

Case Report

SUPERFICIAL BRACHIOULNAR ARTERY AND OTHER VASCULAR VARIANTS IN LEFT UPPER LIMB

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ABSTRACT

Background: Variations in origin, course and distribution of upper limb arteries are well documented and they have a great clinical significance. But the incidence of certain variations like presence of Superficial BrachioUlnar Artery (SBUA) is less and its association with other vascular variations in hand are very few.

Material: Human male cadaver of about 65 years age, received for student demonstration dissections provided the material for this study.

Results & Observations: SBUA originated from brachial artery (BA) in the left upper limb of a human male cadaver. Other vascular variations noted were division of BA into radial artery (RA) and a common trunk (CT) for common interosseous and ulnar recurrent arteries (URA); and variant pattern in completion of Superficial Palmar arch (SPA).

Conclusion: Arterial variations of upper limb have been reported to have clinical implications. A variant vessel like SBUA may be encountered during elevation of forearm flaps, or accidental injections of drugs into artery with mistaken identity for a vein, may land in severe complications. Added to these, knowledge of formation of palmar arterial arches and their branching pattern is important in reconstructive surgeries of hand.

KEYWORDS: Superficial BrachioUlnar Artery; Brachial Artery; Radial Artery; Superficial Palmar Arch.

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BACKGROUND

Normal course and distribution of upper limb vessels have been described in standard books [1, 2]. Incidence of variant vessels varies from author to author and there is difference in the incidence of individual variations. Variations ranging from existence of simple superficial brachial artery and its variant branches to complete absence of either radial or ulnar arteries have been reported. Different terminologies and criteria were used to describe and to classify them [3]. This variable terminology was unified by Rodriguez-Niedenfuhr et al [3].

One such variant vessel reported was superficial brachioUlnar artery. Superficial Brachio Ulnar artery (SBUA) was defined as an ulnar artery with high origin, which courses over the superficial forearm flexor muscles [3]. Reported incidence of this variant vessel was less.

In present case in addition to presence of SBUA, the brachial artery presented an altered pattern in branching and the radial artery and superficial palmar arch presented different type of communication in hand. Hence an attempt is made to present this case.

CASE REPORT

In student demonstration dissections on a human male cadaver of about 65 years age, in the department of Anatomy, NRI Medical College, variant arterial pattern was observed in left upper limb

Upper arm: Axillary artery continued in the upper arm as BA and 5 cm distal to its commencement, a branch originated from medial aspect of it. This vessel pursued a superficial course in upper arm and continued its course as ulnar artery in the fore arm and hand and hence designated as SBUA. It was accompanied by ulnar nerve on its medial side and coursed distally (Fig 1a). Later, ulnar nerve passed posterior to medial epicondyle of humerus.

Cubital fossa & forearm: SBUA coursed superficial to common flexor origin and pronator teres muscle but deep to bicipital aponeurosis (Fig 1b). It was located between palmaris longus and flexor carpi radialis in a superficial plane in proximal part of fore arm and between flexor carpi ulnaris and flexor digitorum superficialis but anterior to flexor digitorum profundus in distal part of forearm (Fig 1c).

Main branchial artery in the upper arm had normal course and relation with median nerve and entered cubital fossa.

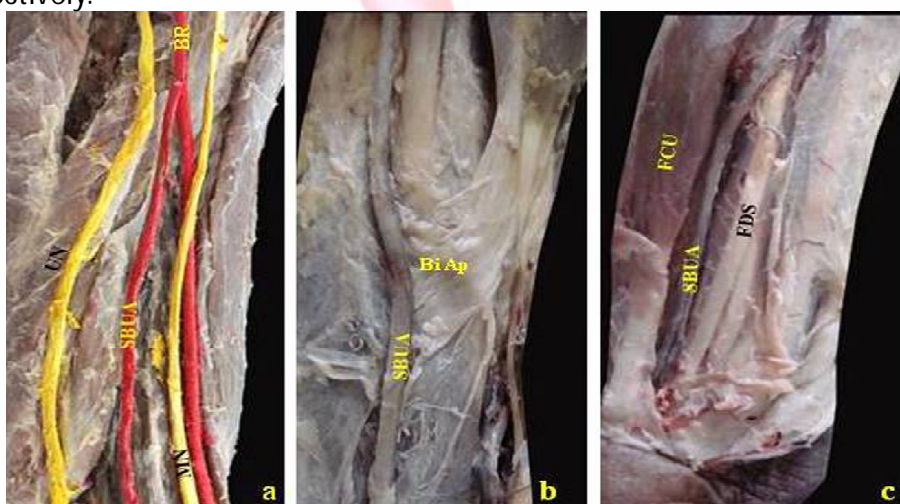
In cubital fossa BA was anterior to brachialis muscle with median nerve and biceps brachii tendon on its medial and lateral sides respectively.

Radial recurrent artery originated from posterolateral aspect of this artery and immediately the succeeding part of vessel bifurcated into medial and lateral divisions (Fig 2a). Lateral division continued as radial artery, medial division was a common trunk for ulnar recurrent arteries and common interosseous artery. Ulnar recurrent arteries continued their normal course and common interosseous artery divided into anterior & posterior interosseous arteries and few muscular branches. These two interosseous vessels pursued their regular course. Anterior interosseous artery was of larger calibre.

Near wrist and in hand:

SBUA continued in to palm superficial to flexor retinaculum with ulnar nerve on its medial side (Fig 3a). In hand it bifurcated into two branches, a superficial and deep. Both branches were of equal size and crossed the palm from medial to lateral side completing superficial and deep palmar arches with branches of radial artery which have a differed course (Fig 3 b,c).

From superficial palmar arch (SPA) initially a common trunk arose to divide into proper digital branch to medial side of little finger and a common digital branch to contiguous sides of little and ring fingers. Later, two common digital branches originated and supplied adjacent sides of ring & middle and middle & index fingers respectively.



[**BR** - Brachial Artery,
SBUA - Superficial
Brachio Ulnar Artery,
UN - Ulnar Nerve,
MN - Median Nerve,
BiAp - Bicipital
aponeurosis (incised),
FCU - Flexor Carpi Ulnaris;
FDS - Flexor Digitorum
Superficialis.]

Fig.1: Course of Superficial Brachio Ulnar Artery.

Fig. 1a: SBUA origin from BA and its relation to Ulnar Nerve.

Fig. 1b: Relation of SBUA to Bicipital aponeurosis and common flexor origin.

Fig. 1c: Relation of SBUA to FCU and FDS near wrist joint.

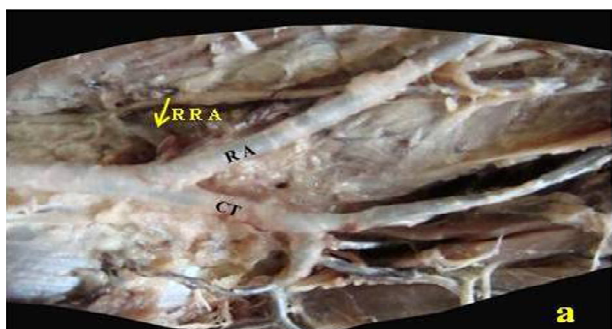


Fig. 2a: Division Of Brachial Artery.

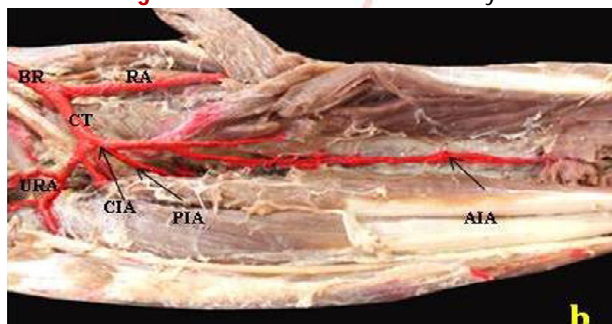


Fig. 2b: Branches Of Common Trunk.

[**RRA** - Radial Recurrent Artery, **RA** - Radial Artery, **BR** - Brachial Artery; **CT** - Common Trunk, **URA** - Ulnar Recurrent Artery, **CIA** - Common Interosseous Artery, **PIA** - Posterior Interosseous Artery, **AIA** - Anterior Interosseous Artery.]

Radial artery:

RA pursued its normal course on to dorsum of hand and coursed to dip in to palm to complete deep palmar arch (Fig 4b). Superficial palmar branch of radial artery was absent. At the point where the main vessel was piercing the 1st interosseous space a large branch originated from it and continued over 1st dorsal web space into the palm to join lateral end of superficial palmar arch beyond its last common digital branch (Fig 4a). At the point where it has joined the SPA, a diamond shaped anastomotic ring was formed. This ring was joined by a branch from radial artery as it entered palm before it formed the deep palmar arch. A large branch to index finger arose from this ring [Fig 4a, b].

Arteria princeps pollicis originated from radial artery before it contributed the branch to anastomotic ring. After giving these two branches, it completed deep palmar arch in palm. There was no separate arteria radial indicis directly from radial artery. There was no anastomosis between ARI and APP.

Three palmar metacarpal arteries, perforating branches and recurrent branches were normal from DPA.



Fig3b. Superficial & Deep palmar arches



Fig 3c Large branch from Radial Artery passing over web margin

Fig. 3a: Formation of Superficial palmar arch.

Fig. 3b: Superficial & Deep palmar arches [SPA pulled distally].

Fig. 3c: Large branch from Radial Artery passing over Web margin.

[**SPA** - Superficial Palmar Arch (pulled distally in fig 3b), **UN** - Ulnar Nerve, **SBUA** - Superficial Brachio Ulnar Artery; **DPA** - Deep Palmar Arch.]

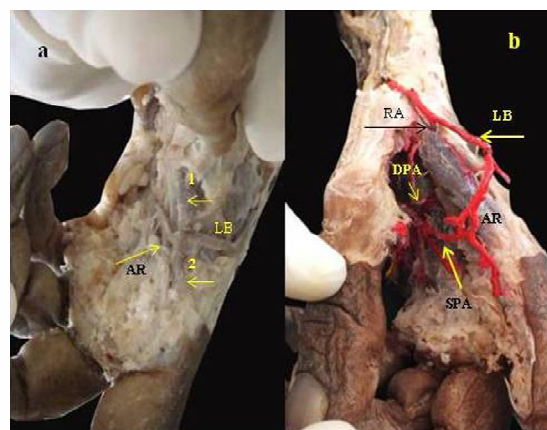


Fig. 4 \diamond Anastomotic Ring Near Web Margin and Palmar Arches.

[**RA** - Radial Artery, **AR**-Anastomotic Ring, **SPA**-Superficial palmar Arch; **DPA** -Deep Palmar Arch; **LB**-Large branch from radial artery, 1.Direct branch from Radial Artery to Anastomotic ring. 2.Branch from anastomotic ring to index finger.]

DISCUSSION

Major variations of principal arteries of upper limb received attention of anatomists [4]. High

origin of ulnar artery from axillary artery [5], and other variations of ulnar artery were reported by several authors [6, 7]. Keeping in view the importance of vascular variations in upper limb, a detailed study of arterial variations was undertaken by many.

192 embalmed cadavers were examined by Rodriguez – Niedenfuhr et al [3] and a meta – analysis of them was done. Literature was reviewed by them on vascular variations in upper limb and variable terminology previously used was unified into 12 categories covering all the previously reported variant patterns of the vessels of arm and forearm.

Seven different arterial variations were reported by them from their work on 192 embalmed cadavers (384 upper limbs). They named the variant vessels of upper limb depending on their location, viz those located in upper arm, those located in arm and forearm, and those only in forearm. In addition to this, (the presence or absence of artery, its superficial or deep course was also taken into consideration in naming the vessel. One of the reported variations in their study was superficial brachio ulnar artery. This was defined by them as an ulnar artery with high origin and courses over the superficial forearm flexor muscles. It arose from axillary artery in 25%; from upper third of BA in 37.5%; from lower third of BA in 18.75% and from lower third of a superficial brachial artery in 18.75%. In their work artery coursed deep to bicipital aponeurosis in 56.25%; superficial to aponeurosis in 37.5% and pierced aponeurosis in 6.25%. Brachial artery divided at its normal level into radial artery and an interosseous trunk, the later sending off the ulnar recurrent artery. Incidence of this vessel (SBU) as per their work was 4.2% (16 of 384 Upper Limbs).

Similar cases were reported by Casal et al [8] and Ozlem ELVAN et al [9]. In the case reported by Casal et al [8], SBUA originated from brachial artery in middle third of arm and brachial artery continued through the radial artery which gave off the common interosseous artery in upper third of forearm. Radial recurrent artery originated from radial artery and ulnar recurrences from common interosseous trunk. In their case the Superficial Brachio ulnar artery crossed anteriorly to bicipital aponeurosis and in forearm

ran deep to palmaris longus muscle belly.

Branching of brachial artery into RA, CIA, recurrent artery and a muscular branch was reported by Ozelm Elvan et al [9]. Basic pattern of brachial artery as a source for radial and common interosseous trunks was seen in all these cases with slight differences in level of origin of radial recurrent and muscular arteries.

In present case also, main branching of BA is almost similar to the findings of others but radial recurrent arose from BA before it bifurcated. The path of SBUA was neither deep to Palmaris longus muscle nor superficial to bicipital aponeurosis as reported by Casal et al [8]. But the vessel in present case was superficial to forearm flexors near elbow which is in concurrence with some cases of Rodriguez - Niedenfuhr et al [3]. Ozelm ELVAN et al [9] described superficial palmar branch of radial artery joined superficial palmar arch passing through the first web space. Vijayalaxmi & Rao [10] reported a different type of formation in superficial palmar arch. Anitha et al [11] reported a rare arterial arcade at 1st web space. In their case the superficial palmar arch in addition to its normal branches, gave origin to a common trunk which traversed towards the web space between pollex and index finger and divided into arteria radialis indicis and arteria princeps pollicis. Arteria princeps pollicis further divided into a palmar branch and a dorsal branch. The dorsal branch communicated with the 1st dorsal metacarpal artery, thus forming an arterial arcade at the base of the pollex.

A rare pattern of SPA was observed by Suxena et al [12]. SPA was formed by ulnar artery alone and digital branches were given from it. In their case ulnar artery bifurcated to supply thumb and index finger. Superficial branch of radial artery did not participate in arch formation but the arch formation was completed by the radial artery proper on the dorsolateral surface of hand, after joining the point of bifurcation of ulnar artery [12].

In present case superficial palmar arch was completed by a large branch of radial artery given on dorsum of hand which curved round 1st dorsal web margin in to palm. This junctional point presented an arterial ring which was again joined by branch of radial artery originated in palm deep to thenar muscles.

From this arterial ring, index finger received its share of blood supply by a branch from the ring and thumb got its share from APP which arose from radial artery before it formed DPA [Fig 4a, b]. We consider this large vessel originating from radial artery as a variant form of 1st dorsal metacarpal artery which has not divided but was also quite large and contributed to completion of SPA. We consider this as a very rare arrangement of vessels and it is not similar to that described by other authors. Main radial artery was comparatively smaller in caliber and it anastomosed with deep branch of SBUA to complete deep palmar arch [Fig 4 b].

CONCLUSION

Variations in branching of brachial artery and alterations in SPA formation were reported by many but each individual variation is different especially so with completion of palmar arches. Reported incidence of SBUA is less, and variant form of SPA as reported in this case is much less in literature. As was already indicated, knowledge of these variations is essential during elevation of forearm flaps, to vascular surgeons, plastic surgeons and hand surgeons in reconstructive surgeries on hand or thumb. Knowledge of this variant form of ulnar artery is highly essential during intra vascular administration of drugs.

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List of Abbreviations:

SBUA - Superficial Brachio Ulnar Artery
BR - Brachial Artery
RA - Radial Artery
CT - Common Trunk
URA - Ulnar Recurrent Artery
RRA - Radial Recurrent Artery
CIA - Common Interosseous Artery
AIA - Anterior Interosseous Artery
PIA - Posterior Interosseous Artery
UN - Ulnar Nerve
MN - Median Nerve
Bi Ap - Bicipital aponeurosis

Conflicts of Interests: None

REFERENCES

- [1]. Romanes.G: In Cunningham's Manual of practical Anatomy Vol.1.15th ed. Oxford University Press. New York. P. 78, 82-83.
- [2]. Susan Standing in Gray's anatomy. The Anatomical Basis of Clinical Practice. Sec 6 Pectoral Girdle and

- Upper Limb Ed David Johnson 40th ed Churchill Living stone Elsevier 2008 p, 835, 85, 890-894.
- [3]. Rodriguez-Niedenfuhr.M ,Vazquez.T , Nearn.L, Ferreira.B, Parkin.I and Sanudo.JR: Variations of the arterial pattern in the upper limb revisited: a morphological and statistical study, with a review of the literature. J Anat 2001; 199: 547 – 566.
- [4]. Rodriguez-Niedenfuhr. M, Sanudo.J.R, Vazquez.T, Nearn.L, Logan.B and Parkin.I : Anastomosis at the level of the elbow joint connecting the deep, or normal, brachial artery with major arterial variations of upper limb. J.Anat 2000;196(Pt 1):115-119.doi:10.1046/j.1469- 7580.2000.19810115.x. PMID:PMC 1468046.
- [5]. Nakatani T, Tanaka S, Mizukami S, Shiraishi Y, Nakamura T: The superficial ulnar artery originating from the axillary artery. [Abstract] Annls. Anat 1996, 178,277-279. [Pub Med ID 8712378]
- [6]. Natsis K, Papadopoulou AL, Paraskevas G, Totlis T, Tsikaras P: High origin of a superficial ulnar artery arising from the axillary artery: anatomy, embryology, clinical significance and a review of the literature. [Abstract] Folia Morphol (Warsz) 2006, Nov; 65 (4): 400-5. [Pub Med ID 17171623]
- [7]. Yazar F, Kirici, Ozan H, Aldur MM: An unusual variation of the superficial ulnar artery. [Abstract] Surg Radiol Anat. 1999; 21(2): 155-7 [PMID: 10399219]
- [8]. Diogo Casal; Diogo Pais; Tiago Toscano; Tiago Bilhim; Luis Rodrigues; Ines Figueiredo; Sonia Aradio; Maria Angelica-Almeida and Joao Goyri – O'Neil:. A rare variant of the ulnar artery with important clinical implications: a case report. BMC Res Notes: 2012; 5: 660. Doi: 10.1186/1756-0500-5-660 [PMCID-PMC 3529700] <http://www.biomedcentral.com/1756-0500/5/660>
- [9]. Ozlem ELVAN, Alev KARA, Nail Can OZTURK: Multiple variations along the brachial artery distribution. I J A V 2011;4:211 – 213.
- [10].Vijaya Lakshmi K and Narasinga Rao B: Variations in superficial palmar arch. International Journal of Basic and Applied Medical Scienc. 2012 Vol.2 (2);May–August:271-274. ISSN: 2277-2103 (online)<http://www.cibtech.org/jms.htm>.
- [11].Anitha G, Naveen K, Srinivasa SR, Snigdha M and Satheesha NB: Presence of Rare Arterial Arcade at 1st Web Space in the Right Hand and Its Possible Clinical Complications. [Abstract] JSA. Vol.3 No.1;2013.
- [12].Saxena A, Agarwal KK, Ray B and Pyrtuh S: A rare finding of the superficial palmar arch developmental and clinical significance. J Clin Diagn Res. 2013 Apr; 7 (4): 706-8. Doi: 10.7860/JCDR/2013/5212.2887. Epub 2013 Apr1.

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