CASE REPORT

Missed aortic valve endocarditis resulting in complete atrioventricular block and redo mechanical valve replacement

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SUMMARY

Infective endocarditis is a rare disease associated with high morbidity and mortality. As a result, early diagnosis and prompt antibiotic treatment with or without surgical intervention is crucial in the management of such condition.

We report a case of missed infective endocarditis of the aortic valve. The patient underwent mechanical aortic valve replacement, with the native valve being sent for histopathological examination. On re-admission 16 months later, he presented with syncope, shortness of breathing and complete heart block. On review of the histopathology of native aortic valve, endocarditis was identified which had not been acted on. The patient underwent redo aortic valve replacement for severe aortic regurgitation.

We highlight the importance of following up histopathological results as well as the need for multidisciplinary treatment of endocarditis with a combination of surgical and antibiotic therapy.

BACKGROUND

Infective endocarditis (IE) is an infection of endocardium or cardiac valves. Prior to the introduction of current aggressive antibiotic treatment regimes, the mortality rate from this condition was very high.^{1 2} Early diagnosis and prompt initiation of antibiotic therapy are essential in the treatment of IE, and delayed diagnosis is unfortunately not uncommon. Furthermore, previous research has shown that 25% of patients with IE are admitted to hospital >1 month after their symptom onset, which is thought to be due to the large range of indistinct symptoms associated with IE.³ Missed endocarditis after surgery is rather uncommon as valve histology is an indispensable diagnostic tool.^{4 5} Re-presentation of IE, especially of the aortic valve, can be life threatening as it may present with septic episodes as well as acute kidney injury (6%–30%) and conduction abnormalities (1%–15%).⁶

We aim to highlight the importance of following up histopathological results as well as the need for multidisciplinary treatment of endocarditis with a combination of surgical and antibiotic therapy

CASE PRESENTATION

A 52-year-old man presented to his general practitioner with shortness of breathing on exertion NYHA III (New York Heart Association), fatigue,

dizziness and significant weight loss of 10 kg over a 3-month period. His medical history included cholecystectomy, tooth extraction during the preceding year and he was a current smoker. Clinical examination revealed a diastolic murmur and subsequent transthoracic echocardiography (TTE) demonstrated severe aortic regurgitation.

Elective mechanical aortic valve replacement using a size 23 mm Sorin Carbomedics valve was performed. The patient had an uncomplicated post-operative course and he was discharged on day 9 postoperatively with lifelong warfarin therapy.

The patient got re-admitted 13 months later with persistent fatigue, increasing shortness of breathing and night sweats. This had prevented him from completing his cardiac rehabilitation programme and resuming his previous employment. Clinical examination was satisfactory at this stage and he was treated with a short course of antibiotics for an assumed lower respiratory tract infection by his general practitioner.

Three months later, he presented to the emergency department with repeated shortness of breathing and multiple syncopal episodes. He was found to be in complete heart block and an emergency pacemaker was inserted. Post-pacemaker insertion, transthoracic echocardiography revealed a 'rocking' aortic valve prosthesis with severe aortic regurgitation in parallel with a significant paraprosthetic and central leak (figure 1, online video 1). He underwent emergency redo sternotomy and aortic valve replacement with a size 25 mm Sorin Carbomedics mechanical prosthesis.

INVESTIGATIONS

1. Initial admission:

- ECG: normal sinus rhythm at the time of first admission, heart rate of 69 bpm with no conduction abnormalities.
- First admission echocardiography/transoesophageal echocardiogram: dilated left ventricle with good systolic and diastolic function. Trileaflet aortic valve with severe aortic regurgitation and a broad eccentric jet. Non-dilated right ventricle with good systolic function. Normal left atrium and right atrium size. Normal other valves.
- Blood cultures were negative.
- Histopathology report of excised valve tissue: mixed acute and chronic inflamma-

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Figure 1 TTE at time of re-presentation showing 'rocking' aortic valve and severe aortic regurgitation. TTE, transthoracic echocardiography.

tion of the aortic valve leaflets composed of lymphocytes, eosinophils and neutrophil polymorphs. Neovascularisation, areas of necrosis and fibrin deposition. Background myxoid degeneration and fibrosis. Specific tissue stains showed no obvious Gram-positive bacteria or fungi. Valve cultures were not performed. Findings thus considered consistent with a form of endocarditis.

- ▶ Postoperative echocardiography showed a well-seated aortic valve.
- ▶ CT coronary angiogram: normal coronary anatomy with no evidence of significant coronary artery disease.
- 2. Re-admission
- ▶ Echocardiography: rocking aortic valve prosthesis and severe paravalvular aortic regurgitation, moderately impaired left ventricular function with ejection fraction of 35%.
- ▶ Blood cultures: negative for growth of organisms.
- ▶ PCR: no bacterial DNA were detected.
- ▶ Chest X-ray was satisfactory postoperatively.

DIFFERENTIAL DIAGNOSIS

- ▶ Culture-negative IE of prosthetic valve
- ▶ IE caused by rare micro-organisms such as *Coxiella burnetii*, *Brucella* and fungi.

TREATMENT

The initial severe aortic regurgitation was treated with elective mechanical aortic valve replacement using a size 23 mm Sorin Carbomedics valve was performed. Intraoperative findings revealed a tricuspid aortic valve, however the non-coronary cusp was virtually absent due to a severe destructive process. The left coronary cusp was thickened especially at the annulus. Both remaining aortic valve leaflets were sent for histopathological analysis. The patient had an uncomplicated postoperative course and he was discharged on day 9 postoperatively with lifelong warfarin therapy.

During the re-presentation with repeated shortness of breathing and multiple syncopal episodes, he was found to be in complete heart block and an emergency permanent pacemaker was inserted. Post-pacemaker insertion, TTE revealed a 'rocking' aortic valve prosthesis with severe aortic regurgitation in parallel with a significant paraprosthetic and central leak (figure 1, online supplementary video 1). This admission

Figure 2 TTE post redo aortic valve replacement showing a well-seated aortic valve with no evidence of aortic regurgitation. TTE, transthoracic echocardiography.

was further complicated by septic shock requiring admission to intensive care for intravenous antibiotics and haemofiltration. He underwent emergency redo sternotomy and aortic valve replacement with a size 25 mm Sorin Carbomedics mechanical prosthesis. Intraoperative findings were circumferential valve dehiscence and significant annular destruction especially around the non-coronary area. No aortic root abscess or vegetations were found. Postoperatively, he was commenced on intravenous antibiotics for IE as per hospital protocol (vancomycin, gentamicin and rifampicin).

While in intensive care it was noted that the histopathology report from the first operation had identified endocarditis as the cause of the severe aortic regurgitation but this had not been acted on at his initial surgical admission. The histopathology report of the prosthetic valve explant was negative for leucocytes and micro-organisms; in addition, PCR analysis of aortic annular tissue did not detect bacterial DNA. All subsequent blood cultures remained negative. A diagnosis of culture-negative IE was made and the patient completed the appropriate course of antibiotics. His postoperative TTE showed a well-seated aortic valve (figure 2, online supplementary video 2), and chest X-ray was satisfactory (figure 3).

OUTCOME AND FOLLOW-UP

At 1-year follow-up appointment, the patient is doing well and denied any cardiac symptoms.

DISCUSSION

IE is an infection of endocardium or cardiac valves. Prior to the introduction of current aggressive antibiotic treatment regimes, the mortality rate from this condition was very high.^{1 2} Early diagnosis and prompt initiation of antibiotic therapy are essential in the treatment of IE, and delayed diagnosis is unfortunately not uncommon. Furthermore, previous research has shown that 25% of patients with IE are admitted to hospital >1 month after their symptom onset, which is thought to be due to the large range of indistinct symptoms associated with IE.³ Missed endocarditis after surgery is rather uncommon as valve histology is an indispensable diagnostic tool.^{4 5} Re-presentation of IE, especially of the aortic valve, can be life threatening as it may present with septic episodes as well as acute kidney injury (6%–30%) and conduction abnormalities (1%–15%).⁶

Figure 3 Chest X-ray post redo surgery showing the permanent pacemaker in situ.

In our case, although the operative findings were suggestive of IE, the clinical presentation was atypical, however, the operative findings should have alerted the possibility of IE. The majority of patients with IE present with fever, however no raised temperatures were recorded with our patient. In addition, typical vegetations were absent both in the echocardiography and in the surgical specimen. As a result, the clinically modified Duke criteria necessary for the diagnosis of IE were not fully met.⁷ Despite this atypical presentation, suspicions should have arisen with regard to the patient's unspecific symptoms of fatigue, shortness of breath, loss of appetite and weight loss. Furthermore, the histopathological report showing clear features of IE was missed during the first surgical admission and at follow-up.

There are very few previous reports on missed endocarditis following surgical valve replacements. Ferraz *et al*⁸ described a case of culture-negative endocarditis resulting in recurrent mechanical valve dehiscence in the mitral position. After the third episode requiring surgical intervention, serology revealed a *Coxiella burnetii* infection, which had persisted as chronic Q fever for years. The present case and the report of Ferraz *et al*⁸ both highlight that culture-negative endocarditis can be particularly challenging to diagnose and therefore treatment should not be delayed while awaiting culture results. As culture-negative endocarditis is known to occur in up to 31% of cases,⁹ it is of paramount to consider this as a differential diagnosis especially in patients with prosthetic valve replacement presenting with the non-specific symptoms suggestive of infection.

In conclusion, surgery itself cannot guarantee complete resolution of IE. Antibiotic treatment is therefore indispensable in its management for total remission. This case highlights the importance of effective communication between pathologists, microbiologists and cardiothoracic surgeons to ensure the appropriate treatment is commenced. Also, it is of paramount to flag the possibility of IE in case of a suspicious operative or

histopathological findings. Finally, an intraoperative finding of destructive valve disease should prompt to an immediate histopathological examination of the diseased valve, and antibiotic therapy should not be delayed while awaiting these results.

Learning points

- ▶ Histopathological and culture examinations of the excised valve are crucial for the diagnosis and management of infective endocarditis (IE) especially when intraoperative findings suggest features of infection.
- ▶ Early referral and assessment to cardiac centres of patients post prosthetic valve replacement who presents with non-specific symptoms of infections is paramount to detect any recurrence of IE.
- ▶ A perioperative suspicion of IE is essential to be treated with aggressive antibiotics until IE is excluded through microbiological and histological examinations.
- ▶ Culture-negative, vegetation-negative endocarditis in patients with apyrexia should be considered especially in the presence of a patient presenting with destructive valve disease, fatigue, weight loss and night sweats in the presence of a recent tooth extraction.
- ▶ Multidisciplinary discussions with microbiologists and cardiothoracic surgeons regarding the outcome of specimens sent from theatre is recommended for all patients with suspected IE.

Contributors MP and MG: prepared the draft case report. AH and MG: made final corrections and amendments. AS: approved final version of the case report.

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