Cerebral oxygen saturation measurement in patients on venoarterial extracorporeal membrane oxygenation – a potential therapeutic target

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Introduction:
Monitoring of cardiac output and sufficient oxygen tissue supply in patients undergoing venoarterial extracorporeal membrane oxygenation (vaECMO) can be challenging. Cerebral oxygen saturation measurement (cSO2) via near infrared spectroscopy (NIRS) offers a promising tool, however has been validated only for on pump cardiac surgery. Goal of the present study was to assess the prognostic value of NIRS in patients undergoing vaECMO on the intensive care unit.

Methods:
This retrospective registry analysis includes all patients (age > 18 years) with vaECMO and NIRS monitoring treated at a single center between 01/2015 and 10/2017 on two independent intensive care units. Two NIRS sensors were routinely placed on the forehead of each vaECMO patient. We evaluated average cSO2 over the whole course of therapy. The area under cSO2<50% was defined as the cSO2<50%time and was calculated by subtracting the actual cSO2 from the predefined threshold of 50% multiplied by the time [hours] of the desaturation.

Results:
This study consists of 69 vaECMO patients (56 in cardiac shock and 13 after cardiac surgery). The patients were 58.8±13.6 years old and 26 (38.3%) survived with good neurology (Cerebral Performance Categories Scale 1 or 2) to hospital discharge. Average cSO2 was statistically similar in survivors and non-survivors (63±1% vs. 59±2%, p=0.09). The cSO2<50%time was significantly lower in survivors (20±1%h vs. 97±3%h p=0.04). Patients with cSO2<50%time above 50%h had an odds ratio of hospital survival of 0.19 (95%CI 0.38-0.91, p=0.037).

Conclusion:
Cerebral oxygen desaturation below 50% was significantly associated with outcome in patients undergoing vaECMO. In patients with cSO2<50%time above 50h%, prognosis was especially poor. Prospective trials are needed to evaluate if cSO2 is a viable target for therapeutic interventions.

Image 1:

Image 2:
Prognosis of patients with cSO2<50%time > 50%h was poor.