

# Pneumococcal aortitis: an insidious diagnosis

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## ABSTRACT

A patient with *Streptococcus pneumoniae* aortitis is presented. Because of nonspecific symptoms (fever and back pain) there was a long diagnostic delay. In addition, the aortitis was located near the renal arteries which severely hampered early surgical treatment. Although emergency surgery was performed when aortic rupture occurred, the patient did not survive. Infectious arteritis of large vessels is a diagnosis often made late and associated with high mortality.

## KEYWORDS

*Streptococcus pneumoniae*, aortitis, fatal outcome, antibiotics, surgery

## INTRODUCTION

Bacterial infections of the cardiovascular system have long been known<sup>1,2</sup> and are associated with high mortality as they may present insidiously.<sup>3</sup> Infectious aortitis is usually a post-mortem diagnosis.<sup>4</sup> Most commonly, bacterial aortitis is caused by *Salmonella* and *Staphylococcus* species.<sup>3,5,6</sup> We discuss a patient with *Streptococcus pneumoniae* aortitis with a long diagnostic delay. Moreover, it was located near the renal arteries which severely hampered early surgical treatment. Despite emergency surgery when the aortitis resulted in (contained) aortic rupture, the patient did not survive. Infectious arteritis of large vessels is a diagnosis often made late and associated with high mortality.

## CASE REPORT

A 63-year-old relatively healthy white male experienced fever without any other complaints two months before

### What was known on this topic?

It is long known that infections of the large vessels can be life-threatening. However, aortitis is a very rare manifestation of bacteraemia and is usually a post-mortem diagnosis. Most commonly, bacterial aortitis is caused by *Salmonella* and *Staphylococcus* species. The experience with aortitis caused by *Streptococcus pneumoniae* is limited.

### What does this case add?

There are two principal points that this case report adds. 1) Aortitis is a difficult diagnosis because of the nonspecific presenting symptoms and, subsequently, can have a long diagnostic delay which will inevitably complicate treatment. Hence, awareness of such a possibly fatal diagnosis is required for doctors confronted with a patient with long-lasting fever and back or abdominal pain. 2) This case report adds to our knowledge that pneumococcal aortitis can not be treated by antibiotics alone (possibly also due to point 1). Instead, surgical treatment is the ultimate treatment modality and delaying surgical intervention may result in loss of the patient. This notwithstanding, the reasons to delay surgical intervention may be obvious as is also shown in this case report. We illustrate the difficult medical decision-making when confronted with pneumococcal aortitis.

admission. Medical history revealed diabetes mellitus type 2 (for which he received metformin) and smoking. A week passed and fever regressed to a subfebrile temperature. He was still able to play tennis, but gradually back pain emerged for which he used acetaminophen. His general practitioner prescribed a five-day course of azithromycin but this was not effective. The pain intensified and he started non-steroidal anti-inflammatory drugs. As he now could no longer play tennis, he was

referred to the regional hospital. A five-day course of moxifloxacin temporarily lowered his temperature but did not relieve the pain.

At the outpatient clinic the patient's physical examination was unremarkable except for a temperature of 37.8 °C. The erythrocyte-sedimentation rate was raised (100 mm/h, ULN 20 mm/h), as were leukocyte count (12 x 10<sup>9</sup>/l, ULN 10,5) and C-reactive protein (107 mg/l, ULN 5 mg/l). Creatinine (71 µmol/l, ULN 110 µmol/l), urine analysis and chest-radiography were normal.

When opioids became necessary to relieve the pain, positron emission tomography-computed tomography (PET-CT) was planned for suspected spondylodiscitis. Because fever did not recur, blood cultures were not performed. PET-CT (*figure 1*) showed a fluorodeoxyglucose hotspot at the ventral side of the abdominal aorta near the renal arteries, best compatible with aortitis. Subsequently, he was referred to our tertiary academic referral hospital.

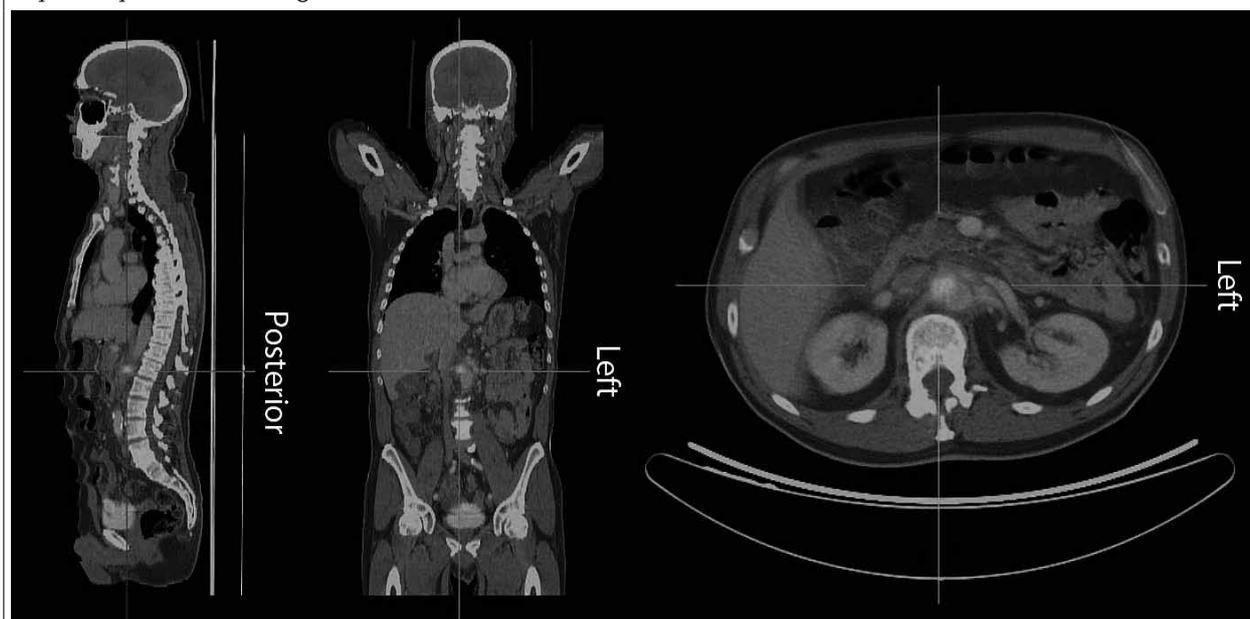
The patient was admitted, physical examination was still unremarkable (temperature 37.6 °C), erythrocyte-sedimentation rate (117 mm/h), leukocyte count (17x10<sup>9</sup>/l), C-reactive protein (309 mg/l), creatinine (122 µmol/l), glucose (21.8 mmol/l, ULN 5,6 mmol/l) and HbA1c (8,5%, ULN 6%) were all increased. Blood cultures were taken and the next day penicillin sensitive Gram-positive bacteria were cultured appearing to be *Streptococcus pneumoniae*. High-dose intravenous penicillin (12 x 10<sup>6</sup> international units/day) was started but lowered to 6 x 10<sup>6</sup> international units/day when kidney function deteriorated (creatinine 246 µmol/l). Because of the positive cultures, impaired

kidney function, the absence of a (false) aneurysm and the complex location of the aortitis, it was decided to optimise the patient by intravenous antibiotics before proceeding to surgery. CT angiography was scheduled to be performed in seven to ten days to assess aneurysm formation. Subsequently, the creatinine declined again but the patient's blood pressure started to rise to 160/90 mmHg for which nifedipine was started. Transthoracic and transoesophageal echocardiography did not reveal signs of endocarditis.

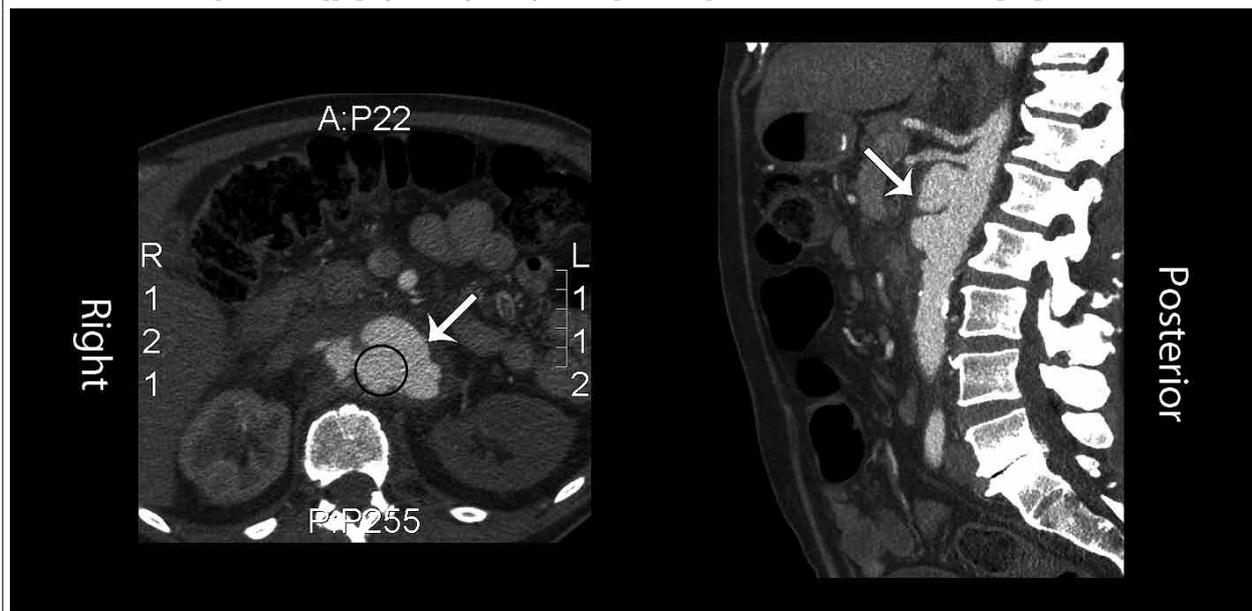
Although the patient's back pain now demanded opioids six to eight times daily he was in a relatively good condition and walking around. Hydration with saline resulted in further creatinine lowering while a MAG3 scan revealed delayed perfusion of the left kidney with a relative contribution of 41%. His temperature and infection parameters also declined (C-reactive protein 88 mg/l, leukocytes 12 x 10<sup>9</sup>/l). Haemoglobin concomitantly decreased slightly from 6.4 to 5.6 mmol/l, then considered to be the result of hydration and continuing infection. Despite the impaired kidney function (creatinine 139 µmol/l) CT angiography was performed after ten days. It showed a contained aortic rupture with a haematoma encompassing both renal arteries (*figure 2*). The left kidney appeared to be hardly perfused and the right kidney was supplied by an accessory artery located just below the aneurysm.

Emergency surgery was performed the same day by a left-sided retroperitoneal approach and distal thoracotomy. A severely infected aorta and surrounding tissue were encountered. The aorta was replaced by a Dacron graft from the superior mesenteric artery to the aorta bifurcation. The renal arteries could not be reconstructed

**Figure 1.** Positron emission tomography – computed tomography (PET-CT) showing a fluorodeoxyglucose hotspot at the ventral side of the abdominal aorta at the level of the renal arteries best compatible with aortitis. The aorta did not show any aneurysms or other irregularities



**Figure 2.** CT scan showing a contained rupture of the aorta (circle) with a haematoma (arrows) encompassing both renal arteries. Additionally there is hypoperfusion of the left kidney. Notably, no unusual atherosclerotic plaques were documented



due to severe destruction of the arterial wall and had to be sutured, resulting in the need for permanent dialysis. The remaining arterial wall was considered of acceptable quality to perform secure anastomoses. Gentamycin sponges were wrapped around the prosthesis and native aorta. After an operation of 5.5 hours the patient was stable and transferred to the intensive care unit. There he remained stable for 4.5 hours after which a sudden sharp fall in blood pressure and haemoglobin (5.2 to 2.5 mmol/l) quickly resulted in cardiac arrest. Although resuscitation was started within seconds, the patient died while being transferred back to the operating theatre. The relatives did not authorise autopsy.

## DISCUSSION

We present an insidious case of pneumococcal aortitis with fatal outcome despite treatment with high-dose intravenous penicillin and emergency surgery. As autopsy was not performed we can only speculate on the sudden death due to severe bleeding. Rupture of an anastomosis due to poor suture holding or any other technical shortcoming is most likely.

Infectious aortitis is rare but potentially life-threatening. Aortitis with *Streptococcus pneumoniae* has been reported,<sup>7-10</sup> although pneumococcal bacteraemia with the clinical presentation of aortitis is very rare.<sup>11</sup> While there are reports of aortitis in children, the usual presentation is an older male febrile patient with underlying atherosclerotic disease and back or abdominal pain.<sup>7-8</sup> As far as we are aware, there are no reports of successful outcome with antibiotic treatment alone, also surgical intervention yields only around 50% survival.<sup>6,7</sup>

The present case was in a sense typical for pneumococcal aortitis with long diagnostic delay.<sup>7</sup> Blood cultures might have been positive earlier, although bacteraemia may not always be present.<sup>6</sup> Whether earlier intravenous penicillin would have resulted in a different outcome is uncertain but likely. This might have prevented emergency surgery in a severely infected aorta as opposed to elective surgery. Although the patient's atherosclerotic burden on CT was not unusual for his age, his diabetes mellitus and smoking did pose him to higher cardiovascular risk, in this case the ominous nesting of *Streptococcus pneumoniae* near the renal arteries.

In conclusion, infectious aortitis is an insidious diagnosis associated with high mortality. It often presents in a nonspecific manner but long-lasting elevated temperature and abdominal or back pain should raise suspicion and warrant further investigations. When suspected, direct initiation of broad-spectrum intravenous antibiotics while awaiting blood cultures is mandatory. Surgical intervention with debridement of the focus of infection is the ultimate treatment modality, although timing is difficult. Imaging techniques (e.g. CT, PET-CT, MRI)<sup>7,9,10</sup> may help to confirm the diagnosis and guide treatment.

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