



## PERSISTENT MEDIAN ARTERY: A CASE REPORT.

## Clinical Anatomy

Aditya Narayan Singh

Moti Lal Nehru Medical College, Prayagraj

Nishtha Singh

Moti Lal Nehru Medical College, Prayagraj

Krishna Pandey\*

Moti Lal Nehru Medical College, Prayagraj \*Corresponding Author

Badal Singh

Moti Lal Nehru Medical College, Prayagraj

Mamta Anand

Moti Lal Nehru Medical College, Prayagraj

Supriya Sudha

Moti Lal Nehru Medical College, Prayagraj

## ABSTRACT

Normally hand is supplied by ulnar artery and radial artery which form superficial and deep palmar arches. This complex anastomosis of arteries is responsible for anatomical variations in hand. Median artery is a transient artery. It is present during intraembryonic life and starts regression at 8th week of intraembryonic life. In rare circumstances it persists known as persistent median artery, which is usually asymptomatic, but sometime it may lead to Carpal tunnel syndrome and other pathologies also. During routine dissection of a 65-year-old male cadaver, persistent median artery was found to be involved in the formation of superficial palmar arch along with ulnar artery in the right hand. It was a branch of anterior interosseous artery and pierces the median nerve under the cover of pronator teres. It further accompanies the median nerve in forearm. Both median nerve and median artery along with venae comitantes are plastered to each other passing underneath flexor retinaculum and the median artery finally terminate in hand by joining lateral end of superficial palmar arch. Here it gives various muscular branches to thenar muscles. In our case the common interosseous artery is absent and Radial artery was not involved in the formation of superficial palmar arch. Finally, we can conclude that our hand are involved in various activities, so chances of various neurovascular pathologies are more common in hands. So, it is important for plastic surgeons and orthopedicians to know about variant vasculature including persistent median artery and variation in its further course.

## KEYWORDS

Persistent median artery, complete palmar arch, Neurovascular variations

## INTRODUCTION

Human hand receives its blood supply mainly by ulnar and radial arteries. Their branches anastomose to form superficial and deep palmar arch respectively. Superficial palmar arch is usually formed by anastomosis of ulnar artery with superficial branches of radial artery, while deep palmar arch is formed by anastomosis of dorsal radial artery with deep branches of ulnar artery. These complex anastomoses of arteries are responsible for anatomical vascular variations in hand. The palmar arch can be of complete or incomplete type depending on the presence of anastomosis between the contributing arteries.

Normally median artery is a transitory vessel, which is present in intraembryonic life, here it supplies the forearm. It regresses before 8 weeks of intraembryonic life when radial and ulnar artery are formed. If this regression does not occur, it leads to persistent median artery. Jaschtschinski SN called this condition as atavistic condition, because median artery is usually found in palmar arch of lower animals [1].

Persistent median artery normally accompanies the median nerve, occasionally perforating median nerve, condition is known as Bifid median nerve by some [2]. And in palm it joins with ulnar artery to form superficial palmar arch. Persistent median artery is usually asymptomatic, but may lead to Carpal tunnel syndrome, Pronator syndrome or anterior interosseous nerve syndrome. One of the etiologies behind carpal tunnel syndrome is thrombosis of this artery according to Salter et al [3]. Other causes may be atherosclerosis, trauma and aneurysm of median artery. Sometime bifid median nerve also causes carpal tunnel syndrome due to increase in mean cross sectional dimension [2]. It is important for surgeons performing artery grafting for cardiac bypass, arteriovenous fistula for hemodialysis and various microvascular surgeries, to know about anastomosis of hand and persistent median artery and its variation.

In this case report we are discussing here a case of persistent median artery in the right arm of 65-year-old male cadaver.

## Case report

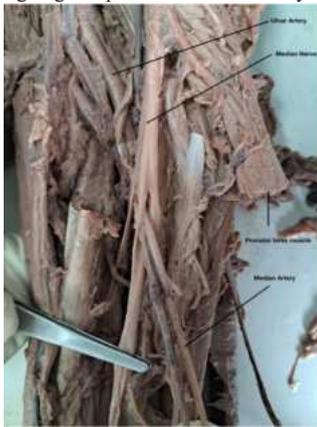
The study was conducted on 30 upper limbs of 15 formalin preserved cadavers in the dissection hall of the department of Anatomy, Moti Lal Nehru Medical college. Out of 15 cadavers 12 were male and 3 were female cadavers. Dissection was done by using guideline given in

Cunningham's manual of Practical Anatomy [4]. After dissecting all 30 limbs, persistent median artery was found to be present in only one right limb of 65-year-old male cadaver. Prevalence is 3.33%.

After removal of skin, subcutaneous tissue and palmar aponeurosis, it was noticed that superficial palmar arch is of complete arch type (Fig. 4) and it was mainly formed by ulnar artery. Radial artery was not involved in formation of superficial palmar arch. It was noted that superficial palmar arch was contributed by an extra artery, this artery is identified as persistent median artery as it is running along with main trunk of median nerve (Fig. 4). On tracing the full course of this artery, it was found to be a branch of anterior interosseous artery, given at the level just below the radial tuberosity (Fig.1). It pierces the median nerve under the cover of pronator teres (Fig.2). The median nerve bifurcates and reunites to give passage to median artery (Fig.2). It further accompanies the median nerve in forearm, runs in between flexor carpi radialis and flexor digitorum superficialis muscle tendons in lower one third of forearm (Fig. 3). Both median nerve and median artery along with venae comitantes are plastered to each other passing underneath flexor retinaculum and finally terminate in the hand by joining lateral end of superficial palmar arch (Fig. 4). Before joining superficial palmar arch, it gives muscular branches to thenar muscles. In our case the common interosseous artery was absent, posterior interosseous and anterior interosseous artery being direct branches of Ulnar artery (Fig. 1).



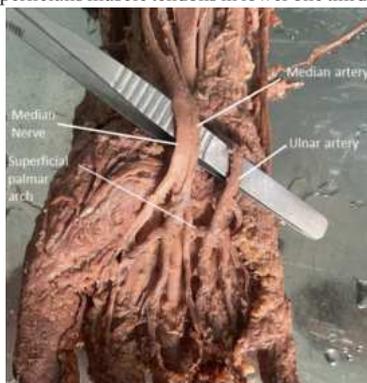
**Figure 1:** Showing origin of persistent median artery



**Figure 2:** Showing persistent median artery pierces median nerve



**Figure 3:** Showing persistent median artery accompanies the median nerve in forearm, runs in between flexor carpi radialis and flexor digitorum superficialis muscle tendons in lower one third of forearm



**Figure 4:** Persistent median artery joins with ulnar artery to form complete superficial palmar arch

**DISCUSSION**

Persistent median artery has been reported to be highly variable in its origin, course, branching pattern and prevalence in various studies as given in table 1. It was first described by Sir Richard Quain in 1844 as small artery that follows the course of median nerve [5].

Singla RK et al observed persistent median artery in 4 limbs (6.6%) in study conducted on 60 upper limbs of male cadavers only. In one cadaver it was found to be bilateral, while one case each of right limb and left limb were seen. In all 4 variant limbs, persistent median artery originated from anterior interosseous artery and terminated in incomplete median-ulnar type of the superficial palmar arch. In three upper limb arteries accompanied the median nerve up to palm. But in left upper limb of cadaver with bilateral variation artery penetrated and divided the nerve into two halves. Thereafter nerve and artery follow the same course up to palm [6].

Katrikh AZ et al reported presence of bilateral persistent median artery and right-sided duplicate palmaris longus in 72-year-old Caucasian male cadaver. Both arteries were located in fibrous sheath

accompanying the median nerve through carpal tunnel. They originated from ulnar artery and anastomosed with the superficial palmar arch in hand [7].

Haladaj R et al studied 125 upper limb and reported persistent median artery in 5 specimens (4%). Persistent median artery took origin from common interosseus artery in 3 upper limbs, ulnar artery in 1 and 1 from the initial part of anterior interosseous artery. In all the cases artery accompanied the median nerve along its course on the distal two-thirds of forearm, where it traveled between flexor digitorum superficialis and flexor digitorum profundus. Two types of superficial palmar arches were present, complete medio-ulnar arch type in 3 limbs and incomplete arch present in 2 limbs [8].

Buch C et al reported the presence of incomplete radio-ulnar type of superficial palmar arch along with bilateral persistent median artery in a cadaver. Persistent median artery originated from ulnar artery and travelled along with the median nerve deep to the pronator teres and flexor digitorum superficialis muscles. It terminated within the carpal tunnel and did not contribute to palmar arch and failed to give rise to palmar digital arteries [9].

Lucas T et al. demonstrated the microevolutionary changes in human beings on 78 upper limbs collected from Australians aged 51 to 101, who died in a period 2015-2016. In this study total 26 median arteries were found showing prevalence of 33.3%. They had shown in their study that the prevalence of median artery increases from around 10% among individual born in mid- 1880 to 30% by the end of 20<sup>th</sup> century (p= 0.0001) [10].

Alexander JG et al reported presence of persistent median artery in upper limb of adult male cadaver of approximately 50–60-year age. Persistent median artery originated as terminal branch of common interosseus artery and run along with median artery. In palmar region it does not anastomoses ulnar artery, common digital arteries emerged from ulnar and persistent median artery [11].

Elhossinyl et al reported a case of persistent median artery which branched off the radial artery and anastomoses with ulnar artery to give rise to complete superficial palmar arch. Their study also revealed reversed palmaris longus and bifid median nerve [2].

From above discussion we can see that there is wide range of variation in the prevalence of persistent median artery from 1.1 % to 33.3%. This discrepancy might be attributed to inadequate sample size and limited studies It may be bilateral [6,7,9] or unilateral [6,2] and taking origin from common interosseous [8,11] or anterior interosseous [6,8] or ulnar artery [7,8,9] or in some cases from radial artery [2] also. In forearm it may simply run along with median nerve or pierce median nerve [6] Elhossinyl et al has called it as bifid median nerve. Variations have been reported in the participation of persistent median artery in the formation of complete [8,2] or incomplete [6,8,9,11] superficial palmar arch.

When we compare our case with previous studies, the unilateral persistent median artery originated from anterior interosseous artery. In forearm it pierces median nerve then run along with median nerve. In palm it forms complete superficial palmar arch of median-ulnar type.

Finally, we can conclude that our hands are involved in various micro and macro activities, so chances of various neurovascular pathologies are more common in hands. It is important for plastic surgeons and orthopedicians to know about normal vasculature and variant vasculature including persistent median artery and variation in its further course.

**Table 1: Showing prevalence of Persistent Median Artery in different study**

S.N.	Author	Prevalence
1	Gray [12]	1.1
2	Jaschtschinski [1]	7.5
3	Eid et al. [13]	4
4	Haladaj R et al [8]	4
5	Singla RK et al [6]	6.6
6	Lucas T et al [10]	33.3
7	Coleman and Anson [14]	9.9

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### Author Contributions

Conceptualization: Krishna Pandey, Nishtha Singh. Data acquisition: Aditya Narayan Singh, Krishan Pandey, Nishtha Singh. Data Analysis or Interpretation: Krishan Pandey, Nishtha Singh. Drafting of the manuscript: Aditya Narayan Singh. Critical revision of the manuscript: Krishna Pandey, Nishtha Singh. Approval of the final version of the manuscript: all authors.

### Conflicts of Interest

None.

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