

ORIGINAL ARTICLE

VARIATIONS OF ORIGIN OF LONG HEAD OF BICEPS BRACHII MUSCLE FROM GLENOID LABRUM OF SCAPULA

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ABSTRACT

Introduction: The origin of the long head of the biceps brachii tendon in the majority of literature is not same. The relationships of the tendon with the glenoid labrum of the scapula also vary.

Methodology: Dissection of 50 shoulder joints of adult human cadavers of both sexes done. The joint cavity was exposed by making an incision in the posterior part of the capsule of the joint to see the extent of its attachment on glenoid labrum.

Results: In all specimens, the biceps tendon was found to be attached to the supraglenoid tubercle as well as to the glenoid labrum. In 74% of specimens, the major part of the tendon was attached to the posterior aspect of the labrum while in 26% it was seen in the anterior aspect as well. The posterior labral attachment extended up to the lower part whereas the anterior attachment was limited to the upper part only. On the basis of the biceps attachment to the anterior or posterior labrum, we categorized them into three types of origin. **Conclusion:** The awareness of these normal anatomical variations are significant for arthroscopic diagnosis and may help to explain the various patterns of injury seen in partial or complete detachment of the tendon, the labrum or both.

Key words: glenoid labrum, biceps brachii, anterior labrum, posterior labrum.

INTRODUCTION

The descriptions of the origin of the long head of the biceps brachii tendon in the majority of textbooks and in anatomical works show disagreements, in special, as the relationships of the tendon with the glenoid labrum of the scapula. Anatomical variations of the glenoid bicipital/ labrum complex and the continuity of the superior labrum with the tendon have been described¹. The tendon of the long head of biceps is usually described as arising from the supraglenoid tubercle of the scapula²⁻⁸ but later on studies have shown a dual attachment to the superior glenoid labrum as well as the supraglenoid tubercle⁹⁻¹².

Arthroscopy studies have admitted that the long head of biceps brachii plays an important role in the properly functioning shoulder and in the pathologic mechanism of action in the superior insertion of the glenoid labrum¹³. In arthroscopic examinations, the assessment of the origin of the long head at the supraglenoid tubercle or labrum is important¹. Snyder *et al.*¹⁴ was who first described the SLAP (superior labial, anterior and posterior) lesions. That may be detected if the stability of the biceps/labrum complex is compromised or if the biceps and labrum are frayed. Our objective of

this study is to characterize the anatomical origin of the long head of biceps brachii in humans especially on the glenoid labrum of the scapula.

MATERIAL AND METHOD

We dissected 50 shoulder joints of adult human cadavers of both sexes belonging to the Department of Anatomy, Government Medical College, Surat. The joint cavity was exposed by making an incision in the posterior part of the capsule of the joint. The origin of long head of biceps was dissected and its attachment studied. The glenoid cavity was divided into upper & lower parts to see the extent of the attachment of the tendon to the glenoid labrum i.e. the anterior labrum, and the posterior labrum. We come across three types of attachment:

- I. All the labral part of the attachment was to the posterior labrum.
- II. Most was to the posterior labrum, but with a small extension from the anterior labrum.
- III. Equal contributions to anterior and posterior labrum.

OBSERVATIONS

The long head of biceps tendon was seen to arise from both the supraglenoid tubercle and the glenoid labrum in all the specimens. We found that the origin of long head of biceps is from posterior labrum margin in 100% specimens and in 74% specimens it was arising only from posterior labrum margin (Fig. 1).

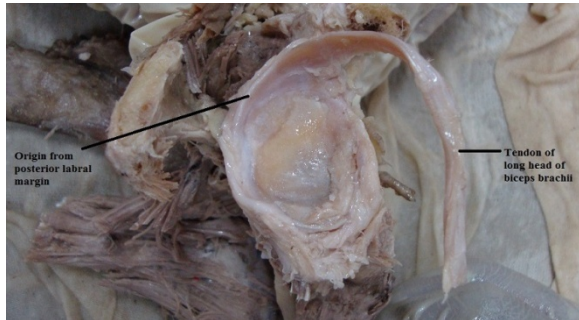


Fig. 1 All the labral part of the attachment was to the posterior labrum

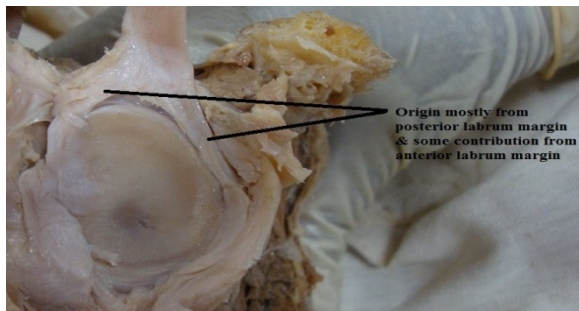


Fig. 2: Most was to the posterior labrum, but with a small extension from the anterior labrum

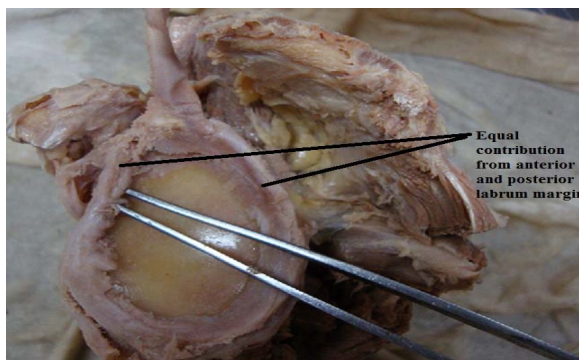


Fig 3: Equal contributions to anterior and posterior labrum

While in 26% specimens it has dual origin from anterior and posterior labral margin. In 20% specimens it arises mostly from posterior labrum and some contribution from anterior labrum (Fig. 2). While in 6% there is equal contribution from anterior and posterior labrum (Fig. 3).

Table 1: Specimens (percentage/frequency) showing origin of long head of biceps from anterior and posterior margin

| Origin from labral margin | Specimens(%) |
|--|--------------|
| Only from posterior margin (type 1) | 37 (74) |
| Most from posterior labrum & some contribution from anterior labrum (type 2) | 10 (20) |
| Equal contribution in origin from anterior and posterior labrum (type 3) | 3 (6) |

The anterior and posterior labral margins were examined to see how far the attachment extended i.e., upper or lower half. In 30% specimen long head arises from upper half of anterior labral margin (Fig. 3). 60% specimen shows origin of long head from upper half of posterior labral margin (Fig. 1) while in 40% it arises from lower half of posterior labral margin (Fig. 4)

Table 2: Percentage distribution of origin of biceps brachii from glenoid labrum

| Origin from glenoid labrum | Upper half | Lower half |
|----------------------------|------------|------------|
| Anterior labral margin | 30% (15) | 0% (0) |
| Posterior labral margin | 60% (30) | 40% (20) |

DISCUSSION

The origin of the long head of the biceps from the supraglenoid tubercle ^{5,10,15} is described in standard texts, but shoulder arthroscopy has revealed all or part of the superior labrum is avulsed from the glenoid, along with the origin of the long head of the biceps during operative procedures.

Anatomical variations in the labral attachment of the biceps tendon help us to explain the association of recurrent shoulder dislocation & labral detachment. The biceps tendon courses over the head of the humerus to continue with the labrum. Thus helping to retain the head in the glenoid fossa and assisting the “rotator cuff”. Our study has demonstrated that in 40% of specimens the posterior labral attachment of the tendon extended up to the lower half of the glenoid cavity. This extensive attachment in the posterior glenoidal labrum is expected to provide a better stability to the shoulder.

Boyd & Sisk ¹⁶ have made surgical use of this labral attachment in patients with detached posterior labrum by combining an operative posterior capsulorrhaphy with a transfer of tendon of long head around the neck of the humerus and across the posterior capsule to be re-attached to the posterior scapular neck. The tendon may be elongated by as much as 1 cm. to achieve this procedure due to the presence of its labral attachment.

In our study we also found that in 30% long head of biceps was attached to the anterior part as well but limited in all cases to the upper half only. None of the specimens showed isolated anterior attachment.

Interpretation of biomechanical electromyography (EMG) data showing maximum activity of long tendon of biceps in the late phase of throwing when the shoulder is abducted & externally rotated¹⁷ and record of a higher, biceps activity in pitchers with known anterior instability¹⁸, wherein the biceps force has been shown to increase the torsional rigidity of the glenohumeral joint by 32%¹⁹. The long head of the biceps may also play a protective role by diminishing the stress placed on the inferior glenohumeral ligament. These studies suggest that the biceps tendon has an active role in anterior shoulder stability.

Shoulder instability in baseball pitchers may be related to the forceful contraction of the injured biceps tendon during the deceleration phase of throwing¹³. Bankart (1938)²⁰ described labral detachment in association with recurrent shoulder dislocation. The term 'SLAP lesion' (superior labrum-anterior to posterior)¹⁴ is used to describe and grade injuries in which biceps tendon, and labrum showed intermingling of the fibres of the biceps with those of the labrum in addition to their definite attachment to the supraglenoid tubercle.

CONCLUSION

Anatomical variations in the labral attachment of the biceps tendon help us to explain the association of recurrent shoulder dislocation & labral detachment. An understanding of variations is essential in evaluating and treating labral pathology in throwing athletes. 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 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.

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