

Extra-articular origin of long head of biceps brachii in human cadaver: a case report

Cheema, P.^{1*} and Singla, R.²

¹Department of Anatomy, H S Judge Institute of Dental Sciences and Hospital, Panjab University, Sector 25, Chandigarh (U.T.), India

²Department of Anatomy, Government Medical College, Amritsar, Punjab, India

*E-mail: manindergill2809@yahoo.com

Abstract

Muscles of the arm exhibit numerous variations. Commonest muscle of the arm to show variations is the biceps brachii. During routine cadaveric dissection in the Department of Anatomy, GMC, Amritsar, India, we came across an abnormal biceps brachii muscle bilaterally in one cadaver. The long head of biceps brachii instead of arising from the supraglenoid tubercle, arose from the capsule of the shoulder joint. The short head had its normal origin. The insertion and nerve supply of the muscle showed no variation. This prompted us to review the literature in order to ascertain the incidence and clinical significance of this variation.

Keywords: biceps brachii, long head, extra-articular, shoulder joint capsule, arthroscopy.

1 Introduction

Biceps brachii is a large fusiform muscle of the anterior compartment of the arm which arises by two heads. The short head is attached by a thick flat tendon to the coracoid apex together with the coracobrachialis. The long head arises within the shoulder joint as a long narrow tendon from the supraglenoid tubercle and is continuous here with the glenoid labrum. The tendon enclosed in a double tubular sheath, an extension of the joint capsule's synovial membrane, curves over the humeral head and emerges behind the transverse humeral ligament. It then descends in the intertubular sulcus, held here by the ligament and a fibrous expansion from the tendon of the pectoralis major. Both bicipital tendons lead into elongated bellies that, although closely attached, can be separated to within 7 cm or so of the elbow joint. Here they end in a flat tendon attached to the rough posterior area of the radial tuberosity, a bursa separating tendon and its smooth anterior area. The tendon has a broad medial expansion, the bicipital aponeurosis, descending medially across the brachial artery to fuse with the deep fascia of the forearm.

Biceps brachii is one of the muscles that display anatomic variations frequently (GREIG, ANSON and BUDINGER, 1952), the most common one being the third head (EL-NAGGAR and ZAHIR, 2001). Other variations, such as anomalous biceps head insertions are less frequent, and although they have been related to rotator cuff pathology (OZAN, ATASEVER and SINAV, 1997; MURTHI, VOSBURGH and NEVIASTER, 2000; PAUL, SEHGAL and KHATRI, 2000) their clinical relevance remains unclear.

We report a case in which the tendon of long head of biceps brachii did not have an intra-articular origin and instead arose from the glenohumeral joint capsule. Knowledge of this variant may be relevant for both the glenohumeral surgery and shoulder joint arthroscopy, as biceps tendon is

the first reference structure to be seen during arthroscopic exploration using posterior approach.

2 Case report

During routine cadaveric dissection of the anterior compartment of the arm in the Department of Anatomy, Government Medical College, Amritsar, India, we came across an abnormal biceps brachii muscle bilaterally in a 35 year old male of Indian origin. The short head arose normally from the tip of coracoid process together with the coracobrachialis. The long head instead of arising intracapsularly from the glenoid labrum and supraglenoid tubercle of the humerus arose from the capsule of the shoulder joint (Figures 1 and 2). As the origin was extracapsular, the tendon of the long head was devoid of the double tubular sheath, an extension of the joint capsule's synovial membrane. The tendon after arising from the capsule of the shoulder joint ran in the bicipital groove and then formed a muscle belly. The two heads joined at a distance of 15.5 and 13.5 cm from the coracoid process on right and left sides respectively. The length of the tendon of the long head was 14 and 13.4 cm on right and left sides, respectively. The insertion and the nerve supply of the muscle were normal.

3 Discussion

Capsular origin of the long head of biceps brachii is an extremely rare anomaly. Though no reports of the incidence of this variation could be found, few authors have reported similar variation (MACALISTER, 1875; EGEE, MELGUIZO, PRADOS et al., 2010). Macalister (1875) also reported a long head attached to greater tuberosity. Bergman, Thompson and Afifi (2005) reported that the two heads of biceps brachii muscle may be totally separate or fused and either head may be absent. In the absence of long head, the tendon may be found arising from the bicipital



Figure 1. Long head (LH) of biceps brachii (BB) arising from capsule (C) of left shoulder joint. The capsule is seen hooked and turned laterally.



Figure 2. Long head (LH) of biceps brachii (BB) arising from capsule (C) of right shoulder joint. The capsule is cut with its upper part upturned at the shoulder joint. Lower part is continuous with long head of biceps tendon and is pinned up on short head (SH) of biceps brachii.

groove, one of the tubercles of humerus, the capsule of the shoulder joint or the tendon of pectoralis major. Hyman and Warren (2001) too came across an extra-articular origin of the long head of biceps brachii.

Normally, the biceps tendon courses over the head of humerus to continue with the labrum, thus helping to retain the head in the glenoid fossa and assisting the rotator cuff. Subjects with the present variation may have weakening of the rotator cuff. Further, Egea, Melguizo, Prados et al. (2010) said that long head of biceps tendon acts as a shoulder stabilizer and its absence in toto or absence of the intra-articular part can lead to an instability which can allow the humeral head to damage the labrum and trap the cuff against the acromion, resulting in fracture of the supraspinatus.

Such variant origin of the long head of biceps may also make arthroscopic visualization and assessment of tendon difficult. Non visualization of the intra-articular part of long head of biceps tendon due to such a variation can be wrongfully diagnosed as rupture of the tendon (TUCKMAN, 1994).

Thus, recognizing abnormalities of the biceps tendon is important because they are a common source of shoulder pain both alone and in combination with abnormalities of the rotator cuff, labrum and other structures. As incomplete/

wrong diagnosis can lead to treatment failure, it is important to recognize this less common entity which can aid the surgeon in focusing the treatment on the actual pathology. Hence, knowledge of the existence of this anatomic variant is necessary to avoid errors in shoulder arthroscopy, surgery and evaluation of MRI scans.

The experiments comply with the current laws of the country in which they were performed.

The authors declare that they have no conflict of interest.

References

- BERGMAN, RA., THOMPSON, SA. and AFIFI, AK. *Muscular system*. In *Illustrated Encyclopedia of human anatomic variation*. Available from: <http://www.vh.org/adult/provider/anatomy/Anatomicvariants/muscular_system/Text/B/02Biceps.html>. Access in: 2005.
- EGEA, JM., MELGUIZO, C., PRADOS, J. and ARÁNEGA, A. Capsular origin of the long head of the biceps brachii tendon: a clinical case. *Romanian Journal of Morphology and Embryology*. 2010, vol. 51, no. 2, p. 375-377.
- EL-NAGGAR, MM. and ZAHIR, FI. Two bellies of the coracobrachialis muscle associated with a third head of the biceps brachii muscle. *Clinical Anatomy*, 2001, vol. 14, no. 5, p. 379-382.

- GREIG, HW., ANSON, BJ. and BUDINGER, JM. Variations in the form and attachment of the biceps brachii muscle. *Quarterly Bulletin of North Western Medical School*, 1952, vol. 26, p. 241-244.
- HYMAN, JL. and WARREN, RF. Extra-articular origin of biceps brachii. *Arthroscopy*, 2001, vol. 17, p. 29.
- MACALISTER, A. Additional observations on muscular anomalies in human anatomy (third series) with a catalogue of the principal muscular variations hitherto published. *Transactions of the Royal Irish Academy*, 1875, vol. 25, p. 1-134.
- MURTHI, AM., VOSBURGH, CL. and NEVIASER, TJ. The incidence of pathologic changes of the long head of the biceps tendon. *Journal of Shoulder and Elbow Surgery*, 2000, vol. 9, no. 5, p. 382-385.
- OZAN, H., ATASEVER, A., SINAV, A., SIMSEK, C. and BASAR, R. An unusual insertion of accessory biceps brachii muscle. *Kaibogaku Zasshi*, 1997, vol. 72, no. 6, p. 515-519.
- PAUL, S., SEHGAL, R. and KHATRI, K. Anatomical variations in the labral attachment of the long head of biceps brachii. *Journal of Anatomical Society of India*, 2000, vol. 53, no. 2, p. 49-51.
- TUCKMAN, GA. Abnormalities of the long head of the biceps tendon of the shoulder: MR imaging findings. *American Journal of Roentgenology*, 1994, vol. 163, p. 1183-1188.

Received June 18, 2010
Accepted October 20, 2010