

A Narrow Accessory Tendon in Biceps Brachii Muscle Insertion

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Abstract

A variation in biceps brachii muscle insertion by two tendons, one common tendon and another accessory tendon, in the right upper limb of a cadaver, 55 years old Indian male, was noted. A separate muscle bundle formed by several fibres from the medial side below the middle level of the arm continued as a narrow accessory tendon. This accessory tendon was in addition to the usual common belly, and was found to continue as a narrow tendinous slip and inserted into the medial supracondylar ridge of humerus. The main muscle belly comprised of tendons from the short and long head and continued distally to form a common tendon which was inserted on the posterior part of the radial tuberosity. This variation may be considered as one of the potential cause of the pronator syndrome looking at the close relationship with the median nerve.

Key-words: Biceps Brachii Insertion; Variation.

Introduction

As understanding and management of different upper limb disorders is hoped to be increased with enhancement of the anatomical knowledge of this muscle, interest in the variations of biceps brachii persists. Variations in the origin of biceps brachii are common. However as regards to variations related to the insertion of this muscle, not many cases have been reported [1].

Case History

A rare unilateral insertion of the biceps brachii by two tendons, one common tendon and another accessory tendon, in the right upper limb of a cadaver, 55 years old Indian male, was noted during routine dissection for undergraduates in the Anatomy department of a tertiary care teaching institution of

western India. The morbidity history of the individual and the cause of death were not known. After examining the topographic details of the muscle, length and thickness of the tendons were measured. Subsequently the muscle was photographed.

The muscle was originating from short and long head as described in any standard textbook of Anatomy and both the heads fused to form a common belly. The length of the common fleshy belly was 80 mm and thickness was 6 mm. The belly continued distally to form a common tendon. The length of the common tendon was 60 mm and the thickness was 5 mm and was inserted on the posterior aspect of the radial tuberosity. In addition a separate muscle bundle 50 mm long and 2mm thick formed by some fibres from the medial side below the level of the middle of the arm continued as a narrow accessory tendon (Figure 1). The length of the accessory tendon was 50 mm and the thickness was 1.5 mm.

This accessory tendon soon divided into two slips - the lateral slip and the medial slip (Figure 2) and both were found deep to brachial artery and median nerve (Figure 3). The lateral slip crossed the cubital fossa, merged with the fascial covering of the flexor carpi ulnaris muscle. The medial slip curved medially and was attached to the medial supra-condylar ridge of the humerus.

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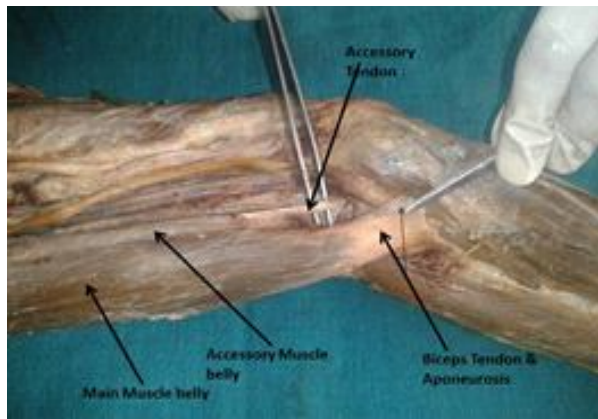


Fig. 1: Showing accessory muscle belly and accessory tendon

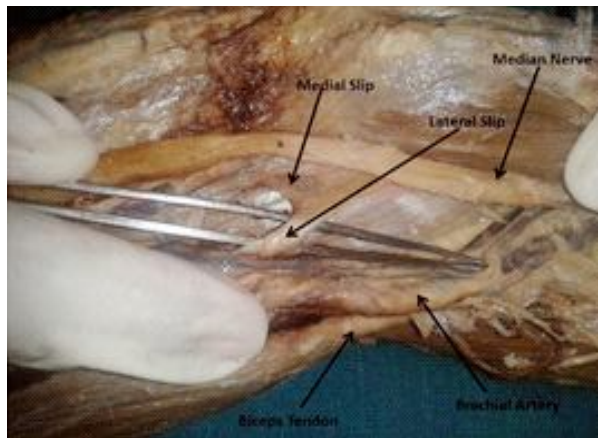


Fig. 2: Showing two slips of the accessory tendon

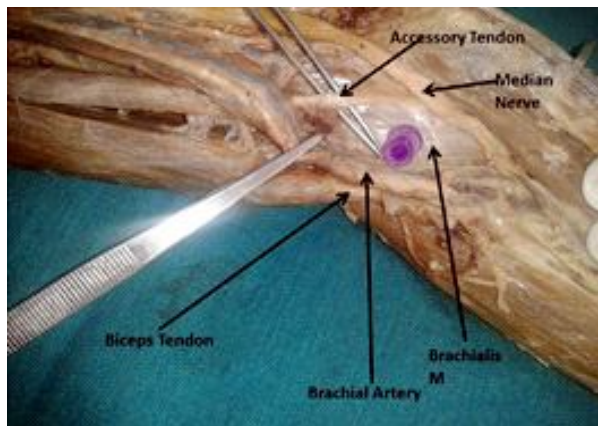


Fig. 3: Brachial artery and median nerve superficial to the accessory tendon

Discussion

Variations in the origin of biceps brachii have been reported by many workers from time to time [2, 3]. Dirim et al in 2008 in their study have reported that the distal biceps tendons are completely separated in 40 percent and bifurcated in 25 percent of cases. [4]

A case of variation in insertion of the Biceps brachii

tendon similar to the observation in the present case had been described by Pavai J and Mathew JG [5]. Eames M S, et. al in their study of the insertion pattern of distal biceps tendon in 17 limbs, observed that the tendon of the long head passed deep to the tendon of the short head to insert more proximally [6]. The tendon of the short head inserted in a fan like fashion into the distal portion of radial tuberosity.

The biceps brachii muscle variations can be explained phylogenetically as a remnant of a “tuberculoseptale” head present in hylobates but is a product of regression in humans and anthropoids [7]. The third head of the biceps brachii is a remnant of the long head of the coracobrachialis [8], an ancestral hominoid condition, particularly in those cases where the third head arose from the insertional area of the coracobrachialis. When the muscle primordial fails to disappear during intrauterine life, it may account for the occurrence of the accessory muscular bands [9].

In the present case study, the clinical implication of the accessory tendon reported may point to the kinematics of the biceps muscle and may have had an important role in the increased power of flexion and supination of the muscle. Further, during tendon reconstruction and repair in cases of avulsion, the comprehension of the accessory tendon of the biceps is crucial in avoiding complications. The accessory tendon of biceps brachii may also have value in flap surgery.

Moreover, subsequent to fractures, the accessory tendon can cause unusual displacement of the bone fragments [10].

The pronator syndrome was first described in 1951 by Seyffarth where the doubled bicipital aponeurosis or the lacertus fibrosus may compress the median nerve. In 17 patients suffering from median nerve entrapment, he reported that the nerve passed through the pronator teres muscle or the flexor digitorum superficialis (FDS) arch. Hence, since the initial description by Seyffarth, ambiguity exists about the name as it included more than just compression by the pronator teres[11]. Although a “spectrum” of locations of compression exists, it is still referred to as the pronator syndrome because it has a common clinical presentation.

Median nerve entrapment may occur at numerous locations considering the long and peculiar course of the median nerve. The median nerve is most vulnerable for compression at the level of the FDS arch [12] or when the nerve is passing through the pronator teres muscle [13]. In the present case, biceps brachii had an accessory muscle fasciculus which

continued as a tendinous slip. Although this variation is different from the cases of doubling of bicipital aponeurosis, this variation may also be considered as one of the potential cause of the pronator syndrome looking at the close relationship with the median nerve. However before coming to a conclusion about the presence of the popular compressive neuropathies, it is imperative to clinically evaluate the problem thoroughly.

Variations of the distal biceps brachii tendon are of clinical interest. Imaging of the distal biceps tendon is somewhat difficult due to its anatomy. An innovation in patient positioning where the patient lying prone with the arm overhead, the elbow flexed to 90°, and the forearm supinated, with the thumb pointing superiorly, has been recently described for magnetic resonance (MR) imaging of the distal biceps tendon. To describe this position the acronym FABS (flexed elbow, abducted shoulder, forearm supinated) has been used [14]. The FABS position creates tension in the tendon and minimizes its obliquity and rotation, resulting in a "true" longitudinal view of the tendon. For visualization of the distal tendon and in detecting other pathologic conditions in the cubital fossa, MR imaging and, to a lesser extent, ultrasonography are useful. In the assessment of the distal biceps tendon, imaging with FABS positioning can complement conventional MR imaging, especially in the axial plane.

Key Messages

A variation in biceps brachii muscle insertion by two tendons, one common tendon and another accessory tendon, in the right upper limb of a cadaver, 55 years old Indian male, was noted.

References

1. Poudel, PP; Bhattarai, C. "Study on the supernumerary heads of biceps brachii muscle in Nepalese". *Nepal Med Coll J.* 2009; 11(2): 96-98.
2. Nayak SR, Krishnamurthy A, Prabhu LV, Jiji PJ, Ramanathan L, Kumar S. Multiple supernumerary muscles of the arm and its clinical significance. *Bratisl Lek Listy.* 2008; 109(2): 74-5.
3. Soubhagya R, Nayak, Latha V, Prabhu, Sivanandan R. Third head of biceps brachii: a rare occurrence in the Indian population. *Ann Anat.* 2006; 188: 159-61.
4. Dirim, Berna; Brouha, Sharon Sudarshan; Pretterkieber, Michael L; Wolff, Klaus S; Frank, Andreas; Pathria, Mini N; Chung, Christine B. "Terminal Bifurcation of the Biceps Brachii Muscle and Tendon: Anatomic Considerations and Clinical Implications". *Am J Roentgen.* 2008; 191(6): W248-W255.
5. Paval J, Mathew J G. A rare variation of the biceps brachii muscle. *Indian J Plast Surg.* 2006; 39: 65-7.
6. Eames MHA, Bain GI, Fogg QA, Riet RP. Distal biceps brachii tendon anatomy: a cadaveric study. *J Bone Joint Surg Am.* 2007; 89: 1044-1049.
7. de Burlet HM, Correlje J. Über Variationen des menschlichen Musculus biceps brachii. *Gegenbaur's Morphol. Jahrb.* 1919; 50: 403-16.
8. Sonntag CF. On the anatomy, physiology and pathology of the chimpanzee. Cited by El-Naggar. *Proc. Zool. Soc.* 1923; 22: 323-363.
9. Sharadkumar Pralhad Sawant. Morphological Study of Connection between the Median and the Musculocutaneous Nerves. *Anatomica Karnataka.* 2013; 7(1): 72-80.
10. Swieter, M. G. & Carmichael, S.W. Bilateral three-headed biceps brachii muscles. *Anat. Anz.* 1980; 148: 346-9.
11. Seyffarth H. Primary myoses in the M. Pronator Teres as a cause of lesions of the N. Medianus (the pronator syndrome). *Acta Psychiatr Neurologica.* 1951; 74: 251-4.
12. Urbaniak JR. Complications of treatment of carpal tunnel syndrome. *Operative Nerve Repair and Reconstruction.* JB Lippincott: Philadelphia. 1991; p. 967-79.
13. Hartz CR, Linscheid RL, Gramse RR. The pronator teres syndrome: Compressive neuropathy of the median nerve. *J Bone Joint Surg Am.* 1981; 63A: 885-90.
14. Michael L. Chew, Bruno M. Giuffre. Disorders of the distal Biceps brachii tendon. *RadioGraphics.* 2005; 25: 1227-1237.