EDITORIAL

Tiago R. Velho[1,2,3]

[1] Cardiothoracic Surgery Department, Hospital de Santa Maria, Centro Hospitalar Universitário Lisboa Norte, EPE, Lisbon, Portugal
[2] Cardiothoracic Surgery Research Unit, Centro Cardiovascular da Universidade de Lisboa (CCUL@RISE), Faculdade de Medicina da Universidade de Lisboa, Lisbon, Portugal
[3] Innate Immunity and Inflammation Laboratory, Instituto Gulbenkian de Ciência, Oeiras, Portugal

Extracorporeal life support in cardiogenic shock: exploring before liberalizing

Cardiogenic shock (CS) is the leading cause of death after acute myocardial infarction (AMI), affecting up to 10% of the patients[1]. Despite all the recent advances, CS is invariably associated with mortality rates around 40-50%[1]. Interestingly, some reports even describe a recent increase in the probability of developing CS after AMI and in the mortality rates, probably due to ageing of population and increased risk profiles[2,3]. When general intensive care measures are insufficient, mechanical circulatory support is an option, with extracorporeal membrane oxygenation (ECMO) being one of the most popular options nowadays. The development of miniaturized systems and percutaneous cannulations have widened the use of ECMO. Although initial trials observed a significant increase of survival in CS with the use of ECMO, the evidence for its use in CS is scarce, and limited to observational studies and three small randomized trials[4].

Recently, Thiele et al. published the results of the multicenter ECLS-SCHOCK trial[4], randomizing 420 patients with CS after AMI with planned early revascularization to receive ECMO plus medical treatment or usual medical treatment alone. Surprisingly, the risk of death from any cause at 30-days was not lower among patients who received ECMO (47.8% vs 49% - relative risk 0.98, 95% CI 0.8-1.19, P=0.81). Additionally, the rate of complications such as peripheral ischemic vascular complications or moderate or severe bleeding were significantly higher in the ECMO group.

The authors raised several possibilities to explain why the trial did not show superiority of ECMO, including the occurrence of complications, a significant number of patients crossing-over both groups, and the existence of poor outcomes that were not primary related to circulatory failure. Some may argue that the methodology or the number and type of patients included should be discussed and revised, but one message is clear with this study: liberal early ECMO does not improve outcomes and survival in patients with AMI and CS. And this is not even a surprising finding, since previous trials have shown similar results[5]. Clearly, we have to reflect on how we generate evidence and use the available evidence to give our patients the best possible care. Investigator-initiated randomized trials provide powerful data that can change many of our current clinical decisions, and we should be more careful before we disseminate a technique or a technology. Current recommendations on the use of ECMO are based on unpowered data, basically considering that we have to increase cardiac output without further considerations. The upcoming IMPELLA trials will definitely bring to discussion

further important data on mechanical support on CS.

However, more than reducing the use of ECMO in our practice, we should use this manuscript as a starting point to better understand when, how and in whom we may use ECMO. We are far away from understanding the effects of mechanical support on our patients, and how we can modulate them to improve outcomes and survival. ECMO induces a tremendous change in almost all tissues and organs, adding an enormous hemostatic perturbation in patients with a critical and weak status. Limited evidence is available on the effects of ECMO on tissues and organs, and the fact is that we are treating a subset of extremely critical patients with a technique that we only partially know. Unveiling the effects of mechanical support, such as ECMO, on patients will definitely provide important insight of when, how and in whom we may use ECMO.

Definitely, before we liberalize the use of mechanical support in cardiogenic shock, we should focus on improving our knowledge on its physiopathology, and how we can modulate it to increase its benefits. Currently, one message is clear: mechanical support with ECMO is not for all, and we should be careful in the decision to advance in the particular setting of AMI with CS.

REFERENCES

1. H. Thiele, E. M. Ohman, S. De Waha-Thiele, U. Zeymer, and S. Desch, "Management of cardiogenic shock complicating myocardial infarction: an update 2019," Eur. Heart J., vol. 40, no. 32, pp. 2671–2683, Aug. 2019, doi: 10.1093/eurheartj/ehz363.
2. B. Redfors et al., "17-year trends in incidence and prognosis of cardiogenic shock in patients with acute myocardial infarction in western Sweden," Int. J. Cardiol., vol. 185, pp. 256–262, Apr. 2015, doi: 10.1016/j.ijcard.2015.03.106.
3. S. A. Wayangankar et al., "Temporal Trends and Outcomes of Patients Undergoing Percutaneous Coronary Interventions for Cardiogenic Shock in the Setting of Acute Myocardial Infarction," JACC Cardiovasc. Interv., vol. 9, no. 4, pp. 341–351, Feb. 2016, doi: 10.1016/j.jcin.2015.10.039.
4. H. Thiele et al., "Extracorporeal Life Support in Infarct-Related Cardiogenic Shock," N. Engl. J. Med., vol. 389, no. 14, pp. 1286–1297, Oct. 2023, doi: 10.1056/NEJMoa2307227.
5. P. Ostadal et al., "Extracorporeal Membrane Oxygenation in the Therapy of Cardiogenic Shock: Results of the ECMO-CS Randomized Clinical Trial," Circulation, vol. 147, no. 6, pp. 454–464, Feb. 2023, doi: 10.1161/CIRCULATIONAHA.122.062949.