# Endovascular revascularization of an occluded persistent sciatic artery for chronic limb-threatening ischemia in a patient with Coronavirus Disease 2019

Tanner I. Kim, MD,[a] Keyuree K. Satam, BA,[b] Peter A. Blume, DPM,[c] Raul J. Guzman, MD,[a] *and* Cassius Iyad Ochoa Chaar, MD, MS,[a] *New Haven, CT*

## ABSTRACT

A persistent sciatic artery (PSA) is a rare embryologic variant that usually presents with aneurysmal degeneration. This report describes a 66-year-old man with severe comorbidities who presented with right forefoot gangrene and severe acute respiratory syndrome coronavirus 2 infection. Imaging revealed a unilateral PSA with a chronic occlusion at the level of the knee joint with no aneurysm. After coronavirus disease 2019 resolution, he underwent $CO_2$ angiography with successful recanalization of the PSA, followed by transmetatarsal amputation that healed uneventfully. At follow-up after 16 months, he was noted to have asymptomatic thrombosis of his stent and, hence, no intervention was performed. (J Vasc Surg Cases Innov Tech 2022;8:345-8.)

**Keywords:** Persistent sciatic artery; Endovascular intervention; Chronic limb-threatening ischemia; Chronic total occlusion; Vascular surgery

A persistent sciatic artery (PSA) is a rare vascular anomaly with estimated incidence of 0.03% to 0.06%.[1] An embryological branch of the umbilical artery supplying the lower limbs, it develops into the common femoral artery and superficial femoral artery (SFA).[2,3] Pillet et al[4] described four PSA types based on morphology of the PSA and SFA. Gauffre added a fifth type, where the PSA originates from the median sacral artery.[4]

Although the highest reported presentation is aneurysmal degeneration, a smaller subset of patients present with occlusive disease.[1,5] The high incidence of aneurysmal disease, stenosis, and occlusion may be due to the vulnerable anatomic position of the PSA and potential congenital arterial elastic tissue anomaly.[5] van Hooft et al[1] described 146 patients with PSA treated with open and endovascular modalities, and 16% had occlusive disease. In this group, symptomatic relief was achieved in 50% at 1 year; 7% underwent major amputation.[1]

This case discusses a patient who presented with chronic total occlusion (CTO) of a type 2a PSA. Consent for publication was obtained, and all identifying information has been omitted.

## CASE REPORT

A 66-year-old man with a history of heart failure (ejection fraction of 24%) and cardiac ascites, atrial fibrillation on rivaroxaban, hepatitis C cirrhosis (Model for End-stage Liver Disease score of 24), and chronic kidney disease (baseline creatinine of 1.5 mg/dL) presented with gangrene of the right toes. On examination, he had palpable femoral pulses but no popliteal or pedal pulses. He was found to have coronavirus disease 2019 (COVID-19) and was started on broad-spectrum antibiotics and 5-day course of remdesivir. He also developed acute kidney injury (creatinine, 2.5 mg/dL; estimated glomerular filtration rate, 43 mL/min). After improvement in his renal function, he underwent a computed tomography angiogram, which demonstrated a right lower extremity PSA (Fig 1). The distal aspect was occluded at the knee and seemed to be contiguous with the popliteal and tibial arteries. A hypoplastic SFA ended in collaterals at the level of the adductor canal, consistent with a type 2a PSA.[4]

After treatment of his acute medical conditions, he underwent a right lower extremity angiogram with local anesthetic and monitored anesthesia care on day 16 of his hospital stay. Given his chronic kidney disease, $CO_2$ angiography was used. The left common femoral artery was accessed, and the right PSA was selected using roadmap guidance. A 0.035 Glide Advantage wire (Terumo, Somerset, NJ) was advanced, and a 6F, 70-cm sheath was placed into the PSA in the proximal thigh. Next, a

From the Division of Vascular Surgery and Endovascular Therapy, Department of Surgery, Yale School of Medicine,[a] Yale School of Medicine,[b] and the Department of Orthopedic Surgery and Anesthesia, Yale School of Medicine.[c]

Author conflict of interest: none.

Presented at the 2021 Eastern Vascular Society (EVS) 35th Annual Meeting, Charleston, South Carolina, September 23-26, 2021.

Correspondence: Keyuree K. Satam, BA, Yale School of Medicine, New Haven, CT, 06510 (e-mail: ksatam@outlook.com).

The editors and reviewers of this article have no relevant financial relationships to disclose per the Journal policy that requires reviewers to decline review of any manuscript for which they may have a conflict of interest.

2468-4287



https://doi.org/10.1016/j.jvscit.2022.04.014

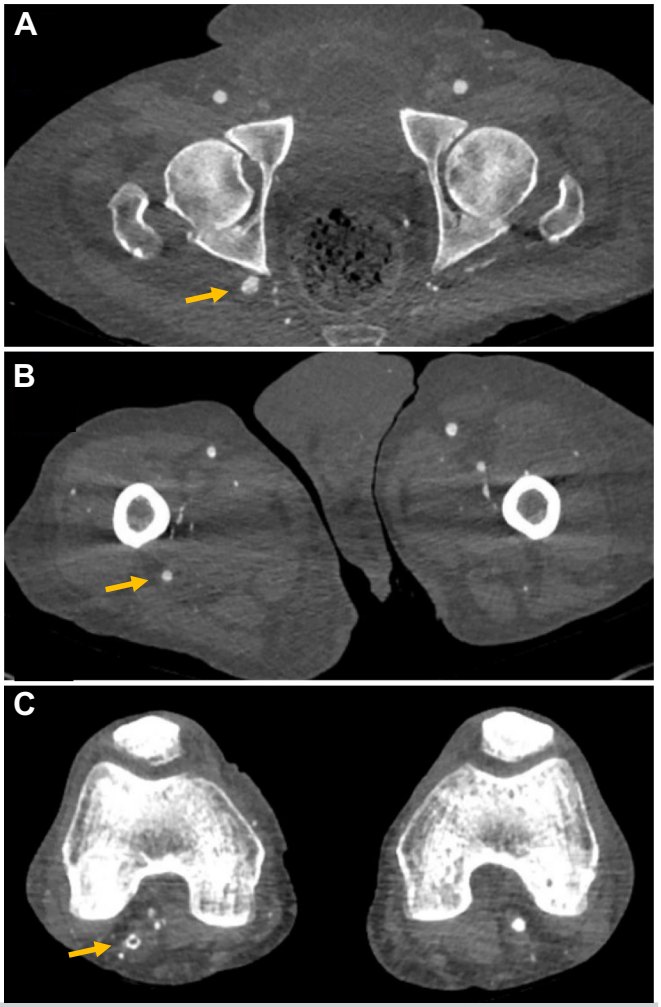


**Fig 1.** Computed tomography images demonstrating a unilateral right lower extremity persistent sciatic artery (PSA) (yellow arrow). **(A)** The PSA is seen taking a posterior course. **(B)** The PSA remains patent in the proximal thigh. **(C)** The posterior sciatic artery is occluded in the distal thigh.

subintimal plane was developed using the Glidewire and 0.035 angled Navicross catheter using the Bolia technique, and reentry into the true lumen in the popliteal artery was confirmed.[6,7] Next, an 0.018 V18 wire was placed in the popliteal artery and balloon angioplasty of the distal SFA and popliteal artery was performed with a 6 × 200-mm sterling balloon (Boston Scientific, Natick, MA) and stented with a 6 × 250-mm Viabahn stent graft (W. L. Gore & Associates, Flagstaff, AZ). After CTO stenting, a 0.014 Regalia wire (Asahi, Irvine, CA) was used to cross the disease in the peroneal artery down to the ankle. A 3-mm Coyote balloon (Boston Scientific) was used for balloon angioplasty of the tibial vessels. Completion angiogram with 3 mL of iodinated contrast showed a patent PSA and outflow through the peroneal artery (Fig 2). Concomitant open transmetatarsal amputation (TMA) was performed.

Postoperatively, he was started on clopidogrel and a therapeutic heparin drip, and was switched to apixaban 5 mg twice daily for atrial fibrillation. Two weeks later, he underwent debridement of the TMA site and secondary closure. His course was complicated by symptomatic bradycardia requiring a dopamine infusion and progression of renal failure requiring temporary dialysis. He was discharged to a rehabilitation center 26 days after index procedure. He was noncompliant, with only one follow-up at 3 months, when his TMA site was healed and the stent was patent. He presented with thrombosis of stents and rest pain after 9 months, undergoing catheter-directed thrombolysis, which resolved the pain. At 16 months, he was admitted for another condition and was found to have thrombosed stents. He was asymptomatic with no wounds, so no additional intervention was performed. At 17 months, he had advanced unrelated sepsis and multiorgan failure and expired.

## DISCUSSION

This case describes a 66-year-old high-risk man with COVID-19 and chronic limb-threatening ischemia from an occluded type 2a PSA treated endovascularly for successful limb salvage.

In a type 2a PSA, the SFA terminates in the thigh and does not reach the popliteal artery. Bypass is the most reported and preferred method for revascularization of occluded PSAs.[8] Belmir et al[9] described a case of PSA occlusion that they treated with a composite femoroperoneal bypass because the durability of endovascular procedures was unknown. They concluded that the long-term consequences of endovascular versus open treatment need to be studied, specifically frequency of fracture and thrombosis in stent grafts.[9] The patient in this case developed stent thrombosis within 1 year. Studies show that stents crossing the knee, particularly in P2 and P3 popliteal artery segments, have a higher risk of stent-related complications and fracture.[10,11] Owing to this patient's extensive comorbidities, sepsis, and ejection fraction of 24%, he was not a good surgical candidate for bypass. Further, his COVID-19 infection increased his complication risk.[12] Although COVID-19 is associated with a thrombogenic state,[13,14] his lesion was not an acute thrombosis, but rather chronic atherosclerotic disease. Despite successful catheter-directed thrombolysis for rest pain at 9 months, the patient was not compliant with follow-up and eventually developed asymptomatic thrombosis of his stent. It is difficult to speculate whether stent thrombosis was related to anatomy of the PSA or noncompliance with medical therapy. However, the patient had a single vessel diseased peroneal artery runoff that may not have provided sufficient outflow.

Mariani et al[15] reviewed case reports on endovascular management of PSA stenosis and occlusion from 1993 to 2020. They found 14 cases: 6 patients had claudication, 5 had chronic limb-threatening ischemia, and 1 had rest pain. The PSA demonstrated focal stenosis in six cases and short occlusions in eight. Six patients underwent angioplasty alone, four had PSA stenting, two cases of acute

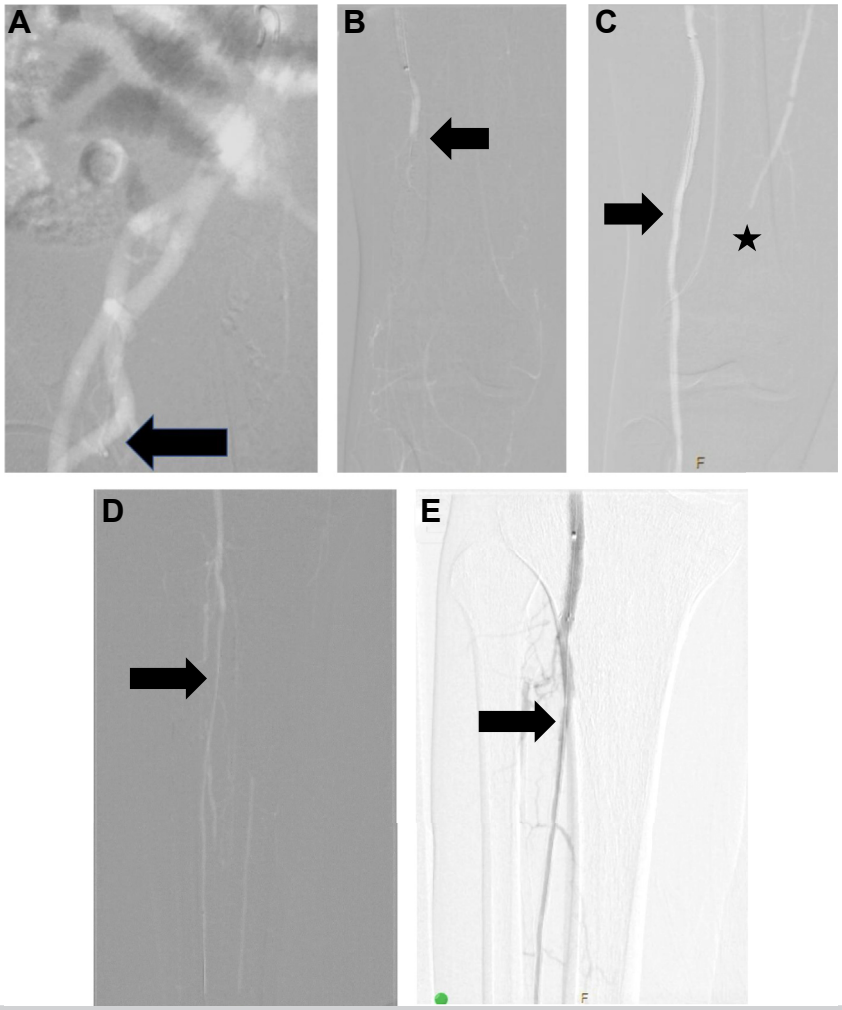


**Fig 2. (A)** Aortoiliac $CO_2$ angiography demonstrates the persistent sciatic artery (PSA) (arrow). **(B)** The PSA is seen with an occlusion in the distal thigh (arrow), with multiple collaterals. **(C)** PSA and popliteal artery are patent after recanalization and stenting (arrow). Completion angiogram also demonstrates the site of occlusion of the distal superficial femoral artery (SFA) (star). **(D)** Initial angiography performed using $CO_2$ shows a diffusely diseased tibioperonal trunk and single vessel peroneal artery runoff. **(E)** A completion selective angiogram performed after balloon angioplasty in the popliteal artery using dilute iodinated contrast confirms absence of dissections or significant residual stenosis and demonstrates excellent flow through the peroneal artery.

limb ischemia were treated with thrombolysis and stenting, and one used a covered stent.[15] The mean follow-up for reported cases when available was 5 months. Patency at 6 months for four cases that reported it was 50%. One experienced reocclusion of the PSA and one had aneurysmal degeneration postoperatively.[15] The review suggested that endovascular therapy may be a good treatment for short occlusion or stenosis, but long-term outcomes are unclear. Similarly, several individual case reports for treatment of patients with PSA for aneurysmal disease and occlusive disease reported stent thrombosis within a year underlying the thrombogenic nature of PSA.[5,16-18] Given the multiple severe comorbidities of the patient described in this case report and the guarded overall prognosis and life expectancy, endovascular therapy, even with limited patency, achieved the clinical goal of limb salvage and wound healing in the right leg.

## CONCLUSIONS

This report describes a patient with COVID-19, multiple severe comorbidities, and extensive right foot gangrene related to CTO of the PSA. Limb salvage was achieved with endovascular stenting performed using $CO_2$ imaging with only 3 mL of iodinated contrast, followed by TMA. Such an approach should be selectively used in high-risk patients because the patency of PSA stenting remains unclear.

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Submitted Jan 5, 2022; accepted Apr 21, 2022.