

VARIATION IN THE INSERTION OF BICEPS BRACHII MUSCLE: A CASE REPORT

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Abstract

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Introduction: Biceps brachii is a large, fusiform muscle of upper limb having two heads of origin; the short head arising by a thick flattened tendon from the apex of the coracoid process and the long head from supraglenoid tubercle of the scapula. The flattened tendon at the lower end rotates as it passes through the cubital fossa to its insertion into the posterior border of tuberosity of the radius.

Case History: During routine cadaveric dissection of undergraduate teaching program in SRMS IMS, Bareilly, we found rare variation in the insertion of biceps. We observed unilateral variation in the insertion of biceps muscle. The biceps tendon at its insertion was divided into three distinct parts. Main tendon of long head inserts on radial tuberosity. This tendon of long head sends musculotendinous slip to pronator teres muscle. The short head sends musculotendinous slip to flexor carpi radialis and its tendon does not insert on radial tuberosity despite formation of common belly with long head. The origin of muscle is normal and from two heads – short head and long head. The muscle is supplied by musculocutaneous nerve.

Conclusion: The triple tendon insertion may allow an element of independent function of each portion of the biceps, and during repair of an avulsion, the surgeon should ensure correct orientation of both tendon components.

Keywords: Biceps Brachii, Pronator teres, Flexor carpi radialis

INTRODUCTION

Biceps brachii is a large, fusiform muscle of upper limb having two heads of origin; the short head arising by a thick flattened tendon from the apex of the coracoid process and the long head from supraglenoid tubercle of the scapula. The two tendons lead to elongated bellies that, although closely applied, can be separated to within 7 cm or so of the elbow joint. The flattened tendon at the lower end rotates as it passes through the cubital fossa to its insertion into the posterior border of tuberosity of the radius. At the level of the elbow joint, the tendon has a broad medial expansion, the bicipital aponeurosis, which is inserted by way of the deep fascia of forearm into subcutaneous border of the upper end of the ulna.

The anatomy of the distal biceps tendon has not been studied in detail till date. Sufficient literature is available on origin of Biceps but the variability in its insertion has not been thoroughly explored.

CASE HISTORY

During routine cadaveric dissection of upper limb for a graduate teaching programme in SRMS IMS, Bareilly we observed rare variation in insertion of biceps.

The present study revealed an unusual unilateral variation in the insertion of biceps brachii muscle of upper limb. The origin of biceps brachii was normal, i.e. short head arising from tip of coracoid process and long head arising from supra-glenoid tubercle of the scapula. At the insertion, biceps tendon was dividing into three distinct parts. We could trace the bellies of long and short heads of biceps and they were partially fused. Main tendon of long head of biceps was inserted on radial tuberosity. This tendon of long head sends musculotendinous slip to muscle belly of pronator teres. This musculotendinous slip was present superficial to brachial artery and median nerve. The tendon of short head continued as a musculotendinous slip towards muscle belly of flexor carpi radialis. Tendon of short head

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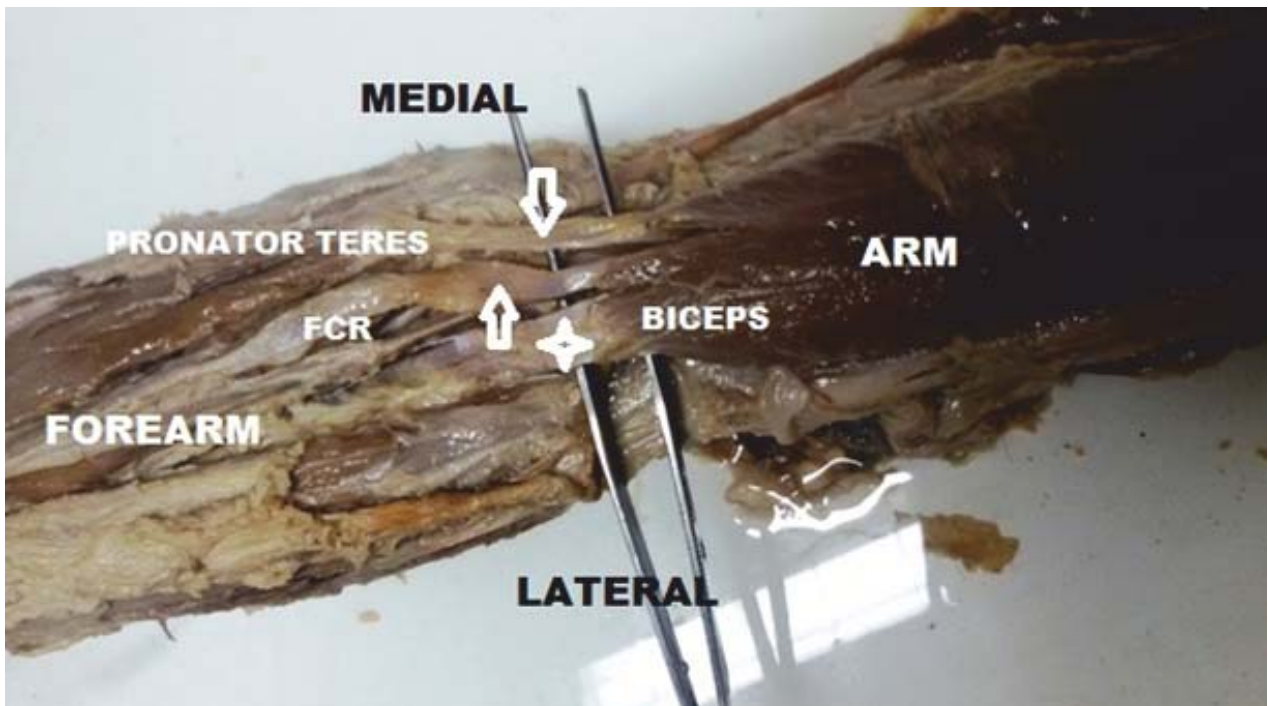


Fig:1 showing additional musculotendinous slips from biceps tendon (star) to pronator muscle belly (down arrow) and flexor carpi radialis muscle belly (up arrow).

did not insert on radial tuberosity. The muscle was supplied by musculocutaneous nerve (Fig.1).

DISCUSSION

Biceps brachii is considered most variable muscle of upper limb with respect to its origin but we found variability in its insertion. Only few cases have been reported on the variations related to the insertion of the muscle. Embryologically, the upper limb develops from somites that migrate to form the limb bud. These somites under higher molecular regulation lead to muscle formation by differential growth and apoptosis. Usually the variations of the muscle arise due to unevenness in the expression of genes and process, thus resulting in absence, presence or abnormal orientation of the muscle or its part.¹

Paval J and Mathew JG, described a case of abnormal insertion in which main tendon inserted on the radial tuberosity, but some of the fibres from the medial side, below the middle of arm form muscle belly. The tendon of this muscle belly divided into medial and lateral slips. Medial slip was inserted on the medial supracondylar ridge of humerus and the lateral slip merged with the fascial covering of flexor carpi ulnaris and was found superficial to brachial artery and median nerve.² While, we found in our study that long head of biceps brachii sends musculotendinous slip to muscle belly of pronator teres.

The tendon of short head sends musculotendinous slip to muscle belly of flexor carpi radialis and tendon of short head does not insert on radial tuberosity.

Eames M S et Al. found that the tendon of the long head passed deep to the tendon of the short head to insert more proximally. The tendon of the short head inserted in a fan like fashion into the distal portion of radial tuberosity.³ But our findings are distinct as biceps brachii sends musculotendinous slip to muscle belly of pronator teres and the tendon of short head sends musculotendinous slip to muscle belly of flexor carpi radialis.

Daimi SR et al found that biceps tendon is inserted by two distinct tendons on the radial tuberosity.⁴ These findings are also different from our finding.

Trivedi et al. observed a case of abnormal musculotendinous slip arising from tendinous head of biceps at its insertion extending from medial side of muscle belly and was gaining attachment to the pronator teres as well as to flexor carpi radialis.⁵ These findings are similar to our findings.

According to Gray's Anatomy, biceps muscle ends in a flat tendon attached to the rough posterior area of the radial tuberosity, a bursa separating tendon and its smooth anterior area.⁶ But in our study we found tendon of long head of biceps was inserted on radial tuberosity and it also

sends musculotendinous slip to muscle belly of pronator teres while tendon of short head ends in musculotendinous slip which is going towards flexor carpi radialis.

The variation in insertion of distal biceps tendon had not been studied in detail. We did not find much literature about the biceps tendon which is giving two musculotendinous slips to muscle bellies of pronator teres and flexor carpi radialis despite extensive search. The presence of these musculotendinous slips may affect kinematics of the biceps muscle. It may affect the direction of pull of muscle. The musculotendinous slip for flexor carpi radialis may have significant role in the increased power of flexion. The slip for pronator teres may affect pronation.

Knowledge of these musculotendinous slips is crucial in avoiding pitfalls while performing tendon reconstruction and repair in cases of avulsion.

CONCLUSION

The triple tendon insertion may allow an element of independent function of each portion of the biceps. During repair of an avulsion, the surgeon should ensure correct orientation of both tendon components.

REFERENCES

1. Mooney EK, Loh C. Hand Embryology Gross Morphologic Overview of Upper Limb Development. Source – <http://emedicine.medscape.com/article/1287982-overview>.
2. Paval J, Mathew JG (2006). A rare variation of the biceps brachii muscle. *Ind J Plastic Surg.* 29 (1):65-67.
3. Eames M H A, Bain G I, Fogg Q A, and Van Riet RP (2007). Distal biceps tendon- Anatomy: A cadaveric study. *J Bone Joint Surg Am* 89:1044-1049.
4. Daimi SR, Siddiqui AU, Wabale RN, Gandhi KR (2010). Additional tendinous insertion of biceps brachii: a case report. *Pravara Med Rev.* 2(1):16-18.
5. Trivedi S., Sinha MB, Sharma DK, Rathore M, Siddiqui AU (2015). Abnormal musculotendinous slip from Biceps Brachii to Pronator Teres: A case report. *International Journal of Biomedical and Advance Research.* 6(01):64-66.
6. Williams PL, Warwick R, Dyson M, Bannister LH. *Gray's Anatomy*, 37th Ed. Churchill Livingstone, New York. 1989. pp.615.

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