

## Original Article

## Proximal attachment of long head of biceps brachii to the bicipital tubercle of scapula and its functional significance

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## ABSTRACT

**Introduction:** Lesions affecting the tendon of Long Head of Biceps brachii (LHB) are among the more frequent causes of pain and disability in the region of shoulder joint. Shoulder arthroscopy has shown that there is dual attachment of LHB to the Supraglenoid tubercle (SGT) and glenoid labrum, but the origin from the bony prominence on upper part of dorsal surface of neck of scapula has not been described in the literature reviewed. This bony elevation has been named as “Bicipital Tubercle (BT)”. What is astonishing is the fact that such a prominent BT has been either missed or ignored by earlier workers.

**Methods:** During the dissection of the shoulder joint, the tendon of LHB could be separated into superficial and deeper laminae. The fibres of the superficial lamina could be traced to BT in approximately 80% cases.

**Results:** In 70% of specimens LHB was seen to join the posterior labrum; in 20% the anterior labrum and in the remaining to both the labrum. In 57% of right and 65% of the left scapulae the BT was very prominent

**Conclusion:** The efficiency of action of LHB is enhanced by its getting a firm attachment to the bicipital tubercle (BT). Thus in man the origin of the tendon of LHB has shifted from only the SGT to SGT plus labrum, and further has got an additional attachment to BT. This attachment to the BT seems to have been overlooked and demands its inclusion in all the future studies.

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## 1. Introduction

Lesions affecting the tendon of Long Head of Biceps (LHB) are among the more frequent causes of pain and disability in the region of shoulder joint. Phylogenetic and functional considerations are important for the understanding of high degree of vulnerability of the tendon, a liability which man has had to assume in his compromise with nature by the adaptation of erect posture.<sup>1</sup> Origin of Long Head of Biceps Brachii (LHB) has been described in most of the text books of Anatomy,<sup>2–7</sup> and extensively studied by various workers<sup>8–12</sup> who have reported its attachment to the supra glenoid tubercle (SGT) of scapula and the glenoid labrum in a variable manner. The origin from the bony prominence on upper part of dorsal surface of neck of scapula has not been described in the literature reviewed. This bony elevation has been named as ‘Bicipital Tubercle’ (BT), which is easily discernible at this site and its significance from the phylogentic, developmental and

functional point of view has been discussed. What is astonishing is the fact that such a prominent BT has been missed by earlier workers.

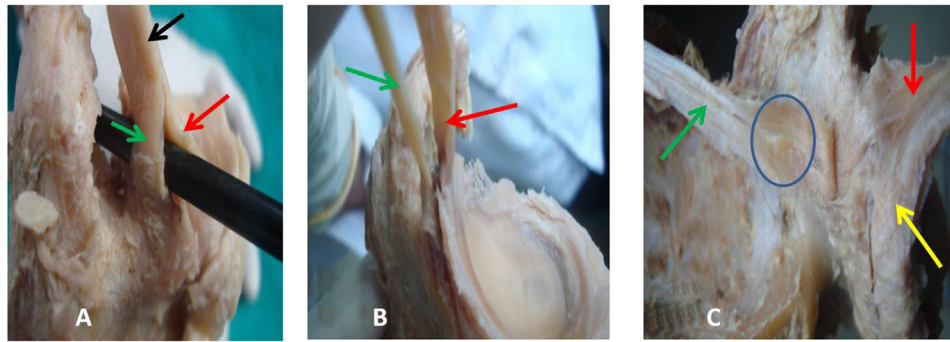
Man has been unable to adapt himself fully to the requirements of erect posture. Changes in the shape of thorax and the functional demands of a prehensile extremity requires its use in relationship to the ventral aspect of the body, thus establishing an example of conflict between function and structure. In the orthograde animals lateral migration of shoulder girdle left the tendon behind on the ventral aspect; as a consequence the bicipital groove no longer lies in the same plane as the centre of the head, but makes an angle of 30° to it.<sup>1</sup> Such a relationship renders the tendon in this region highly vulnerable not only to trauma but also to the wear and tear of every day functions. Analysis of the shape of the bone provides clues to the stresses acting upon it.<sup>13</sup> Hence the attachment of tendon produces an elevation i.e. BT which gives a firm purchase for an efficient functioning of LHB.

## 2. Material and method

Seventy shoulder joints available in the department of Anatomy of this Institution over a period of three years were dissected.

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**Fig. 1.** A: LHB (black arrow) when traced towards the scapula is seen in the form of two laminae – i) superficial green arrow) and ii) deep lamina (red arrow). B: The two laminae have been artificially separated – superficial green arrow) and deep (red arrow). Here the deeper lamina is seen to become continuous with the labrum. C: The two laminae have been further separated to show deeper lamina (red arrow) joining the labrum (yellow arrow); fibres of the superficial lamina (green arrow) are seen to be getting attached to the BT (blue outline).

Periarticular soft tissue around the shoulder joint was removed and the long head of biceps tendon was identified below the bicipital groove of humerus. The tendon was cut transversely at the surgical neck. Later the capsule was incised near its humeral attachment and the LHB was pulled from the bicipital groove and the joint was disarticulated. With little effort the tendon of LHB could be split into a superficial and deep lamina. The scapular component of the joint was observed carefully to note: a) the continuity of LHB with the labrum and the attachment to the supra glenoid tubercle (SGT); and b) the fibres of LHB were traced further through the capsule to its attachment to the BT. All the findings were recorded and where necessary photographed.

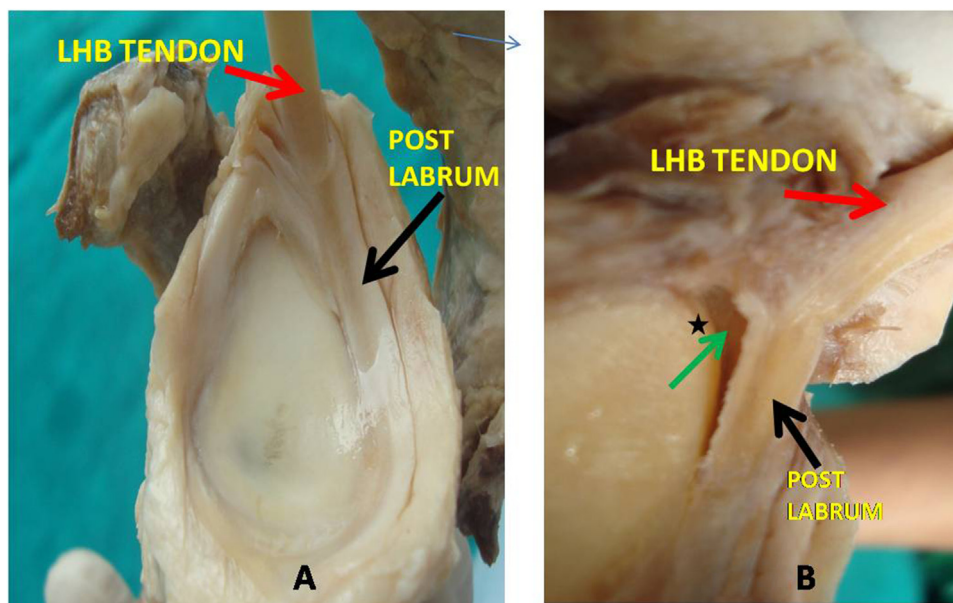
Also 280 (140 right and 140 left) dry, macerated scapulae were utilized for the present work. The dorsal surface of the neck of scapulae was observed for the presence of an elevation (BT) which was graded as very prominent, prominent or not discernible. The beveling of the posterior margin of glenoidal rim was also noted.

### 3. Results

During the dissection of the shoulder joint, in most of the specimens, with little effort, the tendon of LHB could be separated into superficial and deeper laminae (Fig. 1A–C). The tendinous

fibres of the deeper lamina became continuous with either the anterior or posterior labrum (Fig. 2A,B), or both and some were getting attached to the SGT. The fibres of the superficial lamina, which continued as a broad thick tendinous band, could be traced passing through the capsule in its postero-superior part to get attached to the upper part of the dorsal surface of neck of scapula to BT (Fig. 3A,B). In 70% of specimens LHB was seen to join the posterior part of labrum glenoidale; in 20% to the anterior part and in the remaining to both.

- In approximately 80% the tendon was getting attached to the BT, while only in 26% it was seen to extend to the SGT.
- In 57% of right and in 65% of the left scapulae the BT was very prominent (Fig. 4A,B; Fig.5A,B); whereas, in others it was less prominent.
- Incidence of beveling of posterior margin of glenoid cavity was distinctly more on the right side (46.14%), compared to the left (28.2%). On this beveled margin posterior part of the labrum could be moved.
- In a number of specimens there was smooth area at the SGT with a synovial pocket (Fig. 2B) intervening between the labrum and the tubercle.



**Fig. 2.** A: Showing the continuity of LHB tendon (Red arrow) with the labrum, specially the posterior labrum (Black arrow). B: Green arrow shows a deep synovial recess at SGT (black star) and extending downwards deep to the posterior labrum over the beveled margin at the posterior-superior part of the glenoid rim.

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