

Case Report

HIGH DIVISION OF BRACHIAL ARTERY WITH SUPERFICIAL COURSE OF RADIAL AND ULNAR ARTERY IN LEFT FOREARM

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ABSTRACT

Background: Variations in the vascular pattern of the upper limb are common in Indian population. Brachial artery is a continuation of axillary artery, it divides into its terminal branches namely radial and ulnar arteries at the level of neck of radius in the cubital fossa. In the present case, brachial artery bifurcated at its commencement below the lower border of teres major. Both the terminal branches, ulnar and radial artery had superficial course along the medial aspect of biceps brachii. In the cubital fossa, radial artery gave off common interosseous artery. In the forearm, radial artery had more superficial course than ulnar artery. Knowledge of these variations is important during vascular and re-constructive surgery and also in evaluation of angiographic images. Superficial position of ulnar and radial artery makes it more vulnerable to trauma and more accessible to cannulation.

KEY WORDS: VARIATIONS; BRACHIAL ARTERY; SUPERFICIAL ULNAR ARTERY; SUPERFICIAL RADIAL ARTERY.

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INTRODUCTION

Variations in the vascular patterns of upper limb in Indian population have been frequently observed. Brachial artery is a continuation of the axillary artery, divides into radial and ulnar arteries at the level of neck of radius in the cubital fossa [1]. Normally radial and ulnar artery do not have superficial course in the forearm. In various studies higher division of brachial artery with superficial position of radial artery have been reported [2,3]. These vascular variations might cause serious problems in a wide range of clinical situations. In the present case, a rare anomaly of high bifurcation of brachial artery with superficial course of both radial and ulnar arteries in left forearm was studied and its clinical and embryological significance have been discussed.

CASE REPORT

The present case demonstrates the variation in the level of termination of brachial artery, course of radial and ulnar artery in the left upper extremity of a 70 yrs. old male cadaver during routine undergraduate dissection in the department of Anatomy.

In left upper limb, bifurcation of brachial artery into radial and ulnar arteries was found below the lower border of teres major at the junction of upper 1/3rd and lower 2/3rd of arm. Both the arteries had superficial course in the arm along the medial aspect of biceps brachii. (fig.1)

In the middle of the arm, ulnar artery was crossed by median nerve superficially from medial to lateral side. In the cubital fossa it was found medial to the median nerve and superficial to the flexor muscles. In the forearm, ulnar artery

had superficial course (fig.2) and it was not accompanied by ulnar nerve. It finally entered the hand by passing superficial to the flexor retinaculum lateral to pisiform bone and medial to ulnar nerve then continued in palm as superficial palmar branch.

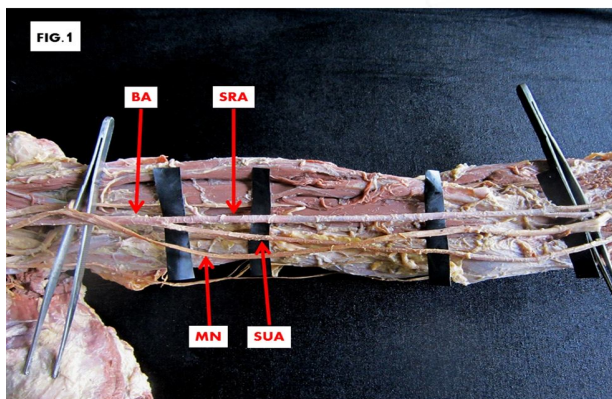


Fig.1. Showing high bifurcation of brachial artery with superficial radial and ulnar artery in left arm. BA- Brachial Artery, SRA-Superficial Radial Artery, MN-Median Nerve, SUA-Superficial Ulnar Artery.

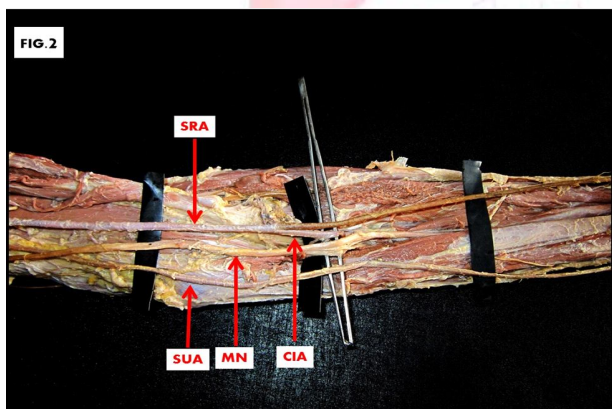


Fig.2. Showing course of superficial radial and ulnar artery in left cubital fossa and forearm. SRA-Superficial Radial Artery, MN-Median Nerve, SUA-Superficial Ulnar Artery, CIA-Common Interosseous Artery.

Radial artery was seen lateral to the median nerve in the arm. It entered into the cubital fossa by crossing the tendon of biceps brachii superficially and gave off common interosseous artery (fig.2). In the forearm, it had more superficial course accompanied by tendon of flexor carpi radialis on its medial side and tendon of brachioradialis on its lateral side in distal part. It had normal course in the hand.

DISCUSSION

Variations in the vascular patterns are usually the result of developmental anomaly during the formation of blood vessels in any part of the body. High division of brachial artery is the most

common variation of brachial artery. Rodriguez-Niedenfuhr et al. considered that the term 'brachio' is combined with the corresponding region in the forearm (e.g., brachioradial, brachioulnar) for variations that originate in the arm, and the term 'superficial' is added depending on whether the latter arteries pursue a normal or superficial course in the forearm [4]. In our case, both radial and ulnar artery had superficial course in forearm so it can be called as "superficial" radial and ulnar arteries.

Typically when the ulnar artery has a high origin, its course is always superficial to the forearm flexors [5]. Mc Cormack et al [6] stated high origin of ulnar artery as superficial ulnar artery found in 2.26% cases and was also observed by Adachi [7] in 1928.

The incidence of superficial radial artery is most frequent variation and is observed to be 14.26% in cadaveric studies and 9.75% in angiographic studies[8]. Udyavar observed the brachial artery dividing into radial and ulnar arteries with common interosseous artery arising from the radial artery[9]. This is consistent with our case in which radial artery gave off common interosseous artery. Vare and Bansal reported a case with high division of brachial artery- the superficial is the brachial artery and deep continuing in forearm as interosseus complex[10].

Keen categories superficial brachial artery (found in 12.3% dissections) into 3 types: (a) Those superficial brachial arteries which continue in cubital fossa and bifurcate as usual into radial and ulnar arteries (3.6%); (b) Superficial brachial artery continues as radial artery and known as 'High origin of radial artery' (5.9%); (c) Superficial brachial artery continues as ulnar artery and known as 'High origin of ulnar artery' (2.8%)[11]. but in our case both radial and ulnar artery had superficial course in the forearm.

Embryological explanation

The lateral branch of seventh intersegmental artery (subclavian) is called axis artery of upper limb-bud. Proximal part of main trunk forms an artery called axillary artery continuing as brachial artery and its distal part persists as the anterior interosseus artery.

The radial and ulnar arteries are last arteries to appear in the forearm; at first, the radial artery arises more proximally than the ulnar artery from the main trunk and crosses in front of the median nerve. Later, the radial artery establishes a new connection with the main trunk at or near the level of origin of the ulnar artery. The upper portion of its original stem usually disappears. Thus radial and ulnar arteries arise at same level. In this case, the proximal origin of radial artery fails to disappear, and the radial artery does not establish new connection with main trunk near the origin of ulnar artery. Thus the radial artery originates at a higher level and gave off common interosseous artery [12].

The superficial course of radial artery in upper part of forearm can be explained on the basis of haemodynamic mechanism between deep and superficial arteries in the forearm. Normally, superficial terminal branches of radial artery undergo developmental arrest due to deep haemodynamic predominance and deep part persists as normal radial artery. But in this case superficial part persisted and deep part underwent regression [13].

Clinical significance

This variation may cause difficulties while measuring the blood pressure and it may disturb the evaluation of angiographic images. Interventionally accidental puncture of superficially placed arteries may occur while attempting the venepuncture. It is prone for injury during limb surgeries [14].

High bifurcation of the brachial artery presenting with acute ischemia secondary to an embolic event was reported. This anomaly was identified, and the ischemia was successfully resolved with embolectomy [15].

CONCLUSION

Knowledge of these variations has got clinical importance in the field of orthopaedic, vascular re-constructive surgeries and also helpful in evaluation of angiographic studies. Superficial course of ulnar and radial artery makes it more vulnerable to traumatic injuries and more accessible to catheterization.

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