Case Report

A Case Report of Endovascular Stenting in *Salmonella* Mycotic Aneurysm: A Successful Procedure in an Immunocompromised Patient

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Abstract

Introduction: Mycotic aneurysms are associated with high mortality rates and are managed in the local setting with extra-anatomical bypass followed by ligation, exclusion and debridement of the aneurysm. This is the first case of successful endovascular stenting in an immunocompromised patient with *Salmonella* mycotic aneurysm. Clinical Picture: A middle-aged man who was HIV positive had *Salmonella* septicaemia. He developed abdominal pain 5 days after admission and a computed tomography (CT) scan of the abdomen revealed infrarenal aortitis. He developed a mycotic aneurysm 3 weeks later. Treatment: He opted for endovascular stenting and after prolonged antibiotic therapy and negative blood cultures, he underwent the procedure using a Talent™ stent, with an iliac extension. Outcome: He was discharged 1 week after stenting and maintained on oral bactrim based on sensitivity. At 1-year follow-up, he remains well symptomatically and CT scan showed no endoleak or collection. Conclusion: Endovascular stenting, though a fairly new procedure, can be successfully deployed even in a mycotic aneurysm in the right setting.

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Introduction

Mycotic aortic aneurysm carries a high mortality and morbidity rate. Traditionally, such cases are treated with open surgery, including extra-anatomical or in-situ graft repair. A growing number of authors have reported the use of endovascular stenting as treatment for mycotic aneurysms. To our knowledge, this is the first case of mycotic aneurysm in Singapore treated with endovascular stenting.

Case Report

A 53-year-old Chinese man presented with 3 days' history of fever associated with intermittent rigours and malaise. He had a background history of pulmonary tuberculosis, non-insulin dependent diabetes mellitus and chronic eczema.

Physical examination revealed a pyrexia of 38.9°C, tachycardia of 105 beats per minute and oral candidiasis. Laboratory examinations revealed a normal white cell count of 7.9 x 10⁹/L and a raised C-reactive protein (CRP)

of 134 mg/L. A provisional diagnosis of septicaemia was made and he was treated empirically with co-amoxyclav after septic work-up had been initiated. After 48 hours, blood cultures revealed *Salmonella enteriditis* bacteraemia which was sensitive to ceftriaxone, bactrim, cotrimoxazole and ciprofloxacin. The patient was started on oral bactrim and referred on to the infectious disease physician.

The patient reported a history of high-risk behaviour for sexual transmitted disease and was counselled to test for sexually transmitted diseases, including the human immunodeficiency virus (HIV). He tested positive for HIV infection, with a CD4 count of 6 cells/mm³ and viral load of 61,200 copies/mL. He was started on Highly Active Anti-retroviral Therapy (HAART) treatment (combivir and nevirapine). At this stage, his antimicrobial therapy was changed to intravenous ceftriaxone for better bioavailability due to the side effects of retroviral therapy.

Our patient developed central abdominal pain on Day 5 after admission. A prompt computed tomography (CT)

Fig. 1. Aortogram showing infrarenal aortic pseudoaneurysm.
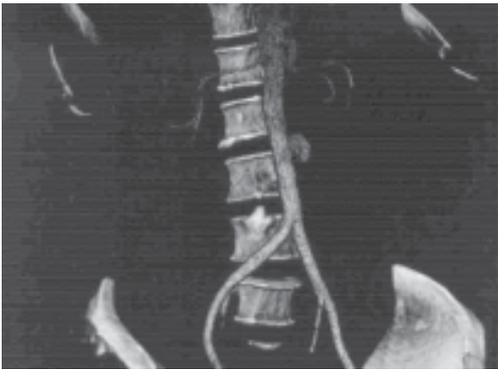

Fig. 2. Aortogram post-stenting.

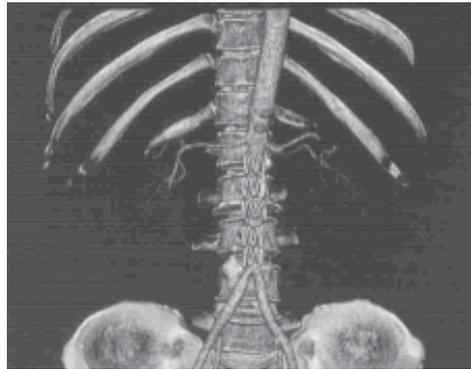Fig. 3. Three-dimensional reconstruction of aortogram.

Fig. 4. Three-dimensional reconstruction with stent graft in-situ.

scan of his abdomen and pelvis revealed an infrarenal aortitis with ulcerative plaques, surrounding fat-stranding and prominent para-aortic lymph nodes. He was then referred on to the vascular surgeon for further management.

The patient and his family were informed of the high mortality associated with *Salmonella* aortitis. The probability of progression to mycotic aneurysm was highlighted and the risks and benefits of open surgery and endovascular stenting were explained accordingly. The patient opted for the latter, understanding fully the experimental nature of this treatment. The risk of stent graft infection, endoleak and the need for regular surveillance and lifelong antibiotic therapy were fully explained to the patient and his family.

During the 3 weeks of inpatient stay, the patient had 2 sets of negative blood cultures for *Salmonella*, his CD4 count improved from 6 to 33 cells/mm^3 and CRP decreased from 136 to 9.3 mg/L. His infrarenal aortitis progressed, with dilation of the infected segment of the aorta resulting in a pseudoaneurysm measuring 3.1 x 2.6 cm in maximum diameter with surrounding para-aortic abscess and fat stranding (Figs. 1 and 2). After much consultation between the patient, his family and the attending doctors, he proceeded with an endovascular stenting under vancomycin cover.

Endovascular stenting was performed via a right femoral artery access. A Talent™ (Medtronic) graft with a 20 x 95 mm iliac extension was utilised (Figs. 3 and 4). Intraoperatively, a persistent type 1 endoleak was identified from the proximal end. A balloon was used to mould both ends of the stent graft with a resultant reduction of endoleak.

The postoperative course was unremarkable. In total, he was treated with 5 weeks of intravenous ceftriaxone. He was discharged 1 week after endovascular stenting and maintained on oral bactrim. He remained well one year post-discharge with normalised inflammatory markers and is scheduled for regular follow-up with the infectious disease physician for continued retroviral therapy and with the vascular surgeon for monitoring of the aortic stent.

Discussion

Salmonella species are the commonest cause of bacterial aortitis accounting for up to one-third of all cases.[1] This may be due to the predilection of *Salmonella* to infect damaged tissues such as atherosclerotic vascular endothelium.[2] This often leads to the formation of mycotic aneurysm. Only 3% to 8% of *Salmonella* infections result in bacteraemia[3-5] and this is more common in immuno-compromised patients.

Patients are usually over 50 years of age and may present in many ways, ranging from full-blown aortic aneurysm rupture to abdominal pain to pyrexia of unknown origin.

There is often no history of gastroenteritis and the commonest mode of presentation is abdominal or back pain with fever.[6,7] Blood cultures can be negative in as high as 25% to 50% of cases.[6-8] Diagnosis is often made by retrospective positive culture of infected tissues after surgical intervention. Positive blood culture and radiological scans are helpful in diagnosing *Salmonella* aortitis. A high index of suspicion is required for patients with *Salmonella* bacteraemia, especially if the patient has predisposing factors including immunocompromise and premorbid atherosclerosis.

Salmonella mycotic aneurysm carries a high rate of rupture and high mortality rate. Up to 53% of patients with *Salmonella* aortitis presented with rupture of the aneurysm. Even with surgical intervention, in terms of open anatomical repair or extra anatomical bypass and ligation exclusion of the mycotic aneurysm and debridement, together with antimicrobial therapy, the mortality rate remains as high as up to 40%.[6-11] Optimal treatment requires early surgical intervention and prolonged treatment with appropriate antibiotic therapy.[9]

Decision-making in our patient was difficult. The preferred choice of an axillo-bifemoral bypass graft with ligation and exclusion followed by debridement of the mycotic aneurysm was considered. However, local experience with aortic ligation showed that if the mycotic aneurysm was too close to the renal arteries, as in this case, the ligature may cut through and exsanguination may then occur. Placement of in-situ antibiotic impregnated grafts has met with some success, but in the setting of an immunocompromised patient, we were reluctant to sew a graft in-situ. That left us with the option of endovascular stenting.

Endoluminal vascular stenting in the treatment of *Salmonella* aortitis is still an experimental procedure. So far, only a handful of cases have been reported.[12-15] Potential advantages include minimal invasiveness and all the benefits that accompany this technique, such as reduced blood loss, shorter hospital stay and fewer perioperative complications. There is also a decreased occupational risk for healthcare workers, especially in the context of immuno-compromised patients. However, this mode of treatment does not allow surgeons to debride infected vascular and perivascular tissues, and therefore carries the potential higher risk of graft infection. Long-term follow-up will therefore be needed to detect endoleaks, graft migration and possible underlying subclinical graft infection. Potential disadvantages would include cost of treatment and surveillance, as well as non-compliance with antibiotic therapy.

There is no current information available on the best timing for interventional stenting. In our case, we opted to delay intervention as our patient remained haemo-dynamically stable. Our patient had serial CT scans and was closely monitored until he had 2 sets of negative blood cultures for *Salmonella* and near normalised erythrocyte sedimentation rate and CRP. Only then was an elective endovascular stent graft repair carried out.

There is no current information on the incidence of graft infection and endoleak with endovascular stenting used in this setting. The duration of antibiotic therapy to treat the potential underlying subclinical infection, in view of the in-situ prosthetic vascular graft and infected perivascular tissue, is also controversial. Most authors have recommended lifelong antibiotic therapy. In our case, we opted to treat the patient with oral bactrim which is bactericidal. He was later switched to IV ceftriaxone for more predictable bioavailability as he was suffering from nausea and vomiting due to the retroviral therapy. He has been maintained on oral bactrim treatment to date. It has been 1-year post-stenting, and our patient remains well with no complaints of abdomen or back pain. His inflammatory markers have normalised and a repeat CT scan has shown no endoleaks or intra-abdominal collection.

Conclusion

In this case report, we have demonstrated that endovascular stenting is an attractive and feasible mode of treatment for *Salmonella* mycotic aneurysm and that the short-term result is promising. Large-scale studies with longer follow-up will be required to fully evaluate the efficacy of this treatment.

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