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A unique case of accessory brachial artery and its continuation as accessory ulnar artery: A case report

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Abstract
A sound knowledge of vascular anatomy of upper limb is of paramount importance, since this is a site of frequent injury and of various surgical and invasive procedures. The term Accessory brachial artery was first established by McCormack. During the routine cadaveric dissection of upper limb of a middle-aged male cadaver, a bilateral variation in the upper limb arteries was observed. Unusual bilateral accessory brachial arteries were arising from the axillary artery, proximal to the intercondylar line of humerus. They were then continuing in the forearm as accessory ulnar artery. The main brachial arteries were dividing into radial and ulnar arteries bilaterally in the cubital fossa. At the wrist, below the flexor retinaculum it was involved in the formation of superficial palmar arches. An accurate knowledge of anatomical variation of brachial artery course, branching, termination and course of its terminal branches are essential prerequisite during surgeries.

Keywords: accessory brachial artery, axillary artery, accessory ulnar artery

1. Introduction
Brachial artery is the continuation of the axillary artery beyond the lower border of the teres major muscle, opposite the neck of the radius. In the cubital fossa, it divides into radial and ulnar arteries. Variation in brachial artery are less common [1]. Radial artery variations are more common followed by ulnar artery [2]. Accurate knowledge of muscular and neurovascular variations is important for both surgeons and radiologist, which may prevent diagnostic error [3].
McCormack coined the term accessory brachial artery and embryologically it is referred as superficial brachial artery which is due to persistence of more than one intersegmental cervical artery which does not deteriorate but persists and can even enlarge its diameter [4, 5] Tohno Y, *et al*., reported a case of double brachial arteries in which superficial brachial artery descended in the arm superficial to the median nerve and deep brachial artery with its normal course descended behind median nerve [6].
The larger terminal branch of brachial artery is the ulnar artery. Ulnar artery arises 1 cm. distal to flexion crease of elbow and reaches medial side of forearm, midway between wrist and elbow**.** In forearm, ulnar artery lies deep to superficial flexor group of muscles and lateral to ulnar nerve [7]. The high origin of ulnar artery from brachial artery has been reported in 1.33% of cases[1]. Ulnar artery may arise proximal to the elbow, in which case it lies usually superficial to the forearm flexors [8]. Incidence of high origin of ulnar artery ranged from 0.67% to 9.38% [9].
A detailed knowledge of variations of branching pattern of vessels is essential for providing accuracy during vascular diagnosis, re-constructive surgery and in evaluation of angiographic images.

2. Case report
During the routine cadaveric dissection of upper limb of a middle aged male cadaver for undergraduate medical students in the Department of Anatomy, AIIMS Jodhpur, bilateral variation in the upper limb arteries was observed. Unusual bilateral accessory brachial arteries were arising from the axillary artery, proximal to the intercondylar line of humerus. They were then continuing in the forearm as accessory ulnar artery. The main brachial arteries were dividing into radial and ulnar arteries bilaterally in the cubital fossa. The accessory brachial arteries were lying medial to the main brachial artery. The arteries then ran downwards superficial to the flexor muscles of forearm and lateral to ulnar nerve. At wrist, below the flexor retinaculum, it was interesting to observe that the accessory ulnar arteries were involved in the formation of superficial palmer arch.

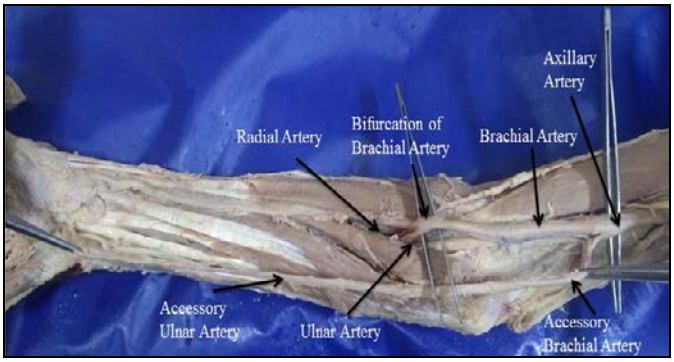

Fig 1: Right upper limb showing Accessory brachial artery, Accessory ulnar artery, Brachial artery, bifurcation of Brachial artery into radial and ulnar arteries.

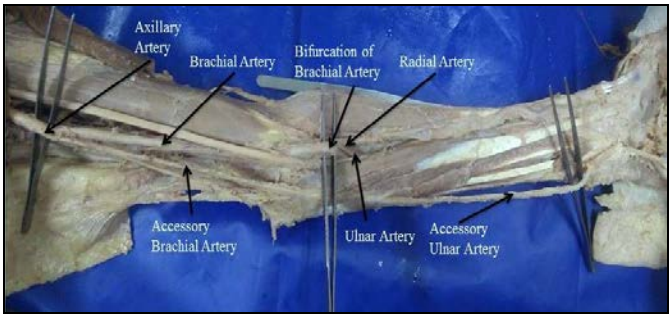

Fig 2: Left upper limb showing Accessory brachial artery, Accessory ulnar artery, brachial artery, Axillary artery, Bifurcation of Brachial artery into radial and ulnar arteries.

Fig 3: Accessory ulnar artery piercing the superficial antebrachial fascia.

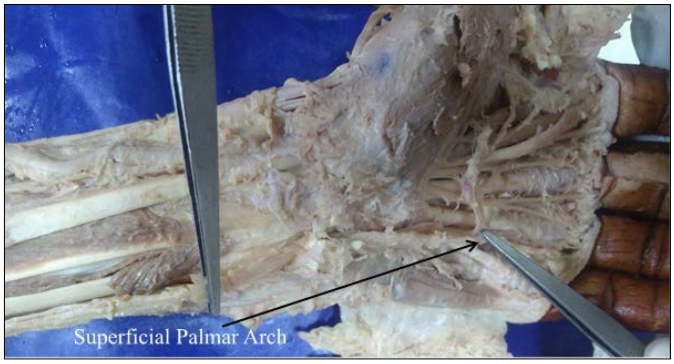

Fig 4: Superficial palmar arch arising from accessory ulnar artery.

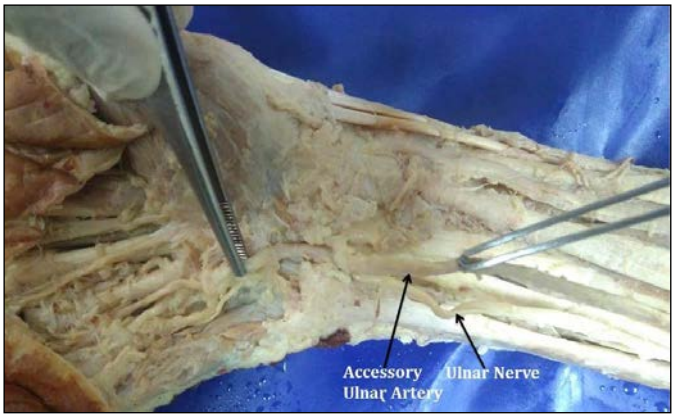

Fig 5: Accessory ulnar artery lying lateral to the ulnar nerve and passing under the flexor retinaculum.

3. Discussion

Variation in the upper limb arteries have been frequently observed either in routine dissections or in clinical practice. Anatomic variations in the main arteries of the upper extremities are not that common and have been reported in only 11-24.4% of the individuals [10].

Intercondylar line of humerus is used as reference to determine the site of origin of anomalous arteries in the arm. The bifurcation of brachial artery proximal to this line is considered a variation [11]. McCormack *et al*. [2] came across a rare entity i.e. accessory brachial artery, which arose from brachial artery 21 cm proximal to the intercondylar line. In its complete course it lay medial to main brachial artery; however midway in the arm it passed deep to median nerve and 4 cm proximal to its termination crossed back over median nerve. It again joined the brachial artery in the cubital fossa 23 cm beyond its origin.

In Kalyan K *et al* study prevalence of accessory brachial artery was noted as 11.43% [12]. Such superficial course of accessory brachial artery can serve as a route for a catheter during the radial approach to coronary procedures for catheterization. At the same time, existence of such superficial brachial artery is more prone to injuries, which can lead to bleeding and ischaemia.

In another study, Kachlik *et al*. reported accessory brachial artery emerging from the third part of axillary artery and its reunion with main brachial artery in the cubital fossa[13]. Baeza *et al* observed duplication of brachial artery. They reported that superficial brachial artery ended by anastomosing with radial artery in the cubital fossa and in few case it continued as antebrachial artery [14]. Solan S. reported accessory superficial ulnar artery originating from brachial artery and participating in formation of superficial and deep palmer arch [15].

In contrast, in our study bilateral accessory brachial artery was continued as a superficial accessory ulnar artery and main brachial artery was dividing into radial and ulnar arteries in the cubital fossa. The superficial accessory ulnar artery terminated by forming superficial palmer arch. Such variant superficial accessory ulnar artery may complicate intravenous drug administration, venepuncture, and percutaneous brachial catheterization. Their superficial course can cause misinterpretation of incomplete angiographic images and also makes them more and also prone to injury, which may result in bleeding.

4. Conclusion

During vascular surgeries and reconstructive surgeries, accurate knowledge of anatomical variation of brachial artery course and accessory brachial artery course is essential prerequisite. Anatomical variations of brachial artery noted in the present study are rare and are clinically significant. Accessory brachial artery and accessory ulnar arteries noted in the study may be mistaken for vein. It may complicate intravenous drug administration, venepuncture in general percutaneous brachial catheterization. A detailed knowledge of such vascular variations is essential not only for anatomists,

but also to radiologists, orthopaedics, vascular and plastic surgeons.

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6. References

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