Transplantation in a patient on extracorporeal membrane oxygenation with infective endocarditis, pericarditis and heparin-induced thrombocytopenia

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Abstract

Heart failure patients with pacemaker or defibrillator-associated endocarditis in cardiogenic shock have few treatment options. We present a case of an INTERMACS I patient who developed device infection, sepsis, bacterial pericarditis and heparin-induced thrombocytopenia. The patient was stabilized with extracorporeal membrane oxygenation and successfully transplanted.

Keywords: ECLS • heart transplantation • pericardium • mechanical circulatory assistance

INTRODUCTION

Heart transplantation in the setting of active infection is controversial and often considered a contraindication because of the increased infection risk for the recipient. However, in select scenarios, patients with ongoing infections have been successfully transplanted [1]. The presence of heparin-induced thrombocytopenia (HIT) adds an additional level of complexity to the management of these critically ill patients [2].

Case

A 55-year-old male with a non-ischaemic dilated cardiomyopathy was transferred to our facility with an infected biventricular cardioverter/defibrillator, bacteremia, pericardial effusion and mixed septic/cardiogenic shock (Fig. 1) for management of his advanced heart failure and endocarditis. He underwent extraction of his device, right axillary Impella 5.0 placement through a 10-mm vascular graft, and drainage of his pericardial effusion while he was being evaluated for advanced heart failure therapies. His pericardial fluid and device cultures grew Propionibacterium acnes and he developed acute lung injury. He was placed on peripheral veno-arterial extracorporeal membrane oxygenation (ECMO). A 6 French distal perfusion catheter was inserted. The Impella was maintained for left ventricular decompression and to aid pulmonary recovery (Fig. 2). His lung function improved and he was extubated. Because of the pericardial infection, he was not considered a left ventricular assist device (LVAD) candidate. We felt cardiac transplantation offered the best chance for survival. His case was further complicated by HIT confirmed by ELISA and serotonin release assays. Anticoagulation was therefore changed to bivalirudin. He was blood group A with a body mass index (BMI) of 29.9 kg/m², total bilirubin of 3.3 mg/dl, and creatinine of 0.5 mg/dl. He was cytomegalovirus (CMV) IgG negative. His calculated panel reactive antibody (PRA) was 0%. Pre-ECMO pulmonary artery pressures were 64/33 mmHg with a central venous pressure of 13 mmHg. On mechanical support day 23, ECMO day 13, he underwent orthotopic heart transplantation using a bivacal technique. ECMO decannulation, and Impella removal. The donor was a 33-year-old male, blood group O, with a BMI of 31.4 kg/m² who died of an intracranial haemorrhage. Ejection fraction was 65% with mild left ventricular hypertrophy. Total donor and warm ischaemic times were 222 and 63 min, respectively. Intraoperatively, we encountered a thickened pericardial rind consistent with pericardial infection. Both the femoral and the axillary artery access sites required thrombectomies and patch reconstruction due to thrombus. A pericardial antibiotic irrigation system was placed. He underwent several cycles of plasmapheresis but HIT ELISA optical density remained elevated and the case was performed with bivalirudin. Our anticoagulation protocol consisted of a 0.75-mg/kg loading dose followed by an infusion of 1.75 mg/kg/h. Fifty (50) mg were added to the prime, and 0.1–0.5 mg doses were given during CPB to maintain the activated clotting time (ACT) above 2.5 times the baseline. After weaning from CPB, the patient underwent ultrafiltration and transfusion of clotting factors [1].

Perioperative immunosuppression comprised basiliximab, azathioprine and methylprednisolone. Postoperatively, azathioprine was continued and he was started on cyclosporine and a prednisone taper. He had an uneventful postoperative recovery and was discharged to a rehabilitation facility on postoperative day 10. Pericardial irrigation with gentamicin was continued for 7 days. He received 4 weeks of intravenous piperacillin/
tazobactam and oral doxycycline. He has remained infection free and is doing well 10 months after transplantation.

DISCUSSION

HIT is an increasingly recognized clinical entity which may affect 1–2% of patients undergoing cardiac surgery [2]. Several strategies have been developed for dealing with HIT in patients requiring cardiopulmonary bypass (CPB) [3]. Intraoperative and postoperative bleeding are major risk factors for most of these approaches as there are no reversal agents for direct thrombin inhibitors. Upon the diagnosis of HIT, our patient was placed on bivalirudin with correction of his thrombocytopenia. We suspect our vascular complications were related to thrombus formation on the Impella catheter and ECMO cannula since he did not demonstrate peripheral ischaemia while on support.

The presence of active infection has been considered a contraindication for transplantation because of the risk of dissemination or recurrence of infection associated with immunosuppressive treatment. Nevertheless, salvage cardiac transplantation has occasionally been used as salvage therapy for the treatment of infective endocarditis [1, 4]. LVAD infection is a more common indication for cardiac transplantation. Although transplantation in this setting offers the best chance for cure, outcomes after transplantation seem to be worse in this patient population [5].

While allocating a finite resource to this patient raises ethical questions, we felt supported in our decision to move forward with transplantation by the Organ Procurement and Transplantation Network Allocation of Hearts and Heart-Lungs Policy (6.1.A.2) which affords patients with severe LVAD infections the highest priority status (Status 1A). Median wait time for Status 1A patients at our centre recently was 17 days for unsensitized patients. In regions were longer wait times are expected, this approach might not be feasible and durable mechanical support may need to be considered.

To our knowledge, this is the first case of device-related bacterial endocarditis with purulent pericarditis treated by salvage cardiac transplantation. Sepsis control and ECMO support were vital to stabilize this patient. We feel the use of a pericardial irrigation is an important adjunct to long-term systemic antibiotic therapy and have used this strategy previously in patients transplanted with LVAD infections. HIT further complicated this case but was successfully managed with a direct thrombin inhibitor.

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REFERENCES