

A Study On Superficial Palmar Arch And Its Variations

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Abstract:

Background: *Anatomy of hand is complex, intricate and fascinating. Its integrity is absolutely essential for our everyday functional living. Our hands may be affected by many disorders, most common type is hand injury, for any physician, or therapist treating hand problems and mastery of such anatomy is fundamental in order to provide the best quality of care. Vascular anatomy of the hand is a complex, challenging area and has been the subject of many anatomical studies. The precise knowledge of normal and variant anatomy of arteries should be the basis for accurate interpretation of microsurgical technique and safe performance of surgical procedures. (McCormack¹. 1953; Coleman & Anson², 1961; JELICIC³, 1988 Gajisin & Zebdrosky⁴, 1993; Gellman⁵ et al 2001.)*

Methods: *Fifty-two hands from 26 embalmed human cadavers were studied. Variations of palmar arches were recorded. This study was carried out during routine dissection sessions for medical students in shanthiram medical college, nandyal. Among 52 hands 12 hands dissection study carried out at Nimra medical college, Vijayawada.*

Results: *A classic superficial palmar arch was found in 10% [5/50].out of dissected specimens complete arch found in 67% and incomplete arch was 33%. Further, in the present study, median artery shows forming superficial palmar arch in 2% of cases.*

Conclusion: *Study of vascular pattern in a particular area of a human body is highly interesting as to the no. of variations subjected with it. At the same time, knowledge of the frequency of anatomical variations of arterial pattern of hand is crucial for safe and successful hand surgical approach, diagnostic and therapeutic procedures. In the absence of vascular disease, harvesting the radial artery should be a safe procedure.*

Keywords: *superficial palmar arch, complete arch, incomplete arch.*

I. INTRODUCTION

The general pattern of arterial supply of hand consists of 2 systems for volar aspect and dorsal aspect. The volar part has 2 arches superficial and deep palmar arch. Superficial is mainly filled by ulnar artery passing flexor retinaculum then curving laterally to form an arch. The superficial palmar arch is formed predominantly by ulnar artery with a contribution from

superficial branch of radial artery, and however in some radial artery may be absent; instead with either princeps pollicis, radialis indices, median artery.

Coleman and Anson² [1961] classified the superficial palmar arch in 2 groups. GROUP 1: complete arch (78.5%) is further divided into five types. TYPE A: The classical radio ulnar arch formed by superficial palmar branch of radial artery and ulnar artery [34.5%]. TYPE B: This arch is entirely by

ulnar artery [37%]. TYPE C: Medio-ulnar arch [3.8%] TYPE D: Radio-mediano-ulnar arch [1.2%] TYPE E: This arch initiated by ulnar artery and completed by a vessel from deep arch [2%]. GROUP 2: Incomplete arch-when the contributing arteries from ulnar artery fails to form an arch; it is incomplete. It can be further divided into 4 types: TYPE A: both superficial palmar branches of radial and ulnar artery take part in supply but fail to anastomose [3.2%]. TYPE B: only the ulnar artery forms the arch but is incomplete in sense that it does not supply thumb and index finger [13.4%]. TYPE C: superficial vessels receive contribution from both median and ulnar arteries but without anastomosis [3.8%]. TYPE D: radial, median and ulnar arteries all give origin to superficial vessels but don't anastomose [1.1%].

The objective of present study was to evaluate these arterial variations, with special attention to the superficial palmar arch contributing vessels and its major branches. Variations in the ulnar artery branches which supply the fingers are at most important in ischemia. Harvesting radial arteries for use as arterial bypass conduits, one of the risks associated with hand ischemia. Accordingly, this study investigated the variations of hand collateral circulation.

II. MATERIAL AND METHODS

Fifty-two hands from 26 embalmed human cadavers were studied. Variations of palmar arches were recorded. This study was carried out during routine dissection sessions for medical students in shanthiram medical college, nandyal. Among 52 hands 12 hands dissection study carried out at Nimra medical college, Vijayawada. The dissected palms with vessels in situ were serially tagged using plastic tokens with numbers on either side of upper limbs and preserved in formaldehyde solution.

III. OBSERVATIONS

A classic superficial palmar arch was found in 10% [5/50].out of dissected specimens complete arch found in 67% and incomplete arch was 33%.

Type of Arch	Arteries forming arches	No. of specimens	%
Complete	Radial & Ulnar	33	63
Complete	Ulnar & Medial	2	3.8
Incomplete	Ulnar Artery	17	33

Table 1: Superficial palmar arch

Incomplete arch formed by Ulnar artery alone, which in majority of cases supplies 3 ½ fingers

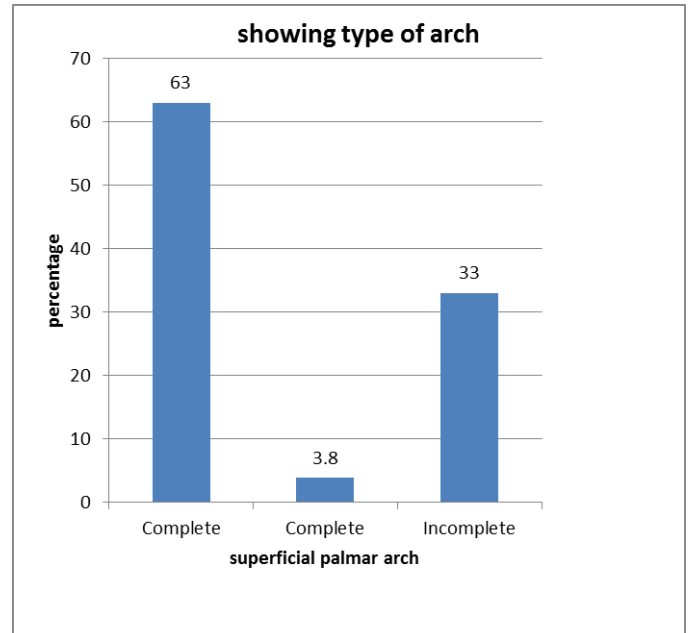


Chart 1

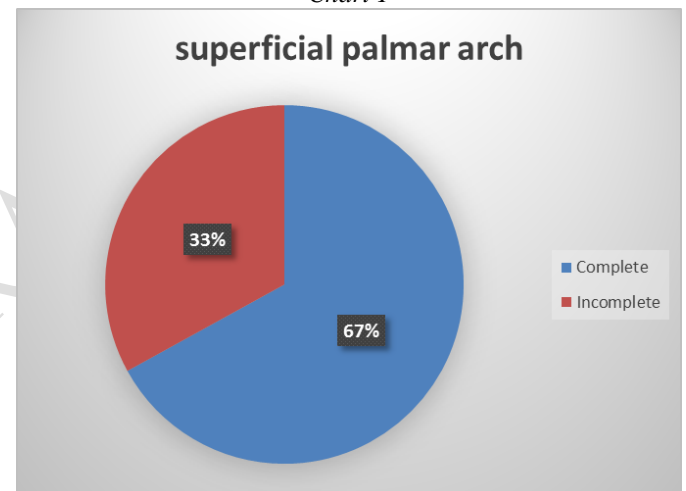


Chart 2

COMPLETE ARCH 1



Figure 1: picture showing the dissection of complete superficial palmar arch

INCOMPLETE ARCH 2



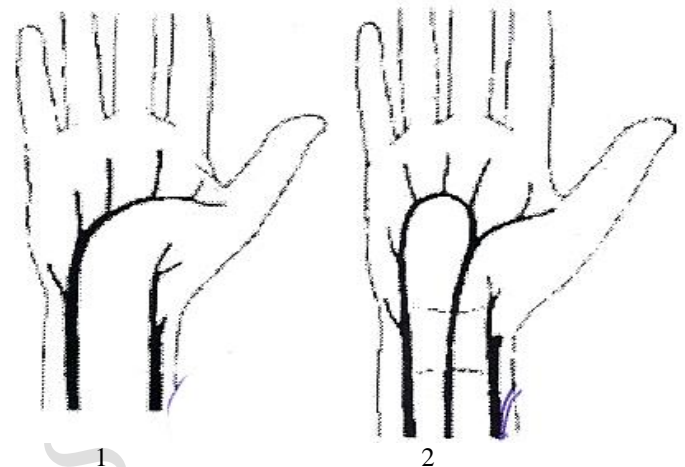
Figure 2: Picture showing the dissection of incomplete superficial palmar arch

COMPLETE ARCH FORMED BY ULNAR ARTERY ALONE



Figure 3: Picture showing the dissection of the complete palmar arch formed by the ulnar artery alone

congenital/developmental in origin. Although the classical pattern of the arch occurs infrequently, anatomical presence of complete superficial palmar arch varies from 84% to 66% [Coleman & Anson²]. This incidence was lower in the current study and might be a reflection of sample size [52 hands]. The median artery was found in 10% of the hands, a similar frequency to that reported by McCormack.¹ [1953]. Although O'Sullivan & Mitchell [2002] suggested that absence of palmaris longus tendon could be a predictor of a pattern of arch, this tendon was present in all cases examined here. Example showing right superficial palmar arch, described in literature, showing all the branches in the current study.



An incomplete superficial palmar arch formed only by the ulnar artery in the above 1st specimen. A superficial palmar arch in which the median artery substituted the radial artery to complete the arch in the 2nd specimen.

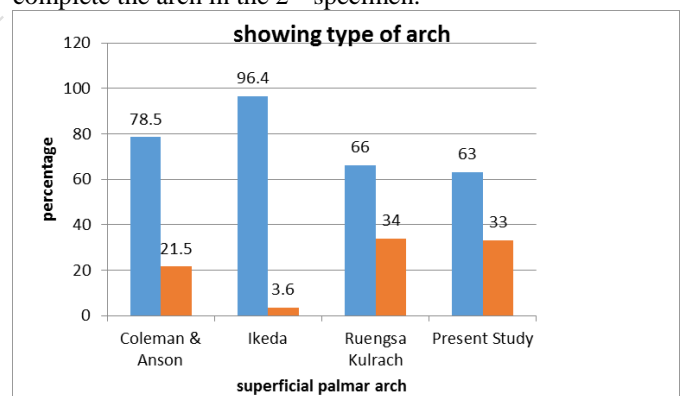


Chart 3: Discussion chart

IV. DISCUSSIONS

Superficial palmar arch and its branches supply the hand. The vascular patterns of the palmar arches and their interconnecting branches present a complex and challenging area of study. Many attempts have been made to classify these variations. A complex classification of superficial palmar arch by Coleman and Anson [1961]. Since then, many other classifications have been suggested by different authors [Karlsson & Niechajev⁷, 1982; Ikeda A, Ugawa A, Kazihara Y, Hamada N⁸ (1988) Ruengsakulrach⁶ et al.2001;] provides simplest understanding of distribution of the arches. The variations observed in this study were

	Complete (%)	Incomplete (%)
Coleman & Anson	78.5	21.5
Ikeda	96.4	3.6
Ruengsa Kulrach	66	34
Present Study	63	33

Table 2: Superficial Palmar Arch

V. CONCLUSION

This study has been taken up because superficial palmar arch and its variations including the collateral circulation are

having a lot of surgical importance and it is of major help to the vascular surgeons. Variations in the termination of radial and ulnar arteries are common. Although the classic type of the superficial palmar arch occurs relatively infrequently, there is always a significant anastomosis between the radial and ulnar artery in hand. In the absence of vascular disease, harvesting the radial artery should be a safe procedure. The variations in the present study may have resulted from the median artery, identifying the median artery as one of the causes for carpal tunnel syndrome is crucial for proper management. In addition the palmar arterial network arrangements are intricate. The identification of any variation in the arterial pattern of hand using Doppler usg, oximetric techniques acquire great importance in various surgical interventions in the hand. The results of the present study have been discussed in detailed and comparative study has been made with the available data. Further, in the present study, median artery shows forming superficial palmar arch in 2% of cases. To conclude the findings of the present study may be useful for vascular surgeons at large.

CONFLICT OF INTERESTS

The author declare that they have no conflict of interests regarding the publication of this paper.

ACKNOWLEDGMENTS

This work was completed with all the help and supports of corresponding authors, and departmental support.

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