Extracorporeal membrane oxygenation for septic shock: Heroic futility?

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Septic shock is a prevalent complication of infection in critically ill patients that can be associated with profound myocardial depression.¹ Despite advances in supportive critical care and the availability of targeted antimicrobial therapy, mortality remains high as a consequence of compromised organ perfusion and multisystem organ failure. For septic shock unresponsive to all conventional treatments, venoarterial extracorporeal membrane oxygenation (VA-ECMO) has been increasingly applied as a salvage therapy.^{2,3} In neonates and children, the use of extracorporeal membrane oxygenation (ECMO) has been associated with improved survival and is considered a viable option for this population.⁴ For adults, the use of ECMO has not provided similar benefit and results from multiple single-center series have been variable and its use in adults remains debatable.⁵ In part, differences in patient outcomes in adults have been related to patient selection as some series have included patients requiring venovenous ECMO for sepsis-associated respiratory failure, whereas other series have included only adult patients with hemodynamic compromise requiring VA-ECMO.⁶

In this issue of *The Journal of Thoracic and Cardiovascular Surgery*, Ro et al⁷ report on a single-center experience of 71 patients who received VA-ECMO support for septic shock. The investigators compared results of VA-ECMO support for septic shock with 253 patients who received VA-ECMO for cardiogenic shock. Ro et al observed that of the total of 71 patients who received VA-ECMO for septic shock, only 15.5% were successfully weaned from ECMO with only 7.0% surviving to hospital discharge. The investigators also observed lower Sepsis-related Organ Failure Assessment scores in survivors and higher arterial lactate levels, lower platelet count, and higher total bilirubin levels in nonsurvivors. However, these trends were not statistically significant. In comparison, of the 253 patients who received VA-ECMO for cardiogenic shock, 45.5% were successfully weaned and 28.9% were discharged from the hospital.

The observations by Ro et al are relevant and represent one of the larger series of patients who received

The role of VA-ECMO in the treatment of septic shock in adults remains controversial.

Central Message

The use of venoarterial extracorporeal membrane oxygenation for the treatment of septic shock in adults is associated with poor survival and its use for this indication remains debatable.

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VA-ECMO for cardiogenic shock and justifiably give pause to the use of ECMO for this indication. However, the study has a number of limitations and include the inherent limitations of a single-center, retrospective, observational study of a small patient cohort. Often, significant bias is introduced into such studies because of patient selection. In the study by Ro et al,⁷ the inclusion of a patient cohort with a high prevalence of liver disease could adversely affect outcomes. Further, the study cohort was derived from the years 2005 through 2012. Whether improved outcomes would have been obtained from a more contemporary cohort is unknown.

Should ECMO be abandoned for treatment of refractory shock in adults as suggested by the authors? It is too early to place the “nail in the coffin” for VA-ECMO for this indication. What is needed is a better understanding of the factors leading to poor outcomes that could lead to improvements in patient selection and development of adjuvant therapies.^{8,9} Larger registry-based studies could also facilitate recruitment of a larger patient cohort to investigate, at a more granular level, what factors contribute to poor outcomes and set the stage for prospective interventions.

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