

Title: Transthoracic echocardiography to guide extracorporeal membrane oxygenation decannulation after refractory ventricular fibrillation cardiac arrest treated with primary angioplasty: a turn-down protocol.

Background. The Minnesota Resuscitation Consortium established the first in the nation refractory ventricular tachycardia/ventricular fibrillation (VT/VF) early mobilization strategy to treat patients with peripheral veno-arterial extracorporeal membrane oxygenation (VA-ECMO) and reperfusion with percutaneous intervention (PCI). The aim of this study is to describe the clinical decision making process to guide the timing of ECMO decannulation based on transthoracic echocardiography.

Methods. Retrospective review of refractory VT/VF out of the hospital cardiac arrest patients treated with peripheral VA-ECMO between 12/2015 and 10/2016. A three step turn down protocol using transthoracic echocardiography was performed daily while the patient was on ECMO. Step 1 was baseline, Step 2 decreased ECMO flow to 2L/min and step 3 to 1.5L/min. Left ventricle ejection fraction (LVEF), hemodynamics and blood gasses were obtained in each step. Patients were deemed to be suitable for decannulation once there was significant recovery of LV function (>25% EF) at <2 L/min support with or without inotropic support and were able to maintain a mean arterial pressure of >55mmHg under the same conditions with arterial oxygen saturation of >92% on <10mmHg of PEEP and <50% of FiO₂ on the ventilator.

Results. Seventeen patients were included. Time to decannulation was 72±34 hours. The average LVEF at the lowest flow support before decannulation was 29±18%. Six patients required inotropes to achieve the targets. Using the above criteria, all patients that were decannulated achieved hemodynamic and respiratory stability and none required another form of cardiorespiratory support. Fourteen of the 17 patients survived with good neurological function and were discharged from the hospital.

Conclusion. An organized turn-down protocol using preset hemodynamic goals coupled with transthoracic echocardiography permitted satisfactory image quality and successfully guided the timing of decannulation following VA-ECMO treatment of refractory VT/VF out of hospital cardiac arrest in all patients.

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