E-CPR (extracorporeal cardiopulmonary resuscitation): An advanced resuscitation method incorporating the utility of veno-arterial extracorporeal membrane oxygenation (V-A ECMO) to achieve adequate circulation and organ perfusion in patients with refractory cardiac arrest (CA) 
- Associated with improved survival rates and neurologic outcomes compared with conventional CPR for both patients with in-hospital cardiac arrest (IHCA) and out-of-hospital cardiac arrest (OHCA).
- A pilot randomized control trial in patients with OHCA showed that E-CPR resulted in significantly improved survival to hospital discharge.
- The first E-CPR program in Hong Kong for patients with refractory cardiac arrest was started in Queen Mary Hospital, a tertiary medical center in 2012.

Objectives:
1. Report the outcomes of the territory-first E-CPR program
2. Identify factors predicting favorable patient survival and neurologic outcomes after E-CPR
3. Examine the utility of the SAVE score, ECRP score, and the nECPR score in predicting patient outcomes

Methodology
Design: Single center retrospective analysis of patients who received E-CPR in Queen Mary Hospital.

Study population: All adult patients who received E-CPR from the ICU team for OHCA or IHCA from Dec 2012 to Nov 2020.

Primary outcome: 3-month neurologic outcome

Statistical analysis: Predictors of favorable neurologic outcome were selected a priori based on biological plausibility and literature review. Variables that were significantly associated with the outcome in univariate analyses were included in multivariable logistic regression. The performance of the SAVE and ECRP scores in predicting hospital mortality, and nECPR score in predicting favorable neurologcal outcome were assessed by logistic regression with the concordance C-statistic.

* Defined as Cerebral Performance Categories (CPC) scale 1 or 2

In this territory-first E-CPR program in Hong Kong, the rate of survival with favorable neurologic outcome was 18.6% with a hospital survival of 24.5% and 30-day survival of 32.3%.

In our cohort the presence of a shockable first documented rhythm is the strongest predictor for favorable neurologic outcome in both univariable and multivariable analysis, with almost a 10-fold increase in the rate of favorable neurologic outcome.

Our study found a strong correlation between high AST levels, a clinical marker of hypoxic hepatitis, within the first 24 hours after resuscitation and poor neurological outcome. Furthermore, AST may be useful in suggesting widespread tissue ischemia since it is present in multiple organs and tissues [4]. However, current literature on the use of AST as a marker of hypoxic damage due to CA is lacking.

Further prospective studies may be required to explore the implications of high AST levels and patient outcomes after CA.

The nECPR score performed better at predicting 3 month neurologic outcomes of E-CPR patients in our cohort than the ECPR score. Furthermore, we showed that incorporating the APACHE score in addition to the nECPR score improved the discrimination of the model. APACHE scores are routinely collected in ICU settings, and the combination of the two scores has better prognostic value in the care of E-CPR patients.

The nECPR score was useful in predicting neurologic outcome after E-CPR, and incorporation of the APACHE IV score can improve the model's performance.

Conclusion
Among patients who received E-CPR, those who had a shockable rhythm at presentation, defibrillation during E-CPR, higher MAP after ECMO cannulation, lower AST or lactate, or higher bicarbonate or base excess values in the first 24 hours after E-CPR, cardiac arrest due to myocardial infarction, or PCI after E-CPR had better neurologic outcomes. The nECPR score was useful in predicting neurologic outcome after E-CPR, and incorporation of the APACHE IV score can improve the model's performance.

References

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