CASE REPORT

Successful treatment, despite a non-surgical approach, of severe infective endocarditis

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SUMMARY

A 60-year-old man with a history of Child-Pugh class B cirrhosis was admitted to the hospital with 4–5 days of nausea, vomiting and altered mental status. Following the development of fever in the intensive care unit and methicillin-sensitive *Staphylococcus aureus* bacteraemia, a large (15 mm) vegetation was discovered on the anterolateral papillary muscle of the mitral valve. Following a thorough multidisciplinary evaluation, the patient was considered to be a poor surgical candidate due to the significant perioperative complications associated with Child-Pugh class B cirrhosis. The patient was treated with 6 weeks intravenous nafcillin as an outpatient. Echocardiography following the treatment course revealed that the vegetation had completely resolved without any valvular dysfunction. This case report emphasises that medical management remains an effective alternative to surgery in complicated cases of infective endocarditis.

BACKGROUND

Patients with *Staphylococcus aureus* infective endocarditis complicated by a large vegetation burden at a vulnerable location are at a heightened risk of complications such as chordae and papillary muscle rupture leading to acute mitral regurgitation. The majority of these cases are treated surgically. However, medical management in an era of surgical availability may not be inferior in the appropriate clinical scenario. Patient selection based on surgical risk factors and evidence-based complication rates is necessary for an adequate risk–benefit analysis in making clinical decisions.

CASE PRESENTATION

A 60-year-old man with a history of type 2 diabetes mellitus, Child-Pugh class B cirrhosis secondary to chronic alcohol dependence, and hepatitis C presented to the emergency department with 4–5 days of nausea, vomiting and altered mental status. The patient was non-compliant with his medication for about 2 months but continued to drink alcohol heavily during this time period. The patient denied any intravenous drug use. A urinary tract infection and hyperglycaemic hyperosmolar syndrome were diagnosed and the patient was admitted to the intensive care unit for inpatient treatment. Hyperglycaemia and its metabolic derangements were corrected with insulin and intravenous fluids. Ceftriaxone was started for the urinary tract infection. Despite treatment with ceftriaxone, the patient developed a persistent fever.

INVESTIGATIONS

Blood cultures were drawn to investigate the persistent fever. These cultures returned positive for methicillin-sensitive *S aureus* (MSSA). To determine the bacterial source, a transthoracic echocardiogram was performed. This study revealed a 15 mm vegetation on the anterolateral papillary muscle of the mitral valve (figures 1 and 2; videos 1 and 2).

TREATMENT

Antibiotic therapy was broadened with an addition of vancomycin when the patient developed the persistent fever. Nafcillin monotherapy was started after speciation of MSSA. Owing to the size, location and speciation of this vegetation, the risk of chordae or papillary muscle rupture with subsequent acute mitral regurgitation was conjectured to be high and would likely be a fatal event for this patient. After an interdisciplinary discussion with cardiology, gastroenterology and cardiothoracic surgery, the patient was deemed not a surgical candidate due to the patient's status as a Child-Pugh class B cirrhotic. The case was also presented to cardiothoracic surgeons at regional hospitals, and they agreed that the patient was not a candidate for mitral valve repair or replacement. The risks and benefits of surgery and medical management were discussed with the patient and he voiced his strong preference for medical management. The patient was treated with intravenous nafcillin for 10 days in the telemetry unit. Surveillance blood cultures on nafcillin were sterile. The patient was then transitioned to outpatient intravenous nafcillin therapy for an additional 6 weeks with cardiology and infectious disease follow-up.

Figure 1 Apical four-chamber view before antibiotics with vegetation labeled.

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Figure 2 Parasternal long axis view before antibiotics.

OUTCOME AND FOLLOW-UP

Transthoracic echo was performed after completion of the 6 weeks of outpatient intravenous nafcillin treatment. The previously seen vegetation was no longer appreciated. There was no mitral regurgitation or stenosis (figures 3 and 4; videos 3 and 4). The patient was doing well and denied development of any new cardiac symptoms.

DISCUSSION

Cases of infective endocarditis caused by *S aureus* are 'almost always surgical diseases,' according to the American Heart Association/American College of Cardiology/American Thoracic Society AHA/ACC/ATS guidelines for the management of valvular heart disease. Surgical correction in cases where there is evidence of haemodynamic instability is a class I recommendation, while the presence of a large vegetation (≥ 10 mm) alone yields a class IIB surgery recommendation.¹ The European Society of Cardiology (ESC) guidelines indicate surgery in infective endocarditis for three main reasons: heart failure, uncontrolled infection and prevention of embolism. According to these guidelines, isolated very large vegetations (>15 mm) indicate urgent surgery, especially when the mitral valve is infected by a Staphylococcal species. These guidelines also state the importance of considering surgery for infections caused by *S aureus* without the presence of large vegetations, but suggest that the response to early antibiotic therapy should be considered prior to surgical intervention, despite many cases eventually requiring valve repair or replacement.² Both sets of guidelines agree on the majority of the criteria related to the treatment of infective

Video 2 Parasternal long axis view before antibiotics.

endocarditis with only subtle differences. Included in the similarities is that both leave much room for interpretation, reflecting a unanimous, relatively poor understanding of the treatment of this serious condition.

The results of the Euro Heart Survey showed that in 159 patients with infective endocarditis diagnoses in 25 countries, surgery was performed in 52% of patients and in-hospital mortality was 10.4% and 15.6% for the medically treated and surgically treated groups, respectively.³ Left-sided native valve infections caused by *S aureus*, in non-intravenous drug users, are associated with mortality rates of 25–40%,⁴ an unacceptably high number that signifies the need for clearer evidence-based treatment guidelines. Determining the appropriate treatment plan, especially in a complicated case such as the one presented here, could become a challenge when referencing current guidelines and published literature alone. ECS guidelines state multiple times that determining the appropriateness of surgery is frequently a difficult task. Guidelines for the non-surgical treatment of *S aureus* infective endocarditis have been well described and are widely available.⁵ However, data regarding the efficacy of medical therapy for *S aureus* infective endocarditis are controversial.^{6,7}

The indications for surgery in patients with stable haemodynamics are 'less clear,' as conceded within the AHA/ACC/ATS guidelines. Owing to the organism involved and the size/location of the vegetation in our patient, the chance of papillary muscle and/or chordal rupture leading to acute mitral regurgitation was considered to be high.^{8–13} It was for this reason that the multidisciplinary team agreed that early surgical repair or

Video 1 Apical four-chamber view before antibiotics.

Figure 3 Apical four-chamber view after antibiotics.

Figure 4 Parasternal long axis view after antibiotics.

replacement of the mitral valve apparatus must be considered, as ample evidence indicates improved clinical outcomes in patients with such complicated infections.^{14–15} The ultimate decision to treat our patient with a prolonged course of antibiotic therapy was based on his high operative risk profile given his liver disease, current haemodynamic and valve stability, early speciation of a virulent but susceptible organism, and the desire of the patient to avoid valve replacement surgery. Child-Pugh class B cirrhosis has been widely reported to be associated with bleeding complications in cardiac surgery requiring the use of cardiopulmonary bypass.^{16–17} This case report provides evidence that outpatient medical therapy is a viable alternative to surgical treatment for patients who are not surgical candidates.

Alcoholism, cirrhosis and diabetes mellitus are known to increase the risk of bacterial infection.^{18–21} Although the exact mechanism behind the increased risk associated with these comorbid conditions is unknown, immune system dysfunction is likely involved. Leucocyte dysfunction and decreased phagocytic activity has been reported in the laboratory as well as the clinical realm.^{20–21} In addition, chronic alcoholic patients are often nutritionally deficient thereby increasing the frailty of these patients.²¹ In this regard, our patient had multiple comorbid conditions that increased the risk profile for blood-borne infection and MSSA endocarditis.

The positive outcome of this case can be attributed to a number of factors. Multidisciplinary evaluation played a critical role in this case. Sound outpatient care, proper patient education and patient-directed decision-making processes were also vital to the favourable result. The unfortunate nature of this

Video 4 Parasternal long axis view after antibiotics.

patient's case leaving him without the option of surgery, for a condition that typically incites invasive correction, resulted in the best possible outcome for him.

Learning points

- ▶ Surgical repair/valve replacement is the gold standard treatment for complicated cases of infective endocarditis.
- ▶ For patients who are not operative candidates, medical therapy remains a viable option.
- ▶ Thorough risk–benefit analyses should not be taken for granted prior to a surgical recommendation.
- ▶ It is essential to take the patient's perspective into account in the development of a treatment plan.

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Competing interests None.

Patient consent Obtained.

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Video 3 Apical four-chamber view after antibiotics.

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