

Giant Cell Myocarditis in the New Era of Novel Mechanical Support Systems: A Case Report

Maxime Robert-Halabi, Samah Al Kharji, Sebastian-Mihail Georgescu, Renzo Cecere, Nadia Giannetti and Gordan Samoukovic*

McGill University Health Center, Montreal, QC, Canada

*Corresponding author: Samoukovic G, McGill University Health Center, Montreal, QC, Canada, Tel: +514 934-1934; Fax: +514 938-767; E-mail: gordan.samoukovic@mcgill.ca

Received: August 07, 2019; Accepted: August 20, 2019; Published: August 30, 2019

Copyright: © 2019 Robert-Halabi M, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Giant Cell Myocarditis (GCM) is a form of fulminant cardiomyopathy caused by a lymphocytic inflammatory response. Prompt diagnosis, hemodynamic stabilization and initiation of therapy are essential steps in the management of this disease. We report a case of fulminant GCM in which rapid implementation of Venous-Arterial Extracorporeal Membrane oxygenation (VA-ECMO) and subsequent addition of a percutaneous biventricular mechanical support with an Impella LP 5.0 (Abiomed, Danvers, MA) and a PROTEK Duo (TandemLife, Pittsburgh, PA) while administering immunosuppressants improved the patient clinical status as well biventricular cardiac function. We concluded that the addition of modern percutaneous biventricular supports to VA-ECMO is important to promote cardiac function recovery by offloading the ventricles and we provided a treatment algorithm incorporating mechanical support in the management of these patients.

Keywords: Extracorporeal membrane oxygenation; Cardiogenic shock; Giant cell myocarditis; Heart failure; Immunosuppressive therapy; Mechanical support device; Ventricular assist device

Objective

Giant Cell Myocarditis (GCM) is a rare and often fatal disease. We report a case of fulminant giant-cell myocarditis treated initially with VA-ECMO therapy due to refractory cardiogenic shock. In order to promote myocardial recovery, we added novel percutaneous biventricular assist device (Protek Duo and Impella LP) to offload his ventricles. The patient was successfully weaned for mechanical support but ultimately required durable left-ventricular assist device.

Case Report

A previously healthy 47-year-old male initially sought medical attention for decompensated heart failure. He underwent a coronary angiography which showed severe left ventricle systolic dysfunction and no coronary artery lesion. An endomyocardial biopsy was performed and was consistent with GCM, so the patient was treated with intravenous methylprednisone. His condition progressively deteriorated, so VA-ECMO was implanted. Seventy-two hours after VA-ECMO initiation, the patient underwent Biventricular Percutaneous Assist Device (BiVAD) implantation with an Impella LP 5.0 (Abiomed, Danvers, MA) and a PROTEK Duo (TandemLife, Pittsburgh, PA). He was also started on cyclosporine and azathioprine, in addition to methylprednisone. After 15 days on immunosuppressive therapy, his biventricular support devices were successfully weaned. A repeat transthoracic echocardiogram demonstrated an improvement in his biventricular systolic function. The patient remained however fragile; being unable to tolerate heart failure medical therapy and requiring intermittent dobutamine. A durable left ventricular assist device (HVAD, Heartware, Framingham, MA) was thus implanted as a

bridge to transplantation. The patient was then successfully discharged home while awaiting elective cardiac transplantation.

Discussion

To the best of our knowledge, this is the first report of a patient with fulminant GCM initially treated with VA-ECMO and rapidly transitioned to modern percutaneous biventricular assist device. VA-ECMO is a mechanical device capable of providing cardiopulmonary support in refractory cardiogenic shock [1]. The literature addressing the use of VA-ECMO in GCM is limited and comes primarily from case series and case reports. A retrospective study by Montero et al. included Thirteen patients diagnosed with GCM between 2002 and 2016 [2]. Eleven of them were initially put on VA-ECMO with a mean duration of therapy of 10 days. Three patients died and the remaining eight patients were transplanted. There was thus no transplant-free survival observed. Ammirati et al. [3] also reported a series of 187 patients with myocarditis of which 6 were diagnosed with fulminant GCM. Among these, three were treated with VA-ECMO. One ultimately died, another one received a heart transplant, and only one patient was successfully weaned off mechanical support [3].

In this case, the patient's biventricular systolic function improved considerably after the implantation of a BiVAD. We believe this resulted from the rapid transition from VA-ECMO to a BiVAD, leading to a reduction of afterload. Indeed, the retrograde flow in a VA-ECMO system is associated with an increased afterload, pulmonary congestion and RV dysfunction, limiting myocardial recovery while administering immunosuppressive therapy.

Many strategies have been developed to offload the left ventricle of patients on VA-ECMO [4]. The addition of an Impella device to ECMO therapy was associated with a higher rate of recovery and decreased in-hospital mortality compared to ECMO therapy alone [5]. The addition an RVAD to VA-ECMO therapy has also been described

in the literature to promote forward flow to the LV in cases of massive PE and fulminant myocarditis [6,7].

While we strongly believe that the rapid transition of mechanical support from VA-ECMO to BiVAD helped improve the patient's cardiac function, the reason which may explain his overall fragility is the delay in diagnosis and initiation of immunosuppressive therapy. Indeed, it took one month of progressive symptoms prior to initiation of immunosuppressant compared to 4 days from symptom onset to ICU admission reported by Montero et al. [2].

As illustrated in Figure 1, we thus recommend that VA-ECMO should be implanted in patients with refractory cardiogenic shock and multiple organ failure. Once the patient stabilized, physicians should aim for a rapid transition to BiVAD to promote myocardial recovery. Should the patient remain in a critical state, urgent cardiac transplantation should be organized.

Conclusion

In conclusion, GCM is a rare form of fulminant myocarditis. Prompt diagnosis and initiation of immunosuppressive therapy has the potential to alter the disease course. Advancement in mechanical support devices and the ever-growing experience in the management of cardiogenic shock were of added benefit to survival in our case. Starting with VA-ECMO as the mechanical circulatory support of choice early on presentation and transition to percutaneous biventricular system is our recommended approach. In this case report we illustrated the usefulness of early transition to low-afterload cardiac support in order to maximize cardiac function stability in the disease course.

References

1. Makdasi G, Wang IW (2015) Extra Corporeal Membrane Oxygenation (ECMO) Review of a lifesaving technology. *J Thorac Dis* 7: E166-E176.
2. Montero S, Aissaoui N, Tadié JM, Bizouarn P, Scherrer V, et al. (2018) Fulminant giant-cell myocarditis on mechanical circulatory support: Management and outcomes of a French multicentre cohort. *Int J Cardiol* 253: 105-112.
3. Ammirati E, Cipriani M, Lilliu M, Sormani P, Varrenti M, et al. (2017) Survival and Left Ventricular Function Changes in Fulminant Versus Nonfulminant Acute Myocarditis. *Circulation* 136: 529-545.
4. Meani P, Gelsomino S, Natour E, Johnson DM, Rocca HB, et al. (2017) Modalities and effects of left ventricle unloading on extracorporeal life support: A review of the current literature. *Eur J Heart Fail* 19: 84-91.
5. Pappalardo F, Schulte C, Pieri M, Schrage B, Contri R, et al. (2017) Concomitant implantation of Impella (R) on top of veno-arterial extracorporeal membrane oxygenation may improve survival of patients with cardiogenic shock. *Eur J Heart Fail* 19: 404-412.
6. Nakajima S, Seguchi O, Fujita T, Hata H, Yamashita K, et al. (2016) Successful treatment of near-fatal fulminant myocarditis using biventricular assist device support. *J Artif Organs* 19: 293-296.
7. Lodewyckx CL, Bednarczyk JM, Mooney OT, Arora RC, Singal RK (2017) Extracorporeal membrane oxygenation, pulmonary embolectomy, and right ventricular assist device for massive pulmonary embolism. *Can J Cardiol* 33: e7-e9.

