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ANATOMICAL VARIANT OF THE BICEPS BRACHII'S MUSCULOTENDINOUS SLIP: A CASE REPORT

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Abstract: Background: The biceps brachii is the main muscle at the front of the upper arm. Normally, it has two points of origin at the shoulder and attaches to the radius bone near the elbow, along with a flat tendon sheet called the bicipital aponeurosis. **Case Presentation:** During a routine dissection of a human body, we found an unusual structure on the left side. The short head of the biceps muscle did not start normally. Instead, its origin was formed partly as a muscle and partly as a tendon- a musculotendinous slip. **Conclusion:** This type of anatomical variation is important for doctors and surgeons to know. Recognizing it can help prevent accidental damage to nearby nerves and blood vessels. It is also useful during surgery to repair a torn proximal biceps tendon.

Keywords: Biceps brachii; anatomical variation; musculotendinous slip; case report; upper limb anomaly; tendon variability; accessory slip

Introduction

The biceps brachii (BB) is one of three muscles in the front of the arm, along with the brachialis and coracobrachialis. Normally, the BB has two heads: the short head arises from the coracoid process of the scapula, and the long head from the supraglenoid tubercle.[1] The muscle inserts onto the radial tuberosity and the bicipital aponeurosis.[2,3] It is supplied by the musculocutaneous nerve[4] and functions mainly to flex the elbow and supinate the forearm.[5] However, the biceps brachii is known to show frequent anatomical variations, including changes in the number of heads or sites of origin and insertion.[6] Knowing these variations is clinically important because it helps surgeons better plan repairs for biceps tendon ruptures and assess tear size based on the attachment pattern.[7]

1.1 Embryology

During the fifth week of intrauterine life, mesodermal somites differentiate into myoblasts, which go on to form the muscles of the upper limb. The anterior muscle condensation specifically gives rise to the biceps brachii and other flexor muscles.[8] Abnormal splitting of this muscle mass during development can lead to musculotendinous variations, such as the presence of an extra slip.[8] A review of various articles shows that the biceps brachii often displays anatomical variations, including differences in the number of muscle bellies and the patterns of origin and insertion.[9,10]

1.2 Musculotendinous Landmark of the Arm [11]

The biceps brachii tendon can be felt between two fingers. The sharp upper edge of the bicipital aponeurosis is felt on the front and inner side of the elbow.

a) Attachments [12]

The short head arises from the coracoid process; the long head from the supraglenoid tubercle. The tendon gives off the bicipital aponeurosis, which crosses the brachial artery and joins the deep fascia over the forearm flexor muscles.

b) Relations [13]

Proximally – pectoralis major and deltoid
Distally – fascia and skin
Medially – coracobrachialis and brachial vessels
Laterally – deltoid and brachioradialis

c) Vascular Supply [14]

Supplied by the superior/inferior ulnar collateral, subscapular, axillary, and profunda brachii arteries.

d) Innervation [15]

Supplied by the musculocutaneous nerve (from the lateral cord of the brachial plexus), which later becomes the lateral cutaneous nerve of the forearm.

e) Action [16]

Supinates the forearm, especially during rapid or resisted movement. Also flexes the elbow when the forearm is supinated.

f) Clinical Testing [17]

With the forearm supinated, the biceps is tested by palpating it during elbow flexion against resistance. The biceps jerk reflex (using a hammer) tests C5 nerve root.

2. Materials and Methods

During a routine dissection of the left upper limb, performed according to standard anatomical guidelines, we examined a formalin-fixed male cadaver approximately 70 years of age. The biceps brachii muscle was carefully cleaned. Dissection began with removal of the skin and superficial fascia from the shoulder, the anterior and medial arm, and the anterior forearm. Next, we visualized the lateral, medial, and posterior cords of the brachial plexus, as well as the biceps brachii, coracobrachialis, and brachialis muscles. The origin, insertion, and nerve supply of the biceps brachii were observed and recorded for any variation. Both upper limbs were compared, and a difference in the origin of the muscle was noted on the left side.

3. Result

The right-sided biceps brachii muscle appeared normal, with its origin and insertion matching the standard description found in most anatomy textbooks. In contrast, the left-sided biceps brachii muscle showed a clear anatomical variation. Specifically, an accessory musculotendinous slip originating from the short head of the biceps brachii was observed on the left side. This anomalous slip arose directly from the tip of the coracoid process. The area was

carefully cleaned to expose the variant structure clearly, and a photograph was taken for documentation.

4. Case Report

During a dissection conducted in the Anatomy Department of Faculty of Health Sciences, Dadeldhura, Nepal in June 2025, an anatomical variation of the biceps brachii tendon was observed in a formalin-fixed male cadaver approximately 70 years of age.

On the left arm, the short head of the biceps normally arises from the coracoid process tip, and the long head from the supraglenoid tubercle. While the right-sided biceps brachii showed a normal origin and insertion as described in standard anatomy textbooks, the left side presented a variation. The insertion was normal, but the origin took the form of a musculotendinous slip that passed through the bicipital groove.

Figure1: Right side -normal origin and insertion

Figure2: Left side Musculo-tendinous origin of Biceps Brachii muscle

5. Discussion

Previous studies on variations of the biceps brachii muscle:

According to various article reviews, the biceps muscle shows several attachment variations, including one tendon, two-band tendon, and three-band shaped tendons.[18] Another reported morphological variation is the number of heads of origin, ranging from 3 to 7 heads.[19] These variations typically have no adverse effect on normal arm function.

Clinical and surgical considerations:

Understanding the anatomical, embryological, and functional aspects of the biceps, along with its morphological variations, helps clinicians plan better diagnosis and management of upper limb disorders. This knowledge can also minimize the risk of neurovascular injuries.[19]

Surgical considerations [19]

For conditions affecting the proximal long head of the biceps tendon, treatment options include:

1. Physical therapy with proximal biceps stretching and strengthening exercises
2. Pharmacologic treatment using nonsteroidal anti-inflammatory drugs (NSAIDs)

Clinical significance [20]

1. Rotator cuff tear
2. Musculocutaneous nerve injury — leads to weakness of forearm supination (biceps) and flexion (biceps and brachialis), plus loss of sensation on the lateral forearm
3. Biceps tendonitis — caused by recurrent microtrauma from overuse and repetitive overhead activities (e.g., baseball, tennis, swimming, weightlifting) 4. Proximal biceps tendon rupture

6. Conclusion

Knowledge of anatomical variations in the biceps brachii, such as the musculotendinous slip described in this case report, can improve preoperative diagnosis and management of upper limb disorders. These variations may also compress nearby neurovascular structures. Clinically, this finding is especially important during proximal biceps tendon repair surgery, where surgeons must proceed carefully to avoid complications.

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