



RESEARCH ARTICLE

VARIATION IN BRANCHING PATTERN OF DORSALIS PEDIS ARTERY

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ABSTRACT

To evaluate patients with arterial disease, palpation of peripheral arterial pulse is commonly used. In lower limb, palpation of dorsalispedis artery is used to evaluate the arteriosclerotic diseases.

Dorsalispedis artery is the main source of blood supply to the dorsum of the foot. A knowledge about the origin, course and branching pattern of this artery is essential, as it forms the stem for one of the major myocutaneous flaps, used for ankle surgeries in plastic and reconstructive surgeries.

During routine dissection variation in branching pattern of dorsalispedis artery in two lower limbs were noted.

In one specimen the dorsalispedis artery was found to have a short straight course and divided into medial and lateral branches. The medial branch continued as the first dorsal metatarsal artery and joined the plantar arch. The lateral branch coursed obliquely towards the head of the other metatarsal bones and gave off the second, third and fourth metatarsal arteries which coursed in the inter-metatarsal spaces.

In another specimen the arcuate artery failed to arise from the dorsalis pedis artery. As variation in dorsalispedis artery is not uncommon, it is essential to have a sound knowledge about the artery. It is advisable to have preoperative angiography for any abnormality, to prevent risks during surgical intervention.

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INTRODUCTION

Dorsalispedis artery is the dorsal artery of the foot and is the continuation of the anterior tibial artery distal to the ankle¹. It passes to the proximal end of the first intermetatarsal space where it turns into the sole between the heads of the first dorsal interosseous to complete the plantar arch.^{1,2}

Branches of dorsalispedis artery

1. Lateral and medial tarsal arteries
2. Arcuate artery
3. First dorsal metatarsal artery
4. Cutaneous branches.^{1,2}

The chief artery of the dorsum of foot is the dorsalispedis artery³. Reconstruction of the arteries of the foot in patients with severe chronic arterial occlusive disease has become a routine and valuable procedure. However, it is frequently difficult to select the optimal site for the distal arterial anastomosis. Awareness of the anatomical variations of the foot arteries is important for angiographers, vascular surgeons and reconstructive surgeons who operate upon the foot region. The dorsalispedis artery is excellent for pedal revascularization since it is the largest artery distal to the ankle joint. Fasciocutaneous flaps have been shown to be very reliable and versatile for covering defects of the foot.

- The anatomical study of the arteries of the foot is necessary for further advances in arterial reconstruction.

Such reconstruction often avoids amputation in cases of arterial trauma resulting from industrial and automobile accidents, as well as in patients with diabetes and severe ischemia of the lower limbs. The dorsalispedis flap is one of the most common used foot flaps. There is still little detailed information on the arterial supply of the dorsum of the foot. Knowledge of the vascular anatomy is key to ensuring the safety and reliability of flap surgery.

- To evaluate patients with arterial disease, palpation of peripheral arterial pulse is commonly used. In lower limb, palpation of dorsalispedis artery is used to evaluate the arteriosclerotic diseases. Dorsalispedis artery is the main source of blood supply to the dorsum of the foot. A knowledge about the origin, course and branching pattern of this artery is essential, as it forms the stem for one of the major myocutaneous flaps, used for ankle surgeries in plastic and reconstructive surgeries.

As variation in dorsalispedis artery is not uncommon, it is essential to have a sound knowledge about the artery. It is advisable to have preoperative angiography for any abnormality, to prevent risks during surgical intervention⁴.

OBSERVATION

During routine cadaveric dissection in the department of Anatomy, HIMS, Hassan, variation in the branching pattern of dorsalispedis artery was noted in two lower limbs.

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In one specimen the dorsalispedis artery was found to have a short straight course and divided into medial and lateral branches. The medial branch continued as the first dorsal metatarsal artery and joined the plantar arch. The lateral branch coursed obliquely towards the head of the other metatarsal bones and gave off the second, third and fourth metatarsalarteries which coursed in the inter-metatarsal spaces. These lateral and medial branches were named as dorsalisarteriamedialis and dorsalisarterialateralis.



Fig:1 ABSENCE OF ARCULATE ARTERY
D- Dorsalis pedis artery

Fig 1 Variation In Branching Pattern Of Dorsalis Pedis Artery.
DAL – dorsalisarterialateralis
DAM – dorsalisarteriamedialis

In another specimen the arcuate artery failed to arise from the dorsalispedisartery

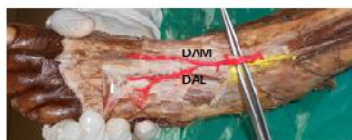


Fig:2 VARIATION IN BRANCHING PATTERN OF DORSALIS PEDIS ARTERY
DAL – dorsalis arteria lateralis
DAM – dorsalis arteria medialis

Fig:2 Absence Of Arcuate Artery.
D- Dorsalispedis artery

DISCUSSION

Variations in the blood vessels and their anomalous course can be attributed to their development. Tiny blood vessels derived from the blood islands in the 3rd or 4th week of development, merge with each other and form a continuous network, from which buds grow out, canalise and form new vessels. New vessels of the neighbourhood areas form a closed network. Depending on the functional dominance, some vessels regress and others diverge in the mode of origin and course from the principal vessel. The dorsalispedis artery is noted for its variations⁵.

Study of the course of dorsalispedis artery in 67 specimens, revealed that the course of the artery was normal in 44 cases. In 15 cases, it divided into 2 terminal branches, Arteriadorsalismedialis and Arteriadorsalislateralis, 2 cm to 3 cm distal to its origin. In 6 cases, the artery was tiny and the arterial supply of the dorsum of the foot was mainly provided by both lateral malleolar and fibular arteries. In the present study, similar variations in dorsalispedis artery were noticed in 8 cases (16%)⁶

The arcuate artery was defined as that artery branching off

from the dorsalispedis artery at or below the level of tarsometatarsal joints, running laterally across the bases of metatarsals second to fourth and supplying the dorsal metatarsal arteries 2-4. The arcuate artery was present in only 16.7% of cases out of 72 cadaveric feet⁷.

In a study of 50 lower limbs showed presence of arcuate artery in 76% of cases, suggesting that the arcuate artery is not the primary blood supply to the dorsal metatarsal arteries 2-4. The lateral tarsal artery and branches from plantar arch supplied the metatarsal spaces 2-4, in the absence of arcuate artery. In the present study, dorsalispedis artery was absent in 2% and arcuate artery was absent in 6% of cases⁴.

Performance of a study on dorsalispedis artery in 30 cadaveric limbs revealed that dorsalispedis artery was absent in 6.7% of cases, the arcuate artery was absent in 33%. The dorsalispedis artery was the continuation of peroneal artery in 6.7% of cases. The dorsalis pedis artery crossed under the extensor hallucis tendon at the ankle in 54%, above the ankle in 43% and below the ankle in 3%, suggesting the optimal site of dorsalispedis artery anastomosis on the foot is the segment distal to the ankle⁸.

Lateral deviation of dorsalispedis artery and higher bifurcation of anterior tibial artery to form dorsalispedis at the junction of upper 3/4th and lower 1/4th of leg were observed during routine dissection⁹

CONCLUSION

Palpation of the dorsalispedis artery is essential, particularly in suspected cases of arterial disorders. The dorsalispedis pulse can be usually felt on the dorsum of the foot, where the artery passes over the navicular and cuneiform bones. It may also be felt at the proximal end of first dorsal interosseous space. As observed above, the artery is subjected to variations, ranging from abnormal course, origin, distribution to complete absence. This must be kept in mind during physical examination in cases of thrombo-angitis obliterans, peripheral arterial diseases, thrombosis, acute embolism in which pulse distal to the occlusion site is lost.

Knowledge of this variation will be useful in deciding whether the absence of pulse in dorsalispedis artery is due to thrombosis of the vessel or its abnormal course or absence. Aberration of the usual anatomic pattern of origin, branching and anastomosing pattern are thus of prime importance in surgical operative techniques. Prior confirmation by angiography for any abnormalities will avoid unnecessary surgical risks. The artery serves as an important landmark on the dorsum of foot. The artery is recognized to play an important role in micro vascular surgery of the foot during replantations, reconstruction and repair due to its unique anatomical position and bountiful supply to the foot. The knowledge of the variations of the dorsalispedis artery is also important in different vascular surgeries and orthopedic surgeries of the foot. A diminished or absent dorsalispedis pulse usually suggest vascular insufficiency resulting from arterial disease¹⁰.

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