

# An Unusual Bacterium, *Aerococcus viridans*, and Four Cases of Infective Endocarditis

Gabriel-Adrian Popescu<sup>1</sup>, Elisabeta Benea<sup>1</sup>, Elena Mitache<sup>1</sup>, Cornelia Piper<sup>2</sup>, Dieter Horstkotte<sup>2</sup>

<sup>1</sup>'Matei Bals' Infectious Diseases Institute, Bucharest, Romania, <sup>2</sup>Department of Cardiology, Heart Center North Rhine-Westphalia, Ruhr University Bochum, Bad Oeynhausen, Germany

Four cases are described of *Aerococcus viridans* endocarditis with favorable outcome, focusing on the clinical picture. Extracardiac findings (e.g. neurological, renal, musculoskeletal, intra-abdominal) in infective endocarditis (IE) have been recognized more frequently in recent years, and may delay the diagnosis and have a negative influence on the prognosis. *Aerococcus viridans*, a very rare microorganism causing invasive infections, has been associated with

The clinical manifestation of infective endocarditis (IE) includes both cardiac and extracardiac findings. The classic cutaneous manifestations are more rarely found, whilst in recent years other, extracardiac ('atypical') presentations such as neurological, renal, musculoskeletal and intra-abdominal manifestations have increased in frequency. The clinical picture of IE patients dominated by atypical peripheral signs may delay the diagnosis and, consequently, worsen the prognosis.

*Aerococcus viridans* is a very rare microorganism that causes IE (1-4). Herein are described four cases of *A. viridans* endocarditis with different 'atypical' extracardiac manifestations.

## Case reports

Two patients were hospitalized in the 'Matei Bals' Infectious Diseases Institute, Bucharest, Romania for fever of unknown origin, and two in the Department of Cardiology of the Heart Center North Rhine-Westphalia, Bad Oeynhausen, Germany, for suspected IE.

bacteremia, septic arthritis, and especially IE. As expected, the strains isolated were susceptible to penicillins, trimethoprim/sulfamethoxazole, and glycopeptides. Medical therapy was sufficient to cure IE in two patients, while two others required surgical intervention.

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## Case 1

A 49-year-old male was admitted with intermittent fever over a period of seven months. During this time, the patient had been treated with several antimicrobial agents, which explained the torpid evolution of the disease. Two months before admission, polymyalgia developed. On admission, physical examination revealed fever (39.1°C) and a diastolic murmur (aortic regurgitation). The C-reactive protein (CRP) level was 213 mg/l, the white blood cell (WBC) count was 10,100 per mm<sup>3</sup>, with 74% neutrophilia. Blood cultures were taken, and antimicrobial treatment was started on day 2 with ampicillin (12 g/day) and amikacin (1 g/day). Initial transthoracic echocardiography (TTE) proved negative for endocarditis, but transesophageal echocardiography (TEE) performed on day 2 showed the presence of a vegetation of 14×5 mm attached to the aortic valve. On days 4 and 5, all blood cultures were positive for *A. viridans*. The isolated strain was identified as *A. viridans* by morphological characteristics (arranged in pairs and tetrads), and subsequently by the API Rapid ID 32 Strep system (BioMerieux, Marcy l'Etoile, France). This organism was susceptible to penicillin, tetracycline and trimethoprim/sulfamethoxazole, but was resistant to quinolones and aminoglycosides. The persistence of myalgia prompted a muscle biopsy that indicated diffuse myositis; indomethacin (100 mg per day) was added to the antibiotic regimen for 10 days, with apyrexia being achieved on day 6. The rapid regression of systemic inflammation was demonstrated by the CRP level

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Address for correspondence:  
Gabriel-Adrian Popescu MD, PhD, 'Matei Bals' Infectious Diseases Institute, Str. Grozovici, nr. 1, sector 2, Bucharest, Romania  
e-mail: gabrielp9@yahoo.com

falling to 8.2 mg/l on day 14. The patient remained afebrile after completion of the antibiotic treatment, and had no other complaints (especially no myalgias) and no relapse during an 18-month follow up. The vegetation size decreased rapidly, and after six months only thickening of the aortic valve cusp was visible. A mild aortic regurgitation was not progressive.

### Case 2

A 62-year-old male was admitted with a four-week history of fever (up to 39°C), weight loss, and a progressive dyspnea. He had been treated with clarithromycin and non-steroidal anti-inflammatory drugs (NSAIDs) for seven days, without improvement. A physical examination revealed fever (40.5°C), a systolic murmur (mitral regurgitation), Janeway lesions, and splenomegaly. The WBC count was 11,900 per mm<sup>3</sup>, with 10,680 per mm<sup>3</sup> neutrophilia, an erythrocyte sedimentation rate (ESR) of 66 mm/h, and CRP level of 186 mg/l. A slight increase in alanine aminotransferase (ALT) (1.8 × ULN) and aspartate aminotransferase (ASAT) (1.5 × ULN) levels was noted. Three blood cultures were taken during the day after admission. Although TTE did not indicate the presence of IE, TEE revealed a 13/12-mm vegetation on the anterior mitral leaflet, and a smaller growth on the posterior leaflet. On day 2, an empirical therapy with ceftriaxone and amikacin was commenced before all three blood cultures became positive for *A. viridans* on the following day. The isolate was identified as *A. viridans* by morphological characteristics, and subsequently by the API Rapid ID 32 Strep system. The isolated strain was susceptible to penicillin, ceftriaxone, aminoglycosides and trimethoprim/sulfamethoxazole, but was resistant to quinolones. The clinical response was prompt with respect to fever, which disappeared within five days, but the increased CRP level persisted at approximately 200 mg/l. An abdominal computed tomography (CT) scan indicated two splenic abscesses of 5/8 cm and 4/4 cm, respectively. A splenectomy was performed on day 7, and the CRP level was normalized on day 21. On day 30, echocardiographic control demonstrated a severe mitral regurgitation, and on day 42 the patient underwent valve replacement. The apyrexia persisted postoperatively. After 12 months of follow up the patient was free from recurrent IE.

### Case 3

A 40-year-old man suffering from fatigue, malaise, arthralgias, remittent fever since the age of 18 years, and continuous fever (>39.0°C) for three weeks was referred for suspected IE after the occurrence of two digital Osler nodes. He had been treated with six different antibiotic regimens for three up to 12 days before. The patient was known to have a congenital

bicuspid aortic valve, as diagnosed by TTE. On admission, he demonstrated fever (39.3°C), tachycardia (heart rate 102 bpm), an elevated CRP level (256 mg/l) and WBC count (11,900/mm<sup>3</sup>). TEE demonstrated a 14 × 11 mm vegetation attached to the aortic cusp. Color-coded Doppler echocardiography revealed a mild to moderate aortic regurgitation with an end-diastolic left ventricular diameter of 59 mm. *Aerococcus* spp. was isolated from blood cultures, and classified as *A. viridans* by pyrrolidonyl-arylamidase production. The organism was shown to be susceptible to penicillin (MIC<sub>PEN</sub> ≤0.1mg/l) and gentamicin (MIC<sub>GENTA</sub> <1.0 mg/l). Because of the vegetation size, a combination of penicillin G (18 × 10<sup>6</sup> units per day, i.v., divided into three doses) and gentamicin (180 mg per day, i.v., divided into three doses) was chosen. Under this treatment the fever declined rapidly, and apyrexia was recorded after day 4. The vegetations became smaller and more dense during the antibiotic therapy, which was continued for two weeks (aminoglycoside) and four weeks (penicillin), respectively. At discharge, the vegetation was not floating and was 8 × 5 mm in size (by TEE). After 38 months of follow up, the patient was free from recurrent endocarditis and the aortic regurgitation was stable. The portal of entry for *A. viridans* remained unclear, as the patient was not ill during the five months before the first onset of fever. The only diagnostic/therapeutic intervention was professional dental cleaning performed without antibiotic prophylaxis approximately five weeks before the onset of symptoms.

### Case 4

A 45-year-old female presented with fever and both clinical and X-ray findings typical of a community-acquired pneumonia in another hospital. She was treated with 2 g per day ceftriaxone (i.v.) for 10 days. The clinical response was prompt. At discharge, the pulmonary infiltrations had almost disappeared, and both clinical and laboratory findings were normalized. An additional X-ray examination performed three weeks later demonstrated no infiltrations. At 11 weeks after discharge, the patient presented at the present authors' outpatient department with progressive dyspnea, ataxia for three days, fever (39.8°C), plantar and palmar Janeway efflorescences, pulmonary congestion on auscultation and X-ray, and a holosystolic apical murmur.

TEE revealed a grade 3 (out of 4°) mitral regurgitation, and fresh floating vegetations adjacent to the anterior (7 × 6 mm) and posterior (5 × 3 mm) mitral leaflets. The CRP level was elevated to 386 mg/l, the WBC count to 16,600 per mm<sup>3</sup>, and arterial oxygen saturation was down to 89%. An X-ray examination demonstrated moderate to severe pulmonary conges-

tion, but no obvious infiltrations. On cranial CT, one small (<2 mm) cerebellar and two posterior infarctions were documented. The patient underwent mitral valve replacement, and was treated empirically (after eight blood cultures had been taken) with a combination of vancomycin and gentamicin. *Aerococcus* spp. was isolated from four of the six blood cultures, and subsequently identified as *A. viridans* by pyrrolidonyl-arylamidase production. The bacterium was shown to be susceptible to penicillin (MIC<sub>PEN</sub> <0.1 mg/l and gentamicin (MIC<sub>GENTA</sub> ≤0.5 mg/l). Consequently, the antibiotic treatment was adapted and the patient treated with penicillin (24 × 10<sup>6</sup> units per day, i.v., divided into four doses) for four weeks and, during the first two weeks of treatment, in combination with gentamicin (180 mg per day, i.v., divided into three doses). On day 8, the gentamicin trough was 0.22 mg/l, and the dosage appropriately adjusted. The further clinical course was uneventful, and the patient was discharged 34 days after valve replacement surgery. *A. viridans* was also demonstrated from the excised valve material.

## Discussion

These four cases illustrate the clinical polymorphism of IE; heart murmurs and classical cutaneous signs were associated with other 'atypical' extracardiac manifestations. Moreover, in three of the four cases there was a significant diagnostic latency, from three up to seven months. Among the 'atypical' extracardiac signs, splenic abscesses are reported in less than 10% of patients with active IE (5); myositis is also a rare event (6). The cases presented herein support the assertion that the clinical course of IE may be a very variable event, even with the same causative organism. The correspondence between an 'acute' course of IE for some bacteria and 'subacute' for others ignores the frequent overlap in manifestations by individual microorganisms. Consequently, recent guidelines have ignored that differentiation (7).

*A. viridans* is a microaerophilic, Gram-positive, catalase-negative, coccus which is usually identified either singly or in tetrads. It is a rare organism, is responsible for invasive infections, and has been associated with bacteremia (8,9), septic arthritis (10) and endocarditis. However, the dextran production of *A. viridans* promotes adherence to a damaged endocardium and explains the predominance of IE among other septic foci. Usually, *A. viridans* is susceptible to many antimicrobial drugs, including penicillins, trimethoprim/sul-

famethoxazole and glycopeptides (8); it is also susceptible to most aminoglycosides. The strains isolated from the present cases were consistent with this characterization, once more sustaining the identification as *A. viridans* among species of the *Aerococcus* genus.

Conservative therapy is not adequate for all patients with IE. Indeed, during the past few years, in developed countries, between 25% and 70% of IE patients underwent a cardiac surgical intervention during active IE (7). The surgical therapy of IE might include some extracardiac procedures, especially for the control of extracardiac infection sources. Two of the present cases were cured by medical therapy alone, while the other two required surgical intervention for acute valve regurgitation and splenic abscesses. Most remarkable was the site of the vegetation, which was large in three of the four cases.

## References

1. Janosek J. *Aerococcus viridans* as a causative agent of infectious endocarditis. J Hyg Epidemiol Microbiol Immunol 1980;24:92-96
2. Pien FD. *Aerococcus viridans* endocarditis. Mayo Clin Proc 1984;59:47-48
3. Augustine T, Thirunavukkarasu BBV, Bhatia BD. *Aerococcus viridans* endocarditis. Case report. Indian Pediatr 1994;31:599-601
4. Hyeong Park J, Kim YS, Kim MN, et al. Superior vena cava syndrome caused by *Aerococcus viridans* para-aortic abscess after heart transplantation. Transplantation 2002;74:1475-1476
5. Ting W, Silverman NA, Arzaman DA, et al. Splenic septic emboli in endocarditis. Circulation 1990;82:IV-105
6. Watanakunakorn T, Burkert T. Infective endocarditis at a large community teaching hospital. Medicine 1993;72:90
7. Horstkotte D, on behalf of the Task Force on Infective Endocarditis of the European Society of Cardiology. Guidelines on Prevention, Diagnosis and Treatment of Infective Endocarditis: Executive Summary. Eur Heart J 2004;25:267-276
8. Razeq JH, Thomas GM, Alexander D. The first reported case of *Aerococcus* bacteremia in a patient with HIV infection. Emerg Infect Dis 1999;5:838-839
9. Uh Y, Son JS, Jang IH, et al. Penicillin-resistant *Aerococcus viridans* bacteremia associated with granulocytopenia. J Korean Med Sci 2002;17:113-115
10. Taylor PW. Septic arthritis due to *Aerococcus viridans*. J Rheumatol 1985;12:1004-1005