

AN ANATOMICAL STUDY OF THE PROXIMAL ATTACHMENT OF LONG HEAD OF BICEPS TENDON

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ABSTRACT

Background: More Recent studies showed that, the proximal attachment of long head of biceps brachii has dual attachment i.e. to the supraglenoid tubercle of the scapula and glenoid labrum at variable extent. The long head of biceps brachii may be a cause of shoulder pain as an isolated tendonitis of biceps brachii or other pathologies of the shoulder.

Objectives: To define the dual attachment and extent of the labral attachment of long head of biceps brachii anteriorly and posteriorly by gross examination..

Materials and Methods: We studied 189 (Right- 101; Left- 88) cadaveric shoulder joints of unknown sex and age. Careful dissection was carried out of each specimen to see the proximal attachment of long head of biceps by gross examination. The anterior and posterior labral margins were examined carefully to see the extent of labral attachment of long head of biceps brachii tendon (LHBBT). The glenoid cavity was divided into upper, middle and lower parts.

Results and Conclusion: Tendon of long head of biceps brachii was attached to posterior labrum only in 5 cases. In remaining 184 specimens it was attached to supraglenoid tubercle and glenoid labrum anteriorly and posteriorly at variable extent with strong posterior orientation. This knowledge is helpful in not only in evaluation, diagnosis and treating labral pathology of shoulder joint but also for the open glenohumeral surgeries.

KEY WORDS: Long Head Of Biceps Brachii, Glenoid Labrum, Supraglenoid Tubercle, Anterior Labrum, Posterior Labrum.

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INTRODUCTION

Majority textbooks of anatomy described the proximal attachment of Long Head of Biceps Brachii Tendon [LHBBT] to the supraglenoid tubercle of the scapula where it is continuous with superior glenoid labrum [1]. But more recent studies have shown that this glenoid

labrum attachment extent posteriorly and anteriorly at variable distance [2-4]. It is proved through arthroscopic studies that, the LHBBT plays an important role in the properly functioning shoulder [5,6]. Complete absence or absence of the intra-articular part of it can lead to an instability which can allow the humeral head to

damage the glenoid labrum and trap the cuff against the acromion and resulting in rupture of the supraspinatus [7]. The LHBTT may be a cause of shoulder pain as an isolated tendonitis of biceps brachii or other accompanying pathologies of the shoulder such as subacromial impingement syndrome, rotator cuff injuries, superior labrum anterior posterior (SLAP) lesions, glenohumeral instability and sport injuries [8]. Considering the clinical importance of proximal attachment of LHBTT and its role in various pathological conditions, especially in sport injuries which are very frequent nowadays, therefore we decided to work on this topic. The Aim of the present study was to define the dual attachment and extent of the labral attachment of LHBTT anteriorly and posteriorly by gross examination.

MATERIALS AND METHODS

Total of 189 (Right- 101; Left- 88) formalin fixed cadaveric shoulder joints of unknown sex and age were used for this study. These shoulder joints were available in our department of anatomy. We excluded the cases showing attrition of shoulder and rupture of LHBTT from our study. Each specimen was dissected meticulously and joint cavity was exposed by making an incision in the posterior part of the capsule of the joint. Careful dissection was carried out of each specimen to see the proximal attachment of long head of biceps by gross examination. The anterior and posterior labral margins were examined carefully to see the extent of labral attachment of LHBTT. The glenoid cavity was divided into upper, middle and lower parts as shown in figure 1. Photographs were taken with digital camera.

Fig. 1: Showing divisions of Glenoid cavity. U 1/3rd: upper one third, M1/3rd: Middle one third, L1/3rd: Lower one third

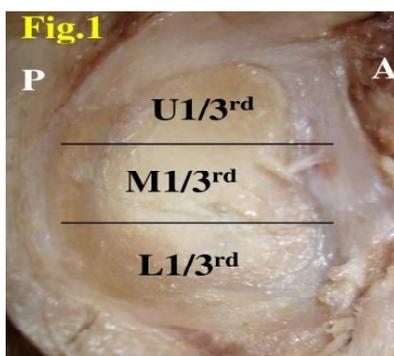


Fig. 2: Showing LHBTT was attached to posterior labrum (blue arrow) only.

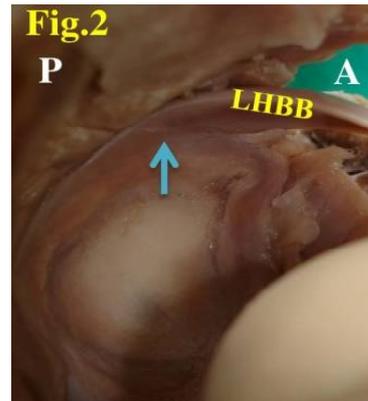


Fig. 3: Showing Type I attachment (upper third part of glenoid labrum: blue arrow)

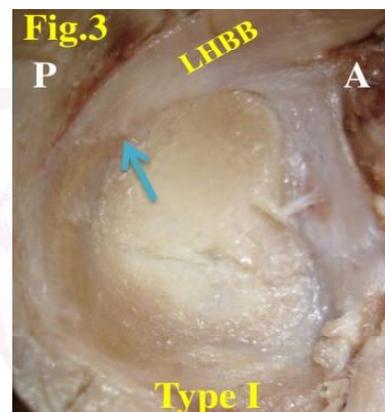


Fig. 4: Showing Type II attachment (contribution to posterior labrum: blue arrow and to anterior labrum: saffron arrow)

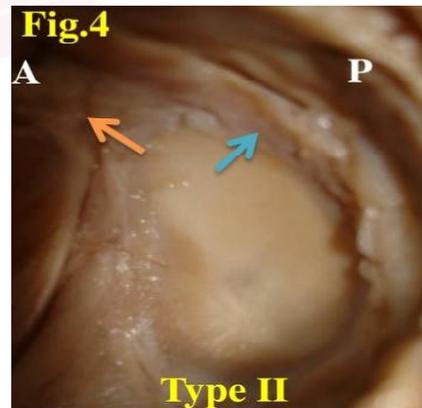


Fig. 5: Showing Type III attachment

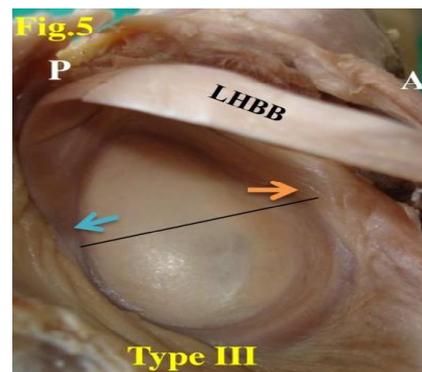


Fig. 6: Showing Type IV (contribution to anterior labrum: saffron arrow and posterior labrum-blue arrow)

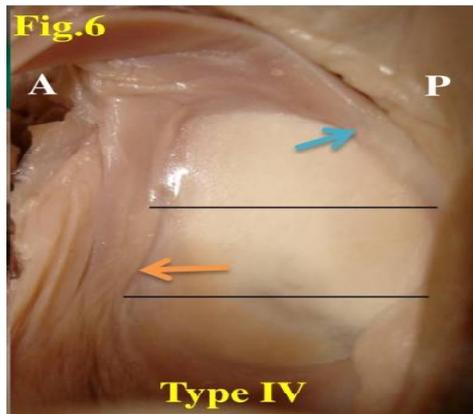
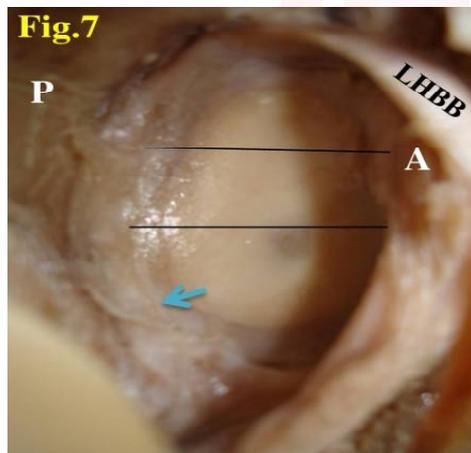


Fig. 7: Showing Extent of the attachment of the LHBBT to the posterior labrum (Type I) up to lower third (blue arrow) which was present in 15% of 189 cases.



RESULTS

We studied the proximal attachment of the tendon of long head of biceps in 189 shoulders. Out of them, 5 were attached to the posterior labrum only i.e. no supraglenoid tubercle attachment (Fig. 2). In remaining 184 (right 98; left- 86) cases we observed that tendon of LHBB had attachment on supraglenoid tubercle as well as on glenoid labrum anteriorly and posteriorly at variable extent. We classified these types of attachment by using Vangsness et al. classification [3] into four types as follows and details are given in Table no. 1

Table 1: Showing the percentage of different types of proximal attachment of LHBBT (n=184).

Type of labral attachment	No of cases			Percentage
	Right	Left	Total	
Type I	59	41	100	54.34
Type II	21	26	47	25.54
Type III	12	18	30	16.3
Type IV	5	2	7	3.8

Type I: Labral attachment is entirely posterior, with no contribution to anterior labrum (Fig.3).

Type II: Most of the labral contribution is posteriorly, with a small contribution to anterior labrum (Fig. 4).

Type III: There are equal contributions to both anterior and posterior parts of labrum (Fig. 5).

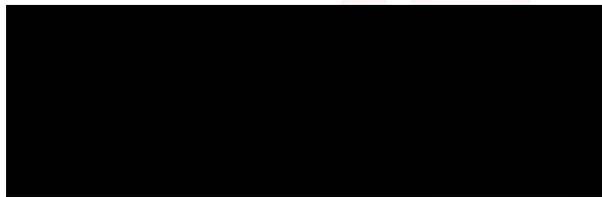
Type IV: Most of the labral contribution is anterior, with a small contribution to posterior labrum (Fig.6) We observed a posterior labral attachment in 100% cases while an anterior labral attachment was present in 44.44% cases. Table no 2 shows the variable extent of the labral attachment of LHBBT to different parts of the glenoid labrum ((i.e. upper, middle and lower third).

DISCUSSION

Anatomical variations of continuity of the LHBBT to glenoid labrum at variable extent have been described by few researchers and most of them agreed that it is attached to anterior and posterior part of glenoid labrum [3]. Electromyographic studies of action of biceps brachii muscle showed that, it has the dynamic action in producing shoulder stability [3,7]. It is most active in the late cocking phase of throwing motion, when shoulder is abducted and extremely rotated [9]. Glousman et al [10] studied the dynamic electromyographic analysis of the throwing shoulder with glenohumeral instability and concluded that, higher biceps activity has been recorded in pitchers with known anterior instability. Bankart [11] studied the pathology of recurrent dislocation of shoulder joint and described labral detachment in association with recurrent shoulder dislocation. The term ‘SLAP lesion’ is used to describe and grade injuries in which all or part of superior labrum is avulsed from glenoid, along with the origin of the LHBB [12]. Present study has demonstrated the extension of LHBBT to the posterior and anterior glenoid labrum (Table 1, 2) and similar observations were described by Pal et al [2], Vangsness et al [3], Tuoheti et al [13] but Jain et al [14] did not observed extension of LHBBT to the anterior labrum. We observed that in 15% of specimens the posterior attachment of LHBBT extended up

to lower one third of glenoid labrum (Fig.7) but Paul et al [15] demonstrated it in 32%. In five specimens, it was attached to posterior labrum only (Fig.2) i.e. no supraglenoid tubercle attachment. In 44.44%, it was attached to the anterior part as well but limited in majority cases to the upper third of glenoid labrum (Table 2). None of the specimens showed isolated anterior attachment and attachment to lower one third part of glenoid labrum. An understanding of the labral attachment of the long tendon of biceps brachii plays an important role in diagnosis, evaluation and surgical correction of labral pathology especially in sport injuries.

Table 2: Percentage of distribution of attachment of LHBBT to different parts of labrum (n=189).



CONCLUSION

The aim of the present study was to demonstrate the dual attachment and variability of the labral attachment of LHBBT and its extent. We observed that this attachment has a strong posterior orientation which is comparable with above mentioned authors. This extensive attachment in the posterior glenoidal labrum is expected to provide a better stability to the shoulder. We also found that, rarely this tendon may not have attachment to supra-glenoid tubercle. In the era of minimal invasive procedure, it is mandatory to have a detailed knowledge of normal and variant anatomy of proximal attachment of LHBBT. This knowledge is helpful in not only in evaluation, diagnosis and treatment of labral pathology of shoulder joint but also for the open glenohumeral surgeries. Further elaborative biomechanical study may demonstrate the relationship between the variations in the anatomy of dual attachment of the LHBBT and different injury patterns.

ABBREVIATIONS

LHBBT - Long head of biceps brachii tendon,

P - Posterior, **A** - Anterior

Conflicts of Interests: None

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