An Unusual Variant of Popliteal Artery Entrapment

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A 43-year-old woman presented with incapacitating exertional pain in the right foot, ankle, and lower calf of 1 year’s duration following a minor ankle sprain. Evaluation by several physicians had been inconclusive. Physical examination identified normal pedal pulses at rest but obliteration of pulses with active plantar flexion. Segmental pressures were normal at rest and duplex scanning showed occlusion of the popliteal artery with active plantar flexion. The findings were confirmed by arteriography despite a normal course of the popliteal artery. Magnetic resonance imaging (MRI) showed no muscular abnormality. At exploration entrapment was noted to be the result of compression by branches of the sural nerve and vein as they coursed medially inserting into the medial head of the gastrocnemius muscle. Division of the neurovascular bundle resulted in complete resolution of symptoms and arterial compression on duplex examination postoperatively. This case was unusual because of the patient's age, sex, and the pathologic findings that had not been previously reported. In this case MRI was not useful in demonstrating a muscular or neurovascular bundle abnormality, supporting the use of duplex scanning as the noninvasive diagnostic modality of choice. (Ann Vasc Surg 1995;9:467-470.)

Popliteal artery entrapment is a rare but well-known cause of lower extremity ischemia and intermittent claudication. The first description is credited to Stuart, who in 1879 identified the popliteal artery coursing medial to the medial head of the gastrocnemius muscle while dissecting an amputated limb for gangrene, and was reiterated by Eastcott. The first surgical treatment was reported by Hamming in 1959. Bilaterality of the condition was described in 1964 and the term “popliteal artery entrapment syndrome” was first coined by Love and Whelan in 1965. Young men are most frequently affected with >50% of symptomatic cases becoming manifest before age 30 years. Arteriography has been considered the “gold standard” for diagnosis, although duplex scanning, CT scanning, and magnetic resonance imaging (MRI) have all been reported as useful diagnostic studies. This case was unusual in that the patient was a middle-aged woman, there was no demonstrable musculotendinous abnormality, and the artery resided in its normal anatomic position.

CASE REPORT

A 43-year-old female flight attendant presented with incapacitating exertional pain involving the right foot, ankle, and lower calf of 1 year’s duration following a minor ankle sprain. She was not working and had been on long-term disability after having been evaluated by numerous physicians of various specialties. Her medical history was remarkable for breast cancer treated 10 years earlier and prior gastrectomy for a bleeding ulcer. She was taking no medication and was a nonsmoker. Physical examination was remarkable only for mild obesity. All lower extremity pulses including the pos-
terior tibialis and dorsalis pedis were normal at rest. Active plantar flexion resulted in obliteration of the posterior tibialis and dorsalis pedis pulses bilaterally. Segmental lower extremity arterial pressures were normal at rest and following exercise on tiptoes. Color duplex evaluation of the right popliteal artery demonstrated normal flow at rest but complete occlusion of flow in the popliteal artery with active plantar flexion. The artery appeared to be in its normal anatomic position and identical findings were noted in the contralateral, asymptomatic extremity, except that a high origin of the anterior tibial artery allowed collateral flow around the occlusion. Arteriography confirmed the duplex findings with a normal appearance at rest but occlusion of the popliteal artery bilaterally with plantar flexion (Fig. 1). An MRI scan was performed in an attempt to identify a muscular abnormality to account for the patient’s findings. As demonstrated in Fig. 2, the MRI showed normal vascular and muscular anatomy.

The patient underwent exploration of the popliteal fossa using a posterior approach. The vascular anatomy was found to be normal, as was the insertion of the gastrocnemius muscle. The cause of the popliteal artery entrapment was found to be a neurovascular bundle containing branches of the sural nerve and vein, which crossed the artery to enter the medial head of the gastrocnemius muscle (Fig. 3). With contraction of the muscle this neurovascular bundle compressed and occluded the popliteal artery. No other muscular or fibrous abnormalities were identified. This neurovascular structure was divided and the patient’s postoperative course was unremarkable with no neurologic deficits. She had complete resolution of her symptoms and has returned to her normal work routine. A follow-up duplex scan showed no evidence of compression of the right popliteal artery with active plantar flexion. The contralateral extremity remains asymptomatic. Contralateral repair was recommended but the patient declined.

**DISCUSSION**

Popliteal artery entrapment is diagnosed principally in young men and is asymptomatic in many cases, so the true incidence is not known. In a group of 20,000 patients seen in a vascular clinic over a period of 50 months, 33 patients with symptomatic popliteal artery compression were identified for an incidence of 0.16%.9,10 Gibson et al.11 performed postmortem examinations of the popliteal fossa in 86 patients and found three cases of anatomic abnormalities. A reported increase in the incidence over the past two decades may reflect an increased awareness of the condition.

The popliteal artery entrapment syndrome consists of a group of anatomic abnormalities involving the popliteal artery and associated musculotendinous structures in the popliteal fossa, most commonly the gastrocnemius muscle. Numerous classifications of the syndrome have been proposed. Delaney and Gonzalez12 proposed a classification that is widely used with some modifications. In type I the popliteal artery passes medially across the medial head of the gastrocnemius muscle. In type II the artery lies in a normal position but is compressed by the medial head of the gastrocnemius muscle, which arises more lat-