

## **A Variation of the Third Common Palmar Digital Artery**

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During a standard anatomical dissection of the left upper limb of an adult female cadaver, a variation of the course of the third common palmar digital artery (CPDA III) was found. The artery was well identified only in the distal part of the fourth interosseous space, giving rise to a pair of proper palmar digital arteries. A detailed dissection revealed that the CPDA III, crossing posterior to the little finger long flexors, arose as a branch of superficial palmar arch with a significant contribution from the terminal part of the deep palmar arch. Based on its path, it is possible for the CPDA III to be compressed by the flexors' tendons. The knowledge of numerous variations in vascular architecture of hand can explain some cases of finger ischemia and might be helpful to surgeons performing microsurgical procedures of the hand and fingers.

*Key words:* superficial palmar arch, common palmar digital artery, proper palmar digital artery, arterial variations, upper limb

### **Introduction**

Three common palmar digital arteries (CPDA) arise from the convexity of the superficial palmar arch (SPA) and proceed distally on the second, third, and fourth lumbrical muscles. Each receives the corresponding volar metacarpal artery and then divides into a pair of proper palmar digital arteries which run along the contiguous sides of the index, middle, ring and little fingers, behind the corresponding digital nerves. They anastomose freely in the subcutaneous tissue of the finger tips and by smaller branches near the interphalangeal joints [1]. Understanding the typical and atypical anatomy and variable relations facilitates safe surgical technique. While the most common arrangements are usually emphasized, less common patterns occur. Unrecognized, these can lead to confusion, difficulty in surgery and may potentially precipitate complications [2]. In this study, we report a variation in the origin and course of the third common palmar digital artery (CPDA III).

## Materials and Methods

The variations reported were observed during routine student dissections of the left upper limb of an adult formalin-fixed female cadaver of Caucasian descent. All dissections took place at the Department of Anatomy, Histology and Embryology, Medical University of Sofia.

## Results and Discussion

The present case report describes a variation in the origin and course of the CPDA III. The SPA on the left hand existed as a closed arch as the radial artery gave a thin superficial palmar branch. From the lateral side of SPA emerged two CPDA – for the second and third web spaces. The CPDA III was initially well identified only in the distal part of the fourth interosseous space, giving rise to a pair of proper palmar digital arteries. Further dissection of SPA revealed a common trunk for the ulnar proper digital artery of the little finger and another small artery that goes deeper to the flexor tendons. Complete dissection of the deep palmar structures clarified the question rising about the origin of the CPDA III. It was revealed that the aforementioned deep artery from the SPA with a significant contribution from the terminal part of DPA gave the origin of the CPDA III. This atypical artery destined to the fourth web space was found to cross posterior to the flexor tendons of the little finger. After a short course the artery received the corresponding palmar metacarpal artery from the DPA and divided into the two proper palmar digital arteries.

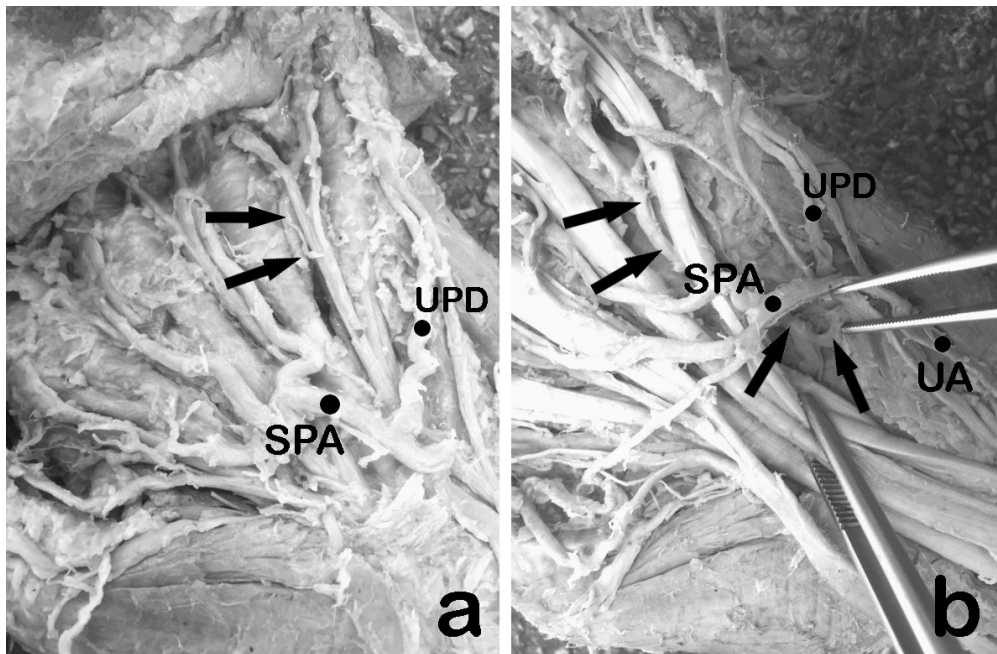
According to Ikeda et al., in a cadaveric study involving 220 hands using angiography and anatomic dissections, the CPDA to the second and fourth web spaces were more frequently deficient and more commonly joint the palmar metacarpal arteries [3]. In our case report the CPDA III originated from both SPA and DPA. The contributing vessel from DPA was with bigger diameter than the one from SPA. This shows that in our case the DPA is the main blood supplier of the vascular territory of the CPDA III.

SPA may present large number of variable branching patterns [3] and some of them might put the blood flow at risk [4-6]. The variations in the origin and course of the arteries to the fourth web space are associated with atypical position of the vessel posterior to the flexor tendons of the little finger [2]. This anomaly can cause pressing of the third common palmar digital artery and Raynaud syndrome. These findings call for a careful systematic approach to the vessels during surgery consistently identifying them from proximal to distal and proceeding from known to unknown [6].

## References

1. **Birch, A.** Section 6. Pectoral girdle and upper limb. – In *Gray's Anatomy: The anatomical basis of clinical practice* (Ed. S. Standring), 41st ed., Elsevier, 2016, 776-897.
2. **Hashem, A. M., R. W. Knackstedt, S. Bernard, M. Hendrickson, J. M. McBride, R. Djohan.** Variations in the origins and absence of the common digital arteries of the hand: a cadaveric study. – *J. Hand Surg. Eur.*, **43**, 2018, 1054-1058.
3. **Ikeda, A., A. Ugawa, Y. Kazihara, N. Hamada.** Arterial patterns in the hand based on a three-dimensional analysis of 220 cadaver hands. – *J. Hand. Surg. Am.*, **13**, 1988, 501-509.

4. **Kaneshiro, Y., N. Hidaka** Anatomical variations of the digital artery found in pollicization: a report of two cases. – *J. Hand. Surg. Eur.*, **35**, 2010, 757-758.
5. **Olinger, A.** Upper limb arteries. – In: *Bergman's Comprehensive Encyclopedia of Human Anatomic Variation* (Eds. R Shane Tubbs, M. M. Shoja, M. Loukas), Hoboken, New Jersey, Wiley Blackwell, 2016, 583–618.
6. **Ottone, N. E., N. Prum, M. Dominguez, E. Blasi, C. Medan, S. Shinzato, D. Finkelstein, V. H. Bertone.** Analysis and clinical importance of superficial arterial palmar irrigation and its variants over 86 cases. – *Int. J. Morphol.*, **28**, 2010, 157-164.



**Fig. 1.** Photographs of the initial (a) and further detailed dissection (b) of the cadaver's left palmar region showing the aberrant third common palmar digital artery (black arrows). Arteries: UA – ulnar artery; SPA – superficial palmar arch; UPD – ulnar proper digital artery of the little finger.