CASE REPORT

A mycotic abdominal aortic aneurysm caused by *Listeria monocytogenes* in a patient with HIV infection

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SUMMARY

A 65-year-old man with HIV infection presented with acute severe abdominal pain radiating to the back. A CT scan revealed an infrarenal abdominal aortic aneurysm, and an aortobifemoral bypass was undertaken. Subsequently, tissue specimens from the aortic wall grew *Listeria monocytogenes*. The patient received 8 weeks of intravenous antibiotic treatment followed by oral sulfotrim as secondary prophylaxis and made an uneventful recovery.

BACKGROUND

Listeria monocytogenes is a Gram-positive intracellular bacterial pathogen that can cause severe disease primarily in individuals with defect in T-cellular immunity.^{1 2} Despite this, listeriosis is a rare infection in patients with HIV infection. This might be due to different immune defense mechanisms in HIV infection, for example, resident macrophages,^{3 4} T lymphocytes not expressing CD4⁵ and elevated levels of tumour necrosis factor α .⁶ Reports on listeriosis in patients who are HIV positive have been presented as bacteraemia,^{6–18} and a number of focal infections (see online supplementary table S1) such as meningitis,^{6–11 19–31} cerebral abscess,^{10 32 33} rhomboencephalitis,³⁴ pericarditis,³⁵ endocarditis,^{7 36} pleural infection^{37 38} and liver abscess.³⁸ Unlike listerial bacteraemia and meningitis in which use of immunosuppression and neoplastic diseases are predisposing factors, host factors seem to play an important role in infected vessels.³⁹

We present a rare case of an infected abdominal aortic aneurysm due to *L. monocytogenes* acknowledged after open surgery with implantation of a vessel graft in a patient with HIV infection.

CASE PRESENTATION

A 65-year-old man with untreated HIV-1 infection and a CD4 T lymphocyte count of 490/ μ L presented to the emergency department with severe abdominal pain preceded by a 3-day history of acute onset radiating back pain. The patient was previously healthy, but informed that the entire family 8 months earlier had an episode of gastroenteritis with several sick days.

On hospital admission the patient was affected by abdominal pain especially on palpation of the lower right quadrant of his abdomen. The general examination was otherwise unremarkable; in particular, there were neither peritoneal reaction nor

palpable abdominal masses. The blood pressure was 130/88 mm Hg, pulse 64/minute and body temperature 39°C. The lungs and heart were clear.

INVESTIGATIONS

Biochemical investigation showed a C reactive protein (CRP) of 231 mg/L (upper limit of normal 8 mg/L), an erythrocyte sedimentation rate (ESR) 107 mm with a white cell count within normal range 8.7×10^9 cells/L.

An abdominal CT scan with intravenous contrast revealed a 5 cm wide and 8 cm long infrarenal aortic aneurysm with periaortic soft tissue attenuation and fat stranding, but without suspicion of an infected or dissecting aneurysm (figure 1).

TREATMENT

An open aortobifemoral bypass was performed. The aneurysm showed no macroscopic features of inflammation. Atherosclerotic changes were found in the aortic bifurcation and in both arteria iliaca externa. A biopsy was performed from the aneurysm wall followed by insertion of a vessel graft around the native aneurysm wall. The patient was given preoperative antibiotic prophylaxis with intravenous teicoplanin 600 mg, and due to fever and rise in CRP postoperative treatment with intravenous piperacillin/tazobactam 4 g twice daily.

OUTCOME AND FOLLOW-UP

The patient made an uneventful early recovery and was started on simvastatin 40 mg $\times$ 1 and acetylsalicylic acid 75 mg $\times$ 1 the day following surgery. At third postoperative day growth with *L. monocytogenes* from the aortic wall biopsy was reported. Treatment with intravenous gentamycin 5 mg/kg four times a day was added, and at day 5 piperacillin/tazobactam was changed to intravenous ampicillin 2 g four times a day. Treatment duration was 8 weeks of intravenous ampicillin with change from intravenous gentamicin to peroral sulfamethoxazole with trimethoprim 400/80 mg thrice daily after 2 weeks. On day 10 the patient was educated in self-administration of intravenous therapy at home. On day 14 HIV treatment was started with the following regimen: tenofovir disoproxil/emtricitabine 245+200 mg once daily, darunavir 800 mg once daily and ritonavir 100 mg once daily aiming to improve the cellular immunity. After finishing the intravenous course of ampicillin, long-term secondary prophylaxis with sulfamethoxazole with trimethoprim 800/160 mg thrice daily was started,

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Figure 1 Contrast-enhanced CT scan of the coronal (A) and axial (B) sections revealing a 5 cm wide x 8 cm long infrarenal aortic aneurysm (arrow) with periaortic soft tissue attenuation and fat stranding.

reducing the dose gradually to 400/80 mg thrice daily after 4 months and to 400/80 mg once daily 11 months after surgery, aiming at continuing secondary antibiotic prophylaxis life-long. The follow-up was uneventful and inflammatory markers and creatinine normalised after 8 and 20 weeks, respectively. The response to HIV treatment was satisfactory with suppressed (<19 copies/mL) plasma HIV-RNA from week 14 after starting antiretroviral treatment, and a rise in CD4 cell count to 600/ μ L after 22 weeks.

At follow-up 10 months after surgery the patient was still well apart from diarrhoea probably linked to either treatment for HIV with a proteaseinhibitor-based regimen, or to antibiotic prophylaxis with sulfamethoxazole with trimethoprim. Inflammatory markers (CRP, ESR and leucocytes) were still within normal limits and a control MRI of the abdomen was unremarkable apart from sequelae after the operation.

DISCUSSION

The primary drug of choice in the management of listerial infection is ampicillin with added gentamicin.^{1 40} Our case was treated daily primarily with intravenous ampicillin 2 g four times a day in 8 weeks supplemented with gentamicin 5 mg/kg four times a day in 2 weeks followed by peroral sulfamethoxazole with trimethoprim 800/160 mg thrice daily in 4 months. The patient did clinically well during follow-up, but the vessel graft was considered chronically infected and sulfamethoxazole with trimethoprim was continued as life-long treatment with a dose reduction to 400/80 mg once daily. There are no consensus guidelines on whether treatment for listeriosis in patients with HIV infection should be discontinued after a time period or continued life-long, or how to manage listeria-infected arterial aneurysms. Most of the previously described cases of listeria infection in patients with HIV infection have been treated for an average of 4 weeks, but treatment duration is often not described (see online supplementary table S1). In the reported cases some patients have recovered without recurrences during follow-up and on no subsequent prophylaxis; however, for most of the cases follow-up was incomplete (see online supplementary table S1). An uneventful recovery has also been reported in patients with HIV with focal listeria infection treated with long-term peroral trimethoprim-sulfamethoxazole at follow-up after 1 year,³⁷ endovascular repair of culture-negative aortic

aneurysms treated with long-term antibiotic treatment⁴¹ and endocarditis treated with surgery, penicillin plus netimicin for 4 weeks seen at 2-year follow-up.³⁶ Three patients with HIV infection with non-listerial infected abdominal aneurysms were continued for several weeks on antibiotic treatment, and did clinically well during follow-up.⁴²

The clinical presentations of listeriosis are similar in patients with and without HIV infection.⁷ Nine of 11 described cases with arterial infection caused by *L. monocytogenes* in patients not infected with HIV, experienced abdominal or back pain and all but one were febrile.³⁹ Patients with HIV infection with listeriosis also presented with diarrhoea.^{6-7 9 20 35} *L. monocytogenes* can cause febrile gastroenteritis,⁴³ and the bacterium may enter through inflamed mucosa of the intestine.^{6 20} Mortality among patients with HIV infection with invasive listeriosis was between 29% and 35%.^{10 38} Listeriosis has been described as a late manifestation in advanced HIV infection,¹⁰ but has also occurred in a patient with HIV with a CD4 count within normal limits.^{9 36}

The reported annual incidence of listeriosis is 0.42–0.75/100 000 capita in Denmark.⁴⁴ Patients with HIV infection have been reported to have a 9–65-fold increased risk of invasive listeriosis compared to the general population.^{19 38} However, the incidence might be higher considering under-reporting, the use of antibiotics such as trimethoprim-sulfamethoxazole prophylaxis for *Pneumocystis carinii* and in some settings recommendations about dietary restriction.¹³ Since 1993, culture-positive listeriosis in Denmark has been notifiable by the Listeria Reference Center at the State Serum Institute, Denmark.

Arterial aneurysms in patients with HIV are frequently located to the abdominal aorta, however, often multiple vessels are implicated.^{45 46} Infection of the abdominal aorta is often located to pre-existing aneurysm rather than to bacterial invasion of a normal vessel,³⁹ direct invasions of fibroblasts by HIV or immune complex-related mechanism are the prevailing explanations rather than bacteraemia due to immunosuppression or molecular mimicry.⁴⁵⁻⁴⁷ Atherosclerotic vessels in the area of the aortic bifurcation might contribute to bacterial formation.⁴² Our case had not received antiretroviral therapy prior to the finding of the aneurysm,^{45 46} but therapy for HIV has been associated with increased risk of cardiovascular diseases.⁴⁸ Arterial reconstruction of HIV-related aneurysms using open surgery or endovascular repair has shown variable outcomes.^{41 45 46}

Patients who are HIV negative with infection of the abdominal aorta due to *L. monocytogenes* have shown variable outcomes; death within 30 days of surgery³⁴ while others survived on antibiotic treatment^{34 39 49} and open surgery plus additional antibiotic treatment.^{50–52} Listerial-infected graft after endovascular repair of an abdominal aortic aneurysm treated with either secondary laparotomy or debridement and antibiotic treatment or 6 months of sulfamethoxazole with trimethoprim showed good follow-up results.^{53–55}

Diagnostic imaging with CT scan is important in the acute stage, while the use of MRI and leucocyte radionuclide scanning are of great value for confirmation of the presence of infected grafts or aneurysms.³⁹

This case report presents a previously unreported triad of HIV, arterial aneurysm and listeriosis. It is important to consider infection with *L. monocytogenes* in the differential diagnosis of febrile illness in patients with HIV infection,⁹ and suspected in patients with aneurysms and a history of gastroenteritis.

Learning points

- Although uncommon, one must consider listeriosis in febrile patients with HIV infection.
- HIV-related aneurysms should be considered in the differential diagnosis of patients with HIV infection.
- Consider long-term or life-long secondary prophylaxis antibiotic treatment in patients who are HIV positive with infected vessel grafts.

Competing interests None.

Patient consent Obtained.

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