SHORT REPORT

Successful Treatment of Ruptured Mycotic Aneurysm of the Iliac Artery in a Patient with Salmonella Sepsis

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Introduction

The term ‘mycotic aneurysm’ was first used by Sir William Osler in 1885 when he described multiple bead-like aneurysms resembling a fungal growth, which were associated with bacterial endocarditis. Currently, however, the term ‘mycotic’ is applied to any aneurysm from which an organism can be cultured. In 25% of patients over 50 years of age with Salmonella sepsis, arteritis due to Salmonella has been reported. Infection of pre-existing atherosclerotic lesions has become more prevalent and this mechanism now accounts for most mycotic aneurysms. Different species of Salmonella were the causative organism in 33–36% of reported cases of primary aortic infection prior to 1965, but thereafter only 10%. The majority of mycotic aneurysms due to Salmonella species involve the abdominal aorta or the iliac arteries. The reported overall mortality rate for this entity is reported as over 50%, however, the mortality and morbidity are much higher in patients with rupture.

The first successfully treated case of Salmonella aortitis was reported in 1962. Since then, sporadic instances have been reported in the literature with a consistent pattern of delayed diagnosis and treatment. The complete excision of the aneurysmal sac is generally accepted, however, in situ versus extra-anatomic reconstruction remains controversial.

Case Report

A 73-year-old male tourist from the USA, was admitted to the emergency room with a 12 days history of shaking chills, fever up to 39°C and abdominal pain. He was referred from another hospital, where he was treated with oral cefuroxime for Salmonella bacteraemia, but was not responding. His past medical history included myocardial infarction 19 years previously and hypertension. On admission his blood pressure (BP) was 110/60 mmHg, pulse rate 60 min⁻¹ and temperature 38.5°C. Shaking chills were noted every few minutes. The physical examination was unremarkable with the exception of a slightly distended abdomen and mild splenomegaly. Peripheral pulses in the lower extremities were all palpable. He was admitted to the medical service and immediate antibiotic treatment was instituted with ampicillin IV 2gr q4h. Abdominal ultrasound on admission was unremarkable, but limited by extensive bowel gas. On the third day of hospitalization the patient developed severe left lower quadrant abdominal pain and an abdominal computed tomography scan revealed a large retroperitoneal haematoma mostly in the left retroperitoneum due to a dissecting aneurysm of the left common iliac artery (Fig. 1). The patient was immediately transferred to the surgical service and to the operating theatre with a BP of 70/40 mmHg and a pulse of 115 min⁻¹.

Fluid resuscitation was begun and anaesthesia instituted. With opening of the abdominal cavity a huge haematoma burst and the patient became severely hypotensive and had a cardiac arrest. The abdominal aorta was cross-clamped above its bifurcation, the massive bleeding was stopped and simultaneously closed cardiac massage was performed.
Cardiac function returned and the BP stabilized at 90/60 mmHg. Complete haemostasis was accomplished by placement of additional clamps above and below the aneurysm of the left common iliac artery and the aortic cross-clamp was removed. The ruptured left common iliac artery aneurysm was found to have signs of severe inflammation including the surrounding tissues and samples were taken for culture. The proximal and distal common iliac artery was doubly ligated in normal tissue and the entire aneurysmal sac was bluntly dissected and removed.

On the assumption of an infected ruptured aneurysm we decided to restore the blood supply by an extra-anatomic approach. A cross-femoral bypass was performed using an 8 mm polytetrafluoroethylene (PTFE) graft. During the surgery the patient received 12 units of packed red blood cells and 4 units of fresh frozen plasma. He was transferred to the Intensive Care Unit in stable condition. On the second postoperative day his right leg showed signs of ischemia, and he underwent a right femoro-popliteal bypass with 6 mm PTFE for atherosclerotic and thrombotic occlusion of his superficial femoral artery. On the 15th postoperative day a percutaneous tracheostomy was done as he could not as yet be weaned from the respirator.

During his stay in the ICU the patient developed oliguric renal failure and benign postoperative hyperbilirubinemia. Early haemodialysis was started on second postoperative day and continued for 4 weeks until urinary output increased and renal function tests approached normal levels. The cultures of aneurysmal sac revealed Salmonella, sensitive to ampicillin.

In the postoperative course a left retroperitoneal fluid collection was percutaneously drained under US guidance. Biochemical composition of the fluid showed that it contained urine. The output of the drainage gradually increased and equalled the amount of urine collected from the Foley catheter in the urinary bladder. The urologic consultation advised only observation for 3–4 months assuming that the ureteral leak was likely due to injury rather than transection.

During hospitalization in the ICU various antibiotics were used according to cultures and sensitivity, amongst them imipenem, vancomycin, cefepime, metronidazole and ampicillin for Salmonella.

After the weaning from mechanical ventilation, the patient was transferred to surgical department and on 45th POD has been transferred to his residential hospital for rehabilitation. Life long oral ciprofloxacin 500 mg x 2/day was recommended by infectious disease physician. The urinary fistula closed spontaneously 1 month later. Nine months after surgery the patient wrote us ‘I drive my car without problems. I’m planning on singing with our church choir.’

**Discussion**

Mycotic aneurysms are rare and represent only 2.6% of all abdominal aneurysms. Most patients with aortitis due to Salmonella have preexisting atherosclerotic disease at the site of the subsequently infected aneurysm.

All investigators have indicated the diagnostic importance of the triad of fever, back pain and a palpable pulsatile abdominal mass. Over one half of the patients had ruptured aneurysms before a definite diagnosis had been made, that is why high index of suspicion is required to establish the diagnosis. It seems logical that any patient with a prolonged fever of unknown origin or established Salmonella bacteraemia should be evaluated for a possible arterial source of sepsis. CT scan is the most useful diagnostic tool to detect the early changes in the arterial wall or periaortic tissue and to define the presence of aneurysm and periaortic fluid collection.

We have found 64 cases of Salmonella aortitis in the available literature with overall mortality rate variously reported from 16% to as high as 75%. The propensity of infected aneurysms to early rupture is clearly illustrated by the study of Bennet and Cherry, who found fatal rupture occurring in 79% of patients for whom surgical treatment was delayed. We failed to find the numbers of mortality in patients presenting with ruptured aneurysm. There were no survivors among the reviewed patients where no aortic resection was undertaken, so we believe that the operative...
management of *Salmonella aortitis* should include debridement of infected tissue. The provision of adequate arterial circulation for the lower extremities involves performance of extra-anatomic prosthetic bypass or insertion of an aortic prosthesis within the infected area. The optimal method of revascularization is controversial. The well-established principles for treatment of arterial graft infections would seem to mandate the extra-anatomic approach. Some advocate the *in situ* reconstruction with acceptable result. However, other data shows that the mortality in this group of patients was clearly higher than with extra-anatomic bypass, mostly due to recurrent sepsis. When the diagnosis of *Salmonella aortitis* is established, appropriate antibiotic treatment should be started immediately and continued for at least 6 weeks. Some authors recommend lifelong administration of antibiotics.

**Conclusions**

In *Salmonella sepsis* with preexisting or high probability of atherosclerotic cardiovascular disease, the work-up should include early chest and abdominal CT scan to detect signs of infected arterial aneurysm. All patients with diagnosed infected arterial aneurysm should be operated immediately before the dramatic complications develop. Most surgeons recommend excision of infected aneurysm, thorough debridement and extra-anatomic bypass of infected area. The successful treatment of such a severe and complex condition as a ruptured *Salmonella mycotic* aneurysm of major vessels is guaranteed by a multidisciplinary approach with an expeditious action of surgeons, anaesthesiologists, intensive care, infectious disease and rehabilitation specialists.

**References**


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