REV BRAS ORTOP. 2017;xxx(xx):xxx–xxx

SOCIEDADE BRASILEIRA DE ORTOPEDIA E TRAUMATOLOGIA

RBO REVISTA BRASILEIRA DE ORTOPEDIA

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Original Article

The arcade of Struthers: an anatomical study and clinical implications☆

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ARTICLE INFO

Article history:
Received 1 July 2016
Accepted 12 July 2016
Available online xxx

Keywords:
Arm/anatomy & histology
Cadaver
Ulnar nerve

ABSTRACT

Objective: To determine the frequency and features of the arcade of Struthers, and to assess its clinical implication in ulnar nerve compression.
Method: Forty arms from 26 cadaver specimens were dissected in the Anatomy Laboratory of this institution. The extension of the arcade, distance from the medial epicondyle, and relation with ulnar nerve were recorded.
Results: The arcade of Struthers was identified in 40 dissected arms (100%). In 29 (72.5%) the ulnar nerve was covered by a muscular arcade, in nine (22.5%) by an aponeurotic arcade, and in two (5%) the arcade was beneath the ulnar nerve. The extension of the arcade ranged from 3.0 to 7.5 cm, and the distance from the medial epicondyle ranged from 2.5 to 7.0 cm.
Conclusion: The arcade of Struthers is a musculoaponeurotic canal that represents an important site of entrapment or compression of the ulnar nerve. The arcade, the intermuscular septum, and the internal brachial ligament should be released in patients submitted to ulnar nerve anterior transposition surgery.

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Arcada de Struthers: estudo anatômico e implicações clínicas

Palavras-chave:
Braço/anatomia & histologia
Cadáver
Nervo ulnar

RESUMO

Objetivo: Determinar a frequência e as características anatômicas da arcada de Struthers e avaliar sua implicação clínica na neuropatia compressiva do nervo ulnar.
Método: Para este trabalho foram dissecados 40 membros de 26 cadáveres, pertencentes à disciplina de anatomia da instituição. A extensão da arcada, a distância da margem inferior da arcada ao epicôndilo medial do úmero e sua relação com o nervo ulnar foram registradas.

☆ Study conducted at the Pontifícia Universidade Católica de São Paulo, Faculdade de Ciências Médicas e da Saúde, Departamento de Cirurgia, Sorocaba, SP, Brazil.

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http://dx.doi.org/10.1016/j.rboe.2016.07.006

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Please cite this article in press as: Caetano EB, et al. The arcade of Struthers: an anatomical study and clinical implications. Rev Bras Ortop. 2017. http://dx.doi.org/10.1016/j.rboe.2016.07.006

Resultados: A arcada de Struthers foi identificada nos 40 membros dissecados (100%), Em dois membros (5%), o nervo ulnar passava anteriormente à arcada. Em 29 (72,5%), uma porção variável do músculo tríceps cobria o nervo ulnar. Em nove membros (22,5%), o nervo estava coberto pela expansão aponeurótica do tríceps. A extensão da arcada variou de 3,0 a 7,5 cm e a distância da margem inferior da arcada ao epicôndilo medial variou de 2,5 a 7,0 cm.
Conclusão: A arcada de Struthers é um canal musculoaponeurótico que representa importante local (potencial) de compressão do nervo ulnar. A arcada, o septo intermuscular medial e o ligamento braquial interno devem ser seccionados nos procedimentos cirúrgicos de transposição anterior do nervo ulnar no cotovelo.

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Introduction

The Struthers' ligament and the arcade of Struthers are two anatomical structures that are often confused. The Struthers' ligament was described by anatomist John Struthers[1] in 1854; it is a fibrous band that extends from a bone spur located on the anteromedial surface of the lower third of the humerus, known as the supracondylar process, and is inserted in the medial humeral epicondyle. The Struthers' ligament passes over the median nerve and the brachial artery, which may cause compression of these structures. It may be observed even in the absence of the supracondylar process; even when present, it may not cause the compression of these structures. The supracondylar process of the humerus has been described by anatomists and anthropologists; it is phylogenetically considered as a vestige of the supracondylar foramen, found in reptiles, marsupials, and some mammals.[2–4] Its occurrence in humans is very rare, being observed in 0.7% to 2.5% of the population.[2,5] However, there is no dispute as to the existence of this ligament. In contrast, the arcade of Struthers was first described in 1973 by Kane et al.[6] It is sometimes defined as a thickening of the brachial fascia, and sometimes as an aponeurotic or musculoaponeurotic structure extending from the medial intermuscular septa to the medial head of the triceps brachii muscle at a variable distance above the medial humeral epicondyle.

The arcade of Struthers can cause compression of the ulnar nerve. Controversy exists in the literature regarding the existence of the arcade of Struthers. Some anatomical studies have found an anatomical formation consistent with the arcade of Struthers. Conversely, other studies have reported that the arcade of Struthers does not exist; rather, that there are only anatomical variations of the intermuscular septum and the forearm fascia.[7–9]

This study aimed to analyze the anatomical structures that relate to the ulnar nerve in the medial aspect of the arm, such as the brachial fascia, the medial intermuscular septum, the internal brachial ligament, and the medial head of the triceps brachii muscle, and to assess the possibility of these structures being responsible for the compressive syndrome of the ulnar nerve or even whether they can interfere after surgical procedures of anterior transposition of the ulnar nerve at the elbow.

Material and methods

40 arms of 26 adult cadavers of the Anatomy Department of this institution were dissected; 14 bilateral (prepared with formalin solution and glycerin), and 12 only the right upper limb (dissected from fresh cadavers). Of the corpses, 22 were male and four were female, 15 were white and 11 were non-white. Cadavers whose forearms were deformed by traumas, malformations, and scars were excluded. The dissection was performed through an incision in the anteromedial aspect of the arm (from the axilla to the middle third of the forearm. Two flaps that included the skin and the subcutaneous tissue were pulled away, exposing the entire medial surface of the arm. The brachial fascia, basilic hiatus, basilic vein, and the medial cutaneous nerve of the forearm were identified. The brachial fascia was incised longitudinally in the medial margin of the triceps brachii muscle in the same manner that the skin was folded, one anterior flap and one posterior flap (Fig. 1). The ulnar nerve was identified in the axillary region and dissected distally to the medial intermuscular septum, which it crosses, passing from the anterior to the posterior compartment of the arm. In this location, the internal brachial ligament can also be identified. Then, the ulnar nerve was identified distally in the

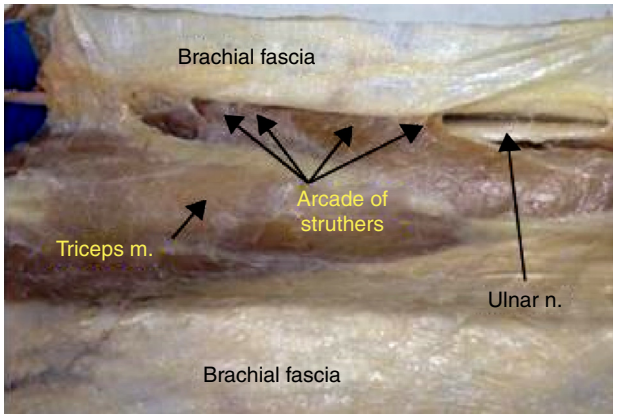

Fig. 1 – The brachial fascia was incised longitudinally in the medial margin of the triceps brachii muscle and in the same way in which the skin was folded, with an anterior flap and a posterior flap.

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