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Fatal *Aerococcus urinae* Aortic Valve Endocarditis with Severe Regurgitation

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Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Patient: Male, 48-year-old
Final Diagnosis: Aerococcus endocarditis
Symptoms: Altered mental status • fever • shock
Medication: —
Clinical Procedure: —
Specialty: Cardiology • Infectious Diseases

Objective: Rare disease

Background: Aerococcus species are a rare cause of endocarditis. Micro-organism identification and antibiotic choice can pose significant management challenges to clinicians who care for patients with this infection. *Aerococcus* is a gram-positive micro-organism which is commonly misidentified because it shares many similarities with streptococcus and enterococcus species. *Aerococcus urinae* is usually found to cause urinary tract infections and occurs more frequently in patients with structural urinary tract abnormalities associated with urethral and ureteral obstruction such as kidney stones, phimosis, and prostate hyperplasia. However, it is reported to rarely cause endocarditis.

Case Report: A 48-year-old man with a history of cocaine abuse and right hip replacement presented to our emergency department with acute encephalopathy. Through a complicated hospital course, he was found to be septic and the bacteria were initially misidentified as an alpha-hemolytic strep before being correctly identified as *Aerococcus urinae*. He was found to have multiple cerebral, likely septic, embolic infarcts and aortic valve endocarditis. Identification of the micro-organism on blood cultures was challenging, as were decisions about antibiotic choice. He died despite efforts of a multidisciplinary care team.

Conclusions: Our case highlights a unique case of Aerococcus endocarditis and shows the difficulty in initially identifying the bacteria. To our knowledge this is the first case reported in the setting of substance abuse. It also highlights the lack of appropriate guideline-directed therapy with regards to antibiotic choices in this group of patients, emphasizing the importance of further research in this regard.

Keywords: Aerococcus • Endocarditis

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/937596

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Background

Aerococcus species is a gram-positive, non-motile coccus which appears in clusters or tetrads [1]. In addition to being reported as a rare cause of infective endocarditis in clinical practice, it has also been reported as a difficult to treat infection. This is a case report of a 48-year-old man with aortic valve endocarditis with acute severe aortic regurgitation due to *Aerococcus urinae*. We highlight the challenges associated with the management of this rare fatal infection.

Case Report

We present the case of a 48-year-old African American man with a past medical history of a right hip replacement who was admitted after he was found unresponsive at home. On physical examination, he was ill-appearing, with a blood pressure of 99/66 mmHg, heart rate of 70 beats per minute with regular rate and rhythm, respiratory rate of 11 breaths per minute, axillary temperature of 36.9°C, and oxygen saturation of 100% on room air. A late diastolic murmur was noted over the aortic region along the left parasternal border. He was noted to have coarse breath sounds on auscultation of the lungs bilaterally. He had a Glasgow Coma Scale score of 9/15 (Eye 2, Verbal 3, Motor 4), pupils reactive to light, normal muscle tone and reflexes, with no neck stiffness. Laboratory studies revealed a white blood count of 19 700 cells/µl, hemoglobin of 11.1 g/dl, and a significant thrombocytopenia of 20 000 cells/µl. Basic metabolic profile showed a serum sodium of 127 mmol/L, albumin level of 2.6 g/dL, and elevated creatinine of 1.37 mg/dL. B-type natriuretic peptide was elevated at 3707 pg/ml, and 3 sets of troponin levels were elevated at 0.197, 0.205, and 0.189. A urine toxicology screen was positive for cocaine. Chest X-ray showed pulmonary alveolar and interstitial infiltrates and his EKG showed sinus tachycardia with T wave abnormalities in the anterior leads. A non-contrast computed tomography (CT) scan of the head was unremarkable, and magnetic resonance imaging (MRI) of the brain showed multiple foci of restricted diffusion involving both cerebral hemispheres and right cerebellar hemisphere, suggestive of embolic infarcts (**Figure 1**). Given the MRI findings, there was concern for infective endocarditis, which prompted a transthoracic echocardiography (TTE). The TTE showed normal ejection fraction of 57% and a vegetation on the noncoronary cusp of the tri-leaflet aortic valve with significant aortic regurgitation without prolapse or perforation (**Figure 2**). He was initially managed with intravenous fluids, and 3 intravenous (i.v.) antibiotics: vancomycin, ampicillin/sulbactam, and doxycycline. On day 2 of admission, ampicillin/sulbactam and doxycycline were discontinued, i.v. vancomycin was continued, and i.v. ceftriaxone was started. A multidisciplinary team comprising a cardiologist, intensivist, and an infectious disease specialist was involved in his care.

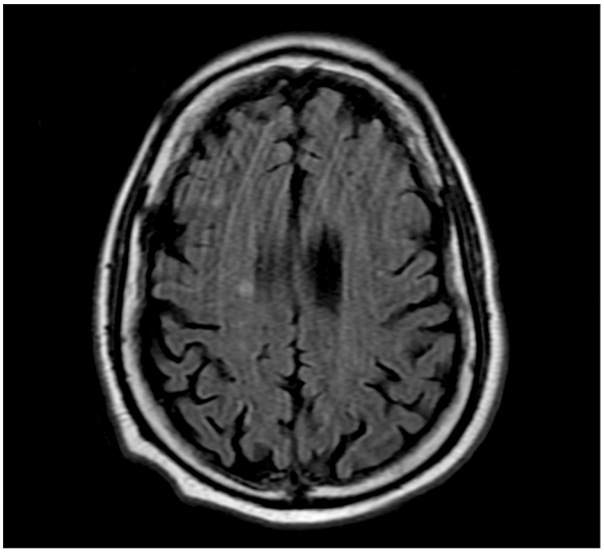

Figure 1. MRI of the brain with and without contrast axial T2 FLAIR view showing areas of multiple infarcts involving both cerebral hemispheres.

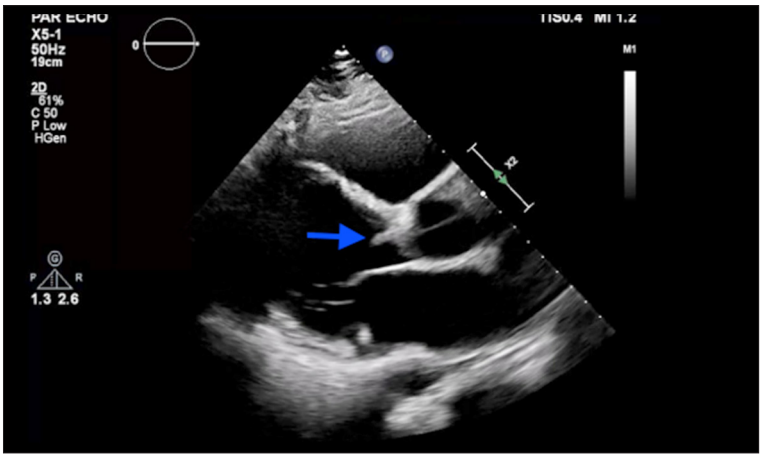

Figure 2. LVOT view of a transthoracic echocardiography showing an aortic vegetation on the noncoronary cusp.

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On day 3 of admission, alpha streptococcus was identified in the blood cultures, which prompted discontinuation of the i.v. vancomycin. The i.v. ceftriaxone was continued while speciation was pending, and on day 5 of admission Aerococcus was identified in the blood cultures, as the initially identified alpha streptococcus turned out to be *Aerococcus urinae*. Therefore, the i.v. vancomycin was restarted, but the patient's clinical status continued to deteriorate, with elevated temperature, increasing white blood cell count, and persistent encephalopathy. His clinical course was further complicated by acute decompensated heart failure in the setting of severe aortic regurgitation (AR) and acute renal failure despite the identification and speciation of Aerococcus, which was sensitive to both vancomycin and ceftriaxone. He was also managed with i.v. diuretics due to his pulmonary edema. He was evaluated by the cardiothoracic surgeons on day 7 and considered a poor candidate for aortic valve replacement due to recent strokes, thrombocytopenia, hypoxemia, and the low likelihood of being able to survive surgery or the recovery period. Given his clinical deterioration, the antibiotics were switched to only i.v. daptomycin by the infectious disease team due to worsening kidney function. During the second week of hospitalization, his family opted for comfort care.

Discussion

In this case report, we describe challenges in the management of Aerococcus endocarditis with aortic valve vegetation, severe aortic regurgitation, and embolic infarcts. In this patient, the blood cultures initially grew an alpha-hemolytic streptococcus but was later reported as *Aerococcus urinae*. There have been reports of the misidentification of *Aerococci* in multiple studies due to the similarities between staphylococci, streptococci, and enterococci [2,3]. This micro-organism is a gram-positive coccus arranged in clusters, similar to Staphylococcus. Its characteristics and colony morphology are also similar to alpha-hemolytic streptococcus [3]. Sequencing of the gene encoding 16SrRNA is the criterion standard for identification of this pathogen, but it has not been used very often due to its expense and lack of availability in many facilities [2,3].

Aerococcus species were initially described in 1953, with the first reported case of Aerococcus endocarditis reported in 1976 [1]. There are 5 species: *A. urinae, A. sanguinicola, A. viridans, A. christensii,* and *A. urinaehominis.* It causes endocarditis through biofilm formation, histological inflammation, neutrophil recruitment, and increased pro-inflammatory cytokines [4].

Aerococcus urinae, although rarely isolated, is known to cause urinary tract infections and endocarditis, especially in patients with structural urinary tract abnormalities associated with urethral and ureteral obstruction such as kidney stones, phimosis, prostate hyperplasia, and long-term urologic catheter use. It has also been observed in patients with comorbid conditions such as chronic kidney disease, diabetes mellitus, malignancy, and, in 1 case report, bicuspid aortic valve [5,6].

Although intravenous substance abuse is a risk factor for endocarditis in general, to our knowledge, no case report has highlighted Aerococcus endocarditis in the setting of substance abuse. According to a systematic review analyzing 30 cases of Aerococcus infection, it tends to affect older adults, age 66.7 years on average, with a 1: 3 female-to-male distribution. It has a high mortality rate of almost 50% and appears to equally affect the mitral and tricuspid valves [6].

Regarding the approach to treatment, current guidelines do not have specific recommendations and therapy seems to be guided by expert opinion. Some studies have shown that the chances of survival of a patient with Aerococcus endocarditis in the ICU setting are 2.5 times higher when the correct antibiotic therapy is selected and initiated as compared to empiric, broad-spectrum antibiotic therapy [7,8]. One systematic review showed that 83% of patients were treated with both Beta-lactams and aminoglycosides. Beta-lactam duration ranged from 2 to 12 weeks and the aminoglycoside duration ranged from 1 to 6 weeks in patients who survived**.** It is important to note that, due to its rarity, these results were based on a small study analyzing 46 patient cases with Aerococcus endocarditis, limiting the availability of specific guidelines for antibiotic management [5].

In the management of Aerococcus endocarditis, the best outcomes are achieved with valve replacement [9]. Survival following valve replacement was as high as 80% in one study [5]. Indications for surgical intervention in IE include persistent vegetation after systemic embolization, increase in size of vegetation despite appropriate antibiotic therapy, anterior mitral leaflet vegetation size >10 mm, ≥1 embolic events during first 2 weeks of antimicrobial therapy, acute aortic or mitral insufficiency with signs of ventricular failure, heart failure unresponsive to medical therapy, valve perforation and rupture, and new heart block [10]. Although our patient had clear indications for valve replacement surgery due to valvular dysfunction leading to heart failure, he could not undergo surgery due to concerns that his preexisting conditions put him at a prohibitively high risk for mortality in the perioperative period. It is not uncommon for patients meeting criteria for surgical intervention in Aerococcus endocarditis to be poor surgical candidates [5]. Our patient received antibiotic therapy with ceftriaxone and vancomycin, but due to the poor prognosis, his family chose for the patient to receive palliative care.

Conclusions

In conclusion, aortic valve endocarditis with severe AR can be fatal. Contributing factors to this outcome include problems

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with identification of the micro-organism, choice of antibiotic therapy, and the timing of surgical intervention. Also, this patient did not have the high-risk factor of a urinary tract infection or structural abnormalities in the kidneys, and the only known endocarditis risk factor was a history of substance abuse, which in our literature review was not mentioned to have a link with Aerococcus endocarditis. Further studies are needed with respect to diagnostic testing, the possible relationship between substance abuse and *Aerococcus urinae* endocarditis, and the optimal timing of surgical interventions in this population.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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