

Extracorporeal cardiopulmonary resuscitation in out-of-hospital cardiac arrest in relation to organ donation

Stefan Roest ¹, Jeroen J.H. Bunge ^{1,2}, and Olivier C. Manintveld ^{1*}

¹Department of Cardiology, Thorax Centre, Erasmus MC, University Medical Centre Rotterdam, Doctor Molewaterplein 40, 3015 GD, Rotterdam, The Netherlands; and

²Department of Intensive Care, Erasmus MC, University Medical Centre Rotterdam, Doctor Molewaterplein 40, 3015 GD, Rotterdam, The Netherlands

Online publish-ahead-of-print 29 August 2020

This commentary refers to ‘Extracorporeal cardiopulmonary resuscitation in out-of-hospital cardiac arrest: a registry study’, by W. Bougouin et al., 2020;41:1961–1971.

With great interest, we have read the article by Bougouin et al. on extracorporeal cardiopulmonary resuscitation (CPR) in patients with an out-of-hospital cardiac arrest (OHCA) using extracorporeal membrane oxygenation (ECMO).¹ An important study in a field where mortality rates remain high and the search for the best therapy and patient selection continues. In the largest ECMO registry to date, there were 13 191 patients who received resuscitation for OHCA of presumed cardiac cause and included 525 patients (4%) managed with extracorporeal-CPR because sustained return of spontaneous circulation (ROSC) was not achieved. Among patients treated with extracorporeal-CPR, 8.4% was discharged alive, compared with 8.6% in the conventional-CPR group.¹ This shows that we need to define better which patients might benefit the most from this therapy, such as patients with an initial shockable rhythm, transient ROSC, and limited delay.

One aspect we believe is underexposed in the manuscript is the potential of ECMO in the OHCA setting leading to eventual organ donation. Of course, organ donation should not be the driving force to choose for extracorporeal-CPR. Surviving the OHCA should always be the primary goal of CPR. However, when the patient's life cannot be saved due to severe neurological impairment or brain death, eligibility for organ donation should be evaluated and discussed with the family.

In the manuscript, Bougouin et al. demonstrated that 4% of patients in the extracorporeal-CPR group became an organ donor after brain death compared with 1% in the conventional-CPR group.¹ Although this increase may seem small, it is of significance in an era where organ donors are limited.² Whereas the incidence of brain

death was higher in extracorporeal-CPR-treated patients in this study, ECMO may preserve other organ function for a possible donation procedure.

Practically, this situation is comparable to donation after circulatory death (DCD), where the organs are perfused using ECMO as a means of normothermic regional perfusion. The only difference is seen in the clamping of the descending aorta in abdominal donation and clamping of the aortic arch vessels and internal jugular veins from and to the brain in thoracic donation.^{3,4}

In this manner, one extracorporeal-CPR patient, whose life could not be saved, might be able to donate several organs and as such is able to save several patients waiting for a donor organ. Is it known in the study of Bougouin et al., how many donations out of the 4% mentioned were multi-organ donations? In our opinion, these data should be further explored as this might (indirectly) be a lifesaving procedure that should be shared with all of the medical community dealing with OHCA patients.

Conflict of interest: none declared.

References

- Bougouin W, Dumas F, Lamhaut L, Marjion E, Carli P, Combes A, Pirracchio R, Aissaoui N, Karam N, Deye N, Sideris G, Beganton F, Jost D, Cariou A, Jouven X, the Sudden Death Expertise Center Investigators. Extracorporeal cardiopulmonary resuscitation in out-of-hospital cardiac arrest: a registry study. *Eur Heart J* 2020;41:1961–1971.
- Eurotransplant International Foundation. Annual Report 2018. https://www.eurotransplant.org/wp-content/uploads/2020/05/ET_Jaarverslag_2018.pdf (11 June 2020).
- Messer S, Page A, Colah S, Axell R, Parizkova B, Tsui S, Large S. Human heart transplantation from donation after circulatory-determined death donors using normothermic regional perfusion and cold storage. *J Heart Lung Transplant* 2018; 37:865–869.
- Morrissey PE, Monaco AP. Donation after circulatory death: current practices, ongoing challenges, and potential improvements. *Transplantation* 2014;97:258–264.

* Corresponding author. Tel: +31107035078, Email: o.manintveld@erasmusmc.nl

© The Author(s) 2020. Published by Oxford University Press on behalf of the European Society of Cardiology.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact journals.permissions@oup.com