

Popliteal artery entrapment syndrome: a rare diagnosis for calf pain

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An 18-year-old man presented with a long history of occasional right calf pain and fullness. He also complained that over the last year his right foot

became pale and numb after exercising for few minutes. There was no history of trauma and the patient had no constitutional symptoms. On physical examination, the right calf was non-tender with no mass although right posterior tibial and dorsalis pedis pulses were weaker than the left. Radiograph of the right knee showed static right proximal tibial exostosis, which had been monitored since the patient was aged 10 years. Magnetic resonance arteriogram showed almost complete occlusion of the right popliteal artery and distal superficial femoral artery at the level of the right popliteal fossa (Fig 1). Collateral branches were seen feeding the distal right leg arteries trifurcation. Magnetic resonance imaging scan of the knee revealed the medial head of the gastrocnemius inserting at a more lateral position than usual (Fig 2). The popliteal artery was separated from the popliteal vein, passing medial to and underneath the medial head of the gastrocnemius, and was severely compressed between the medial head of the gastrocnemius and distal femur. Loss of normal flow-related signal void was noted in the right popliteal artery distal to the compression.

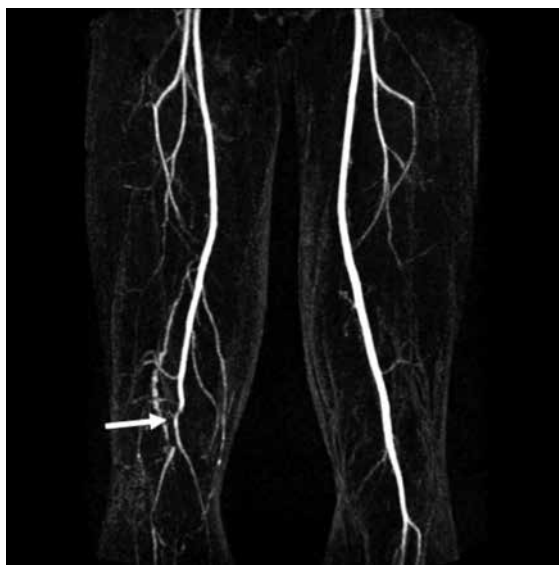


FIG 1. Magnetic resonance arteriogram of bilateral lower limbs showing almost complete occlusion of the right popliteal artery (white arrow) and distal superficial femoral artery at the level of the right popliteal fossa. Collateral branches are seen feeding the distal right leg arteries trifurcation

Popliteal artery entrapment syndrome (PAES) is a rare¹ and frequently underdiagnosed disease entity. It typically affects young male athletes who commonly have hypertrophied musculature without significant cardiovascular risk factors. The classic

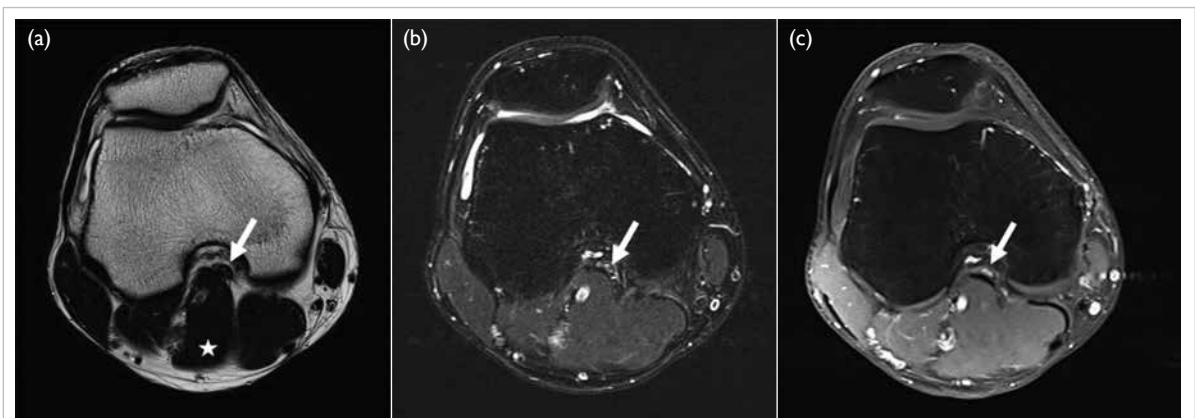


FIG 2. Magnetic resonance image of the knee. (a) T2-weighted, (b) T2-weight fat saturated and (c) T1-weighted fat-saturated post-contrast images showing popliteal artery (white arrows) passing medial to and underneath the medial head of the gastrocnemius. It is severely compressed between the medial head of the gastrocnemius (asterisk) and distal femur into a slit-like configuration. Findings are consistent with popliteal artery entrapment syndrome

presentation of PAES is of symptoms related to vascular compression, which is intermittent lower limb claudication. Other symptoms can include numbness, pain, discoloration, or even paralysis.² Symptoms in the early stages typically occur during or following physical activity but can progress to symptoms at rest if complications develop.

In addition to a careful history, proper physical examination aids in diagnosis. Usual findings include calf muscle hypertrophy,² and reduced posterior tibial and dorsalis pedis pulses on passive dorsiflexion or active plantar flexion of the foot.³ In addition, resting ankle-brachial index tests will usually be normal but will show a decrease with exercise.⁴ Differential diagnoses include other vascular diseases such as atherosclerosis, exertional syndrome, and cystic adventitial disease. Further diagnostic testing is usually needed to make a confident diagnosis of PAES.

Doppler ultrasonography is one of the first-line imaging modalities. It may demonstrate popliteal artery stenosis, increased velocity, or reduced peak systolic velocity during stress manoeuvres. However, it plays a limited role since imaging findings with this modality are non-specific and show only the consequences of the abnormal anatomy.⁴

Conventional angiography has been long used for the diagnosis of PAES.¹ Typical findings include medial deviation of the proximal segment, occlusion in the middle segment, and post-stenotic dilatation at the distal segment.⁵ However, it is invasive and is unable to demonstrate surrounding soft tissue structures leading to the occlusion of the popliteal artery. It has recently been replaced by diagnostic modalities that are non-invasive such as computed tomography angiography and magnetic resonance imaging with magnetic resonance arteriogram.

Computed tomography angiography offers good soft tissue contrast and can provide diagnostic evaluation of surrounding muscular anomalies.⁴ It may also be used to evaluate the contralateral limb to exclude bilateral entrapment.

Magnetic resonance imaging and MR angiography are promising imaging modalities for the diagnosis of PAES⁶ due to their superior capability to demonstrate surrounding anatomy and soft tissue compared with computed tomography angiography, with no ionising radiation required.

In this case, timely diagnosis was made and treatment given. However, delay in diagnosis and management may lead to irreversible effects of lower limb ischaemia. This case illustrates the importance of considering this rare diagnosis when encountering

young patients with lower limb claudication or calf pain symptoms. This will facilitate early surgical intervention to minimise the risk of complications.

Author contributions

All authors contributed to the design, acquisition of data, analysis of data, drafting of the manuscript, and critical revision of the manuscript for important intellectual content. All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

All authors have disclosed no conflicts of interest.

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Ethics approval

The patient was treated in accordance with the Declaration of Helsinki. The patient provided written informed consent for the treatment/procedures, and consent for publication.

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