Extracorporeal membrane oxygenation therapy for postcardiotomy cardiogenic shock

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We congratulate Chen and colleagues¹ on their large, nationwide cohort study in Taiwan of extracorporeal membrane oxygenation (ECMO) support for postcardiotomy cardiogenic shock (PCS), as described in their article in this issue of the *Journal*. Not only the large number of the cohort involved but also the propensity-matching technique made the findings in this study convincing. The study showed that clinical outcomes of PCS patients requiring ECMO were very poor relative to matched patients not requiring ECMO as late as 1 year after surgery. Beyond 1 year, the outcomes did not differ thereafter in the 2 cohorts (ECMO vs no ECMO). The study also identified acute renal failure and massive blood transfusion as independent predictors of in-hospital mortality in those patient populations. Some might say of these findings, “We knew it, and no surprise,” because of their clinical experiences. It is important to note, however, that Chen and colleagues¹ successfully proved their contention with statistical analyses. It is also worthwhile to mention that because of national guidelines and recommendation for the use of ECMO in patients PCS without financial concern or restriction in Taiwan, ECMO support in this study was initiated for “all comers” who clinically required ECMO support. This lack of financial constraint contributed to less selection bias than in previously published studies.

Since ECMO support for acute respiratory distress syndrome was first described in 1972,² it has successfully become a standard strategy to treat severe acute respiratory failure, with dramatically improved clinical outcomes in step with the advances in medical technology. On the other hand, the survival of patients receiving ECMO support for cardiogenic shock, especially PCS, still remains unsatisfactory, as low as 41% to 60%.^{3,4} Recovery of cardiac function on ECMO would be the key for survival; however, it is usually unpredictable and uncontrollable. Another aspect to improve clinical outcomes of ECMO support for PCS would be the prevention of ECMO-related complications, such as massive bleeding, leg ischemia, and stroke. Once these complications have occurred, they negatively affect

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Central Message

Postcardiotomy cardiogenic shock is still a challenging property, even with extracorporeal membrane oxygenation therapy. Breakthrough technologies are awaited in this field.

See Article page 469.

outcomes and patient quality of life. In our institution, we always use a micropuncture needle under ultrasound guidance to minimize collateral damage that may lead to bleeding complications. In the case of a peripheral ECMO insertion through a femoral artery, it is our routine to place a distal perfusion cannula to prevent leg ischemia. The distal perfusion cannula is connected to the ECMO circuit with a Y connector. This configuration provides low resistance and minimal turbulence, resulting in a low rate of circuit thrombosis complication in our institution. With respect to stroke, Nasr and colleagues⁵ reported that the incidence of stroke was 4.1% in patients on ECMO support and that these patients had worse outcomes. Although prevention is the most critical part of the management, early detection of these complications is also important. Wong and colleagues⁶ have used near-infrared spectroscopy to monitor cerebral and lower limb blood flow during ECMO support. Kanda and colleagues⁷ have reported on a new technology to detect the tissue blood flow by using a laser and have measured the cerebral blood flow during ECMO support. The advent of the Impella device (Abiomed Inc, Danvers, Mass) has made it easy to access the left ventricle for venting. Pappalardo and colleagues⁸ reported that combined use of left ventricular unloading devices

during ECMO support improved survival in patients with cardiogenic shock. This strategy would also contribute to minimizing the incidence of intracardiac thrombus during ECMO support, which could be catastrophic.⁹

ECMO technology has evolved during the past decade. ECMO support is often used as a salvage procedure for those who would otherwise face 100% mortality. PCS is still a challenging condition, and we have not yet achieved acceptable outcomes, even with the current ECMO strategy. Breakthrough technologies are awaited in this field.

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