Persistent sciatic artery in a patient with unilateral acute lower extremity ischemia

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ABSTRACT

We report a rare case of a persistent sciatic artery in a 59-year-old woman who had presented with unilateral acute limb ischemia. A heparin infusion was started. A right lower extremity arterial duplex ultrasound scan showed an occluded superficial femoral artery and underwent catheter-directed thrombolysis of her right popliteal artery, which was fed by a persistent sciatic artery. After recovery, computed tomography angiography was performed, which confirmed a persistent sciatic artery of the right lower extremity. The patient had presented with thrombosis disease secondary to atherosclerosis of popliteal and tibial arteries, in contrast to the more commonly seen aneurysmal disease with thrombosis. (J Vasc Surg Cases and Innovative Techniques 2021;7:89-92.)

Keywords: Persistent sciatic artery; Ischemia; Thrombotic disease

CASE REPORT

A 59-year-old woman had presented with 10 days of severe right toe pain and claudication. Her medical history included diabetes, hypertension, chronic obstructive pulmonary disease, and one pack per day of smoking for >30 years. Her surgical history was significant for left superficial femoral artery (SFA) angioplasty and stenting ~2 years previously. The patient provided written informed consent for the report of her case and imaging studies.

Her right toes were mottled, cold, and exquisitely tender. Palpable bilateral femoral pulses were noted; however, no palpable or Doppler signal was heard at the popliteal, dorsalis pedis, and posterior tibial (PT) arteries on the right. On the left, patient had Doppler signals present at the popliteal, dorsalis pedis, and PT arteries.

Heparin was started, and right lower extremity arterial duplex ultrasonography and the bilateral ankle-brachial index and pulse volume recordings were performed. Duplex ultrasonography demonstrated an occluded right SFA with severe disease of the right and moderate disease of the left lower extremities indicated by the pulse volume recordings. The ankle-brachial index was 0.64 on the left and unattainable on the right lower extremity. Endovascular revascularization was undertaken via the left common femoral artery. Diffuse, moderate disease was noted in the infrarenal aorta and common iliac arteries. An external and internal iliac artery were visualized. However, the patient demonstrated a patent profunda femoral artery, no SFA, and a right persistent sciatic artery (PSA) feeding into a diseased, occluded popliteal artery likely due to acute thrombosis (Figs 1 and 2). The runoff to the foot was poor, and no plantar arch was noted (Fig 2). A thrombolysis catheter was placed in the popliteal artery and alteplase, a tissue plasminogen activator (Activase; Genentech, Inc, South San Francisco, Calif), was administered for 24 hours with a 4 mg bolus followed by infusion at 1 mg/kg/h.

Completion angiography the next day demonstrated successful thrombolysis. A patent right popliteal artery with stenosis (>50%), an occluded right anterior tibial artery, severe stenosis (80%-90%) at the origin of the PT, an incomplete plantar arch, and no evidence of an embolic event. Angioplasty of the popliteal and PT arteries and atherectomy of the PT artery were performed. Completion angiogram demonstrated patent popliteal and PT arteries without distal embolization (Fig 3).
Postoperatively, her symptoms resolved, and a Doppler signal was evident at the right PT artery. Subsequent computed tomography angiography (CTA) of the right lower extremity demonstrated a patent iliac, profunda femoral, hypoplastic SFA, a PSA with significant atherosclerotic disease and no aneurysm, and popliteal and PT arteries to the ankle with collateral branches supplying the foot (Figs 4 and 5). The left lower extremity had an occluded stented SFA with distal reconstitution (Figs 4 and 5).

DISCUSSION

A PSA is a rare anatomic anomaly requiring an early diagnosis to prevent unnecessary femoral artery puncture. During early embryonic development, the sciatic artery serves as the major lower limb bulb blood supply from the internal iliac artery. The sciatic artery later involutes and is replaced by the iliofemoral artery. Failure to involute is associated with femoral artery hypoplasia, leading to a PSA as the dominant blood supply to the lower limb. It has been reported to have an incidence of 0.025% to 0.04% in the population. A PSA can occur on the right in 50%, left in 20%, or bilaterally in 30% of cases. The PSA can be either complete or incomplete, depending on whether the SFA is normal, hypoplastic, or absent. The PSA is considered complete when the PSA is the main blood supply to the lower limb. In complete PSA, the SFA will be hypoplastic and end in the thigh, as in the present patient. The PSA is considered incomplete if a PSA is present but the SFA remains the main blood supply to the popliteal artery and lower limb.

Fig 2. Preintervention computed tomography angiograms showing right popliteal artery with complete occlusion (Left) and no distal runoff to the foot (Right).

Fig 3. Postintervention computed tomography angiograms showing patent right popliteal artery (Left) and distal runoff to the foot predominately via the posterior tibial (PT) artery (Right).
In the present patient, as in most cases, PSA will be discovered incidentally during evaluation for lower extremity symptoms such as claudication, acute lower extremity ischemia caused by thrombosis or embolization (75%), a painful pulsatile buttock mass, and sciatic neuropathy. A positive Cowie’s sign can suggest the presence of a PSA. The Cowie sign is indicated by the presence of distal pulses in the setting of absent femoral pulse. However, in the present case, the patient likely had a palpable right femoral pulse owing to the hypoplastic SFA and patent profunda femoral artery. Aneurysmal dilation is the most frequent complication, occurring in ≤47%, and can lead to thrombosis. Most often, the aneurysm will develop between the piriformis muscle and posterior aspect of the greater trochanter. The present patient did not have an aneurysm of the PSA, which often occurs, but, instead, had developed atherosclerosis of the right PSA. The point of occlusion was at the level of the popliteal artery just above the knee, likely secondary to her smoking and atherosclerotic disease progression.

The early and proper diagnosis of a PSA can be determined from CTA, magnetic resonance angiography (MRA), and/or duplex ultrasonography. CTA and MRA have been used to assess the aneurysmal component and its anatomic relationships and to monitor these patients for progression after treatment. Arterial duplex ultrasound studies can provide the diagnosis. However, the findings can be misleading if performed by an operator unfamiliar with the abnormality or if the femoral artery is completely absent, which could result in the assumption of acute thromboembolic occlusion of lower extremity inflow. The findings from the present patient demonstrated the failure of arterial duplex ultrasonography to identify a PSA and the need for CTA or MRA to diagnosis the variant preoperatively.

Treatment is dependent on the symptoms, PSA type, and the presence or absence of an aneurysm. Although the present patient’s symptoms were attributed to the popliteal and tibial disease, if the patient had had a symptomatic aneurysm, bypass would have been indicated to maintain distal blood flow because the PSA was complete and a hypoplastic SFA was present. When aneurysm excision is combined with placement of an interposition graft, graft patency can be compromised when the patient is sitting. Endovascular treatment with coiling or a stent-graft is an alternative when the PSA is stretched over the sciatic nerve and the risk of injury is high with aneurysm excision. The specific treatment and management for these patients requires a thorough preoperative evaluation and early diagnosis to best address the issue.
CONCLUSIONS

A PSA is a rare vascular disease. It is most often complicated by aneurysm formation, although cases of thrombosis can occur distally in patients with a complete PSA. This can complicate endovascular approaches, and early recognition is needed to treat patients reliant on the PSA for distal blood flow. Because of the variety in presentation, duplex ultrasonography, CTA, and MRA can provide an early preoperative diagnosis, allowing for appropriate open and endovascular intervention for symptomatic patients. However, owing to the rarity of this anomaly, no single approach can be recommended, and multiple approaches should be considered with an individualized approach, such as for the present patient.

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