Late Infection of Endovascular Aneurysm Repair Stent Graft by Mycobacterium tuberculosis

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Abstract

We report a case of infection by *Mycobacterium tuberculosis* in an endovascular aneurysm repair stent graft placed 4 years earlier for an abdominal aortic aneurysm. Tuberculous infection of aortic stents or grafts is not reported but should be considered in tuberculosis endemic countries in patients with suspected stent infections and negative blood cultures.

Keywords: Aortic aneurysm, endovascular stent infections, tuberculosis

**INTRODUCTION**

Endovascular aneurysm repair (EVAR) stent infections are usually due to Gram-positive bacteria, followed by Gram-negative bacteria.[1] Tuberculosis (TB) as a cause of EVAR stent graft infection has never been reported. Our case is unique in that tuberculous EVAR stent infection presented late as culture-negative low-grade sepsis syndrome 4 years after the procedure in an immunocompetent male without any other obvious primary focus of TB.

**CASE REPORT**

A 57-year-old hypertensive male was incidentally found to have an infrarenal abdominal aortic aneurysm in 2013 during a routine health check. He underwent EVAR with the aorto-uni-iliac (Medtronic) graft with femorofemoral crossover in 2013. Routine annual follow-up with 320-slice computed tomography (CT) angiograms were normal in 2014, 2015, and 2016.

In 2017, the patient presented with a history of fever of 1-week duration associated with diarrhea for 4 days with normal clinical examination. He was treated empirically for acute gastroenteritis. Although diarrhea stopped, his fever did not settle. Basic laboratories showed normal total count with an erythrocyte sedimentation rate of 92, normal renal and liver functions, and normal sonography of the abdomen. Multiplex polymerase chain reaction gastrointestinal panel showed enteropathogenic *Escherichia coli* and enteraggregative *E. coli* for which he received empiric therapy with azithromycin. Three sets of blood cultures grew *Staphylococcus capitis* in only one anaerobic bottle, assumed to be a contaminant. He remained febrile with new-onset diffuse abdominal pain for >2 weeks despite being started on empiric therapy with ceftriaxone for suspected stent infection with an enteric pathogen. Repeat CT angiogram of the abdomen showed an increase in the size of the thrombus in aortic aneurysm with contrast enhancement in the aortic wall [Figure 1]. Whole body positron emission tomography-CT (PET-CT) showed fluoro-2-deoxy-d-glucose (FDG) uptake along the wall of fusiform aneurysmal dilatation in the infrarenal portion of aorta (standardized uptake value – 5.9–9.3) with surrounding fat stranding and increased uptake in enlarged paraaortic nodes [Figure 2]. There were no other demonstrable lesions in other abdominal nodes or disease elsewhere in the body.

An aortic stent infection was suspected, and he underwent laparotomy. There was no difficulty in exposure; proximal control was suprarenal with both renal artery controls. Intraoperatively, frank pus was encountered when the aneurysmal sac was opened [Figure 3]. Pus was sucked out, the stent graft was removed with a wire cutter, and an aorto-right iliac silver-coated...
Dacron graft reconstruction was done. Gram stain of pus showed no bacteria, and postoperatively, he was continued on empiric meropenem and teicoplanin. On the postoperative day 2, pus showed acid-fast bacilli in smear and Xpert MTB was positive (rifampicin resistance negative). The patient was started on a four-drug antituberculous drug (ATT) regimen with isoniazid, rifampicin, pyrazinamide, and ethambutol and antibiotics were discontinued after bacterial cultures were reported negative. Histopathology of the intraoperative specimen showed caseating granulomatous inflammation [Figures 4 and 5], and tissue also grew *Mycobacterium tuberculosis* in the Mycobacteria Growth Indicator Tube liquid media, sensitive to all first-line antituberculous drugs. The patient was afebrile and doing well during the last follow-up after 9 months of ATT.

**DISCUSSION**

Infections of endovascular grafts or stents placed within aortic aneurysms are rare and life-threatening conditions warranting combined medical and surgical management. Infection can be due to hematogenous seeding or from a contiguous site of infection. The incidence of stent infections post-EVAR is reported to be 0.6% in a median of 25-month postprocedure in a meta-analysis. Vascular graft infection is reported in literature presenting as gastrointestinal hemorrhage, chronic low-grade sepsis, or severe sepsis. Patients can also present with abdominal pain, fatigue, weight loss, and leukocytosis. Although the presence of any foreign material predisposes to seeding of an infection, other risk factors such as the presence of a thrombus in the aneurysm, hematoma, secondary endovascular, or open procedures due to technical reasons predispose to endovascular stent infections post-EVAR. Our patient, who had a 4-year-old stent in the aorta (post-EVAR) presented with gastrointestinal symptoms, followed by persistent fever.

The American Heart Association recommends CT angiogram as the initial procedure of choice for suspected vascular graft infections followed by magnetic resonance imaging/PET-CT/white blood cell scan as further procedures if the initial CT is indeterminate of an infectious cause. Our patient’s CT angiogram showed an increase in thrombus size with contrast enhancement in the aneurysmal sac, and PET-CT findings were consistent with infection.
The microbiology of a vascular graft infection is dominated by gram-positives (coagulase-negative staphylococcus followed by Staphylococcus aureus) followed by gram-negatives (pseudomonas being the most common) and candida.\(^6,7\) Our patient had one of six blood samples growing S. capitis which could be a cause of vascular graft infection, but it was ignored as a contaminant because of the low-grade bacteremia and a very late presentation from the procedure.

The first report of tuberculous aortic aneurysm was in 1882.\(^8\) Most cases will have a secondary focus identified.\(^9\) M. tuberculosis can infect the aorta in one of the following ways:

1. Seeding of the intima with atherosclerotic plaques or ulcers which lowers the mechanical resistance of the intimal wall to infections
2. Infection spreading from the vasa vasorum, inward to the media
3. Spread from a contiguous focus such as a lymph node, paraspinal abscess, or a vertebral focus either directly or indirectly through lymphatics.\(^9\)

Although reported to be a cause of mycotic aneurysm, tuberculous infection of endovascular graft within an aortic aneurysm has never been previously reported. As follow-up scans for 3 consecutive years after placement of the stent did not show any evidence of infection and the patient was also asymptomatic, it is likely that infection occurred later. Our patient did not have evidence of disease elsewhere in the body such as vertebral osteomyelitis and the pulmonary source was ruled out by normal imaging. Although there were few paraaortic FDG-avid nodes near the infected aneurysm, it is not clear whether the infection was due to contiguous spread from these nodes or secondary to hematogenous seeding. Our patient responded well to combined medical and surgical therapy.

Our case is notable for the following: the host was immunocompetent, there was no prior history of TB, there was no other focus of TB elsewhere, infection was confined to the aneurysmal sac with the stent, presentation was as pyrexia of unknown origin with diagnostic difficulties preoperatively, and there is no known report of M. tuberculosis affecting the aorta in the presence of a stent graft.

**Conclusion**

In countries which have a significant burden of the disease, TB should be considered when infection in an aortic graft or endovascular stent is suspected, and blood cultures are negative. Intraoperative samples should be sent for acid-fast bacillus stain, Xpert MTB, and mycobacterial cultures along with bacterial and fungal cultures and histopathology to confirm the diagnosis. Response to combined medical and surgical management in this patient was excellent.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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