

ORIGINAL RESEARCH

Assessment of variation in branching pattern of dorsalis pedis artery

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ABSTRACT

Background: The dorsalis pedis artery is a major blood vessel located on the dorsal (upper) surface of the foot. The present study was conducted to assess variation of branching pattern of dorsalis pedis artery.

Materials & Methods: 54 lower limbs of both genders were dissected lower down from the level of the ankle joint on the dorsal aspect till the level of the web space, the long extensor tendons were severed, dorsalis pedis artery was identified and traced down, the origin, branching pattern and the course were noted.

Results: Out of 54 limbs, 30 were of males and 24 were of females. Type A was seen in 28, B in 10, C in 5, D in 3, E in 2, F in 1, G in 1, H in 1, I in 2 and J in 1 case. The difference was significant ($P < 0.05$).

Conclusion: There are different branching patterns in the dorsalis pedis artery. Type A was the most prevalent type found.

Key words: Dorsalis pedis artery, knee joint, muscles

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Introduction

The dorsalis pedis artery (also known as the anterior tibial artery) is a major blood vessel located on the dorsal (upper) surface of the foot. It is one of the two terminal branches of the popliteal artery, which is found behind the knee joint.¹ The other terminal branch is the posterior tibial artery. After originating from the popliteal artery, the dorsalis pedis artery courses down the front of the leg and crosses the ankle joint to reach the dorsal aspect of the foot. It runs along the anterior (front) surface of the tibia bone, just lateral to the extensor hallucis longus muscle.² The dorsalis pedis artery is responsible for supplying oxygenated blood to the structures on the dorsum (top) of the foot, including the skin, muscles, and bones.³ It also sends branches to the toes, helping to nourish them with nutrients and oxygen. A diminished or absent dorsalis pedis pulse usually suggest vascular insufficiency. However, some healthy individuals may have a congenitally non palpable dorsalis pedis pulse. In these cases there is a variation in the termination pattern of anterior tibial artery.⁴ The dorsalis pedis artery is noted for its variations. Different pattern of dorsalis pedis artery is as follows-Type A: Normal branching pattern of dorsalis pedis artery. Type B: 2nd DMA directly arose from DPA and 3rd and 4th DMAs were given by

LTA. Type C: 2nd DMA directly arose from plantar arch and 3rd and 4th DMAs were given by LTA. AA was absent. Type D: 2nd DMA directly arose from DPA and 3rd and 4th DMAs were given by plantar arch. AA was absent.⁹ Type E: Arcuate artery arising higher at Cuneonavicular joint rather than its normal position at tarsometatarsal joint. Type F: DPA took a lateral course and terminated into the 2nd and 3rd DMAs. FDMA and 4th DMA arose from plantar arch. AA was absent. Type G: AA was absent and 2nd, 3rd and 4th DMA were given by plantar arch. Type H: AA were absent; 2nd, 3rd and 4th DMA were given by plantar arch. Type I: AA were absent; 2nd, 3rd and 4th DMA were given by plantar arch. Type J: DPA was hypoplastic, it terminated just below ankle into two terminal branches; MTA and LTA. AA was absent and all DMA's were given by plantar arch.⁵ The present study was conducted to assess variation of branching pattern of dorsalis pedis artery.

Material & Methods

The present study was conducted on of 54 lower limbs of both genders in the department of Anatomy. Ethical consideration from institutional ethical committee was obtained before starting the study. Limbs were dissected lower down from the level of the ankle joint on the dorsal aspect till the level of the web space, the

long Extensor tendons were severed, dorsalis pedis artery was identified and traced down, the origin, branching pattern and the course were noted. Results

thus obtained were analysed statistically. P value less than 0.05 was considered significant.

Results

Table I : Distribution of patients

Total- 54		
Gender	Male	Female
Number	30	24

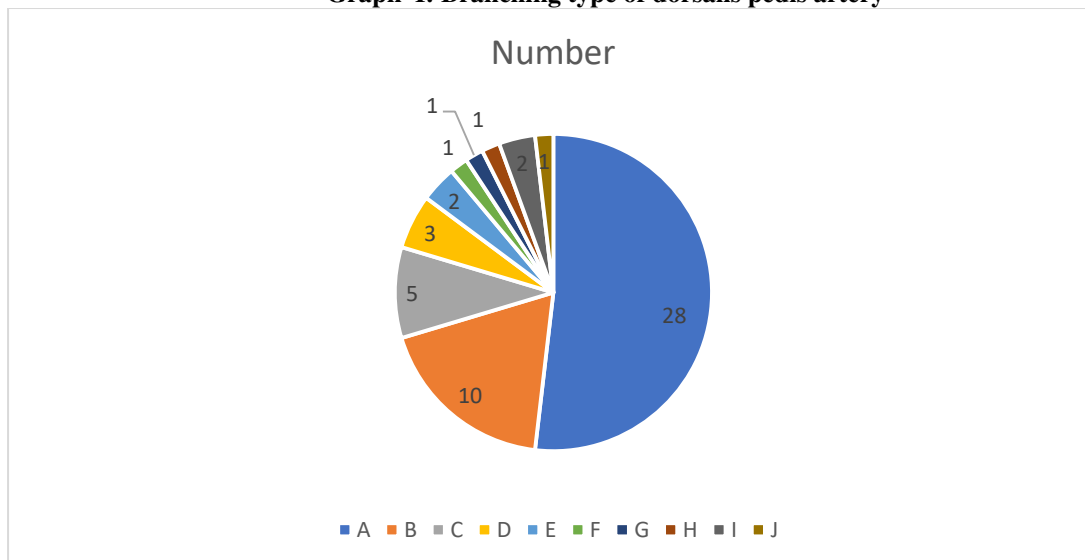
Table I shows that out of 54 limbs, 30 were of males and 24 were of females.

Table II: Branching type of dorsalis pedis artery

Type	Number	P value
A	28	0.01
B	10	
C	5	
D	3	
E	2	
F	1	
G	1	
H	1	
I	2	
J	1	

Table II, graph I shows that type A was seen in 28, B in 10, C in 5, D in 3, E in 2, F in 1, G in 1, H in 1, I in 2 and J in 1 case. The difference was significant (P< 0.05).

Graph I: Branching type of dorsalis pedis artery



Discussion

With changing lifestyle, and increasing stress, mankind is more liable for diseases like diabetes and hypertension. Diabetic neuropathy leads to foot infections and ischemia, leading to the risk of major amputations. In the efforts of salvaging the ischemic limb DPA bypass acts as a major role.⁶ The dorsalis pedis artery (DPA) with its major branches is the preferentially used recipient vessel.⁷ The myocutaneous dorsalis pedis arterialised flap can be safely used as an island flap, to cover the ankle or heel

and as a free flap for palm defects. The pulse of the dorsalis pedis artery is commonly palpated on the dorsum of the foot, just lateral to the extensor hallucis longus tendon.⁸ Physicians and healthcare providers often check this pulse as part of a routine physical examination to assess the arterial blood flow to the foot and lower limb. It can give important diagnostic information about vascular health, particularly in cases of peripheral arterial disease or circulation-related concerns.⁹ The present study was conducted to assess variation of branching pattern of dorsalis pedis

artery .We found that out of 54 limbs, 30 were of males and 24 were of females. Mamatha et al¹⁰ found that the dorsalis pedis artery was discovered to have a short, straight course and to be divided into medial and lateral branches. The medial branch joined the plantar arch and continued as the first dorsal metatarsal artery. The second, third, and fourth metatarsal arteries emerged from the lateral branch, which went obliquely in the direction of the heads of the other metatarsal bones. We observed that type A was seen in 28, B in 10, C in 5, D in 3, E in 2, F in 1, G in 1, H in 1, I in 2 and J in 1 case. According to Vijayalakshmi et al¹¹, fifty free lower limbs were dissected, and the dorsalis pedis artery's origin, course, and branching pattern were examined. A free collection of 50 lower limbs was made at the anatomy dissection room. The origin, course, and branching pattern of the dorsalis pedis artery were investigated during dissection. The dorsalis pedis artery was found to have a normal course and branching pattern in 56% of the specimens examined. Variations in origin, branching pattern, and artery absence were observed in 2%, 8%, and 16% of the specimens, respectively. Because the dorsalis pedis artery can vary, it is important to understand the artery well. To reduce risks during surgery, it is recommended to have preoperative angiography for any abnormality. Hemamalini et al¹² observed the variations in origin, course and branching pattern of dorsalis pedis artery because of its clinical significance. During routine dissection of lower limbs for undergraduates they came across rare variations in the dorsalis pedis artery in its origin, course and branching pattern. Normal anatomic description was found in 27 limbs. In 13 specimens we noted variations, includes bilateral anomalous origin of dorsalis pedis artery, bilateral lateral deviation of dorsalis pedis artery, double dorsalis pedis artery, trifurcation of dorsalis pedis artery and absence of arcuate artery. Knowledge about the arterial variations around the ankle is important to orthopaedic, vascular surgeons and radiologists to prevent complications during surgical interventions. Ntuli et al¹³ examined dorsalis pedis artery branching patterns in which a total of 33 dissected lower limbs were examined (27 adult cadavers and 6 incomplete wet lower limb specimens). Photographs and descriptions of the dorsalis pedis artery's path and branching pattern were taken. There were nine different dorsalis pedis artery variations identified, with the conventional branching pattern having the highest prevalence (36.36%) and being completely absent in 6.06% of the sample.

Conclusion

Authors found that there are different branching patterns in the dorsalis pedis artery. Type A was the most prevalent type found.

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