



## Infective endocarditis of bovine pericardial patch in the aortic position in a patient with left ventricular assist device

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### Abstract

A 53-year old woman, who had a history of left ventricular assist device implantation for acromegalic cardiomyopathy and aortic valve closure with bovine pericardial patch, was diagnosed with active endocarditis of aortic valve closure patch. The investigation revealed that infection was limited to the aortic valve closure patch; thus, redo aortic valve closure with a new bovine pericardial patch was performed. The postoperative course was uneventful and the infection was sufficiently controlled. Early surgical intervention is mandatory for a good result without spread of infection to the left ventricular assist device pump and formation of embolism.

**Keywords** Infective endocarditis · Left ventricular assist device · Aortic valve

### Introduction

With the development of implantable continuous-flow left ventricular assist devices (CF-LVAD), the outcome of the treatment for end-stage heart failure has prominently improved in the recent decade. However, there are still various inevitable complications in patients with LVAD. Of these LVAD-related complications, infection is one of the most frequent complications and more than half of the patients with LVAD have been affected with some infection. Driveline infection, followed by pump pocket infection is the most common LVAD-related infection, but the incidence of infective endocarditis (IE), especially intra-cardiac prosthetic patch endocarditis, is very rare. We report the successful treatment of infective endocarditis of aortic valve (AV) closure patch in a female patient.

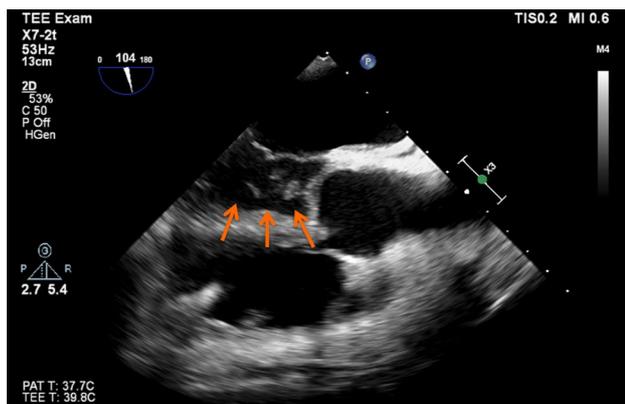
### Case

A 57-year-old woman underwent HeartMate II (Abbott Laboratories, Chicago, IL, USA) LVAD implantation for acromegalic cardiomyopathy and aortic valve closure for mild preoperative aortic valve regurgitation. The aortic valve closure was done with bovine pericardial patch, which was sewn to the aortic annulus with continuous sutures. Postoperatively, the patient had been stable without any complications. However, the patient developed high fever on postoperative day 45. Empiric intravenous antibiotics therapy with ceftriaxone for unknown fever was started. Methicillin-resistant *Staphylococcus epidermidis* (MRSE) was detected from the blood cultures and transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) showed mobile vegetation-like mass beneath the patch in the aortic position (Fig. 1). For differentiation from the thrombus, gallium scintigraphy was performed, which showed positive high uptake of the patch (Fig. 2). It also revealed no evidence of spread of infection to the LVAD pump and other LVAD components. A diagnosis of endocarditis of the AV closure patch was made, and ceftriaxone was changed to daptomycin in consideration of antimicrobial susceptibility. Systemic computed tomography (CT) showed no evidence of embolism or hemorrhagic lesion in the brain, so urgent surgical intervention was planned.

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**Fig. 1** Preoperative esophageal echocardiography demonstrated the vegetation under the bovine pericardial patch for aortic valve closure. The vegetation was floating on the left ventricle side of the aortic valve closure patch (arrows)

Intraoperatively, no infection was encountered in the mediastinum. After dissection of severe adhesions around the heart and the LVAD component, a small amount of abscess was detected around the aortic root. There was a normal intimal proliferation above the implanted bovine pericardial patch and no infected tissue could be seen. However, once the patch was carefully removed, a large amount of the vegetation was seen attached under the patch (Fig. 3). The aortic annulus appeared to remain intact; therefore, redo AV closure was performed with the new bovine pericardial patch by fixation with a running suture, and the LVAD outflow graft was also exchanged for a new one. Finally, the aortic root and the LVAD outflow graft were covered with the omental flap in consideration with the abscess around the aortic root. The extracted culture from the patch was positive for MRSE, which was the same species as found in the preoperative blood culture. Postoperatively, intravenous

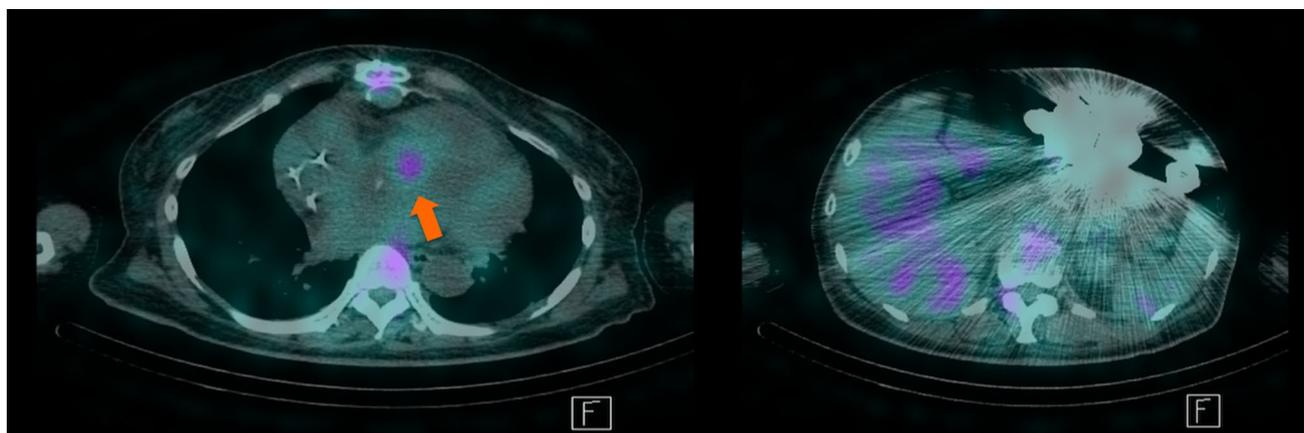
antibiotic therapy with daptomycin was administered for 8 weeks, and postoperative blood culture has remained negative. On postoperative day 150, she was discharged from the hospital without recurrence of the infection even after conversion to oral antibiotics. The patient has been doing well for 6 months after the initial discharge (Fig. 4).

## Discussion

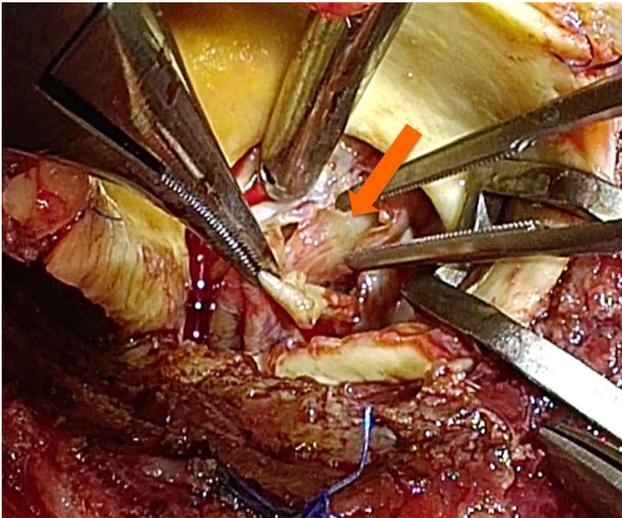
We report the successful treatment of infective endocarditis of aortic valve (AV) closure patch in a 57-year-old female patient.

Although implantable CF-LVAD has been widely used for end-stage heart failure, various LVAD-related complications still remain, with LVAD-associated infection being one of the most common complications. Representative LVAD-associated infection are driveline infection (22%), blood stream infection (3.5%), pump pocket (3.3%) [1]. Of these infections, LVAD-related IE is rare, and Nienaber et al. [2] reported the incidence of LVAD-related IE, wherein mortality exceeded 50% [3], as 1.6 cases per 100 person-years with LVAD support. Endocarditis in LVAD patients is usually classified into LVAD component endocarditis and endocarditis in native tissue. As far as we know, cases of endocarditis of the AV closure patch in patients with LVAD has never been reported.

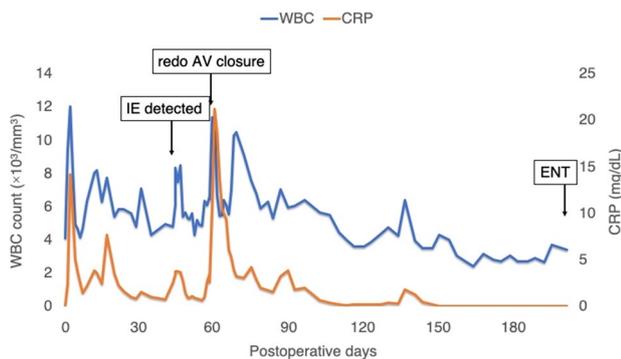
The timing of surgery for endocarditis in patients with LVAD is very complicated. Patients usually take antiplatelet and anticoagulation therapy, and the risk of hemorrhagic complications is high even in patients without systemic infection. It has been previously reported that LVAD-related infection has positive association with cerebral microbleeds and the incidence of symptomatic hemorrhagic stroke is high in the acute phase after bacteremia [4, 5]. Therefore, unless



**Fig. 2** Preoperative gallium scintigraphy demonstrated the accumulation at the aortic valve (arrow). No accumulation was detected at the other lesions, including LVAD pump, LVAD component, and pump pocket



**Fig. 3** Intraoperative findings showed the vegetation on the left ventricle side of the bovine pericardial patch (arrow)



**Fig. 4** This graph showed the perioperative course of white blood cells count and C-reactive protein levels

there are obvious current hemorrhagic lesions, infected tissue should be removed early. Perioperative anticoagulants therapy should be strictly managed with target PT-INR 2.5 to prevent thrombohemorrhagic complications.

In conclusion, we encountered a rare case of endocarditis of bovine pericardial patch, which was used for aortic closure in a patient with LVAD. Accurate diagnosis and prompt surgical intervention plays a key role in endocarditis patients with LVAD.

### Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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