

ABSTRACT

•There are 15 reported cases of *Aerococcus urinae* endocarditis, which we summarize briefly. Roughly half of these cases have been fatal, and survivors frequently have complications from emboli or neurologic sequelae. We present here an additional case of *A. urinae* endocarditis, in which the patient required emergent aortic valve replacement due to shock from several factors, including a perforated aortic valve.

CASE SUMMARY

- 54-year-old African American man was brought by paramedics with an acute onset of confusion associated with dizziness and chills.
- Past medical history was significant for prostatic hypertrophy with microscopic hematuria and a urinary tract infection in the previous year.
- Initial examination revealed tachycardia, blood pressure of 116/52 mm Hg, and the patient was afebrile. He was oriented only to person and place and had mild confusion.
- Labs were notable for blood urea nitrogen of 33 mg/dL and creatinine of 2.7 mg/dL (creatinine was 1.3 mg/dL earlier that year), total bilirubin of 1.6 mg/dL, albumin 3.3 mg/dL, white blood cell count of 10.1 x 10⁶ cells/mL with 80% neutrophils, and hematocrit 32.3%.
- An electrocardiogram showed sinus tachycardia, left ventricular hypertrophy, and infero-lateral ischemic changes.
- Chest radiograph showed left basilar atelectasis and computed tomogram of the head was normal.
- Two sets of blood cultures were drawn before he was administered vancomycin, ceftriaxone, and ampicillin for presumptive bacterial meningitis.
- He later developed progressive dyspnea requiring mechanical ventilation and ICU admission.
- Chest radiograph was consistent with pulmonary edema.
- Lumbar puncture was performed, which was unremarkable.
- Patient had progressive hypotension requiring dopamine and norepinephrine.
- Temperature increased to 104.4 F and blood cultures came back positive for "α-strep species."
- Computed tomograms of the chest, abdomen, and pelvis showed an enlarged prostate and acute respiratory distress syndrome.
- Antibiotics were changed to vancomycin, ceftriaxone, clindamycin, and gentamicin.
- A transesophageal echocardiogram was performed, showing an A2 mitral valve vegetation with moderate to severe mitral valve regurgitation and a large aortic vegetation with perforated non-coronary cusp, and severe aortic valve regurgitation.
- Organism growing in the blood cultures was later identified as *Aerococcus urinae*.
- The patient was transferred to another medical center and underwent emergent aortic valve replacement (#23 St. Jude mechanical valve).
- Pathology report showed that both non-coronary and left coronary cusps were perforated and two leaflets on the aortic valve showed multiple vegetations.
- Histopathology showed a few foci of small mostly refractile round coccoid-like structures inconclusive for bacteria.
- The patient remained comatose post-operatively and now is in a chronic vegetative state.

DATA

Table 1: Comparison of *A. urinae*, *A. viridans*, α-hemolytic streptococci, and *S. aureus*.

Characteristic	<i>A. urinae</i>	<i>A. viridans</i>	α-hemolytic streptococci	<i>S. aureus</i>
Microscopic Appearance	Tetrads/Clusters	Tetrads/Clusters	Chains	Clusters
Hemolysis	α	α	α	α
Catalase reaction	-	-	-	+
Aminopeptidase activity:				
Pyrrolidonyl	-	+	-	+
Leucine	+	-	+	+
Susceptibility:				
Penicillin	S	R	S	R (mostly)
Aminoglycosides	R	S	R	S
Sulfonamides	R	S	S	S

*Based on Table 4 from Christensen et al., (1995) *Clin. Infect. Dis.*, 21, 943-947.

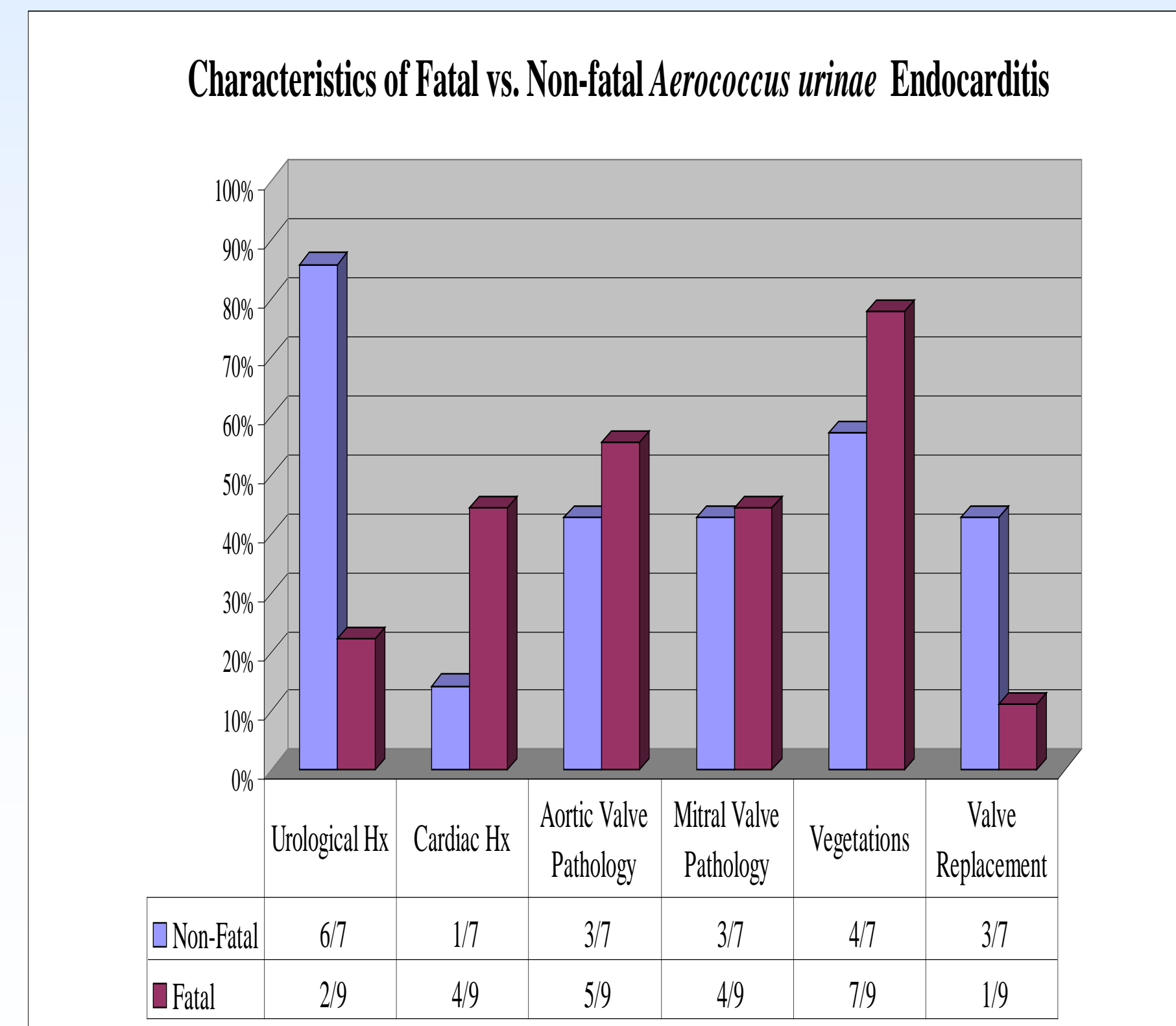
DATA

Table 2: Summary of *A. urinae* endocarditis cases

ID	GU Predisposition	Presentation	UTI	UTI Tx	Involved Valve	Antibiotic Regimen	Emboli	Neurologic Sequelae	Outcome
81M	Prostate CA	Hematuria, dysuria, F/C	+	TMP	Mitral*	Amp->PCN G + Netilmicin+ Vanco	Abd Aorta		Died(1 mo after dx)
73M	BPH	Admitted for TURP	-		Aortic*	Pivampicillin->Amp + Gent		Hemiplegia	Died(1 day after dx)
65F	None	Back pain, vomiting, fever			Mitral*, Aortic*	PCN + Gent + Metronidazole			Died(10 days post-admit)
78M	Nephrolithiasis					PCN + Gent+ Dicloxacillin added		Intracranial hemorrhages	Recovered
78M	None	Weakness, angina, anterior MI	+		Aortic*	Cefuroxime->PCN G + Gent	Renal, Splenic		Died(10 days post-admit)
81M	UTI, BPH	Fatigue, dyspnea	+	Sulfa	None	Amp + Gent->Diclox + Gent -> PCN G + Gent-> PCN G			Died(4 weeks post admit)
89M	None	Fever, Hematuria	+		Mitral*	Cefamandol + Tobra-> Fluxlox + Tobra-> PCN G + Gent		Cerebral Infarct	Died(7 days after dx)
43M	UTI	Septic shock	+	Cipro	Aortic*	Piperacillin + Netilmicin + Vanco	Myocardial, Renal	Cerebral Infarct	Died(5 days post admit)
48M	None	Left hemisindrome, mental confusion			Mitral*	Ceftriaxone + Tobra-> PCN + Netilmicin			Recovered
79F	UTI	N/V, abdominal pain	+		None	Amox/Clav->PCN-> Ceftriaxone			Recovered
18M	Phimosis, Pyelonephritis	Sudden death	+			Cefixim		Ischemic lesions	Died (after initial presentation)
75M	Urethralstenosis, Phimosis	Urinary retention, fever	+	Cipro	Aortic	Flucloz + PCN + Netilmicin-> Fluxoc + Gent + Ceftriax + Cipro ->Ceftriaxone + Netilmicin	Renal, Splenic		AVR, Recovered
54F	None	Weakness, hypothermia, septic shock			Mitral*, Aortic*	PCN G + Fluxlox + Gent			AVR, MVR, Died 5 days post-op
68M	BPH	Back pain, weight loss			Mitral*	PCN G + Gent	L-Spine		Recovered
69M	Bladder CA, Pyelonephritis, BPH	Fever, dehydration, diarrhea			Aortic*	Ceftiax + Cipro-> Amox/Clav-> Ceftriax		Anoxic encephalopathy	AVR, Recovered
54M	BPH, UTI	Confusion, weakness, dizziness, shock	+		Mitral*, Aortic*	Vanco + Ceftriaxone + Gent->Ceftriax-> PCN G			AVR, Permanent vegetative state

*Presence of vegetation on echocardiography

Figure 1: Comparison of Fatal and Non-Fatal *A. Urinae* endocarditis cases



DISCUSSION

- The genus *Aerococcus* was first described in 1953, with the representative species named *Aerococcus viridans* (24) .
- Aerococcus*-like organisms (ALOs) were later isolated from urinary tract infections (4, 5) , and in 1992, these ALOs were proposed to be a new species – *Aerococcus urinae*.
- It produces α-hemolysis on blood agar, and grows in tetrads and clusters on gram stain and can be mistaken for α-hemolytic streptococci or for staphylococci if care is not taken.
- Aerococcus urinae* may be distinguished from other similar bacteria with the use of biochemical tests (5) , by examining the cellular fatty acid composition (25) , or by doing antibiotic susceptibility testing (8) . The techniques of PCR and DNA sequencing of the 16s rRNA gene have been utilized for identification of *A. urinae* (1, 2, 9, 10, 11, 14, 22) .
- Aerococcus urinae* has been found mostly in isolates from urinary tract infections and usually carries a benign clinical course (4) but has also been shown to cause more serious disease, such as urosepticemia (6, 7) , septicemia (7, 13, 14, 20) , and endocarditis (6, 7, 11, 12, 13, 15, 17, 19, 21, 22, 23, 25) . There are also reports of lymphadenitis (18) , soft-tissue infections (19) , spondylodiscitis (3, 23) , and peritonitis (16) .
- Aerococcus urinae* endocarditis has been associated with several predisposing factors including advanced age, male gender, and a history of urological pathology (7) .
- The urinary tract is a significant route of bacteremia in *A. urinae* endocarditis (15) as 6 of the 15 cases demonstrated urinary tract infections (6, 11, 19, 21, 25) , although only two patients had documented urine cultures positive for *A. urinae*.
- Clinically *A. urinae* endocarditis is indistinguishable from other bacterial causes of endocarditis as nine cases had documented new murmurs on admission (11, 12, 13, 15, 19, 21, 22, 23, 25) , six patients were febrile on presentation (6, 12, 13, 19, 22, 25) , all cases that underwent echocardiography demonstrated valvular pathology (6, 7, 11, 12, 13, 15, 19, 21, 22, 23, 25) and twelve cases had positive blood cultures for ALO or *A. urinae* (6, 7, 12, 13, 15, 19, 21, 23, 25) with two reported cases of culture negative *A. urinae* endocarditis with the causative organism being identified by PCR of the affected valve (11, 22) .
- A. urinae* should be highly considered when gram stain shows gram positive cocci in clusters and blood agar grows colonies which are both alpha-hemolytic and catalase negative (6) .
- Susceptibility data from patient isolates show mostly uniform sensitivity to penicillin, vancomycin, and fluoroquinolones, variable sensitivity to cephalosporins, intermediate resistance to aminoglycosides, and uniform resistance to sulfonamides (8, 21) .
- Synergy between penicillin and aminoglycosides was also noted in isolates from two endocarditis cases (25) .
- The predominant antibiotic regimen used has been either penicillin G or amoxicillin in combination with gentamicin or netilmicin with nine patients were treated with this regimen and out of these nine only two survived (6, 7, 11, 12, 13, 15, 19, 21, 23, 25) .
- The literature appears to support the combination of penicillin G and gentamicin as sufficient for initial treatment of suspected *A. urinae* endocarditis followed by antibiotic adjustment once sensitivities are known. An alternative regimen of vancomycin and gentamicin may be used in the setting of a penicillin allergy.
- As all reported *A. urinae* endocarditis cases were associated with significant valvular pathology (6, 7, 11, 12, 13, 15, 17, 19, 21, 22, 23, 25) we propose that early valve replacement is integral to the treatment of *A. urinae* endocarditis.
- In summary if gram stain morphology shows gram positive cocci in clusters which does not match hemolytic and catalase behavior of *Staphylococcus aureus* on blood agar it is reasonable to start penicillin G in combination with gentamicin and to consider early valve replacement if significant valvular pathology is detected on echocardiography.

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