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## SHORT REPORT

## A Rare Cause of Popliteal Artery Entrapment Syndrome

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*Popliteal artery entrapment must be considered as a cause of claudication in young patients. Prompt diagnosis and early surgical intervention improves the prognosis. We report a rare case in a young patient where the entrapment was caused by the lateral, rather than the more common medial head of gastrocnemius. MRI demonstrated the anatomical abnormality and prompt surgery via a posterior approach produced a good outcome.*

*Keywords: Popliteal; Entrapment; Lateral head gastrocnemius; MRI.*

## Introduction

Lower limb claudication is uncommon in young adults. The differential diagnosis must include popliteal artery entrapment. Prompt and accurate diagnosis of popliteal artery entrapment is vital, to enable early surgical treatment, before vessel complications detriment long term prognosis. The most frequently described anatomical causes of popliteal entrapment involve the medial head of gastrocnemius and its relationship to the course of the artery in the popliteal fossa. We hereby report a rare anatomical cause of popliteal entrapment caused by the lateral head of gastrocnemius diagnosed on MRI.

## Report

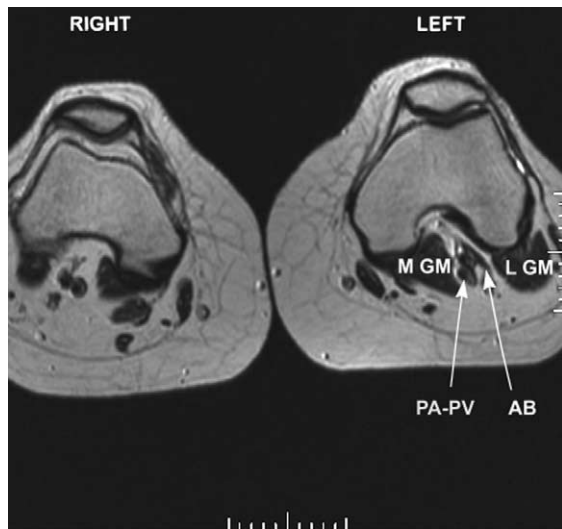
A healthy 35-year-old lady, with no vascular history or risk factors, presented with a 3 week history of sudden onset left calf and foot pain whilst gently exercising. Neurological function was fully preserved and she did not experience rest pain. On examination the affected foot was of normal appearance but the pedal pulses were impalpable. Handheld Doppler examination demonstrated a reduction of the left dorsalis pedis signal on plantar flexion of the foot.

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Duplex ultrasonography demonstrated a patent left SFA with triphasic flow. The left popliteal artery occluded abruptly in mid-vessel for 5–10 cm with collateral reconstitution of the anterior and posterior tibial arteries. The contralateral side was normal.

CT angiography confirmed a 6 cm severe stenosis of the left popliteal artery immediately above the knee joint, with the vessel reforming at the level of the trifurcation, and normal three vessel run off in the calf. The contralateral limb was normal. MRI imaging of the left knee clearly demonstrated an aberrant band of the lateral head of gastrocnemius passing in front of the popliteal vessels, to insert into the upper lateral aspect of the medial femoral condyle (Fig. 1). The muscular anatomy of the contralateral popliteal fossa was normal. The MR imaging of the popliteal fossa soft tissue was performed without an arterial contrast, using a different scanning protocol to that used for MR angiogram. It is for this reason that a CT angiography was needed.

With both confirmation of the diagnosis and knowledge of the precise anatomical cause, prompt surgical exploration of the left popliteal fossa was undertaken via a posterior approach. The operation confirmed the MRI findings, with the aberrant band entrapping both the popliteal artery and the short saphenous vein (Fig. 2). Flow was absent in the popliteal artery on initial intra-operative Doppler assessment, but flow was restored after division of the band and mobilisation of the artery, without the need for vascular reconstruction. The patient made an excellent recovery, and on 6 week



**Fig. 1.** Transverse MR imaging of both lower limbs demonstrating anatomical abnormality in left popliteal fossa. M GM, medial head gastrocnemius; L GM, lateral head gastrocnemius; PA-PV, popliteal artery and vein; AB, aberrant band of muscle from lateral gastrocnemius.

follow-up was noted to have gained significant symptomatic relief and be mobilising normally.

### Discussion

Popliteal artery entrapment was first described in 1879, with an account of the associated clinical syndrome and its successful surgical treatment by Hamming in 1959.<sup>1</sup> Although more common than previously thought, the true incidence of popliteal artery entrapment syndrome (PAES) remains unknown.<sup>2</sup>

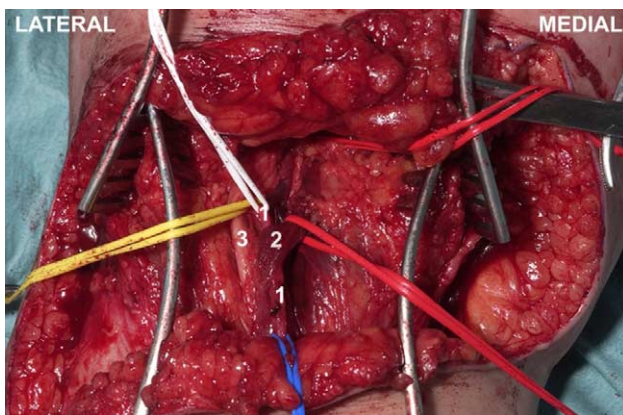
Embryologically PAES is usually the result of either abnormal development of the popliteal artery itself, or excessive cranial migration of the medial head of gastrocnemius.<sup>3</sup> The common anatomical

abnormalities relate to the medial head of gastrocnemius and are classified into five types. In addition, 'functional' compression is possible without any anatomical abnormality. The anatomy in our case was highly unusual, and we are aware of only two other published cases involving entrapment by a band from the lateral head of gastrocnemius.<sup>4</sup>

The diagnosis of PAES relies on a high index of suspicion when assessing a young patient with claudication. Duplex ultrasonography and angiography during active plantar flexion or passive dorsiflexion of the foot will frequently demonstrate compression of the popliteal artery, and in some an abnormal course of the artery, local thrombus or post-stenotic aneurismal dilatation in this condition. Although CT imaging can be helpful, MRI gives the best delineation of the muscular anatomy of the popliteal fossa.<sup>5</sup> Entrapment in the contralateral limb must always be excluded as the condition is frequently bilateral.

Without prompt surgical treatment popliteal entrapment results in progressive deterioration of the artery with time, and eventual vessel occlusion. Surgery at this late stage involves vascular reconstruction, and consequently a much poorer prognosis than when treated earlier by simple division of the constricting tissue band to release the entrapment.

In conclusion, PAES must be considered in every young patient with claudication. We suggest that following angiography, MRI is the investigation of choice to delineate the anatomical cause of the entrapment, as illustrated by the accuracy of the imaging of the rare anatomy in this case. Prompt recognition and surgical division of the constricting structure gives the best outcome. Unless a femoropopliteal bypass is anticipated, we always recommend the posterior approach to the popliteal artery as affording the best access to the popliteal fossa.



**Fig. 2.** Photograph of left popliteal fossa at surgical exploration, demonstrating aberrant muscle band. 1, short saphenous vein; 2, aberrant muscle band; 3, tibial nerve.

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