

HIGH ORIGIN OF SUPERFICIAL ULNAR ARTERY- A CASE REPORTAnjana Jayakumaran Nair¹, Vijayamma Kunnath Narayanan², Ushavathy Padmanabhan³, Margret William⁴¹Junior Resident, Department of Anatomy, Government Medical College, Kottayam, Kerala, India.²Professor and HOD, Department of Anatomy, Government Medical College, Kottayam, Kerala, India.³Associate Professor, Department of Anatomy, Government Medical College, Kottayam, Kerala, India.⁴Junior Resident, Department of Anatomy, Government Medical College, Kottayam, Kerala, India.**ABSTRACT****BACKGROUND**

High origin and superficially placed ulnar artery is a rare anatomical variant that usually arises either in the axilla or arm and runs a superficial course in the forearm, enters the hand and participates in the formation of superficial palmar arch. During routine dissection of cadavers in our department, we observed a unilateral case of high origin and superficial ulnar artery in a human male cadaver. It originated from the brachial artery in the lower third of arm 4 cm above its bifurcation. From its origin, it passed downwards along the medial aspect of forearm, superficial to the flexors, entered hand superficial to the flexor retinaculum and formed superficial palmar arch. The knowledge of existence of a superficial ulnar artery is important during vascular and reconstructive surgery and also in evaluation of angiographic images. Superficial position makes it more vulnerable to trauma and more accessible to cannulation.

KEYWORDS

Ulnar Artery, Brachial Artery, Superficial Palmar Arch, Superficial Ulnar Artery.

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BACKGROUND

Variations of the arterial patterns in the upper limb have been the subject of many anatomical studies due to their high incidence.

Normal Anatomy

The brachial artery is the main artery of the arm which terminates at the level of the neck of the radius in the cubital fossa by dividing into radial and ulnar arteries of which ulnar artery is the largest. It crosses deep under the median nerve and passes obliquely downward and medially covered by superficial flexors of the forearm. The artery ends superficial to the flexor retinaculum by dividing into two terminal branches. The superficial one forms the superficial palmar arch with a contribution from superficial branch of radial artery and the deep branch anastomoses with radial artery to form the deep palmar arch.¹

The common interosseous artery is a short branch of ulnar artery, which at the proximal border of the interosseous membrane divides into anterior and posterior interosseous arteries.

The term superficial ulnar artery is applied to an artery which arises from the axillary, brachial or superficial brachial arteries and courses over the origins of superficial forearm

muscles to join at the midlevel of forearm with the ulnar artery, sometimes replacing it.^{2,3}

The artery has been reported with different terminologies; arteria antebrachialis superficialis ulnaris mentioned by Adachi B (1928),⁴ high origin of ulnar artery and superficial ulnar artery with a high origin.

Although variations of upper limb arterial pattern are common, the presence of an ulnar artery of high origin and superficial course is considered rare with clinical significance.

Incidence

The anatomic variations in major arteries of upper limb have been reported as 11-24.4 percent. Whereas the reported incidence of superficial ulnar artery is only 0.17-2 percent.⁴

Causes

Presence of variations in blood vessels may be due to persistence of vessels and normally get obliterated during development. The presence of superficial ulnar artery may be due to haemodynamic forces, chemical factors, foetal position in uterus, first limb movements, and developmental arrest in early stages and genetic predisposition.

Very early in the development, the seventh cervical intersegmental branch enlarges and becomes consolidated as the axis artery to the developing upper limb bud. The axis artery gives rise to subclavian, axillary, brachial, interosseous arteries and to the deep palmar arch. Other arteries in the upper limb develop as sprouts of the axis artery as mentioned by Allen FD (1969)⁵ in his book on Essentials of Human Embryology.

CASE REPORT

Variation in the origin and course of an ulnar artery was found in the right upper limb of a 68-year-old male cadaver

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during routine dissection for undergraduates. However, the left upper limb showed no variations.

The ulnar artery arose from the brachial artery in the lower third of the right arm 3 cm above its bifurcation (Figure 1). The artery ran superficial to the bicipital aponeurosis where it was crossed by median cubital vein. Then its course was downwards, slightly medial and superficial to the forearm flexor muscles (Figure 2) and under the superficial venous system to reach the distal third of forearm where it was seen on the lateral side of flexor carpi ulnaris. It was present under the antebrachial fascia. The artery then passed anterior to the flexor retinaculum where it divided into two terminal branches. The superficial branch formed the superficial palmar arch (Figure 3) and the deep branch anastomosed with the radial artery to form the deep palmar arch (Figure 4). 3 cm below the origin of ulnar artery, the brachial artery (at the level of neck of radius) divided into radial and common interosseous arteries. The radial artery had a normal course. The common interosseous artery gave off muscular branches and interosseous recurrent artery before it divided into anterior and posterior interosseous arteries.

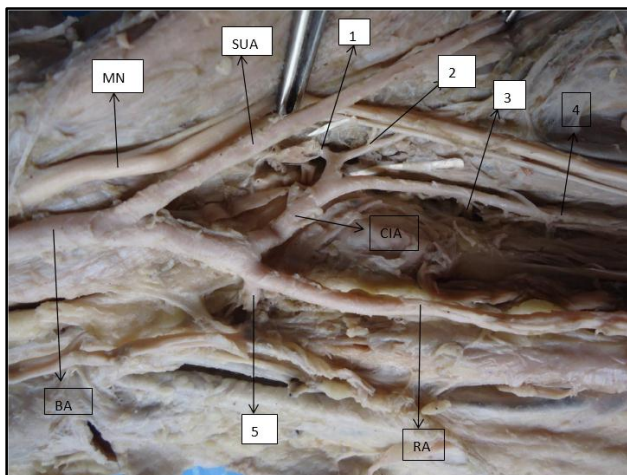


Figure 1- Picture Shows the Branching Pattern of Brachial Artery

- SUA- Superficial Ulnar Artery.
- MN- Median Nerve.
- CIA- Common Interosseous Artery.
- RA- Radial Artery.
- BA- Brachial Artery.
- 1. Interosseous recurrent artery.
- 2. Muscular branches.
- 3. Posterior interosseous artery.
- 4. Anterior interosseous artery.
- 5. Radial recurrent artery.

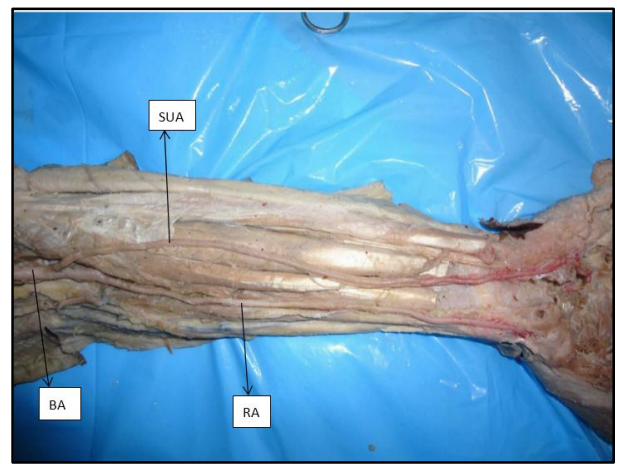


Figure 2. Superficial Course of SUA

- SUA- Superficial Ulnar Artery.
- BA- Brachial Artery.
- RA- Radial Artery.

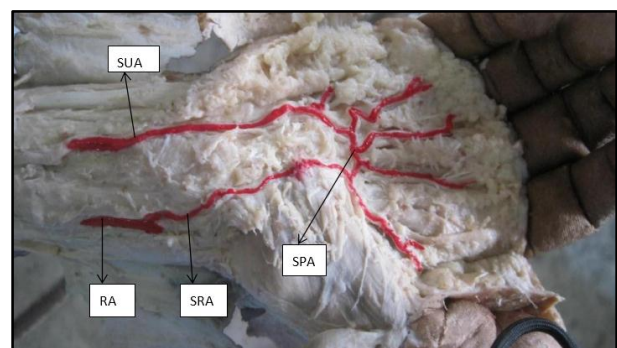


Figure 3. Picture Showing the Formation of Superficial Palmar Arch

- SUA- Superficial Ulnar Artery.
- SPA- Superficial Palmar Arch.
- SRA- Superficial Branch of Radial Artery.

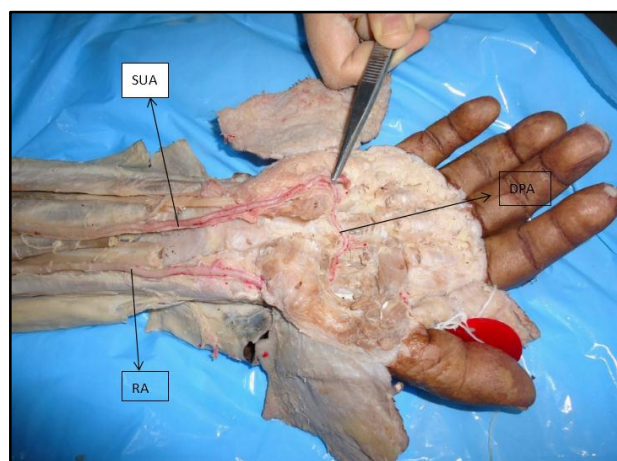


Figure 4. Picture Showing the Formation of Deep Palmar Arch

- RA- Radial Artery.
- SUA- Superficial Ulnar Artery.
- RA- Radial Artery.
- DPA- Deep Palmar Arch.

DISCUSSION

The anomalies of the arterial system of the upper limb may be of various types such as variations in the mode of origin or branching pattern or relations with surrounding structures.⁶ The superficial ulnar artery is a well-known but very rarely encountered abnormality. The superficial course of ulnar artery described here places it at risk during trauma and intravenous cannulation. The variation in course could also lead to intra-arterial injection and difficulties in angiographic procedures. It is also at high risk of damage during surgeries of forearm. Reconstructive surgeries using flaps are becoming increasingly common.

Free forearm flaps based on radial artery may damage the superficial ulnar artery causing ischaemia of the hand. Demonstration of patency of the ulnar artery is very important which can be accomplished by Doppler ultrasound examination.

Some clinical interventions where the knowledge of superficial ulnar artery is of great importance-

1. In patients who require a surgery because of a thrombosed forearm artery and poor collateral circulation.
2. While treating a case of ruptured distal bicipital tendon.
3. In the present case, as the vessel was subjacent to median cubital vein, there is a chance of its puncture during attempts of venepuncture of median cubital vein.
4. During brachiocephalic arteriovenous fistula in haemodialysis, this artery can be punctured accidentally.
5. The presence of such arteries need not always be regarded as an adverse feature. They may be useful for plastic surgeons to use in reconstructive ulnar flap.⁷

Hence, its clinical importance should not be underestimated as several cases of intra-arterial injections of drugs and subsequent amputations have been reported.

Embryological explanation- The developmental reason for the superficial ulnar artery in the present case may be due to the ulnar artery establishing a connection with the axis artery in the arm. The bifurcation of brachial artery into radial artery and common interosseous artery may be due to the posterior interosseous artery arising from the axis artery just distal to the connection of radial artery with the axis artery in the cubital fossa and the continuation of the main trunk (axis artery) between the radial and posterior

interosseous arteries being the common interosseous artery. Hamilton et al (1979),⁸ Arey L B (1966),⁹ and Patten BM (1968)¹⁰ have given the embryological explanation of such cases.

CONCLUSION

As the superficial ulnar artery leads to many surgical problems and confusions in diagnosis, it is important to diagnose the same before doing any procedure in upper limb. The artery can be diagnosed during routine and careful palpation of the antecubital fossa and forearm during clinical examination which can be confirmed by a Doppler ultrasound. Apart from anatomists, this variation is of great importance to radiologists, plastic surgeons and orthopaedic surgeons as well.

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