Resuscitation 126 (2018) e13

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Letter to the Editor

Reply to: A protocolized approach to veno-arterial extracorporeal membrane oxygenation for massive pulmonary embolism

The use of veno-arterial extracorporeal membrane oxygenation (VA-ECMO) for the management of massive pulmonary embolism (PE) is an area of great interest but sorely lacking in concrete data making it difficult to apply universally. We recently published a review of our single-center experience in *Resuscitation* outlining the differences between survivors and non-survivors of massive PE who received treatment with VA-ECMO. Among the 32 patients we managed over a four-year period, we found that patients who sustained cardiac arrest prior to cannulation, had a prior history of malignancy, or presented with an initial serum lactate 6 mmol/L, should be heavily scrutinized before such a measure as costly and labor-intensive as VA-ECMO is employed [1].

Our institution is one of many using a pulmonary embolism response team which provides an algorithm to categorize and streamline care. The algorithm is detail-specific upstream and individualized based on provider preference downstream. At our institution, VA-ECMO is considered in all patients presenting with shock after discussion with an interventional cardiologist and cardiothoracic surgeon. Our single-center survival to discharge was 53.1%, but our protocol did not have a specific management outline regarding the placement, weaning, or decannulation of VA-ECMO.

Pasrija et al. are to be commended for their findings demonstrating an in-hospital and 90-day survival outcome of 95% for a group of twenty patients with massive PE who received VA-ECMO treated with an established and detail-specific protocol [2]. This is a much higher reported survival than previous studies regarding the use of VA-ECMO in massive PE where mortality ranges from 40 to 60% and readers expecting similar results should be cautious [3–5]. Two main factors could contribute to this success. The first is likely patient selection bias. While a clearly sick cohort in shock is described (5 patients sustaining cardiac arrest with instances of prolonged arrest times, 15 patients requiring vasopressors, presenting median serum lactate > 6 mmoL/L, etc.), the rationale for the decision to provide VA-ECMO is not specified. The authors do mention that all patients regardless of age or comorbid conditions were considered candidates for VA-ECMO, but we do not have insight into the clinical status of the patients for whom VA-ECMO was denied, let alone what percentage of all-comers with massive PE their cohort represents. Interestingly, the patients who did proceed to cannulation were a decade younger than what our center reported.

The more important reason for survival success, however, is that VA-ECMO was often used as a bridge to more definitive therapy. VA-ECMO flows were adjusted to achieve echocardiographic-guided decompression of the right ventricle. If the patient remained on VA-ECMO for five days, the right ventricle was re-imaged, and if still compromised, a repeat CT pulmonary angiogram was performed with plans to proceed to surgical embolectomy should thrombus persist. Eleven (55%) of the patients received definitive therapy with surgical embolectomy, unlike our center where only two patients received surgery. Our center did find an association between concomitant use of catheter-directed thrombolysis with VA-ECMO and survival to discharge, while catheter-directed thrombolysis was reserved only for patients deemed to be poor surgical candidates by Pasrija et al. In fact, just one patient in their cohort received catheter-directed thrombolysis though this patient happened to be the only one with persistent right ventricular dysfunction on follow-up.

The findings from Pasrija et al and those we previously published raise several important considerations for pulmonary embolism response teams moving forward. Patient-specific criteria favoring use of VA-ECMO are poorly delineated. The ideal post-cannulation VA-ECMO management strategy is unknown. Knowing if and when anticoagulation monotherapy will be sufficient is unclear. Furthermore, a trial comparing upstream surgical embolectomy to catheter-directed thrombolysis is needed.

Funding

None.

Conflict of interest

All of the authors declare no conflict of interest concerning this manuscript.

Authorship statement

All authors had full access to the data and participated in the data collection, design and writing of the manuscript. Each author has seen and approved the submitted version.

References

[1] George B, Parazino M, Omar HR, et al. A retrospective comparison of survivors and non-survivors of massive pulmonary embolism receiving veno-arterial extracorporeal membrane oxygenation support. Resuscitation 2017;122:1–5.
[2] Pasrija C, Kronfli A, George P, et al. Utilization of veno-arterial extracorporeal membrane oxygenation for massive pulmonary embolism. Ann Thorac Surg 2017;105(2):498–504.
[3] Corsi F, Lebreton G, Brechot N, et al. Life-threatening massive pulmonary embolism rescued by venoarterial-extracorporeal membrane oxygenation. Crit Care 2017;21:76.
[4] Maggio P, Hemmila M, Haft J, Bartlett R. Extracorporeal life support for massive pulmonary embolism. J Trauma 2007;62:570–6.
[5] Dolmatova EV, Moazzami K, Cocke TP, et al. Extracorporeal membrane oxygenation in massive pulmonary embolism. Heart Lung 2017;46:106–9.

Bennet George*, George Davis, Maya Guglin, Susan Smyth
Gill Heart and Vascular Institute, University of Kentucky, Lexington, KY, United States
E-mail address: bennet.george@uky.edu

https://doi.org/10.1016/j.resuscitation.2018.03.005
Received 2 March 2018
0300-9572/ Published by Elsevier B.V.