# Nontraumatic popliteal pseudoaneurysm: A rare entity with different etiologies

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## ABSTRACT

Pseudoaneurysms of the popliteal artery represent a rare vascular pathology. Leaving aside traumatic antecedents, in the presence of sudden swelling of the popliteal region, it is useful to suspect this entity, especially in the presence of infectious processes or connective tissue disorders. We present two cases from our institution where management included surgical intervention and control of the underlying diseases. (J Vasc Surg Cases Innov Tech 2024;10:101606.)

**Keywords:** Popliteal; Artery; Pseudoaneurysm; Infectious; Connective

Pseudoaneurysms of the popliteal artery represent a rare vascular pathology, accounting for <3.5% of all popliteal aneurysms.[1] Although trauma remains the predominant cause, these anomalies can also emerge secondary to infectious processes or, more uncommonly, in association with connective tissue disorders such as vasculitis.[1-3] We present two cases of popliteal pseudoaneurysms at our institution, supplemented by a comprehensive literature review. Publication consent was obtained from both patients.

**Case 1.** A 51-year-old man has a history of prior intravenous drug abuse, hypertension, diabetes, dyslipidemia, and end-stage renal failure owing to polycystic kidney disease. He was admitted to another center for *Staphylococcus aureus* bacteremia resulting from a hair follicle infection in his right axillar region. He was undergoing antibiotic therapy with vancomycin and had no history of previous groin puncture or infection. Two weeks into treatment, he manifested a sudden swelling in the distal one-third of the left thigh. Doppler ultrasound examination and subsequent computed tomography angiography revealed a popliteal pseudoaneurysm measuring 6.7 × 6.7 × 6.6 cm, concomitant with deep popliteal venous thrombosis (Fig 1). He was transferred urgently to our center for surgical intervention. The patient, upon arrival, exhibited hemodynamic stability and no fever. Physical examination revealed the absence of distal pulses, along with a pulsatile 6 × 5 cm swelling in the popliteal region and a hemoglobin level of 7.93 g/dL.

Intraoperatively, it was observed that 90% of the circumference of the arterial wall was open, contained by associated thrombus (Fig 2). Pseudoaneurysm exclusion was performed with a bypass from the distal superficial femoral artery to the third portion of the popliteal artery using the contralateral inverted great saphenous vein, which was tunneled subcutaneously to avoid the infected area. Aggressive debridement of the mycotic aneurism was done. No further images are available once the reconstruction was completed.

Intraoperative cultures were obtained of the resected arterial sample and surrounding tissue and no growth of microorganisms was observed. Postoperatively, the patient recovered pedal pulses and was discharged on postoperative day 6, completing a 6-week course of antibiotic therapy. Ultrasound evaluation was performed with a negative result for endocarditis. At the 12-month follow-up, the patient remained asymptomatic with a patent bypass and no complications.

**Case 2.** A 23-year-old man with a history of smoking, a previous episode of deep popliteal venous thrombosis in the left lower limb 5 years ago, and superficial venous thrombosis 4 years ago, presented to the emergency department with a 2-week history of swelling in the right popliteal fossa. The patient had no fever, was hemodynamically stable, and denied any trauma, but presented with leukocytosis of 12.3 × $10^3$/μL. Physical examination revealed a femoral pulse with a pulsatile medial thigh swelling and absent distal pulses. Urgent ultrasound examination and computed tomography angiography unveiled a 9.0 × 5.1-cm popliteal pseudoaneurysm at the second portion (Fig 3).

Urgent resection and a bypass from the first to the third portion was performed using the ipsilateral reversed great saphenous vein. Both microbiological cultures and pathological anatomy yielded negative results. The patient was discharged 1 week later with distal pulses and received empiric antibiotic treatment for 6 weeks according to the protocols of our institution, in agreement with the infectious diseases unit. A subsequent Doppler examination, 1 year later, revealed a pseudoaneurysm at the proximal anastomosis. A new bypass was performed using the contralateral reversed great saphenous vein from the distal superficial femoral artery to the tibioperoneal trunk. No micro-organisms were identified.

Lost to follow-up, the patient returned to the emergency department 4 years later with a sudden pulsatile right inguinal mass and additional nodular lesions on both lower limbs. He also presented elevated inflammatory markers, leukocytosis of

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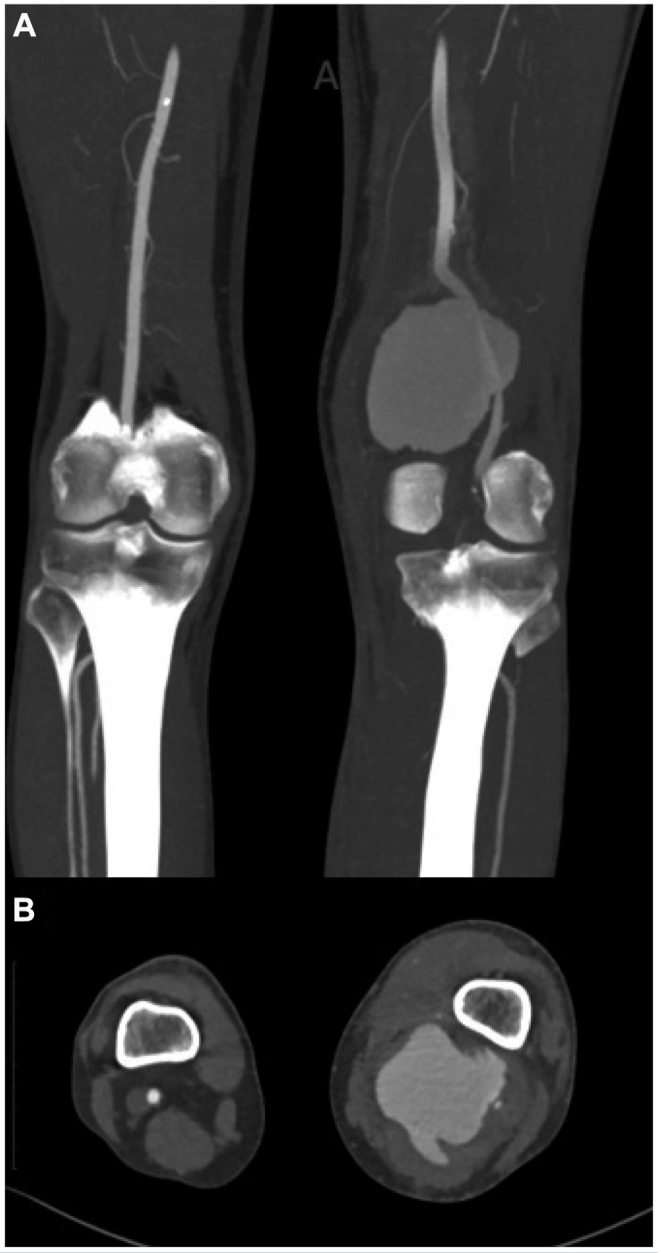


**Fig 1.** **(A)** Coronal and **(B)** axial views of case 1.

14.5 × $10^3$/μL and C-reactive protein level of 138.38 mg/L (Fig 4). Diagnosed with an asymptomatic spontaneous pseudoaneurysm of the right common femoral artery with superficial femoral artery occlusion, a bypass from the common femoral artery to the deep femoral artery was performed using a silver Dacron prosthesis. Distal revascularization was not performed owing to the absence of ischemic symptoms. An autoimmune study yielded negative results, and intraoperative findings revealed inflammatory arterial wall involvement consistent with polyarteritis nodosa. Initiated on immunosuppressive treatment with cyclophosphamide and prednisone, the patient remained vascularly asymptomatic at the 12-month follow-up.

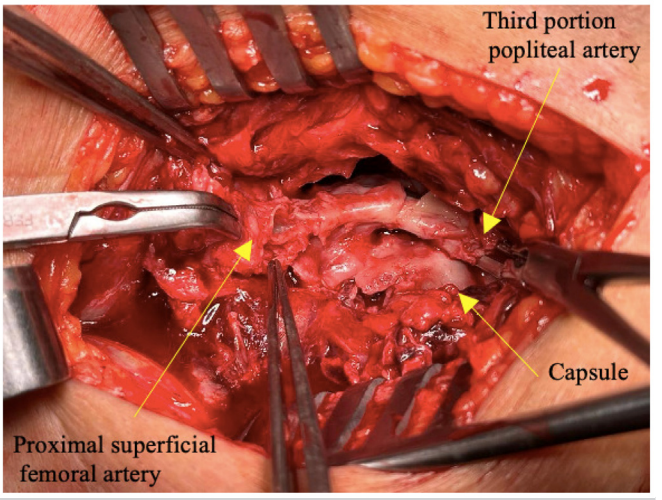


**Fig 2.** Intraoperative view.

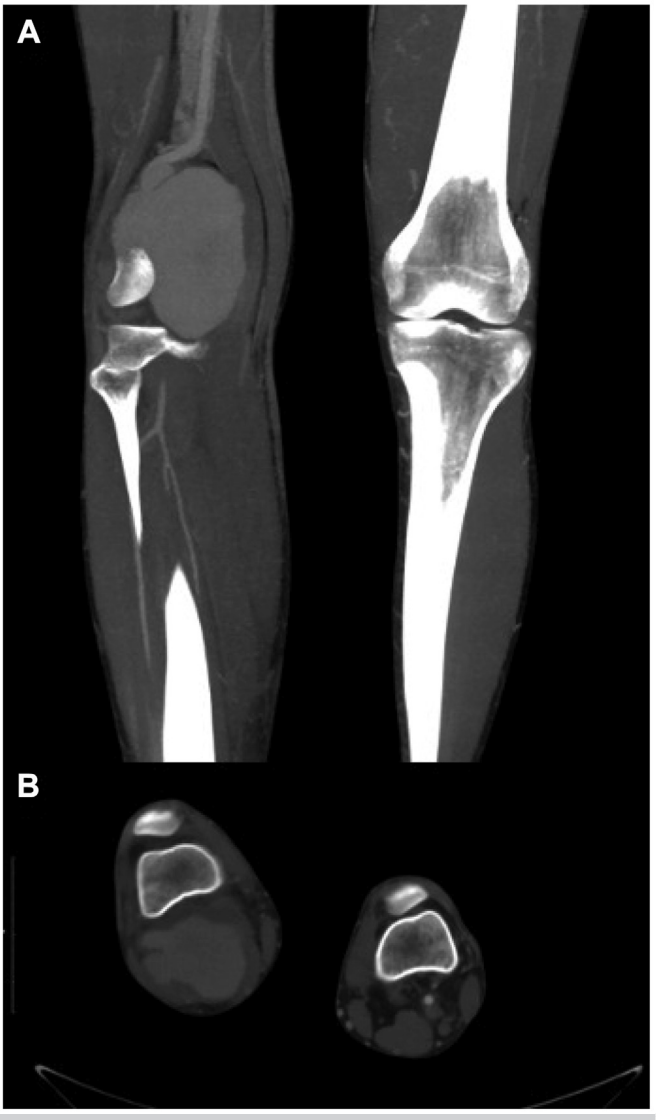


**Fig 3.** **(A)** Coronal and **(B)** axial views of case 2.

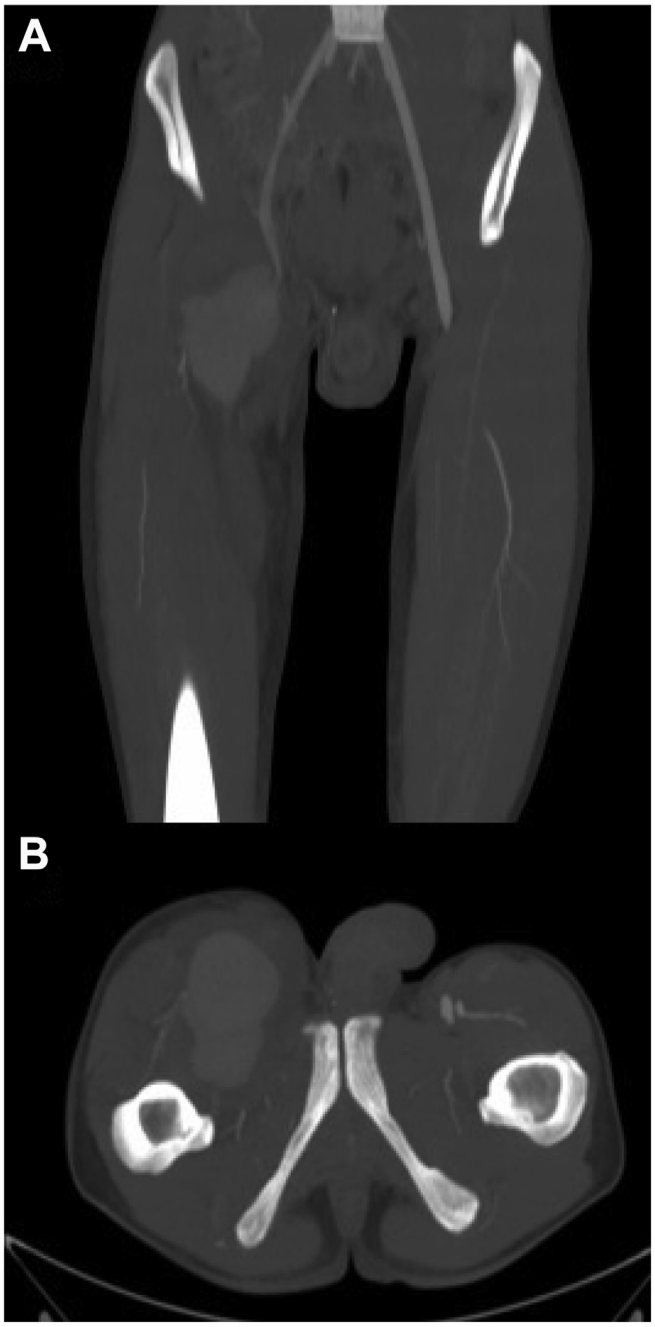


**Fig 4. (A)** Coronal and **(B)** axial views of case 2, 4 years later.

## DISCUSSION

Popliteal pseudoaneurysms typically manifest as a pulsatile mass associated with diminished pulses, at times mimicking deep venous thrombosis of the popliteal vein.[4-6] Mycotic pseudoaneurysms affecting the popliteal artery are rare.[7] Gram-positive cocci are associated predominantly,[6] although cases involving gram-negative cocci and exceptionally unusual pathogens such as *Brucella*,[8] along with other micro-organisms like *Mycobacterium tuberculosis*, have been documented.[9]

In the first case, the absence of microbiological growth in samples may be attributed to the antibiotic treatment initiated two weeks prior.[9] However, given the recent history of *S aureus* bacteremia and the described laboratory findings, an infectious etiology was presumed, with a favorable outcome after appropriate treatment. Cases lacking identification of a causative micro-organism are not uncommon, as evidenced by Killeen et al's review,[2] where one-half of the cases demonstrated no micro-organism isolation. Similarly, blood cultures are positive in only 50%, and a negative result does not rule out the diagnosis.[2] Although there are no specific guidelines recommendations on the precise duration of antibiotic treatment, a 6-week outpatient regimen appears judicious[7,10]

Surgical intervention entails resection of the pseudoaneurysm and limb revascularization, with a preference for avoiding prosthetic material. Although direct ligation without reconstruction in femoral artery pseudoaneurysms has been shown to be a safe approach,[11] its application in the popliteal artery should be considered cautiously. Injuries in this territory are associated with the highest rates of limb loss in lower extremity arterial injuries.[12] Asensio et al[13] published a report including 76 patients with popliteal artery injuries where artery ligation was an independent risk factor for amputation.

Regarding endovascular treatment, Rief et al[14] described an idiopathic pseudoaneurysm[11] treated successfully by placement of a covered stent and its use in infected popliteal[12] aneurysms has been previously published.[15] However, it should be noted that extrapolating data from other territories suggests that its use in infections should be avoided, especially when autologous vein is available.[10]

Although systemic diseases like fibromuscular dysplasia and vasculitis have been linked to aneurysms in other vascular territories, their association with spontaneous pseudoaneurysms remains less clear. Baba et al[16] and Wang et al[17] have reported cases in Behçet's disease and fibromuscular dysplasia, respectively. Panarteritis nodosa is a necrotizing vasculitis affecting medium and small vessels, with symptoms secondary to the organs these vessels supply. Hypertension of renal origin, heart failure, or gastrointestinal symptoms, along with other common findings in vasculitis such as weight loss, arthralgia, or fever, are typically present. Similarly, skin lesions such as the presence of erythema nodosum are crucial in identifying this pathology.[18] However, its association with pseudoaneurysms in the arteries of the lower limbs has not been described previously, making this report, to the best of our knowledge, the first case in the literature.

Laboratory investigations may reveal elevated nonspecific inflammatory markers and, in such instances, etiological diagnosis relies in histopathological samples, as underscored by the second case. Management is based on immunosuppressive treatment.[18]

## CONCLUSIONS

Popliteal artery pseudoaneurysms constitute an extremely rare entity with different etiologies. Beyond traumatic antecedents, a heightened index of suspicion is imperative in the context of sudden popliteal fossa swelling, especially in patients with infectious processes or underlying connective tissue disorders. Management includes surgical intervention for defect exclusion and the judicious control of underlying diseases, where histopathological and microbiological studies could be very useful.

## DISCLOSURES

None.

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