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SHORT REPORT

A Unique Case of 'Superficial' Posterior Tibial Artery – Anatomical and Clinical Considerations

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Abstract We report a unique dissectional case of 'superficial' posterior tibial artery, unknown in anatomical and surgical literature. Arising from the popliteal artery, the aberrant posterior tibial artery coursed medially and passed between the tendons of the soleus and the medial head of gastrocnemius muscles. Covered by the crural fascia, the variant artery descended along the medial border of the tibia, parallel to the great saphenous vein. The arterial variation described here, though rare, could present some diagnostic and therapeutic challenges in the field of vascular surgery.

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Introduction

Unlike the frequently encountered arterial variations of the upper extremity, the arteries of the lower limbs show less unusual patterns.^{1,2} The basic variations here include mainly the level of origin of the profunda femoris artery, the division pattern of the popliteal artery and the interrelation between the size and distribution area of its terminal branches.^{1,2} In addition to the normal arteries of the lower limb, aberrant arteries, such as the sciatic and

saphenous arteries, occur in only a small number of cases.^{1,2} Nevertheless, because the lower limb arteries are generally subjected to vascular and endovascular surgery, we need to have detailed knowledge about even the rarest of their variations.

We present a case of unusual course and location of the posterior tibial artery, found during routine anatomical dissection. The medico-legal office and local Ethic Committee approved this study.

Report

Upon dissecting the medial part of the posterior leg compartment of a right lower extremity, an aberrant large vessel located just beneath the crural fascia along the medial border of the tibia was observed (Fig. 1a). The

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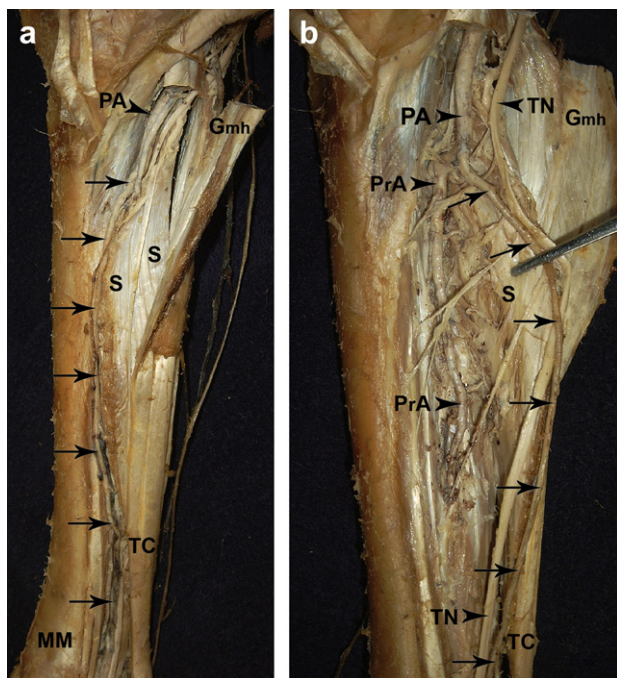


Figure 1 Photographs of the dissected leg showing the variant course of the posterior tibial artery (arrows). In (a) the medial head of the gastrocnemius muscle is cut and retracted posteriorly; in (b) the tibial attachment of the soleus muscle is cut and retracted posteriorly, as well. Popliteal artery (PA), peroneal artery (PrA), tibial nerve (TN), soleus muscle (S), medial head of the gastrocnemius muscle (Gmh), tendo calcaneus (TC), medial malleolus (MM).

complete dissection in that region (Fig. 1b) revealed an artery, defined according to its origin, terminal branches and supplying area as the posterior tibial artery. It arose (initial external diameter 4.3 mm) as the first terminal branch of the popliteal artery, just superior to the tendon of the soleus muscle. From its origin, the aberrant posterior tibial artery directed medially between the tibial attachment of the soleus and the medial head of gastrocnemius muscles. Reaching the subfascial plane, the artery descended along the medial border of the tibia, parallel to the course of the great saphenous vein, and gave off some small muscular branches. In the distal third of the leg, the variant artery was located at the usual position of the posterior tibial artery, namely, between the medial malleolus and the tendo calcaneus. Under the abductor hallucis muscle, the artery divided into the usual medial and lateral plantar arteries. Because of its characteristics, the variant artery was termed 'superficial' posterior tibial artery, similar to the variant upper limb arteries having a subfascial location.^{1,2} Additionally, in this case, an enlarged peroneal artery was established.

Discussion

The posterior tibial artery is the larger terminal branch of the popliteal artery. It begins at the lower border of the popliteus muscle, opposite the interval between the tibia and fibula.³ Usually this artery passes deep to the origin of the soleus muscle, and after giving off the peroneal artery, descends to the posterior compartment of the leg between the superficial and deep muscles.³ In the distal third of the leg, the artery is more superficial, being covered only by skin and fascia. Finally, the posterior tibial artery divides under abductor hallucis muscle into the medial and lateral plantar arteries supplying the sole of the foot.

The anatomical variations of the posterior tibial artery concern primarily its level of origin from the popliteal artery and also its size.^{1,2} Quite frequently, the posterior tibial artery is smaller than usual or even absent. In such cases, its field is supplied by a large peroneal artery, which either joins the small posterior tibial artery or continues alone to the sole of the foot.³ However, the superficial course of the posterior tibial artery, as described in our report, is unknown even in the most detailed books on arterial variations.^{1,2}

The variant superficial course of the posterior tibial artery, presented here, could have definite clinical significance. First, the initial course of the artery between the muscle tendons could cause entrapment with possible occlusion and limb ischaemia. Similar relation of the popliteal artery to fibrous and muscular structures has been identified as a cause of the well-known popliteal artery entrapment.⁴ Second, the unexpected course of the posterior tibial artery could impede performing of femoro-tibial bypass. Third, due to its superficial course, parallel to that of the great saphenous vein, the artery can be added to the possible aberrant structures encountered during varicose vein surgery⁵ or vein harvesting for coronary artery bypass graft surgery. Fourth, the reported variant posterior tibial artery might be of particular relevance with newer thermal methods of endovenous ablation for varicose veins.

Conflict of interest/funding

None.

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