find out the incidence of these accessory or supernumerary heads of the biceps brachii in an Indian population from the north of Maharashtra.

Materials and method: The present study was carried out in

the Department of Anatomy, Dr. Ulhas Patil Medical College and Hospital, Jalgaon (Kh), (M.S.) The arms of 40 cadavers (right (Rt.)- 40, left (Lt.) -40) were carefully dissected to study the accessory heads of the biceps brachii.

Results: Out of the 80 arms, 3 had the accessory head of the biceps brachii, which were attached proximally to the humerus, just below the distal attachment of the coracobrachialis. We found a bilateral supernumerary head of the biceps brachii in one cadaver and a unilateral one in another one, which was on the right side. The findings of present study were compared with those of previous studies.

Key Words: Biceps brachii, Accessory head

INTRODUCTION

The variations in the flexor muscles of the arm, especially the biceps brachii are very common and these have been reported by several anatomists. The biceps brachii is a large fusiform muscle which derives its name from its 2 proximally attached parts or heads i.e the long head and the short head. The long head arises from the supraglenoid tubercle and the adjacent glenoidal labrum and the short head arises with the coracobrachialis from the tip of the coracoid process of the scapula. The 2 heads unite with each other commonly at about the junction of the middle and the lower thirds of the arm and these form the muscular belly. The biceps brachii is inserted by 2 parts, one through the rounded tendon to the posterior rough part of the tuberosity of the radius and the other part through the broad flattened bicipital aponeurosis (Lacertus fibrosus), from the medial border of the tendon which is merged with the deep fascia of the forearm, which in turn is attached to the posterior border of the ulna [1].

Sometimes, the biceps brachii shows accessory or supernumerary heads. The accessory heads may be one, 2 or 3 (tricipital or quadricipital). As many as 4 to 7 heads have been reported. These variations are found in about 9%-22% cadavers and these have been found to be present as accessory fascicles which arise from the deltoid, the pectoralis major, the capsule of the shoulder joint, the coracoid process, the intertubercular sulcus of the humerus and from one or more heads from the middle third of the humerus, which is commonest amongst all [1,2,3].

The incidence of the third head of the biceps brachii muscle varies according to the population; south African blacks -20.5%; south African whites -8.3%; Chinese -8%; European whites -10%; Japanese -18%; Turkish- 15% [4]; and Indians -7.1% [5], which is variable.

The accessory or the supernumerary head may be unilateral or bilateral [6]. The variations in this muscle usually does not cause symptoms, but the muscle anomalies can not be differentiated easily from the soft tissue tumours. There may be chances of high median nerve compression around the elbow joint. The brachial artery may get compressed around the elbow joint. This study was undertaken to find out the occurrence of the accessory head of the biceps brachii in Indians, especially in those from north Maharashtra, which will be helpful during surgery of the upper limb and it may affect the branching course of the musculocutaneous nerve. This knowledge on the incidence of the accessory (humeral) head of the biceps brachii will facilitate a preoperative diagnosis [7].

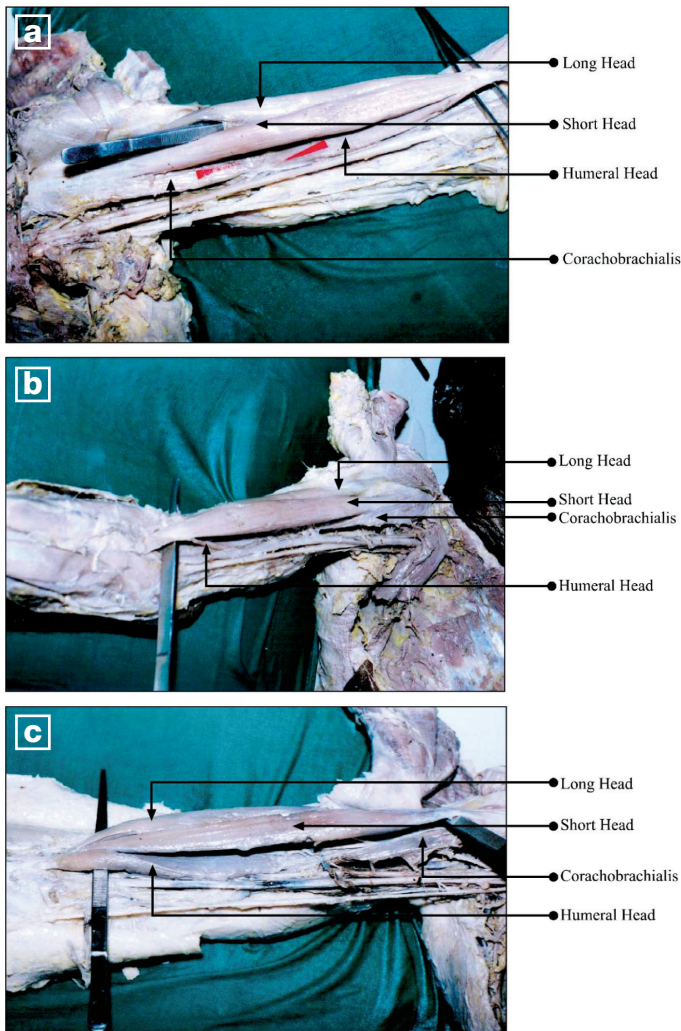
MATERIALS AND METHODS

The present study was carried out in the Department of Anatomy, Dr. Ulhas Patil Medical College and Hospital Jalgaon (Kh), (M.S). Both the upper limbs of 40 cadavers (Rt-40, Lt-40) were carefully dissected, irrespective of the age and the sex, for the study. A longitudinal incision was made on the anterior aspect of the arm, which extended from the level of the acromion process to a point which was about 2.5cm below the elbow joint. Horizontal incisions were made on both the proximal and the distal ends. The biceps muscle was carefully displayed to its full length by removing the subcutaneous fat and the fascia was separated. The muscle was exposed up to its insertion and the accessory heads were examined for their origin and courses at the lower end.

RESULT

Out of the 80 upper limbs which were studied, 3 (3.75%) had the accessory heads of the biceps brachii, among which two were in the same cadaver i.e., one was bilateral and one was unilateral.

The accessory heads of the biceps in all the 3 upper limbs were humeral heads. In one arm, it arose from the anteromedial aspect of the humerus, proximal to the origin of the brachialis muscle, just below the insertion of the coracobrachialis. In the other two arms, the muscle arose from the lower part of the anteromedial surface of the shaft of the humerus, along with the brachialis muscle. Out of the 3 arms, in 2 arms which were from the same cadaver, the accessory heads were thin and slender [Table/Fig-1a and b] and in one which was unilateral, the accessory head was thick and fleshy. [Table/Fig-1c].



[Table/Fig-1]: Accessory head of biceps brachii

In short, the biceps brachii accessory heads were 3.75% (3 out of 80), all were tricapital.

Right-2 i.e., 2.5% and Left-1 i.e., 1.25%

Total 3.75%

DISCUSSION

The accessory heads of the biceps brachii have been reported by many anatomists. The frequency of the accessory heads of the biceps brachii varies in different regions. This study was undertaken to find out the occurrence of the accessory head of the biceps brachii in Indians from north Maharashtra and to compare it with that which was found in previous studies.

In man, the biceps muscle helps in flexing the forearm for lifting or pulling an object. It is a variable muscle, probably due to its characters, having been acquired late in the human phylum. Originally, it was one headed, originating from the coracoid process and

merging inferiorly with the brachialis and the common tendon was attached to both the bones. It later acquired the second head from the base of the coracoid, the primary head being fused with the coracobrachialis.

Morphologically, the scapular head originates from the scapula [8]. In lemurs, usually there is only one head and in apes, two heads occur as in man, but in gibbons, the biceps is usually provided with the extra parts of the heads, which are 2 or 3 in number, according to Keith [9]. One of these extra heads appears in 10 % of the human bodies and occasionally a third and even a fourth head have been observed.

The humeral head of the biceps brachii is a portion of the brachialis muscle which is supplied by the musculocutaneous nerve, which was observed embryologically [3].

The incidence of this variation is 10% in whites [1] and it was found to be 18.8% in the south African population [2]. Such variations were found to be about 21.5% [10] and 9% among the blacks [11] and it was found to be 7.1% in Indians [5]. In our study, it is 3.75%, which also matched with the 3.7% of the Sri Lankan population [12]. In our study, the incidence of the Rt sided arm was 2.5% and that of the Lt sided arm was 1.25%. One cadaver had a bilateral accessory head of the biceps brachii, which had also been reported by some workers previously [13].

The accessory heads of the biceps brachii are common from the middle third of the humerus, that is the humeral head, though the accessory head may originate rarely from the pectoralis major [13], the coracoid process, the deltoid muscle, the articular capsule and the intertubercular sulcus [12]. In our study, all the 3 cases had the humeral head. In one arm, it arose from the anteromedial aspect of the humerus, proximal to the origin of the brachialis muscle, just below the insertion of the coracobrachialis. In the other two arms, the muscle arose from the lower part of the anteromedial surface of the shaft of the humerus along with the brachialis muscle.

Depending upon the origin and the location, the accessory heads of the biceps brachii have been classified as the superior inferomedial and the inferolateral humeral heads. Amongst all, the inferomedial head is the commonest variation, which was proved in our study also [14]. Embryologically, it has been stated that the third head of the biceps brachii arises from the brachialis muscle and that in such instances, its distal insertion has been translocated from the ulna to the radius [3].

The present cadaver study was an attempt which was made to highlight the accessory head of the biceps brachii. These types of variations are of academic as well as clinical interests and they are also helpful for the surgeons who perform surgeries of the arm, as the accessory heads may lead to variations in the course of the musculocutaneous nerve. The unilateral variation like the one that we got in one cadaver in the present study may cause an asymmetry between the two arms and this can easily be confused with tumours of the arm.

From the above discussion, we can conclude that the occurrence of the accessory head of the biceps brachii is rare in Indians. Further studies are required on large populations from all the regions of India.

REFERENCES

- [1] Williams PL, Warwick R, Dyson M, Bannister LH. Gray's Anatomy: The Anatomical Basis of Medicine And Surgery, 37th Ed. ELBS Churchill Livingstone.1989; 614-15.

- [2] Asvat R, Candler P, Sarmiento EE. A high incidence of the third head of the biceps brachii in south African populations. *J Anat.* 1993; 182:101-04.
- [3] Testut L, Latarjet A. Compendio de anatomia descriptiva. 22nd Ed. Buenos Aires. *Salvat*:1981.
- [4] Poudel PP, Bhattarai C. A study on the supernumerary heads of the biceps brachii muscle in the Nepalese. *Nepal Med Coll J* 2009; 11(2): 96-98.
- [5] Rai R, Ranade AV, Prabhu LV, Prakash MMP. The third head of the biceps brachii: A study from the Indian population. *Singapore Med J.* 2007; 48:929-31.
- [6] Vinnakota S, Bhattam N. A bilateral 3 headed biceps brachii – A case report. *People's Journal of Scientific Research.* 2011; 4(2): 53-54.
- [7] Nayak SR, Ashwin K, Madhan KSJ, Latha VP, Vasudha S, Merin MT. Four-headed biceps and triceps brachii muscles with neurovascular variations. *Anat Sci Intl.* 2008; 83:107-11.
- [8] Swieter MG, Carmichael SW. A bilateral three headed biceps brachii muscle. *Anatomischer Anzeiger.* 1980; 148(4):346-49.
- [9] Hootan EA. *Up from ape.* 2nd ed. New York: The Mac Millian Company; 1960.
- [10] Greig HW, Anson BJ, Budinger JM. Variations in the form and the attachment of the biceps brachii muscle. *Quart Bull Northw Univ Med Sch.* 1952; 26: 241-44.
- [11] Santo Neto H, Camalli JA, Andrade JC, Meciano Filho J, Marques MJ. The incidence of the third head of the biceps brachii in Brazilian whites and blacks. *Ann Anat.* 1998; 180:69-71.
- [12] Kumar H, Das S, Rath G. An anatomical insight into the third head of the biceps brachii muscle. *Bratisl Lek Listy.* 2008; 109:76-8.
- [13] Abu-Hijleh MF. A three-headed biceps brachii muscle which was associated with a duplicated musculocutaneous nerve. *Clin Anat.* 2005; 18:376-79.
- [14] Rodriguez-Niedenfuhr N, Vazque T, Choi D, Parkin I, Sanudo JR. The supernumerary humeral heads of the biceps brachii muscle revisited. *Clinical Anatomy.* 2003; 16(3):197-203.

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