

A STUDY ON ULNAR DOMINANT COMPLETE SUPERFICIAL PALMAR ARCH

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ABSTRACT

Background: The chief source of arterial supply to the palm is provided by association between the superficial palmar branch of radial artery and ulnar artery. Sometimes, there are divergent sources forming the superficial palmar arch and one of them is where there is no arterial supply via radial artery and it is provided entirely by the ulnar artery where the ulnar artery ends by supplying the index finger and thumb. The present study was undertaken to investigate the percentage showing superficial palmar arch formed entirely by ulnar artery.

Materials and Methods: The present study was conducted on 20 hands of unknown sex and age acquired from the Department of Anatomy, Sri Ramachandra Medical College and Research Institute, Chennai. The superficial palmar arch was dissected and the variations are reported.

Results: Out of the 20 hands dissected, 8 hands (40%) showed complete ulnar artery type.

Conclusion: The variations in the pattern of superficial palmar arch will be more significant for anatomists, orthopaedicians, radiologists and trauma care surgeons for micro vascular arterial restorations in cases of inefficient collateral circulation due to ulnar artery occlusions.

KEY WORDS: Superficial Palmar Arch Variation, Radial Artery, Microvascular Surgeries.

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INTRODUCTION

Superficial palmar arch is an important structure that provides arterial supply to the palm. Superficial palmar arch is formed by colligation between direct continuation of the ulnar artery and the superficial palmar branch of radial artery. Sometimes it is formed entirely by ulnar artery or by arteria radialis indicis or a branch of either princeps pollicis artery or the median artery [1].

Superficial palmar arch is said to be entirely

formed by ulnar artery when it does not receive any contribution from the radial artery and also when it allocates arterial supply to the radial side of index finger and thumb representing radialis indices and princeps pollicis arteries respectively. Interference with an efficient blood flow leads to inefficient movements of fingers and the hand [2].

Superficial palmar arch formed entirely by ulnar artery is found in higher incidence than the classical type in a study by Suman U et al where

this type was found in 50% of specimens and it was suggested that it cannot be called as a variation. They also opined that ulnar artery occlusion may cause claudication and gangrene in the digits [3].

Since the formation of superficial palmar arch is not constant and higher incidence of this type is seen in literature, the present study was undertaken to enhance the existing knowledge of this type of formation of superficial palmar arch.

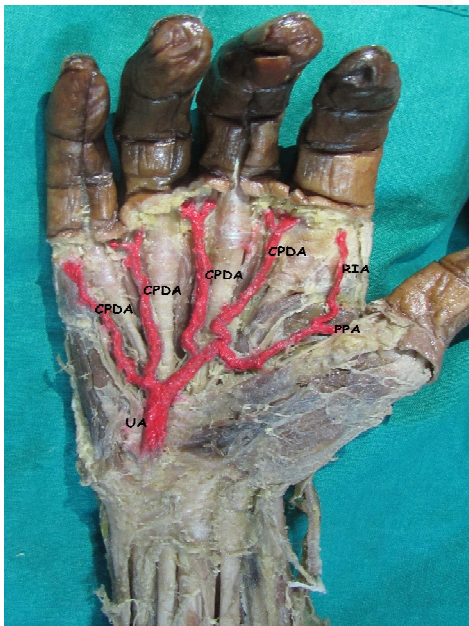
MATERIALS AND METHODS

The present study was conducted on 20 hands in the department of Anatomy, Sri Ramachandra Medical College and Research Institute.

The hands were dissected as per Grant's Dissector [4]. A transverse incision was made across the palm from 2nd to 5th digits at the level of web of the fingers. In addition an incision was also extended along the web of the thumb. After removal of the skin by these incisions, the fat on the palmar aponeurosis was scraped off and the aponeurosis was preserved. The formation of superficial palmar arch and its branches were traced and photographed.

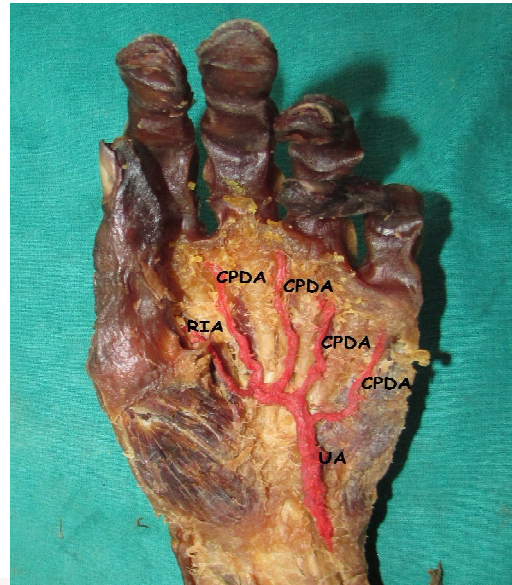
RESULTS AND OBSERVATIONS

Fig. 1: Showing superficial palmar arch formed by ulnar artery.



UA - Ulnar Artery, **CPDA** - Common Palmar Digital Artery, **RIA** - Radialis Indicis Artery, **PPA** - Princeps Pollicis Artery.

Fig. 2: Showing ulnar artery termination by giving a branch to radial side of index finger and thumb.



UA - Ulnar Artery, **CPDA** - Common Palmar Digital Artery, **RIA** - Radialis Indicis Artery.

Of the 20 hands dissected, superficial palmar arch formed entirely by ulnar artery was observed in 8 hands (40%) as shown in Fig 1.

In all these hands, ulnar artery arises as a branch of brachial artery and directly continues into the palm and forms an arch superficially without superficial palmar branch of radial artery joining it. The ulnar artery terminates by giving a branch to radial side of index finger and thumb. [Fig. 1 & Fig. 2]

DISCUSSION

Superficial palmar arch formed entirely by ulnar artery was found in 40% hands in the present study which is similar to that of a study in which this type was found in 37% among 650 specimens [5].

Ulnar artery is the dominant source of supply in most hands and collateral circulation of hand would maintain viability of fingers when either radial artery or ulnar artery is occluded at the wrist. However, 9% of hands showed drastic disturbance of circulation on occlusion of ulnar artery suggesting that in those hands, superficial palmar arch was formed entirely from ulnar artery and no participation from the radial artery [6].

In contrast to the present study, Al-Turk M et al [7] and Patnaik VVG [8] reported an incidence of 8% and 2% respectively.

The anomalies of blood vessels was described by Arey [9] and stated that it may be due to the following reasons:

- a) Unusual paths taken by primitive vascular plexus
- b) Persistence of vessels that normally has to be obliterated
- c) Disappearance of vessels that normally has to retain
- d) Incomplete development of vessels
- e) Fusion and absorption of the parts of vessels that are usually distinguishable.

Suman U et al noticed the same in 50% of their specimens [3]. They also remark that any finger could become ischaemic if the arch is entirely formed by ulnar artery which results in occlusion of the same during Hypothenar Hammer Syndrome.

A healthy functional arch is important during microsurgical procedures and radial artery cannulation [10]. The knowledge of variations in the superficial palmar arch will be helpful for radiologists for performing angiographic procedures [11] and for microvascular surgeons in crush injuries and amputations of hand [12].

CONCLUSION

Palm is the common site of laceration and most commonly affected by traumatic injuries. In a complete ulnar dominant superficial palmar arch, ulnar artery forms a major source in supplying all the digits and variation occurs in the radial part of the arch. Due to the advancement of microsurgical techniques in reconstructive hand surgery, the knowledge of variations in the vascular patterns of hand will gain more importance in surgical applications.

Conflicts of Interests: None

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