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Original article

Bicipital aponeurosis. Anatomical study and clinical implications☆

Edie Benedito Caetano, Luiz Angelo Vieira, Tyago Araújo Almeida, Luis Andres Montero Gonzales, José Eduardo de Bona, Thais Mayor Simonatto*

Faculdade de Ciências Médicas e da Saúde, Pontifícia Universidade Católica de São Paulo (PUC-SP), Sorocaba, SP, Brazil

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ABSTRACT

Objective: The aim of this study was to analyze the anatomic variations of the bicipital aponeurosis (BA) (*lacertus fibrosus*) and its implications for the compression of the median nerve, which is positioned medially to the brachial artery, passing under the bicipital aponeurosis.

Methods: Sixty upper limbs of 30 cadavers were dissected, 26 of which were male and four, female; of the total, 15 had been previously preserved in formalin and glycerine and 15 were dissected fresh in the Laboratory of Anatomy.

Results: In 55 limbs, short and long heads of the biceps muscle contributed to the formation of the BA, and the most significant contribution was always from the short head. In three limbs, only the short head contributed to the formation of the BA. In two limbs, the BA was absent. The length of the bicipital aponeurosis from its origin to its insertion ranged from 4.5 to 6.2 cm and its width, from 0.5 to 2.6 cm. In 42 limbs, the BA was thickened; of these, in 27 it was resting directly on the median nerve, and in 17 a high insertion of the humeral head of the pronator teres muscle was found, and the muscle was interposed between the BA and the median nerve.

Conclusion: These results suggest that a thickened BA may be a potential factor for nerve compression, by narrowing the space through which the median nerve passes.

☆ Study conducted at the Faculdade de Ciências Médicas e da Saúde, Pontifícia Universidade Católica de São Paulo (PUC-SP), Sorocaba, SP, Brazil.

* *Corresponding author.*
E-mail: ediecaetano@uol.com.br (E.B. Caetano).

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Aponeurose bicipital. Estudo anatômico e implicações clínicas

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Cadáver

RESUMO

Objetivo: Analisar as variações anatômicas da aponeurose bicipital (*lacertus fibrosus*) e suas implicações na compressão do nervo mediano, que passa sob a aponeurose bicipital (AB) e se posiciona medialmente à artéria braquial.
Método: Foram dissecados 60 membros superiores de 30 cadáveres adultos, 26 do sexo masculino e quatro do feminino; 15 haviam sido previamente preservados em formol e glicerina e 15 foram dissecados a fresco no Laboratório de Anatomia.
Resultados: Em 55 membros, a AB recebia contribuição das cabeças curta e longa do musculo bíceps braquial, a contribuição mais significativa foi sempre da cabeça curta. Em três membros recebia contribuição exclusiva da cabeça curta. Em dois membros, a AB estava ausente. O comprimento da AB desde sua origem até sua inserção variou entre 4,5 e 6,2 cm e sua largura entre 0,5 e 2,6 cm. Em 42 membros, a AB apresentava-se espessada, em 27 apoiava-se diretamente sobre o nervo mediano e em 17 havia inserção alta da cabeça umeral do músculo pronador redondo, de forma que o músculo ficava interposto entre a AB e o nervo mediano.
Conclusão: Esses resultados sugerem que a AB espessada pode ser um dos fatores potenciais da compressão nervosa, por estreitar o espaço no qual passa o nervo mediano.

Introduction

The median nerve is formed by the junction of the lateral and medial fascicles of the brachial plexus. In the middle third of the arm, it crosses laterally to medially, in front of the brachial artery, both enveloped by a neurovascular sheath.[1] It proceeds toward the cubital fossa, where it is located medially to the brachial artery and tendon of the biceps brachii muscle, then passes posteriorly to the bicipital aponeurosis (BA), and then usually continues between the humeral and ulnar heads of the pronator teres muscle.[2]

The biceps brachii is an important muscle of the anterior compartment of the arm. It is formed by its long and short heads that are inserted on the bicipital tuberosity of the radius. The BA is a thickening of the brachial fascia that joins the biceps brachii to the ulna, covering the proximal portion of the flexor-pronator muscle group. There are multiple theories to explain the function of the BA[3]: (1) To protect the underlying neurovascular bundle in the cubital fossa. (2) To provide proprioceptive information for the biceps brachii muscle, based on muscle activity in the forearm. (3) To serve as an additional anatomical anchorage for the biceps tendon.[3]

Variations in origin, dimensions, and thickening of the BA have been described.[1,4] Some authors[5,6] consider that a thickened BA can compress the median nerve and cause motor and sensory symptoms. It is one of the causes of the pronator teres syndrome, one of the three compressive syndromes that affect the median nerve; the other two are anterior interosseous nerve syndrome and the much more common carpal tunnel syndrome. Compression is called pronator teres syndrome, regardless of the site, because it is between the two heads of this muscle that it occurs more frequently.[7,8]

Compression of the median nerve in the elbow region is a condition usually caused by the presence of fibrous bands, which can be observed at four anatomical sites in the following order of frequency[7]: between the superficial and deep heads of the pronator teres muscle; in the arcade formed by the proximal insertions of the superficial flexor muscle; in the BA; and in Struthers ligament, associated or unassociated with the humeral supracondylar process. Clinically, it is not easy to identify the exact location of the compression. Tinel's sign may be useful to identify the location of the compression. The results of electrophysiological tests are consistent with nerve compression in the elbow region, suggesting (but not confirming) the exact location of the compression. Identification of the structure responsible for nerve compression is only possible through surgical exploration of the nerve in the antecubital fossa.[2,6,9]

This study is aimed at analyzing, through anatomical dissections of 60 limbs of 30 cadavers, the relationship between the BA and the median nerve and thus contributing to a better understanding of the possible role of the BA in nerve compression at this site.

Material and methods

In the present study, 60 forearms of 30 adult cadavers belonging to the Laboratory of the Department of Anatomy were dissected, of which 26 were male and four were female; 15 had been previously preserved in formaldehyde and glycerin and 15 were fresh dissected cadavers. Age ranged from 28 to 77 years; 17 of the cadavers were white and 13 were non-white. Cadavers whose forearms were deformed by traumas, malformations, and scars were excluded. Dissection was performed through a midline incision in the arm and forearm; two flaps, including the skin and subcutaneous tissue, were folded to the radial and ulnar sides, respectively. The same was performed in the fascia of the arm and forearm, so as to

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