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Commentary: Can we REVERSE the effects of venous-arterial extracorporeal membrane oxygenation in cardiogenic shock?

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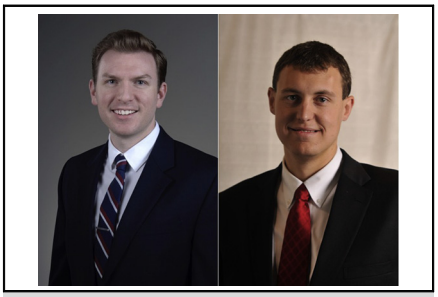

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CENTRAL MESSAGE

The REVERSE study seeks to be the first randomized trial to evaluate the safety of left ventricular unloading during venous arterial extracorporeal membrane oxygenation for cardiogenic shock.

Cardiogenic shock is a major clinical issue, with high mortality and poor prognosis.[1] The use of venous-arterial extracorporeal membrane oxygenation (VA-ECMO) has introduced a paradigm shift in treating patients; however, increased afterload may precipitate pulmonary congestion and impair myocardial recovery.[2] A 2019 systematic review and meta-analysis investigating the optimal strategy and timing of left ventricular (LV) venting during VA-ECMO demonstrated LV venting improved weaning from ECMO (odds ratio, 0.62; 95% confidence interval, 0.47-0.83; $P = .001$), with early venting (<12 hours) significantly reducing short-term mortality (relative risk, 0.86; 95% confidence interval, 0.75-0.99; $P = .03$).[3] Although more than 60 studies were included in this review, no randomized trials were identified, reinforcing the need for prospective data. Here, we comment on the proposed Randomized Trial of Early LV Venting Using Impella CP for Recovery in patients with cardiogenic shock managed with VA ECMO (REVERSE) investigation.[4]

We commend the authors on a pertinent and well-designed prospective, randomized, clinical trial to further define the safety and effectiveness of unloading the left ventricle during VA-ECMO. The authors aim to identify whether combining LV decompression via the Impella microaxial LV assist device with VA-ECMO leads to greater rates of cardiac recovery, defined by survival from mechanical circulatory support, heart transplantation, or inotropic support at 45 days. In addition, they will explore the differences in clinical, biochemical, radiologic, and echocardiographic effects that adding LV venting to VA-ECMO has compared with VA-ECMO-only controls. They do well to describe the possibility of crossover events from a non-vented to vented strategy in the presence of pulmonary congestion at the discretion of the Principal Investigator. This represents an obvious source of bias, although early rates of crossover are low (1/17 patients). Furthermore, their randomization protocols and end points are well described and substantiated by statistical rigor.

There are multiple options to decompress the LV, including intra-aortic balloon pumps, transeptal Tandem, Impella, and surgical LV vents.[5] The REVERSE investigators chose Impella, also known as "ECpella," when combined with VA-ECMO as their LV venting strategy.[4,5] We are excited for the results of this trial but will pay particular attention to measures of hemolysis and renal injury with this device. Ultimately, the risk–benefit profile for each strategy must be based on the best clinical indication for a patient. We look forward to the outcomes of this proposed investigation and are intrigued by the prospect of REVERSE-ing the effects of increased LV afterload by with VA-ECMO.

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