

Variation in Superficial Palmar Arch: A Case Report

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Abstract: Normally the superficial palmar arch is the continuation of the ulnar artery, continues its course across the flexor retinaculum. Distal to retinaculum it turns laterally and arches by combining with another artery and supplies medial three and half fingers. This case was observed in right hand after thorough and regular dissection of both hands of a 70 year old male cadaver in Department of Anatomy at S.V. Medical College, Tirupathi. In the present case, the superficial palmar arch in the hand is supplying the medial four and half fingers of right hand. With the advent of micro vascular surgery and reconstructive surgeries, it is important to recognize and document the developmental variation in course, distribution and branching pattern of the arteries of upper limb. Recognition and documentation of this type of anatomical variation is highly significant during the surgeries of hand.

Keywords: Superficial palmar arch, Ulnar artery, Radial artery, Flexor retinaculum, Microvascular surgery.

INTRODUCTION

The superficial palmar arch is the continuation of the ulnar artery which is same in size. It continues distally across the flexor retinaculum. It turns laterally and penetrates the septum separating the hypothenar muscles from central palmar compartment. It then arches across the palm of hand immediately behind the palmar aponeurosis [1].

The superficial palmar arch has its concavity proximally and lies at about the level of the proximal transverse palmar crease. The arch varies in shape and position, especially on its radial side, since it may curve smoothly back toward the origins of the thumb muscles or may run distally and it is traced to the radial side [1].

The arch gives rise to three common digital arteries, supplying the medial three and half fingers. The part of the arch beyond the origin of the common digital artery to the index and middle fingers; usually represents a contribution from the radial artery, but may be an end branch into the muscles of thumb. The branch of the radial artery that usually completes the arch on radial side is most commonly from common stem of princeps pollicis and radialis indicis arteries or from either of these arteries alone and sometimes arteria nervi mediana which accompanies the median nerve [2].

CASE REPORT

The present variation of the arterial pattern was observed in right hand of a seventy year old male cadaver during the regular dissection of an undergraduate medical training programme at S. V. Medical College, Tirupathi. The body was stored in formalin tanks. Externally, there are no wounds or scars on the palm. The dissection was done according to standard procedure. Palmar arch is thoroughly traced and the variation was recorded and photographed.

DISCUSSION

The superficial palmar arch is the continuation of the ulnar artery which is completed by radial artery supplying the medial three and half fingers of hand.

According to McCormack, Cauldwell and Anson, out of 80 specimens, 15% is completed by superficial palmar branch of radial artery and 47% is completed by princeps pollicis and palmar radialis indicis arteries of radial artery in which 6 were joined by median artery and in 10% - superficial palmar arch is not formed at all [1].

According to Weathersby, in 200 hands, Ulnar artery contributed to superficial arch in all cases but superficial arch had no connection with radial artery in 12% and in remaining connected to stem of origin of princeps pollicis and palmar radialis indicis arteries or either of these arteries alone or to the superficial palmar

branch of radial artery forming a complete arch. In 86%, it is completed by radial indicis artery and 10% by median artery [1].

According to Weathersby, variations of superficial palmar arch are of 4 types.

- Type A - An incomplete arch
- Type B - One connected to princeps pollicis and radialis indicis
- Type C - One connected to princeps pollicis
- Type D - One to superficial palmar branch of the radial and the stem of princeps pollicis and radialis indicis [1].

Superficial palmar arch is classified into complete and incomplete arch. An arch is said to be incomplete if the vessels forming the arch does not take part in anastomosis [3]. In a cadaveric study done in 650 upper extremities, Coleman S *et al.* [4] reported the incidence of incomplete superficial palmar arch in 21.5% but Ikeda *et al.* [5] observed the incidence to be only 14.2%.

In our study, superficial palmar arch is formed by ulnar artery completed by radial artery branch which is seen in a photograph labelled as Fig. 1. It almost corresponds to Weathersby-type D as seen in Fig. 2 and gives blood supply to the medial four and half fingers and the radial side of the thumb is supplied by princeps pollicis artery. A line diagram is shown in Fig. 3.

It is seen by Madyastha [6] that an additional palmar branch is given by the arch to the first web space, divided into arteria radialis indicis and arteria princeps pollicis and also by Vollala *et al.* [7]. It was named as common palmar artery by Ikeda, Ugawa, kazihara *et al.* [5]. According to Madyastha [6], its incidence was only 2.08% approximating our incidence of 2.5%.

The first web space arteries from SPA are of great importance if there is absence of arterial supply from deep palmar arch. In studies by Ruengsakulrach *et al.* [8], same finding is seen and in 66% hands, all fingers are supplied by SPA showing its predominance. On the lateral side of the arch in our study, a single artery comes out giving 3 muscular branches, this type of variation is not noted in literature.

The embryological significance of variations is given by Patnaik *et al.* [9] after studying the comparative anatomy of arteries of hands in primates that variations represent persistence or reappearance of primitive patterns agreeing with ontogeny repeats phylogeny.



Fig. 1: showing additional branch from superficial palmar arch

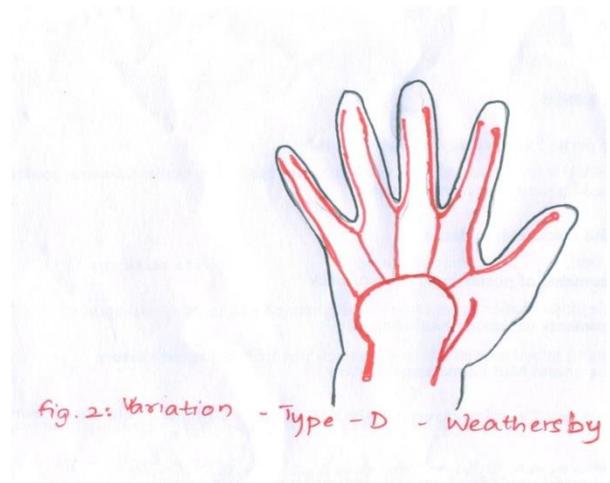


Fig. 2: Variation-Type D-Weathersby

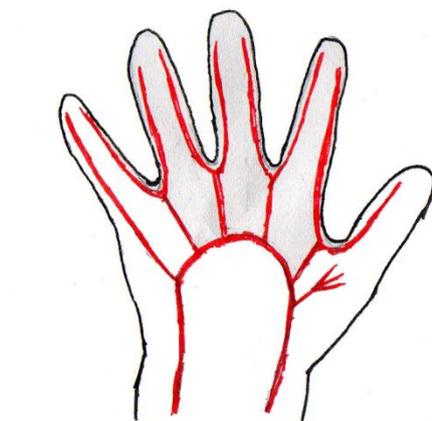


Fig. 3: Present case

CONCLUSION

The blood supply of hand is derived from the anastomosis of superficial and deep palmar arches. So injuries to hand may disrupt this causing profuse bleeding. But because of this rich anastomosis, the healing is rapid. The patterns of arches are important while doing hand surgeries, amputations. Caution is taken while doing radial artery grafting, ligation of arteries –when superficial palmar arch is formed differently to avoid the bleeding and to avoid ischaemia and gangrene of fingers in case of deficiency. It is also important in microsurgeries of hand [10]. Injury to SPA and ulnar artery compromise the arterial supply and so tests like Allen test, angiography and colour doppler studies of the hand are to be done before starting any invasive procedures and vascular surgeries [6].

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