Mycotic (infected) aneurysm of the popliteal artery and arthritis following Salmonella bacteriemia

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ABSTRACT

We report a case of a mycotic (infected) aneurysm of the popliteal artery due to Salmonella enteritidis. The clinical presentation may be confused with other more common causes of diffuse swollen leg, causing a delay in the diagnosis and proper therapy. Prompt surgical resection of the infected aneurysm together with medical therapy is required for successful treatment.

Introduction

Salmonella infection is still a major problem in public health (1). Salmonellosis is considered to affect primarily the gastrointestinal tract, but infection at other sites may also occur (2). The bacteriemia may cause localized infections such as septic arthritis, osteomyelitis, meningitis, pleuropulmonary, renal, splenic or cardiovascular infections (1). Although arterial infection is rare, it remains one of the most common causes of primary mycotic aneurysm (3). Mycotic (infected) aneurysm of the popliteal artery is a rare clinical entity (4-7). This report describes a case of a mycotic (infected) aneurysm of the popliteal artery due to Salmonella enteritidis. We discussed the main clinical and radiological features, the differential diagnosis with other more frequent processes that can mimic this entity, and the therapeutic approach that is required for successful outcome.

Case report

A 70-year-old man presented to the emergency room with a painful enlargement of his right knee and calf. The patient’s medical history included a previous well-documented episode of penicillin allergy: he smoked 20 cigarettes and consumed 100 g alcohol per day. Two weeks before admission he felt ill, with the sudden onset of diarrhea, high fever (39°C) and chills. Twelve hours later, he developed progressively painful enlargement of the right leg. His general practitioner started treatment with oral trimethoprim-sulphamethoxazole, indomethacin (150 mg/day) and subcutaneous low molecular weight heparin. Two weeks later, despite the remission of the diarrhea, his general condition worsened, the local symptoms in the affected limb showed no improvement, and he was referred for evaluation.

On the day of admission he appeared acutely ill, with pale skin, a temperature of 37.5°C and a hepatomegaly of 3 cm. The right knee was swollen and warm with local erythema, moderate synovial effusion and diffuse swelling of the surrounding soft tissues. A painful edema of his right calf and foot was also present, and more careful examination revealed a pulsatile mass in the popliteal fossa. Laboratory tests showed a white cell count of 14,100 cells/mm³ with 85% neutrophils, slight anemia (hemoglobin 11.6 g/dl and hematocrit 34.5%), an erythrocyte sedimentation rate of 92 mm/1 hour and a C-reactive protein of 17.7 mg/dl (normal value < 0.5 mg/dl). The biochemistry profile disclosed moderate decreases in serum albumin and total cholesterol levels and a mild increase in liver function tests. Arthrocentesis of the right knee showed an inflammatory joint fluid (8,400 cells/mm³) without crystals at microscope examination. Repeated gram staining and cultures of the synovial fluid revealed no bacteria. No stool cultures were obtained, but four blood cultures yielded Salmonella enteritidis.

Radiographs of the affected joint were normal except for the presence of diffuse soft tissue swelling. On the day of admission, the Doppler ultrasound (US) ruled out deep vein thrombosis. US showed a focal enlargement of the right popliteal artery to a diameter of 3.5 cm which was suspicious of an aneurysm. This aneurysmatic dilatation was partially thrombosed and the surrounding soft tissues were affected (Fig. 1). A contrast enhanced computerized axial tomography (CT) showed a large, heterogeneous and poorly defined soft tissue mass which extended from the intercondilar space to 5 cm down the extremity. The right popliteal artery and vein could not be identified. These findings were consistent with either an inflammatory process or an hematoma (Fig. 2).

The patient underwent a gadolinium-
enhanced magnetic resonance (MR) imaging of the right knee. Axial, coronal and sagittal T1- and T2-weighted imaging were performed. A collection surrounding the popliteal artery with lobulated margins and heterogeneous signal intensity was found. Its largest diameter was 5 cm. The soft tissues at the antero-external aspect of the right knee were thickened and edematous. The MR images confirmed the diagnosis of aneurysm of the popliteal artery with surrounding abscess of the popliteal fossa and a small, uncomplicated Baker’s cyst (Fig. 3A and B). A ⁹⁹Technetium methylene diphosphonate bone scan revealed increased uptake in the right knee, especially in the external condyle, without involvement of the interarticular space. Scintigraphy with ⁶⁷Gallium showed an intense uptake of the radioisotope in the external articular capsule with normal bone captation, suggestive of septic arthritis. Angiographic study was not made.

The patient was treated with a 4-week course of intravenous ciprofloxacin (400 mg/12 hours) and daily needle arthrocentesis of the knee was performed for 17 days until the arthritis was resolved. Three days after admission, an emergency operation was performed with a wide desbridement and complete drainage of the abscess, removal of the infected aneurysm and collocation of a by-pass with a segment of safena vein. Four weeks after his admission the patient was discharged on treatment with oral ciprofloxacin (750 mg/12 hours) for 8 additional weeks, with complete recovery.

Discussion

We report a case of a mycotic (infected) aneurysm of the popliteal artery due to Salmonella enteritidis. The patient presented with right knee arthritis and swollen leg following an episode of diarrhea and bacteremia. He had a very unusual vascular infection (4-7) that presented as a typical episode of arthritis and swelling of the calf. The previous history of diarrhea and febrile syndrome together with the poor general condition of the patient at admission and the findings of the Doppler US helped us to rule out other more frequent entities that mimic a ruptured Baker’s cyst and point to the possibility of a mycotic aneurysm (8), which was confirmed by MR. In our patient, the association of 4 weeks of intravenous antibiotics, regular arthrocentesis of the affected knee and the surgical resection of the aneurysm was followed by clinical and radiological complete recovery.

In this clinical setting, the differential diagnosis mainly includes ruptured Baker’s cyst and deep vein thrombosis. Nowadays, Doppler US is the technique of choice in making the diagnosis of both entities. More infrequently, other causes that can be included in the differential diagnosis are tumors of the bone or soft tissues, rupture of the plantaris muscle or the medial head of the gastrocnemius (usually after a sport injury) and conditions that affect the popliteal artery (8). Even if rare events, and in contrast with the above mentioned conditions, leaking of a poplite-
al artery aneurysm or mycotic aneurysm represent two special situations because of the urgency to diagnose and treat these life-threatening arterial complications. Salmonella infection is still a major problem in public health. It has been estimated that gastrointestinal due to nontyph Salmonella affects annually 30 persons per 1 million population and that transient bacteremia may be present in around 10% of these patients (1). Salmonellosis is considered to affect the gastrointestinal tract primarily, but infection at other sites may occur (2). The bacteremia may cause localized extravascular infections such as septic arthritis, osteomyelitis, meningitis, pleuropulmonary, renal, splenic or cardiovascular infections (1). Although arterial infection is rare, it remains one of the most common causes of primary mycotic aneurysm (3). Salmonella organisms are particularly virulent pathogens that have a predilection for diseased arterial walls and rarely infect healthy arterial intima.

The main risk factors are old age (over 65 years), diabetes mellitus, liver cirrhosis, and advanced atherosclerosis (1). The abdominal aorta is the most frequent site of vascular infection by Salmonella pathogens, but peripheral and visceral arteries may be affected as well (1, 2, 4, 9).

Mycotic aneurysms are fulminant infectious processes frequently resulting in rupture and leading to death if not properly treated (1, 10). Although Salmonella species are one of the most frequent pathogens involved in the production of mycotic aneurysm, the infection of peripheral vessels is rare and the involvement of the popliteal artery is exceedingly rare (4, 5, 7). The diagnosis must be considered in any patient in whom an aneurysm and culture specimens positive for Salmonella are found (3). In general, the diagnosis of mycotic aneurysm is based on the classical features of fever, pain, pulsatile mass and positive blood cultures. The best imaging diagnostic techniques are CT and US, which have been shown to be effective, non invasive methods for the detection of established mycotic aneurysms (11). In our patient the final diagnosis was made with MR, although this is not the elective technique for the diagnosis of an aneurysm. Although the Doppler US findings were highly suggestive, the inflammatory process surrounding the aneurysm made a sure diagnosis. The MR appearance of vascular abnormalities is highly variable and depends principally on the amount and velocity of blood flow through the lesion. The sequences that should be used are flow sensitive ones such as gradient-recalled echo (GRE) and MR angiography, and intravenous gadolinium should be administered to confirm the vascular nature of the lesion if doubt persists. An aneurysm appears as focal arterial dilatation with which a mural thrombus is often associated and it may exhibit variable signal intensity on MR sequences (12).

Patients with suspected mycotic aneurysm should be treated with antibiotics immediately after blood samples for culture have been drawn. In the case of
Salmonella infections, the antibiotics of choice include third generation cephalosporins or new generation fluoroquinolons. In addition, emergency surgery is mandatory because of the high risk of death with medical therapy alone (1) and because of the frequent presence of rupture (1, 6, 7). Furthermore, all the potentially infected tissues should be debrided, including any infected clot.

In summary, the infection of an aneurysm of the popliteal artery is very uncommon but the true incidence of mycotic aneurysms is unknown. The clinical presentation may be confused with other more common causes of diffuse swollen leg, especially a ruptured Baker’s cyst, resulting in a delay in the diagnosis and appropriate therapy of this life-threatening condition. Prompt surgical resection of the infected aneurysm together with medical therapy is required for successful treatment.

References