LETTER TO THE EDITOR

To The Editor

Aerococcus Urinae Endocarditis Presenting with Bilateral Cerebellar Infarcts

Keywords: *Aerococcus urinae*, Infective endocarditis, Stroke, Penicillin G

Aerococcus urinae is a urinary tract coloniser, and is known to be a causative agent of infective endocarditis in elderly men, with associated high case fatality despite appropriate antibiotic treatment and surgical intervention.[1,2] An aggressive treatment approach using combination antibiotics (penicillin G and aminoglycosides) is usually required. In this report, we present a case of *A. urinae* infection with an isolated and uncommon neurological presentation. Further workup revealed evidence of systemic and cerebral embolism, bacteremia and infective endocarditis. Our patient was successfully managed with a single antibiotic regimen (penicillin G) and made a successful clinical recovery, suggesting that the prognosis of *A. urinae* infective endocarditis is not universally poor if the infection is recognised early and treatment with penicillin G is initiated promptly.

A 92-year-old man presented with a 24-hour history of vomiting, without headache, abdominal pain, changes in bowel or bladder function or dysuria. He had a history of myasthenia gravis in remission, non-insulin-dependent diabetes mellitus, hypothyroidism, severe mitral and tricuspid valve regurgitation and 3rd-degree heart block with symptomatic bradycardia (single chamber pacemaker placed 3 months prior to presentation).

Initial examination revealed bilateral pitting pedal edema and 3/6 holosytolic murmur at the apex, with no peripheral stigmata of infective endocarditis. He had tonic neck deviation to the left with conjugate gaze deviation to the left. He was unable to cross the midline on voluntary horizontal gaze. There was gaze-evoked nystagmus to the left. He had dysmetria in both upper limbs.

Initial evaluation revealed elevated white cell count of 16.4×10^9/L (normal range 4.0–10.5×10^9/L), elevated lipase of 303 U/L (normal range 0–79 U/L), total bilirubin of 35 umol/L (normal range 0–17 umol/L) and alanine aminotransferase (ALT) of 46 U/L (normal range 8–45 U/L). Urinalysis and urine cultures were negative. Computed tomography (CT) scan of the abdomen revealed a 12-mm hepatic infarct. Electrocardiogram revealed atrial fibrillation superimposed on 3rd-degree heart block.

Non-contrast CT scan of the head showed mild diffuse age-related atrophy with no acute changes. Magnetic resonance imaging (MRI) of the brain demonstrated acute infarcts in the bilateral medial cerebellar hemispheres and a subacute infarct in the right dorsolateral brainstem (Figure 1, Panels A and B). CT angiography showed occlusion of the right superior cerebellar artery (SCA) (Figure 1, Panel C).

Four blood cultures drawn at admission grew gram-positive cocci on day 2, identified as *A. urinae* susceptible to penicillin. Transthoracic echocardiogram (TTE) demonstrated severe mitral and tricuspid regurgitation and biatrial dilatation, with preserved left ventricular systolic function (ejection fraction 74%). Compared to TTE performed 6 weeks prior, there was interval development of flail anterior mitral valve leaflet with a small mobile mass on the tip suspicious for vegetation (Figure 2, Panels A and B).

Given the new mitral valve mass and positive blood cultures, pre-existing mitral and tricuspid valve insufficiency and vascular phenomenon (arterial emboli), the patient was diagnosed with infective endocarditis. Empiric treatment with piperacillin-tazobactam 3.375 mg IV q6 hours was initiated but changed to cefazolin 2 g IV q8 hours plus vancomycin 1 g IV q12 hours when blood cultures grew gram-positive cocci. After species determination demonstrated *A. urinae*, penicillin G 4 million units IV q4 hours was initiated for 4 weeks.

The pacemaker was removed, and a temporary pacemaker was implanted. Following the antibiotic course and negative repeat blood cultures, a permanent pacemaker was re-implanted. Repeat TTE following 4 weeks of antibiotic treatment demonstrated resolution of the vegetation (Figure 2, Panel C). He was anticoagulated with apixaban due to the diagnosis of atrial fibrillation. He was discharged from hospital to inpatient stroke rehabilitation.

A. urinae is a gram-positive, catalase negative, alpha haemolytic cocci that grows in clusters and is often found in the urinary tract. *A. urinae* can be mistaken for streptococci and enterococci, as at 24 h, the colony morphology resembles that of alpha-haemolytic streptococcus, and at 48 h, it is similar to that of enterococcus.[3] With matrix-assisted laser desorption ionisation time-of-flight mass spectrometry (MALDI-TOF MS) becoming increasingly available in laboratories, there is now improved species determination and recognition of *A. urinae* as an invasive human pathogen.

A. urinae was previously considered to be of low pathogenicity and thought only to infrequently cause urinary tract infections in elderly men with underlying urological abnormalities or recent urological procedures. However, *A. urinae* is now recognised as a cause of severe infections such as infective endocarditis and sepsis.[1,2] Potential virulence mechanisms include platelet aggregation and biofilm formation, increasing the risk of infection in patients with pre-existing valvular disease and implanted devices.[4] Since the first two cases of serious *A. urinae* infection were described by Christensen and colleagues in 1991, *A. urinae* has been found to be the causative agent of infective endocarditis in 31 reported cases.[5]

Isolates of *A. urinae* are generally susceptible to beta-lactam antibiotics.[6] A synergistic bactericidal effect between benzylpenicillin and gentamicin has been demonstrated *in vitro*.[6] Most reported cases had utilised a combination of penicillin and aminoglycoside antibiotics. In a review of 43 cases of *A. urinae* endocarditis, Yabes et al.[7] noted survival in four out of five patients treated exclusively with a beta-lactam antibiotic. In patients with myasthenia gravis, antibiotics that affect neuromuscular transmission, including aminoglycosides, floroquinolones and macrolides, should be avoided. Aminoglycoside-induced nephrotoxicity and ototoxicity are other potential concerns in the elderly and must be considered before initiating combination therapy. There is a suggestion of an unfavourable prognosis for *A. urinae* infective endocarditis, with estimated case fatality reported up to 50%,[2,5] possibly due to delays in identification

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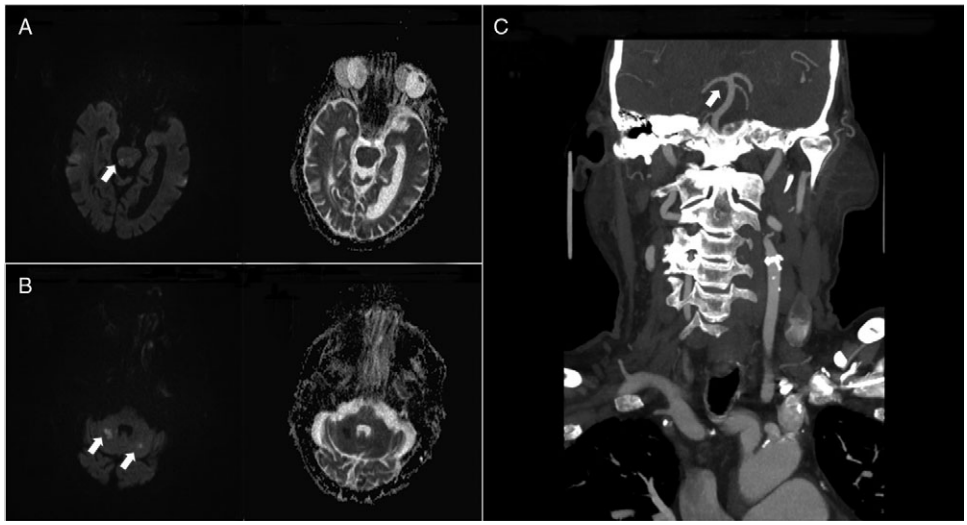

Figure 1: *A: MRI (diffusion-weighted imaging [DWI], left; apparent diffusion coefficient [ADC], right) showing acute infarct in the right dorsolateral brainstem at the pontomesencephalic junction. B: MRI (DWI, left; ADC, right) demonstrating acute infarcts in the medial cerebellar hemispheres. C: CT angiography showing a clot in the superior cerebellar artery (arrow).*

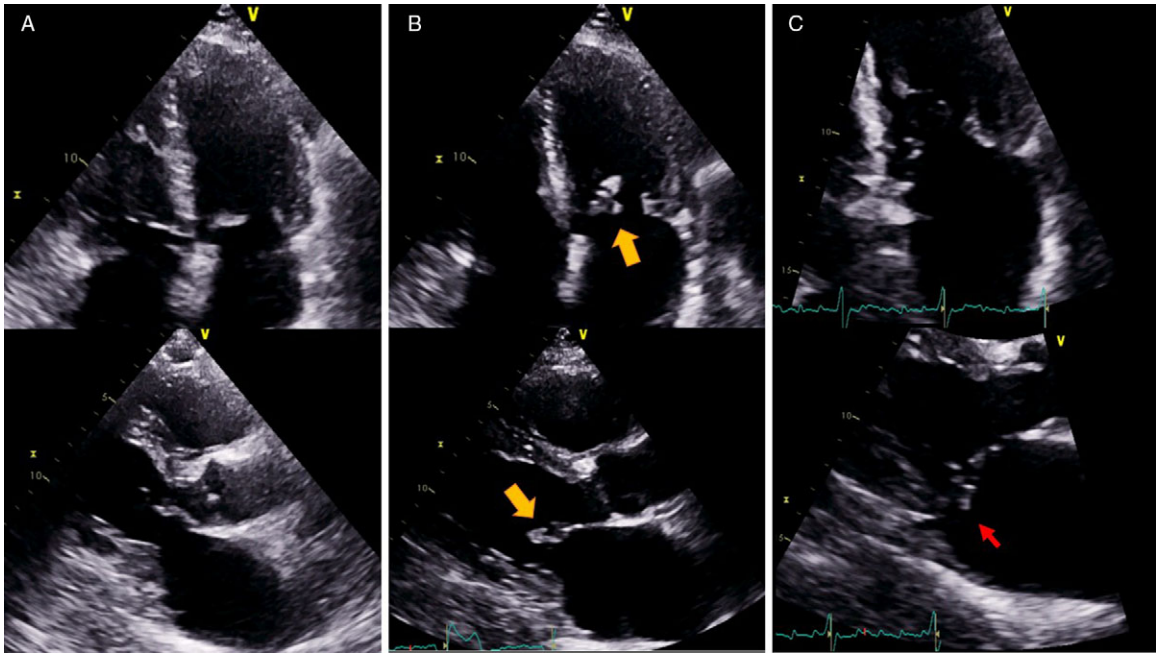

Figure 2: *Four-chamber and parasternal long axis views of the mitral valve. Panel A shows the patient's baseline echocardiogram which was performed 2 months prior. The mitral valve was thickened secondary to degenerative changes. Panel B shows an independently mobile mass attached to the tip of the anterior mitral leaflet (thick arrow). The appearance was consistent with a vegetation. Panel C shows the resolution of the endocarditis after 4 weeks of antibiotic treatment, with no residual vegetation seen. The endocarditis further damaged the mitral valve, and the patient was left with a flail anterior mitral leaflet (narrow arrow).*

of the bacterium and initiation of appropriate antibiotic therapy, in addition to patient-related factors such as age and pre-morbid cardiac status.

A. urinae infection should be considered in elderly males presenting with cardioembolic strokes and other risk factors including urinary tract infections or urosepsis. Our case demonstrates the successful treatment of *A. urinae* infective endocarditis with a single antibiotic in an elderly gentleman with multiple co-morbidities. The management of cardiac co-morbidities including valvular dysfunction requires an individualised approach, with close collaboration with cardiology and cardiac surgery services.

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Conflict of Interest

The authors declare no competing interests relevant to this work.

Statement of Authorship

All authors have seen and approved the content of the submission, and all have contributed significantly to the work. K.R., B.D. and R.A. were involved in the clinical care of the patient, prepared the written case report and performed the literature review. W.C. and P.D. reviewed the echocardiogram findings of the case, prepared the figure containing the echocardiogram images and reviewed and edited the manuscript.

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