Report of a Rare Human Variation: The Superficial Ulnar Artery Arising from the Axillary Artery

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Summary: A rare variation of the ulnar artery is presented on routine anatomical dissection in one male cadaver. The superficial ulnar artery was found to originate from the axillary artery. The free forearm flap is increasingly popular among plastic surgeons. As a result of this case, and a review of the literature to gain further knowledge of anatomical variations, it is advised that more attention should be paid clinically to this artery to prevent its injury.

The arteries of the upper limb is known to display a wide range of anatomical variations1,4,10-13,16. Although many of these cause no disturbance in the functions of the body, they may be of considerable interest to the surgeons and to the vascular radiologists. Due to the surgical or clinical relevance of the superficial ulnar artery (SUA), here this case was presented.

Materials and Methods

Between 1992–1998, 30 adult and formalin fixed cadavers were dissected in the Anatomy Departments of Medical Schools of Istanbul and Ondokuzmayis Universities. The routine dissection included both upper extremities of all cadavers. A superficial ulnar artery arising from the axillary artery was observed in a 45 year-old male cadaver.

Results

This variation was presented on the left upper extremity. There was no variation in the arterial pattern of the right upper extremity.

The SUA (5 mm in diameter) originated from the anteromedial surface of the axillary artery (8 mm in diameter) at 4 cm proximal to the lower margin of the teres major and at 1.7 cm distal to the thoracoacromial artery. The artery immediately crossed over the confluence of the medial and lateral roots of the median nerve, and at the middle third of the arm it pierced the brachial fascia to continue its distal course subcutaneously deep to the basilic vein, and lay superficial to the brachial artery and median nerve in the medial bicipital groove and passed medially to the median nerve and then continued in the cubital area (Figs. 1A, 2). After that it was crossed by the median cubital vein. It descended superficial to the bicipital aponeurosis, the pronator teres and the flexor carpi ulnaris. In the distal half of the forearm, the artery was located lateral to the flexor carpi ulnaris and met the ulnar nerve running a normal course covered only by skin and fascia. Then SUA and the ulnar nerve passed lateral to the psiform bone entering the hand. The SUA anastomosed with a branch of the radial artery completing the superficial palmar arch. The anatomy of the deep palmar arch was unclear. It supplied nutrient branches to the flexor carpi ulnaris. There was no anastomoses between the SUA and the brachial or the common interosseous arteries. Moreover, no arteries which might correspond to the normal ulnar artery accompanied the ulnar nerve in the forearm (Figs. 1B, 2).

After giving off the SUA, axillary artery gave rise to the posterior humeral circumflex arteries.

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and continued the brachial artery (7 mm in diameter). The brachial artery had a normal course in the arm but at elbow level it divided into the radial and common interosseous arteries. Radial and common interosseous arteries measured 4 mm and 6 mm in diameter, respectively. The courses of the radial artery and common interosseous artery were normal. The arrangement of the brachial nerve plexus was normal. There were no anomalies of the muscles in the arm (Figs. 1A, 1B, 2).

Discussion

The term SUA is applied to an artery which arises from the axillary, brachial or superficial brachial arteries and courses over the origins of the superficial forearm muscles to join at the midlevel of the forearm with the ulnar artery, sometimes replacing it\(^2,3,14,17,20,24\). The SUA has been reported with different terminologies; arteria antebrachialis superficialis ulnaris\(^1,7,15\), high origin of the ulnar artery\(^3,19,23\) and SUA with a high origin\(^6\).

The frequency of the presence of a SUA was reported as 3.1%–0.7%\(^1,8,16\). The reported frequency of the SUA arising from the axillary artery was 1.6%\(^8\), 0.93%\(^16\) and 0.2%\(^1\). Therefore it is seen that the SUA is a very rare anomaly.

The superficial course of the artery in the forearm has been described in two ways: under the antebrachial fascia\(^1,2,7,8,15,16,18,19\) or more frequently as in our case, over the antebrachial fascia in a subcutaneous position crossed by the median cubital vein\(^5,8,18,20\).

In our case, an artery with a small calibre, that arose from SUA immediately after origin of the ulnar artery was observed. This artery was lateral mammary branch which supplied to mamma.

Other authors have reported SUA associated with the presence of a median artery and a superficial brachial artery continuing as the common interosseous artery\(^14,15,19,21\).

Based on these arterial variations an anatomical and embryological correlation was established from a morphogenetic pattern which is proposed as being normal. The case presented here could be explained by the persistence of the embryonic superficial brachial and antebrachial arteries which have taken the place of an atrophic normal ulnar artery\(^15,20\).

Thus, the terminal branches of the superficial brachial artery take part in the development of the radial, ulnar and median arteries joining with the trunks of deep origin of these arteries in the primitive axial artery\(^19\). Regression of the superficial arterial segments located proximal to this anastomosis gives rise to the definitive arterial pattern. Either the total or partial persistence of the superficial arterial segments explains this case of high origin of the SUA.

This abnormally coursing ulnar artery may have the following clinical implications: Since the SUA passes superficial to the flexor muscles, as do the superficial veins, accidental intra-arterial injection may occur when certain drugs are injected into these vessels\(^8,17,22\). During surgery it may ligate the artery instead of the vein. The free forearm flap is increasingly popular among plastic surgeons, and it is therefore imperative that this anomaly be well recognized because inadvertent injury of the SUA may devascularize the hand\(^22\). Therefore, more attention should be paid clinically to this artery to prevent its injury.

References

1903; 377–575.


20) Sanudo JR, Garcia MR and Rodríguez-Nidenfür M. A superficial ulnar artery anastomosing with a larger anterior interosseous artery to supply the wrist and hand. 1998; 192:439–441.


Explanation of Figures

Plate I

Fig. 1A. Anterior view of the proximal third of the left arm. The superficial ulnar artery (su) arising from the axillary artery (a). t: Lateral mammary branch, m: Musculocutaneous nerve, u: Ulnar nerve, n: Median nerve, b: Brachial artery l: Lateral root of the median nerve, r: Medial root of the median nerve.

Fig. 1B. The course of the superficial ulnar artery at the elbow and at the proximal third of forearm. su: Superficial ulnar artery, c: Common interosseous artery, b: Brachial artery, ra: Radial artery, n: Median nerve.
Fig. 2. Schematic diagram of the superficial ulnar artery arising from the axillary artery. ta: Thoracoacromial artery, u: Ulnar nerve, a: Axillary artery, t: Lateral mammary branch, m: Musculocutaneous nerve, l: Lateral root of the median nerve, r: Medial root of the median nerve, su: Superficial ulnar artery, n: Median nerve, b: Brachial artery, c: Common interosseous artery, ra: Radial artery.