

Is there any clinical significance of biceps brachii being three-headed?

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ABSTRACT

The biceps brachii is an arm muscle which normally has two heads named as the long head and the short head. The incidence of an accessory head of biceps brachii was reported to be 8-20% in the literature. Variations in biceps brachii were found mostly in cadaver studies and also, they were rarely found incidentally in clinical practice. We report a 38 years-old man who presented with right shoulder pain during routine daily activities. Shoulder impingement syndrome and rotator cuff tear were suspected during physical examination. MRI incidentally revealed bifurcation of the long head of the biceps tendon. Biceps tendon has an important role in shoulder stability. Variations in long head of biceps brachii are reported to cause compression syndromes at upper extremity. Moreover, being aware of this variation may provide clinical benefit in diagnosis or arthroscopic surgery. It is also clinically important to plan a treatment or follow up for a patient presenting with shoulder-arm pain.

Keywords: Biceps brachii, anatomical variation, anatomy, shoulder

INTRODUCTION

Bicipital tendon originates from upper border of glenoid cavity, continues with glenoid labrum, and passes through bicipital groove. A few anatomical variations have been defined.¹ Variations in biceps brachii were found mostly in cadaver studies and also they were rarely found incidentally in clinical practice. Variations in biceps brachii are important in surgical interventions to the shoulder and they should be considered in compression syndromes of the upper extremity.

CASE

A 38 years old male presented with right shoulder pain from which he was suffering for 5 months. In his physical examination no swelling, erythema or muscle atrophy was revealed and Neer test, Yergason and speed test which suggest rotator cuff tear were positive and tenderness was present over right bicipital groove. However, her right subacromial bursa and acromioclavicular joint were tender. Degrees of flexion, abduction and external rotation were 90°, 70° and 30°, respectively, and internal rotation was through lumbosacral level. Progressive pain was denoted when flexion over 90°. The opposite shoulder was symptom free and normal on examination. There wasn't a comorbidity and laboratory tests were within normal limits. In radiological evaluation, osseous structures were normal in direct X-Ray films (**Figure 1**). In magnetic resonance imaging T2 axial, coronal and sagittal lipid suppression proton density sections showed duplication of tendon at the level of bicipital groove. Signal intensity of the

tendon was normal and there was peripheral effusion (**Figure 2a-c**). After the first visit, 10 sessions of physical therapy modalities (TENS, US, Superficial heat) were done once every two days, each session for 45 minutes. Beside modality, 15 mg Meloxicam tablet was prescribed for the patient twice per day, which was taken for only the one first week by the patient. An exercise program began from the fifth session of physical therapy modalities. Exercise program was under the physician's supervision twice per week in the first month and trained exercises were performed daily at home. Patient's cooperation during 6 months of treatment was excellent and he performed taught exercises with high precision.



Figure 1. Antero-posterior shoulder graphy

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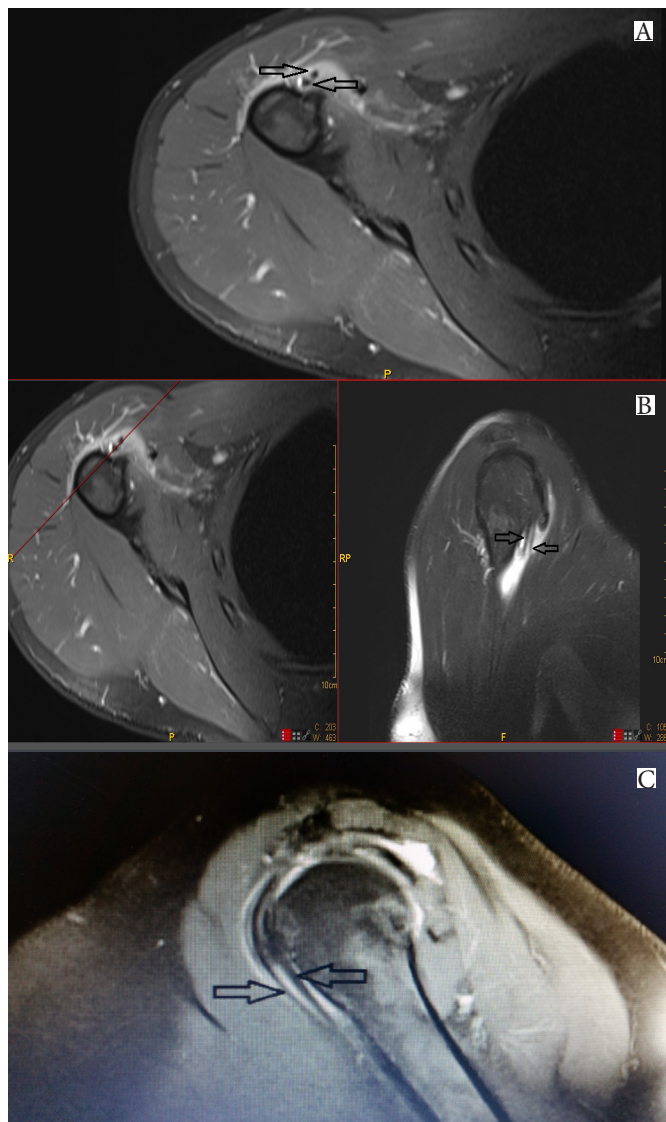


Figure 2. MRI shows duplication at the level of bicipital groove in T2 axial (a), coronal (b), and sagittal (c) sections

DISCUSSION

Biceps brachii is a long fusiform muscle at the anterior side of arm and it has two heads. Its short head originates from coracoid process, while its long head originates from supraglenoid tubercle at the upper border of glenoid cavity, continues with glenoid labrum, passes through bicipital groove, and terminates at radial tuberosity.¹

Several variations of the long head of biceps brachii have been described. Some of these anomalies are believed to have roles in rotator cuff tendinopathy. The most common anomaly occurs at the body of the muscle. Variations of the long head are more common than short head although absence of the long or the short head is rare. With multiplication of the long head 3, 4, or 5 headed biceps brachii have been described. Variation rate in biceps brachii change between different populations and rates between 8-38% have been reported.^{2,3}

Three headed biceps brachii is seen in 10% of the population. The third head extends at upper and medial side of the brachialis muscle and it may terminate at lacertus fibrosus or medial side of the brachialis tendon. Rarely a fourth head is present. It may originate from lateral side of humerus, bicipital groove or great tubercle. Kopuz et al.³ studied shoulders of 160 cadavers and found 15% prevalence for three headed biceps brachii. In literature, during diagnostic

shoulder arthroscopy, long head of the biceps was reported to have a bifurcated origin. In these cases, one of the long heads originates from supraglenoid tubercle and the other originates from posterosuperior capsulolabral tissue.^{4,5} Posttraumatic tendon separation which may have a similar appearance can be differentiated with formation of a bony septum.⁵

Awareness of this anatomical variation may be helpful for clinical diagnosis and surgical intervention.⁶ Appearance of this variation in the long head of biceps tendon may mimic a tear in tendon or superior labrum.^{7,8}

In some cases brachial artery and median nerve may pass inside the variant biceps brachii muscle. In addition, aponeuroses of accessory heads may press on median nerve at arm or ankle and may produce clinical complaints. Signs of compression are especially prominent when forearm is supinated.^{9,10} Variants of biceps brachii may cause clinical complaints mimicking radiculopathy or carpal tunnel syndrome.¹¹

CONCLUSION

As a result, biceps tendon has an important role in shoulder stability. Variations in long head of biceps brachii are reported to cause compression syndromes at upper extremity. Moreover, being aware of this variation may provide clinical benefit in diagnosis or arthroscopic surgery. It is also clinically important to plan a treatment or follow up for a patient presenting with shoulder-arm pain.

ETHICAL DECLARATIONS

Informed Consent

The patient signed and free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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