

## Popliteal Artery Entrapment Syndrome: A Case with Bilateral Different Types

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Popliteal artery entrapment syndrome (PAES) is a non-atherosclerotic cause of claudication and acute ischemia of the legs in young athletic individuals. It is classified in terms of the abnormal anatomical relationship between the popliteal artery and surrounding structures. All types of PAES have the same pathophysiology. Repetitive arterial compression by surrounding structures causes progressive vascular injury. Bilateral PAES is reported in about 30% of cases. Bilateral PAES is usually of the same type in each artery; exceptions are rare. We report a case of a young athletic patient who suffered bilateral PAES of two different types.

Key words: 1. Claudication  
2. Young  
3. Peripheral vascular disease

### CASE REPORT

A previously healthy 22-year-old male had subacute claudication in both legs 3 months prior. He was a non-smoker and did not exhibit any atherosclerotic risk factor. The pain in the left leg was more severe than in the right, and the calf muscles showed atrophic change. No skin discoloration, paresthesia, weakness, or other ischemic symptom was apparent. On physical examination, the pulse of the dorsalis pedis disappeared on forceful plantar flexion, although the ankle-brachial index of both legs was within the normal range.

A magnetic resonance imaging (MRI) scan showed an abnormal relationship between the gastrocnemius and the popliteal artery (PopA) (Fig. 1). In the right leg, the PopA lay medial to the fibrous medial head of gastrocnemius

(MHGM)-type II. In the left leg, the PopA lay lateral to the MHGM, but an accessory slit, usually derived from the remnants of the MHGM, compressed the PopA-type III.

We performed surgery using a posterior popliteal approach (Fig. 2). In the PopA of the right leg, we found no stenosis or vascular wall hypertrophy and therefore, performed only MHGM myotomy. In the left leg, the compressed PopA showed a degenerative change with stenosis. We performed PopA interposition using a greater saphenous vein graft with MHGM myotomy.

We performed computed tomography (CT) 7 days postoperatively. CT showed the resolution of the previously noted compressed areas of both legs, and the patency of the saphenous vein graft in the left leg was good. The patient was discharged on postoperative day 15. He took aspirin, clopidog-

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**Fig. 1.** Preoperative magnetic resonance imaging scan. (A) Left leg: accessory slit of MHGM compressed popliteal artery (type III). Abnormal insertion of MHGM (white arrow); Popliteal artery (black arrow). (B) Right leg: popliteal artery lies medial to the fibrous MHGM (type II). MHGM, medial head of gastrocnemius. Abnormal insertion of MHGM (white arrow); Popliteal artery (black arrow).

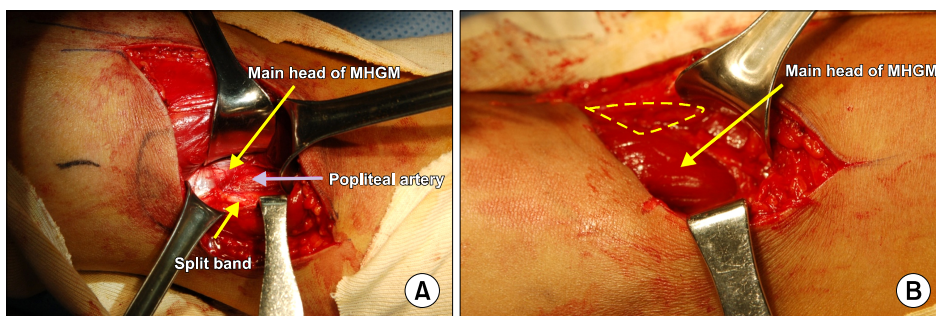
rel, and warfarin. Warfarin was stopped 6 months postoperatively. The patient complained of mild difficulty in moving his left leg until 1 month postoperatively but has no symptoms currently. Five years after surgery, the patient now lives a normal life, including playing soccer, without any medication.

## DISCUSSION

PopA entrapment syndrome (PAES) is a rare cause of limb ischemia in young athletic males lacking atherosclerotic risk factors. The condition was first described by a medical school student named Stuart in 1879. Hamming and Vink reported the first surgical treatment to decompress an entrapped artery [1]. The term 'popliteal artery entrapment syndrome' was first introduced by Love and Whelan in 1965 [2].

The true incidence of the condition is unknown. The prevalence in young soldiers was 0.165% and that in post-mortem limbs 3.8% [3], which means that clinically significant PAES is less common than are anatomical abnormalities. Bilateral PAES has been reported in 30% [4] to 67% [5] of patients and usually, presents similarly on both sides. It has been reported that 87% of bilateral PAES is identical in terms of the anatomical abnormality and that bilateral asymmetric PAES is very rare [6]. Our patient was a rare exception with a different type of PAES in each lesion.

PAES is classified by anatomical position of MHGM (Table 1). If the PopA lies medial to the MHGM, the abnormality is type I. If the MHGM has a lateral attachment to the medial femoral condyle, and the PopA lies medial to the MHGM and is compressed by it, the abnormality is type II. When the PopA is entrapped between the MHGM and an ac-



**Fig. 2.** Intraoperative findings. (A) Left leg. (B) Right leg. MHGM, medial head of gastrocnemius.

**Table 1.** Classification of popliteal entrapment syndrome

Type	Content
1	Popliteal artery medially displaced, normal MHGM.
2	Normal popliteal artery, laterally displaced MHGM.
3	Compression of popliteal artery by additional slip of gastrocnemius.
4	Compression of popliteal artery by popliteus.
5	Compression of popliteal vein.
6	Functional entrapment of popliteal artery. No aberrant anatomy.

MHGM, medial head of gastrocnemius.

cessory slit, the abnormality is type III. Type IV is the entrapment of the PopA by the popliteus. Any of these abnormalities accompanied by popliteal vein entrapment is referred to as type V. A functional entrapment syndrome, with no evidence of anatomical abnormality but with its symptoms, is type VI.

PAES can be diagnosed by symptoms, physical examination, and radiologic studies such as angiography and MRI. Clinically, PAES may be doubted when the dorsal pulses diminish with forceful plantar flexion in symptomatic patients. Angiography was useful earlier, but MRI is currently essential because it confirms the abnormal anatomical relationship between the PopA and the muscular structures of both legs.

Symptomatic PAES needs surgical intervention. Treatment should include decompression of the artery via myotomy, or resection of the fibrous tendon and revascularization of the impaired artery. Fibroplasias, stenosis, or aneurysmal change in the entrapped artery creates a necessity for vascular interposition. Saphenous graft bypass has been reported to be excellent [7]. The posterior approach is used more commonly because it provides a better visual field and makes it easy to

access the vessels.

In terms of postoperative complications, thrombosis in and restenosis of replaced veins, bleeding, infection, and deep vein thrombosis can occur. More than 90% of treated patients enjoy a good prognosis [8], resume normal activities, and exhibit no symptoms.

In conclusion, PAES is rare, but it may affect young physically active persons and worsen their quality of life. If this disease is suspected, diagnostic evaluation must be performed. The possibility of bilateral PAES cannot be ignored. Modern diagnostic modalities, like MRI, are required for detecting abnormalities in both legs. Once a diagnosis is confirmed, treatment (including surgical management) should be considered. Although a patient may be asymptomatic, a graft bypass should be performed when the entrapped artery shows intimal damage, such as fibroplasias, stenosis, or aneurysmal transformation.

**CONFLICT OF INTEREST**

No potential conflict of interest relevant to this article was reported.

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