

Case Report

Successful Surgical Treatment of Mitral Valve Endocarditis Caused by *Brucella*: A Case Report

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Abstract

Brucellosis endocarditis is a rare but life-threatening complication of brucellosis, involving congenital, prosthetic and even native valves. Its diagnosis and treatment is a great challenge for doctors. The patient's prognosis requires prompt diagnosis and continuous evaluation of treatment plans to assess the need for either surgical intervention of the infected valves or continuation of antibiotic therapy alone. We present a patient with brucellosis endocarditis, predominantly involving the mitral valve, presenting with vegetations and prolapse of the anterior leaflet of the mitral valve with moderate to severe regurgitation. The patient was treated with triple antibiotic therapy before surgery. After the patient's blood culture results were negative, we removed the infected mitral valve vegetations and performed a mitral valve replacement. The patient was successfully extubated 4 hours after surgery and discharged 11 days after surgery. After discharge, the patient continued to receive triple antibiotic therapy for 2 months and was followed up at the cardiac surgery and infectious disease outpatient clinics.

Keywords

brucellosis endocarditis; mitral valve vegetation; early diagnosis; surgical treatment; anti-infection

Introduction

Brucellosis is a worldwide zoonotic disease, which is particularly prevalent in the Mediterranean area, the Middle East, the Arabian Peninsula, Central and South America, Asia and Africa [1]. Brucellosis is a systemic infectious disease. Skeletal muscle, spleen, liver and bone marrow, rich in reticuloendothelial cells are the most common affected sites [2]. It can rarely involve the cardiovascular system, resulting in endocarditis, myocarditis, pericarditis, or endarteritis. Although relatively rare (3% of cases), patients who develop endocarditis (1%–2% of cases) account for 80% of deaths [3]. *Brucella* infection can affect multiple organ systems and usually presents with symptoms of

general malaise, arthralgia, night sweats, and latent fever [4]. Due to the diversity of clinical signs and symptoms, diagnosis and treatment options are sometimes difficult. We present a case of a 36-year-old male patient with brucellosis endocarditis who recovered uneventfully after successful surgery and antibiotic treatment.

Case Report

A 36-year-old male was admitted with recurrent fever and joint pain in the extremities for half a year. The pain involved the left sacroiliac, bilateral lower limb knee, bilateral ankle, bilateral elbow, and left shoulder joints. The patient was treated for gout in another hospital, but his symptoms did not improve. He was admitted to the Department of Infectious Diseases of our hospital because of recurrent fever.

Physical examination after admission showed that the blood pressure was 127/93 mmHg, temperature 37.4 °C, heart rate 120 beats/min, and respiration rate 20 beats/min. Laboratory tests showed a white blood cell count of $2.7 \times 10^9/L$, hemoglobin 97 g/L, and platelet count $64 \times 10^9/L$. High sensitive C-reactive protein (hs-CRP) was increased to 80.7 mg/L, and the erythrocyte sedimentation rate (ESR) was significantly increased to 116 mm/hr. A 12-lead electrocardiogram revealed sinus tachycardia (121 beats per minute), and chest radiography revealed no abnormalities. Abdominal CT showed hepatosplenomegaly. Transesophageal echocardiography showed a mobile lesion on the anterior leaflet of the mitral valve (6.9×8.2 mm), which was consistent with a vegetation. There was no regurgitation of the valve (Fig. 1). There were no manifestations of blood systemic disease noted on bone marrow immunophenotyping. Blood cultures were positive for *brucella* with a *brucella* antibody of 1:200, which confirmed the diagnosis of *brucella* infection.

A quadruple anti-infective regimen of rifampicin 600 mg QD, doxycycline 100 mg Q12H, amikacin 0.4 g Q12H, and trimethoprim-sulfamethoxazole (SMZ) 0.96 g bid was started. After one week of treatment, the patient's serum creatinine significantly increased, and the antibiotic regimen was changed to triple anti-infective therapy with rifampicin, doxycycline and ceftriaxone. The patient's renal function significantly improved, but he remained febrile.

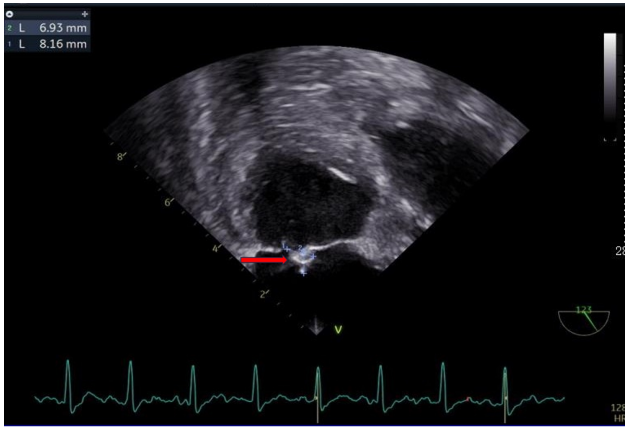


Fig. 1. The admission echocardiography revealed strong echo (6.9×8.2 mm) in the left atrium of the anterior mitral valve, which was considered to be a vegetation (as shown by the red arrow).

Cardiac auscultation revealed a grade 2/6 systolic mitral murmur and osler nodules were seen on the right index finger and the tip of the right toe. A follow up echocardiogram showed that the mitral valve vegetation was enlarged (12.7×8.1 mm) and accompanied by moderate to severe mitral valve insufficiency (Fig. 2).

The patient was transferred to department of cardiac surgery for surgical treatment. However, considering the patient's high risk of surgery due to recurrent hyperthermia (up to 40.3 °C), it was decided after a multidisciplinary consultation to continue the current antibiotic therapy. After 3 weeks of fever control and three consecutive negative blood cultures, the patient underwent surgery. During the operation, multiple vegetations (with the maximum size about 15×13 mm) were found in the anterior leaflet of the mitral valve (Fig. 3). Because the valve tissue was significantly damaged and difficult to repair, we excised the mitral valve vegetations and performed a mechanical mitral valve replacement. The patient was extubated 4 hours after surgery and discharged from the hospital on the 11th postoperative day. The white blood cell count, C-reactive protein, serum creatinine level, and body temperature were normal at discharge, and no abnormal findings were found on echocardiography (Fig. 4). After discharge, the patient continued to receive triple antibiotic therapy with rifampicin, doxycycline and ceftriaxone for 2 months. Since the patient had normal inflammatory markers and renal function, the antibiotic treatment regimen was changed to rifampicin, doxycycline and SMZ two months after surgery. No abnormality was found at 3 months after the operation. Follow-up was continued in the outpatient department of cardiac surgery and infectious diseases.

Discussion

Brucellosis is one of the most common zoonotic diseases in the world. The main manifestations are fever, hyperhidrosis, fatigue, muscle and joint pain, which can affect various systems of the body. The osteoarticular system is the most commonly affected, while the cardiovascular system is less common but the most serious. Brucellosis endocarditis is the leading cause of death, responsible for 80% of brucellosis related deaths [2,3]. The aortic valve is the mainly involved in brucellosis endocarditis, and mitral valve involvement is usually seen in patients with preexisting rheumatic diseases. Preexisting valve disease accounts for less than half of the total number of reported cases [5,6]. However, as in this case, a healthy valve can be affected and can manifest as leaflet vegetations, abscesses, perforations, rupture of chordae tendineae, and regurgitation of the valve.

The diversity of early clinical symptoms, results in great challenges to the diagnosis of the disease, which often leads to clinical misdiagnosis. This patient initially presented with recurrent fever and pain in the limbs and joints. Because of her previous history of gout, the treatment was based on the diagnosis of gout at the local hospital, thus delaying the initiation of proper antibiotic therapy, which contributed to failure of medical therapy. The diagnostic methods for *Brucella* infection include blood culture, biopsy culture and serological examination. A systematic review by Willems *et al.* [4] showed that 66% (37/56) of brucellosis patients had a positive in blood culture, 68% (27/40) a positive tissue culture, and 92% (49/53) had positive serology. Therefore, serological examination is the most important method for the diagnosis of *Brucella* infection. In this case, the blood culture was positive, and the serum agglutination test showed that the antibody to brucella was positive at 1:200. Both methods can confirm the diagnosis of *Brucella* infection. Infective endocarditis requires echocardiography to confirm the diagnosis. Transesophageal echocardiography (TEE) is preferred over transthoracic echocardiography (TTE) because TEE can visualize very small vegetations that may be missed by TTE. TEE also provides more information on the extent of valve regurgitation, the presence of ring or myocardial abscess, and the formation of aneurysms [7].

In *Brucella* endocarditis, early antibiotic therapy and valve surgery are still important treatment options. Satisfactory results were obtained in long-term follow-up, and the quality of life of patients is improved [8,9]. In general, antibiotic regimens include a combination of two or three out of five antibiotics: fluoroquinolones, sulfonamides, tetracyclines, rifampicin, and aminoglycosides [10]. The World Health Organization (WHO) recommends 6 weeks of treatment with doxycycline and rifampicin as standard treatment for brucellosis. However, treatment with doxycycline for 6 weeks and streptomycin for an initial 3 weeks is also an acceptable alternative [11]. The Chinese Soci-

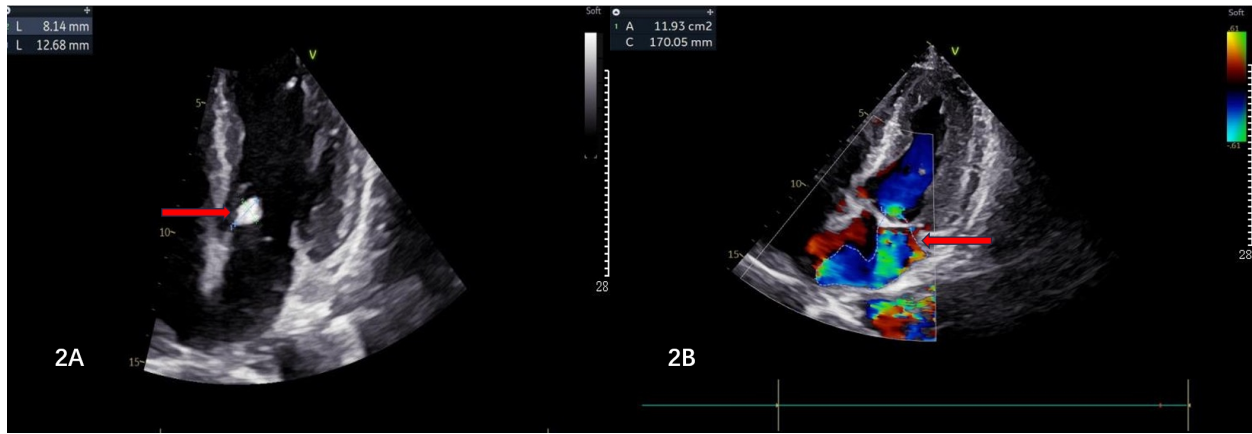


Fig. 2. Preoperative echocardiography showed that the mitral valve vegetation was enlarged (12.7×8.1 mm) (2A) and accompanied by moderate to severe mitral insufficiency (2B) (as shown by the red arrows).



Fig. 3. The largest vegetation on the anterior leaflet of the mitral valve was removed with the size about 15×13 mm.

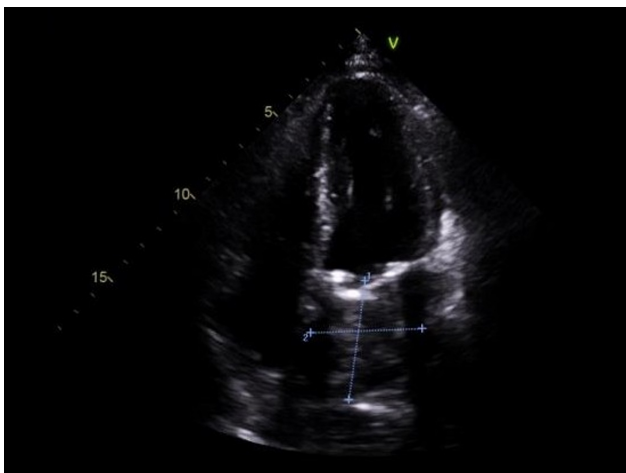


Fig. 4. Postoperative echocardiography showed no abnormality.

ety of Infectious Diseases recommends the quadruple anti-infective therapy with doxycycline (6 weeks–6 months), rifampicin (6 weeks–6 months), sulfamethoxazole (6 weeks–

6 months) and aminoglycosides (2–4 weeks) [12]. Our patient was treated with a quadruple regimen, but she had an increase in the serum creatinine. Considering the increased risk of nephrotoxicity and ototoxicity of aminoglycosides and the nephrotoxic side effects of SMZ, we changed to a triple antibiotic regimen of rifampicin, doxycycline and ceftriaxone. After 3 weeks of treatment, the patient's fever was effectively controlled, and blood cultures were negative.

Surgery combined with drug therapy can significantly improve the survival rate of patients with brucella endocarditis. Keshtkar-Jahromi *et al.* [13] evaluated the role of surgery in the treatment of Brucella endocarditis in a retrospective study of 308 cases, and concluded that surgical treatment could reduce the mortality of brucella endocarditis from 32.7% with medical treatment alone to 6.7% with combined medical and surgical treatment ($p < 0.001$). The indications for surgery usually include severe heart failure, hemodynamic instability, valve dysfunction and prosthetic valve endocarditis, local abscess formation due to uncontrolled infection, sinus formation, and continuous positive blood cultures. In addition, if the risk of embolic events is high, including the diameter of the vegetation >30 mm or the diameter of the vegetation >10 mm with high mobility, embolic events can still occur despite effective antibiotic treatment, and timely surgical treatment is also required [12,14]. In our case, on admission, the patient's echocardiography revealed a vegetation of <10 mm and no obvious symptoms of heart failure, so the patient was treated with an antibiotic regimen. But as time progressed, fever symptoms were poorly controlled. The mitral valve vegetation was enlarged (13.7×7.3 mm) and accompanied by moderate to severe mitral insufficiency. Cardiac auscultation detected a grade 2/6 mitral valve systolic murmur, and osler nodules could be seen on the right index finger and the tip of the right toe. Although the patient's fever was poorly controlled, there were no obvious symptoms of heart failure or hemodynamic instability. After 3 weeks of antibiotic treatment, the patient's body temperature returned to normal

and blood cultures were negative, and we proceeded with surgery. The patient received continuous antibiotic therapy after surgery to achieve an adequate course of treatment. The duration of antibiotic treatment varies from 6 weeks to lifelong [4]. Our patient will receive lifetime follow-up.

Conclusions

In conclusion, Brucella endocarditis is a rare disease with high mortality and poor prognosis. Once the diagnosis is confirmed, adequate antibiotic therapy should be initiated to avoid the progression of the disease. Surgical treatment should be performed for progression of valve disease and hemodynamic instability. Close outpatient follow-up should be performed to prevent recurrence.

Availability of Data and Materials

Data supporting the conclusions are included in the article.

Author Contributions

All authors designed and gave the main idea of this case report. All authors contributed to editorial changes in the manuscript. Writing - original draft: JMH; Writing - review & editing: BJX; Conceptualization and Supervision: FH; Visualization: XMQ. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work to take public responsibility for appropriate portions of the content and agreed to be accountable for all aspects of the work in ensuring that questions related to its accuracy or integrity.

Ethics Approval and Consent to Participate

This case report is a retrospective study that did not involve clinical trials and was exempt from the Ethics Committee of Sir Run Run Shaw Hospital. Written informed consent was obtained from the families of the patient for scientific activity including publication of this case report.

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Conflict of Interest

The authors declare no conflict of interest.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at <https://doi.org/10.59958/hsf.5857>.

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