Case Report

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Anomalous origin of posterior tibial artery from anterior tibial artery: beware!

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ABSTRACT

A 64 year old diabetic, hypertensive male with claudication and rest pain in his left leg was found to have diffuse narrowing below the politeal artery in the left lower limb with good collaterals. There was bifurcation of the right popliteal artery above the knee joint and an anomalous origin of the right posterior tibial artery from the anterior tibial artery. Awareness of anotomical variations is important for evaluation of the lower extremity arteriograms, for vascular surgeons during reconstructions such as femorodistal bypass graft procedures and embolectomy, during surgical techniques such as arthroscopy, tibial osteotomy, vascular reconstruction grafts, plastic surgical flaps and catheterization procedures.

Keywords: Angiography, Anomaly, Claudication

INTRODUCTION

Arterial variations of the lower limb are less common than that of the upper limb. Presence of aberrant arteries, variant levels of origin of the profunda femoris artery and branching patterns of the popliteal artery are the surgically important ones. 1,2 The frequent use of lower limb arteries for arterial catheterizations and various other surgical procedures makes the knowledge of such variations important. Such anomalies, though rare can cause undue distress to surgeons and intervention radiologists during procedures if they are unaware of the same. We would like to draw the attention of surgeons and interventional radiologists to this potential problem with this interesting case report and a short review of literature on the topic.

CASE REPORT

A 64-year-old diabetic, hypertensive male presented to the vascular surgery department with claudication pain in the left lower limb for 4 months and rest pain for 1 week. Patient was a smoker for 15 years and his past history was unremarkable. His general physical examination was normal. On local examination, left lower limb anterior tibial, posterior tibial and dorsalis pedis pulses were absent on palpation. His other peripheral pulses on bilateral lower limbs were normal. ABI in the left leg was 0.5 and in the right leg was 0.7. His blood investigations were normal. A digital subtraction angiography of both the lower limbs was performed and showed diffuse narrowing of the left anterior tibial artery in its entire course with good collaterals (Figure 1). There was bifurcation of the right popliteal artery above the knee joint and an anomalous origin of the right posterior tibial artery from the anterior tibial artery (Figure 2).

DISCUSSION

The popliteal artery most commonly (90%) divides into anterior and posterior tibial branches at the distal border of popliteus. The division usually occurs at the proximal

end of the crural interosseous space between the wide tibial metaphysis and the slender fibular metaphysis. The fibular (peroneal) artery arises from the posterior tibial artery approximately 2.5 cm distal to popliteus and passes obliquely to the fibula. Either the anterior tibial or the posterior tibial artery may be vary in size. The size of the fibular artery is inversely related to the size of the anterior and posterior tibial arteries, either of whose functions the fibular artery may take up.³

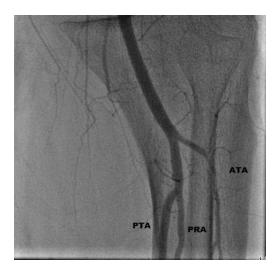


Figure 1: Showing a diffusely narrowed anterior tibial artery (ATA) on the left side. PTA-posterior tibial artery; PRA-peroneal artery.



Figure 2: Right PTA arising from the ATA and the PRA arising separately from the popliteal artery.

Sanders and Alston found the posterior tibial artery originating directly from the popliteal artery proximal to the anterior tibial origin in 5% of their study population.⁴ It was located either at the knee joint or within 5 cm of it.

Kil and Jung described anomalies in 10.8% of their study population who showed seven variant branching patterns: hypoplastic or aplastic posterior tibial artery; hypoplastic or aplastic anterior tibial artery; trifurcation; high origin of anterior tibial; hypoplastic or aplastic posterior tibial and anterior tibial; high origin of posterior tibial; and anterior tibioperoneal trunk.⁵ The arteries of the lower limb arise from: the primary limb bud artery (sciatic artery) and the femoral artery. Arterial variations usually occur due to combinations of persistent primitive arterial segments, abnormal fusions, and segmental hypoplasia or absence. Day and Orme studied 1037 limbs. They found that 90.7% limbs had the usual branching pattern with anterior tibial artery arising first followed by the tibial-peroneal trunk, which then gives rise to the posterior tibial and peroneal arteries. The commonest variation was high origin of the anterior tibial in 4.5% limbs.⁶

Most anatomical variations in the arterial pattern of the lower limb arteries are symptomless like in our patient. They may be incidental findings in the dissection room or during the course of angiographic examination. Awareness of these variations is important for evaluation of the lower extremity arteriograms, for vascular surgeons during reconstructions such as femorodistal bypass graft procedures and embolectomy. Percutaneous transluminal angioplasty could be impeded by different anterior tibial arterial variations in the leg. Knowledge of arterial variations around the knee is important for surgical techniques such as arthroscopy, tibial osteotomy, vascular reconstruction grafts, plastic surgical flaps and catheterization procedures. With the recent spurt in the number of interventional radiological procedures, the modern day interventional radiologist may do well to remember such variations.

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