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A report on two cases of persistent median arteries

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ABSTRACT

Commonly the superficial palmar arch is formed by the anastomosis of the ulnar artery with the superficial palmar branch of the radial artery at mid palmar level. Variations of the superficial palmar arch as reported include:

a. Arch formed by the anastomosis of the Princeps Pollicis branch of the Radial artery with Ulnar artery.

b. In the rare instances, the anastomosis of the Median artery with the Ulnar artery forming complete superticial palm's arch of the Medio-Ulnar type.

There have been previous reports about the bilateral occurrence of the Medio-Ulnar type and in most cases were similar in both hands of the same body. Here in the present study, we report a case, where in one hand, arch was formed by the ulnar and radialis indicis is joined by median artery that is accompanying the median nerve forming complete superficial palmar arch of Radio-medio-ulnar type, while in the other hand median artery continued to persist without participating in the formation of the arch. This dissimilarity between the two hands of the same body is very rare and hence reported. However, complete dissection of the whole body did not reveal any other vascular abnormality.

Keywords: Median artery; Ulnar Artery; Medio- Ulnar type; Radio medio- ulnar type.

INTRODUCTION

The superficial Arterial Arcade of the palm, commonly known as superficial palmar arch, is usually formed by the ulnar artery anastomosing with any one of the branches of Radial artery.

Normal arterial pattern of superficial palmar arch is as follows:

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a. Ulnar artery enters the palm superficially to flexor retinaculum, lateral to the pisiform and medial to the hook of the hamate.
b. The ulnar artery usually anstomoses with the superficial palmar branch of the radial artery to form the **complete superficial arterial arcade**, but sometimes it may anastomose with any one of the branches of the radial artery at the level of the base of the extended thumb thus forming convexity towards the fingers.
c. Three common palmar digital arteries arise from the convexity of the arch.
d. Proper palmar digital artery divide at the web of the fingers, each common supplying contiguous sides of the fingers.

METHODS AND MATERIALS

A study was done on 50 properly fixed human hands. There were 29 of left and 21 of right hands collected from the cadavers. These were carefully dissected under water and variations were noted. They were dried well with acetone. Painted with fabric red colour paint for arteries and yellow colour for nerves to get proper contrast in specimens (number 25 and 26) and prepared for photograph. The specimens were numbered from one to fifty. Specimens showing the same pattern of superficial palmar arch were grouped. One specimen from each group was photographed.

OBSERVATIONS

In the present study, the following are the percentages of incidences of different patterns of both complete and incomplete varieties of superficial Palmar arches.

Table I

Group 1	Ulnar artery anastomosing with the superficial palmar branch of the Radial artery.	24 %
Group 2	Ulnar artery anastomosing with the Radialis Indicis branch of the Radial artery.	34 %
Group 3	Ulnar artery anastomosing with the Princeps Pollicis branch of the Radial artery.	02 %
Group 4	Ulnar artery anastomosing with the common trunk of both Radialis Indicis and the Princeps Pollicis.	28 %
Group 5	Ulnar artery anastomosing with the persistent median artery forming a complete palmar arch in the right palm and forming incomplete palmar arch in the left palm.	04 %
Group 6	Superficial palmar arch formed by ulnar artery alone as incomplete superficial palmar arch.	08 %

Table I has two specimens numbered 25 and 26 under group five showing **two cases of persistent median arteries** forming both complete and incomplete types of superficial palmar arches.

Under Group Five

Specimen no 25 of the right palm

In this specimen of the right palm, the superficial palmar arch is formed by the ulnar artery and the Radialis Indicis which is joined by the median artery **which is accompanying the median nerve** into the hand. Like any other type, three common palmar digital arteries

are given off from the convexity of the arch, which divide into arteries at the webs of the index and middle and ring and little fingers.

The index finger is supplied by radialis indicis on radial side of the index finger and the thumb is supplied by princeps pollicis on the either side. So, this is a complete superficial palmar arch of Radis-medio-ulnar.

Photograph 25 of R palm and R forearm. Here median artery accompanying with median nerve enters the palm and an astomoses with ulnar forming complete medio ulnar type of superficial palmar arch.

Specimen no 26 of the left palm

In this specimen the median artery accompanying median nerve, enters the hand and divides into two branches. One branch is a common trunk, which further divides into two, supplying radial side of the index finger and the thumb on the either side, replacing Radialis Indicis and princeps polilicis respectively. The other branch, the first common palmar digital, divides at the web of index and middle fingers supplying ulnar side of the index finger and radial side of the middle finger.

Photograph 26 (showing) of L palm and lower $\frac{1}{3}$ forearm. Here median artery accompanying median nerve enters the palm has remained without anastomosing with ulnar artery thus forming incomplete superficial palmar arch.

The ulnar artery divides into two common palmar digital arteries: one supplying ulnar side of the middle finger and radial side of the ring finger, and the other supplying ulnar side of the ring finger and radial side of the little finger. A palmar digital branch is given off from the ulnar side of the little finger.

Thus the median artery forms part of superficial palmar arch which is incomplete and supplies digital arteries to the two sides of the thumb, radial side of the index finger and contiguous sides between the index and middle fingers.

The persistence of median artery is seen in both palms of the same body thus forming complete and incomplete superficial arterial arcades of the palm.

DISCUSSION

Table II: Classification of superficial palmar arch in 650 specimens as studied by Sherman Coleman, Berry J. Anson.

Group 1	510 hands (78.5%) showed complete arch	
Type A	Radio Ulnar arch is formed by superficial volar branch of radial artery and large ulnar artery.	24.5%
Type B	Arch entirely formed by ulnar artery.	37.0%
Type C	Medio-ulnar arch is completed by ulnar artery and enlarged median artery.	3.8%
Type D	Radio-medio-ulnar inter communication in which 3 vessels enter into formation of superficial palmar arch.	1.2%
Type E	Well-formed arch by ulnar artery completed by large by size vessels derived from deep palmar arch.	2.0%
Group 2	Incomplete Arch studied in 140 hands	(21.5%)
Type A	Superficial palmar branch of radial and ulnar artery fail to form the arch.	3.2%
Type B	Ulnar artery is the superficial volar arch which is incomplete. Ulnar artery does not supply thumb and index finger.	13.4%
Type C	Superficial vessels receive contribution from both median and ulnar arteries and but they do not anastomose.	3.8%
Type D	Radial ulnar median arteries all give origin to superficial vessels but do not anastomose.	1.1%

Table III: Piersol classification of superficial palmar arch complete arch

Type 1	Median or volar interrosseous artery anastomose directly with arch formed by formed by superficial volar and ulnar artery.
Type 2	Those in which superficial volar fails to reach ulnar, the arch being formed by the union of the later vessel either with median and volar interrosseous.
Type 3	Arch may be formed by ulnar artery alone - No direct communication taking place between it and arteries mentioned.

Incomplete arch

II class: The ulnar and superficial volar on reaching the palm divide in somewhat fan like manner giving rise to digital branches.

a. Superficial volar vessel may contribute to the fourth digital as well as to the thumb and radial side of index or it maybe limited to later vessels, all normal digital being derived from ulnar.

b. With extra development of median artery, there is an associated absence of more or less complete

superficial lvolar and median giving off branches to radial digits as well as fourth digital vessel.

Specimen 25 is similar to type D of group I (as studied by Sherman & Coleman) in which the median artery is joined by superficial palmar arch formed by ulnar artery joining radialis indics. Thus it is radio medio ulnar type.

Specimen 26 is similar to type C of group II (incomplete arch) as studied by Sherman & Coleman n 650 specimen - (1953).

In the present study median artery gives branches to both sides of the thumb and the radial side of the index finger by a common stem, and also supplies adjacent sides of the index and middle fingers. But it does not anastomese with ulnar artery. It supplies proper palmar distal branches to the medial side of the middle finger and ring and little fingers.

In the present study, specimen 26 is similar to the observation of Piersol of Incomplete Superficial Palmar Arch (II class B group).

Percentage of incidence of persitent median artery

The superficial palmar arch has been known to vary a great deal. These variations have been explained on the basis of developmental stages which have persisted abnormally.

The enormous variability in the formation of superficial palmar arch has been observed by earlier workers.

Sherman, Coleman and Anson (1961) based on the analysis of 650 dissection, grouped the variations into 2 groups (table III Group 1 and 2). Piersol (1911) and Weathersby (1955) reported by Hollinshed also observed the same variation in their study (table II).

It is well known that persistent median artery may descend as for as palm and enter in the formation of superficial palmar arch. Joschitchinski called this as ATAVISTIC because the median artery is normally found in the palmar arch of certain lower animals and at late stage in the development of the arteries of the human hand.

The relative wide difference in percentage noted can be explained in part by the observation that median artery frequently joins superficial arch as fibrotic thread or as a tiny vessel which is barely dissectable.

The incidence is reported by Piersol (1911) - 7.5% Dubreuil & Chamberdel (1926) - 4%, Adachi (1928) - 8.2%, B.D. Mishra (1955) - 16.66%, Weathersby (1955) - 10%, Sherman & Coleman (1961) - 12.3%, Lippert H (1991) - 10%, Saundo Chickwe & Evans (1994) - 27.1%.

In the present study, the median artery was observed in both hands of the same body arising from the anterior interiorsseous artery but termination is asymmetrical. B.D Mishra reported four cases of bilateral occurrence of median artery.

In the right hand, median artery joins superficial palmar arch, while in the left hand, arch was not formed and it sent branches directly as I palmar metacarpal artery to the adjacent side of middle and index finger, while the other branch is a common trunk, which further divides to supply radial side of the index finger and thumb, replacing radialis indicis and princeps pollicis respectively. B.D. Mishra reported similar type of termination of median artery in 6 cases.

Saundo Chikwe and Evans (1944) found persistence of median artery in combination with anomalies of median artery in combination with anomalies of median nerve which formed a ring enclosing median artery.

In our present study, no such anomaly was observed.

Anatomists are satisfied with slender or even partly obliterated median artery, while clinicians are more concerned with its diameter. Adachi found median with diameter of 1.5 mm and more in about 3%. In present case, median artery is unequal in diameter . In right hand it is 1.5 mm in the left hand, it is 2.0 mm.

The frequency with which the median artery takes part in the formation of superficial arch has been ariably stated. Jachinski - 7.5%, Tandler - 16.11%, Adachi - 8.0%, Coleman & Anson - 9.9%, Gray - 1.1%. In the present study, it is 4%.

A study of Superficial palmar arch in 20 limbs by Visalakshi Thirumangai *et al* showed a high incidence (20%) of Variations in 1996 session which had contribution from median artery in 10%. The terminal part of incomplete arch ended in thener muscles in one limb. No such termination was observed in present study.

CONCLUSION

The present study of two cases of persistent median arteries of the palm has been co-related with earlier workers. This knowledge of variation is very much essential in the re-constructive surgery of the hand to preserve the original functions of the hand even after surgical intervention by vascular plastic surgeons.

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