CASE REPORT

Successful treatment of *Salmonella* aortitis with endovascular aortic repair and antibiotic therapy

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SUMMARY

We report a case of a 77-year-old Asian man with a history significant for type II diabetes mellitus and chronic kidney disease who presented with abdominal pain, nausea, vomiting and a 20-pound weight loss of 3 weeks' duration. Further evaluation revealed an infected mycotic aneurysm and distal abdominal aortitis as a result of *Salmonella*. This case demonstrates an interesting case of aortitis and a successful therapeutic approach.

BACKGROUND

Infectious aortitis refers to an inflammatory process within the arterial wall in response to microorganisms. Possible mechanisms include septic emboli to the vessel, direct inoculation and seeding in an existing intimal injury or continuous infection which extends through to the arterial wall. It is a rare disorder associated with significant morbidity and mortality. We report a case of a patient with aortitis due to *Salmonella* successfully managed with endovascular aortic repair (EVAR) and antibiotic therapy.

CASE PRESENTATION

The patient, a 77-year-old Asian man, with a medical history significant only for type II diabetes mellitus and chronic kidney disease presented to his primary care physician with abdominal pain, nausea, vomiting of 10 days' duration and an accompanying 20-pound weight loss of 21 days' duration. He is a resident of New York who has made several recent trips to China. He denied any fevers or chills, and any correlation of initial symptoms with certain foods. He endorsed smoking pipes recreationally in the past but had quit all tobacco products 10 years prior. His atherosclerotic risk factors included his remote history of smoking, hypertension (well controlled on a β -blocker) and diabetes mellitus (diet controlled).

INVESTIGATIONS

At the outside hospital, an initial CT scan was performed which revealed moderately pronounced inflammatory findings centred on the aortic bifurcation. There was morphology of inflammatory pseudoaneurysm, with a luminal outpouching measuring approximately 15×17 mm, with fusiform soft tissue thickening around the focus extending 6.6 cm vertically and 4.3 cm transversely in width. These findings were suggestive of an infected mycotic aneurysm and distal abdominal aortitis (figure 1). At this point, the patient was

Figure 1 CT scan demonstrating inflammatory aortitis at its bifurcation with an inflammatory pseudoaneurysm within the phlegmon.

transferred to a tertiary care facility for further evaluation and surgical intervention. The patient underwent an extensive diagnostic workup. Serological studies were diagnostic of a recent *Salmonella* infection (see table 1).

Table 1 Serological studies

Serological tests	
Cytoplasmic ANCA	Negative <1:20
Perinuclear ANCA	Negative <1:20
Atypical pANCA	Negative <1:20
ANA screen	Negative
C reactive peptide	15.8
Sedimentation rate	>140
Syphilis (<i>Treponema pallidum</i>) IgG	Non-reactive
HIV-1/2 antibodies	Non-reactive
RPR (STS)	Non-reactive
<i>Salmonella</i> H. Group A	Equivocal
<i>Salmonella</i> H. Group B	Equivocal
<i>Salmonella</i> H. Group D	Equivocal
<i>Salmonella</i> O. Group V	Positive (>1:160)
<i>Salmonella</i> O. Group D	Negative
White cell count	21.8
IGG quantitative (IgG4)	2301 (187)
Follow-up inflammatory markers	
C reactive peptide	<0.3
Sedimentation rate	81

ANCA, anti-neutrophil cytoplasmic antibody; ANA, anti-nuclear antibody; RPR, rapid plasma reagin; STS, serologic test for syphilis; IGG, immuno-globulin.

DIFFERENTIAL DIAGNOSIS

► Tuberculosis: Tuberculous aortitis, an uncommon problem in the developed world, may occur as a result of direct seeding of the thoracic aorta from adjacent infected tissues such as infected lymph nodes or lung lesions or by

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miliary spread. Being that the patient is native-born from China and made frequent visits, it remained on our differential.

- ▶ IgG4 disease: IgG4-related systemic disease is a newly recognised disorder that may manifest as thoracic aortitis, inflammatory abdominal aortic aneurysm or retroperitoneal fibrosis. An IgG4-related systemic disease should be considered in any patient found to have aortitis or periaortitis.
- ▶ Syphilis: Syphilitic or luetic aortitis, now exceedingly rare, typically involves the ascending aorta and is associated with thoracic aortic aneurysm. Being that the patient is native born from China and made frequent visits, it remained on our differential, albeit lower on the list.
- ▶ Autoimmune disease: Several autoimmune phenomena are associated with aortitis including giant cell arteritis, Takayasu arteritis, rheumatoid arthritis, systemic lupus erythematosus, Wegener granulomatosis, Behçet disease, polyarteritis nodosum and microscopic polyangiitis. His elevated C reactive peptide and sedimentation rate were initially suggestive of an autoimmune aetiology, however, it was later thought to be unlikely given the negative ANA screen, cANCA and pANCA.

TREATMENT

Once transferred to the tertiary care facility, the patient was started on broad-spectrum antibiotics, which were set to be for a total duration of 3 months. A vascular surgeon performed an endovascular repair with stenting of the distal aorta (figure 2) using Gore Excluder AAA Endoprosthesis. His preoperative course was uncomplicated.

OUTCOME AND FOLLOW-UP

The patient improved during the course of his hospitalisation. Initially placed on broad-spectrum antibiotics, his antibiotic

regimen was tailored once serologies returned. He did not incur any complications during his hospitalisation. He was discharged on intravenous antibiotics and is currently following up as an outpatient with infectious disease and vascular surgery. To date, the patient's follow-up inflammatory markers and repeat CT (figure 3) demonstrate an improvement in his aortitis. The repeat CT depicts an interval decrease in size in addition to resolution of surrounding fatty stranding seen in the initial study. A small high attenuation area within the anterior hypodensity also shows moderate interval decrease in attenuation. These findings are suggestive of interval improvement in the patient's aortitis.

DISCUSSION

Salmonella is a Gram-negative, non-spore forming motile enterobacteria. Recently, the incidence of non-typhoidal *Salmonella* infections has increased dramatically in Western countries. *Salmonella* is implicated in gastroenteritis and enteric fever, as well as osteomyelitis, meningitis and endovascular lesions. Vascular infections secondary to *Salmonella* may involve the coronary arteries, thoracic and abdominal aorta, prosthetic valves and vascular grafts.¹

Salmonella aortitis is a rare disorder, with a mortality rate of up to 36%.² Chen *et al*³ investigated the risk factors for vascular infection in 358 patients with *Salmonella* bacteraemia. In this study, four risk factors that were noted to be significantly associated with vascular sequelae, which included male sex, history of coronary artery disease, hypertension and serogroup C1 infections. Patients suspected of *Salmonella* aortitis can be diagnosed primarily by radiological imaging, culture data and serology. Signs and symptoms tend to be non-specific and include abdominal discomfort, fever, back pain, nausea or vomiting.⁴ On making the diagnosis, it is imperative to start intravenous antibiotic therapy and consult a vascular surgeon for evaluation of endovascular intervention.

Soravia-Dunand *et al*¹ recently published results from a case series (10 patients) and literature review which included a total of 150 cases. These authors reported an increased survival rate in patients treated with early surgical intervention in

Figure 2 CT scan demonstrating abdominal-bilateral common iliac endovascular stent graft and successful repair of aortitis.

Figure 3 CT scan demonstrating interval improvement of aortitis.

Learning points

- ▶ *Salmonella* aortitis is a rare condition associated with significant morbidity and mortality.
- ▶ Diagnosis of *Salmonella* aortitis is based primarily on radiographic and serological evidence. Once diagnosed, aggressive antibiotic therapy should be initiated and the patient should be evaluated for potential endovascular repair.
- ▶ Risk factors for developing vascular sequelae, that is, aortitis, in patients with *Salmonella* bacteraemia include male sex, history of coronary artery disease, hypertension and serogroup C1 infections.
- ▶ The total duration of antibiotic therapy remains controversial, with many experts advocating lifelong oral suppression therapy. At a minimum, antimicrobial therapy should be continued for 6 weeks after successful surgical repair.

conjunction with intravenous antibiotic therapy. Kan *et al*⁵ recently evaluated the use of EVAR in 12 consecutive patients with infected aortic aneurysms, 10 of which were attributed to *Salmonella*. In this series of patients, there was no in-hospital mortality and only one late death (unrelated to reinfection), which led the authors to conclude that EVAR in conjunction with aggressive intravenous antibiotic therapy may be a suitable approach for the treatment of *Salmonella* aortitis.

The optimal duration of antibiotic therapy remains controversial, with some experts advocating lifelong suppressive therapy.⁶ Balestra *et al*⁷ described a patient who was treated with endovascular repair and lifelong oral ciprofloxacin suppression therapy with subsequent imaging studies demonstrating disease resolution. Strahm *et al* reported resolution of aortitis in a patient who underwent EVAR with 12 months of antibiotic therapy.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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