

## Traumatic Variation of Popliteal Artery Entrapment Syndrome.

HC Guthrie, A Hatrick, DJ Gerrard

### Abstract

**Popliteal artery entrapment syndrome is a well recognised sequelae of anatomical variation in the origin of the medial head of gastrocnemius. It classically presents with distal ischaemia from progressive intimal fibrosis and eventual thrombosis. We present a unique case of acute lower limb ischaemia precipitated by trauma in a young man with undiagnosed popliteal artery entrapment. In this case sudden stress of the lower limb resulted in tearing of the tunica intima of the entrapped artery and exposure of the subendothelium with subsequent thrombus, distal embolisation and acute ischaemia. Successful limb salvage was achieved through endovascular thrombolysis and arterial reconstruction.**

### Case Report

A previously fit 19 year-old hockey player slipped as he attempted to change direction while running on wet Astroturf resulting in hyperextension of his knee and forced plantar flexion of his ankle. He felt immediate pain in his left calf and subsequently experienced increasing cold, pain and numbness in his left foot and ankle. There was some relief of his symptoms with rest but after 5 days of intermittent foot and ankle pallor, pain, paraesthesia and cold he presented to his GP.

He was referred urgently to the local hospital where he was found to have a cold white left foot with altered sensation and no

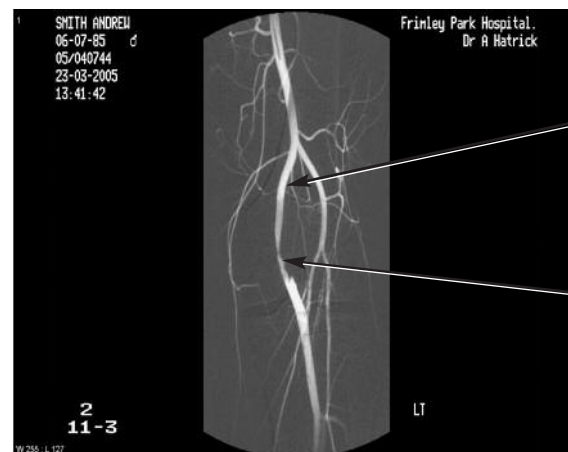
palpable pulses below a uniphasic popliteal pulse on the affected side. He had a weak Doppler signal at his posterior tibial artery with an Ankle: Brachial Pressure Index of 0.3. A clinical diagnosis of popliteal artery thrombosis and distal embolisation was made. Urgent angiography revealed a medially deviated popliteal artery with a severe mid-segment stenosis and truncation of the crural vessels.

Continuous endovascular thrombolysis resulted in progressive improvement in distal limb perfusion on sequential angiography with an associated improvement in the patient's pain and paraesthesia. MRI scans of both popliteal fossae confirmed that the medial head of gastrocnemius had an aberrant lateral origin on both sides and the presence of an accessory slip of muscle from the medial head on the right and confirmed the diagnosis of Popliteal Artery Entrapment Syndrome. 8 days after his original injury he underwent surgical exploration of his left popliteal fossa. The medial head of gastrocnemius was divided to release the popliteal artery from its 'entrapped' position between the muscle and the medial femoral and tibial condyles. Popliteal arteriotomy revealed a significant intimal tear treated by segmental resection and end-to-end interposition grafting of reversed ipsilateral short saphenous vein. He was discharged 4 days later, fully mobile and pain free. Six weeks later the contralateral aberrant medial head of gastrocnemius was divided to prevent a similar injury or progressive fibrosis occurring. He has remained asymptomatic from both sides during 6 months of follow up.

Capt H C Guthrie  
MBE MRCS RAMC -  
Senior House Officer in  
Surgery, MDHU  
Frimley Park,  
Camberley Surrey  
GU16 5UJ.  
hugoguthrie@doctors.org.uk

Dr A Hatrick FRCR -  
Consultant Vascular  
Radiologist - Frimley  
Park Hospital

Mr D J Gerrard FRCS  
(Gen Surg) -  
Consultant Vascular  
Surgeon - Frimley Park  
Hospital



- (i) Medial deviation of the popliteal artery suggesting an abnormal origin of the medial head of gastrocnemius.
- (ii) Mid-segment stenosis of the popliteal artery.

Figure 1 Contrast angiogram of the popliteal artery demonstrating:

- (i) Popliteal artery medial to the medial head of gastrocnemius and therefore trapped between the muscle and the medial femoral condyle.
- (ii) Popliteal vein is in the normal position lateral to the medial head of gastrocnemius and is usually accompanied by the artery.

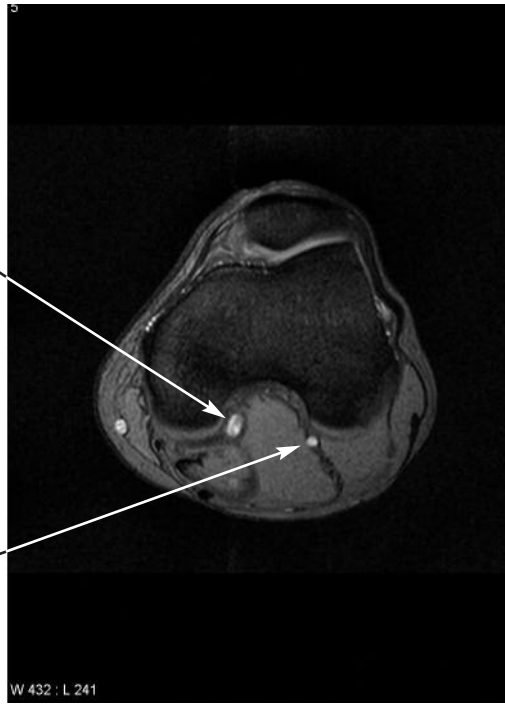


Figure 2 MRI scan showing of the knee

### Discussion

Popliteal Artery Entrapment Syndrome was first described in 1879 by Stuart when, as a medical student, he encountered the anatomical variation while dissecting a gangrenous leg (1), but it was not until 1959 that Hamming described the first operative case in a 12 year-old with calf claudication (2). Love and Whelan named the syndrome in 1965 (3) and several hundred cases have now been reported in the literature. The exact incidence of PAES is unknown but in 1977 Gibson described a 3.8% incidence in a series of cadavers (4), by comparison a study of 20,000 asymptomatic Greek army recruits found the rate to be only 0.165% (5). Eighty percent of cases are male; half are under 30 years of age (5). PAES has 5 anatomic variants (6) plus a functional syndrome of vessel compression due to calf muscle hypertrophy (7) and is often bilateral.

Most patients present with intermittent calf claudication that is relieved completely by rest, some present with chronic limb ischaemia and occasionally acute ischaemia following thrombus formation in an aneurysmal or fibrotic vessel occurs. PAES may cause acute or chronic ischaemia but the pathophysiology has been described as a

process involving prolonged entrapment and progressive vessel wall fibrosis eventually damaging the intima and promoting thrombotic occlusion (8). The consequence of these histological changes is that simply attending to the muscular abnormality does not exclude subsequent arterial pathology. The vessel wall may already be fibrosed with an increased risk of aneurysm and thrombosis later.

In this case there was no sign of vessel fibrosis at the time of surgery and it would appear that the intima was suddenly torn by the abnormal stress placed on the artery by forced plantar flexion of the foot because of the entrapped position of the popliteal artery between the aberrant medial head of gastrocnemius and the medial femoral condyle. Thrombus formation on the exposed endothelium was followed by embolisation and distal arterial occlusion. This traumatic variation of the pathophysiology has not been described previously.

### Conclusion

We present a unique case of intimal damage, and thromboembolism causing limb ischaemia in previously undiagnosed popliteal artery entrapment syndrome precipitated by trauma. Prompt thrombolysis followed by resection of the damaged artery and interposition vein grafting resulted in an excellent functional outcome. Bilateral disease should be excluded.

### References

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