

CASE REPORT

A CASE REPORT OF MULTIPLE ARTERIAL ANOMALIES IN A CADAVER

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ABSTRACT: During routine dissection in our department, multiple arterial variations were observed in a cadaver. The following arterial variations are present. They are, superficial brachioulnar artery, which originated at the level of junction of upper and middle third of arm. It runs a superficial course anterior to median nerve in the arm and terminates in the formation of superficial palmar arch. The brachial artery terminated as radial and common interosseous artery. Subscapular artery and circumflex humeral artery arose as a common trunk from the third part of axillary artery. The circumflex humeral artery later divides into anterior circumflex humeral and posterior circumflex humeral arteries. The right common carotid artery bifurcated into internal carotid artery anteromedially and external carotid artery posterolaterally at the level of upper lamina of thyroid cartilage. A proper knowledge of variations in the arterial pattern is a must for a good treatment outcome, especially in the fields like vascular surgery, reconstructive surgery, cardiac surgery, angiogram, arterial cannulation, arterio-venous fistula for renal dialysis. etc.

KEYWORDS: Axillary artery, superficial brachioulnar artery, external carotid artery.

INTRODUCTION: Arterial variations are common manifestations. Variations in the branching pattern of upper limb arteries occur upto 20% of the population. (McCormack et al. 1953; Wankoff, 1962; Rodriguez-Niedenfuhr et al. 2001). Awareness about these variations is necessary for a good treatment outcome and to avoid surgical complications.

This report describes concomitant presence of arterial variations in the upper limb and a unilateral variation of right external carotid artery. Clinical significance about these variations is also described in this case report.

MATERIALS, METHODS & RESULTS: During routine dissection in our Department of anatomy at Karpaga Vinayaga Institute of Medical Sciences, Maduranthagam, the following arterial variations are observed in a single cadaver.

Bilateral superficial Brachioulnar Artery: It arises from the brachial artery at a point, 12 cm from the acromion process in the arm. It runs a superficial course in the arm and forearm, passes superficial to the flexor retinaculum and terminates by forming the superficial palmar arch along with the superficial palmar branch of radial artery. [FIGURE 1A, 1B, 2]

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FIGURE 1A: Left Upper Limb; AA- axillary artery; BA- Brachial artery; SUA-superficial brachioradial artery; BB-biceps brachii muscle



FIGURE 1B: Right Upper Limb; BA- Brachial Artery; SUA- superficial brachioradial artery; RA- radial artery; CIA- common interosseous artery

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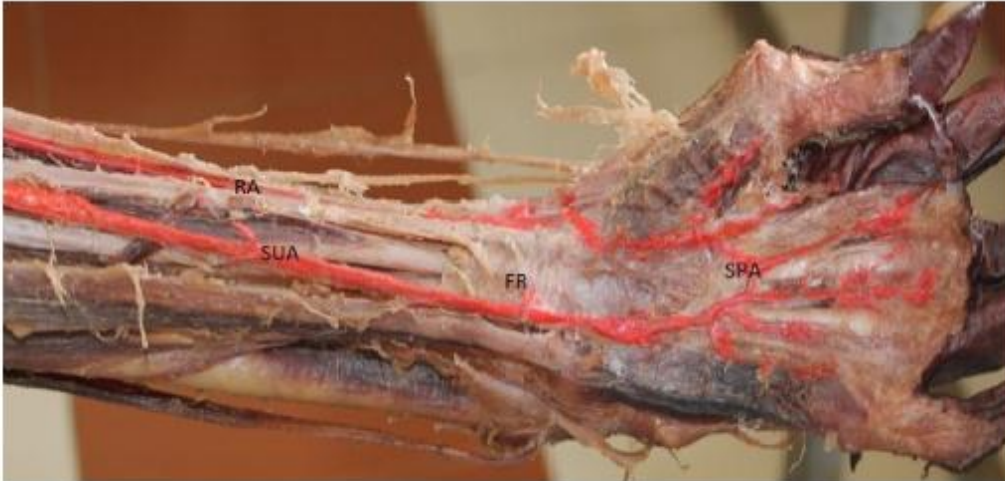


FIGURE 2: Left Upper Limb: RA- radial artery; SUA- superficial brachioradial artery; FR- flexor retinaculum; SPA- superficial palmar arch

The brachial artery after crossing the elbow joint bifurcates into radial artery and common interosseous artery at the level of neck of radius bilaterally [FIGURE 3]. The common interosseous artery terminates by dividing into two branches namely anterior interosseous and posterior interosseous arteries.



FIGURE 3: left upper limb: SUA-superficial brachioradial artery; BA-brachial artery; CIA- common interosseous artery; RA- radial artery

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Other arterial variations noted in the same cadaver are:

- In normal course the third part of axillary artery gives rise to subscapular artery, anterior circumflex humeral and posterior circumflex humeral arteries.
- Whereas in this present case, on the left side, the third part of axillary artery gives rise to a common trunk, this divides into subscapular artery and circumflex humeral artery [FIGURE 4A]. The circumflex humeral artery further divides into an anterior and posterior circumflex humeral artery [FIGURE 4B].



FIGURE 4A: showing a common trunk arising from third part of axillary artery(AA). Subscapular artery (SSA) and circumflex humeral artery(CH) branch from the common trunk of axillary artery



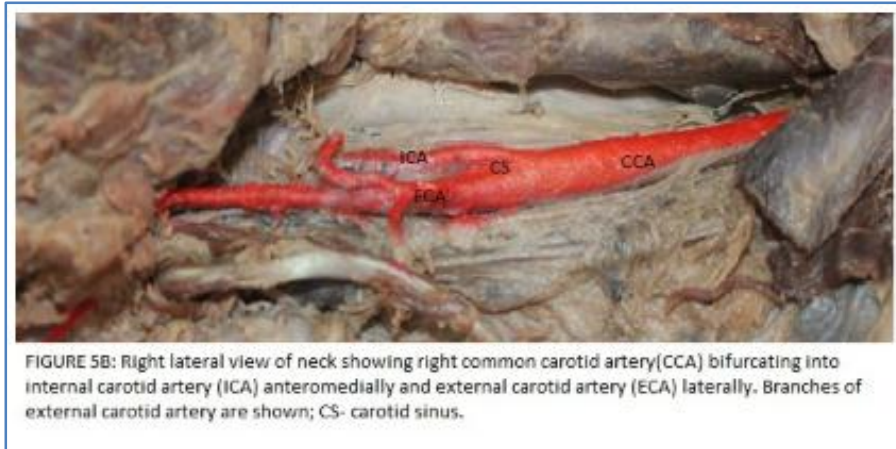
FIGURE 4B: Left axillary artery (AA); SSA- subscapular artery; CHA-circumflex humeral artery; ACHA- anterior circumflex humeral artery; PCHA- posterior circumflex humeral artery; TM-teres major muscle

- Normally the common carotid artery bifurcates into an external carotid artery and internal carotid artery at the level of upper lamina of thyroid cartilage. The external carotid artery is anteromedial to internal carotid artery.
- In this present case, the right common carotid artery bifurcates into internal carotid and external carotid arteries at the level of upper lamina of thyroid cartilage, the internal carotid artery being anteromedial to the external carotid artery [FIGURE 5A, 5B].



FIGURE 5A: Right lateral view of neck showing : TC-thyroid cartilage; CCA- right common carotid artery; ECA-right external carotid artery; ICA-right internal carotid artery

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DISCUSSION: Arterial variations are not uncommon. Arterial variations were noted for the first time by Von Haller in 1813. The adult pattern of arteries develops from the axial trunk which extends from the axilla to the fingers and represents the axillary, brachial and interosseous arteries. The different arteries arise via sprouting angiogenesis (Singer, 1933).

The anomalous blood vessels may be due to:^[1]

- I. The choice of unusual paths in the primitive vascular plexuses.
- II. The presence of vessels that are normally obliterated.
- III. The disappearance of vessels that are normally retained.
- IV. Incomplete development.
- V. Fusion and absorption of the parts which are usually distinct (Dorros& Lewin, 1986).

Unilateral arterial variations (24. 45%) in the upper limb are more common than bilateral variations (6. 32%) -McCoramack et al. Sprouting of aberrant blood vessels was proposed as reason for arterial variations (Singer, 1933; Lippert& Pabst, 1985; O’Rahilly& Muller, 1992).

The new theory proposed is, arterial pattern of upper limb develops from an initial capillary plexus by a proximal to distal differentiation, due to maintenance, enlargement and differentiation of certain capillary vessels and regression of other.^[2]

Hence persistence, enlargement and differentiation of capillaries forming the initial capillary plexus, which would normally remain in a capillary state or even regress gives rise to arterial variations. The incidence of variations of superficial brachioulnar artery is 4. 7%.^[2]

Variations in the branching pattern of Axillary artery noted by previous workers are:

In a report by Ravindra s. s et al, the second part of the axillary artery gave rise to a common trunk from which subscapular and lateral thoracic arteries branched.^[3]

Samta et al reported that the third part of axillary artery gave rise to a common trunk, which branched into subscapular artery, profunda brachii and circumflex humeral arteries, and also Alar branches arose from the second part of axillary artery.^[4]

Saralaya V et al reported that there was a unilateral variation in the axillary artery, where, from the first part of axillary artery two branches were given. One is the superior thoracic artery and the other is a large branch which is termed as common subscapular trunk from which circumflex scapular artery, anterior and posterior circumflex humeral arteries, profunda brachii artery, ulnar

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collateral artery and thoracodorsal artery branched. The 2nd and 3rd part of the axillary artery did not give any branches.^[5]

Bilateral common trunk of posterior circumflex humeral and subscapular artery from the third part of axilla is noted in 3.8% of cases (Saeed et al; 2002).

Variations in the external carotid artery noted by previous workers are:

Handa et al mentioned that the first description of the lateral position of the External Carotid Artery was reported by an anatomist Hyrtl in 1841.^[6] He described that medial or lateral External Carotid Artery migration during embryogenesis may be responsible for this anatomical variation.

According to Prendes et al, an anatomic variant for the position of the external carotid artery (ECA) at the carotid bifurcation was noted in 5.3 percent of patients studied by Doppler ultrasound and contrast angiography. The External Carotid Artery was lateral to and posterior to the internal carotid artery (ICA).^[7]

According to Bussaka et al, lateral position of the external carotid artery was seen in 17 cases (4.3%), of which 13 cases were on the right side and 4 cases on the left side.^[8]

At the origin, the internal carotid artery lies lateral as well as dorsal to external carotid artery. This can explain embryologically since the external carotid artery arises mainly from the ventral aorta and internal carotid artery arises mainly from the dorsal aorta (Datta. A. K; 2005).^[9]

Variant posterolateral position of External carotid artery may be of particular interest to surgeons, cardiologist, radiologist and anatomists. Such variations must be given utmost importance before planning for any neck surgeries to avoid post-operative complications.

In present Case:

- Bilateral superficial brachioulnar artery is present, which is less common when compared to unilateral variation.
- Common trunk of subscapular and circumflex humeral artery, which further divides into anterior and posterior circumflex humeral arteries are rarely reported in the literatures.
- The presence of unilateral posterolateral external carotid artery on the right side carries utmost clinical significance.
- Concomitant presence of this set of variations presented in this case is rarely cited in the literatures.

CONCLUSION:

- A good knowledge of the variations of the arterial pattern is must for a good treatment outcome especially in the fields like vascular surgery, reconstructive surgery, arterial cannulation, to avoid surgical complications etc.
- Radial artery is used for harvesting purpose in Coronary artery bypass graft procedures.
- Radial forearm flaps are used for cosmetic surgery, post burns, contractures of neck, nasal reconstruction etc.
- In renal failure patients, arterio-venous fistula is done for hemodialysis.
- Forearm arteries are also used for angioplasty purposes, for catheterization etc.
- Hence such variations should be kept in mind and should be given importance to avoid unnecessary surgical complications.

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