RESUSCITATION 173 (2022) 201–202

Available online at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Letter to the Editor

Important factors regarding the analysis of extracorporeal blood flow in extracorporeal cardiopulmonary resuscitation

To the Editor,

We want to thank Halenarova and colleagues for raising awareness of the importance of patient selection in extracorporeal cardiopulmonary resuscitation (ECPR) and we congratulate them for successfully confirming and thereby strengthening criteria for patient selection in their analysis of a multicentre database.[1]

In their recent study, Halenarova and colleagues confirmed previous heart disease, an initial shockable rhythm, and the use of pre-hospital hypothermia as being associated with a lower probability of an unfavourable neurological outcome in ECPR after out-of-hospital cardiac arrest (OHCA). Additionally, they found an extracorporeal blood flow above 3.5 L min^{-1} at hospital admission to be a predictor of poor neurological outcome in OHCA.[1]

As extracorporeal blood flow on its own has not been recognized as an independent risk factor for unfavourable outcome by previous studies and the scientific community,[2] we would like to highlight two aspects, which in our opinion contributed to this finding in the presented study.

First, the lack of a standardized post-resuscitation care protocol across all centres significantly weakens the correlation between flow at hospital admission and neurological outcome several days later. Examining extracorporeal flows without considering the individual centre protocols and patient requirements carries the great risk of a false correlation. At this point, we also want to point out that restoration of a sufficient blood flow is of eminent importance to limit the cerebral no-reflow phenomenon after cardiac arrest.[3] When analysing extracorporeal blood flows in ECPR, no-flow time and body position should be taken into account.[4,5]

Second, we want to call attention to the fact that all patients in this study seem to have received pure oxygen via the oxygenator prior to hospital admission. Therefore, higher extracorporeal blood flows might have resulted in a greater reoxygenation injury. Extracorporeal flow and other parameters (i.e., arterial pressure, oxygen saturation, temperature and blood parameters like osmolality or calcium concentration) need to be perceived as important components of a multimodal reperfusion strategy in order to achieve sufficient neuroprotection after global cerebral ischemia in cardiac arrest.[6]

We believe the fact, that solely the restoration of blood flow after cardiac arrest will not rescue any patient to be undisputed and self-evident. But we equivalently believe in the superiority of controlled reperfusion over uncontrolled reperfusion, where selected patients benefit from temporarily, high extracorporeal flows, when the composition of the reperfusate is controlled and optimised.[7]

Therefore, we feel encouraged by the results of the presented study by Halenarova and colleagues and want to emphasize, that a multimodal, targeted ECPR approach should be pursued and has the potential to improve outcomes after cardiac arrest.[8]

Conflict of Interest Statement

Friedhelm Beyersdorf, Christoph Benk and Georg Trummer are shareholders in ResuSciTec GmbH, Freiburg, Germany, which is a start-up company from the University Medical Center Freiburg. Christoph Benk is also CEO of ResuSciTec GmbH, Freiburg, Germany. Jan-Steffen Pooth is part-time employee of ResuSciTec GmbH, Freiburg, Germany.

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Received 19 February 2022
Received in revised form
23 February 2022
Accepted 24 February 2022

https://doi.org/10.1016/j.resuscitation.2022.02.025