



Original Article

Anatomical study on the innervation of the elbow capsule[☆]



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ABSTRACT

Objectives: To put forward an anatomical description of the innervation of the elbow capsule, illustrated through morphological analysis on dissections.

Methods: Thirty elbows from fresh fixed adult cadavers aged 32–74 years, of both sexes, were dissected.

Results: Among the dissected arms, we observed that the median nerve did not have any branches in two arms, while it had one branch in five arms, two branches in two arms, three branches in ten arms, four branches in nine arms and five branches in two arms. The radial nerve did not have any branches in two arms, while it had one branch in two arms, two branches in nine arms, three branches in ten arms, four branches in five arms and five branches in two arms. The ulnar nerve did not have any branches in three arms, while it had one branch in six arms, two branches in four arms, three branches in five arms, four branches in seven arms, five branches in four arms and six branches in one arm.

Conclusions: We observed branches of the radial, ulnar and medial nerves in the elbow joint, and a close relationship between their capsular and motor branches.

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Estudo anatômico da inervação da cápsula do cotovelo

RESUMO

Objetivos: Promover a descrição anatômica da inervação da cápsula do cotovelo com ilustração por meio da morfologia das dissecações.

Métodos: Foram dissecados 30 cotovelos de cadáveres adultos frescos e fixados, com idade entre 32 e 74 anos, de ambos os sexos.

Palavras-chave:

Articulação do cotovelo
Cápsula articular
Cadáver
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[☆] Work performed at the Faculdade de Ciências Médicas e da Saúde de Sorocaba (FCMS), Pontifícia Universidade Católica de São Paulo (PUC-SP), Sorocaba, SP, Brazil.

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Resultados: Observamos, dentre os braços dissecados, dois com nenhum ramo do nervo mediano, cinco com um ramo, dois com dois ramos, 10 com três ramos, nove com quatro ramos e dois com cinco ramos. Quando se trata do nervo radial, dois braços não apresentaram ramos, dois mostraram dois ramos, nove continham dois ramos, 10 contaram com três ramos, cinco tinham quatro ramos e dois tinham cinco ramos. Em relação ao nervo ulnar, tivemos três braços sem ramos articulares, seis com um ramo, quatro com dois ramos, cinco com três ramos, sete com quatro ramos, quatro com cinco ramos e um com seis ramos.

Conclusões: Constatamos ramos do nervo radial, ulnar e medial na articulação do cotovelo, assim como a relação próxima entre os seus ramos capsulares e motores.

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Introduction

The first mentions of the nerve branches of the elbow capsule date from 1844, in descriptions of a branch of the cutaneous nerve perforating the brachial muscle and reaching the capsule; branches of the median nerve penetrating the elbow joint; and branches of the ulnar nerve branching out between medial epicondyle and the olecranon. A branch of the radial nerve extending to the long head of the triceps and heading toward the olecranon and posterior capsule was also described.

In 1857, small branches of the musculocutaneous and median nerve extending to the anterior part of the capsule and variable branches of the anterior interosseous nerve appearing between the radius and ulna and innervating the capsule around the radial head were described. With regard to the posterior part of the capsule, a branch derived from the radial nerve that originated from the muscle branch of the lateral and medial head of the triceps brachii muscle was described.

A study conducted in 1877 reported the presence of small filaments from the median nerve going to the anteromedial region of the capsule and branches of ulnar origin going to the posteromedial capsule.

In subsequent years, studies began to describe this subject with greater precision through dissections. From dissections on seven adult elbows and five fetal elbows, the contributions of the four main nerves innervating the elbow capsule (ulnar, median, musculocutaneous and radial) were demonstrated. A study in 1949 only mentioned ramifications going to the olecranon process, and did not describe capsular branches of the radial nerve.

The present-day main anatomy textbooks, such as Gray, Hollinshead, Latarjet and Liard, do not cite the radial nerve.¹⁻⁸

The elbow capsule is extensive and coats the distal extremity of the humerus and proximal extremity of the ulna and radius. Anteriorly and proximally, it is inserted above the fossa of the coronoid process and capitellum. Distally, it adheres medially to the coronoid process of the ulna and laterally to the annular ligament of the radius (Fig. 1A).

Posteriorly and proximally, the capsule adheres above the olecranon fossa, goes around the margin and continues across the entire medial and lateral column, where it covers all of the sigmoid fossa (Fig. 1B).

The anterior joint capsule is usually thinner and more transparent. It remains under tension when the elbow is

extended and relaxes when the elbow is flexed. The greatest capacity of the joint capsule is 30–35 ml at 80° of flexion, when it is fully distended.

In relation to the musculocutaneous nerve, it is known that the area that it innervates is the anterior capsule. This nerve issues a small branch from its main trunk, which penetrates the middle third of the brachial muscle and goes in deeper to reach the anterior part of the humerus and supply the periosteum. It then reaches the elbow capsule, where it divides into a variable number of branches (Fig. 2A). This nerve is the most constant supplier of the capsule, both macroscopically and microscopically. In some cases, this capsule branch may form anastomoses with branches of the median nerve and then continue to the capsule (Fig. 2B). The region of the musculocutaneous nerve may be juxtaposed both to median and to lateral areas.⁹⁻¹²

Before passing between the heads of the pronator teres muscle, the median nerve branches out into small sections that go to the capsular region of the anterior medial epicondyle

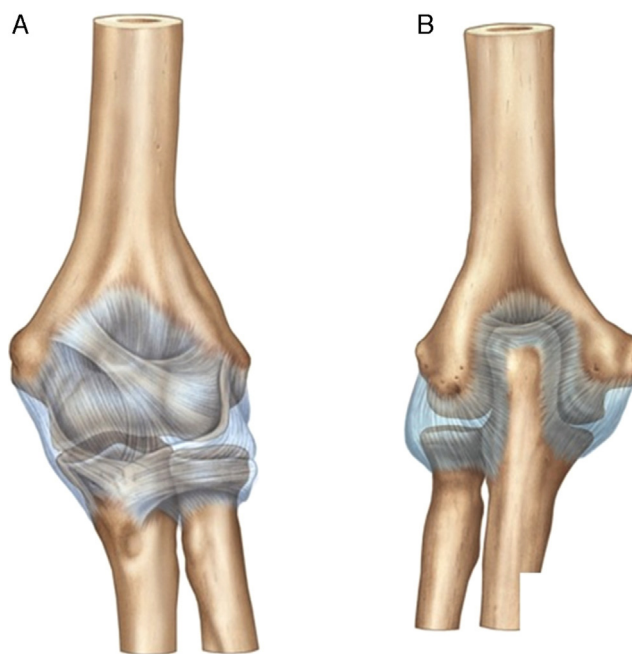


Fig. 1 – Anterior limits of the elbow capsule (A). Posterior limits of the elbow capsule (B).

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