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CASE REPORT

Septic Emboli to the Skin Following Angioplasty

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PALABRAS CLAVE

Pseudoaneurisma;
Angioplastia coronaria
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percutánea;
Staphylococcus aureus;
Púrpura

Abstract Invasive vascular procedures have good efficacy and safety profiles and are now widely used for the diagnosis and treatment of many cardiovascular disorders. However, they do have potential complications that can occasionally be life-threatening. We present a new case of infectious pseudoaneurysm following percutaneous transluminal coronary angioplasty and complicated by septic emboli to the skin. It is a rare condition characterized by persistent bacteremia, sepsis of unknown origin, and regional septic emboli. Histopathology of the skin lesions typically reveals gram-positive coccobacilli and septic vasculitis. The condition carries a significant morbidity and mortality, making early diagnosis essential. Both cholesterol and septic emboli should be considered in the differential diagnosis of skin lesions after invasive vascular procedures.

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Embolismos sépticos cutáneos tras angioplastia

Resumen Los procedimientos vasculares invasivos son en el momento actual ampliamente utilizados para el diagnóstico y tratamiento de muchas patologías del sistema cardiovascular, con un buen perfil de seguridad y eficacia, aunque entrañan potenciales complicaciones que ocasionalmente pueden comprometer la vida del paciente. Presentamos un nuevo caso de pseudoaneurisma infeccioso postangioplastia complicado con embolismos sépticos cutáneos. Se trata de una entidad infrecuente caracterizada por bacteriemia persistente, sepsis sin foco aparente y embolismos sépticos regionales. El análisis histopatológico de las lesiones cutáneas habitualmente permite evidenciar la presencia de coccobacilos Gram positivos y de vasculitis séptica. Es una entidad con una importante morbimortalidad, por lo que el diagnóstico precoz resulta esencial. Por ello, ante lesiones cutáneas tras procedimientos vasculares invasivos deben considerarse en el diagnóstico diferencial no solo los embolismos de colesterol, sino también los embolismos sépticos.

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Introduction

Angioplasty is a safe and effective invasive vascular technique that is widely used in revascularization procedures.¹ However, complications do occur, including infectious complications, which are relatively rare and develop in less than 1% of these procedures.^{2,3} The most common infectious complications are postangioplasty bacteremia and local infections at the puncture site; postangioplasty endocarditis and septic endarteritis are very rare.⁴ We present a case of septic emboli to the skin secondary to an infectious postangioplasty pseudoaneurysm. This is a rare condition, but it has a characteristic clinical presentation and histopathology.⁵

Case Description

The patient was a 70-year old man with a history of diabetes mellitus on treatment with insulin, systemic hypertension, ischemic heart disease, and renal and bladder cancer treated surgically in 2005, with no evidence of local recurrence or metastases. Three days after undergoing revascularization of the anterior descending artery by angioplasty with insertion of a drug-eluting stent, performed via the right femoral artery, he was admitted to our hospital for a deterioration of his chronic renal failure and pain in the right lower limb associated with acute functional impotence. In a previous admission 6 days earlier he had undergone revascularization of the right coronary artery, with access via the same artery.

He presented fever of 39°C and hypotension (blood pressure, 90/60 mm Hg) since the previous admission. Physical examination revealed an increase in diameter of the right lower limb associated with loss of muscle strength; there was a nonpulsatile mass in the right inguinal region compatible with a postangioplasty hematoma. Round and oval plaques of approximately 1 to 3 cm in diameter were observed exclusively in that limb. The plaques were erythematous and edematous, with a purpuric center and poorly defined borders; they were most numerous on the distal part of the limb and tended to be present in groups (Figure 1). There were no other significant findings.

Blood tests showed acute anemia (hemoglobin, 9 g/dL; reference range, 13-17.3 g/dL), an elevation of the plasma creatinine (4.24 mg/dL; basal level, 2.3 mg/dL; reference range, 0.60-1.30 mg/dL), neutrophilia of 90% (reference range, 41%-74%) without leukocytosis, and elevated C-reactive protein (150 mg/L; reference range, 0-5.00 mg/L). Urgent and delayed cerebral computed tomography (CT), arterial Doppler ultrasound of the right lower limb, and CT scan of the abdomen and pelvis were normal. Retinal examination revealed no signs of cholesterol emboli. Histopathology of the skin lesions showed a normal epidermis and multifocal, dense neutrophilic inflammatory infiltrates in the mid and deep dermis with extravasated red blood cells (Figure 2). The vessels presented a prominent endothelium, intraluminal thrombi, and intraluminal, intraparietal, and interstitial neutrophils. Gram stain revealed the presence of scattered gram-positive coccobacilli in pairs and clusters in the areas



Figure 1 Edematous, erythematous plaques with a purpuric center on the right lower limb.

corresponding to the dense neutrophilic inflammatory infiltrates (Figure 3). Methicillin-sensitive *Staphylococcus aureus* (MSSA) was isolated from the blood and skin cultures; all other cultures were negative.

Transesophageal echocardiography was requested on the basis of a diagnosis of septic vasculitis due to MSSA. This showed no vegetations or signs suggestive of infective endocarditis. Arteriography revealed the presence of a pseudoaneurysm of the right deep femoral artery (Figure 4).

With a definitive diagnosis of sepsis secondary to an infectious postangioplasty pseudoaneurysm of the right deep femoral artery complicated by local septic emboli to the skin, the patient was administered a course of treatment with intravenous cloxacillin 1 g/4 h for the first 2 weeks followed by 1 g/6 h by mouth for 4 weeks, and the

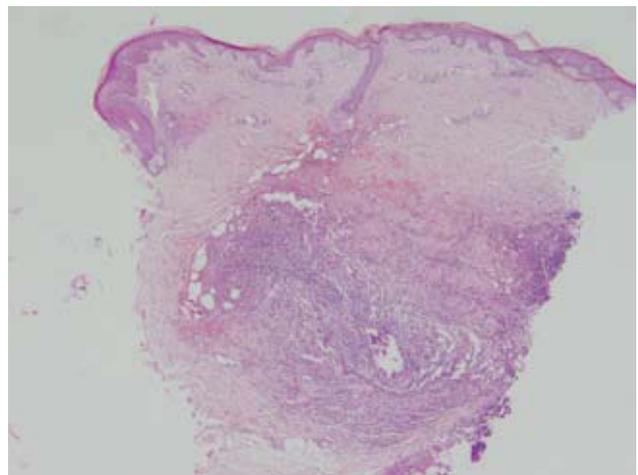


Figure 2 Multifocal microabscesses and extravasated red blood cells in the mid and deep dermis (Hematoxylin-eosin, original magnification $\times 2$).

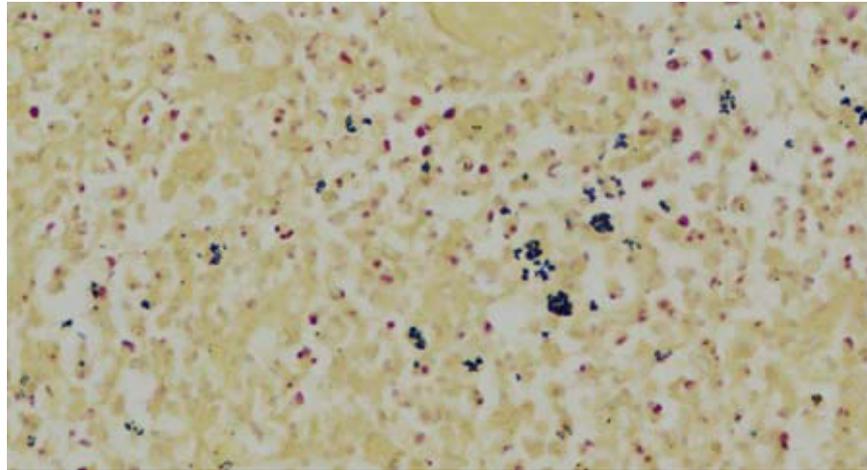


Figure 3 Higher magnification of the lesion in Figure 2: Gram-positive coccobacilli in the microabscesses in the mid and deep dermis (Gram stain, original magnification $\times 10$).



Figure 4 Arteriography revealed a pseudoaneurysm of the right deep femoral artery (within the circle).

infectious pseudoaneurysm was surgically repaired. This achieved complete resolution of the condition.

Discussion

In 1985, Krupski et al⁶ published the first case of infectious postangioplasty pseudoaneurysm. Previously reported cases of infective endarteritis complicated by local septic emboli were related to the use of arterial catheters for monitoring vital signs in critically ill patients.⁷ Septic endarteritis is an infection of the wall of an artery. Its natural clinical course leads to destruction of the wall and dilatation of the artery, with the subsequent formation of an infectious

aneurysm or pseudoaneurysm that may even rupture. As cited by other authors,⁵ Frazee and Flaherty² established criteria to differentiate between local infection and postangioplasty septic endarteritis. According to those 2 authors, postangioplasty septic endarteritis is defined by clinical evidence of local infection at the puncture site and one or more of the following observations: persistently positive blood cultures in the absence of infective endocarditis, evidence of local septic emboli, and presence of a pseudoaneurysm with pus observed on surgical examination.

In the pre-antibiotic era, the most common cause of septic endarteritis and of an infectious aneurysm or pseudoaneurysm was infective endocarditis, due either to persistent bacteremia with bacterial seeding of the previously damaged arterial wall or to septic microemboli entering the vasa vasorum. Nowadays, the most common cause is blood vessel injury due to the increasing use of invasive diagnostic and therapeutic vascular procedures and to the parenteral administration of recreational drugs.⁶ *S aureus* is the microorganism most frequently implicated in septic endarteritis and in postangioplasty mycotic pseudoaneurysm.⁸

The risk factors for developing postangioplasty septic endarteritis are advanced arteriosclerosis, a past history of blood vessel injury, and congenital or acquired immunodeficiency.⁹ There are also risk factors related to the angioplasty technique, such as difficulty of arterial access, the duration of the procedure, and leaving the arterial sheath in place for 24 to 72 hours after angioplasty; it has been observed that thrombus forms on the surface of 100% of these sheaths within 24 hours. Furthermore, a second coronary revascularization procedure with access via the same artery between 3 and 7 days after an initial procedure also predisposes to septic endarteritis, and the formation of a post-revascularization hematoma at the site of arterial puncture favors bacterial proliferation due to a disturbance of local immunity.^{1-3,5,8,10} In our patient, a second angioplasty was performed via the right femoral artery, used in an initial revascularization procedure less than a

week earlier, and there was a postangioplasty hematoma in the right groin, which favored the formation of septic endarteritis progressing to an infectious pseudoaneurysm.

Septic endarteritis and its complication, the infectious pseudoaneurysm, can lead to potentially fatal complications, such as persistent bacteremia, sepsis, rupture of the arterial wall causing hypovolemic shock, a compression syndrome of adjacent neurovascular structures, septic arthritis, or regional osteomyelitis. In our case, the acute muscle weakness of the right lower limb was probably due to an acute compressive femoral neuropathy. In fact, limb weakness may be the only sign of a pseudoaneurysm of the deep femoral artery.^{11,12} Skin manifestations due to regional cutaneous septic emboli from an infectious postangioplasty pseudoaneurysm are variable and include palpable purpura, petechiae, pustules, digital cyanosis, and livedo reticularis.^{1,5,11,13,14}

The differential diagnosis of unilateral skin lesions in limbs used for vascular procedures should include cholesterol emboli syndrome and acute postangioplasty infective endocarditis. The cholesterol emboli syndrome has a high morbidity and mortality and is typically seen after invasive vascular procedures, anticoagulation, or thrombolysis in elderly men with advanced arteriosclerosis. Skin manifestations, such as livedo reticularis, digital cyanosis, palpable purpura, petechiae, and acral nodules and ulcers, are the most common and typically the first clinical signs of this syndrome.¹⁵ In our case, histopathology did not reveal intravascular cholesterol crystals. Infective endocarditis is a very rare infectious complication of angioplasty. In our patient it was ruled out not only by the unilateral presentation of the skin lesions and the absence of echocardiography findings compatible with the condition, but also by the absence of clinical and radiological evidence of septic emboli to other organs, such as the central nervous system, spleen, or kidneys.

Preventive measures recommended by some authors to minimize infectious postangioplasty complications include withdrawal of the arterial sheath as early as possible after revascularization and use of the contralateral limb if a second angioplasty must be performed within a week of the first procedure. In high-risk patients in whom the contralateral limb is unsuitable for technical reasons, antibiotic prophylaxis should be considered, although there is insufficient evidence to support this recommendation.^{2,3,5,8}

In conclusion, we believe that early suspicion of infectious pseudoaneurysm is essential when a patient who has undergone an invasive vascular procedure presents fever of unknown origin, persistently positive blood cultures, and no evidence of infective endocarditis on echocardiography. In this clinical context, if skin lesions develop on the limb used for the intervention, not only cutaneous cholesterol emboli but also septic emboli secondary to an infectious blood vessel lesion must be considered in the differential diagnosis. Diagnostic confirmation is achieved by skin biopsy that demonstrates the presence of microorganisms both histopathologically and on culture. Arterial imaging

studies can then be used to rule out the existence of an infectious aneurysm or pseudoaneurysm as a complication of postangioplasty septic endarteritis.

Conflict of Interest

The authors declare that they have no conflict of interest.

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