

DOUBLE PROFUNDA BRACHII AND ABNORMAL BRANCHING PATTERN OF THE BRACHIAL ARTERY

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REZUMAT

Arterele brahiale profunde duble, cu origine într-o singură arteră brahială, sunt rareori întâlnite la oameni. Această prezentare de caz descrie descoperirea, în cursul disecției unui cadavru, a prezenței arterelor brahiale profunde duble, însoțite de o bifurcare mai înaltă a arterei brahiale și de o comunicare între artera radială și ulnară, acoperită de tendonul bicepsului. Prezența arterelor brahiale profunde duble în șanțul radial poate duce la hemoragie masivă în cursul fracturilor. Anatomia topografică și variațiile anatomice neobișnuite ale arterei brahiale au importanță clinică pentru chirurghi, ortopezi și radiologii care efectuează explorări angiografice ale membrului superior.

Cuvinte cheie: profunda brahială, arteră radială, arteră ulnară, dublă, variații

ABSTRACT

Double profunda brachii arteries originating from a single brachial artery is rarely found in individuals. The present case report the finding during routine cadaveric dissection of the presence of double profunda brachii arteries accompanied with a higher bifurcation of brachial artery and a communication between the radial and ulnar arteries being overlapped by the tendon of biceps. The presence of double profunda arteries in the radial groove may result in excessive haemorrhage during fractures. Topographical anatomy of the normal and abnormal variations of the brachial artery are clinically important for surgeons, orthopaedicians and radiologists performing angiographic studies on the upper limb.

Key Words: profunda brachii, radial, ulnar, artery, brachial, double, variation.

INTRODUCTION

The brachial artery is the continuation of the axillary artery beyond the inferior border of the teres major muscle.¹ The brachial artery usually gives off branches known as profunda brachii, superior and inferior ulnar collateral, nutrient and the muscular arteries. The profunda brachii artery is known to traverse the radial groove along with the radial nerve. The usual level of bifurcation of the brachial artery into radial and ulnar arteries is at the level of the neck of the radius. The present study describes a rare anatomical variant i.e

double profunda brachii arteries traversing the radial groove, a higher bifurcation of brachial arteries into radial and ulnar arteries and a communication between radial and ulnar arteries being overlapped by tendon of biceps.

The incidence of anatomical variations of upper limb arteries vary between 11-24% in normal population.² Considering the higher incidence of anatomical variations of arteries of the upper limb, prior anatomical knowledge of such anomalies may be of great clinical significance to vascular surgeons, orthopaedicians and radiologists performing angiographic studies.

CASE REPORT

During routine cadaveric dissection of upper limb, we detected an anomalous branching pattern of the brachial artery on the left side of a 42 year male cadaver who died of pneumonia. The arm was dissected, the region of the radial groove cleaned and the branches of brachial artery were traced. The specimen was studied in detail and appropriate photographs were taken. (Figs. 1, 2)

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Received for publication: Mar. 22, 2005. Revised: Apr. 27, 2005.

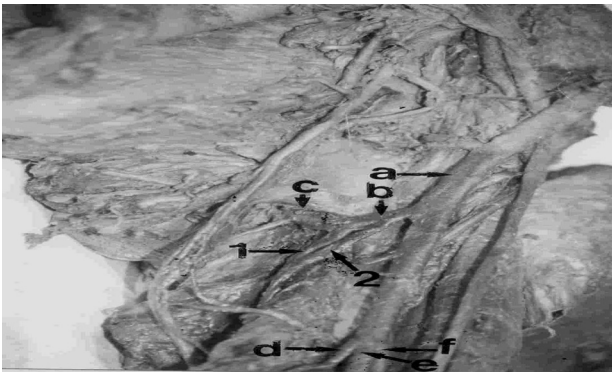


Figure 1. Photograph of the dissected upper limb showing: a. brachial artery, b. common stump, c. branch to scapula, d. radial artery, e. ulnar artery, f. superior ulnar collateral artery, 1, 2. double profunda brachii artery

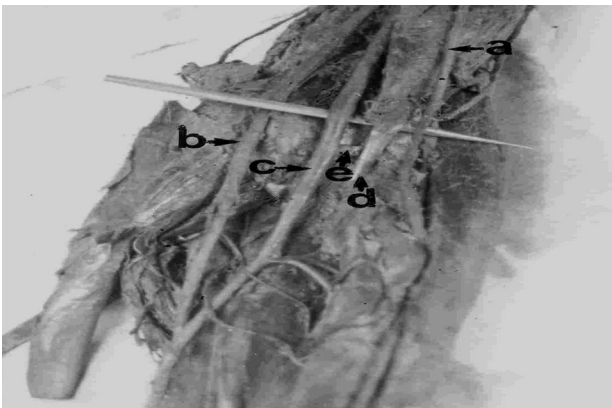


Figure 2. Photograph of the dissected upper limb showing: a. radial artery, b. superior ulnar collateral artery, c. ulnar artery, d. tendon of biceps brachii, e. anterior communication between ulnar and radial arteries.

The beginning of the brachial artery was identified at the lower border of the teres major muscle. After traversing a distance of 5 cm, a common stump was found to arise from the main artery. The common stump gave rise to three branches. A branch ran towards the scapula, while the other two which were identified as profunda brachii arteries, traversed the radial groove, with one ending as a muscular branch to triceps muscle and the other descended down and anastomosed with a branch of the ulnar artery at the level of the elbow. The brachial artery divided into radial, ulnar and superior ulnar collateral arteries at a distance of 6 cm higher than its usual site of division (i.e., 6 cm above the neck of the radius). The most lateral of the three was of thinner caliber and descended down on the lateral side of the arm and forearm, lying lateral to the tendon of flexor carpi radialis muscle (i.e., radial artery). The middle one was thicker in caliber and descended on the medial side of the forearm to the superior aspect of the flexor retinaculum (i.e., ulnar artery). The third branch pierced the intermuscular septum along with the ulnar nerve (i.e., superior ulnar collateral artery). We also noticed an abnormal communication between

the radial and the ulnar arteries at the level of the cubital fossa and the tendon of biceps brachii muscle crossed this communication. No other abnormalities were observed.

DISCUSSION

The present paper describes a rare anomaly of the presence of double profunda brachii artery. In the present case, both arteries traversed the radial groove. In case of fractures involving the radial groove of the humerus both the profunda brachii arteries may be involved resulting in excessive hemorrhage. Many past research studies have reported the higher origin of radial and ulnar arteries.³⁻⁷ Interestingly, an earlier study had also reported a double deep artery of arm and deep artery of arm with superior ulnar collateral artery.⁸ A higher origin of radial and ulnar arteries might be explained embryologically by the fact that there is regression of primitive axial artery and the proximal part of superficial brachial - radial artery resulting in such anomalies.^{9,10} A past study has described the terminal branch of superficial brachial artery to take part in development of radial, ulnar and median arteries, joining with the trunks of deep origin of these arteries in primitive axial artery and thus it is the regression of superficial arterial segments proximal to the anastomosis, giving rise to definitive arterial patterns.⁷ This particular study explains the higher origin of the radial or ulnar arteries and the duplication of brachial artery as a result of total or partial persistence of superficial arterial segments.⁷

In the present case, there was a communication between the radial and the ulnar arteries at the region of the elbow and the tendon of biceps was found to cross this communication. The reasons for the presence of anastomosis behind the tendon of biceps may be explained by the fact that there may have been an arterial ring network around the bicipital tendon during embryological development.¹¹ In such cases, the stretching of the tendon of biceps during any movement may cause vascular compression.

The anatomical knowledge of the anomalous branching pattern of the brachial artery is important during percutaneous arterial catheterization, so as to prevent any complications arising from accidental damage to the anomalous vessel.¹² The anatomical knowledge of surrounding structures is clinically important while using vascularised nerve homografts.¹³ Anatomical knowledge of the variations may be important for surgeons using flaps for reconstructive surgeries. The vessels of the upper limb are frequently

used for cardiac catheterization and awareness of such variations may check any inadvertent injury. Knowledge of higher division of brachial artery is also important for all cases of traumatic amputation and re-implantation.¹⁴ It is to be remembered that the bifurcation of the brachial artery is the commonest site for embolism and a higher bifurcation would result in a larger area of ischemia than expected.¹⁵ Hence, the higher division assumes a greater clinical significance.

In our opinion, as anatomists, the present study on the presence of double profunda brachii artery along with associated anomalies of the brachial artery, may be clinically important for clinicians, surgeons, orthopaedicians and radiologists performing angiographic studies.

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