



Case report: Broad insertion of a large subscapularis tendon in association with congenital absence of the long head of the biceps tendon

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Abstract

Congenital absence of the long head of the biceps (LHB) tendon is a rare variation in shoulder anatomy. The authors present a case of congenital absence of the long head of the biceps tendon associated with a large insertion of the subscapularis muscle. The patient initially presented with shoulder pain on overhead activity. Shoulder examination was negative for signs of a torn biceps tendon. MRI revealed congenital absence of the LHB tendon, a rim rent tear of the supraspinatus, and a large insertion of the subscapularis muscle. This is the first reported case describing a large insertion of the subscapularis muscle associated with absence of the LHB tendon.

Keywords Long head of biceps tendon · Congenital absence · Congenital absence of long head of biceps tendon · Subscapularis · Large subscapularis insertion · Shoulder · Magnetic resonance imaging

Introduction

Congenital absence of the long head of the biceps (LHB) tendon is a rare anomaly, with only 18 reported cases in the English literature [1–15]. We present the MRI findings in a patient who presented with unilateral shoulder pain and was found to have congenital absence of the LHB tendon and a supraspinatus tear. To our knowledge, this article is the first to report a large insertion of the subscapularis muscle associated with absence of the LHB tendon.

Case report

A 25-year-old previously healthy male rugby player presented with left shoulder pain of few weeks duration. He denied any traumatic incident or any injury to his shoulder. His main complaint was left shoulder pain with overhead activities.

He had no history of connective tissue diseases or congenital abnormalities.

Physical examination of his left upper extremity revealed no “Popeye sign” to suggest a torn retracted biceps tendon and there was no functional deficiency suggestive of a frank tear in the biceps tendon. His shoulder examination revealed normal contour, full symmetric range of motion in all planes, and full muscle strength. Speed’s maneuver was negative, and O’Brien’s test was positive. Magnetic resonance imaging (MRI) of the left shoulder was conducted and revealed the absence of the LHB tendon and absence of the bicipital groove (Fig. 1a). A rim rent tear of the supraspinatus tendon was appreciated (Fig. 2), in addition to a subscapularis tendon measuring 12 mm in width (Fig. 3a). For comparison, MRI of the contralateral shoulder was done and revealed normal bicipital groove and LHB tendon (Fig. 1b), with the right subscapularis tendon measuring 7 mm in width (Fig. 3b). No further investigations were made, and the patient was instructed to follow up with physical therapy.

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Discussion

The Biceps Brachii is one of the most morphologically diverse muscles in the human body [12]. The most frequently reported variation is the presence of supernumerary heads, most

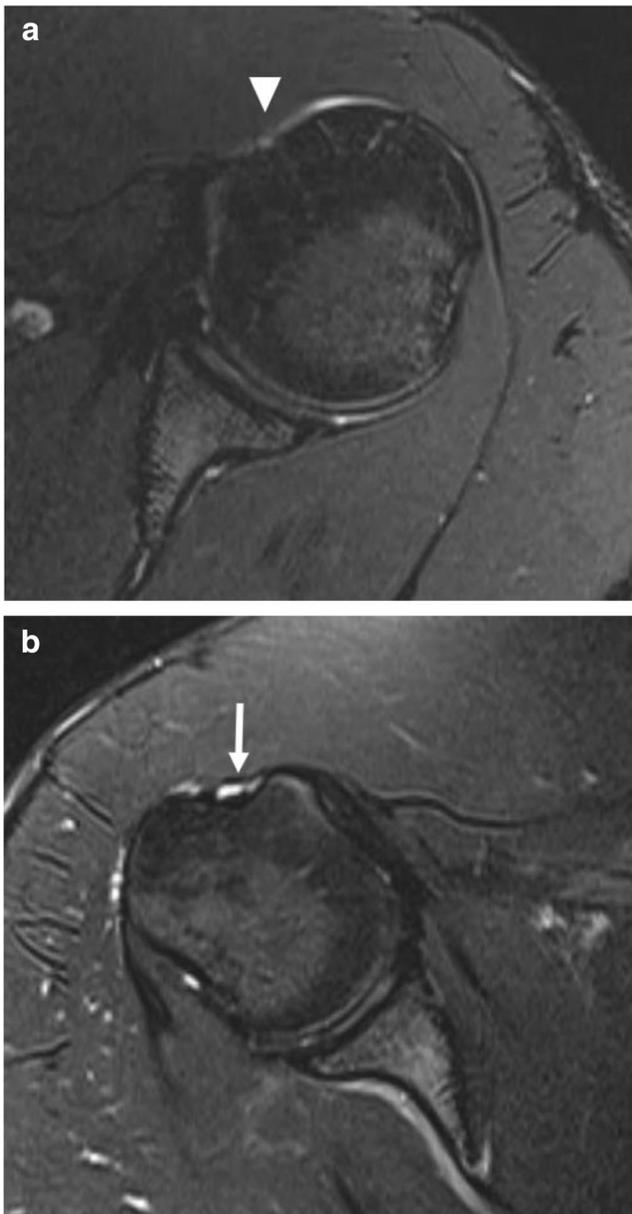


Fig. 1 Axial proton density MRI sequence with fat saturation of both shoulders. **a** Absent bicipital groove and absent biceps tendon. **b** Contralateral image shows normal bicipital groove and tendon

commonly three heads, with a prevalence of 8–20% in cadaveric studies [16]. In contrast, congenital absence of the LHB tendon is an exceedingly rare anomaly. To our knowledge, only 18 cases [1–15] have been reported in the English literature, all of whom presented with either shoulder pain or instability as their chief complaint. On physical examination, none of the cases displayed the typical “Popeye” sign. On MRI, a shallow or absent bicipital groove is pathognomonic of congenital absence of the LHB tendon, and was reported in all previous cases. This finding can aid in ruling out the more common differential diagnosis of a frank tear when the tendon is not visualized on MRI.



Fig. 2 Coronal oblique proton density MRI sequence with fat saturation shows a rim rent tear of the supraspinatus (*arrow*)

The association between congenital absence of the LHB tendon and congenital abnormalities such as spina bifida, VATER syndrome, and congenital limb abnormalities has been described in the literature. This association is believed to occur due to fetal insult during biceps differentiation in the sixth or seventh week of gestation [14, 17].

Several cadaveric and electromyogram studies [18–20] have hypothesized that the tendon of the LHB is a dynamic stabilizer of the anterior shoulder that increases resistance to torsional forces and decreases stress on the inferior glenohumeral ligament. Keefe et al. hypothesize that absence of the LHB tendon leads to increasing strain on the labrum and rotator cuff muscles, possibly leading to tears [6], as was the case in our patient. Only three reported cases in the literature have noted a supraspinatus tear, all of whom reported no inciting traumatic event or functional disability, presenting with shoulder pain as the chief complaint [7, 8].

The subscapularis originates from the anterior surface of the scapula, in the subscapular fossa, coursing beneath the coracoid and scapular neck. The tendinous component inserts on the lesser tuberosity of the humerus, while the muscular part inserts on the humeral neck slightly distal to the lesser tuberosity [21]. Several cadaveric studies have described the subscapularis footprint as having a broad and wide superior insertion, which narrows down distally forming a trapezoidal shape [21, 22]. Ide et al. found no significant difference between measurements of the subscapularis tendon insertion between left and right side in their cadaveric study [21]. As part of the rotator cuff, the subscapularis functions to provide glenohumeral compression, stability, abduction, and internal rotation [23].

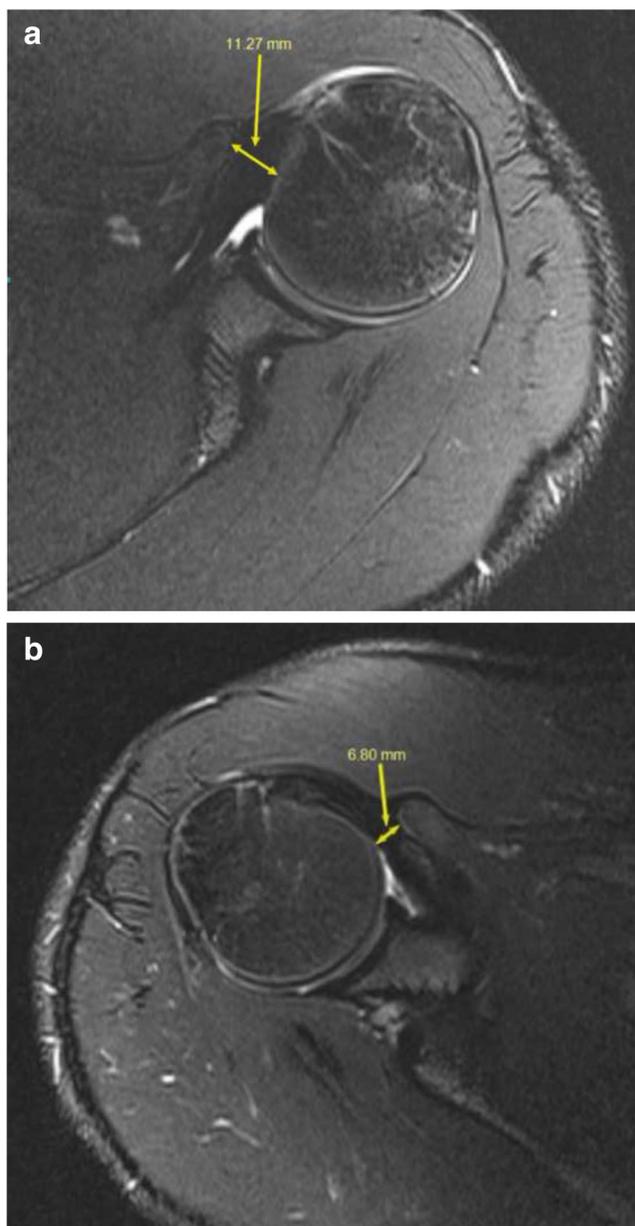


Fig. 3 Axial proton density MRI sequence with fat saturation of both shoulders. **a** Thick subscapularis tendon with broad proximal humeral insertion measuring 12 mm in thickness. **b** Contralateral image shows normal subscapularis tendon measuring 7 mm in thickness

Biceps instability with subluxation is commonly associated with tears in the subscapularis tendon. In cases of instability over an intact subscapularis tendon, the rotator interval may become disrupted [2, 24].

Rahman et al. found that a single tear of the supraspinatus tendon causes a change in both structural and mechanical properties of the subscapularis and infraspinatus. Four to eight weeks after supraspinatus tear, the area of the subscapularis and infraspinatus increased, while the elastic modulus decreased [25]. This may be due to compensation of the subscapularis and infraspinatus muscles to maintain shoulder stability.

Our case is the first to describe a large insertion of the subscapularis muscle associated with absence of the LHB tendon. We believe that absence of a bicipital groove from the anomalous biceps allows for a larger area available for subscapular insertion, in addition to compensatory hypertrophy of the subscapularis to maintain shoulder stability.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

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