Case Report:
High Origin of Superficial Ulnar Artery Associated with Absence of Palmaris Longus Muscle- A Rare Concurrent Anatomical Variation

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Abstract: Superficial ulnar artery is one among the rare variant form of ulnar artery. The overall incidence of superficial ulnar artery is reported to be 0.7% - 9.4%. The occurrence of superficial ulnar artery is also said to be associated with the absence of palmaris longus muscle as an uncommon variation. We report here such a concurrent unilateral case of high origin of superficial ulnar artery from brachial artery at mid arm level associated with the absence of palmaris longus muscle in a male cadaver. Knowledge of atypical superficial course of ulnar artery might be useful for cannulation but such a course is also prone to injuries leading to bleeding and ischemia. Therefore, it is important for radiologists, surgeons and phlebotomists to check for the persistence of superficial ulnar artery before performing any interventional procedures in the upper limb.

Key Words: Superficial ulnar artery, palmaris longus, high origin, brachial artery

Introduction:
The ulnar artery is the larger terminal branch of the brachial artery given off at cubital fossa together with the radial artery. Upon its origin, it courses deeper than the radial artery in the flexor compartment of forearm and reaches to the medial side at mid forearm level. In the cubital fossa, it gives common interosseous branch and anterior and posterior ulnar recurrent arteries.[1] Ulnar artery, in its course, if it lies superficial over the flexor muscles of forearm it is known as superficial ulnar artery (SUA). The incidence of superficial ulnar artery given off by the brachial artery is estimated to be 0.7% - 9.4%.[2] It is therefore considered as a rare occurrence.

Palmaris longus (PL) is a retrogressive muscle in the flexor compartment of the forearm, which originates from medial epicondyle of humerus as a common flexor origin. Its tendon fans out distally as a flat sheet and continues as palmar aponeurosis. It is a phylogenetically degenerated flexor muscle of metacarpophalangeal joints. Variations of PL muscle are common. The prevalence of its absence is about 11%.[3]

We report here a case, where in high origin of SUA from brachial artery at mid humeral level associated with the absence of palmaris longus as a rare concurrent unilateral musculo-vascular variation.

Case Report
During routine dissection of upper limb for the undergraduate medical students we observed high origin of ulnar artery from the brachial artery at mid arm level. It was superficial throughout its course (Figure 1 and 2). In the cubital fossa it was lying superficial to the bicipital aponeurosis. The brachial artery had normal course in the arm and within the cubital fossa it terminated by dividing into radial and common interosseous arteries at the level of neck of the radius. The SUA entered the palm by passing superficial to flexor retinaculum and terminated by dividing into superficial and deep palmar branches. There was also the absence of palmaris longus muscle noted in the same limb (Figure 3).
These variations were observed unilaterally on right upper limb of a male cadaver aged about 60 years.

Figure 1: Dissection of front of the arm (a) and forearm (b) of right upper limb showing the high origin and superficial course of superficial ulnar artery (SUA) from brachial artery (BA). RA- Radial artery, MN- Median nerve, CIA- Common interosseous artery.

Figure 2: Close view to show high origin of superficial ulnar artery (SUA) at mid arm level from brachial artery (BA). MCN- Musculocutaneous nerve, CB- Coracobrachialis muscle, MN- Median nerve.

Figure 3: Dissection of front of the forearm showing superficial flexor muscles with the absence of palmaris longus muscle. FCR- Flexor carpi radialis, FCU- Flexor carpi ulnaris, PT- Pronator teres, FDS- Flexor digitorum superficialis, FR- Flexor retinaculum, TM- Thenar muscles, SUA- Superficial ulnar artery, RA- Radial artery.

Discussion
The prevalence of anatomical variations involving major arteries of upper extremities reported to be 11-24%. Presence of unusual blood vessels may be due to the persistence of vessels that normally get obliterated during the process of development. SUA frequently takes its origin from lower third of brachial artery but it is less frequent from the upper third. Very rarely it arises from middle third of brachial artery.[5] In the occurrence of SUA, the brachial artery commonly terminates as the radial and common interosseous arteries.[6] Very rarely SUA arises from the axillary artery and its occurrence is reported to be 0.7-2%. As a rare occurrence, bilateral persistence of SUA has been reported.[8,9] Co-existence of SUA and aneurysm of the deep palmar arch in the hand has been described as an uncommon concurrent vascular variation.[10]

A case, where in SUA anastomosed with a larger anterior interosseous artery to supply the wrist and hand has been reported by Sanudo et al.[11] Surekha et al., reported a similar variation and mentioned that, presence of SUA may be often associated with the absence of palmaris longus without details on its aetiology.[5] In the present case, there was absence of palmaris longus on the same limb, which makes our report unique.

It is difficult since neither anatomists nor embryologists have yet reached a unanimous conclusion regarding the embryological interpretation of the development of a SUA.[12] In humans, so far three developmental theories have been proposed. According to first of its theory, the result of a remodelling of the complex primitive networks suggested the formation of final and definite arterial pattern. The second theory states that, the arteries sprout from the axial artery. According to third theory, the arterial pattern develops from an initial capillary plexus by a proximal-to-distal differentiation in the forearm with a posterior to anterior polarity, as a result of the maintenance, enlargement and differentiation of certain capillary vessels and the regression of others.[9,13,14] The reasons for modified arterial development although have not yet been clarified, it may be due to haemodynamic forces, chemical factors, foetal position in the uterus, first limb movements, developmental arrest in the early stages and genetic predisposition might result in SUA.[9,13,14] PL muscle is often considered morphologically important than functionally. Incidence of absence of PL is 5.5%-24% in Caucasian population while it is 4.6%-26.6% in Asian population.[15] Bilateral absence of PL is said to be common than unilateral.[16] The agenesis of PL muscle could be seen in 26% individuals.[17] It is often used in reconstructive plastic surgery particularly in setting of tendon grafting. SUA, due to its unusual superficial course it is more prone to injuries which lead to bleeding and ischemia.[18] Gangrene of upper extremity due to instances of inadvertent intraarterial injection of drugs into SUA was reported in the literature.[19] Conversely, it is more accessible for cannulation due to its superficial course.

Presence of SUA may pose misinterpretation of incomplete angiographic images in the event of arterial anastomosis performed for haemodialysis.[8] Surgical procedures like radial artery grafting, coronary bypass may be complicated due to its anatomical variation[6] and its presence may also complicate intravenous drug administration, venipuncture and percutaneous brachial catheterization.[18] Therefore it has been suggested that, persistence of SUA should be detected before surgery for the easy and reliable elevation of forearm flap.[2]

Hence, the adequate knowledge of these variations is important not only to anatomists, but also to radiologists, angiologists, orthopaedic and plastic surgeons.

References