Abstract

Background and aims: The biceps brachii is the large muscle of flexor compartment of arm. Normally it arises by two heads (long head and short head) and gets insertion in two parts (tendinous part and aponeurotic parts). The biceps brachii muscle is well known for variation in its origin. These variations can cause compression of brachial artery and median nerve which may pass deep to the accessory head of biceps brachii muscle, and can create problems for surgeons. So the surgeons should keep in mind such variations of biceps brachii muscle. The present study is to find out the variations in origin of biceps brachii muscle.

Material and methods: The present study was conducted in the department of anatomy of Gian Sagar Medical College, Ramnagar, Rajpura district Patiala (Punjab). In this study 32 human cadaveric limbs which were embalmed and fixed in 10% formaldehyde solution were used and these limbs were dissected and variations in origin of the biceps brachii muscle were noted. Results: Out of 32 limbs, 3 limbs (9.38%) were having three heads of biceps brachii muscle in its origin. The variations were found in the right limbs only. Conclusions: The knowledge of accessory head of biceps brachii muscle is important for the surgeons and traumatologists because there can be iatrogenic injury to the third head of biceps brachii muscle.

Key words: coracobrachialis muscle, cubital fossa, variations, median nerve, musculocutaneous nerve, compression, iatrogenic injuries

Introduction

The biceps brachii muscle arises from the supraglenoid tubercle, whereas the short head arises from the tip of the coracoids process of scapula along with the coracobrachialis muscle. The insertions are by the tendinous part and aponeurotic part. Tendinous part inserts on the posterior border of radial tuberosity in the cubital fossa and aponeurotic part inserts on the subcutaneous fascia on the ulnar side of forearm, in other words it gets insertion on the ulna indirectly. The nerve supply of biceps brachii muscle is musculocutaneous nerve.

Morphologically this muscle is commonly known for its variable origin of heads. Most common variation of origin is by three heads. Even more than three heads has been reported. The accessory head of biceps brachii muscle has clinical importance as they may confuse a surgeon or orthopedician during surgical intervention. The accessory head may cause compression of neurovascular structures passing through and by near it. The aims of the present study are to study the variations in origin of the biceps brachii muscle in the cadavers and to compare our study with the studies done by other authors.

Materials and methods

The present study was conducted in the department of Anatomy, Gian Sagar Medical College, Ram Nagar, Rajpura, District Patiala in February 2014. Upper limbs of 16 cadavers fixed and embalmed with 10% formaldehyde solution were dissected according to the Cunningham's Manual of practical Anatomy. Ten cadavers (20 limbs) were of male sex and six cadavers (12 limbs) were of female sex. Totally 32 upper limb specimens were studied. Attachments of biceps brachii muscle, nerve supply and any accessory head if present were recorded and photographed.
Results

The biceps brachii muscles were normally arising from supraglenoid tubercle and tip of coracoid process and their insertion were, tendinous part on the radial tuberosity and aponeurotic part on the fascia on the upper part of ulnar side of forearm forming the roof of cubital fossa. Out of 32 upper limbs, in three cases (9.38%), the biceps brachii muscles were found to have accessory heads. Out of 20 upper limbs of male sex, two limbs were having accessory head i.e. 10% were having accessory head of right side only. Out of 12 upper limbs of female sex one limb i.e 8.33% was having accessory head of right side only. No variation was seen on left side in any of the upper limbs studied.

In the right side upper limb of a male cadaver, the origins of long and short heads were normal. Accessory head was seen arising from the anterior border of deltoid tuberosity. The fibres were running distally and merged with the lower fibers of the belly of biceps brachii muscle at its lower lateral border before the muscle turning into the tendinous structure. The insertion of biceps brachii muscle was taking place normally. A branch from musculocutaneous nerve was supplying to the accessory head as well as other two heads of biceps brachii muscle. All the heads of biceps brachii muscle were getting blood supply from the branches of brachial artery (Figure-1).

In another right side upper limb of male cadaver, the origins of long head and short head were normal as in first case. An accessory head was seen arising from anterior border of the deltoid tuberosity and a few fibres were taking origin from the fascia covering the brachialis muscle. The fibres passed distally and merged with belly of biceps brachii muscle on its lateral border and turned into tendinous structure. A branch from musculocutaneous nerve was seen supplying the third head as well as the other two heads of biceps brachii muscle. The insertion was normal as in first case (Figure-2).

In the right side upper limb of a female cadaver, the origins of long and short heads were normal as in previous cases. Accessory head was seen arising from anteromedial surface of the humerus near the insertion of coracobrachialis muscle. The fibres were seen running distally and merged with belly of biceps brachii muscle on its medial border before the biceps brachii muscle turning into tendinous part. The insertion of biceps brachii muscle was normal as tendinous part on the radial tuberosity and aponeurotic part on the subcutaneous fascia on the medial side of upper part of forearm. The musculocutaneous nerve was seen supplying to accessory head and other two heads of biceps brachii muscle also (Figure-3).

Discussion

Several studies have reported the variations in origin of biceps brachii muscle. Many of the studies have reported a third head. The third head can be a cluster of accessory fascicles arising from coracoid process, pectoralis minor tendon, head of humerus or articular capsule of the humerus (Sargon et al)*. Londhe and Jadhav* reported third head arising from the upper third of humerus at the 'V' shaped insertion of deltoid muscle. Third head of biceps brachii muscle was present lateral to both long and short heads of biceps brachii muscle. All the heads were supplied by the musculocutaneous nerve. The third head descended and merged with other two heads of biceps brachii muscle to form common tendon of biceps brachii muscle and was inserted on posterior part of radial tuberosity.

Mamatha et al6 studied 40 arms of adult cadavers. They observed the presence of super numerary head of biceps brachii muscle in 6 (15%) cases. In 5 cases (12.5%), they observed three heads and in one case (2.5%), they observed four heads. In one case, they noticed bilateral incidence with three head on left side and four heads on right side. Kosugi, Shibata and Yamashita7 studied 546 upper limbs of 273 cadavers and found that supernumerary head of biceps brachii were present in 75 limbs (13.7%) of 58 cadavers (21.3%).

Poudel and Bhattarai8 studied 32 arms from 16 Nepalese cadavers and observed that supernumerary
heads of biceps brachii muscle were present in 12.5%. Among these, three headed biceps brachii muscles were present in 6.2% and four headed were also present on the same percentage. They observed that all the variations were found in the right side arm of male sex. Tountas and Bergman found the supernumerary heads in 10.2% of 1453 arms. In about 12.0% of arms, a humeral head was found in addition to those that usually arise from the scapula.

The most common variation is a third head (10%), but four or even seven heads have been reported by Johnson et al, Nakatani et al, Asvat, Candler & Sarmiento, Nayak et al, Kosugi et al. Kosugi et al stated that there was no clear gender and racial differences in occurrence of supernumerary heads of biceps brachii muscles.

Fig 1: Accessory head is seen arising from the anterior border of deltoid tuberosity.

Fig 2: Third head is seen arising from anterior border of the deltoid tuberosity and a few fibres are taking origin from the fascia covering the brachialis muscle.

Fig 3: Third head is seen arising from anteromedial surface of humerus near the insertion of coracobrachialis muscle.
muscle. Emeka & Emmanuel\textsuperscript{13} reported unilateral third head of biceps brachii muscle lying between the long head and short heads. The third head was running within the capsule of shoulder joint along the bicipital groove to take origin from supraglenoid tubercle. Rai et al\textsuperscript{14} stated that the occurrence of a third head of biceps brachii muscle is relatively rare in Indian population. They have observed the origin of third head of biceps brachii muscle from anteromedial aspect of lower part of the humeral shaft. They report 7.1 \% incidence in this type of variation. Kumar et al\textsuperscript{15} reported the presence of third head of biceps brachii muscle in 3.33 \% cases. In their study, they observed a bilateral presence of additional heads and their varied pattern of origin, their insertion was to the tendon of biceps brachii muscle or to its aponeurosis.

The result of the present study almost resembles with results of other authors (Table 1.). The most common side of the limb which is having accessory head is right side and most common site of origin of extra head is shaft of humerus and in few cases it was from the fascia covering the brachialis muscle also. There was no extra insertion of the accessory head of muscle and it was getting insertion with other two heads of the biceps brachii muscle i.e on the radial tuberosity and also in aponeurotic form in the fascia of upper part of forearm on its medial side. The nerve supply to all the three heads of muscle was by musculocutaneous nerve.

The presence of accessory heads in biceps brachii muscle is not uncommon. The accessory heads of biceps brachii muscle can create problem to the surgeons and orthopaedician and traumatologist during the surgical procedures. So the knowledge of presence of accessory head of biceps brachii muscle and its nerve supply is very much important for the surgeons, orthopaedicians and traumatologist. It may become significant in pre operative diagnosis and during surgery of upper limb as well as in diagnosing the nerve impairments as the bulky additional heads of biceps brachii muscle may compress the musculocutaneous nerve and also vessel like brachial artery.

Table 1. Comparison of study with other authors

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References


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