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# The Superficial Femoral Artery Mycotic Pseudoaneurysm in A Patient with Uremia: A Case Report and Review of Literature

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## Abstract

Mycotic pseudoaneurysm is a rare and serious disease that may manifest clinically in a subtle and gradual manner. Here, we report a challenging case of a 47-year-old male with diabetes, stage 5 chronic kidney disease, and a history of stroke resulting in left hemiplegia. He presented to the neurology outpatient department (OPD) with lethargy, slurred speech and weakness in his right lower extremity. He was initially suspected of having an acute ischemic stroke. The development of fever and a painful mass in the right thigh after hemodialysis alerted us to an occult mycotic pseudoaneurysm of the superficial femoral artery (SFA), prompting immediate treatment.

**Key Words: Mycotic pseudoaneurysm, superficial femoral artery, uremia, staphylococcus aureus, hemodialysis, atherosclerosis**

## Introduction

A mycotic pseudoaneurysm, also known as an infected pseudoaneurysm, is a localized, irreversible arterial dilatation caused by the destruction of the vessel wall due to infection. If left untreated, it can cause sepsis, rupture, hemorrhage, and mortality. An infected aneurysm can develop from systemic infections with bacteremia, through direct local invasion of the vessel wall, for example, intravenous drug users in pre-existing aneurysms or plaques, local spread of infection to adjacent arteries, or septic emboli such as valvular vegetations. Immunocompromised individuals, such as those with human immunodeficiency virus (HIV) infection, diabetes, malignancy, or undergoing chemotherapy, face higher risks.

The mycotic pseudoaneurysm of the SFA is a rare disease and is difficult to diagnose and treat. Although the symptoms characterized by pain and a palpable pulsatile mass, the initial presentation can

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be subtle and misleading due to its location deep in the thigh and the presence of multiple comorbidities. There is no diagnostic algorithm and correct diagnosis depend on clinical observation and judicious judgement. The pain signals inflammation and rupturing of a mycotic pseudoaneurysm, necessitating emergent treatment.

## Case report

This 47-year-old male, a smoker, has a medical history of hypertension, ischemic stroke resulting in left hemiplegia, diabetes, and stage 5 chronic kidney disease, exhibited symptoms of right lower extremity weakness for three days. He also experienced slurred speech and was prone to choking. He denied recent trauma to his right lower extremity and use of illicit drugs. He didn't receive regular follow-up for diabetes and chronic kidney disease. His serum creatinine level was 5.7 mg/dL 10 months ago.

Upon examination, he appeared oriented, chronically ill, and had pedal edema. The patient's vital signs were as follows: temperature 36.1°C, blood pressure 197/109 mmHg, heart rate 103 beats per minute, and respiratory rate 18 breaths per minute. The examination of his right lower limb revealed decreased muscle power, a nearly normal appearance, with no tenderness, and normal peripheral pulse.

Preliminary blood tests showed low hemoglobin levels (6.4 g/dL), a white blood cell count of 14100/ul with a predominance of neutrophils, and an elevated C-reactive protein (CRP) levels of 8.8 mg/dL. The laboratory studies revealed additional abnormal findings, such as impaired renal function (creatinine 10.9 mg/dL), elevated uric acid levels (8.0 mg/dL), high glucose levels (246 mg/dL), and abnormal sodium (Na 133 mmol/L) and potassium (K 5.79 mmol/L) levels. The hemoglobin A1c level is 4.7%. Initially, he was suspected to have an acute cerebral ischemia and was admitted to neurology ward. The magnetic resonance imaging of brain revealed no focal lesion of abnormal intensity. On the third hospital day, he had acute onset of dyspnea and was transferred to intensive care unit. The patient developed acute lung edema and severe metabolic acidosis, presumably related to uremia, and began receiving hemodialysis. The non-tunneled double-lumen catheter was inserted into right femoral vein as temporal access for hemodialysis. After an improvement of dyspnea, fever and insidious pain in the right thigh occurred. The ampicillin-sulbactam was administered after the blood cultures were collected. The pain in the thigh appeared to be sharp, persistent, and deep, originating not from the insertion site of the double-lumen catheter. No erythema or edema of right thigh was found. During the latter days, a vaguely palpable egg-shape mass was observed. On the 8$^{th}$ hospital day, He underwent a contrast-enhanced computed tomography (CT) which revealed severe calcification of the aorta and great vessels of the lower extremities, as well as a thin-walled eccentric saccular aneurysm arising from the middle third of the right SFA measuring about 2 cm in diameter with an intramuscular fluid collection. (Figure 1 and 2) Subsequent transthoracic echocardiography showed adequate left ventricle contractility without vegetation. The double-

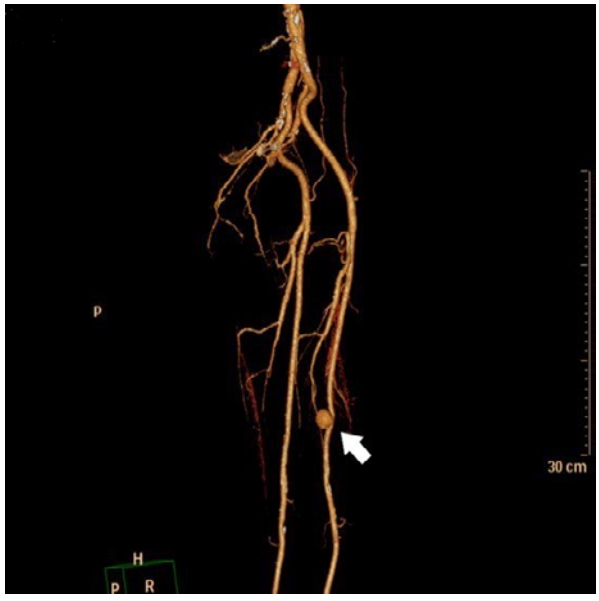


Figure 1. CT angiography: An eccentric saccular aneurysm arising from the middle third of the right superficial femoral artery.

lumen catheter was removed, and a cuffed tunneled catheter was placed in the right internal jugular vein instead for maintenance hemodialysis. On the 12th day of hospitalization, a vascular covered stent was deployed across aneurysm as a bridging procedure before definitive repair. During the surgery, it was discovered that he had an intramuscular pseudoaneurysm surrounded by an abscess cavity filled with pus. The superficial femoral artery proximal and distal to the aneurysm was ligated. Subsequently, the abscess was debrided, the mycotic aneurysm was resected. The in-situ bypass using the ipsilateral reversed great saphenous vein was performed from the inguinal common femoral artery to the lower SFA. (Figure 3) Both the pus culture and the previous blood cultures later yielded oxacillin-sensitive Staphylococcus aureus.

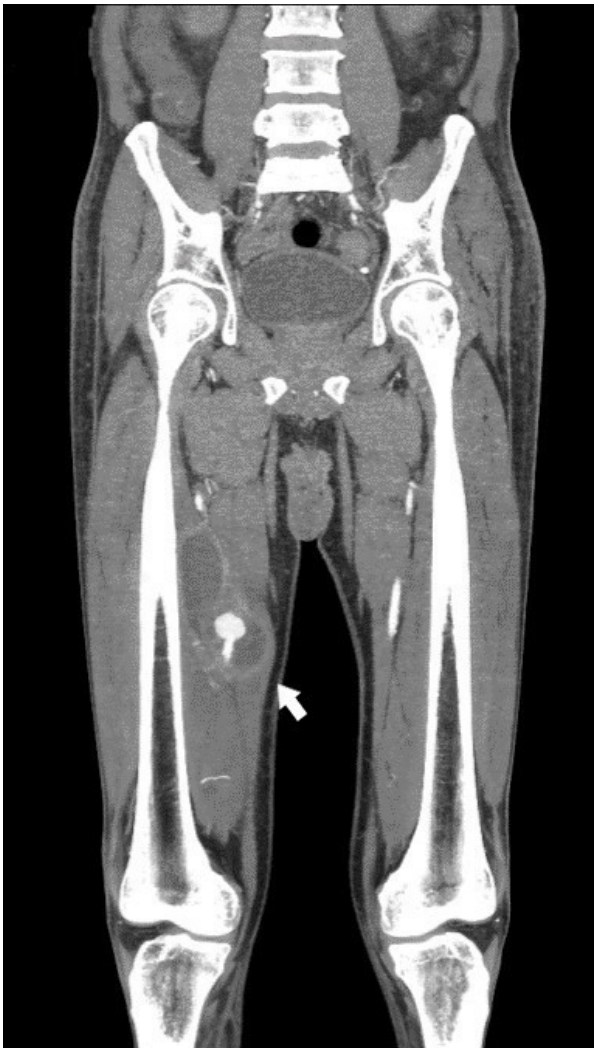

Figure 2(A). A saccular aneurysm of right superficial femoral artery with an intramuscular fluid collection.

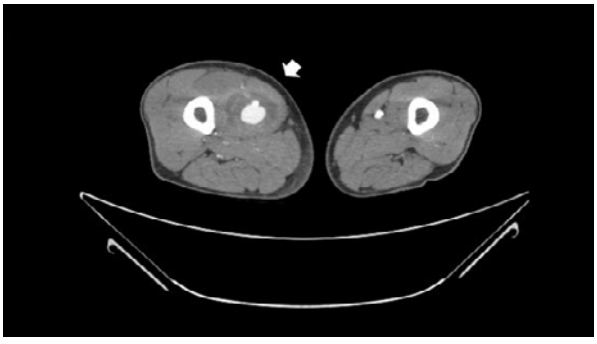

Figure 2(B). A saccular aneurysm of right superficial femoral artery with an intramuscular fluid collection.

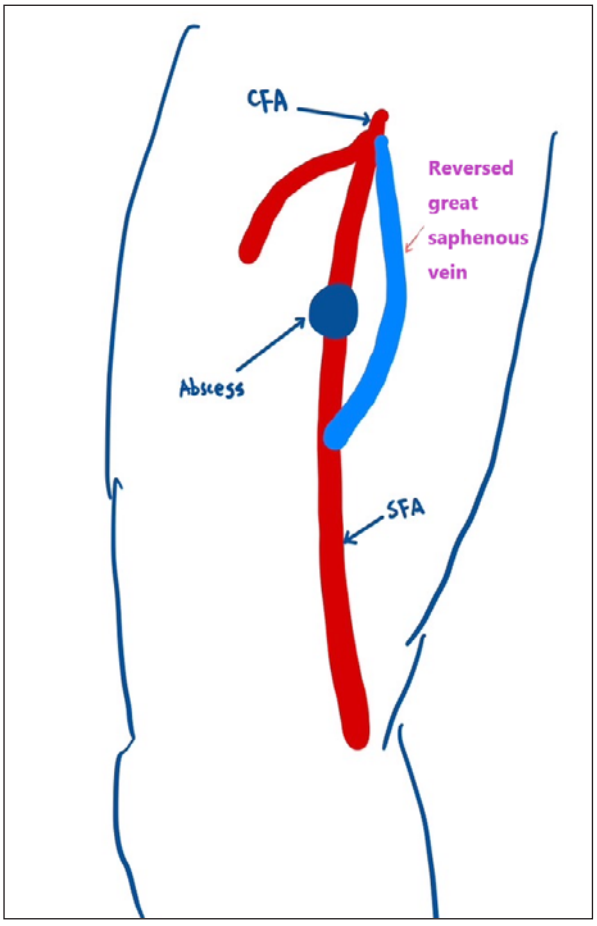


Figure 3. Illustration of operation: The excision of the right SFA mycotic pseudoaneurysm with in situ bypass with reversed great saphenous vein from common femoral artery (CFA) to superficial femoral artery (SFA).

The pathology report revealed a muscular vessel with mural granulation tissue formation, acute suppurative and chronic inflammation, necrosis, fibrosis, and reactive vascular proliferation. Organizing blood clot contained within the tunica adventitia and fibrous pseudocapsule was noted.

Postoperatively, his wounds healed well without limb ischemia.(Figure 4) He had completed a six-week course of antibiotics and was successfully discharged. Following his discharge, he received maintenance hemodialysis at our OPD. The postoperative period was uneventful during the three-year follow-up.

## Discussion

A mycotic aneurysm is the dilation of an arterial wall due to infection. The term "mycotic" was introduced by William Osler in his *Gulstonian lectures,* where he described a patient on autopsy with aortic valve vegetations had multiple aortic aneurysms, which resembled the appearance of a fungus[1]. It does not refer to fungal etiology, as the majority of infected pseudoaneurysms are caused by bacterial pathogens. Therefore, the correct term for these aneurysms can be an infected pseudoaneurysm. Pseudoaneurysm, also known as a false aneurysm, is abnormal outpouching and dilatation of arteries which are bounded only by the tunica adventitia, the outermost layer of the arterial wall. In a true aneurysm, the three layers of vessel wall remain but weaken and bulge.

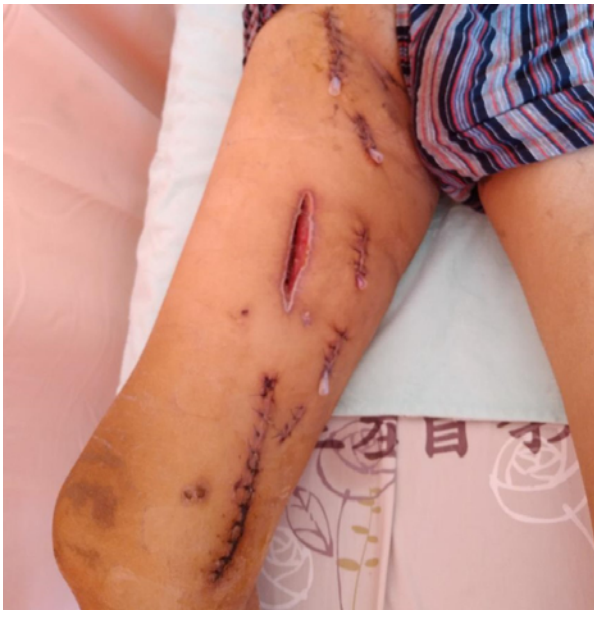

Figure 4. The wounds healed well on post operation day 21.

The incidence is rare in clinical practice due to effective and prompt antibiotic therapy, constituting only 1-3% of all arterial aneurysms[2]. The median age of patients is around 65 years. The most commonly involved arteries are the femoral arteries, followed by abdominal aorta, splanchnic (superior mesenteric, hepatic and splenic arteries), and cerebral arteries[3].

In the pre-antibiotic era, the most common predisposing factor was bacterial endocarditis[4]. This is now only present in the minority, with the exception of intracranial lesions that are almost exclusively related to intracardiac sources[5]. The main risk factor currently is atherosclerosis[6] and its determinants including male sex[4], advancing age[7] and smoking. Immunocompromise is another important determinant with increased frequency of mycotic aneurysms observed with malignancy, diabetes mellitus, alcohol misuse, use of immunosuppressive medication and HIV infection[8]. With the advent of antibiotics, there are more mycotic pseudoaneurysms caused by direct arterial injury[9]. The increasing incidence of intravascular drug abusers and catheters for hemodynamic monitoring has led to increased numbers of peripheral mycotic pseudoaneurysms in the extremities. The mycotic pseudoaneurysm from self-injection of drugs occurs most commonly in femoral artery near or at the groin area.

The healthy arteries are unsusceptible to bacterial infection because the endothelial cells act as a barrier to microorganism invasion. The damage to the intimal lining increases susceptibility to microbial colonization and secondary degeneration[7]. The combination of arterial injury and bacterial seeding results in infection of the intima. Once microorganisms infect the damaged vessel wall, it rapidly break down the deeper layers resulting in the formation of

an aneurysm[10].

Cultures are positive in 50-85% of the cases[3,8]. The most common isolated pathogens are *Staphylococcus aureus* (28 to 71%)[9,11] and *Salmonella* (15%)[12]. Other microbes that have been implicated are *Treponema pallidum*, Mycobacterium spp., *Pseudomonas aeruginosa*, *E. coli,* etc. Fungal organisms are rarely observed but they may be seen in immunocompromised states such as diabetes, systemic chemotherapy or HIV infection, or following disseminate fungal infection[13].

Among patients with infected pseudoaneurysm of SFA[14], pain is the main symptom (83.3%), followed by swelling (80%) and redness (78.5%) , while only 30% experience fever.

Contrast-enhanced CT scan is the diagnostic choice for mycotic pseudoaneurysms, contrast-enhanced MR angiography is a suitable alternative. Digital subtraction angiography can provide the same information, although it is more invasive[15].

The standard treatment for mycotic pseudoaneurysms consists of surgical resection and extensive debridement with or without revascularisation[16,17]. In-situ or extraanatomical bypass can be used. If in-situ revascularization is performed, graft conduits include autologous veins (saphenous, femoral). Cryopreserved allograft is also an option if available[16,17]. Antibiotic therapy is also crucial in treatment of infected aneurysm. Once the diagnosis has been made, broad spectrum antibiotic therapy should be started, and then switched to targeted antibiotics once the results of the cultures are available[18].It is recommended that treatment should be continued for at least 6 weeks. Although they can be curative in aortic infection if diagnosed in the early stages[19], antibiotics are usually an adjunctive but necessary complement to surgery.

In the case we presented, his initial symptoms were atypical of the mycotic pseudoaneurysm. After reviewing his hospital course, an elevated level of CRP may be a hint of undetected and pre-existing aneurysmal disease, as some aneurysmal tissue is capable of producing CRP[20].The fever, pain, and a palpable mass in the right thigh seemed to occur after the initiation of hemodialysis using a temporary non-tunnel double-lumen catheter. Besides, history taking, physical examination, and long-term follow-up during maintenance hemodialysis excluded the occurrence of prior trauma, dental extraction, and self-injection of illicit drugs. The presumed origin of staphylococcal sepsis and infected pseudoaneurysm was related to the catheter-related bloodstream infection (CRBSI). Hence, the reason as to why the mycotic pseudoaneurysm of the SFA occurred in our patient can be explained by a spontaneous aneurysm infected after CRBSI or a pre-existing mycotic pseudoaneurysm before admission with an atypical presentation in this uremic and diabetic patient with an immunocompromised state.

## Conclusion

The patient with a mycotic pseudoaneurysm of the SFA is at a significant risk of sepsis, rupture, and mortality. The presence of risk factors in the medical history, combined with clinical features, should prompt further assessment. Combining medical and surgical interventions is imperative. We hope that our experiences may increase internists' awareness of this unusual cause of lower extremity weakness in patients with multiple comorbidities.

## Financial Disclosure

The authors declare no financial support for the article.

## Conflict of Interest

The authors declare no conflict of interest.

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# 尿毒症病患表淺股動脈黴菌性偽動脈瘤：個案報告與文獻回顧

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## 摘 要

黴菌性偽動脈瘤 (Mycotic pseudoaneurysm) 是一種罕見且嚴重的疾病，臨床上可能以隱約逐漸的方式表現。這裡我們報導了一個具有挑戰性的病例，一名 47 歲男性，患有糖尿病、第五期慢性腎臟疾病和左側肢體癱瘓的中風病史。他前往神經科門診部門，主訴昏睡、口齒不清和右下肢無力。最初懷疑他患有急性缺血性中風。在血液透析後出現發燒和右大腿疼痛腫塊，使我們警覺潛在的表淺股動脈黴菌性偽動脈瘤，立即進行治療。