

➤ **Case Report** ◀

Endovascular Stent-Graft Repair of a Persistent Sciatic Artery Aneurysm

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Persistent sciatic artery (PSA) is a rare anomaly that may cause various symptoms, such as aneurysm, rupture, thromboembolism, and sciatica. Direct surgery can be performed to treat PSA aneurysm (PSAA), but is associated with complications; e.g., anatomical problems such as sciatic nerve injury. Herein we report a case of a 74-year-old woman with acute limb ischemia that developed from a distal embolism caused by a thrombus in the left PSAA; favorable results were obtained for her by treatment with a stent-graft after rapid anticoagulation therapy for limb salvage.

Keywords: endovascular therapy, persistent sciatic artery aneurysm, acute limb ischemia

Introduction

Persistent sciatic artery (PSA) is a rare but clinically significant congenital vascular anomaly with a high incidence of complications, including aneurysm formation and ischemia, which may lead to amputation. PSA aneurysm (PSAA) treatment involves direct aneurysm excision and reconstruction, but complications including sciatic nerve injury and procedural difficulties can occur.

Here, we report a case of a patient with acute limb ischemia (ALI) caused by an embolism from a thrombus in the left PSAA. This report describes the treatment performed, which included recanalizing the blood flow of the lower extremity by rapid diagnosis and anticoagulation therapy, as well as aneurysm exclusion by endovascular therapy (EVT) using a stent-graft. The patient granted consent for the publishing her clinical information and imaging.

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Case Report

The patient was a 74-year-old woman who was admitted to the hospital for sudden left lower-limb pain. She presented with pain, paleness, paresthesia, and paralysis in the left lower extremity (Rutherford category 4). The popliteal and tibial arteries were impalpable and the ankle-brachial pressure index could not be measured. Further, Doppler ultrasound did not detect tibial artery flow. Laboratory examinations revealed a creatinine phosphokinase of 88 IU/L, white cell count of 5900/L, hemoglobin of 12.6 g/dL, platelet count of 14.2×10^4 /L, C-reactive protein of 0.1 mg/dL, prothrombin time international normalized ratio of 0.96, and D-dimer of 33.6 μ g/mL. Contrast-enhanced computed tomography (CT) images revealed a left PSA, with the PSA branching off from the left common iliac artery (CIA) and forming an aneurysm in the buttock, causing thromboembolism. Occlusion was confirmed in the distal PSA and extended to the popliteal and tibial arteries. The hypoplastic superficial femoral artery (SFA) terminated in the mid-thigh (Figs. 1A and 1B). A heparin bolus infusion (3,000 U) was immediately administered followed by a systemic infusion (15,000 U/day), which improved the ischemia rapidly, and relieved nearly all of the patient's symptoms 5 hours after onset. Warfarin was also administered. Because the CT revealed improved blood flow and near disappearance of the thrombus, warfarin was continuously administered as an oral anticoagulant. An angiography performed on day 2 also revealed recanalization of the PSA and peripheral arteries as well as disappearance of the thrombus in the peripheral arteries. The diagnosis was ALI caused by a distal embolism from the buttock PSAA, based on the PSA branching from the left CIA to the popliteal artery and the hypoplastic SFA terminating in the mid-thigh. CT performed on day 7 revealed that the thrombus had disappeared at the PSA, popliteal, and tibial arteries but that a residual mural thrombus remained in the PSAA (Figs. 1C and 1D). Due to the high risk of ALI recurrence caused by mural thrombosis even with the ongoing anticoagulation therapy, surgical therapy was deemed necessary. Direct PSAA resection or embolization, and femoropopliteal bypass surgery were



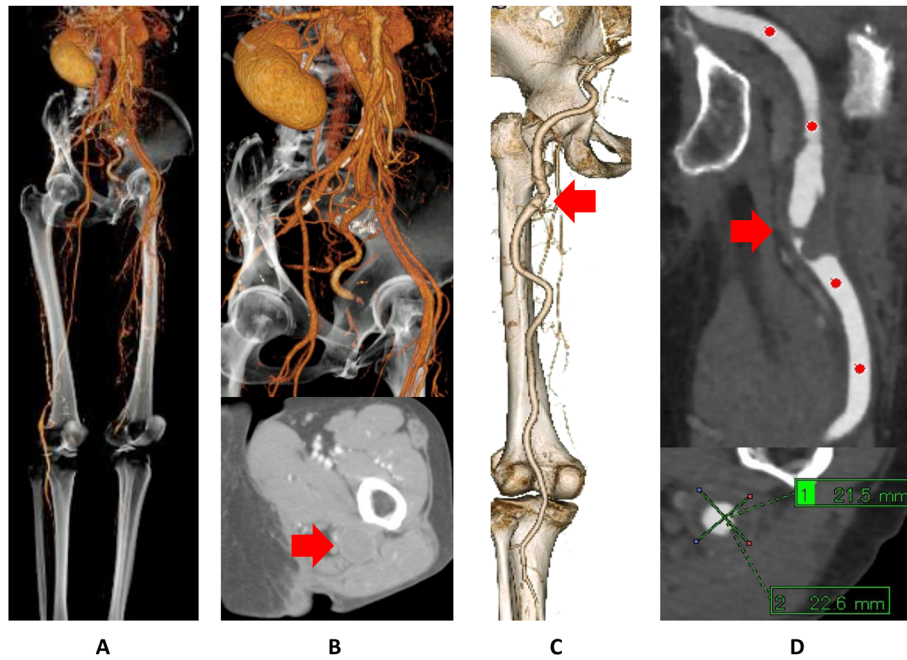


Fig. 1 (A, B) Computed tomography (CT) images showing the development of acute lower-extremity ischemia and a thrombosed persistent sciatic artery aneurysm (PSAA), persistent sciatic artery (PSA) in the femoral region, embolized popliteal artery, and lower limb artery. In addition, a superficial femoral artery, which was terminated in the hypoplastic middle part of the femur, was also confirmed. (C, D) CT performed after anticoagulation therapy showing a recanalized left PSA, popliteal artery, and lower limb artery. (C shows the posterior view.)

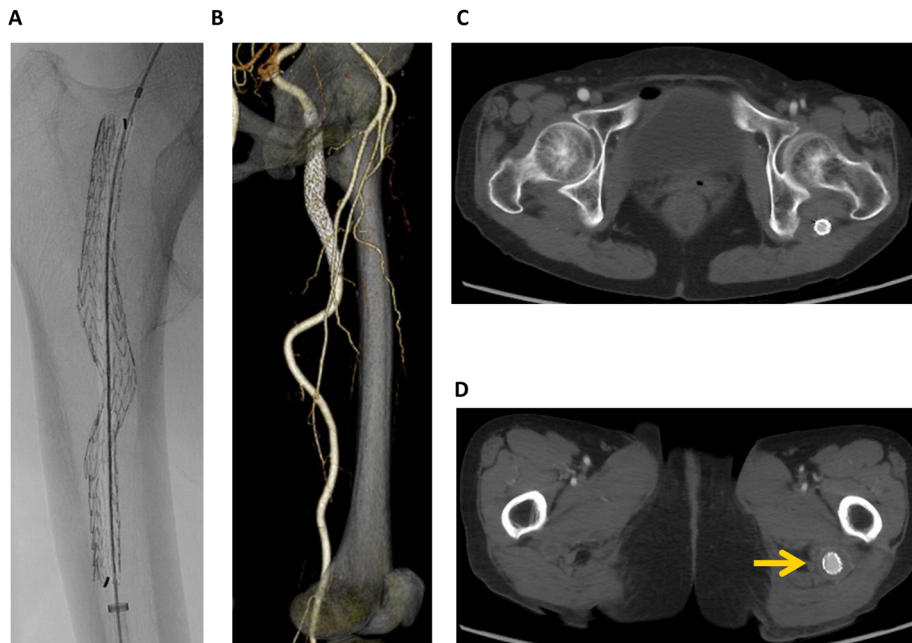


Fig. 2 (A) A stent-graft deployed in a persistent sciatic artery aneurysm (PSAA). (B–D) Post-operative computed tomography showing patent stent-graft and exclusion of PSAA.

considered as a surgical option. However, direct surgery presented a risk of complications, including sciatic nerve injury. Further, finding a distal anastomosis site in the bypass procedure presented potential difficulties because an above-knee popliteal artery that connected with the PSA ran through a deep compartment of the woman's dorsal thigh. It was thus decided that aneurysm closure and revascularization using a stent-graft would resolve these problems with minimal invasion. On CT images, PSAA was 60-mm long, and the proximal and distal PSAA diameters were 8 and 9 mm, respectively. Therefore, we selected a 16-mm × 12-mm × 12-cm Excluder Contralateral Leg Endoprosthesis (W. L. Gore and Associates, Flagstaff, AZ, USA), generally used in endovascular aneurysm repair of abdominal aortic aneurysms (AAAs). Under general anesthesia, a 4-cm transverse incision was made in the left popliteal region in the prone position to expose the popliteal artery. The stent-graft was inserted through a 12-Fr DrySeal Sheath (W. L. Gore and Associates, Flagstaff, AZ, USA). After confirming the position via angiography, the stent-graft was deployed from the PSA above the PSAA to the peripheral PSA and post-balloon was performed. The final angiography confirmed no presence of endoleak or stent-graft collapse (Fig. 2). Thereafter, clopidogrel and apixaban were administered to the patient. We selected apixaban because it does not require PT-INR control and we felt that these drugs should be used as long as possible. CT images and clinical findings 12 months after the procedure showed PSAA shrinkage, representing a favorable stent-graft outcome.

Discussion

PSA is a rare anomaly first reported by Green in 1832.¹⁾ Embryonic blood flow in the lower extremities is provided by the sciatic artery connecting from the umbilical artery. When the sciatic artery regresses as a result of the development of the external iliac artery system by gestational month 3, it remains a part of the inferior gluteal artery.²⁾ A sciatic artery remnant is referred to as a PSA.

Clinically, symptoms are observed during 40–50 years of age, with an equal incidence in both sexes.³⁾ Lower-limb ischemia has been confirmed in 31%–63% of cases²⁾ and aneurysms have been confirmed in 44%, with symptoms including sciatic as well as pulsatile mass in the buttocks.^{3,4)} PSAA is believed to be caused by a less elastic arterial wall in a location subjected to chronic trauma.⁴⁾

The classification of PSAs established by Pillet et al. (and modified by Gauffre et al.) was based on lower-limb blood flow^{5,6)} and is useful for understanding clinical conditions and selecting a therapeutic strategy, as stated in many previous reports²⁾ (Fig. 3). Due to the risk of an embolism from a PSAA causing lower limb ischemia, special attention should be given to Type 2 and 5 PSAs, which include a complete PSA that communicates with the popliteal artery and an incomplete hypoplastic SFA. The patient in this report had Type 2a PSA; thus, she developed ALI. This required the initialization of heparinization immediately after diagnosis. If limb ischemia had not improved, additional thrombolytic therapy or surgical embolectomy would have been required. Mascarenhas de Oliveira et al. suggested that surgical treatment should generally be provided for all PSAs to avoid distal embolism, sciatic nerve

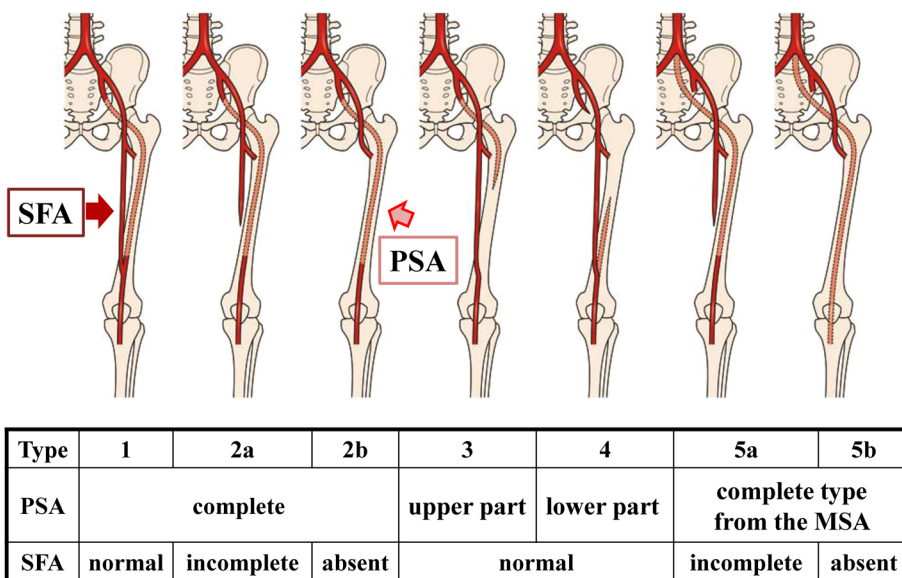


Fig. 3 Classification according to Pillet et al.⁵⁾ (modified by Gauffre et al.⁶⁾ SFA: superficial femoral artery; PSA: persistent sciatic artery; MSA: median sacral artery

compression by aneurysm, and rupture.⁷⁾

For treatment of symptomatic PSAAs, surgical resection, coil embolization, or EVT may be selected. Surgical resection presents a risk of potential complications, such as sciatic nerve injury caused by unusual anatomy, and may need to be performed in a deep and narrow surgical field in the buttock. Although coil embolization is a minimally invasive approach, femoropopliteal bypass is required for the type of PSAs that include complete PSA and incomplete SFA. In this approach, distal anastomosis is performed in the above-knee popliteal artery connecting with the PSA, which runs deeper than usual, as in the case reported here.

Recently, EVT for PSAA has been discussed because its minimal invasiveness may help avoid the complications associated with direct surgery. Previous reports have used stent-grafts with small diameters of 6–10 mm, such as the VIABAHN endoprosthesis (W.L. Gore and Associates, Flagstaff, AZ, USA).^{4,7-9)} Because the VIABAHN stent-graft has not been approved in Japan, an AAA stent-graft leg was selected. Sato et al. reported a case in which the Excluder stent-graft leg was used for PSAA.¹⁰⁾ Likewise, an Excluder leg was selected for this case due to its high conformability and patency. However, the stent-graft for AAA deployed in the peripheral artery requires extra care to avoid vessel injury caused by oversizing, device collapse, and presence of an endoleak. For example, the proximal diameter of the Excluder contralateral leg is uniformly 16 mm, and the minimum distal diameter is 12 mm. Additionally, because the stent-graft is deployed in the PSA, which is exposed to chronic extrinsic compression over the hip joint, long-term durability is a concern.¹⁰⁾ Indeed, Girsowicz et al. reported a stent-graft that fractured 6 months after implantation.⁸⁾ Although other reports have described favorable short- and mid-term results, the longest reported patency was 4 years.⁹⁾ Follow-up is therefore imperative to identify potential device fracture(s) and occlusion of the Excluder leg that may occur due to chronic compression. We hope that further development of devices will be promoted to establish safe and effective EVT for peripheral aneurysms, such as the PSAA.

Conclusion

In the present case, PSAA was complicated with ALI caused by an embolism from the PSAA. The PSA was Type 2a, consisting of a complete PSA and an incomplete SFA. After revascularization via immediate anticoagulation therapy, EVT was performed to exclude the PSAA.

We believe that EVT using a stent-graft can be useful for peripheral arterial aneurysms and is a minimally invasive therapy that can exclude and simultaneously revascularize the lesion.

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Disclosure Statement

The authors have no conflicts of interest.

Author Contributions

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Critical review and revision: all authors

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Accountability for all aspects of the work: all authors

References

- 1) Green PH. On a new variety of the femoral artery: with observations. *Lancet* 1832; **17**: 730-1.
- 2) Patel MV, Patel NH, Schneider JR, et al. Persistent sciatic artery presenting with limb ischemia. *J Vasc Surg* 2013; **57**: 225-9.
- 3) Aziz ME, Yusof NRN, Abdullah MS, et al. Bilateral persistent sciatic arteries with unilateral complicating aneurysm. *Singapore Med J* 2005; **46**: 426-8.
- 4) Gabelmann A, Krämer SC, Wisianowski C, et al. Endovascular interventions on persistent sciatic arteries. *J Endovasc Ther* 2001; **8**: 622-8.
- 5) Pillet J, Cronier P, Mercier Ph, et al. The ischiopopliteal arterial trunk. A report of two cases. *Anat Clin* 1982; **3**: 329-31.
- 6) Gauffre S, Lasjaunias P, Zerah M. Sciatic artery: a case, review of literature and attempt of systemization. *Surg Radiol Anat* 1994; **16**: 105-9.
- 7) Mascarenhas de Oliveira F, de Souza Mourão G. Endovascular repair of symptomatic sciatic artery aneurysm. *Vasc Endovascular Surg* 2011; **45**: 165-9.
- 8) Girsowicz E, Georg Y, Lejay A, et al. Midterm failure after endovascular treatment of a persistent sciatic artery aneurysm. *Ann Vasc Surg* 2014; **28**: 1323e7-12.
- 9) Wijeyaratne SM, Wijewardene N. Endovascular stenting of a persistent sciatic artery aneurysm via retrograde popliteal approach: a durable option. *Eur J Vasc Endovasc Surg* 2009; **38**: 91-2.
- 10) Sato H, Nakai M, Sato M, et al. Retrograde popliteal endovascular stent-graft repair for a growing persistent sciatic artery aneurysm (Type IIa): case report and review of the literature. *J Vasc Interv Radiol* 2014; **25**: 1997-2000.