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EDITORIAL

Exploring a new world with mechanical circulatory support during cardiac arrest: the horizon of extracorporeal cardiopulmonary resuscitation

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While looking back to the last few months, we are proud and fascinated that such mountains could and have been moved by our ICU community. As a group, characterised by collaboration, we have shown that ICU is united and is a trade itself. In addition, we have invited the public to become acquainted with the Intensive Care. Our chair Diederik Gommers, but also Peter van der Voort, Arthur van Zanten, Armand Girbes and others did a fantastic job explaining the public the speciality 'Intensive Care'. In this issue of the Netherlands Journal of Critical Care, you will find a remarkable case report and a review on extracorporeal cardiopulmonary resuscitation (ECPR).[1,2] The review focusses on the unknown prehospital variables of patients who are considered for ECPR. This review acknowledges that the scientific status of ECPR is weak: until now the best scientific data are propensity matched observational studies. At this moment, there are no randomised trials. However, multiple randomised trials are currently enrolling patients and are expected to end inclusion later this year. Randomised trials, aiming at improving survival, are indeed difficult to design if questions as 'who to include' and 'how to treat the patients' are still unresolved. ECPR is a relatively new treatment modality in resuscitation medicine. In some ways, the lack of scientific data resembles the way we looked at positive pressure ventilation and the treatment of ARDS, now more than half a decade ago. Mortality due to ARDS was then more than twice as high as nowadays.[3] In a 50th year review of ARDS, Pham described that lack of definition of ARDS hampered the path to improvement, citing Murray: 'How can you collect, much less compare, epidemiologic data and mortality figures when there is no uniformly accepted and used definition.'[4] The review covering ECPR in this issue of the NJCC concludes the same. It is hard to draw to scientific conclusions when it is unclear which patients will benefit from ECPR, which prehospital parameters are important, what the best logistical clinical pathway is to insert cannulas for ECPR, and what the best post-ECPR management strategy is. Nowadays, it is often advocated to only consider patients for ECPR with the best chances of survival. Who are these patients? How can these 'best patients' be identified? Some centres in the Netherlands will not consider patients with a pH <7.0 or high lactate for ECPR. The case report in this issue of NJCC shows that lives could be saved if these patients with profound acidosis were to be considered for ECPR.[1] The review in this issue of NJCC as well as others, including an upcoming meta-analysis, suggest that low-flow duration might be one of the most important determinants of survival after ECPR. Low-flow duration is defined by the time between collapse and regaining spontaneous or mechanically supported circulation (i.e. start of ECPR blood flow). In a study by Bartos et al., all patients receiving ECPR with a low-flow duration below 30 minutes (n=8) survived and were neurologically intact.[5] They state that after between 30-60 minutes of low-flow duration, neurologically intact survival decreases by 25% with every 10 minutes of additional low-flow. Also, others describe this strong link with low-flow duration and survival.[6,7] The first problem to solve for the Dutch setting is how to decrease low-flow duration in the out-of-hospital cardiac arrest (OHCA) setting. INCEPTION, the Dutch randomised trial investigating ECPR in OHCA advises paramedics to use a 'load-and-go' strategy, defined as loading after the third shock block.[8] Despite this directive, time from collapse to arrival in the emergency department is approximately 45-60 minutes, after which the initiation of ECPR has to be started. It seems much work is still needed to lower the time until hospital arrival. Another strategy could be to perform ECPR in a prehospital setting. Paris was one of the first cities in which ECPR was performed prehospitally.[9] Other cities such as London, Berlin, Freiburg, and Albuquerque followed the Paris route. At the moment, strategies to decrease low-flow duration in the Netherlands are being explored. From a pathophysiological point of view, ECPR is very promising. However, there is still a lot to explore. Many physiological studies and outcome studies are currently being performed in order to improve the understanding of who might benefit most from ECPR, how to deliver ECPR, and how to treat these patients after initiation of ECPR. As knowledge improves, ECPR will have a solid place as ICU therapy. ECPR: coming soon to a theatre near you!

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