Infective endocarditis caused by *Abiotrophia defectiva* presenting as anterior mitral leaflet perforation mimicking cleft anterior mitral leaflet

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**ABSTRACT**

Infective endocarditis (IE) is primarily a bacterial infection of the heart valves. The most common organisms implicated include *Staphylococcus* and *Streptococcus* species. However, with the advent of MALDI-TOF and molecular techniques, the reports of IE being caused by rare organisms are on a rise. Here we describe a case of IE due to *Abiotrophia defectiva*. This is the first report of simultaneous infection of both mitral and aortic valves by *Abiotrophia defectiva* from India. IE caused by *Abiotrophia defectiva* has been seen to be more severe, associated with higher failure rates and relapse. This emphasizes the accurate identification of nutritionally variant *Streptococcus* (NVS) species as the management of choice varies between *Abiotrophia* and *Granulicatella*.

**Keywords:** *Abiotrophia defectiva*, case report, infective endocarditis, MALDI-TOF, resistance

**Introduction**

Infective endocarditis (IE) is a chronic infection of lining or valves of the heart, primarily bacterial in origin, which can be either culture positive or negative.[¹] The most common organisms implicated in IE include *Staphylococcus* and *Streptococcus* species. However, reports of IE being caused by other rare organisms like nutritionally variant *Streptococcus* (NVS), *Bartonella spp.*, *Coxiella burnetii*, *Trophymena whippelii*, HACEK (*Haemophilus aphrophilus, Actinobacillus actinomycetemcomitans, Cardiobacterium hominis, Eikenella corrodens, Kingella kingae*) group and some of the fungi are on a rise.[²] Sporadic cases by rare organisms like

**Case Report**

A 22-year-old male was presented with a history of continuous, high-grade fever for the past 20 days. He was a known case of congenital bicuspid aortic stenosis and underwent balloon aortic valvotomy of the bicuspid aortic valve 14 years back. Physical examination revealed pulse rate of 110 bpm, respiratory rate of 25/min and blood pressure of 110/40 mmHg. Cardiac apex was displaced and hyperdynamic. On auscultation, there was early systolic murmur of grade IV/V, best heard at apex and radiating...
to axilla suggestive of acute mitral regurgitation. Another early diastolic murmur, heard in neo-aortic area was suggestive of severe aortic regurgitation. Echocardiography revealed a large vegetation of size 12 × 2 mm attached to aortic side of bicuspid aortic valve and anterior mitral leaflet perforation with vegetation at the tip of AML of size 2 × 2 mm, [Figure 1a and b]. Parasternal long-axis 2D echocardiography with color doppler showed large vegetation attached to bicuspid valve and anterior mitral leaflet perforation along with severe mitral regurgitation and severe aortic regurgitation. [Video 1] Routine laboratory investigations showed a white blood cell count of 21.4 cu/mm, hemoglobin of 8.6 g/dl, hematocrit of 27.3%, and reticulocyte count of 6.3%. Based on Modified Duke’s criteria, a diagnosis of IE was made. Blood culture was collected under aseptic conditions and it grew Abiotrophia defectiva after 3 days of incubation in BACTEC. The smear showed pleomorphic gram-positive coccobacilli in chains, with no capsule or spores [Figure 2a]. The colonies were very sparse on 5% sheep blood agar plate, with satellitism near Staphylococcus aureus streak due to the fastidious nature of this organism [Figure 2b]. The identification was done using MALDI-TOF with a score of 1.8. Empirical therapy with I/V ceftriaxone and gentamicin was initiated. Antimicrobial susceptibility was performed on blood agar plate using Kirby-Bauer method and the isolate was found to be sensitive to ampicillin, ceftriaxone, gentamicin, erythromycin, teicoplanin, and vancomycin. The patient was continued on ceftriaxone and gentamicin and became afebrile after 2 days of treatment. As patient had no symptoms of heart failure, he received antibiotics for duration of 4 weeks and is currently awaiting elective aortic valve replacement with mitral valve repair.

Discussion

Abiotrophia defectiva is a non-motile, gram-positive coccobacilli in chains that is catalase negative, pyridoxine dependent and exhibit satellitism around Staphylococcus streak.[3] It needs L-cysteine, pyridoxal, and other factors for its proper growth.[4] It is a commensal flora of oral, intestinal, and genitourinary tract.[5] These sites serve as the portals from where the bacteria gain entry into bloodstream and causes endocarditis, brain abscess, keratitis, peritonitis, septic arthritis, meningitis, and osteomyelitis.[6] CVS is the preferred site due to its ability to secrete exopolysaccharide and propensity to adhere to fibronectin of endovascular tissue.[5,7] NVS contribute approximately 3–5% of IE cases and out of this, ~6% (3–5%) is attributed by Abiotrophia.[9] The major risk factors include any dental procedure in the recent past, pre-existing cardiac problems; prosthetic heart valves; antibiotic therapy and excessive alcohol intake.[8] The frequency of mitral valve being affected is more.[9]

IE caused by A. defectiva is associated with greater morbidity and mortality (17%)[10] Rhodes et al. have reported significant neurological findings, specifically intracranial aneurysm (ICA), in 100% of their cases.[11] The major causes of mortality include congestive cardiac failure (CCF) or multiple emboli. The size of vegetations due to Abiotrophia is small and have high propensity to embolize (one-third of cases). Approximately 27% of patients require prosthetic valve replacement and 50% of the patients require surgery.[9] Treatment failure has been recorded in 41% of cases, despite the susceptibility pattern in vitro.[9] Some of the recent studies have shown that it might be due to the generation of L-forms and thereby these antibiotics are of no use in such cases.[12] Resistance up to 50% has been noted against beta-lactams and up to 90% against macrolides, contributing to relapse in ~17% of cases. In case of treatment failure to this combination therapy, vancomycin is the preferred drug.[9] The American Heart Association guidelines recommend the use of ampicillin and gentamicin with 18–30 million units of penicillin per 24 h divided into six doses or 12 g of ampicillin per 24 h I/V divided into six doses with I/V gentamicin at 3 mg/kg/24 h divided into three doses for 4–6 weeks.[14] Studies have shown that early surgical intervention can reduce the mortality in these cases.[9] To the best of our knowledge, this is the third report of Abiotrophia IE from India. Two cases of Abiotrophia IE have already been reported from India in 2000 and 2001, respectively.[16,17] Our isolate was sensitive in all drugs, thereby suggesting that the resistance is not that high in our region, as earlier reports have also reported the isolate to be sensitive to all antibiotics.[16,17]

Conclusion

IE caused by Abiotrophia defectiva is associated with higher mortality and relapse. Due to a high risk of embolization, early surgical intervention is recommended. This emphasizes the accurate identification of NVS species. The present case also

Figure 1: (a) TEE (Apical two-dimensional view) showing perforation of A2 scallop of AML with normal P1 and P3 scallop of PML. (b) TEE showing thickened bicuspid aortic valve

Figure 2: (a) Smear showing gram-positive cocci in chains. (b) Alpha hemolytic satellite colonies of Abiotrophia defectiva on blood agar
calls for increased awareness amongst the clinicians for prompt diagnosis and management of the disease.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Fowler VG, Scheld WM, Bayer AS. Endocarditis and intravascular infections. In: Mandell GL, Bennett JE, Dolin R, editors. Mandell, Douglas and Bennett’s Principles and Practice of Infectious Diseases. Vol 6. Philadelphia: Churchill Livingstone; 2005. p. 975-1021.

2. Millar BC, Altweg M, Raoult D, Moore JE. Culture-negative endocarditis—causes, diagnosis and treatment. Rev Med Microbiol 2000;11:59.

3. Christensen JJ, Facklam RR. Granulicatella and abiotrophia species from human clinical specimens. J Clin Microbiol 2001;39:3520-3.

4. Carey RB, Gross KC, Roberts RB. Vitamin B6-dependent Streptococcus mitior (mitis) isolated from patients with systemic infections. J Infect Dis 1975;131:722-6.

5. Bouvet A, Villeroy F, Cheng F, Lamesch C, Williamson R, Gutmann L. Characterization of nutritionally variant streptococci by biochemical tests and penicillin-binding proteins. J Clin Microbiol 1985;22:1030-4.

6. Kiernan TJ, O’Flaherty N, Gilmore R, Ho E, Hickey M, Tolan M, et al. Abiotrophia defectiva endocarditis and associated hemophagocytic syndrome: A first case report and review of the literature. Int J Infect Dis 2008;12:478-82.

7. Okada Y, Kitada K, Takagaki M, Ito HO, Inoue M. Endocardiac infectivity and binding to extracellular matrix proteins of oral Abiotrophia species. FEMS Immunol Med Microbiol 2000;27:257-61.

8. Roberts RB, Krieger AG, Schiller NL, Gross KC. Viridans streptococcal endocarditis: The role of various species, including pyridoxal-dependent streptococci. Rev Infect Dis 1979;1:955-66.

9. Je H, Song D, Chang CL. Bacterial endocarditis caused by *Abiotrophia defectiva* in a healthy adult: A case report with literature review. Ann Clin Microbiol 2019;22:23-7, Korean.

10. Tuazzon CU, Gill V, Gill F. Streptococcal endocarditis: Single vs. combination antibiotic therapy and role of various species. Rev Infect Dis 1986;8:54-60.

11. Rhodes HM, Hirigoyen D, Shabnam L, Williams DN, Hansen GT. Infective endocarditis due to Abiotrophia defectiva and Granulicatella spp. complicated by infectious intracranial cerebral aneurysms: A report of three cases and review of the literature. J Med Microbiol 2016;65:493-9.

12. Frenkel A, Hirsch W. Spontaneous development of L forms of streptococci requiring secretions of other bacteria or sulphhydryl compounds for normal growth. Nature 1961;191:728-30.

13. Stein DS, Nelson KE. Endocarditis due to nutritionally deficient streptococci: Therapeutic dilemma. Rev Infect Dis 1987;9:908-16.

14. Baddour LM, Wilson WR, Bayer AS, Fowler VG, Bolger AF, Levison ME, et al. Infective endocarditis: Diagnosis, antimicrobial therapy, and management of complications: A statement for healthcare professionals from the committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease, council on Cardiovascular Disease in the young, and the councils on clinical cardiology, stroke, and cardiovascular surgery and anesthesia, American heart association: Endorsed by the infectious diseases society of America. Circulation 2005;111:e394-434.

15. Houpikian P, Raoult D. Blood culture-negative endocarditis in a reference center: Etiologic diagnosis of 348 cases. Medicine (Baltimore) 2005;84:162-73.

16. Verghese S, Mullasari A, Padmaja P, Mathew T, Elizabeth SJ, Chitra AK, et al. Bacterial endocarditis caused by abiotrophia defectiva (nutritionally variant streptococci). Indian Heart J 2000;52:594-6.

17. Ray M, Subramanian C, Ray P, Singh P. Infective endocarditis in a child due to Abiotrophia defectivus. Indian Pediatr 2002;39:388-92.