Endovascular coil embolization of a large tibioperoneal trunk pseudoaneurysm

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ABSTRACT

Infrapopliteal artery aneurysms are rare, and tibioperoneal trunk aneurysms are even rarer. We herein report an unusual case of large tibioperoneal trunk pseudoaneurysm. The patient underwent successful endovascular exclusion of the pseudoaneurysm by coil embolization with stent assistance. The clinical features and management of tibioperoneal trunk aneurysms are also discussed in this article. (J Vasc Surg Cases and Innovative Techniques 2020;6:365-8.)

Keywords: Tibioperoneal trunk; Tibial arteries; Aneurysm; Endovascular procedures; Coil embolization

Infrapopliteal artery aneurysms are rare, and tibioperoneal trunk aneurysms are even rarer. We herein report a case of a large tibioperoneal trunk pseudoaneurysm managed with a novel endovascular approach using coils with stent assistance. The patient consented to the publication of this case report.

CASE REPORT

A 70-year-old man presented with a several-month history of asymptomatic pulsatile swelling in his left calf. The patient had a history of well-controlled diabetes, mild hypertension, and surgical resection of an intramuscular cystic mass at the left proximal calf 15 months earlier. He denied claudication and foot pain at rest. A physical examination revealed a surgical scar and a nontender pulsatile mass in the left calf (Fig 1). Findings on sensory and motor examinations were normal in the left leg. Routine laboratory test results were unremarkable, including a normal white blood cell count and C-reactive protein level. Computed tomography showed a wide-necked 65-mm pseudoaneurysm of the left tibioperoneal trunk (Fig 2). The proximal tibioperoneal trunk that was not involved in the pseudoaneurysm was 6 mm in length and 4.5 mm in diameter. Several treatment options were discussed, including open surgery, endovascular stent graft placement, and arterial embolization with or without arterial reconstruction. We decided to employ an endovascular approach to exclude the pseudoaneurysm. The left common femoral artery was punctured in an antegrade manner, and a 6F Destination sheath (Terumo Corporation, Tokyo, Japan) was inserted. Injection of contrast material revealed a large tibioperoneal trunk pseudoaneurysm (Fig 3, *A*). The tibioperoneal trunk gave off the posterior tibial artery and a branch to the adjacent muscles. The distal peroneal artery was visualized through the muscle branches, but the orifice of the peroneal artery was not revealed. The distal posterior tibial artery was stenotic, and the normal dorsalis pedis artery as a continuation of the anterior tibial artery was not present, but foot circulation was mainly maintained through the anterior tibial artery. First, a muscle branch that arose from the aneurysmal segment was selectively catheterized and

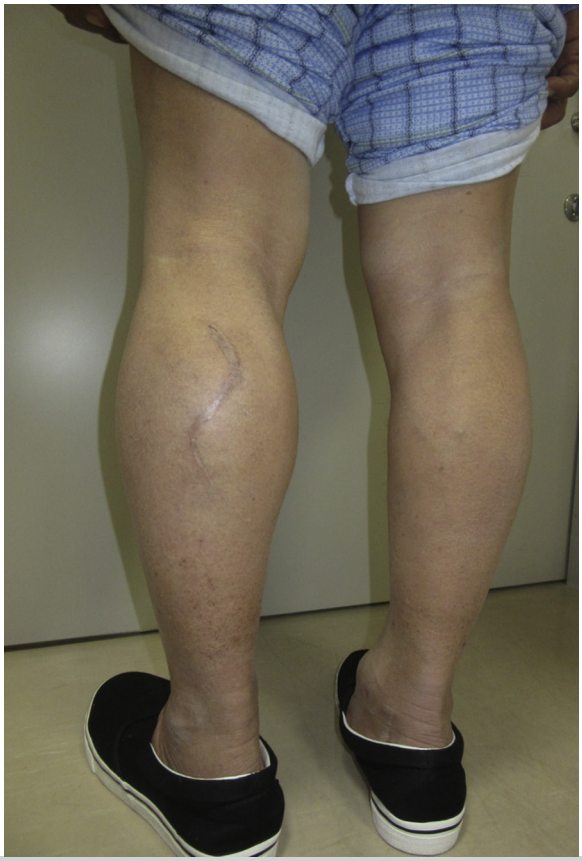

Fig 1. Preoperative photograph showing swelling in the left calf.

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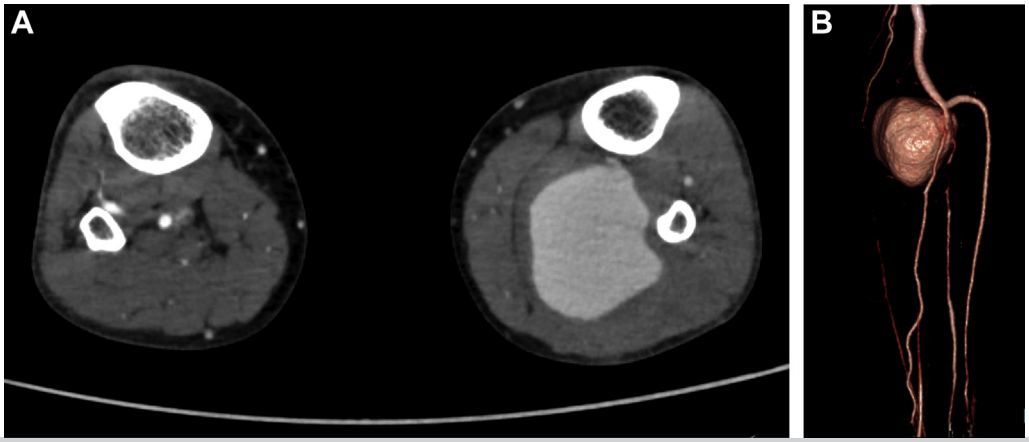

Fig 2. Preoperative computed tomography images. Axial **(A)** and three-dimensional reconstruction **(B)** images showing a large pseudoaneurysm of the tibioperoneal trunk.

embolized with Interlock coils (Boston Scientific, Marlborough, Mass; Fig 3, *B*). A 6- × 40-mm Innova self-expanding stent (Boston Scientific) was then placed through the proximal posterior tibial artery to the orifice of the tibioperoneal trunk, covering the aneurysmal segment (Fig 3, *C*). The aim of stenting was to create a fence to prevent subsequent coils from protruding into the wide-necked pseudoaneurysm. Interlock coils and IDC coils (Boston Scientific) were accumulated in the stent to completely cover the neck of the pseudoaneurysm (Fig 3, *D*).

A completion angiogram demonstrated successful exclusion of the pseudoaneurysm (Fig 3, *E*). The distal parts of the posterior tibial and peroneal arteries were visualized through collaterals (Fig 3, *F*). Pulsatile Doppler signal was confirmed in the distal anterior tibial and posterior tibial arteries. After the procedure, pulsation in the calf disappeared and swelling gradually decreased. The postoperative left ankle-brachial pressure index was 0.80, and the toe-brachial pressure index was 0.44 (toe pressure, 64 mm Hg). No symptoms of limb ischemia were observed. Postoperative computed tomography at 1 month showed complete thrombosis and shrinkage of the pseudoaneurysm (Fig 4).

DISCUSSION

Aneurysms of the infrapopliteal arteries are rare. Previously reported cases of infrapopliteal aneurysms have typically been secondary to trauma or infection.[1] Both true aneurysms and pseudoaneurysms of the tibioperoneal trunk, however, are even rarer and reported only as case reports in the literature. The most common cause of tibioperoneal trunk aneurysm is arterial infection secondary to infective endocarditis.[2-7] Other causes include trauma,[8] iatrogenic trauma,[9] Behçet disease,[10,11] and arteriosclerosis,[12] but some cases are idiopathic.[13,14] In this case, no obvious predisposing factors other than a history of surgery to the left calf were detected by a careful review of the patient's medical history and preoperative examinations. Vascular damage sustained during the previous surgery was thought to have been the cause of the pseudoaneurysm. Symptomatic patients with tibioperoneal trunk aneurysm typically present with chronic calf pain or swelling. Atypical presentations such as blue toe syndrome,[15] neurologic compromise resulting from compartment syndrome,[6,14] and acute pain with limb ischemia due to rupture of an aneurysm[7,10] have also been reported. Some patients are asymptomatic and the aneurysm is detected incidentally even if it is large.[11,16]

Operative treatment is indicated for symptomatic or large infrapopliteal aneurysms. However, the optimal size at which infrapopliteal aneurysms should be treated has not been clearly established. Small asymptomatic aneurysms may be observed safely,[17] but Ventarola et al[14] recommended repair for tibioperoneal trunk aneurysms of >1.5 cm and for tibial arterial aneurysms of even smaller dimensions.

Infrapopliteal aneurysms can be treated by open surgery or endovascular repair. Owing to the low number of reported cases, however, there is no evidence-based recommendation for determining the choice of treatment. Several treatment options are available for tibioperoneal trunk aneurysms. Classic surgical resection with or without arterial reconstruction is an effective and durable method. Arterial reconstruction can be done with interposition grafting[2,9,11,13,15] or bypass to the distal tibial artery.[5,7,10] If the collateral flow is adequate, arterial reconstruction after sacrificing both orifices of the posterior tibial and peroneal arteries may not always be necessary.[3,6] Endovascular coil embolization[4] and stent graft placement[8,16] are also treatments of choice. When an infected aneurysm is suspected, an endovascular approach with prosthetic materials should be avoided because of the possibility of perpetuating the infection. Our patient did not have specific aneurysm-related complications that absolutely indicated open surgery, such as neurovascular compression,

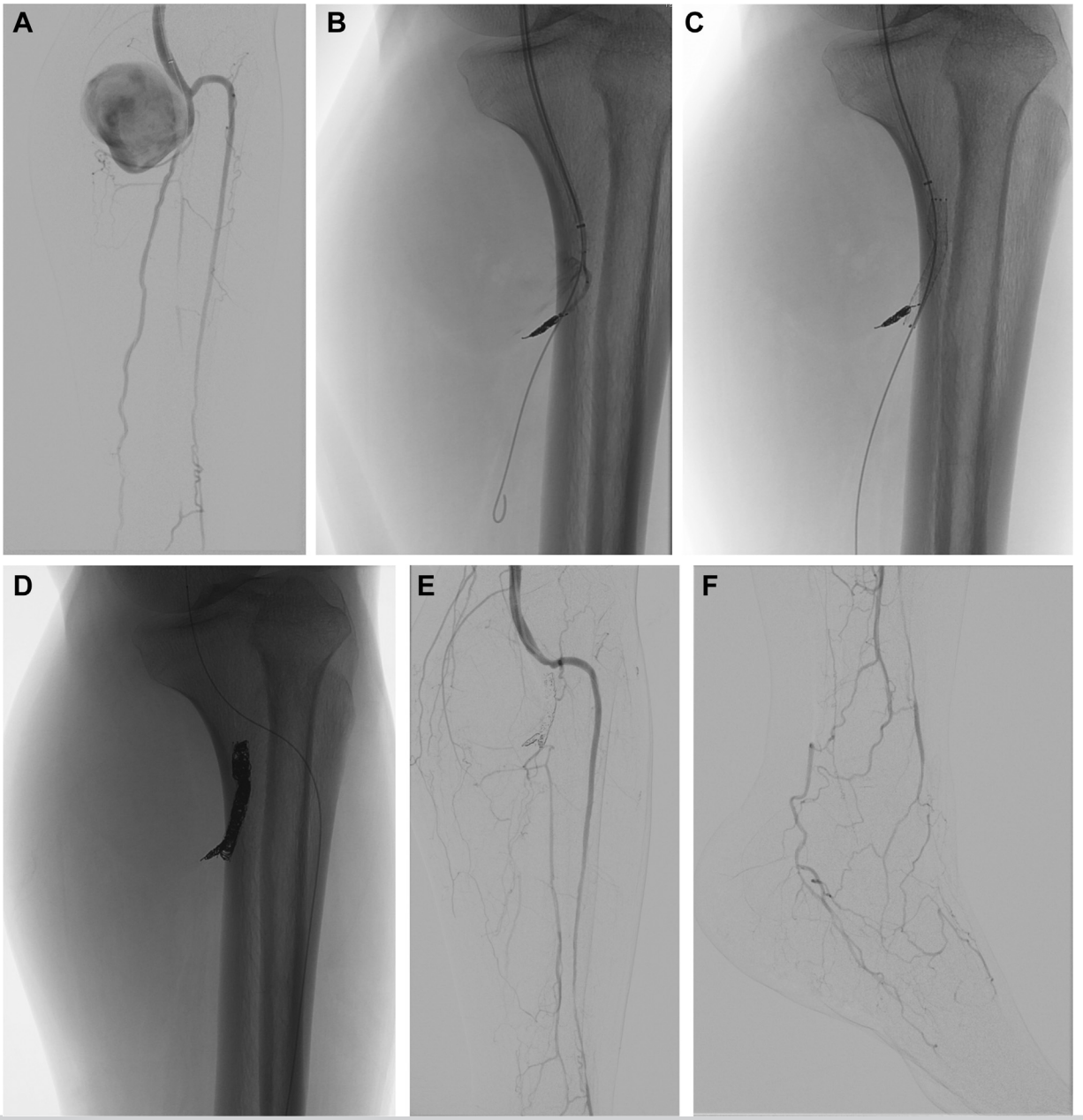

Fig 3. Intraoperative angiographic findings. **A,** Initial angiogram showing the pseudoaneurysm. **B,** A muscle branch was selectively catheterized and embolized with coils. **C,** A 6- × 40-mm bare-metal stent was placed through the proximal posterior tibial artery to the orifice of the tibioperoneal trunk, covering the aneurysmal segment. **D,** Coils were accumulated in the stent to completely cover the neck of the pseudoaneurysm. **E** and **F,** Completion angiogram demonstrating successful exclusion of the pseudoaneurysm. The distal parts of the posterior tibial and peroneal arteries were visualized through collaterals.

compartment syndrome, or bacterial infection that required débridement. After discussion, we chose an endovascular approach in the setting of anticipated surgical difficulties associated with the previous operation on the left calf. For the endovascular treatment of tibioperoneal trunk aneurysms, some would argue that stent graft placement is a desirable option because it can preserve antegrade blood flow. Unfortunately, in this case, the healthy arterial segment proximal to the pseudoaneurysm was 6 mm in length, which was too short to obtain an adequate proximal landing zone. Another endovascular option for excluding the aneurysm was coil or vascular plug embolization of the artery. In this case, the wide aneurysm neck in addition to the short proximal arterial segment raised concerns of insufficient embolization or device migration into the aneurysm. To achieve reliable embolization of the artery, we used a bare-metal stent to create a frame, and the coils

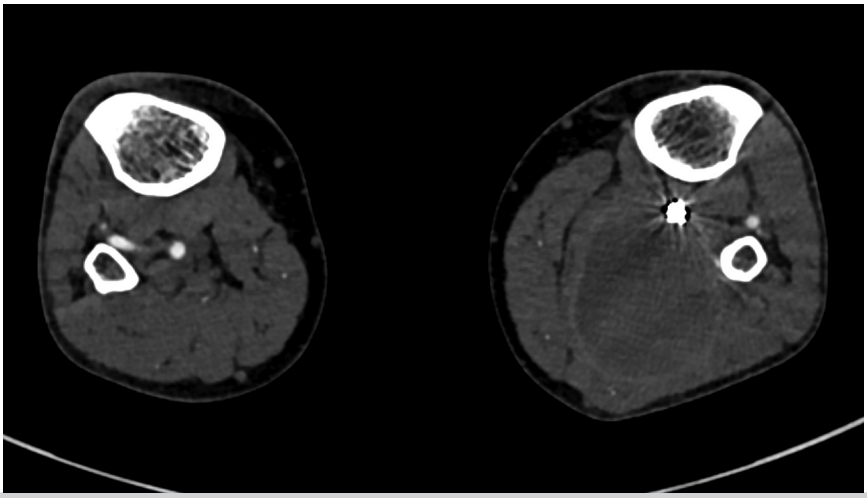

Fig 4. Postoperative computed tomography image showing complete thrombosis and shrinkage of the pseudoaneurysm.

were able to be placed accurately in a short segment as tightly as possible without migration. When the tibioperoneal trunk is sacrificed, a careful evaluation of the blood flow is necessary to determine the need for arterial reconstruction. We confirmed the safety of the embolization of the tibioperoneal trunk based on the angiographic findings and Doppler signals in the distal arteries. Although our procedure necessitated an off-label and previously undescribed application of a bare-metal stent, the pseudoaneurysm was successfully excluded without complications.

CONCLUSIONS

We herein report an unusual case of a large tibioperoneal trunk pseudoaneurysm. The strategy for treating tibioperoneal trunk aneurysms should ultimately be determined on an individual basis. In our case, the pseudoaneurysm was successfully treated by endovascular coil embolization with stent assistance.

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