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CASE REPORT

A rare case of aerococcus urinae infective endocarditis

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ABSTRACT

Introduction: *Aerococcus urinae* is a rare cause of infective endocarditis. Aerococcus is a gram positive cocci that is easily misidentified as Staphylococci or Streptococci. The true incidence rate of this pathogen is likely underestimated. Recent advances in laboratory diagnostic methods with matrix-associated laser desorption ionization time-of-flight mass spectrometry (MALDI-TOF-MS) have lead to increased recognition of this pathogen in the clinical microbiology lab, and awareness as a cause of infective endocarditis in the infectious disease community.

Case reports: Aerococcus usually affects males with underlying urinary tract conditions. Herein, we report a case of prosthetic aortic valve endocarditis caused by *Aerococcus urinae*.

Discussion: Our patient was considered high risk for cardiac surgery and was treated successfully with intravenous antibiotics alone for six weeks.

Conclusion: Infective endocarditis should be considered in all cases of *Aerococcus* bacteremia and appropriate diagnostic evaluations pursued.

Abbreviations: AV: Aortic valve; IE: Infective endocarditis

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1. Case presentation

A 69-year-old Caucasian male presented to the emergency department with complaints of fever, cough, and dyspnea on exertion for two days prior to presentation. His past medical history was significant for Diabetes mellitus type 2, hypertension, bioprosthetic aortic valve (AV), heart failure with preserved ejection fraction, chronic obstructive pulmonary disease, obstructive sleep apnea, morbid obesity (BMI 64 kg/m^2), recurrent nephrolithiasis (status post bilateral lithotripsy and ureteral stent placement), benign prostatic hypertrophy, and adenocarcinoma of colon status post partial colectomy. Twelve days prior to presentation he had undergone cystoscopy with cannulation for the right ureter for laser lithotripsy and stone basket retrieval of kidney stone followed by right ureteral stent placement. He was taking oral amoxicillin for streptococcal pharyngitis diagnosed prior to the procedure and also following the procedure. He was unemployed, had no history of smoking, alcohol or illicit drug use, and family history was only notable for obesity and diabetes. His vital signs on presentation included temperature of 39.6°C, heart rate of 110 bpm, respiratory rate of 20 breaths per minute, blood pressure of 140/70 mm Hg, and oxygen saturation of 91% on room air. Physical examination revealed normal heart sounds without any murmur. There were no peripheral stigmata of infective endocarditis (IE) such as Janeway's lesions or splinter hemorrhages; nor was there evidence of immunologic phenomena, e.g., Roth spots or Osler's nodes. The reminder of the physical examination was unremarkable. Laboratory investigations revealed white blood cell (WBC) count of 17.86 cells/mm^3 with left shift, Procalcitonin 10.31 IU, and lactic acid 4.2 mg/dL. Chest X ray was not suggestive of pneumonia or heart failure. EKG showed sinus tachycardia. Urinalysis demonstrated both RBCs and WBCs on microscopic exam, but no leukocyte esterase or nitrites. Blood and urine cultures were obtained in the emergency department (ED) and our patient was admitted to the hospital with a diagnosis of sepsis and started on empiric antibiotic treatment with intravenous vancomycin and piperacillin/tazobactam.

Despite a positive microscopic urinalysis for WBC, the urine culture was no growth (possibly attributable to the ongoing oral antibiotic treatment). After 18 hours both sets of blood cultures drawn on admission grew Gram positive cocci in clusters (see Figure 1), which were ultimately identified as *Aerococcus urinae* in the microbiology laboratory by Vitek® 2 testing (bioMérieux, Marcy l'Etoile, France) prompting performance of a transthoracic echocardiogram (TTE). The screening TTE did not show any vegetation. Transesophageal echocardiogram (TEE) however revealed a 1.77 cm x 1.42 cm vegetation on the prosthetic aortic valve (see Figure 2). Although no peripheral

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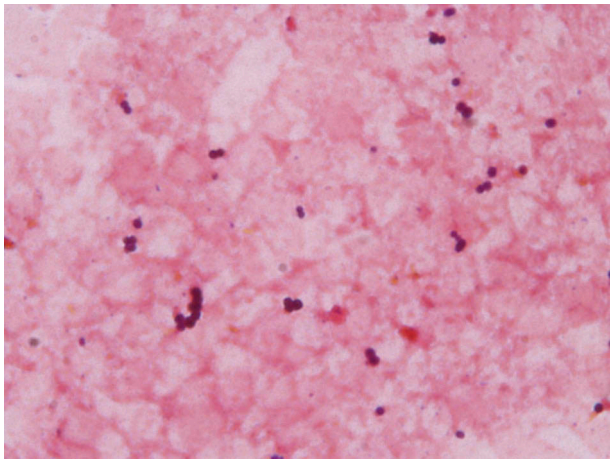

Figure 1. Gram stain showing gram positive cocci in clusters.

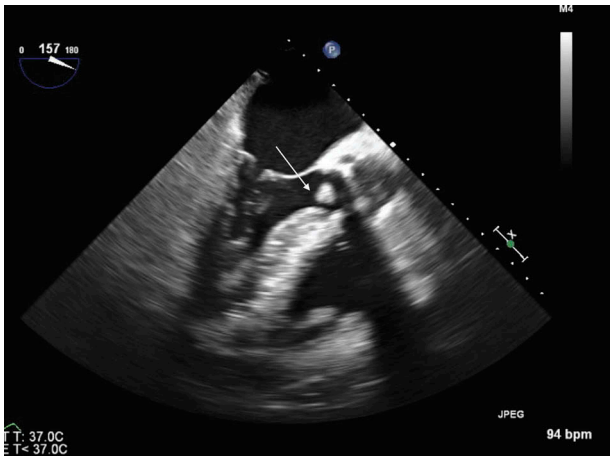

Figure 2. Trans esophageal echocardiogram, mid esophageal view showing prosthetic aortic valve with vegetation prolapsing in diastole.

stigmata of infective endocarditis (IE) were noted on exam, based on the results of the TEE and blood cultures, our patient did meet Duke Diagnostic Criteria of definite IE [1].

Agar diffusion antibiotic susceptibility testing by ETEST® 2 (bioMérieux) revealed a penicillin susceptible strain of *Aerococcus*: (PCN-G MIC < 0.023 mcg/mL). Antimicrobial treatment was changed to a combination of intravenous (IV) penicillin G and gentamicin. Antimicrobial susceptibility results were only available for three other drugs: ETEST revealed MICs of 0.50 mcg/mL and 24 mcg/mL for Vancomycin and Levofloxacin, respectively. A ceftriaxone Kirby-Bauer disk demonstrated a 31 mm zone of inhibition around the ceftriaxone disk consistent with the susceptibility of the organism to this antibiotic. Gentamicin susceptibility testing was not performed.

Although the initial urine culture on admission was negative as well as a repeat urine culture following adjustment of antibiotic treatment (again while the patient was receiving ongoing antibiotics), two critical factors led the treatment team to the consensus that the original source of infection was the urinary tract with subsequent systemic dissemination and progression to IE: the patient had been on oral amoxicillin treatment for streptococcal pharyngitis prior to admission; and the patient had a history of hydronephrosis requiring ureteral stent placement.

Morbidity and mortality associated with medical therapy alone for treatment of prosthetic AV *Aerococcus* IE is not known, but due to the size of the vegetation in our patient, the cardiovascular surgery service (CVS) was consulted. He was considered high risk for repeat aortic valve replacement by CVS and recommended medical therapy with IV antibiotics. Once our patient was stable, he was discharged to the skilled nursing facility to complete IV antibiotic treatment. Our patient ultimately completed a full six-week course of combination IV penicillin G and gentamicin antibiotic treatment for bioprosthetic aortic valve endocarditis. He was seen back in the infectious disease office following completion of treatment and repeat blood cultures were obtained which were negative.

Despite negative cultures and achieving an apparent cure of *Aerococcus* endocarditis, our patient continued to develop serious medical conditions following completion of the six-week course of antibiotics. Three months after his initial presentation he developed an incarcerated ventral hernia requiring urgent surgical repair. One month following the urgent hernia repair he underwent elective ureteroscopy with extraction of a left kidney stone and ureteral stent exchange. He received amoxicillin for endocarditis prophylaxis pre- and post-operatively, and tolerated both procedures well without any complications. Unfortunately, our patient ultimately developed progressive heart failure and eventually died one year following his original presentation with *Aerococcus* endocarditis.

2. Discussion

Aerococcus urinae, a species of the genus *Aerococcus*, is an aerobic, alpha-hemolytic gram positive coccus that is arranged in pairs or clusters. It can be easily misidentified as Streptococci or staphylococci. It has Gram staining characteristics of staphylococci but biochemical and growth features of streptococci and enterococci [2]. The normal habitat of pathogenic aerococci is unknown but are considered part of normal flora of the urinary tract [3,4]. Potential virulence mechanisms for Aerococcus include platelet aggregation and biofilm formation [5]. *Aerococcus* species were rarely suspected to cause human disease and may be dismissed as a contaminant in clinical cultures from non-sterile sites [6]. Correct species determination has been difficult due to similarities with other bacteria and hence the true incidence is historically underestimated. 16S ribosomal RNA gene sequencing is the gold standard for accurate

identification of *Aerococcus*, but this technique is costly, time consuming, and impractical for most diagnostic clinical microbiology labs. With improvement in diagnostic methods, especially matrix-assisted laser desorption ionization time-of-flight mass spectrometry (MALDI-TOF MS), *Aerococcus* has been increasingly recognized as a human pathogen [7–9]. MALDI-TOF MS is rapid, accurate, and has demonstrated good sensitivity and specificity in identifying aerococci.

A. urinae is generally associated with simple cystitis and infections of upper urinary tract (UTI). It accounts for approximately 0.15–0.8% of all the cases of UTI [10,11]. Predisposing factors for *A.urinae* infections include male sex, advanced age (greater than 65 years) and pre-existing urinary tract pathologies like prostatic hyperplasia, urethral stricture, renal calculi and prior urinary tract surgery [12]. Invasive infections by *A. urinae* are rare but have been described. Infective endocarditis (IE) although rare is the most common form of disseminated *Aerococcus* infection. The reported prevalence of *A.urinae* UTI and endocarditis is 54 and 3 per 1 million, respectively [13]. With the recent advances in identification and increased recognition of *Aerococcus* as a cause of IE the incidence statistics is likely to be adjusted upward in the coming years. Other less common clinical conditions associated with *A. urinae* include lymphadenitis, peritonitis in peritoneal dialysis patients, soft tissue infections in genital area, postpartum infections and joint infection [7]. Cases of septic embolization to kidney, brain and cervical spine have been described. Infective endocarditis should always be suspected in *Aerococcus* bacteremia and the urinary tract is usually the portal of entry for the bacteremia.

Optimal treatment of *Aerococcus urinae* endocarditis is yet to be determined. A.urinae isolates have very low MICs for penicillin and relatively low MICs for cephalosporins and carabapenems [14,15]. Most cases described in literature have been treated with combination of beta-lactam and aminoglycoside antibiotics. Two studies have reported evidence of *in vitro* synergy of penicillin and aminoglycoside against on *Aerococcus* [14,16]. The potential benefit of synergism should be weighed against the risks of aminoglycoside therapy, especially in elderly patients. Vancomycin can be used in patients with severe penicillin allergy. A recent study suggested daptomycin as an alternative to vancomycin [17]. Early surgical replacement of the involved valve should be considered especially in cases with heart failure and high risk of embolization [18]. Most patients with valve replacement surgery described in the literature have survived [18].

Previous case reports have suggested an unfavorable prognosis with case fatality as high as 54% in patients with *A. urinae* endocarditis [6]. Of the 42 cases currently accounted in published literature (excluding the current case) 15 fatalities (35.71%) have been reported [7,19–21]. However, a recent Swedish study by Sunnerhagen *et al.* demonstrates a favorable prognosis despite even in patients with advance age and significant comorbidities [19]. The authors in that study also suggest better prognosis compared to IE from Staphylococcus aureus in terms of mortality and frequency of embolization [19].

Our patient in this case was deemed high risk for valve replacement surgery and was treated with intravenous antibiotics alone. He did well for over a year until he developed progressive heart failure and eventually died. Cause of death in this patient was suspected due to progressive prosthetic valve dysfunction due to endocarditis.

3. Conclusion

In conclusion, we report a case of infective endocarditis of prosthetic aortic valve caused by *Aerococcus urinae*. *A. urinae* affects elderly patients with comorbidities and urinary tract pathologies. Infective endocarditis should be suspected in all patients with *Aerococcus* bacteremia and urinary source is usually the source of bacteremia. Optimal treatment of *A. urinae* infective endocarditis is yet to be determined but a combination of Penicillin G and Gentamicin is most often used. Although prior case reports have suggested worse prognosis with case fatalities more recent studies have suggested a favorable prognosis even in elderly population with comorbidities. More population-based studies are needed in order to establish the true incidence, optimal treatment regimen, and prognosis of *A. urinae* bacteremia and infective endocarditis.

Disclosure statement

No potential conflict of interest was reported by the authors.

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