



Case Report

Case Report of Abiotrophia Defectiva Endocarditis: Treatment of Severe Mitral Regurgitation and Anemia in a Jehovah's Witness Patient

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Abstract

Background: We report a case of a 50-year-old Jehova's Witness male with Abiotrophia defectiva endocarditis on the mitral valve (MV) with severe mitral regurgitation (MR), multiple septic emboli and accompanying anemia. Due to his religious beliefs, he strictly refused blood transfusion. The aim of this case is to show that with an individual preoperative management a surgical valve replacement without blood transfusion is feasible.

Case Summary: Our patient presented with a 6-month history of B-symptoms, abdominal pain and shortness of breath. In clinical examination cardiac murmur was found, ultrasound showed splenomegaly with suspicion of segmental splenic infarct which was confirmed by magnetic resonance imaging (MRI). A severe MR with multiple vegetation's was found by transthoracic echocardiogram (TTE) and trans-oesophageal echocardiogram (TEE). Multiple blood culture samples detected the streptococcus Abiotrophia defectiva. First, a calculated antibiotic treatment was initiated and as the patient refused blood transfusion, an additional iron treatment as well as recombinant human erythropoietin substitution were performed to address the anemia. Finally, the patient underwent open cardiac surgery with biological valve replacement using autologous transfusion. Following surgery, he showed regular function of the MV-prosthesis by TTE up to 24 months postoperative.

Discussion: Infective endocarditis (IE) is mostly caused by common pathogens like staphylococcus aureus, streptococcus viridans and enterococcus faecalis. Nevertheless, multiple rare pathogens are described to provoke IE. In our case the streptococcus Abiotrophia defectiva, belonging to the natural environment of the oral cavity, the gastrointestinal and urogenital tract, was found. Due to its slow growing rate, its identification is challenging. As our patient refused blood transfusion and early surgical valve replacement, but showed hemodynamic stability we could develop this individual therapeutic management with intravenous antibiotics as well as iron and erythropoietin substitution to achieve operability.

Keywords: Infective Endocarditis, Abiotrophia defectiva, Jehova's Witness, Trans-Oesophageal Echocardiography, Anemia, Valve Replacement, Case Report, Septic Embolization.

Introduction

Infective endocarditis (IE) is still a life-threatening disease with a high morbidity and mortality. To date, in Germany the incidence of an acute IE is about 11.6/100.000 residents with an intrahospital mortality of 17% [1,2]. Therefore, the early diagnosis of an IE with beginning of an appropriate anti-infective therapy is crucial. Due to the high variability at clinical presentation, diagnosis of IE is sometimes challenging. Patients can present with acute, subacute or chronic symptoms. They can show signs of an acute infection like sepsis and fever. But also, unspecific symptoms like subfebrile temperature, weight loss, night sweats or fatigue can be shown, which may mislead the initial diagnosis as they are accompanied by many chronic diseases of the rheumatological, neurological or immunological field [3]. Around 70-87% of the cases of IE are caused by pathogens belonging to staphylococcus (*Staphylococcus aureus* 30%) and streptococcus (*Streptococcus viridans* around 17%) group, followed by enterococci (around 10%), pathogens of the HACEK-group and fungi (around 2%) [4]. Abiotrophia defectiva (*A. defectiva*) is a very rare specimen belonging to the streptococcus group, which is described to cause IE with a high risk of embolic complications, treatment failure and mortality [4-6]. Repetitive blood testing especially blood culture testing is crucial for the diagnosis of IE based on the Duke criteria and represents the basis of an calculated anti-infective therapy. Imaging modalities like transthoracic echocardiography (TTE), trans-oesophageal echocardiography (TOE), computer tomography (CT), nuclear imaging (PET) and cardiac magnetic resonance imaging (CMR) are important for confirmation of IE, assessment of the severity of valve defect and prognosis. Based on the latest ESC Guidelines a 'Endocarditis Team' should be involved for the therapeutic management right up to indication and timing of cardiac surgery [3]. Jehovah's Witnesses belong to a distinct Christian movement, separate from mainstream Christianity. Founded in the United States in 1872 by Charles Russell, they have over 8 million members worldwide, with 170.000 in Germany. Their religious beliefs prohibit them from accepting whole blood transfusions or its primary components. A review shows that cardiac surgery in Jehova's Witness patients without blood transfusion is feasible and can yield results equivalent to those of other patients. Advances in blood conservation methods, including the use of pharmacological agents such as iron and erythropoietin (EPO), have contributed to achieve favourable surgical outcomes [7].

Case Presentation

A 50-year-old man, presented to his family doctor with a 6-month history of intermittent fever, night sweats, weight loss

(approx. 14 kg in the previous 6 months), abdominal pain and poor appetite. He noticed shortness of breath but denied chest pain, palpitation or cough. Seven months prior to his presentation, he had a dental extraction. He denied intravenous drug use, smoking or heart diseases and consumed alcohol only rarely. The patient was referred to the gastroenterology clinic in our hospital for further investigation due to splenomegaly and suspected segmental splenic infarct. On admission the patient was afebrile, had a regular heart rate of 95 beats per minute and a blood pressure of 121/94 mmHg. The physical examination revealed a pansystolic murmur in the mitral area, splenomegaly and vision impairment on both sides. Laboratory investigation revealed a normal blood count (hemoglobin of 11.4 g/dL, WBC 9.6 10⁹/L, platelets 316 x 10⁹/L), with enhanced levels of CRP 55.7 mg/L, serum creatinine 1.21 mg/dL [8]. ECG showed sinus rhythm with no reciprocal changes. Contrast sonography and CT scan of the abdomen showed segmental splenic infarct, mild splenomegaly and liver hemangioma (Figure 1). The patient was presented to cardiology and department for consultation. TTE and 3D-TOE showed a severe eccentric mitral regurgitation (MR) due to multiple vegetation's on the posterior mitral leaflet (PML) and the anterior mitral leaflet (AML) with a maximum expansion of 16 x 8mm leading to a PML prolapse (Figure 2-3). The left ventricular ejection fraction was normal without any other heart valve defects; especially no further vegetation's were detected. Brain MRI showed a small area of white matter abnormality suggestive of embolism in the right middle cerebral artery branches. Clinical examination showed no petechiae or Janeway lesions. Multiple sets of blood cultures could detect *A. defectiva*, which was tested sensitive to ampicillin and gentamicin. Hence, the patient was commenced on intravenous gentamicin (3mg/kg/day i.v. in 1 dose) and ampicillin (12g/day i.v. in 4 doses) leading to gradual CRP decrease. The TOE control showed no obvious reduction of the vegetation on the MV with persistent severe eccentric MR. In the further course, the patient developed acute cardiac decompensation with severe dyspnea due to MR, and therefore, indication for urgent surgical treatment was given. However, the patient, adhering to Jehovah's Witness beliefs, declined any blood transfusions or blood products. Consequently, we admitted the patient to our intensive care unit for intravenous diuretic therapy, continued the intravenous antibiotic treatment, and initiated intravenous iron substitution (1.000 mg Ferrinject) to address the iron deficiency anemia. Subsequently, recombinant EPO (600 I.E./kg KG per week for 2 weeks) was administered to manage the progressing anemia associated with chronic endocarditis and iron deficiency. With these measures, hemodynamic stability was achieved and hemoglobin level reached 12 g/dl to minimize the risk of bleeding during upcoming operation. After 6 weeks of intravenous antibiotic treatment, the patient was discharged from our hospital. He was referred to cardiac surgery and received biological MV replacement (Carpentier-Edwards-Perimount 33

mm). Microbiological investigation of the native MV showed still *A. defectiva* DNA by 16S-PCR so anti-infective treatment was continued for 6 six weeks after MV replacement. During 24 months, follow up after MV replacement the patient showed no evidence of MV dysfunction or endocarditis (Figure 4).

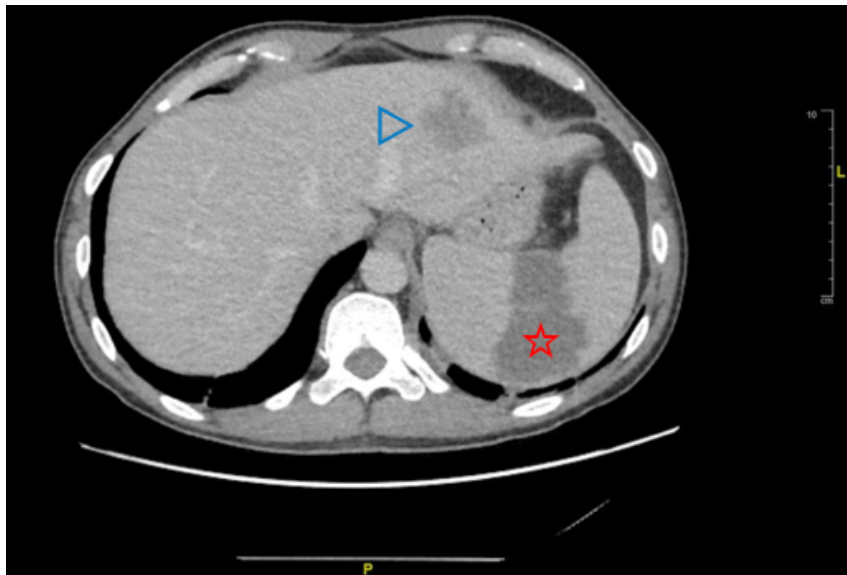


Figure 1: Segmental splenic infarct (red star) and liver hemangioma (blue arrow) seen on CT.

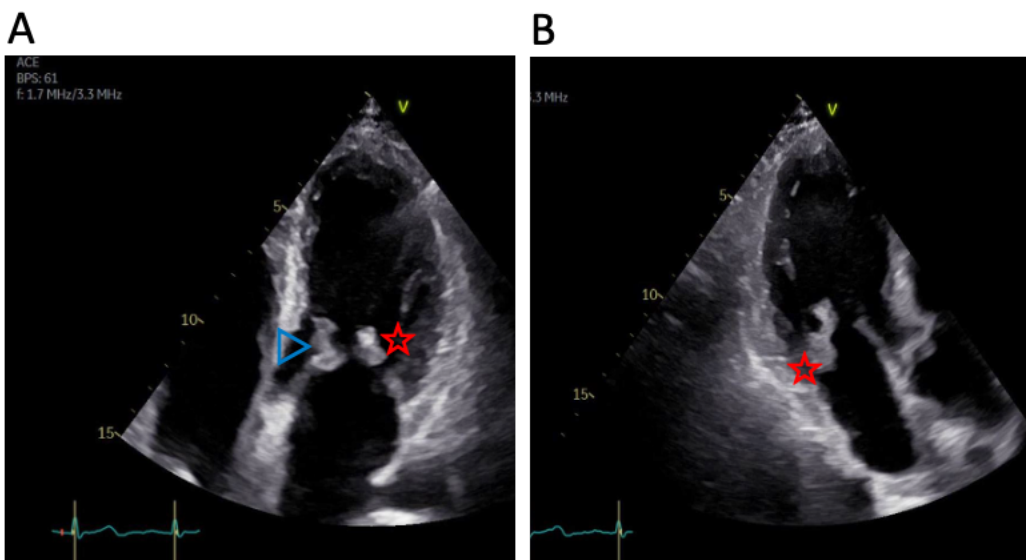


Figure 2: Transthoracic echocardiography showing vegetation on posterior (red star) and anterior mitral leaflet (blue arrow) in 4-chamber view (A) and 3-chamber view (B)

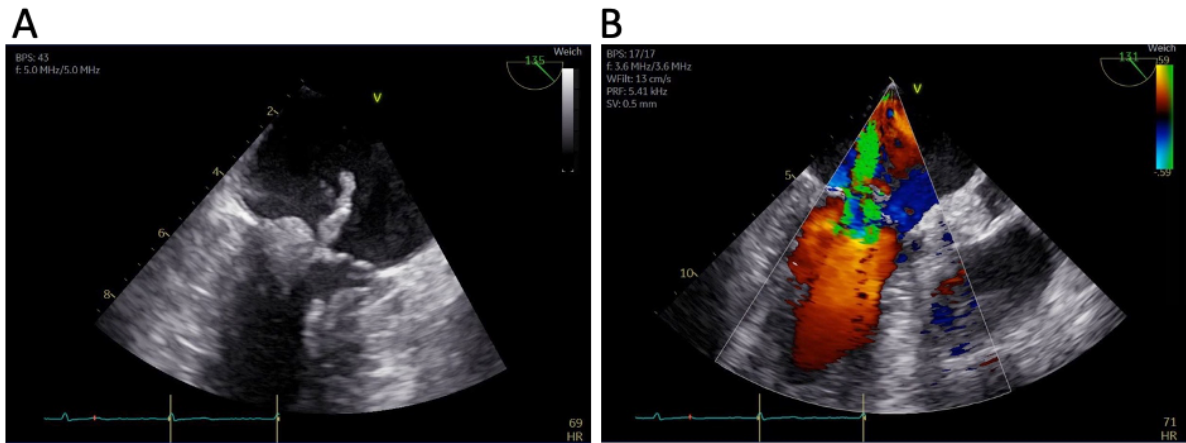


Figure 3: Trans-oesophageal echocardiography showing vegetation on posterior and anterior mitral leaflet (A) with accompanying severe mitral valve insufficiency (B)

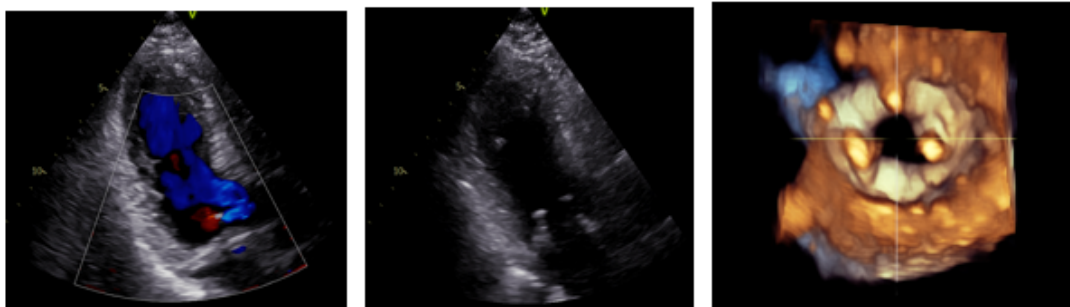


Figure 4: Transthoracic echocardiography showing the biological mitral valve prosthesis in the Follow up control, 24 months after surgery.

Discussion

A. defectiva belongs to the nutritionally variant streptococci (NVS), which were first described in 1961 by Frenkle and Hirsch. Different to the viridans-group streptococci, they exhibit characteristic growth requirements (thiol-requiring, vitamin B6-/pyridoxal-dependent), prolonged incubation time, variable gram stain findings and a satellite-promoting phenome (staphylococcus species provide suitable culture conditions in absence of supplement) [6,9]. In 1989 NVS were classified into Streptococcus defectiva and Streptococcus adjacens based on DNA-DNA hybridization studies and finally in 1995, due to 16S rRNA gene sequence data, the new genus Abiotrophia was created and with it the two streptococci were transferred to A. defectiva and A. adiacens [10]. A. defectiva is a gram-positive coccus in chains, non-motile, catalase negative and shows satellites around other bacteria. It belongs to the natural environment of the oral cavity, the gastrointestinal and urogenital tract and can cause bacteraemia as well as severe infections with abscesses, osteomyelitis, meningitis and IE. In our case, dental extraction seven months prior is the

suspected entry side. A. defectiva is described to cause 5-6% of streptococcus IE but also cases of culture-negative IE are assumed [9]. IE by A. defectiva is characterized by large vegetation's (<10 mm) and high rates of systemic embolization [3,6,11,12]. Also in our case the initial finding at presentation was segmental splenic infarct and furthermore a large vegetation at the MV was found. Exopolysaccharides allow them to adhere to fibronectin in the extracellular cardiac matrix and therefore IE can progress slowly with predisposition to develop large vegetation's [8,13]. Because of its slow growing rate patients often present with unspecific clinical symptoms, like in our case weight loss, night sweats and intermittent fever, and due to its special growing requirements its identification is challenging [10] which can delay early diagnosis. As antimicrobial treatment Penicillin G, ceftriaxone or vancomycin in combination with an aminoglycoside are recommended regarding the current ESC guidelines [3]. In literature, A. defectiva is described to show a notable tolerance to Penicillin [8], so we decided according to antimicrobial testing for an intravenous antimicrobial regime with ampicillin and gentamicin. Treatment

failure rates despite the use of appropriate antibiotic treatment are about 41% and even with clearance in repetitive blood culture testing A. defectiva IE has a high risk of valve replacement (around 50%) which is attributable to large vegetation's, valve destruction and/or heart failure [3,11,12]. Our patient developed clinical deterioration with acute decompensated heart failure and need for intravenous diuretics. In this situation, mortality rate is described to be around 17% which is much higher compared to viridans streptococci (0-12%) [13]. But due to its religious beliefs by Jehova's Witness he denied blood transfusion. To address the accompanying anemia, we performed intravenous iron substitution and treatment with EPO, which has been demonstrated to restore red blood cells and hemoglobin levels in Jehovah's Witness patients, although these effects may be significantly delayed [7]. As described above, A. defectiva is difficult to prove due to its characteristic growth requirements. In our case, gram staining of the excised native MV provided no proof of A. defectiva but 16S-PCR still showed A. defectiva and so the postoperative antibiotic treatment was continued for six weeks. Summarized, due to the slow growing rate of A. defectiva and the hemodynamic stability of our patient, we could develop this individual approach with appropriate antimicrobial treatment as well as iron substitution to achieve operability without perioperative blood transfusion.

Conclusions

Performing open-heart surgery on a patient with pre-existing anemia and the exclusion of intraoperative or postoperative blood transfusion significantly increases surgical mortality. In our case, we effectively managed the specific pathogen with a carefully calculated antibiotic regimen and utilized the time to support hematopoiesis with iron and EPO doses. In this case, of A. defectiva IE, the combination of antibiotic treatment, anemia management, and valve replacement surgery proved to be a successful treatment approach. During 24 months follow up our patient showed freedom from recurrence.

Learning points:

- IE can be caused by uncommon pathogens like in our case A. defectiva
- A. defectiva shows a high potential of systemic embolization, high rate of mortality due to heart failure caused by valve destruction
- Diagnosis of A. defectiva IE can be challenging due to special growing requirements
- Rates of valve replacement in A. defectiva IE reach around 50% of cases
- In case of surgical valve replacement due to IE the excised native valve should be investigated microbiological with culture, gram staining and PCR to prove residual bacteria even in case of clearance in repetitive blood culture testing

Disclosures

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Conflicts of interest: There are no conflicts of interest.

Ethics Statement: Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

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