

Chapter 8

ANATOMY OF DORSALIS PEDIS ARTERY

Şeyma TOY¹

Erol TOY²

CLINICAL SIGNIFICANCE AND VARIATIONS OF DORSALIS PEDIS ARTERY

When the anterior tibial artery passes the ankle, it is called dorsalis pedis artery (DPA). DPA advances between the first and second digits and gives the branches of first dorsal metatarsal artery and deep plantar artery. DPA is located superficially in the areas where it is crossed by inferior extensor retinaculum of the foot and the first tendon of extensor digitorum brevis muscle. DPA pulse can be palpated with extensor digitorum longus muscle on the outside and between the tendons of extensor hallucis longus muscle on the inside.

Branches of DPA

1-The lateral tarsal artery: It separates from DPA at the level of os naviculare. After extending to lateral over the tarsal bones and deep extensor digitorum brevis muscle, it anastomosis with arcuate artery, anterior lateral malleolar artery, lateral plantar artery and perforating branch of fibular artery.

2- The medial tarsal arteries: They branch off as 2-3 thin branches at the media edge of the foot and participate in the formation of medial malleolar network.

3-Arcuate artery: It is the branch of DPA to the lateral. It extends outwards on the bases of metatarsal bones and under extensor tendons. It gives three branches called dorsal metatarsal arteries (II-IV). These are divided into three branches (dorsal digital arteries) on the digits.

4-Dorsal metatarsal artery-I: It is the branch DPA gives before passing to the sole of the foot. It is called dorsal digital artery when it reaches the digits.

5-Deep plantar artery: This vein, which is in the form of the continuation of DPA, passes between the two heads of dorsal interossei muscle-I from the first metatarsal space and joins lateral plantar artery and they form the plantar arch.

¹ Asst. Prof. Dr., Karabük University Faculty of Medicine, seymatoy@karabuk.edu.tr

² M.D Erol TOY Karabük Training and Research Hospital, Department of Anesthesiology and Reanimation, erolto@karabuk.edu.tr

In the dissection study they conducted on 42 cadavers, Rajeshwari et al. found that in 54.76% of the cases, DPA and its branches had normal course, while 9.52% did not have DPA. They found that 16.67% of the cases did not have arcuate artery and 14.29% had variations in the branching of DPA (23).

In the dissection study they conducted on 72 cadavers, Dilandro et al. found that 16.7% of the cadavers had arcuate artery, which is an important branch of DPA (24).

In their study they conducted on 50 legs, Vijayalakshmi et al. stated that 76% of the cases had arcuate artery (13).

In the dissection study they conducted on 30 cadavers, Yamada et al. found that 6.7% of the cases did not have DPA, while 33% did not have arcuate artery. In the same study, they found that in 6.7% of the cases, DPA was a continuation of peroneal artery. They also found that in 54% of the cases, the DPA crossed under the extensor hallucis tendon at the ankle and in 3% of the cases, it crossed below the ankle, which suggested that the segment distal to the ankle is the optimal site of DPA anastomosis on the foot (25).

REFERENCES

1. Arifoğlu, Y. Her Yönüyle Anatomi. 2. Baskı. İstanbul: İstanbul Tıp Kitabevi, 2019.
2. Arıncı, K. ve Elhan, Anatomi Cilt 2, Ankara: Güneş Tıp Kitabevleri. 2016.
3. Sobotta Atlas of Anatomy, General Anatomy and Musculoskeletal System, 15th Edition. Edited by F. Paulsen and J. Waschke. Page:364, Publisher: Elsevier Urban & Fischer, 2011)
4. Frowen P, O'Donnell M, Lorimer. Neale's disorders of the foot. 8th ed. Edinburgh: Churchill Livingstone; 2010.
5. Standring, S. Gray's Anatomy: The Anatomical Basis of Clinical Practice. 41st ed. New York, Elsevier, 2016.
6. Kumari M, Bharti JP. Anatomic variations of arteria dorsalis pedis: a cadaveric study on 40 dissected lower limbs with clinical correlations. International Journal of Contemporary Medical Research, 2016; 3 (6), 1575-1576.
7. Luckrajh JS, Lazarus L, Naidoo N. Anatomy of the dorsalis pedis artery. Int. J. Morphol, 2018; 36 (2), 730-736.
8. Hou Z, Zou J, Wang Z. Anatomical classification of the first dorsal metatarsal artery and its clinical application. *Plastic and reconstructive surgery*, 2013; 132(6), 1028-1039.
9. Kennedy L, Maxime S, Blanco CJ. Dorsalis pedis aneurysm: a case report and review of the literature. Foot Ankle J, 2008; 1 (11), 1.
10. Mowlavi A. Whiteman J, Wilhelmi BJ. Dorsalis pedis arterial pulse: palpation using a bony landmark, Postgrad Med J, 2002; 78(926), 746-747.
11. Kulkarni V, Ramesh BR. A morphological study of dorsalis pedis artery and its clinical correlation. IOSR-JPBS, 2012; 2 (3), 14-19.
12. Muir L, Labiotis N, Kutty S. Absence of dorsalis pedis pulse in the parents of children with club foot. Journal of Bone Joint Surgery, 1995; 77, 114-116.

13. Vijayalakshmi S, Raghunath G, Varsha S. Anatomical study on dorsalis pedis artery and its clinical correlations. *J Clin & Diag Res.* 2011;5 (2), 287-290.
14. Keith L Moore. In clinically oriented anatomy, 3rd edition. Lippincott William and Wilkins;1992: 462 – 471
15. Sun YQ, Zhu DL. Absent dorsalis pedis and posterior tibial pulsations in normal young Chinese. A survey of 1,728 young people. *Chinese medical journal*, 1983; 96(9), 643-646.
16. Chow LC, Napoli A, Klein MB. Vascular mapping of the leg with multi-detector row CT angiography prior to free-flap transplantation, *Radiology*, 2005; 237(1), 353-60.
17. Mamatha Y, Sunitha R, OmPrakash KV. Variation in branching pattern of dorsalis pedis artery, *Int. J. Sci. Res*, 2014; 5 (9), 1662-1664.
18. Ntulia S, Nallab S, Kiter A. Anatomical variation of the Dorsalis pedis artery in a South African population – A Cadaveric Study, *The Foot*, 2018; 35, 16–27.
19. Huber JF. The arterial net work supplying the dorsum of foot, *Anatomical Records* 1941; 80: 373.
20. Mirwajahath A. Dorsalis pedis artery- variation and clinical significance, *Journal of Indian Medical Association*; 1996: 94, 417-418.
21. Maral Tuncel M, CelikTas C. Anomalous Dorsalis pedis Artery, *Surgical Radiology Anatomy*, 1994; 6, 319 -323.
22. Bailleul JP, Olivez PR, Mestdagh H. Desgraphical anatomy of the dorsalis pedis artery of the foot, *Bull association of anatomy (Nancy)*, 1984; 68, 15 – 25.
23. Rajeshwari MS, Roshankumar BN, Vijayakumar. An anatomical study on dorsalis pedis artery, *IJAR*, 2013;1(2), 88–92.
24. Dilandro AC, Lilja EC, Lepore FL. The prevalence of arcuate artery and a cadaveric study of 72 feet, *Journal of American Pediatric Medical Association*, 2001; 91 (6), 300-305
25. Yamada T, Glovicki P, Bower TC. Variations of the arterial anatomy of foot, *American Journal of Surgery*, 1993; 166 (2), 130 - 135.