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Case Report

Pneumococcal urinary antigen test: A tool for pneumococcal aortitis diagnosis?☆

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ABSTRACT

Introduction: Aortitis is rare. The etiological diagnosis is difficult but essential for treatment. Even with appropriate treatment mortality remains high. We present a case of pneumococcal aortitis followed by a brief review of the literature.
Presentation of Case: In this case, the aortic disease was characterized by multiple inflammatory aneurysms. Blood cultures were negative but urine was tested for the presence of pneumococcal urinary antigen postoperatively was positive. Treatment consisted of antibacterial therapy and both surgical and endovascular procedures. The patient was discharged and is well.
Discussion: Preoperative determination of etiology is crucial in implementing a specific treatment. Pneumococcus is a common bacterium in infectious aortitis. Identification of the causative microbe is necessary to guide antimicrobial therapy. Blood cultures are frequently sterile. The pneumococcal urinary antigen test may be more sensitive than blood cultures, as is the case in pneumococcal pneumonia.
Conclusions: The pneumococcal urinary antigen test may was a useful diagnostic tool in establishing the cause for aortitis in this case. Its potential value should be assessed in furthers studies.

Introduction

Aortitis has various etiologies, most common being vasculitis, and infectious. An etiological determination is crucial in implementing specific treatment. Diagnosis involves imaging and nuclear medicine techniques. An inflammatory or infectious cause should be differentiated after identification of aortitis [1] and may be difficult. Mycotic aneurysm is a rare subset of aneurysms (0.06–2.6%) and has amortality rate that can reach 25% even with adequate therapy [2–4].

The pneumococcal urinary antigen test is commonly used to increase diagnosis in cases of pneumonia. We present a case with pneumococcal aortitis and found this diagnostic tool useful in establishing the cause for aortitis.

Case report

A 53-year-old woman presented with lumbar pain suggestive of a kidney stone. She was a frequent smoker, suffered from alcoholism, had undergone cervical conization and was in remission of anal margin cancer after radiotherapy and chemotherapy. There was no history of fever. A CT without contrast did not find evidence of kidney stone. The patient was hospitalized for persistent pain and raised levels of inflammatory markers (leukocytosis at 9.5×10^9/L and C reactive protein at 129 mg/L). Subsequently, a CT angiography showed three separate aortic aneurysms with surrounding inflammatory processes: two in the abdominal aorta (Fig. 1A) and one in the thoracic aorta (Fig. 1B). Positron Emission Tomography using Fluorinated Desoxyglucose (FDG-PET) and Labelled Leucocyte Scintigraphy (LLS) were suggestive of a septic process in the thoracic aorta aneurysm and in the abdominal aorta aneurysm located below the left renal artery (hypermetabolic activity with LLS in agreement with FDG-PET) (Fig. 2). Transthoracic echocardiography found no valvular lesion.

Serial blood cultures yielded no growth. Step by step surgical management was elected 19 days after admission. A surgical

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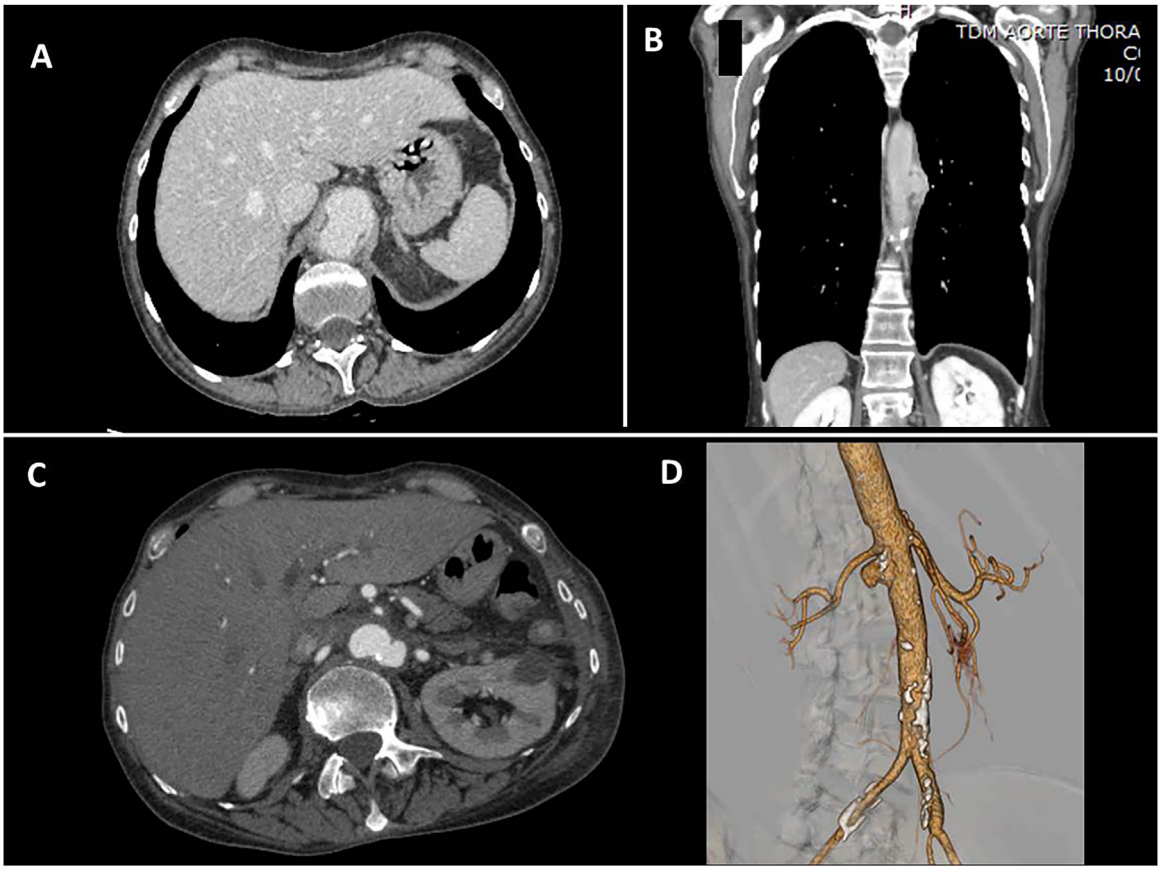

Fig. 1. CT angiography. **A:** Initial CT angiography showing abdominal aortic aneurysm upstream of the coeliac axis (28 × 23 × 29 mm) in axial view. **B:** Initial CT angiography finding an aneurysm on the descending thoracic aorta (18 × 9 mm and 22 mm in height) with an inflammatory aspect as observed in coronal view. **C:** Control CT angiography 9 days after surgery showing an increase in size of the abdominal aorta infrarenal aneurysm (10 × 8 × 10 mm) in axial view. **D:** Control CT angiography 3-dimensional reconstruction.

debridement of the abdominal aorta aneurysm upstream of the celiac axis was performed. An aorto-aortic bypass was performed with cryo-conserved aortic allograft in an interposition at the thoracoabdominal junction. Empiric antibacterial therapy by piperacillin/tazobactam, gentamicin, and vancomycin was initiated. The postoperative course was uncomplicated. Urinary pneumococcal antigen was positive and intraoperative specimens report *Streptococcus. pneumonia*. Antibacterial therapy was changed to cefotaxime (for 4 weeks) and gentamicin (for 2 weeks). A CT 9 days after surgery showed an increased size of the two aneurysms (Fig. 1.C.D). Two weeks after the first surgery an endovascular procedure to exclude the descending thoracic aortic aneurysm was conducted. Finally, 4 weeks after the first surgery, infrarenal aortic replacement by allograft cryo-conserved was performed. The surgical specimen remained sterile. The postoperative course was uneventful. The patient was discharged with oral amoxicillin for 3 months (amoxicillin) after recovering her normal diet.

Discussion

Mycotic aneurysms are usually solitary, but multiple locations have already been described [5,6]. Atheromas appear to be the main risk factor for subsequent infection [3]. Several mechanisms have been considered, the most common being bacteremic seeding leading to weakness of the aortic intima. Primary pneumonia has been suggested as a source for pneumococcus [3]. Others risk factors include steroid or other immunosuppressive agents use, alcoholism, chronic renal failure, and diabetes [7]. Staphylococcal species, salmonella species and *Streptococcus pneumoniae* (12%) are the most frequently encountered microorganisms [4,8]. The classical clinical picture includes fever, chest, back or abdominal pain associated with an inflammatory biological syndrome occur in 33% of cases [2]. Aneurysm rupture represents the main risk and can occur without preceding dilation [3].

The immediate or delayed surgical management includes resection of the septic aortic pseudoaneurysm [6]. The bypass can be achieved with a prosthetic graft or an in situ allograft [2] with no superiority of one over the other [9]. Graft infection is a known risk of the procedure [5].

Small case series have demonstrated the feasibility of endovascular treatment [10–12] with survival rates varying from 40 to 82%. Additional surgical treatment such as debridement or percutaneous drainage is protective but not essential [10].

Fever at the time of the surgical procedure is predictive of persistent endovascular graft infection [13]. Antibacterial therapy is a key element of the preoperative management. Identification of the causative microbe is necessary to guide antimicrobial therapy and thus eliminate vasculitis. Antibacterial therapy alone is sufficient only in rare cases [1].

The early identification of an infectious agent is crucial. Patients frequently receive inappropriate therapy due to delayed diagnosis (e.g. use of corticosteroids for suspected inflammatory aneurysms) [14]. Conventional microbiological techniques have low sensitivity. Blood cultures are positive in 40–60% of cases [3,4]. Intraoperative specimens culture can also be misleading because they are only positive in 10–75% of cases [3]. Molecular biology techniques may be of interest but can only be used postoperatively.

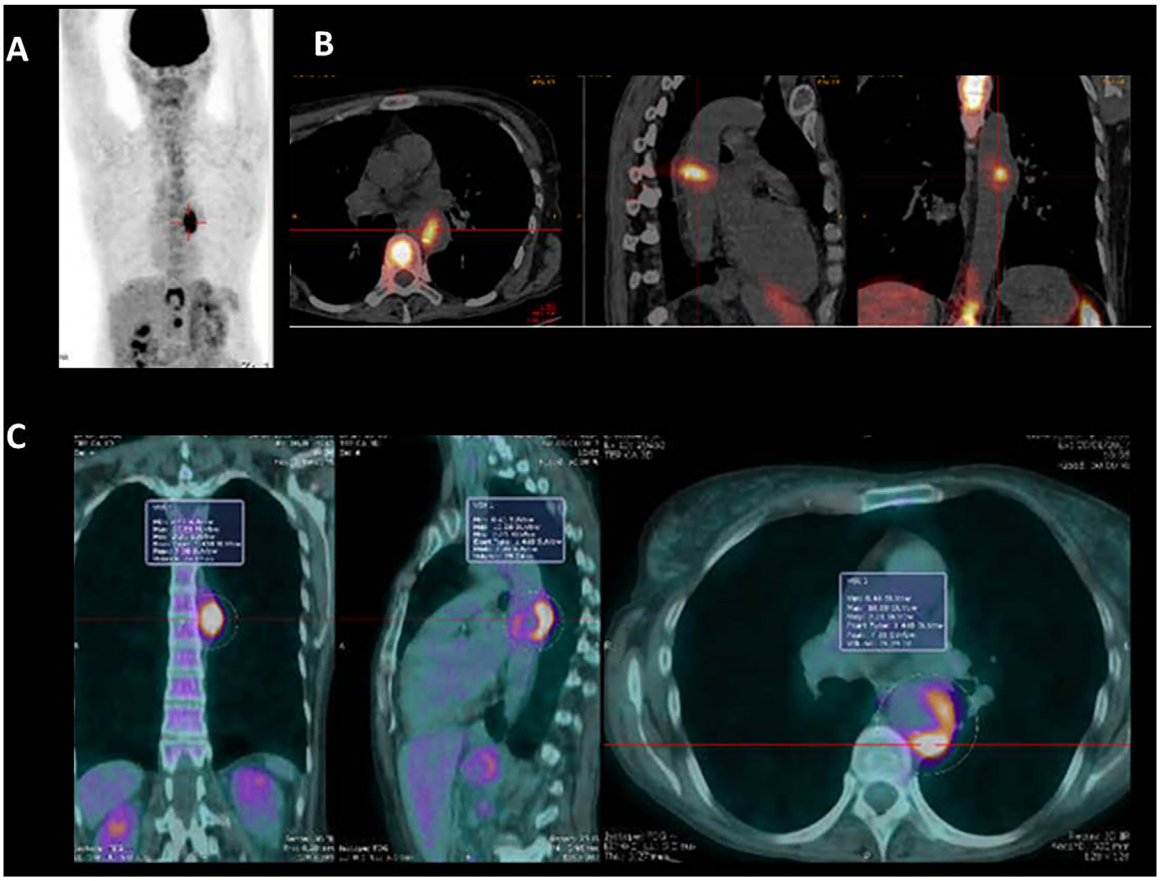

Fig. 2. Nuclear medicine images of the descending thoracic aorta. **A.** Fluorinated Desoxyglucose Scintigraphy has shown a paravertebral hypermetabolic activity. **B.** Positron Emission Tomography using Fluorinated Desoxyglucose (FDG-PET) showing the origin of this hyperactivity located on aneurysm of the descending thoracic aorta. **C.** Activity has shown on aneurysm of the descending thoracic aorta with Labelled Leucocyte Scintigraphy (LLS) in agreement with FDG-PET, suggestive of a septic process in the thoracic aorta aneurysm with adjacent infiltration.

In acute community-acquired pneumonia, Binax NOW S. pneumoniae assay, a pneumococcal urinary antigen test, has increased the etiological diagnosis to values varying between 39 and 50% [15–17]. Estimated sensitivity and specificity were 74% and 97%, respectively [18]. The assets of this technique are its rapidity (15 min), simplicity and ability to detect pneumococci even after antimicrobial administration [19]. This test may be used in the preoperative assessment of inflammatory aneurysms. Concurrent vasculitis, endocarditis, and syphilis should also be investigated. Aortitis is more likely to be bacteremic than pneumonia because it is a located infection in the vascular system. Sensitivity was reported to be higher for bacteremic pneumococcal pneumonia than for non-bacteremic cases [20]. The pneumococcal urinary antigen test may be more sensitive than blood cultures, as is the case in pneumococcal pneumonia. The lower sensitivity of blood cultures could be explained by the need for higher concentration of circulating bacteria, the use of antibacterial therapy and histological presentation with vascular wall micro-abscesses that are not directly in contact with bloodstream. This positive test should lead to utilize antimicrobial therapy with good activity against the pneumococcus and, if possible, wait for apyrexia before surgical management. Future research should assess the value of this diagnostic test.

In summary, in infectious aortitis blood cultures may be sterile and the etiological diagnosis is often made post-operatively with the samples collected during surgery. Pneumococcus is one of the three most common germs implicated. Early identification allows targeted antibiotic therapy, a major element for treatment effectiveness. Even with appropriate treatment mortality remains high. Early detection of pneumococcus with a urinary pneumococcus antigen test might improve the treatment success rate. Therefore we suggest the use of this test in patients presenting with aneurysms and fever or whose CT scan suggest an inflammatory process associated with the aneurysm.

Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Conflict of interest

The authors declare that they have no conflicts of interest concerning this article.

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