



Original article

Anatomical variations of pronator teres muscle: predispositional role for nerve entrapment[☆]



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ABSTRACT

Objective: To assess the anatomical variations of the pronator teres muscle (PTM) and its implication in the compression of the median nerve, which passes through the humeral and ulnar heads of the PTM.

Methods: For the present study, 100 upper limbs from human cadavers from the anatomy laboratory were dissected. Forty-six specimens were male and four, female, whose aged ranged from 28 to 77 years; 27 were white and 23, non-white. A pilot study consisting of six hands from three fresh cadaver dissections was conducted to familiarize the authors with the local anatomy; these were not included in the present study.

Results: The humeral and ulnar heads of PTM were present in 86 limbs. In 72 out of the 86 limbs, the median nerve was positioned between the two heads of the PTM; in 11, it passed through the muscle belly of ulnar head of the PTM, and in three, posteriorly to both heads of the PTM. When both heads were present, the median nerve was not observed as passing through the muscle belly of the humeral head of PTM. In 14 out of the 100 dissected limbs, the ulnar head of the PTM was not observed; in this situation, the median nerve was positioned posteriorly to the humeral head in 11 limbs, and passed through the humeral head in three. In 17 limbs, the ulnar head of PTM was little developed, with a fibrous band originating from the ulnar coronoid process, associated with a distal muscle component near the union with the humeral head. In four limbs, the ulnar head of the MPR was represented by a fibrous band. In both limbs of one cadaver, a fibrous band was observed between the supinator muscle and the humeral head of the PTM, passing over median nerve.

Conclusion: The results suggest that these anatomical variations in relationship median nerve and PTM are potential factors for median nerve compression, as they narrow the space through which the median nerve passes.

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[☆] Study conducted at the Pontifícia Universidade Católica de São Paulo, Faculdade de Ciências Médicas e da Saúde, Disciplina de Ortopedia e Traumatologia, Sorocaba, SP, Brazil.

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Variações anatômicas do músculo pronador redondo e sua importância nas síndromes compressivas

R E S U M O

Palavras-chave:

Pronação
Nervo mediano
Síndromes de compressão nervosa

Objetivo: Analisar as variações anatômicas do músculo pronador redondo (MPR) e suas implicações na compressão do nervo mediano, que passa entre as cabeças umeral e ulnar do MPR.

Método: Foram dissecados 100 membros superiores de cadáveres adultos pertencentes ao laboratório de anatomia; 46 cadáveres eram do sexo masculino e quatro do feminino. A idade variou entre 28 e 77 anos; 27 eram da etnia branca e 23, não branca. Um estudo piloto que incluiu três cadáveres frescos foi feito, para familiarização dos autores com a anatomia regional. Esses não foram incluídos no estudo.

Resultados: Em 86 membros, observou-se a presença das cabeças umeral e ulnar do MPR. Em 72 dos 86 membros, o nervo mediano estava posicionado entre as cabeças umeral e ulnar do MPR; em 11, esse encontrava-se através da massa muscular da cabeça ulnar do MPR e em três, o nervo mediano estava posicionado posteriormente às duas cabeças do MPR. Nos casos em que as duas cabeças do músculo estavam presentes, não se observou o nervo mediano passando através da massa muscular da cabeça umeral do MPR. Em 14 dos 100 membros dissecados, a cabeça ulnar do MPR não estava presente. Nessa situação, o nervo mediano posicionava-se posteriormente à cabeça umeral em 11 membros e através da cabeça umeral em três membros. Em 17 membros, a cabeça ulnar estava muito pouco desenvolvida, com conformação fibrosa em sua origem no processo coronoide da ulna, associada a um componente muscular distal, próximo a sua união com a cabeça umeral. Em quatro membros, a cabeça ulnar do MPR estava representada apenas por uma banda fibrosa. Nos dois membros de um cadáver, observou-se uma expansão fibrosa que saía do músculo supinador para a cabeça umeral do MPR, passando como uma cinta sobre o nervo mediano.

Conclusões: Esses resultados sugerem que as variações anatômicas na relação nervo mediano e MPR representam fatores potenciais para compressão nervosa, por estreitar o espaço no qual passa o nervo mediano.

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Introduction

There are several anatomical structures that can compress the median nerve near the elbow joint. From proximal to distal, the compression may be caused by the Struthers' ligament^{1,2} with or without the supracondylar process of the humerus, by aponeurotic expansion of the biceps brachii muscle (*Lacertus fibrosus*),^{3,4} between the humeral and ulnar heads of the pronator teres muscle (PTM),^{5,6} by the vascular network of the region,⁷ and by the arch formed by the two insertions of the superficial flexor muscle of the fingers.⁸

Regardless of these sites where compression occurs, this condition is termed pronator teres syndrome, because the compression occurs most frequently between the two heads of this muscle.⁹⁻¹¹ The main causes are the anatomic variations of the PTM. The normal anatomical pattern described by the classical anatomy studies¹²⁻¹⁴ is that the PTM is constituted by two heads. The humeral head, more extensive, originates in the supracondylar process of the humerus and adjacencies. The ulnar head originates in the coronoid process of the ulna. The two portions unite for insertion into the diaphysis of the radius, contouring to it. The median nerve is positioned between the two heads of the PTM. However, the

relationship between the median nerve and the humeral and ulnar heads of the PTM is subject to numerous variations.^{4,6,15,16} This study aimed to analyze, through anatomical dissections, the relationship between the PTM and median nerve and thus contribute to a better understanding of the causes of the pronator teres syndrome.

Material and methods

One hundred upper limbs of 50 adult cadavers from the anatomy department of this institution were dissected for this study, 46 cadavers were male and four were female. The age ranged from 28 to 77 years; 27 were white and 23, non-white. Cadavers whose forearms were deformed by traumas, malformations, and scars were excluded. A pilot study that included three fresh cadavers was conducted so that the authors could familiarize themselves with the local anatomy. These were not included in this study.

The dissection was performed through a medial incision across the forearm and lower third of the arm. The skin and the subcutaneous tissue were folded to the radial and ulnar sides, respectively. The median nerve was identified in the medial margin of the biceps brachii muscle, approximately

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