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Prosthetic valve infection caused by *Abiotrophia defectiva*: A case report

Merlyn Blessy Jebamani Samraj[1], Varunikaa Nandakumar Sumitha[1], Tessa Antony[1], Mary Jeins Sobia[1], Kopula Sathyamoorthy Sridharan[1]

[1] Department of Microbiology, Sri Ramachandra Institute of Higher Education and Research, Chennai, India.

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ABSTRACT
Infective endocarditis (IE) refers to the microbial invasion of the heart valves or mural endocardium, which characteristically results in the formation of bulky friable vegetations, composed of platelets, fibrin, microcolonies of organisms and scanty inflammatory cells. *Abiotrophia defectiva* is a fastidious, Gram-positive cocci (GPC), formerly classified under "nutritionally variant streptococci" (NVS), and is recognised as an agent of endocarditis involving both native and prosthetic valves. It is an uncommon but important causative agent of infective endocarditis, especially when the bacterial cultures are negative. Here, we present a 62-year-old patient with a prosthetic aortic valve who came with complaints of low-grade fever and fatigue, 5 months following surgery, which was diagnosed using echocardiography and bacterial culture. The patient was successfully treated with oral levofloxacin for 3 weeks.

INTRODUCTION:

Staphylococcus aureus is the leading cause of IE globally, often associated with acute infections, intravenous drug use or healthcare-associated procedures. Symptoms develop rapidly in acute IE. Acute IE has a fulminant course with high fever, systemic toxicity, and leukocytosis[1]. *Staphylococcus aureus, Streptococcus pyogenes, Streptococcus pneumoniae,* or *Neisseria gonorrhoeae* are other etiologic agents causing acute IE. Subacute IE has a slow, indolent course with low-grade fever, night sweats, weight loss, systemic complaints and anaemia [2]. Viridans group of streptococci are commonly implicated in subacute endocarditis and often originate from the oral cavity, typically following a dental procedure. It can enter the bloodstream and cause transient bacteremia while chewing or brushing teeth. Roth's spots or Osler's nodules, which are the classical signs, are infrequent. A new or changing heart murmur is a classic clinical finding that can be accompanied by shortness of breath or swelling in the legs due to valve destruction [3].

IE is more commonly associated with damaged heart valves due to disease or congenital valvulopathies. Currently, prosthetic valves and intravenous drug abuse are added risk factors for IE. Prosthetic valve endocarditis (PVE) accounts for 20% of all IE. It occurs on parts of the prosthetic valve or native valve that has been reconstructed. PVE has been classified into two types based on their time of onset: early PVE (occurring within 1 year of surgery) and late PVE (occurring after 1 year). Early diagnosis and treatment can reduce complications and prevent mortality [4].

Organisms belonging to the genus *Abiotrophia* and *Granulicatella* were formerly known as NVS. *Abiotrophia defectiva* was first identified by Frenkel and Hirsch in 1961 in a case of subacute infective endocarditis. A key feature of *A. defectiva* is its strict nutritional requirement. It requires pyridoxal hydrochloride, pyridoxamine (active forms of vitamin B6) and L-cysteine for its growth [5,6]. In clinical laboratory settings, this leads to the "satellitism" phenomenon, where colonies grow better near the beta-lytic *Staphylococcus aureus* that provides these growth factors. They are usually present as part of normal flora in the oropharynx, gastrointestinal and genitourinary tract, but can lead to infective endocarditis with the presence of vegetations [7,8]. In 1995, Kawamura et al. reclassified the organism into its own genus using 16S rRNA gene sequencing. Further phylogenetic analysis by

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Collins and Lawson in 2000 established *Abiotrophia defectiva* as the only species in the genus *Abiotrophia*, while other previous members were moved to the newly created genus *Granulicatella* [5].

Case report:

A 62-year-old male presented to the cardiothoracic outpatient department with complaints of low-grade fever and fatigue for two weeks associated with decreased appetite. This was his second review following an aortic valve replacement surgery, which was done 5 months back. His past medical history included seizure disorder for which he was on oral levetiracetam 500mg, and aortic valve stenosis for which the prosthetic valve replacement surgery was done. He had no history of drug allergies and was on medications that included Tab. Telmisartan 20mg, Tab. Nicoumalone 2mg and Tab. Frusemide 50mg.

On clinical examination, the patient was febrile but remained conscious and well-oriented. Vital signs included temperature of 99.8°F, pulse 72 beats per minute (bpm) and blood pressure 150/80 mm Hg. Physical examination was negative for pallor, icterus, cyanosis, clubbing and generalised lymphadenopathy. Systemic examination showed harsh ejection systolic murmur heard over the right second intercostal space.

A transthoracic echocardiogram was done, which showed pannus/vegetation attached to the prosthetic aortic valve and moderate pulmonary artery hypertension. Severe aortic stenosis (stuck valve) and mild mitral and tricuspid regurgitation were seen with no obvious regional wall motion abnormality. Adequate left ventricular systolic function with grade II diastolic dysfunction (ejection fraction – 55%) as shown in Figure 1.

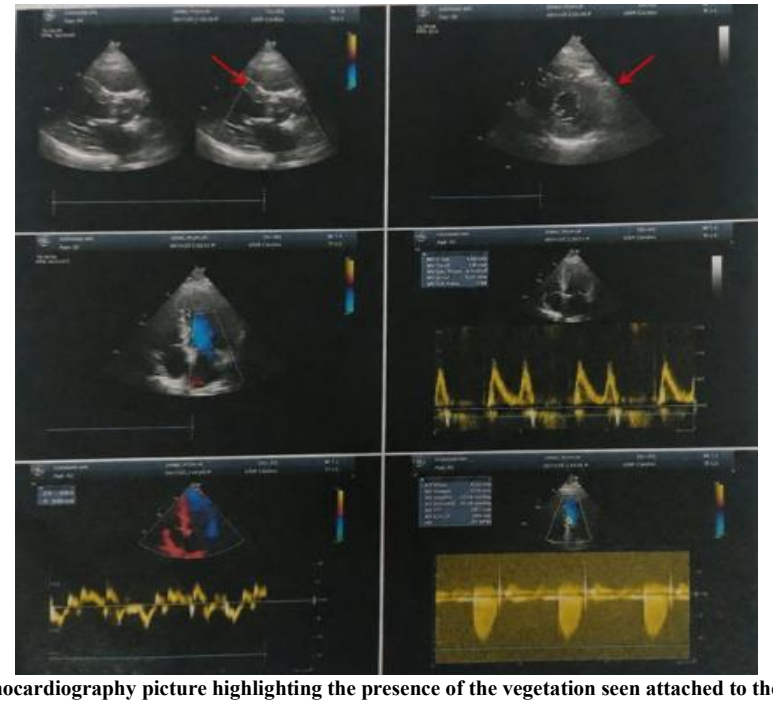

Figure 1: shows the Echocardiography picture highlighting the presence of the vegetation seen attached to the prosthetic aortic valve

Laboratory workup revealed increased prothrombin time (P.T 20.0 seconds) and the INR was within normal limits (1.79). A pair of aerobic and anaerobic blood cultures were collected before the start of empirical antibiotic therapy and sent in view of fever and the presence of vegetation.

Microbiological findings:

Blood culture was sent to the microbiology laboratory after inoculation of the blood into a pair of aerobic and anaerobic BACTEC (Becton Dickinson,) blood culture bottles. Gram stain from the flagged bottles showed the presence of Gram-positive cocci (GPC) in chains. It was sub-cultured onto blood, chocolate and MacConkey agar and incubated aerobically at 37°C for 24–48 hours. Tiny, grey, translucent colonies were observed on the third day on both blood and chocolate agar, as shown in Figure 2.

Figure 2: Tiny, grey translucent colonies of *Abiotrophia defectiva* on blood agar

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The organism was identified using VITEK-MS (bioMérieux, France) based on matrix-associated laser desorption ionisation – time of flight (MALDI-ToF) mass spectrometry with 99.9% probability. A test for satellitism was performed. A single cross streak of *S. aureus* (ATCC 25923) was applied near the inoculated *A. defectiva* on blood agar. After incubation at 35 °C in CO_2 incubator, the organism grew better in the vicinity of the staphylococcal growth as seen in Figure 3.

Figure 3: shows the phenomenon of satellitism – growth of *A. defective* near the streak line of *Staphylococcus*

Antimicrobial susceptibility testing (AST) was performed using GPC card (AST P-628) and the minimum inhibitory concentration (MIC) was compared with Clinical and Laboratory Standards Institute (CLSI M45) guidelines for *Abiotrophia* and was found to be susceptible to penicillin (MIC < 0.06µg/mL), ampicillin (MIC < 0.25µg/mL), cefotaxime (MIC = 0.5µg/mL), ceftriaxone (MIC < 0.12µg/mL), vancomycin (MIC = 0.5µg/mL), levofloxacin (MIC < 0.25µg/mL), clindamycin (MIC < 0.25µg/mL) and resistant to erythromycin (MIC >8µg/mL).

Treatment:

The patient was started on oral levofloxacin 500mg twice a day for 3 weeks and advised to come for a follow-up.

The patient remained asymptomatic after the treatment and was able to perform his daily activities on follow-up calls.

DISCUSSION:

Nutritionally variant streptococci are an important cause of culture-negative infective endocarditis due to their fastidious growth requirements [9].

Prosthetic valve endocarditis caused by *A. defectiva* is rare but clinically significant due to its association with biofilm formation and increased resistance to host defenses. The organism's ability to colonize prosthetic material increases the risk of persistent infection and complications such as valve dysfunction and embolization [10].

NVS (*Abiotrophia spp*) should be suspected when direct Gram stains of specimens of positive blood cultures show gram-positive cocci in chains, but fail to grow on the plates initially. Commercial blood culture medium that contains pyridoxal will support the growth of these organisms [11]. The use of automated blood culture bottles and longer incubation period can also facilitate the isolation of this organism from the sample. Preexisting valvular heart disease or other cardiac conditions are commonly associated with NVS, causing endocarditis [12]. Aortic valve involvement is more common with this rare infection. The symptoms include fever, weight loss and complications that can involve embolization of the vegetations, which can lead to stroke if the cerebral arteries are obstructed [13].

Another important aspect of *A. defectiva* endocarditis is its association with prosthetic valve involvement and late presentation. This patient developed infection five months following valve replacement, consistent with early prosthetic valve endocarditis. The presence of vegetations and increased transvalvular gradients indicated significant prosthetic valve dysfunction. Early identification and targeted antimicrobial therapy likely contributed to the favourable clinical outcome in this case, despite the known high morbidity associated with this pathogen.

This case highlights the rare occurrence of prosthetic valve endocarditis caused by *A. defectiva* and its successful management with oral levofloxacin, which is not routinely reported. The management of *A. defectiva* endocarditis remains challenging due to its variable susceptibility profile and relative tolerance to β-lactam antibiotics. Current recommendations by the American Heart Association and European Society of Cardiology advocate the use of high-dose penicillin or ceftriaxone in combination with gentamicin for a period of 6 weeks for PVE (Penicillin, 2–4 million units IV q4h × 4 weeks, plus gentamicin, 1 mg/kg IV q8h × 2 weeks). In case of penicillin allergy, the recommended alternative regimen is Vancomycin, 15–20 mg/kg IV q8–12h for 4 weeks. However, increasing reports of treatment failure and relapse have raised concerns regarding optimal therapy. In the present case, the AST demonstrated susceptibility to levofloxacin, and the patient was successfully managed with oral levofloxacin. Although fluoroquinolones are not considered first-line therapy, this case highlights their potential role as an alternative in selected, susceptibility-guided scenarios [9,10].

This case also exhibits the importance of having a clinical suspicion for fastidious organisms such as *A. defectiva* in patients presenting with features of infective endocarditis, especially when initial

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culture results are inconclusive. The integration of conventional microbiological techniques with advanced modalities such as MALDI-TOF MS plays a crucial role in early diagnosis. Furthermore, antimicrobial therapy based on susceptibility patterns may improve clinical outcomes, even in infections traditionally associated with poor prognosis.

CONCLUSION:

Abiotrophia defectiva is a rare but important pathogen that can be successfully treated if diagnosed at the earliest. Because of the high rate of mortality and morbidity associated with this infection, physicians and microbiologists must pay close attention when a blood culture bottle smear shows GPC in chains, and the subsequent culture plates do not show any growth. This case highlights the rare occurrence of prosthetic valve endocarditis caused by *A. defectiva* and its successful management with oral levofloxacin, which is not routinely reported. The use of MALDI-TOF MS enabled rapid identification, aiding in timely targeted therapy.

REFERENCES:

1. Alpert JS, Klotz SA, Simon HB. Infective Endocarditis: An Update. The American Journal of Medicine. 2025 Apr 1;138(4):589-90.
2. Blaser MJ, Cohen JI, Holland SM. Mandell, Douglas, and Bennett's principles and practice of infectious diseases. (No Title). 2025.
3. Callegari S, Cabrera A, Mejia L, Sanchez CA. A case series and literature review of subacute infective endocarditis: a clinical challenge. Cureus. 2023 Mar 10;15(3).
4. Khalil H, Soufi S. Prosthetic valve endocarditis.
5. Collins MD, Lawson PA. The genus Abiotrophia (Kawamura et al.) is not monophyletic: proposal of Granulicatella gen. nov., Granulicatella adiacens comb. nov., Granulicatella elegans comb. nov. and Granulicatella balaenopterae comb. nov. International Journal of Systematic and Evolutionary Microbiology. 2000 Jan;50(1):365-9.
6. Bouvet A, Van De Rijn I, McCarty M. Nutritionally variant streptococci from patients with endocarditis: growth parameters in a semisynthetic medium and demonstration of a chromophore. Journal of Bacteriology. 1981 Jun;146(3):1075-82.
7. Wilawer M, Elikowski W, Greberski K, Ratajska PA, Welc NA, Lisiecka ME. Abiotrophia defectiva endocarditis–Diagnostic and therapeutic challenge: Case report. IDCases. 2023 Jan 1;34:e01906.
8. Seguiti C, Piacentini E, Fraghì A, Zappa M, Croce E, Meloni A, Cirillo M, Ferrari C, Zani C, Belli D, Sabatini T. Abiotrophia defectiva and granulicatella: a literature review on prosthetic joint infection and a case report on A. defectiva PJI and concurrent native valve endocarditis. Microorganisms. 2025 May 12;13(5):1113.
9. Habib G, Lancellotti P, Antunes MJ, Bongiorni MG, Casalta JP, Del Zotti F, Dulgheru R, El Khoury G, Erba PA, Iung B, Miro JM. 2015 ESC guidelines for the management of infective endocarditis: the task force for the management of infective endocarditis of the European Society of Cardiology (ESC) endorsed by: European Association for Cardio-Thoracic Surgery (EACTS), the European Association of Nuclear Medicine (EANM). European heart journal. 2015 Nov 21;36(44):3075-128.
10. Baddour LM, Wilson WR, Bayer AS, Fowler Jr VG, Tleyjeh IM, Rybak MJ, Barsic B, Lockhart PB, Gewitz MH, Levison ME, Bolger AF. Infective endocarditis in adults: diagnosis, antimicrobial therapy, and management of complications: a scientific statement for healthcare professionals from the American Heart Association. Circulation. 2015 Oct 13;132(15):1435-86.
11. Winn Washington C, Allen SD, Janda WM, Koneman EW, Procop GW, Schreckenberger PC, Woods GL. Koneman's Color Atlas and Textbook of Diagnostic Microbiolgy. Lippincott, Williams & Wilkins; 2006.
12. Chowdhury S, German ML. Rare but not infrequent: infective endocarditis caused by Abiotrophia defectiva. Case Reports in Infectious Diseases. 2018;2018(1):5186520.
13. Chinnaraj H, Gudibandi HV, Kumar JS, Kumarasamy S, Kumar J. Abiotrophia defectiva: A Rare Causative Agent of Infective Endocarditis With Severe Complications. Cureus. 2024 Nov 15;16(11).