

**CASE REPORT**

Higher Bifurcation of Brachial Artery with Superficial Course of Radial Artery in Forearm

Harbans Singh, Neena Gupta, Bargotra RN, NP. Singh*

Abstract

An unusual case of bilaterally symmetrical higher bifurcation of brachial artery into radial and ulnar arteries with superficial course of radial artery in right forearm is reported. Accurate information regarding these variations is important during vascular and re-constructive surgery and also in evaluation of angiographic images.

Key Words

Higher Bifurcation, Brachial Artery, Superficial Radial Artery

Introduction

Variations in arterial patterns of upper limb in adult human body have been frequently observed either in routine dissections or in clinical practice (1). In 2-3% Korean cadavers, a superficial brachial artery arising from axillary artery and continuing in the forearm as radial artery has been reported (2). Few cases of higher origin of radial artery in arm with normal course in forearm have been published (3,4). In the present case, a rare anomaly of brachial artery dividing into radial and ulnar arteries in middle third of arm with superficial course of radial artery in right forearm is presented. The case is more significant as the higher bifurcation of brachial artery has been found to be bilateral.

Case Report

Bilateral variations in the level of bifurcation of brachial artery were observed during routine dissection of an adult male cadaver in the dissection hall of anatomy department. In this case it was observed that in right upper limb, brachial artery which normally divides into radial and ulnar arteries in cubital fossa got divided 7.5 cms above the line joining two humeral epicondyles. These are hitherto been called designate radial and ulnar arteries (Fig. 1A,B). Part of the brachial artery proximal to this bifurcation gave origin to profunda brachii artery and branches to flanking muscles as it normally does. The designate radial artery in arm gave only small branches to biceps and brachialis muscles. It coursed distally along with the designate ulnar artery on medial aspect of biceps and brachialis muscles upto elbow joint. From here onwards radial artery adapted a superficial oblique course

covered only by the brachial and antebrachial fascia. In upper part of forearm, it ran along medial margin of brachioradialis muscle in the superficial plane lying on the tendon of biceps, supinator and flexor digitorum superficialis muscles (Fig. 1C). In lower part of forearm and beyond that it had the same course as is normally seen. In the arm and proximal part of forearm it gave branches only to adjoining muscles. The designate ulnar artery had the same course as normal brachial artery in the arm and cubital fossa beyond which it continued as normal ulnar artery. On left side, bifurcation of brachial artery into radial and ulnar arteries was observed relatively at higher level i.e. 10.5 cms above the line joining humeral epicondyles (Fig. 2A,B). Course of these vessels in forearm remains normal.

Discussion

Variations in upper limb arteries are fairly common and have been reported by several authors. Majority of these variations occur in radial artery followed by ulnar

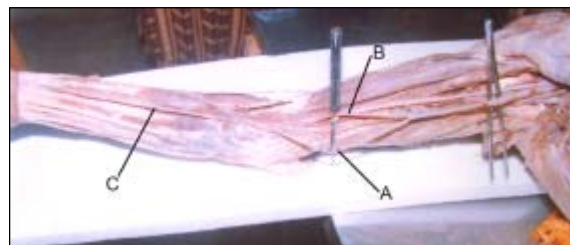


Fig 1. Dissection of Front of Right Arm & Forearm. (A) Designate Radial Artery (B) Designate Ulnar artery (C) Superficial Radial Artery.

From the Department of anatomy, Government Medical College Jammu & *Jammu College of Physiotherapy Jammu J&K -India
Correspondence to : Dr Harbans Singh Associate Professor Deptt. of Anatomy Govt. Medical College, Jammu (J&K) India

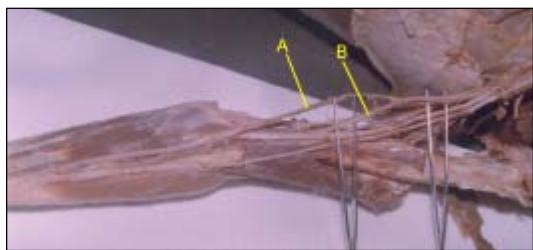


Fig 2. Dissection of Front of Left Arm & Forearm (A) Designate Radial Artery (B) Designate Ulnar Artery

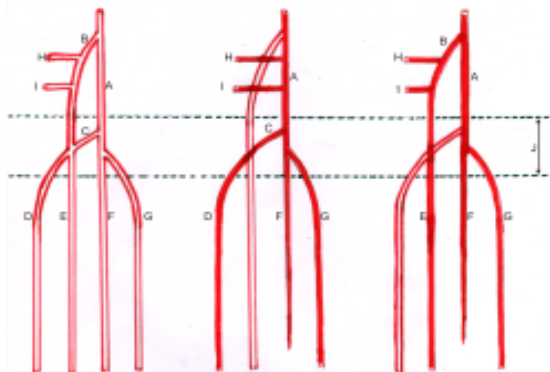


Fig 3-5 (Fetal pattern) (Normal adult pattern) & (Present case)
Schematic diagram showing main arterial patterns of upper limb in fetal life, normal adult and present case. A: Axial (Brachial) artery. B: Origin of radial artery from brachial artery in arm in fetal life. C: Communication between radial & brachial artery in cubital fossa. D: Deep branch of radial artery in fetal life. E: Superficial terminal branch of radial artery in fetal life. F: Interosseous artery. G: Ulnar artery. H and I: Muscular branches of radial artery which later on shift their origin to brachial artery.

artery(5). Brachial artery variations are less common(6). Though some cases of anomalous divisions of brachial artery in cubital fossa have been described (7) but mid-arm variations in brachial artery are relatively of rare occurrence. In the present case, right brachial artery bifurcated into radial and ulnar arteries in mid-arm both of which ran together upto elbow joint. From here onwards designate ulnar artery descended to cubital fossa and had its normal course in forearm. The designate radial artery remained superficial lying just deep to brachial and ante-brachial fascia up to lower part of forearm from there onwards it had its usual course. Similar case of unilateral higher division of brachial artery at the level of middle of arm with superficial course of radial artery in upper part of forearm has been reported by Nagalaxmi (8). In our case higher division of brachial artery was also encountered on left side though the course of radial and ulnar arteries from elbow downwards was normal similar to the one published by Yalcin *et al* (4). Variation reported in the present case is significant because bilateral higher bifurcation of brachial artery into its terminal branches with superficial course of radial artery on one side is extremely rare.

Embryological Explanation: Every anomaly in the peripheral vascular anatomy can be related to genesis, regression or persistence of one or other segment of the embryologic axial artery (1,9). The type of anomaly presented in this case is due to persistence of radial artery in the arm and failure of formation of communication between radial and axial arteries in cubital fossa (Fig,5). 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 due to deep haemodynamic predominance, superficial terminal branches of radial artery undergo developmental arrest and deep part persists as normal radial artery. The superficial radial artery in right upper limb as seen in this case appears to be due to chance variations in haemodynamic factors which leads to regression of deeper vessels and persistence of one of the superficial terminal branches of radial artery (1,10).

Clinical Implication

The presence of superficial radial artery which makes it more vulnerable to trauma and thus bleeding. The superficial artery also makes it accessible for cannulisation and also for taking radial artery graft which is widely used nowadays for coronary artery bypass graft surgery (CABGS). Being superficial, the radial artery may be mistaken for a vein and accidental injection of certain drugs in this artery may cause reflex vascular occlusion resulting in disastrous gangrene of hand.

References

1. Baeza AR, Nebot J, Ferreira B *et al*. An anatomical study and ontogenic explanation of 23 cases with variations in the main pattern of the human brachio-antebrachial arteries. *J Anat* 1995; 187:473-39.
2. Yang HJ, Gil YC, Jung WS *et al*. Variations of the superficial brachial artery in Korean cadavers. *J Korean Med Sci* 2008; 23(5):884-87.
3. Okaro IO, Jiburum BC. Rare high origin of radial artery: A bilateral symmetrical case. *Nigerian J Surgical Research* 2003, 5(1-2):70-72.
4. Yalcin B, Kocabiyci N, Yazir F *et al*. Arterial variations of upper extremities. *Anat Sc International* 2006; 81(1):62-64.
5. McCormack LJ, Cauldwell MD, Anson BJ. Brachial and antebrachial arterial patterns. *Surg Gynae Obs* 1953; 96:43-54.
6. Cherukupuli C, Dwivedi A, Dayal R. High bifurcation of brachial artery with acute arterial insufficiency: A case report. *Vascular Endovascular Surg* 2008, 41, No 6:572-74.
7. Bilodi AK, Sanikop MB. Variations in termination of brachial artery: A case report. *Kathmandu University Medical J* 2004, 2(1):49-51.
8. Nagalaxmi. Higher bifurcation of brachial artery and superficial radial artery: A case report. *J Anat Soc India*, 2005, 54(1):32-85.
9. Anuradha L, Prabhu LV, Kumar A. Report on an anomalous pattern in the upper limb with its anatomical and clinical implication. *J Anat Soc India*, 2001, 50 (1):69-98.
10. Singer E. Embryological pattern persisting in the arteries of the arm. *Anat Record* 1933, 55:403-9.