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Commentary: Should the brain be continuously monitored during extracorporeal membrane oxygenation (ECMO) support?

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Continuous monitoring of cerebral activity using electroencephalography (EEG) during cardiopulmonary bypass has been a subject of great interest to cardiac surgeons and neurologists. The premise is that some degree of injury may occur to the brain during this period, which may not be recognized, leading to serious sequelae.¹ Furthermore, since femoral cannulation for cardiopulmonary bypass was popular in early days of heart surgery, there was interest in a comparison between arch versus femoral perfusion regarding cerebral function.² Of interest, there were more surgical complications with femoral compared with arch cannulation, but more EEG abnormalities (not statistically significant) with femoral cannulation.² Extracorporeal membrane oxygenation (ECMO) support has expanded to become an important adjunct in the critically ill patients with reversible conditions.³ However, despite improved oxygenator and device technology, patients on ECMO support continue to experience high morbidity and mortality and neurologic complications. Ong and colleagues⁴ report a single-center experience with standardized neurologic monitoring (NMN), consisting of frequent neurologic examinations, EEG, transcranial Doppler, and somatosensory monitoring. The primary outcome was neurologic complications with mortality and neurologic function determined at time of hospital discharge. They included 215 patients in their single-center experience, divided into 2 groups,

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CENTRAL MESSAGE

ECMO support is an innovative support tool to treat several clinical conditions. The need for continuously monitoring cerebral activity during ECMO is highlighted in this important manuscript.

one with and the other without NMN, assessed as part of a standardized NMN protocol on ECMO support.⁴ Results showed greater patient survival in the NMN group compared with the other group (not statistically significant). Neurologic outcomes were significantly improved in patients on ECMO support who were monitored with the NMN protocol.

Other published reports, including Extracorporeal Life Support Organization Registry data, confirm the relevance of neurologic complications in these patients.^{5,6} Lorusso and colleagues⁵ reported 5000 adult patients on ECMO support, showing an overall incidence of neurologic complications of 7.1%. The injuries included hemorrhage in 42.5%, brain death in 23.5%, stroke in 19.9%, and seizures in 14.1% of patients. The in-hospital mortality was much greater in patients with neurologic complications. Combes and colleagues⁷ reported a randomized controlled clinical trial comparing ECMO support to conventional mechanical ventilation in patients with severe acute respiratory distress syndrome. There was a low rate of ischemic strokes in patients on ECMO support.

Efficient patient management on ECMO support remains challenging, especially during the coronavirus disease 2019 (COVID-19) pandemic, with need for increased ECMO

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support. Also, ECMO support has been used for a variety of different conditions, including respiratory and cardiac failure, sudden cardiac arrest of unknown etiology, trauma, pulmonary embolism, and many others. As a result, it is likely that sequelae related to cerebral injury will become more apparent, leading to the importance of this current article. Ong and colleagues⁴ are to be congratulated for their pioneering work, attempting to raise awareness of an aspect of ECMO support that may have been overlooked, or has not received the attention it deserves. Computed tomography and magnetic resonance imaging scans of the brain, and other modalities of investigations, will continue to be of importance in the management of patients on ECMO support. The challenge of transportation of these critically ill patients to have these diagnostic procedures has led to more frequent use of bedside computed tomography scanning of the brain and more frequent neurologic examinations.

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