Case Report

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Yersinia enterocolitica: a rare cause of infected aortic aneurysm successfully treated with antibiotics and endovascular repair

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Introduction: *Yersinia enterocolitica* is a Gram-negative coccobacillus belonging to the family *Enterobacteriaceae*. We present a rare case of abdominal aortic aneurysm infected with *Y. enterocolitica* that was successfully managed using intravenous antibiotics and endovascular aneurysm repair.

Case presentation: A 74-year-old male was admitted with a 1-week history of feeling generally unwell with worsening abdominal pain radiating through to his back. Inflammatory markers were raised and blood cultures grew *Y. enterocolitica* biotype 2. A computed topography scan revealed a 50 mm infected abdominal aortic aneurysm. The patient was successfully treated with intravenous antibiotics and endovascular aneurysm repair.

Conclusion: Whilst endovascular aneurysm repair has been increasingly used to treat aortic aneurysms infected with a variety of pathogens, this is, to our knowledge, the first reported case of an aortic aneurysm infected with *Y. enterocolitica* being treated by such a technique. Further research is required to establish the long-term outcomes of patients undergoing endovascular repair of infected aneurysms.

Keywords: abdominal aortic aneurysm; antibiotics; endovascular repair; *Yersinia enterocolitica*.

Introduction

Yersinia enterocolitica is a Gram-negative coccobacillus belonging to the family *Enterobacteriaceae*. It is widely disseminated within aquatic and animal reservoirs and infections are typically transmitted to humans by ingestion of contaminated food or water, usually invoking a range of gastrointestinal symptoms (Bottone, 1997).

Infected aortic aneurysms are a rare but life-threatening condition, with *Staphylococcus* spp. and *Salmonella* spp. being the most commonly isolated organisms (Moneta *et al.*, 1998). To our knowledge, only 14 cases of infected aneurysms associated with *Y. enterocolitica* have been reported in the literature.

Traditionally, infected aneurysms are treated with antibiotics and aggressive surgical debridement of the infected tissue with vascular reconstruction. We report the first known case of aortic aneurysm infected with *Y. enterocolitica* to be successfully treated with antibiotics in combination with a minimally invasive endovascular aneurysm repair (EVAR).

Abbreviations: CT, computed topography; EVAR, endovascular aortic repair.

Case report

A 74-year-old male presented to the emergency department with a 1-week history of feeling generally unwell with worsening right-sided abdominal pain radiating through to his back. He denied fevers, vomiting or urinary symptoms, but reported one episode of diarrhoea 2 weeks prior to presentation. He was under surveillance for a known abdominal aortic aneurysm, which 3 months prior to admission had measured 50 mm. Other past medical history included hypertension, non-ST elevation myocardial infarction, reflux disease and non-invasive prostate cancer.

On examination, the patient was afebrile and haemodynamically stable. His chest was clear on auscultation and his abdomen was soft with minimal tenderness centrally on palpation. There was no palpable or expansile abdominal mass on initial examination.

Investigations

Blood tests revealed a C-reactive protein level of 296 mg l⁻¹, haemoglobin at 143 g l⁻¹, white blood cells at 18.4 × 10⁹ l⁻¹ with neutrophils at 15.7 × 10⁹ l⁻¹, urea at 16 mmol l⁻¹ and creatinine at 117 μmol l⁻¹.

An abdominal computed topography (CT) scan demonstrated a fusiform aneurysmal dilatation of the infrarenal abdominal aorta measuring 55 mm at the greatest diameter. Moderate fat stranding anterior to the aneurysm gave an appearance consistent with that of an inflammatory aneurysm. There was no evidence of leak or rupture (Fig. 1).

One set of blood cultures were obtained on admission, prior to commencement of antibiotics. Anaerobic blood cultures were negative after 5 days of incubation. However, aerobic blood cultures grew *Y. enterocolitica* biotype 2. The species was identified using matrix-assisted laser desorption/ionization time-of-flight technology. Further biotype characterization was confirmed using the method of Wauters *et al.* (1987). Disk diffusion antibiotic sensitivity testing found the organism to be resistant to amoxicillin and co-amoxiclav but susceptible to nalidixic acid, ciprofloxacin, cefuroxime, ceftriaxone, tobramycin and gentamicin. Stool sample analysis showed no growth.

Treatment

Empirical treatment with intravenous amoxicillin, metronidazole and gentamicin was started on admission. Once blood culture results became available, the patient was switched to intravenous ciprofloxacin, at a dose of 400 mg twice daily.

Antibiotics alone did not lead to any clinical improvement. Serial blood tests revealed worsening inflammatory markers and a repeat CT scan 3 days post-admission showed no acute increase in the size of the abdominal aortic aneurysm but a slight increase in the inflammatory stranding.

In view of this, the patient underwent endovascular repair and fenestrated stent placement. The procedure was

successful with no immediate complications. He was monitored in intensive care for 2 days post-operatively prior to transfer back to the surgical ward. On day 2 post-procedure, the patient was switched to 500 mg oral ciprofloxacin twice daily. This regimen was continued for a total of 8 weeks. A repeat CT scan 9 days post-procedure showed no evidence of endoleak (Fig. 2). Repeat aerobic and anaerobic blood cultures obtained on days 1 and 7 post-EVAR were negative after 5 days of incubation.

Outcome and follow-up

The patient made a gradual recovery, complicated by periods of confusion, poor mobility and deconditioning, requiring substantial physiotherapy and nutritional support. There have been no surgical complications from the procedure. He was discharged from hospital 6 weeks post-EVAR, with follow-up scheduled from both the surgical and the infectious diseases teams.

Discussion

Y. enterocolitica is a Gram-negative coccobacillus belonging to the family *Enterobacteriaceae*. It is primarily an enteric pathogen that typically presents in humans with gastrointestinal symptoms such as gastroenteritis, terminal ileitis and mesenteric lymphadenitis (Bottone, 1997). It is commonly found in animal, water and soil reserves, with pigs serving as the main reservoir for strains that are pathogenic in humans (Bottone, 1997). Transmission is typically via the faecal–oral route or via ingestion of contaminated food products (Bottone, 1997). However, there have also been cases of transmission to humans via contaminated blood products (Stenhouse & Milner, 1982).

Fig. 1. Abdominal CT scan showing an infective abdominal aortic aneurysm measuring 55 mm, with inflammatory change within the adjacent intraperitoneal fat.

Fig. 2. Abdominal CT scan post-EVAR, showing stent placement with no evidence of endoleak and continued stranding around the aneurysm sac.

'Infected aneurysm' is an overarching term, encompassing mycotic aneurysms, bacteraemia-related infection of an existing aneurysm and trauma-related infected false aneurysms (Bisdas & Teebken, 2011). Infected aortic aneurysms are uncommon, accounting for just 0.7–2.6 % of all aortic aneurysms (Hsu *et al.*, 2004). The most commonly isolated bacteria are *Staphylococcus* spp. and *Salmonella* spp. (Moneta *et al.*, 1998). *Y. enterocolitica* is a rare cause of infected aortic aneurysm, with only 14 cases reported in the literature so far (Donald *et al.*, 1996; Hagensee, 1994; Knudsen *et al.*, 1993; La Scola *et al.*, 1997; Mason *et al.*, 2014; Mercie *et al.*, 1996; Prentice *et al.*, 1993; Tame *et al.*, 1998; Van Noyen *et al.*, 1987; Van Steen *et al.*, 1989). To our knowledge, this is the first reported case of an aortic aneurysm infected with *Y. enterocolitica* in New Zealand and only the second in Australasia (Tame *et al.*, 1998).

Infected aortic aneurysms are associated with high morbidity and mortality (Kan *et al.*, 2007) and present a challenging clinical dilemma for clinicians. Traditionally, open surgery with debridement and extra-anatomic bypass together with antibiotic cover has been the treatment of choice (Forbes *et al.*, 2006; Moneta *et al.*, 1998). However, with the rise of endovascular treatment options, more clinicians are opting to treat patients with endovascular insertion of a stent. The efficacy of this intervention, however, remains unproven and contentious (Kan *et al.*, 2007, 2010; Razavi & Razavi, 2008), with many clinicians concerned that placing a prosthetic graft into an area of active infection will lead to persistent graft infection and further complications such as aortic rupture (Kan *et al.*, 2007; Tame *et al.*, 1998).

Following the first reported case of endovascular repair of an infected aneurysm (Semba *et al.*, 1998), there has been an increasing number of cases reported in the literature whereby EVAR has been successful (Jones *et al.*, 2005; Kan *et al.*, 2010; Kinney *et al.*, 2000; Liu *et al.*, 2000; Ting *et al.*, 2006; Sorelius *et al.*, 2009). There have also, however, been a number of cases in which there were serious complications including death (Forbes *et al.*, 2006; Gavens *et al.*, 2011; Kan *et al.*, 2010; Labrousse *et al.*, 2007; Sorelius *et al.*, 2009). Consequently, there is currently no consensus as to the gold-standard treatment of choice.

In conclusion, whilst EVAR has been increasingly used to treat aortic aneurysms infected with a variety of pathogens, it has not, to our knowledge, been used previously to treat an aortic aneurysm infected with *Y. enterocolitica*. Although only an isolated case, the successful outcome for this patient suggests that EVAR, together with antibiotics, should be considered as a possible treatment for *Y. enterocolitica*-infected aortic aneurysms. Further research is needed, however, to establish not only the immediate benefits and risks of such treatment but also the long-term outcomes of patients undergoing EVAR. It remains to be seen whether EVAR is a long-term solution for such patients or whether it would be better used as a

bridging therapy while the patient prepares for definitive surgical treatment.

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