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REPLY: DIFFERENT CRITERIA FOR INITIATING EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION INFLUENCE CLINICAL RESULTS

Reply to the Editor:

We appreciate the thoughtful comments related to our recent study and our team would certainly be interested in studying the clinical data from Condello's[1] assessments with extracorporeal cardiopulmonary resuscitation (ECPR). Condello[1] focused on the clinical outcomes of ECPR in 50 patients who underwent ECPR to show the influence of favorable and unfavorable criteria for initiating ECPR and clinical outcomes, including neurological, cardiovascular, reperfusion syndrome, ischemic injury, and kidney failure.[1] Among these clinical outcomes, the probability of reperfusion syndrome and ischemic injury was the highest. Unfavorable criteria for initiating ECPR were significantly more likely to influence various adverse clinical outcomes. It is helpful to predict essential patient outcomes and this should be included in clinical decision making for patients who received ECPR.

Recent European Resuscitation Guidelines[2] provide a recommendation that ECPR may be considered a rescue method when conventional CPR fails. However, guidelines or clinical studies do not provide sufficient data on ECPR practice. Inoue and colleagues[3] reported data on ECPR applied to 1644 patients experiencing out-of-hospital cardiac arrest and showed that the proportion of favorable neurological outcomes at hospital discharge was 14.1%, the survival rate at hospital discharge was 27.2%, and complications were observed during ECPR in 32.7%. Although ECPR effectively increases overall survival, a better characterization of long-term outcomes is needed. Previous studies on complications of ECPR treatment mainly concentrated on the nervous system, cardiovascular system, reperfusion syndrome, ischemic injury, renal failure, and hemorrhage. Neither physician-adjudicated arrest rhythm nor underlying origin was significantly associated with survival to discharge. Younger age was significantly associated with survival. Arrest due to ischemic heart disease, initial shockable rhythm, out-of-hospital cardiac arrest, low-flow time, and continuous renal replacement therapy were significant predictors of in-hospital mortality. Establishing ECPR programs with stringent compliance to institutional criteria (mainly age, witnessed arrest, and time of prehospital resuscitation) and providing ECPR to strictly selected patients seems to be a vital factor for good outcomes. Our research shows that ECPR may lead to systemic and cerebral inflammatory reactions and poor prognosis, but the specific mechanism needs further study. Whether or not target temperature management improves the clinical results of ECPR is still controversial. Wang and colleagues[4] reported on applied cerebral selective deep hypothermia (<30 °C) during ECPR treatment for a patient with cardiac arrest. The patient was discharged without significant neurological deficit 32 days after the initial arrest.

We consider selective hypothermic cerebral perfusion a new method to protect the brain in extracorporeal cardiopulmonary resuscitation.[5] Our upcoming research may focus on the molecular mechanism of ECPR combined with selective cerebral perfusion to alleviate brain injury. With many problems regarding the cause of sequelae not being studied, more research and evidence are required to understand the dilemma better.

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References

1. Condello I. Impact between the favorable and unfavorable criteria for initiating ECPR and clinical outcomes. *J Thorac Cardiovasc Surg Open*. 2023;13:214.
2. Lott C, Truhlář A, Alfonzo A, Barelli A, González-Salvado V, Hinkelbein J, et al. European Resuscitation Council Guidelines 2021: cardiac arrest in special circumstances. *Resuscitation*. 2021;161:152-219.
3. Inoue A, Hifumi T, Sakamoto T, Okamoto H, Kunikata J, Yokoi H, et al. Extracorporeal cardiopulmonary resuscitation in adult patients with out-of-hospital cardiac arrest: a retrospective large cohort multicenter study in Japan. *Crit Care*. 2022;26:129.

4. Wang CH, Lin YT, Chou HW, Wang YC, Hwang JJ, Gilbert JR, et al. Novel approach for independent control of brain hypothermia and systemic normothermia: cerebral selective deep hypothermia for refractory cardiac arrest. *J Neurointerv Surg*. 2017;9:e32.

5. Zhai K, Li M, Li J, Wei S, Li Z, Zhang Y, et al. Neuroprotective effect of selective hypothermic cerebral perfusion in extracorporeal cardiopulmonary resuscitation: a preclinical study. *J Thorac Cardiovasc Surg Open*. 2022;12:221-33.

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