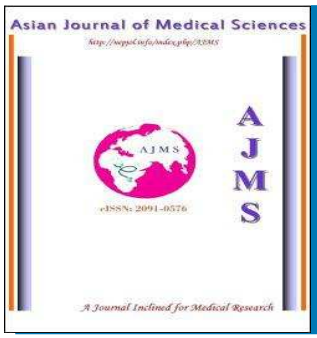

UNILATERAL THIRD HEAD OF BICEPS BRACHII WITH ASSOCIATED NEUROVASCULAR VARIANTS IN BOTH THE UPPER LIMBS OF A SINGLE CADAVER

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"Multiple arterial, neural and muscular variants in both the upper extremities of a single cadaver are quite rare observations; the knowledge of such variations can be applied in interventional and surgical procedures. Presence of additional head of biceps brachii has added value in plastic and reconstructive surgeries."

ABSTRACT

During routine undergraduate dissection in the upper extremities of a 65 years old male cadaver in the department of Anatomy at Dr. PSIMS & RF, coexistence of muscular and neurovascular variants were identified .Muscular variations included presence of additional head(third) of biceps brachii in the left arm ,accompanied with medially positioned median nerve in relation to brachial artery bilaterally . Teres minor muscle was not identified and the origin of long head of triceps brachii extended upto the lateral border of scapula on the left side. Both the medial cutaneous nerves of arm and forearm arouse from a single trunk bilaterally. In the right limb the axillary artery showed only four branches instead of six branches, with common trunk for thoraco-acromial and lateral thoracic artery and common trunk for subscapular and posterior circumflex humeral artery. Knowledge of coexistence of these variations would of profound importance surgically and clinically, especially in limb injuries and surgical repairs.

Key Words: Biceps brachii, Median nerve, Axillary artery, Neurovascular variants.

INTRODUCTION

Anatomic muscular and neurovascular variations have been reported individually in literature, but a coexistence of all these variations in a single cadaver in both the upper extremities are relatively rare findings. Presence of third head of biceps brachii has been subject of study for many authors, but a combination of neurovascular variants along with third head of biceps brachii is less documented. Knowledge of these anatomic variations has both surgical and clinical implications, especially while dealing with injuries and surgical procedures in the upper limbs.

CASE REPORT

During routine dissection studies on a 65 years old male cadaver preserved by injection of formalin-based preservative, author encountered variations in both the upper extremities which are as follows.

Left side observations:

An additional head of biceps brachii along with the short and long head was observed in the anterior compartment of the arm.The third head originated from the anterio-medial surface of middle of shaft of humerus, just inferior to the insertion of coracobrachialis which was comparatively very slender to that of opposite side. The additional head was attached by accessory muscle fascicles to the main muscle belly formed by the long and short heads and the main muscle continued as the bicipital aponeurosis which inturn blended with the deep fascia of the forearm. Musculocutaneous nerve pierced and supplied the slender coracobrachialis, and later supplied the two heads of biceps and a separate branch supplied the additional head. The nerve continued between the additional head and the brachialis supplying the latter and continued as lateral cutaneous nerve of forearm. Other muscular variations included absence of teres minor muscle with only a large teres major and subscapularis forming boundaries of spaces on the back of arm. The origin of long head of triceps brachii extended from infraglenoid tubercle on to the lateral border of the scapula, giving aponeurotic appearance.

Right side observations:

The axillary artery had four branches, with common trunk for lateral thoracic artery and thoraco-acromial artery arising from the second part and a common trunk for subscapular artery and the posterior circumflex humeral artery arising from third part of axillary artery (Fig 3). The contribution for the formation of median nerve from the lateral cord was relatively smaller compared to the medial root from the medial cord (Fig 3).

Bilaterally median nerve was related medially throughout its course to the brachial artery without crossing it from lateral to medial side (Fig 2&3).

Bilaterally there was common trunk for medial cutaneous nerve of arm and forearm (Fig 2&3).

DISCUSSION

According to previous studies done in other countries, the presence of third head of biceps brachii was observed to be 8% in Chinese, 10%in white Europeans,12% in black Africans, 18% in Japanese, 20.5% in South African,20% in Brazilian whites,9% in Brazilian blacks and merely 2% in Indian population.[1] Thus, the occurrence of third head of biceps brachii in the Indian population is rare. In the present case the third head of biceps arose from the anterio-medial surface of shaft of humerus which similar to the observations of Asvat et al, Kopuz et al, Kosugi et al and Amudha Govindarajan et al. [2,3] According to Rodriguez-Niedenfuhr et al the accessory bicipital head in the present case corresponds to the inferiomedial type.[4] It also took part in formation of bicipital aponeurosis and was supplied by separate branch from musculocutaneous nerve, which is similar to the findings of Amudha Govindharajan et al.[3] Embryological observations by Testut described this variation of the third head of biceps brachii as a portion of the brachialis muscle supplied by musculocutaneous nerve, in which its distal insertion has been translocated from the ulna to the radius.[5] Literature on absence of muscles is less reviewed. In present case there was absence of Teres minor muscle and the origin of long head of triceps extended on to the lateral border of scapula. According to Mori, Teres minor may be absent in 4% of individuals. Teres minor may fuse with infraspinatus in 20% of cases

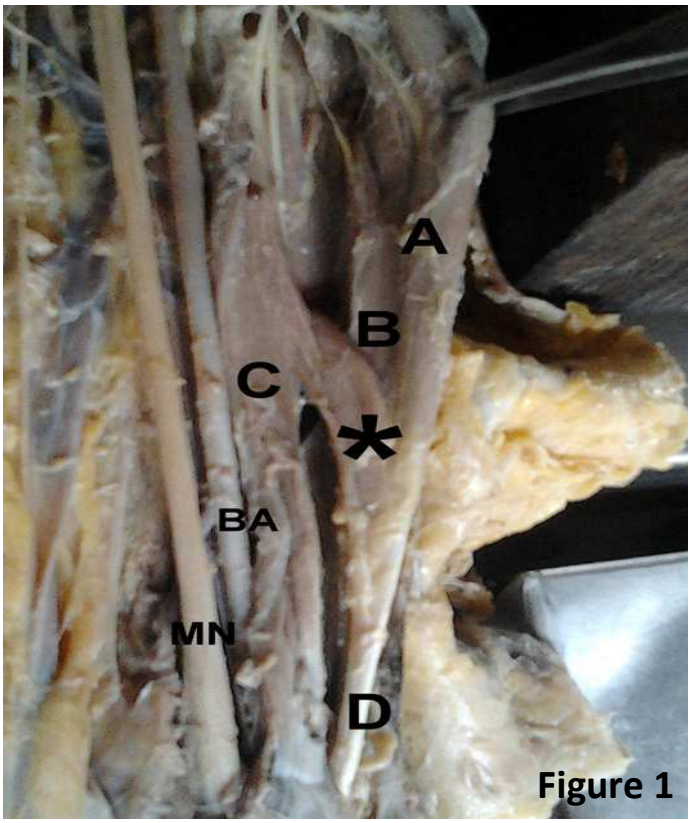

Figure 1. Showing third head of biceps brachii with accessory muscle fascicle attaching it to common belly of biceps brachii in left upper limb. A – Short head of biceps, B- long head of biceps, C – third head of biceps, * - accessory muscle fascicle, D – common tendon of biceps, BA – brachial artery, MN – median nerve.

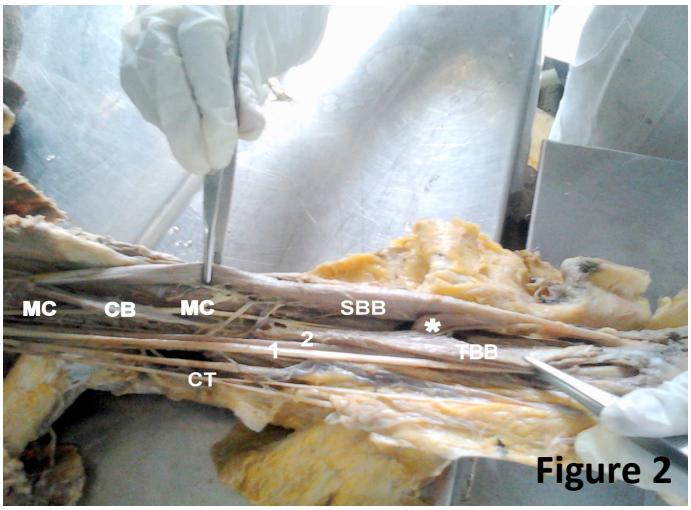

Figure 2. showing musculocutaneous nerve piercing the slender coracobrachialis and the medial positioning of median nerve to brachial artery in the left upper limb. MC – musculocutaneous nerve, CB – coracobrachialis muscle, SBB- short head of biceps brachii, TBB – third head of biceps, * - accessory muscle fascicle, 1 – median nerve, 2 – brachial artery, CT – common trunk for medial cutaneous nerve of arm and forearm.

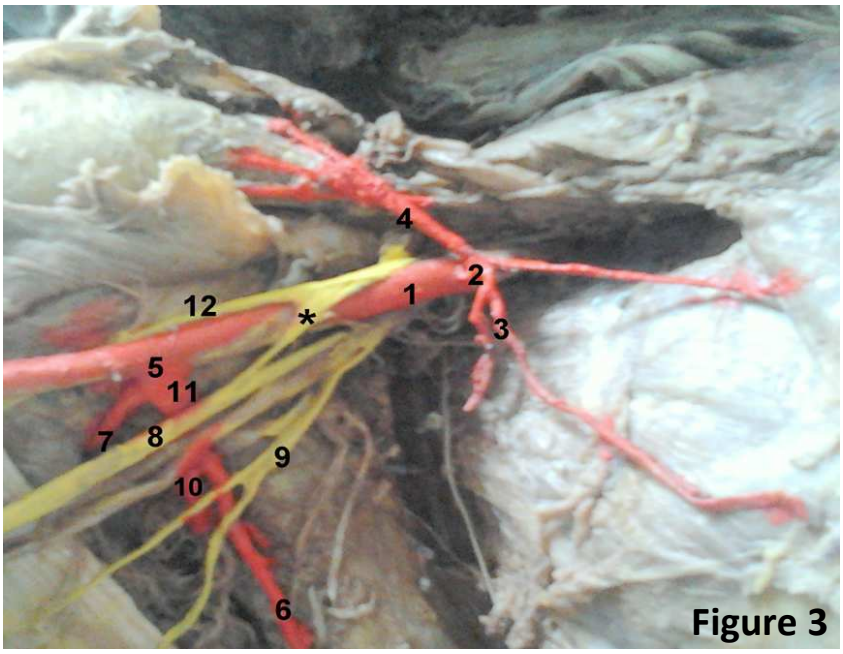

Figure 3

Figure -3 showing variation in branching pattern of axillary artery, slender lateral root forming median nerve, medial positioning of median nerve to brachial artery and common trunk for medial cutaneous nerve of arm and forearm in the right upper limb.1 – 2nd part of axillary artery, 2 – common trunk for thoracoacromial & lateral thoracic artery, 3 – lateral thoracic artery, 4- thoracoacromial artery, 5 –common trunk for subscapular & posterior circumflex humeral artery, 6-thoracodorsal artery, 7-posterior circumflex humeral artery,8- median nerve,9- common trunk for medial cutaneous nerve of arm & forearm,10- circumflex scapular artery,11-subscapular artery, 12-musculocutaneous nerve, * - slender lateral root of median nerve.

Studied.[6] Variations in the triceps are neither numerous or common. Macalister described the variations of triceps into three types one of which being long head split, one attached to the capsule, and the other to the tricipital spine, axillary border or the first slip was found splitting the capsular ligament.[7]

Earlier studies by many observers showed that variations in the branching pattern of axillary artery are very common. The branches of the third part of the axillary artery are subject to great variations. In up to 30% of cases subscapular artery can arise from a common trunk with posterior circumflex humeral artery.[8] In the present case we have observed a common trunk for lateral thoracic artery and thoraco-acromial artery from the second part of axillary artery and a common trunk for subscapular and posterior circumflex humeral artery from the third part. Saeed et al reported , a bilateral common subscapular-circumflex humeral trunk(3.8%) emerging from the third part of the axillary artery and a bilateral thoraco humeral trunk arising from second part (1.9%), branching into lateral thoracic, circumflex humeral, subscapular and thoracodorsal arteries. The presence of common trunk for lateral thoracic and thoraco-acromial from second part is quite rare and much less in frequency as compared to variations of third part. [9] Kumar MR Bhat et al reported a single trunk from second part giving all of its common branches except superior thoracic and anterior circumflex humeral artery. [10] Such anomalous branching pattern may represent persisting branches of the capillary plexus of the developing limb buds. The seventh cervical segmental artery gives rise to axillary artery and any abnormality during development results in unusual branching pattern.

Many variations in branches of brachial plexus have been observed and many studies are been conducted over various patterns of brachial plexus. Documentation regarding the common nerve trunk for medial cutaneous nerves of arm and forearm is less frequent. The positioning of median nerve to the brachial artery on the medial side bilaterally is also less reviewed in literature. In the present case we have observed very slender lateral root contributing for formation of median nerve on the right side. This could be justified by the fact that peripheral nerve is a collection of nerve fibres bound together by connective tissue. It is

understandable that the nerve fibres which had to pass through the lateral root might have coursed more towards the medial root during formation of brachial plexus.

CONCLUSION

To conclude, individually all these variations have been reported and documented in literature, but coexistence in a single cadaver is infrequent. A sound knowledge of these various is important while dealing limb injuries, nerve blocks and other major surgeries in the limbs.Improvization of information regarding branching pattern of axillary artery is worth considering while creating bypass between axillary and subclavian artery, in axillary artery aneurysm,haematoma,thrombosis and while creating axillary –coronary bypass shunt in high risk patients. Knowledge regarding the presence of additional head of biceps and its nerve supply would be useful during surgical repairs, has an important role in plastic surgeries and added value in flap surgeries.

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