Commentary: God is in the details

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The role of venovenous extracorporeal membrane oxygenation (ECMO) for patients with COVID-19 is evolving. The Extracorporeal Life Support Organization registry and other studies recently found that the 90-day mortality rate in patients with COVID acute respiratory distress syndrome (ARDS) treated with ECMO was less than 40%, much improved from early reports in the initial pandemic wave and comparable to those without COVID ARDS. Meanwhile, the most recent Extracorporeal Life Support Organization registry data indicated that mortality of patients with COVID ARDS treated with ECMO was approximately 50%. Thus, challenges remain in patient selection, optimal treatment with ECMO support, and final disposition of the patients.

In this issue of the Journal, Patel and colleagues reported on the use of ECMO circuits in parallel for patients with persistent refractory hypoxemia, combined with mechanical ventilator settings beyond the normal lung-protective range, and other adjunctive therapies. The indications for and patient management of the ECMO in the parallel system developed at Vanderbilt University Medical Center were logical, meticulous, and ingenious. This dual circuit achieved higher ECMO flow, reduced undrained systemic venous return, and increased ECMO flow/patient cardiac ratio, enabling lung-protective ventilator settings. They achieved 72.7% survival to hospital discharge in patients with COVID-19 who had persistent severe hypoxemia on single ECMO.

Several things should be noted. First, patients received mechanical ventilation before ECMO for an average of only 2.5 days, shorter than other recent multicenter reports, possibly contributing to better survival. Second, nearly all patients underwent a tracheostomy, which may have facilitated early bedside rehabilitation. Notably, approximately half of the patients (10/22 [45.5%]) participated in regular physical therapy while receiving ECMO in parallel.

Interestingly, although the cohort they studied spent longer on ECMO in total (median, 40 days) and longer on dual ECMO (median, 19 days) than patients in other major multi-institutional studies, their survival to discharge rate was more than 70%. In other studies, longer ECMO was correlated with reduced survival after ECMO for COVID-19 with ARDS, so the results achieved by the multidisciplinary team at Vanderbilt with these challenging patients on ECMO are remarkable.

However, there are several concerns. First, their exclusion criterion for body mass index (BMI) was greater than 55 kg/m², and they accepted many severely obese patients with BMIs greater than 45 kg/m², whereas most other studies, including the ECMO to Rescue Lung Injury in Severe ARDS trial, excluded those with a BMI of more than 42 kg/m² to 45 kg/m².

These liberal inclusion criteria may explain how more than 25% of patients required dual ECMO in parallel because obese patients tend to require greater total ECMO flow. Additionally, only 1 patient (4.5%) was discharged to home, whereas 13 patients (59%) were transferred to a long-term acute care facility. Thus, prolonged dual ECMO...
may result in physical deficits and need for longer stay in acute care facilities compared with single ECMO\textsuperscript{4,5,13,16}.

ECMO is resource intensive, and we must identify those patients with COVID who are most likely to benefit from single or dual ECMO in parallel to improve survival, reduce morbidity, and ensure a reasonable quality of life.

References