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Unusual Presentation of Supernumerary Head of Biceps Brachii Muscle in South Indian Population

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Abstract: The biceps brachii muscle is one of the muscles with most frequent anatomical variant. The most frequent variation of the biceps brachii is its supernumerary heads. In our study, three headed biceps brachii muscle was observed in the dissected cadaver of a 53±2 year old Indian population. The supernumerary head is taking origin from the lower anterior part of the humerus on its medial side and from upper anterior part of humerus on its medial side. In our study, a communicating branch between musculocutaneous nerve and median nerve was also observed. Compared to the previous studies, the present study showed that the presence of third head of biceps brachii muscle is relatively rare in south Indian population. Anatomical variations of the heads of the biceps brachii muscle have importance in clinical syndromes and thus it is worthwhile and noteworthy to keep this in the minds of surgeons in preoperative diagnosis and during surgery of limbs.

Key words: Anatomical variation · Biceps brachii · Humeral head

INTRODUCTION

The biceps brachii muscle belongs to the flexor group of muscles in the arm. It is the only flexor of the arm crossing the shoulder joint as well as the elbow joint, there by acting on both the joints. It is characteristically described as a two-headed muscle that originates proximally by a long head and a short head [1]. The two heads of the biceps muscle take origin from the scapula and soon fuse distally, in the upper half of the arm to form a common tendon which inserts into the radial tuberosity and some aponeurotic fibres form the bicipital aponeurosis which merges with the deep fascia of the forearm [2, 3]. This muscle mainly contributes to flexion and supination of the forearm [4]. At the lower end, the muscle forms the flattened tendon which crosses the elbow ventrally, turns backwards and laterally to get inserted into the posterior rough part of the radial tuberosity. This mode of insertion makes biceps an efficient and important supinator of the forearm [5].

The biceps brachii muscle is one of the muscles with most frequent anatomical variant. Testut, [6, 7] described the biceps brachii muscle as one of the muscles with very frequent anatomic variations. The presence of any supernumerary head of the biceps brachii muscle might increase its kinematics. It is estimated that 9-22% of the people has a supernumerary head [8, 9].

In the literature, several authors reported the presence of third head that originated either from head of the humerus or tendon of pectoralis major or articular capsule of the humerus or from the humeral shaft. Gender and racial differences in the presence of third head of biceps presents was also reported by several authors [3, 10]. The present study was carried out to report the occurrence of the third head of biceps brachii in a sample of south Indian population to compare with other racial groups from previous studies. The presence of bicep heads may be important for academic and clinical purposes. The present study streamlines the importance of such variations.

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MATERIALS AND METHODS

The upper limbs of 40 cadavers were dissected and observed for variations in the origin and insertion of the biceps brachii muscle bilaterally. All the cadaveric materials were studied in the Department of Anatomy, Sri Venkateswara Medical College, Tirupati andhra Pradesh, India. A longitudinal incision was made at the anterior aspect of the arm, from the level of acromion process to a point about 2.5 cm below the elbow joint. A horizontal incision was made bilaterally in both proximal and distal ends of the longitudinal incision. The subcutaneous fat and fascia were separated to expose the biceps brachii muscle.

RESULTS

The variations in the number of heads of origin of biceps brachii were observed in two cadavers (5.0 %). In one male cadaver of fifty three years variant third head of biceps brachii muscle was originating from the lower anterior part of the humerus on its medial side and fused with the common bulk of the muscle before its termination into bicipital tendon and aponeurosis (Figure 1).

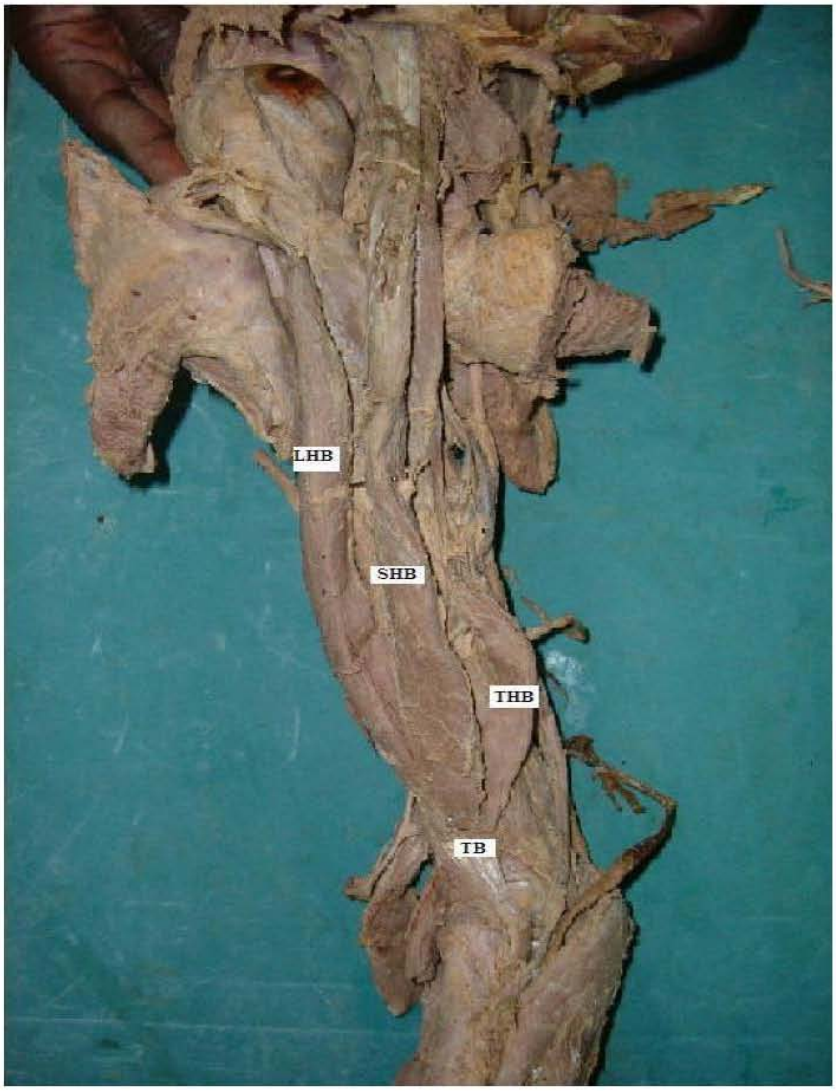

Fig. 1: Photograph of the dissected arm of male cadaver shows the bicep brachii with its three heads. The specimen shows the origin of the third head of biceps from the anteromedial aspect of the humeral shaft. (*LHB: long head of biceps; SHB: short head of biceps; THB: third head of biceps; TB: tendon of biceps*)

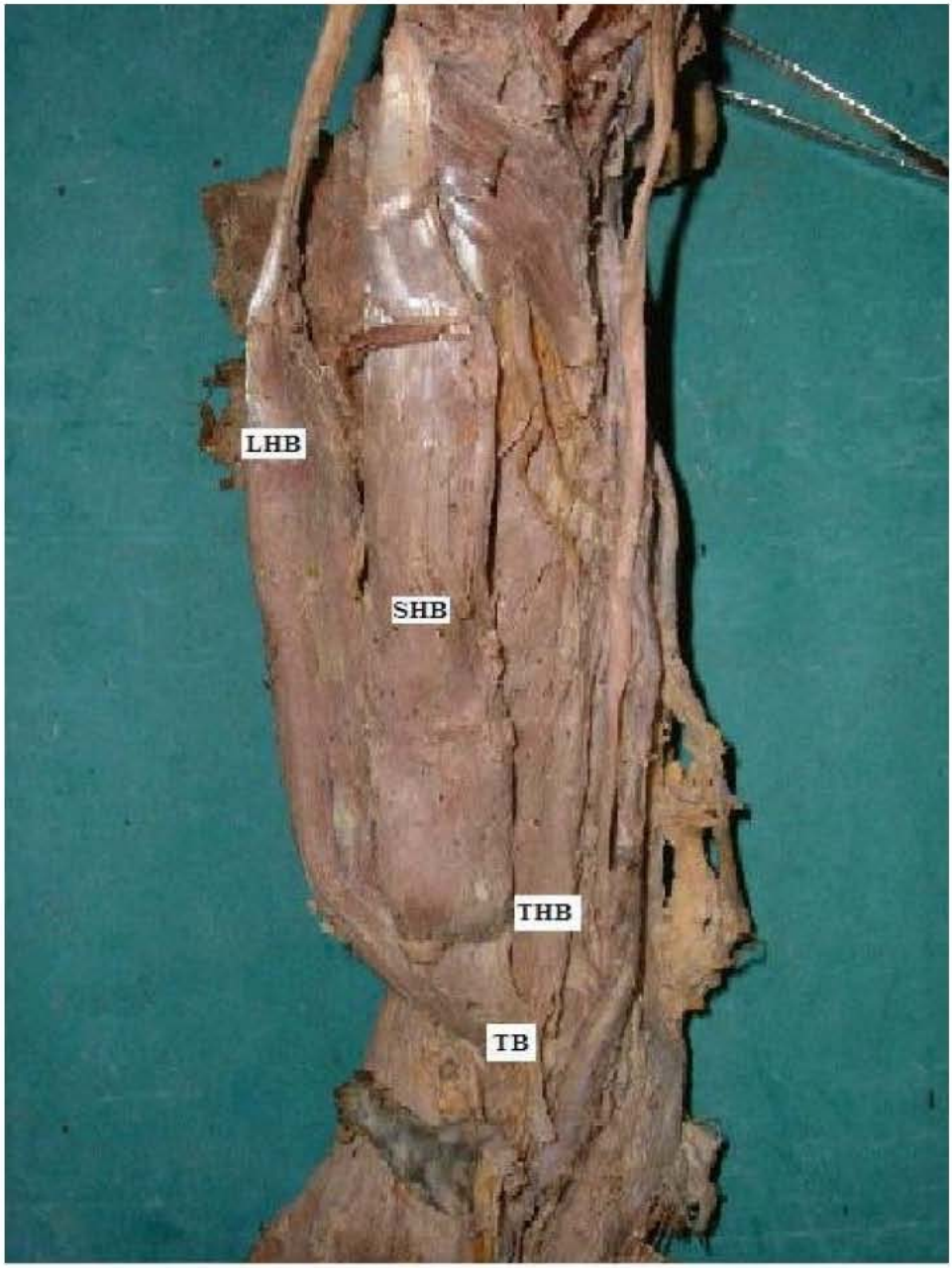

Fig. 2: Photograph of the dissected arm of male cadaver shows the bicep brachii with its three heads. The specimen shows the origin of the third head of biceps from the anteromedial aspect of the humeral shaft and it appears to be a portion of the brachialis muscle. (*LHB: long head of biceps; SHB: short head of biceps; THB: third head of biceps; TB: tendon of biceps*)

In another fifty years old male cadaver the third head was originating from upper anterior part of humerus on its medial side. The third head fused with the common bulk of the muscle before the origin of bicipital tendon (Figure 2). Some fibers of this supernumerary third head joined the brachilalis muscle. In the same cadaver a communicating branch between musculocutaneous nerve and median nerve were observed (Figure 3).

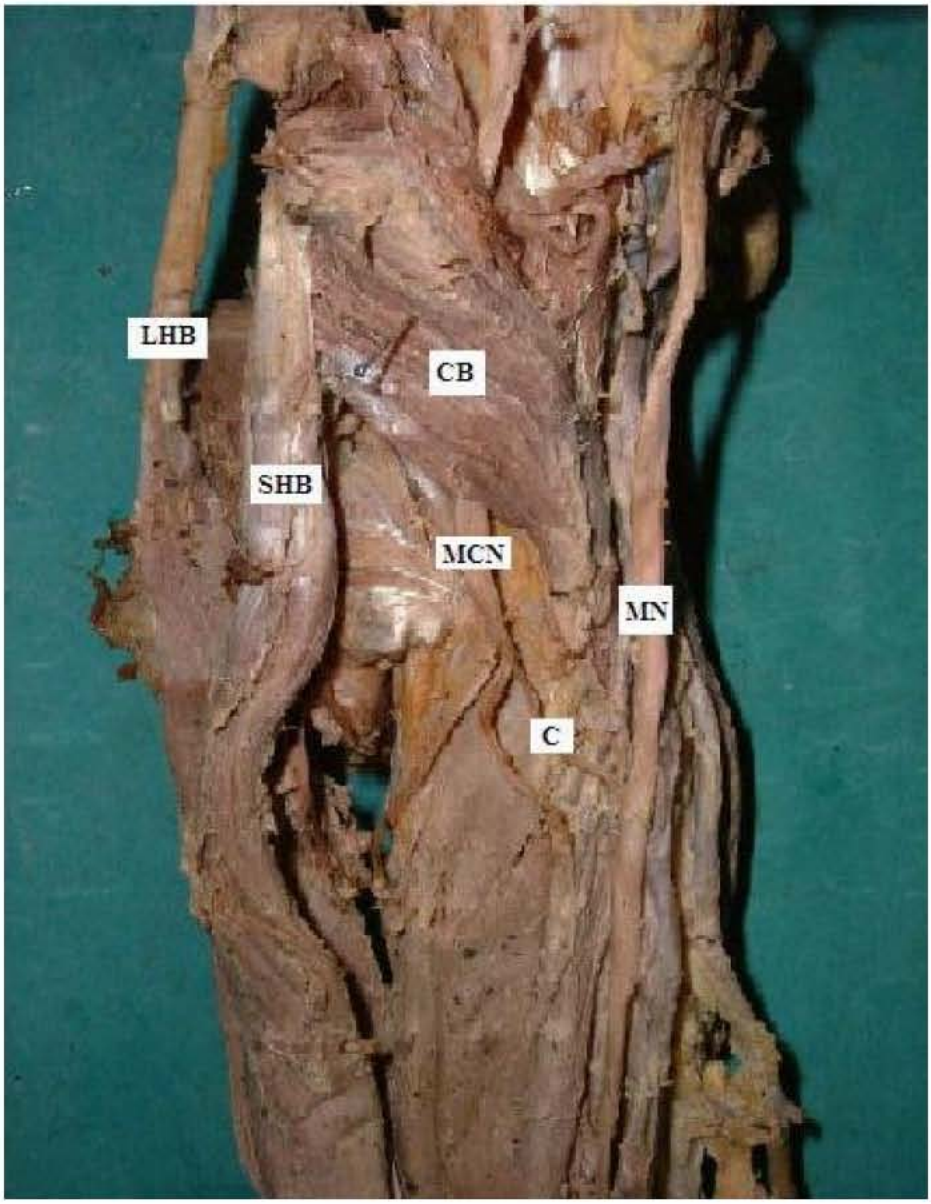

Fig. 3: Photograph of the dissected arm of male cadaver shows the bicep brachii with its three heads. The specimen shows the origin of the third head of biceps from the anteromedial aspect of the humeral shaft and observation of communicating branch from musculocutaneous nerve to median nerve (*LHB: long head of biceps; SHB: short head of biceps; THB: third head of biceps; CB: coracobrachialis; MCN: musculocutaneous nerve; C: communicating branch; MN: median nerve*)

DISCUSSION

Biceps brachii is presents extremely variable anatomy with special reference to number and morphology of its heads [11]. Supernumerary heads of the biceps brachii muscle have been widely studied regarding their origin, insertion, size, innervation and racial differences [9, 12]. They have been described as part of either a three, four, or five headed biceps brachii muscle [2, 4, 13, 14]. It has been reported that in 10% cases the third head of biceps may arise from the superomedial part of the brachialis and is attached to bicipital aponeurosis and medial side of tendon insertion [15]. It usually lies behind the brachial artery, but it may consist of two slips, which descend in

front of and behind the artery. Often absence of entire muscle or one of its heads and variations of the insertions seem to be uncommon, supernumerary heads of the biceps brachii are relatively frequent [3, 16].

The percentage incidence of third head of biceps brachii reported in different population varies with Chinese 8%, European white 10%, African black 12%, Japanese 18%, South African black 20.55%, South African whites 8.35% and in Colombians 37.5% [12, 16]. Third head of biceps brachii was rare in whites and relatively high among blacks and found to have a variant incidence of 31.2% [4]. In our study 13.3% (two of 15) of male cadavers were found to have the third head of biceps. Recently Rodriguez *et al*. [3] observed the presence of a third head in 23 of 175 (13.1%) cadavers or in 27 of 350 (7.7%) arms. The infero-medial humeral head was observed in 31 of 350 (9%) arms and was therefore the most common variation. The superior humeral head was observed in five (1.5%). The infero-lateral humeral head was the least common variation, observed only in one (0.3%) of 350 arms. In the present study, the supernumerary head corresponds to the infero-lateral type and it is a very rare variation originating from the tendon of deltoid muscle. Kopuz *et al*. [12] and Abu Hijleh, [2] used a different way of describing the attachment of the third head of biceps brachii. According to them it frequently arises from the anterior surface and antero medial surface of humerus distal to the insertion of coracobrachialis, which are similar to our results. Schoenleber and Spinner, [17] found that supernumerary head of the biceps brachii and long head originated from the deltoid muscle itself.

The presence of supernumerary heads of the biceps brachii muscle has been associated with variations of the musculocutaneous nerve [11]. The musculocutaneous nerve or its connection with the median nerve usually passed deep to the supernumerary head but may also pass superficial to it or have no relationship to it at all [6]. Besides, there was no variation in the origin and distribution of the musculocutaneous nerve, a supernumerary head covered to the customary long head, as observed in Baris *et al*. [18]. Hyrtl, [19] who suggested that the presence of supernumerary medial heads was due to the musculocutaneous nerve piercing the brachialis muscle and producing a supernumerary separate head. Compared to the previous studies the present study showed that the presence of third head of biceps brachii muscle is relatively rare in south Indian population. The fused higher origin of brachioradialis with brachialis and median head of triceps differ from previous reports. The third head of biceps brachii observed in present study may provide increased power of flexion and supination component. The fused higher origin of brachioradialis may also form the basis for compression neuropathy of median nerve and vascular compression symptoms due to entrapment of brachial artery. El-Naggar and Zahir [20] described that a two bellies of the coracobrachialis muscle associated with a third head of the biceps brachii muscle, although the coracobrachialis muscle was found to have a normal origin, short head of the biceps brachii muscle had separate bellies. If the supernumerary head is relatively large, it may provide additional strength to the biceps brachii. Since this supernumerary head is taking origin from the tendon of deltoid it may have some contribution to the action of deltoid along with biceps brachii muscle [21]. The innervation and vascularisation to the third head of the biceps brachii agrees with normal embryologic development of the related dermatomes and myotomes as reported by Asvat *et al*. [16]. Supernumerary heads may confuse surgeons during shoulder operations or cause compression of neurovascular structures. Anatomical variations of the heads of the biceps brachii muscle have importance in clinical syndromes and thus it is note worthy to keep this in the minds of surgeons in preoperative diagnosis and during surgery of the upper limbs.

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