Total endovascular repair for a persistent sciatic artery aneurysm with widespread limb-threatening arterial occlusion

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ABSTRACT

In the present report, we have described the case of a 79-year-old woman who presented with acute right lower limb ischemia and was diagnosed with bilateral persistent sciatic arteries and a right persistent sciatic artery aneurysm. Concomitant widespread thrombotic occlusion was present, extending from the orifice of the right internal and external iliac arteries to the below-the-knee popliteal artery. These complicated lesions were successfully treated using only percutaneous endovascular procedures, including stent-graft placement, bare metal stent implantation, and thrombolysis. Our report illustrates how a combination of techniques can achieve total endovascular repair of a persistent sciatic artery aneurysm accompanied by occlusion of the internal and external iliac arteries. (J Vasc Surg Cases and Innovative Techniques 2021;7:128-32.)

Keywords: Aneurysm; Endovascular treatment; Persistent sciatic artery; Stent-graft; Thrombolysis

A persistent sciatic artery (PSA) is a connection between the internal iliac artery (IIA) and popliteal artery. It is an embryologic remnant of the internal iliac artery occurring during early embryonic development. A PSA occurs in ~0.01% to 0.06% of the population and can cause sciatica neuralgia, aneurysmal formation (PSA aneurysm [PSAA]), and/or thrombotic occlusion.[1-6] In addition to surgical bypass and/or resection, endovascular treatment (EVT), including stent-graft deployment, thrombolysis, and/or embolization, has recently emerged as a key treatment option.[2,6-12]

In the present report, we have described the successful management of a case of a PSAA with thrombotic occlusion extending from the orifice of the IIA and external iliac artery (EIA) to the below-the-knee popliteal artery. The PSAA was repaired using only EVT, including stent-grafts, a bare metal stent (BMS), and thrombolytic agents via a bidirectional percutaneous approach. The patient provided written informed consent for the report of her case.

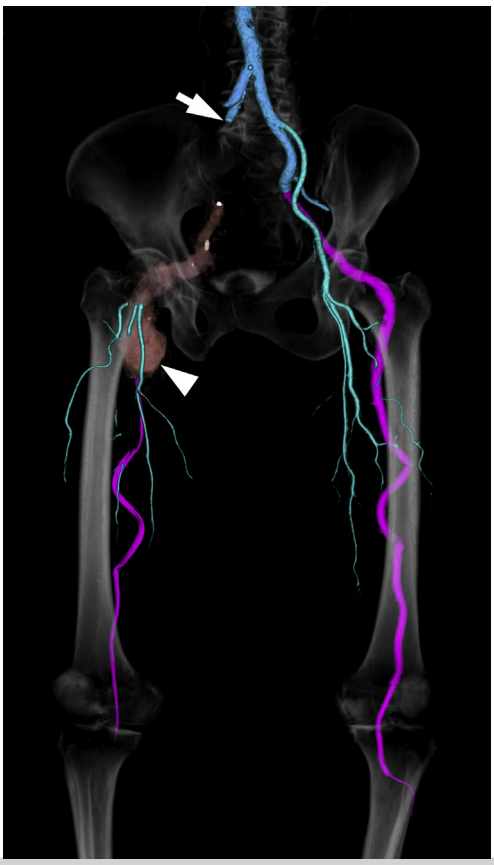

Fig 1. Initial three-dimensional computed tomography angiogram showing a bilateral persistent sciatic artery (PSA). Continuous thrombotic occlusion is observed extending from the orifice of the right internal iliac artery (IIA; *arrow*) to the end of the PSA aneurysm (PSAA; *arrowhead*) and extending from the orifice of the external iliac artery (EIA) to the proximal part of the deep femoral artery. Intermittent thrombosis is observed extending from the distal end of the PSAA to the below-the-knee popliteal artery.

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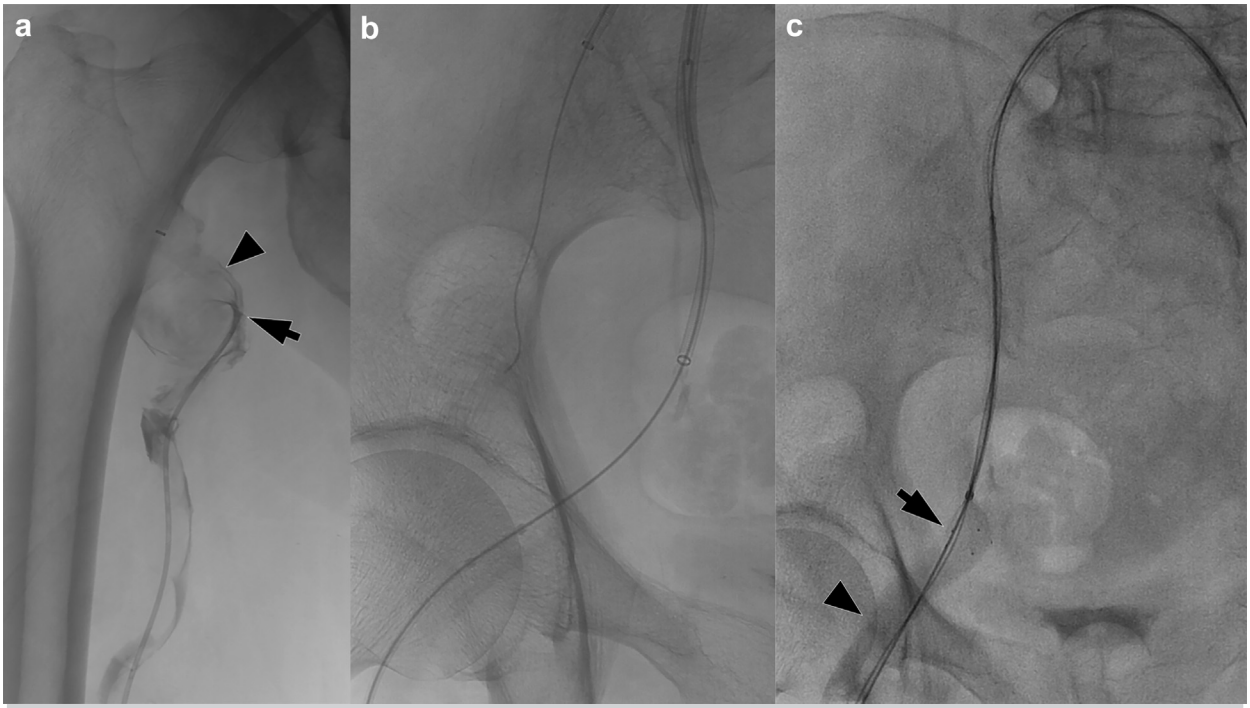

Fig 2. First session of endovascular treatment (EVT; proximal). **a,** Retrograde 4F system (*arrow*) was advanced up to the distal part of the completely thrombosed persistent sciatic artery (PSA) aneurysm (PSAA; *arrowhead*). **b,** A 0.035-in. guidewire retrogradely passed the PSAA and was advanced into the internal iliac artery (IIA), and the pull-through system was established with the antegrade system. **c,** A bare metal stent (BMS) was deployed from the distal part of the intrapelvic IIA (*arrow*) after reduction of the thrombus within the range of motion in the gluteal segment of the PSA (*arrowhead*).

CASE REPORT

At a rehabilitation session for rheumatoid arthritis, a 79-year-old woman complained of a sudden severe pain in her right leg with pulselessness, pallor, and paresthesia of the limb. The laboratory examination results were as follows: myoglobin, 139.1 ng/mL; creatine kinase, 92 IU/L; and D-dimer, 46.2 μg/mL. Contrast-enhanced computed tomography (CE-CT) showed bilateral PSAs with the absence of superficial femoral arteries and a right PSAA measuring 32 mm in diameter in the proximal femoral segment of the PSA (Fig 1). Continuous thrombotic occlusion was observed that extended from the right IIA orifice to the end of the PSAA. In addition, intermittent thrombosis was seen, extending from the distal part of the PSAA to the below-the-knee popliteal artery. The right EIA orifice was also occluded. A limb-threatening condition was considered present, requiring emergency repair. Because surgical bypass would have been inadequate owing to the lack of a run-off site resulting from the distal thrombus, EVT was performed.

EVT PROCEDURE

First EVT session. With the patient under local anesthesia, the access route was achieved percutaneously via the left deep femoral artery using ultrasound guidance. A 10F sheath and 8F sheath (Supersheath; Medikit, Gifu, Japan), a 6F guiding sheath (Destination; Terumo, Tokyo, Japan), and a 4F cobra catheter (Seiya; Medikit) were coaxially advanced antegradely into the right PSA through the thrombosed IIA using a 0.035-in. guidewire (Radifocus; Terumo). Crossing over to the distal part of the PSAA was impeded by the huge thrombus within the aneurysm. Therefore, retrograde access was achieved percutaneously via puncture of the PSA of the lower thigh using radiographic guidance. Next, a 4F sheath (Supersheath; Medikit) was inserted into the distal part of the PSAA (Fig 2, *a*). A 0.035-in. guidewire (Radifocus; Terumo) could retrogradely pass through the PSAA and was advanced into the IIA, and a pull-through technique was established with the antegrade system (Fig 2, *b*). The following maneuvers were applied in antegrade fashion: the thrombus within the range of motion in the gluteal segment of the PSA was reduced by manual aspiration thrombectomy and balloon angioplasty. Next, a BMS 10 mm in diameter and 10 cm in length (Epic; Boston Scientific, Boston, Mass) was deployed in the IIA (Fig 2, *c*). Two stent grafts (8 mm in diameter and 15 cm in length in the distal part and 9 mm in diameter and 15 cm in length in the proximal part; VIABAHN, Gore Medical, Newark, Del) were then deployed into the proximal neck of the PSAA up to the end of the femoral segment of the PSA (Fig 3, *a*), and the retrogradely inserted sheath was removed. A large thrombus was also observed within the popliteal artery and was fragmented using a balloon

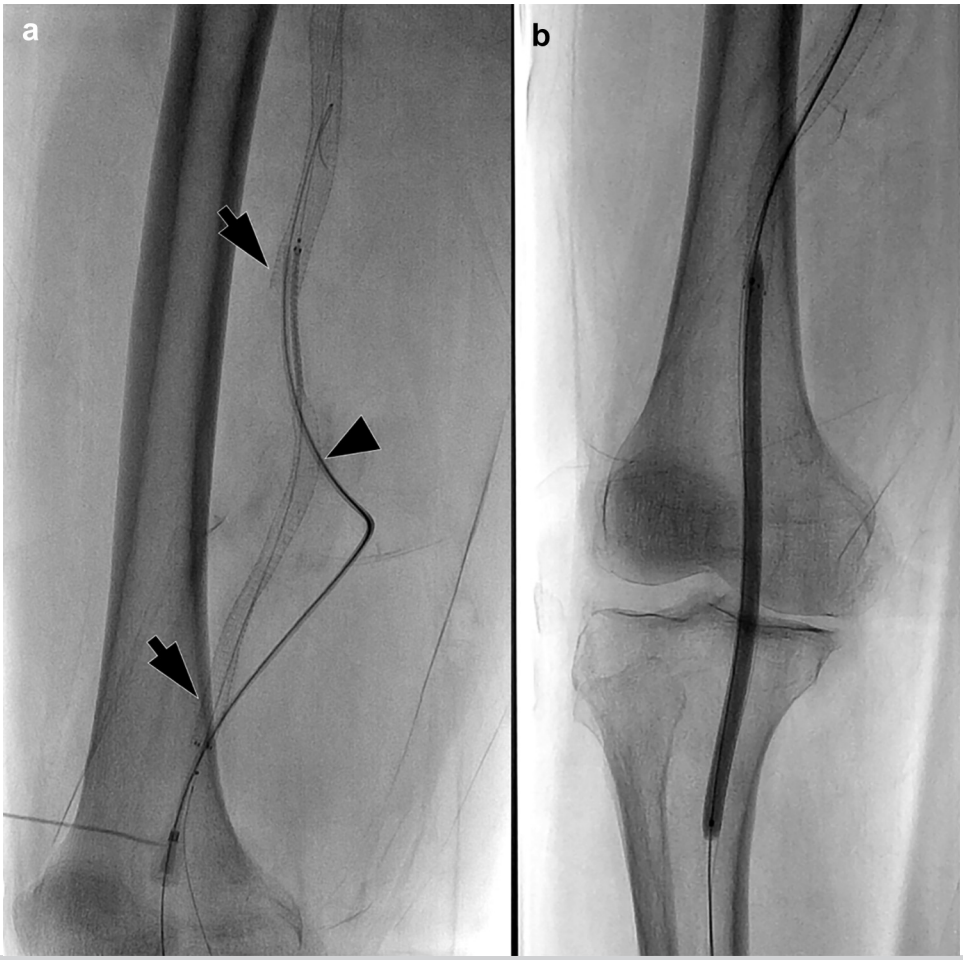

Fig 3. First session of endovascular treatment (EVT; distal). **a,** Two stent grafts were deployed in the proximal neck of the persistent sciatic artery (PSA) aneurysm (PSAA) up to the end of the femoral segment of the PSA (*arrows*). The retrogradely inserted sheath (*arrowhead*) was removed after closure of the puncture site with the stent-graft. **b,** A large thrombus observed within the popliteal artery was fragmented using a balloon catheter.

catheter measuring 6 mm in diameter and 15 cm in length (Mustang; Boston Scientific; Fig 3, *b*). Thromboses of the popliteal artery remained. Therefore, in the intensive care unit, continuous intra-arterial infusion of urokinase was administered through the catheter, which had been advanced into the stent-graft via the left brachial access route. After 24 hours of urokinase infusion (a total of 24 million units), cyanosis had reduced markedly. However, the patient remained hospitalized for rehabilitation.

Second EVT session. At 7 days after the first EVT session, a CE-CT scan revealed significant stenosis within the proximal part of the stent-graft resulting from thrombus fragmentation (Fig 4, *a*). Therefore, a second session was initiated. With the patient in the prone position, the gluteal segment of the right PSA was punctured, and a 6F sheath (Supersheath; Medikit) was inserted. A BMS measuring 8 mm in diameter and 4 cm in length (Inova; Boston Scientific) was deployed at the level of the thrombus (Fig 4, *b*). Resolution of the stenosis was achieved, with good blood flow (Fig 4, *c*).

Follow-up findings. Although the right ankle brachial index had improved to 1.15, motor impairment to the anterior tibial muscle persisted owing to an ischemic injury. At 16 days after the first EVT session, the patient was transferred to the original hospital to continue rehabilitation. Within 3 months, the patient was able to walk unaided. Patency of the treated arteries and size reduction of the PSAA were confirmed by follow-up CE-CT (Fig 5). No symptoms had recurred during the next 20 months.

DISCUSSION

PSAA, often caused by possible fragility of blood vessel walls and repetitive mechanical compression, occurs in 14.3% to 50.7% of patients with a PSA.[2-6] Arterial occlusion occurs in 9.0% to 41.7 % of PSA cases[2,5,12] and frequently coexists with PSAA.

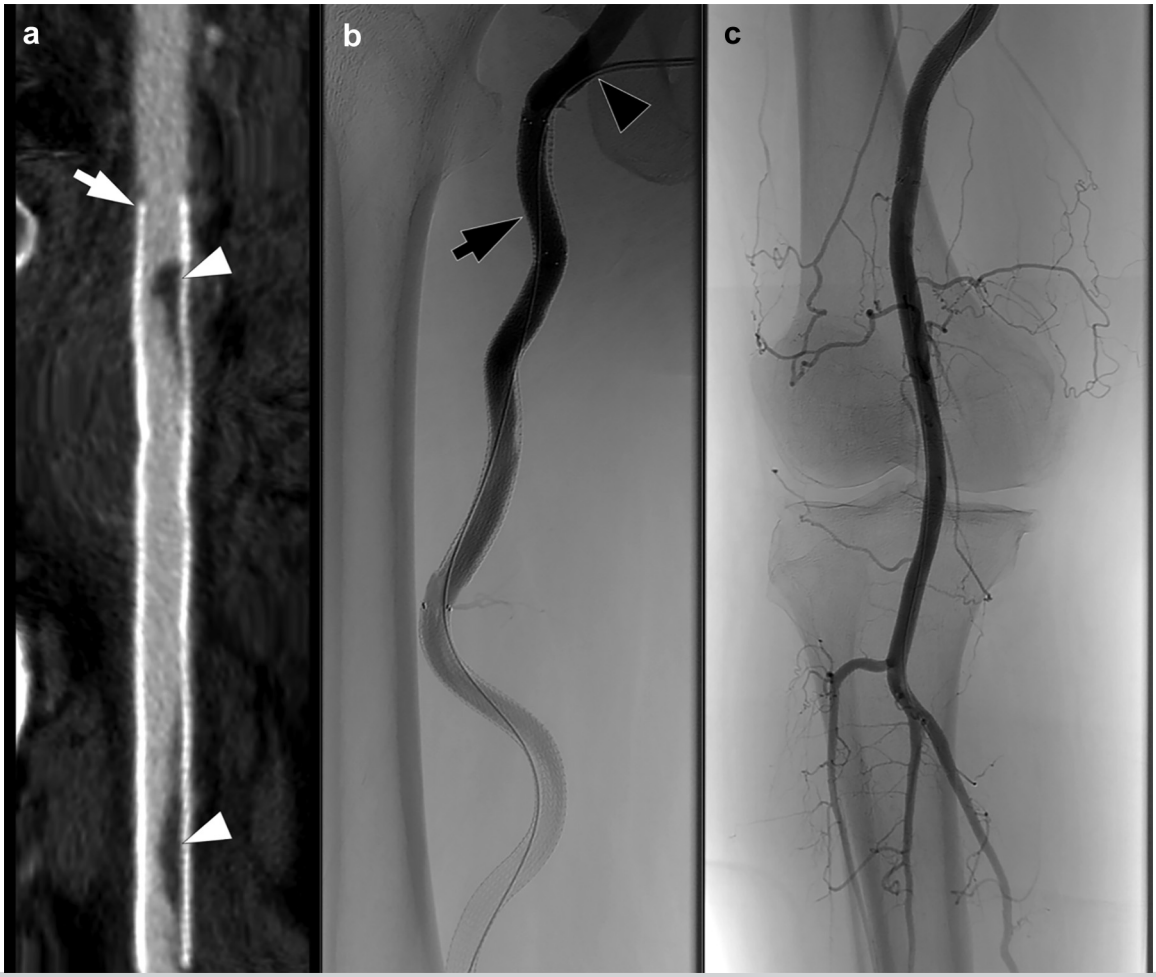

Fig 4. Second session of endovascular treatment (EVT). **a,** Curved planner reconstruction image of contrast-enhanced computed tomography scan, 7 days after the first session, showing significant stenosis within the proximal part of the stent-graft (*arrow*) due to thrombosis fragments (*arrowheads*). **b,** An additional bare metal stent (BMS) measuring 8 mm in diameter and 4 cm in length was deployed at the level of the thrombus within the proximal part of the stent-graft (*arrow*) via the system inserted from the gluteal segment of the right persistent sciatic artery (PSA; *arrowhead*). **c,** Disappearance of the thrombus and good blood flow can be observed up to the below-the-knee arteries.

The anatomic classification of PSA,[13,14] presence of a PSAA, and location and length of occlusions are important factors to consider during treatment. Most PSA cases will demonstrate partial or continuous occlusion between the gluteal segment of the PSA and the below-the-knee arteries. We search the reported data and found no previously reported cases of continuous thrombotic lesions that extended from the IIA orifice to the below-the-knee arteries.[2-14] In such cases, the EIA running to the deep femoral artery could develop as a collateral pathway into the popliteal artery.[15] However, the EIA in the present patient was also thrombosed, and a potential risk of limb loss was high. To the best of our knowledge, simultaneous occlusion of the EIA has not been reported previously.

Various EVT techniques depending on the lesion segments of the PSA were performed. The intrapelvic IIA segment was treated with thrombectomy and BMS implantation, the gluteal segment was treated using thrombectomy, the femoral segment that included the aneurysm was managed using stent-grafts, and the popliteal artery was treated using balloon angioplasty and thrombolysis. Access was achieved bidirectionally via the opposite deep femoral artery and the distal femoral segment of the PSA in the first session. Access was then achieved in antegrade fashion by direct puncture of the gluteal segment of the PSA in the second session. Each technique worked adequately, and complete revascularization was achieved throughout the right limb.

CONCLUSIONS

The combination of EVT techniques performed was an effective therapeutic option for a PSAA with a

Fig 5. Follow-up three-dimensional computed tomography angiogram at 3 months after treatment showing patency of the bare metal stent (BMS) within the internal iliac artery (IIA; *arrow*), stent-grafts, BMS within the femoral part of the persistent sciatic artery (PSA; *arrowhead*), and native arteries under the internal iliac artery (IIA) system.

widespread and complicated thrombotic arterial occlusion and assisted in successfully achieving total endovascular repair.

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