

A VARIATION IN THE ORIGIN AND COURSE OF THE POSTERIOR CIRCUMFLEX HUMERAL ARTERY AND THE DEEP BRACHIAL ARTERY: CLINICAL IMPORTANCE OF THE VARIATION

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Summary

A case of an unusual variation of the blood supply of an upper limb is presented. During a routine anatomical dissection, it was found that the posterior circumflex humeral artery had an unusual course and branching. It arose as a branch of the brachial artery, not the axillary one, and it did not accompany the axillary nerve. It ran under the lower border of the teres major muscle instead of passing through the lateral axillary foramen, then followed its usual course around the surgical neck of the humerus, supplying the deltoid muscle. It was also found that instead of arising from the brachial artery, the deep brachial artery arose from the posterior circumflex humeral artery. Variations are reported and their clinical relevance is discussed.

Key words: posterior circumflex humeral artery, deep brachial artery, variation, clinical significance

Introduction

A great number of variations in the arterial blood supply of the limbs have been described in the literature. The branching and courses of certain blood vessels could vary among individuals. These could have both academic and clinical relevance. The incidence of anatomic variations of the major arteries of the upper limb is relatively high. Usually, the posterior circumflex humeral artery (PCHA) is a branch of the brachial artery at the distal border of the subscapularis muscle. It runs through the quadrangular space which is bounded by subscapularis muscle, the capsule of the shoulder joint and teres minor muscle above, teres major muscle below, the long head of triceps brachii muscle medially and the surgical neck of the humerus laterally. It then curves around the humeral surgical neck and supplies the shoulder joint, deltoid and other muscles around the quadrangular space. The deep brachial artery (DBA) is a branch of the brachial artery, which closely follows the radial nerve, passes through the lower triangular space which is bound by the teres major muscle above, the long head of the triceps brachii muscle medially and the shaft of the humerus laterally [1-6].

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The quadrangular space syndrome is a condition, characterized by tenderness over the quadrangular space and shoulder pain radiating to the arm, caused by the compression of the PCHA and the axillary nerve [7-9].

Case report

During a routine anatomical dissection of the left upper limb of the formal-carbol fixed cadaver of a 63-year-old Caucasian male from the autopsy material available at the Department of Anatomy, Histology and Embryology at the Medical University of Sofia, an unusual arterial variation was found.

After removing the brachial fascia and opening the humeromuscular canal it was found that the PCHA did not pass through the quadrangular space. It also did not run along the axillary nerve. Instead, it ran under the lower border of the teres major muscle and after that it followed its course around the surgical collum of the humerus to form an anastomosis with the anterior circumflex humeral artery. In this case,

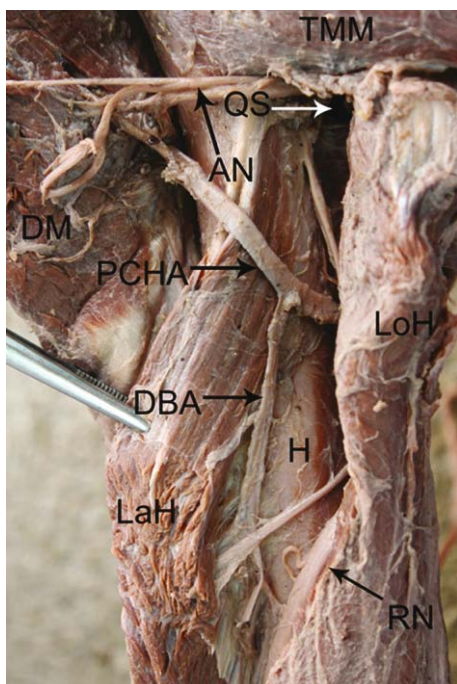


Figure 1. Dissection of the axilla and the proximal part of the upper limb. Posterior view. Abbreviations: PCHA – Posterior circumflex humeral artery, DBA – Deep brachial artery, AN – Axillary nerve, QS – Quadrangular space, LoH – Long head of the triceps brachii muscle, LaH – Lateral head of the triceps brachii muscle, H – Humerus, DM – Deltoid muscle, TMM – Teres major muscle, RN – Radial nerve

the PCHA arose in the medial bicipital groove under the lateral border of the teres major muscle and distally from the beginning of the anterior circumflex humeral artery. Thus it could be considered a branch of the brachial artery, instead of the axillary (Figure 1). A branch arose 2.7 cm from the beginning of the PCHA. It was identified as the DBA since it ran through the humeromuscular canal along with the radial nerve, then gave rise to its usual branches (Figure 2). The diameter of the PCHA at the branching point was 6 mm, and the diameter of the DBA was 4mm.

No variations were found in the contralateral upper limb. No medical or surgical history of the cadaver was available.

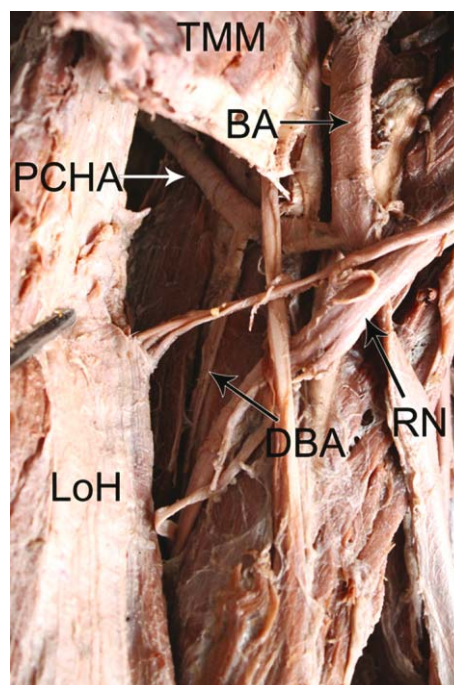


Figure 2. Dissection of the axilla and the proximal part of the upper limb. Anterior view. Abbreviations: PCHA – Posterior circumflex humeral artery, DBA – Deep brachial artery, BA – Brachial artery, LoH – Long head of the triceps brachii muscle, TMM – Teres major muscle, RN – Radial nerve

Discussion

The PCHA usually arises from the axillary artery and runs along the axillary nerve trough the quadrangular space. There are many reports regarding the variant origin of the PCHA. Olinger and Benninger conducted a study on 83 cadavers. The PHCA originated from the subscapular artery in about 12% of the cases, and in about

8.4% it originated from the deep brachial artery and traversed the triangular space to supply the deltoid muscle. The PCHA supplies the lateral portion of the teres minor muscle. It has been reported to even form a hairpin loop around the teres major muscle [10]. PCHA is also the main artery that supplies the upper humeral epiphysis [11], a major part of the deltoid muscle [12] and the rotator cuff and capsule of the shoulder joint [13].

Compression of the PCHA and the axillary nerve has been reported to cause quadrangular space syndrome [8]. It is a rare condition, which causes poorly localized pain radiating to the arm, paraesthesia and tenderness over the quadrangular space [7]. Injuries of the PCHA frequently cause ischemia of the hand in athletes and especially professional volleyball players due to arterial emboli originating from the injured artery. The treatment usually involves ligation of the PCHA [14]. The abnormal course of the PCHA in a case like the one we report makes it more vulnerable to trauma, so patients could present with symptoms of quadrangular space syndrome without actual compression in the quadrangular space [8]. Given the fact that in our case the DBA branches from the PCHA it could be suggested that this patient felt paraesthesia and pain around the triceps brachii muscle when putting his arm under mechanical stress. Anatomical variations of the PCHA must be considered during surgical procedures. Fractures of the proximal humerus account for approximately 6% of all fractures and are twice as common in females [15]. The PCHA is one of the main arteries to be injured by a proximal humeral fracture, along with the axillary artery, and such an injury poses a deadly risk for a patient [16]. It has also been reported that the PCHA could be damaged during percutaneous proximal humeral fracture fixation [17]. Although they are extremely rare, aneurysms of the deep brachial artery usually need surgical treatment [18]. Anatomical variations of this artery are not too rare [19] and should be kept in mind during such procedures.

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