VA-ECMO in Cardiogenic Shock as a Bridge to Heart Transplantation

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Introduction

The use of venoarterial extracorporeal membrane oxygenation (VA-ECMO) in cardiogenic shock as a direct bridge to heart transplantation is highly controversial. Most hospitals only use VA-ECMO as a bridge to decision, recovery, or other long-lasting devices.1,3

We report a successful case of VA-ECMO as a bridge to urgent heart transplantation in a patient in INTERMACS I cardiogenic shock. There was complete recovery of tissue oxygen and renal and liver functions, allowing for heart transplant in a patient with overall improved organ functions. In selected cases, VA-ECMO is a relatively low-cost alternative to mechanical circulatory support that could be more easily implemented in Brazilian hospitals.

Case Report

A 55-year-old male patient with no known comorbidities developed cough, edema, and dyspnea with progressive worsening approximately 2 months earlier. There were no viral or infectious prodrumes. The patient was initially treated for pneumonia in another hospital with piperacillin-tazobactam and clarithromycin. A respiratory viral panel including influenza, respiratory syncytial virus, and SARS-CoV-2 was negative for all viruses.

An echocardiogram was performed during hospitalization and showed significant dilation of the cardiac chambers (left ventricle: 70 mm; right ventricle: 36 mm) with marked increase of the left atrium (left atrial volume index of 74 cm³). The absence of tricuspid regurgitation did not allow for measurement of pulmonary artery systolic pressure.

After 4 weeks of hospitalization, the patient’s clinical condition continued to deteriorate despite heart failure treatment. He developed systemic and pulmonary congestion resistant to diuretics, progressive worsening of renal function, increased liver transaminases, hypotension, and clinical signs of low cardiac output. The patient was started on 10 mcg/kg/min dobutamine and referred to our hospital for evaluation by the heart transplant team.

After VA-ECMO implant, the patient progressed with rapid hemodynamic improvement and normalization of tissue perfusion and lactate levels and was extubated after 48 hours. There was also improvement of renal function, with discontinuation of renal replacement therapy after 7 days, and normalization of liver function and transaminases.

After 1 week on circulatory support, the patient was placed on the heart transplant waiting list with a priority status. After 14 days, the patient underwent a heart transplant, but there was severe right ventricular dysfunction during VA-ECMO weaning, thus we decided to maintain VA-ECMO until right ventricular function was recovered. On postoperative day 4, right ventricular function was completely stabilized, and the patient was successfully weaned off VA-ECMO. The patient was discharged from the intensive care unit on postoperative day 9 and from the hospital on postoperative 18 in good general condition for outpatient follow-up.

Pathological examination of the surgical specimen showed signs of lymphocytic myocarditis, dilated heart disease, and arterial thrombosis. Immunohistochemistry and viral investigation were not performed due to limitations in the pathology service.

Discussion

Despite several advances in recent years, cardiogenic shock remains a major challenge in critical care cardiology, with very high mortality rates and a scarcity of well-structured hospitals that can provide adequate care for this patient population.4,6

According to the Acute Heart Failure Guidelines, the use of mechanical circulatory assist devices is indicated in patients...
Case Report

Peripheral VA-ECMO is a short-term, relatively low-cost, easy-to-implement circulatory assist device. Considering how difficult it often is to provide medium-term devices for patients on the heart transplant waiting list, especially those with severe biventricular dysfunction who progress to INTERMACS II or I cardiogenic shock, peripheral VA-ECMO may be a viable and cost-effective alternative in selected cases and in hospitals with reduced waiting time for a heart transplant.1

In this case report, we showed that, although controversial, VA-ECMO can be successfully used as a direct bridge to transplantation in some hospitals in selected cases.1-3 Author

Figure 1 – Swan-Ganz measurements immediately after patient admission.

Figure 2 – Hemodynamic improvement after intra-aortic balloon pump and venoarterial extracorporeal membrane oxygenation implantation.
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Contributions
Conception and design of the research, Acquisition of data, Writing of the manuscript and Critical revision of the manuscript for intellectual content: Chaves RB, Ulhoa MB, Araújo MCCL; Analysis and interpretation of the data and Statistical analysis: Chaves RB, Ulhoa MB.

Potential Conflict of Interest
No potential conflict of interest relevant to this article was reported.

References


