CASE REPORT

Aerococcus urinae, a rare cause of infective endocarditisStephen Melnick,^{1,2} Salik Nazir,³ Rittu Hingorani,³ Philip Wexler³¹Department of Internal Medicine, Reading Hospital and Medical Center, Reading, Pennsylvania, USA²Lebanon, Pennsylvania, USA³Reading Hospital and Medical Center, Reading, Pennsylvania, USA

Correspondence to

Dr Stephen Melnick,
stmelnick@gmail.com

Accepted 3 June 2016

SUMMARY

We present the case of an elderly male who was initially seen in our hospital for a urinary tract infection that was treated with oral ciprofloxacin. He was admitted 2 weeks later with altered mental status and fever, and was found to have bacteraemia with *Aerococcus urinae*. Owing to altered mental status a brain MRI was performed which showed evidence of embolic stroke. Following this, a transesophageal echocardiogram showed severe mitral regurgitation and a vegetation >1 cm involving the mitral valve with associated destruction of posterior valve leaflets. The patient was started on antibiotics intravenous penicillin G and intravenous gentamicin for a total duration of 6 weeks. He underwent mitral valve replacement on day 4 of hospitalisation. The postoperative course was complicated by ventilator-dependent respiratory failure, requiring tracheostomy and eventual transfer to a skilled nursing facility. Unfortunately, he died after 2 weeks of stay at the facility.

BACKGROUND

A frequently misidentified organism, *Aerococcus*, is an aerobic, α -hemolytic Gram-positive coccus that grows in pairs or clusters and is becoming an increasingly important pathogen in medicine. *Aerococcus urinae* is a rare cause of urinary tract infection (UTI) that can unusually be associated with infective endocarditis.¹ Infection with this organism is usually seen in elderly males with underlying urinary tract abnormality where it can cause bacteraemia leading to infective endocarditis.² Infective endocarditis due to *A. urinae* is associated with a significant fatality rate.³ Hence, timely recognition and early treatment of this fatal infection is essential in order to decrease morbidity and mortality.

CASE PRESENTATION

A 74-year-old male with a history of benign prostatic hyperplasia presented to the emergency department (ED) of our hospital with fever and altered mental status that started 24 hours prior to presentation. His temperature was 39.3°C, heart rate of 100 bpm, respirations of 30/min and blood pressure of 128/73 mm Hg. Examination revealed normal heart sounds without a murmur. The patient was moving all his limbs but altered mental status precluded complete neurological examination. The rest of the examination was unremarkable.

Two weeks prior to the admission, the patient was evaluated in the ED of our hospital with

symptoms of frequency and dysuria. His urinalysis was found to be positive for leucocytes, nitrite and bacteria suggesting a UTI. He was discharged from the ED on oral ciprofloxacin for 5 days, pending urine cultures which eventually were found to be negative. Despite completing antibiotic therapy, the patient continued to develop occasional fevers with fluctuations in cognition that worsened 24 hours prior to the present admission.

INVESTIGATIONS

Relevant laboratory testing on admission showed a sodium level of 129 mEq/L, glucose 158 mg/dL, white cell count 13.1×10^3 /L and erythrocyte sedimentation rate 77 mm/hour. The rest of the laboratory investigation was unremarkable, including repeat urinalysis with culture, chest X-ray, blood alcohol levels and a urine drug screen. The initial head CT scan performed in the ED was unremarkable. Blood cultures at 24 hours grew Gram-positive cocci in clusters which were assumed to be of *Staphylococcus* spp and, hence, a transthoracic echocardiogram was performed, which showed annular calcification of the mitral valve. As a result of persistent altered mental status, MRI of the brain was performed on day 2 of hospitalisation which showed multifocal bilateral areas of acute/subacute infarction suggesting an embolic source. Following this, a transoesophageal echocardiogram was performed which showed a large mobile 1.7×1.9 cm cavitating vegetation suggesting an abscess and severe mitral regurgitation due to the destruction of the posterior mitral leaflet, as shown in figure 1. The final results of blood culture eventually showed *A. urinae*, on day 4 of hospitalisation.

TREATMENT

Hyponatraemia was thought to be secondary to hypovolaemia as it rapidly improved with normal saline (0.9%) administration. He required frequent doses of intravenous furosemide because of the new onset heart failure. The patient was started on empiric broad spectrum antibiotics in the ED including cefepime and vancomycin. Once the blood cultures returned positive for *A. urinae*, the antibiotics were switched to intravenous penicillin G and intravenous gentamicin. A decision to pursue mitral valve replacement was made based on the presence of new severe MR and a highly mobile vegetation >1 cm with associated valve destruction leading to heart failure. He underwent surgery on day 4 of hospitalisation. The mitral valve from surgery was cultured and was found to

CrossMark

To cite: Melnick S, Nazir S, Hingorani R, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2016-215421

Figure 1 Transesophageal echocardiogram of infective endocarditis. Three-dimensional, short-axis view of the vegetation adherent to the mitral valve (A). Two-dimensional, long-axis view of the mitral valve showing vegetation measuring 1.7×1.9 cm (B). Two-dimensional, four-chamber view with amorphous vegetation of the mitral valve (C). Two-dimensional, four-chamber view of mitral valve with color flow Doppler demonstrating significant mitral regurgitation with suspicion of valve perforation (D).

be positive for *A. urinae*. Repeated blood cultures after 48 hours of administration of intravenous penicillin G and intravenous gentamicin returned negative.

OUTCOME AND FOLLOW-UP

Post mitral valve replacement surgery, the patient's course was complicated by ventilator-dependent respiratory insufficiency requiring the placement of a tracheostomy and a gastrostomy tube. Following this, the family requested no further intervention and patient was transferred to a long-term skilled nursing facility on day 26 of hospitalisation. Unfortunately, he died shortly thereafter.

DISCUSSION

A. urinae is a Gram-positive coccus that was recognised as a separate species in 1992.⁴ *A. urinae* is frequently misidentified as *Staphylococcus* (growing in clusters) or *Streptococcus* (α -haemolysis) or an *Enterococcus* (shares antibiotic resistance pattern).^{5–6} Owing to these reasons, correct identification of the species has been difficult. Identification of *A. urinae* with biochemical tests is possible, but sequencing of the gene encoding 16S ribosomal RNA remains the gold standard. This technique reliably distinguishes *A. urinae* from the other species within the *Aerococcus* genus and from other genera as well.^{7–8}

A. urinae has been found to cause UTIs,^{9–10} invasive infections such as septicemia,¹¹ and infective endocarditis.¹² These infections usually occur in elderly males with underlying urological abnormalities.^{3–11} The estimated prevalence of *A. urinae* UTI and endocarditis is 54 and 3/1 million, respectively.¹³ In a Swedish study by Senneby *et al*³ the case fatality rate for

infective endocarditis caused by *A. urinae* was reported to be 50% and multiple cases have reported a similar high mortality.¹⁴

The patient described in this case was initially diagnosed with UTI and was treated with ciprofloxacin for 5 days. Treatment of this infection is challenging as *Aerococcus* are often resistant to the typical antibiotics used for UTIs. *A. urinae* is intrinsically resistant to sulfamethoxazole.¹⁵ Trimethoprim resistance is also reported, which generally depends on which test medium is used.^{16–17} Resistance to ciprofloxacin has recently been reported as well,^{18–19} suggesting that in patients with positive urine cultures antibiotic susceptibility testing should be performed where treatment with ciprofloxacin is initiated. Since infection with this organism is so rare, no current recommendations exist about any alternative treatment options in patients who are at risk for *A. urinae* UTI.

The ideal treatment for infective endocarditis caused by *A. urinae* has not been determined, but in most instances a β -lactam such as penicillin G has been combined with an aminoglycoside like gentamicin. This combination is supported by in vitro study that showed synergistic effect when such a combination was used.²⁰ We started our patient on intravenous penicillin G and intravenous gentamicin based on the limited evidence available in the literature.

The 2015 American Heart Association guideline on the management of infective endocarditis recommends early valve replacement surgery can be considered in the following cases: symptoms of congestive heart failure caused by severe valve dysfunction and severe valve regurgitation with a large mobile vegetation >1 cm.²¹ Our patient met these criteria and hence we

proceeded with surgical mitral valve replacement. Unfortunately, our patient died despite the aggressive management which is consistent with many fatal cases reported so far in the literature.^{3 14}

Learning points

- ▶ *Aerococcus urinae* is a rare cause of infective endocarditis that is associated with significant morbidity and mortality.
- ▶ *A. urinae* can be misidentified as *Staphylococcus*, *Streptococcus* or *Enterococcus*.
- ▶ Treatment options are limited but in most instances penicillin G and gentamicin in combination have been used effectively.

Contributors SM wrote the case report, followed the patient and supervised the manuscript writing. SN was involved in writing the manuscript and literature search. RH was involved in writing the manuscript and following the patient. PW was the primary physician involved in patient care and also involved in the final editing. Moreover, all authors were involved in proofreading and revision of the manuscript. SM is the study guarantor. All the authors significantly contributed to the development of this manuscript.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Senneby E, Göransson L, Weiber S, *et al.* A population-based study of aerococcal bacteraemia in the MALDI-TOF MS-era. *Eur J Clin Microbiol Infect Dis* 2016;35:755–62.
- 2 Rasmussen M. *Aerococcus*: an increasingly acknowledged human pathogen. *Clin Microbiol Infect* 2016;22:22–7.
- 3 Senneby E, Petersson AC, Rasmussen M. Clinical and microbiological features of bacteraemia with *Aerococcus urinae*. *Clin Microbiol Infect* 2012;18:546–50.
- 4 Aguirre M, Collins MD. Phylogenetic analysis of some *Aerococcus*-like organisms from urinary tract infections: description of *Aerococcus urinae* sp. nov. *J Gen Microbiol* 1992;138:401–5.
- 5 Christensen JJ, Korner B, Kjaergaard H. *Aerococcus*-like organism—an unnoticed urinary tract pathogen. *APMIS* 1989;97:539–46.
- 6 Christensen JJ, Vibits H, Ursing J, *et al.* *Aerococcus*-like organism, a newly recognized potential urinary tract pathogen. *J Clin Microbiol* 1991;29:1049–53.
- 7 Lawson PA, Falsen E, Truberg-jensen K, *et al.* *Aerococcus sanguicola* sp. nov., isolated from a human clinical source. *Int J Syst Evol Microbiol* 2001;51(Pt 2):475–9.
- 8 Lawson PA, Falsen E, Ohlén M, *et al.* *Aerococcus urinaehominis* sp. nov., isolated from human urine. *Int J Syst Evol Microbiol* 2001;51(Pt 2):683–6.
- 9 Schuur PM, Sabbe L, Van der wouw AJ, *et al.* Three cases of serious infection caused by *Aerococcus urinae*. *Eur J Clin Microbiol Infect Dis* 1999;18:368–71.
- 10 Sierra-hoffman M, Watkins K, Jinadatha C, *et al.* Clinical significance of *Aerococcus urinae*: a retrospective review. *Diagn Microbiol Infect Dis* 2005;53:289–92.
- 11 Christensen JJ, Jensen IP, Faerk J, *et al.* Bacteremia/septicemia due to *Aerococcus*-like organisms: report of seventeen cases. Danish ALO Study Group. *Clin Infect Dis* 1995;21:943–7.
- 12 Ebnöther C, Altwegg M, Gottschalk J, *et al.* *Aerococcus urinae* endocarditis: case report and review of the literature. *Infection* 2002;30:310–13.
- 13 De Jong MF, Soetekouw R, ten Kate RW, *et al.* *Aerococcus urinae*: severe and fatal bloodstream infections and endocarditis. *J Clin Microbiol* 2010;48:3445–7.
- 14 Kass M, Toye B, Veinot JP. Fatal infective endocarditis due to *Aerococcus urinae*—case report and review of literature. *Cardiovasc Pathol* 2008;17:410–12.
- 15 Schuur PM, Kasteren ME, Sabbe L, *et al.* Urinary tract infections with *Aerococcus urinae* in the south of The Netherlands. *Eur J Clin Microbiol Infect Dis* 1997;16:871–5.
- 16 Humphries RM, Lee C, Hindler JA. *Aerococcus urinae* and trimethoprim-sulfamethoxazole. *J Clin Microbiol* 2011;49:3934–5.
- 17 Grude N, Jenkins A, Tveten Y, *et al.* Identification of *Aerococcus urinae* in urine samples. *Clin Microbiol Infect* 2003;9:976–9.
- 18 Cattoir V, Kobal A, Legrand P. First molecular characterization of fluoroquinolone resistance in *Aerococcus* spp. *Antimicrob Agents Chemother* 2011;55:451–2.
- 19 Guilarte YN, Tinguely R, Lupo A, *et al.* Prevalence and characteristics of fluoroquinolone-resistant *Aerococcus urinae* isolates detected in Switzerland. *Int J Antimicrob Agents* 2014;43:474–5.
- 20 Zbinden R, Santanam P, Hunziker L, *et al.* Endocarditis due to *Aerococcus urinae*: diagnostic tests, fatty acid composition and killing kinetics. *Infection* 1999;27:122–4.
- 21 Baddour LM, Wilson WR, Bayer AS, *et al.* Infective endocarditis in adults: diagnosis, antimicrobial therapy, and management of complications: a scientific statement for healthcare professionals from the American Heart Association. *Circulation* 2015;132:1435–86.

Copyright 2016 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow