Infected pseudoaneurysm of the superficial femoral artery in a patient with Salmonella enteritidis bacteremia

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Mycotic aneurysms, defined as irreversible dilation of an artery due to destruction of the vessel wall by infection, are rare but are associated with a high risk of rupture if not treated promptly. The case of a healthy 52-year-old smoker who presented with pyrexia, rigors, night sweats and severe right leg pain with swelling is presented. He was diagnosed with a superficial femoral artery mycotic aneurysm, with Salmonella enteritidis as the causative agent. He was treated with high-dose antibiotics, local debridement and autologous reconstruction. A high index of suspicion is needed to make the correct diagnosis in these cases. Prompt surgical intervention and antimicrobial therapy are the cornerstones of treatment to reduce the associated high morbidity and mortality.

Key Words: Aneurysm bacteriology; Femoral; Mycotic; Pseudoaneurysm; Salmonella; SFA

CASE PRESENTATION

A 52-year-old male smoker with no medical history presented with pyrexia, rigors, night sweats and severe right leg pain with swelling. Physical examination revealed an indurated swelling on the medial aspect of his right thigh. Investigations demonstrated a white blood cell count of 18×109/L, a normochromic, normocytic anemia of 94 g/L, an elevated erythrocyte sedimentation rate of 125 mm/h and a C-reactive protein level of 278 mg/L. A computed tomography (CT) scan revealed a 3.3 cm right superficial femoral artery (SFA) pseudoaneurysm with no evidence of leak and deep vein thrombosis (Figure 1). Radiological appearances suggested the aneurysm was mycotic in origin. There was no history of intravenous (IV) drug use, recent arterial catheterization or immunosuppression. Two weeks earlier, he had an episode of gastrointestinal upset, which was self-limiting, Salmonella enteritidis sensitive to IV ceftriaxone was grown in blood cultures. The aneurysm was treated successfully with in situ reconstruction using autogenous superficial femoral vein from the contralateral limb and wide tissue debridement. The excised aneurysm tissue was sent for culture and Salmonella enteritidis was isolated. The patient was treated for six weeks with high-dose IV antibiotics and remained well at follow-up after two years.

DISCUSSION

Mycotic aneurysm, defined as a localized, irreversible arterial dilation due to destruction of the vessel by infection, is a rare entity comprising only 0.9% of total aneurysms (2,3). A primary mycotic aneurysm arises following infection of a previously normal arterial wall, whereas infection of a pre-existing aneurysm is defined as a secondary mycotic aneurysm (2). There are several proposed mechanisms for infection of an arterial wall: septic emboli to the vasa vasorum, bacteremic seeding of the arterial wall, trauma causing direct bacterial inoculation and contiguous infective focus extending to the arterial wall (2).

In a series of 180 patients with mycotic aneurysms, the femoral artery was the most common location (38%), followed by the abdominal aorta (31%), superior mesenteric (8%), brachial (7%), iliac (6%) and carotid arteries (5%) (4). The etiology of mycotic aneurysms has been changing, from endocarditis being the most common cause before the antibiotic era, to arterial trauma in the postantibiotic era (4). This is believed to be due to increased intravascular drug use and...
Sclerotic disease that facilitated endovascular infection from broad-spectrum antibiotics, immunosuppression and arterial puncture endocarditis in the preantibiotic era (4). Brown et al (4) reported a change were responsible for the majority of mycotic aneurysms secondary to 20% enterococcus, streptococcus (70%) and hemoglobin levels <120 g/L (56%) (7). In two different series, blood cultures were reported positive in 46% and 61% of patients with mycotic aneurysms and organisms were isolated from the aneurysm or surrounding tissue in 73% and 84% of the patients, respectively (7,8). In our patient, leukocytosis of 18×10^9/L and a hemoglobin level of 94 g/L were present, in addition to positive blood and tissue cultures for S. enteritidis.

Diagnosis can be confirmed by ultrasound, CT scan, angiography or magnetic resonance angiography. Air within the aneurysm, local inflammation, contained rupture or saculous or lobulated aneurysms are some radiological findings evident on tests (9). The diagnosis in the present case was confirmed with CT that demonstrated a 3.3 cm SFA pseudoaneurysm.

The bacteriology of mycotic aneurysms has been undergoing a constant change. Initially entrococcus, streptococcus and pneumococcus were responsible for the majority of mycotic aneurysms secondary to endocarditis in the preantibiotic era (4). Brown et al (4) reported a change in etiology to Saphylococcus aureus (28%) and Salmonella (15%) as the use of broad-spectrum antibiotics, immunosuppression and arterial puncture from vascular procedures and IV drug use has increased. Recently, a series of 26 patients by Brossier et al (8) showed the majority of mycotic infections were related to atypical bacteria, including Campylobacter fetus, Listeria monocytogenes, Mycobacterium tuberculosis, Cheliotis burmeti and Aspergillus species. This trend may be attributed to improved diagnostic tests in detecting microorganisms and increasing numbers of patients with immunosuppression related to cancer, immunosuppressive therapy or long-term steroid therapy (8).

Salmonella are flagellated Gram-negative, facultatively anaerobic, nonspore-forming bacilli of the family Enterobacteriaceae. They can be broadly categorized into two forms, typhoidal and nontyphoidal. The two typhoidal strains Salmonella typhi and Salmonellapara typhi are known to cause enteric fever characterized by fever and abdominal pain. Nontyphoidal Salmonella such as S. enteritidis, on the other hand, cause self-limited acute gastroenteritis and cardiovascular complications (10,11). The likely etiology for the mycotic aneurysm in the present case was S. enteritidis-induced acute gastroenteritis two weeks before his presentation, which was then complicated by S. enteritidis bacteremia and subsequent endovascular infection.

The pathogenesis of Salmonella causing endovascular infection involves three main steps. First, the bacteria use fimbriae to attach to intestinal epithelial cell membranes. Once phagocytosed in the submucosal space by lymphoid tissue, Salmonella can be disseminated via the hematogeneous route or lymphatic system. The final step is progression from bacteremia to endovascular infection, the mechanism of which is still unclear (12,13). Nontyphoidal Salmonella gastroenteritis is known to cause bacteremia in up to 8% of patients, with immunodeficiency the major risk factor (10,13). Of patients with Salmonella bacteremia, 10% to 25% older than 50 years of age develop endovascular infections (14,15). Persistent or high-grade bacteremia in a patient with a history of atherosclerotic disease increases the risk of endovascular infection (10). Because our patient was a known smoker, he likely had atherosclerotic disease that facilitated endovascular infection from Salmonella bacteremia and subsequent development of the mycotic aneurysm.

Surgical treatment of femoral mycotic aneurysms is controversial, with studies supporting ligation with debridement alone, ligation with revascularization and routine revascularization (16). The use of stents grafts is less invasive but the outcome is unknown in the setting of infected aneurysms. The patient in the present case was treated successfully with in situ reconstruction using autogenous superficial femoral vein from the contralateral limb and wide tissue debridement. The use of bactericidal antibiotics together with early surgical intervention and long-term suppressive antibiotic therapy has led to improved survival and decreased amputation rates (5,7,17). High-dose bactericidal therapy should be maintained for at least six weeks and longer if inflammatory biomarkers such as C-reactive protein level, erythrocyte sedimentation rate and white blood cell count do not subside (17,18). Our patient was treated with six weeks of high-dose intravenous antibiotics and remained well at follow-up at two years.

An infected femoral aneurysm is a challenging clinical entity that should be diagnosed and managed promptly because it is associated with high mortality and morbidity, including limb loss. Our clinical experience in the present case highlights that a high index of suspicion should be present whenever an inflammatory mass appears near a large artery even in the absence of previous arterial trauma, IV drug use or immunosuppression, so that timely management is commenced.