

Intracranial hemorrhage in adult patients on venoarterial extracorporeal membrane oxygenation

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Funding Acknowledgements: Type of funding sources: None.

Purpose: Intracranial hemorrhage (ICH) is one of the most serious complications of adult patients treated with venoarterial extracorporeal membrane oxygenation (VA-ECMO) and is associated with increased morbidity and mortality. However, the prevalence and risk factors of ICH in this cohort are still insufficiently understood. Therefore, the purpose of this study was to further investigate prevalence, associated mortality and predictors of ICH in VAECMO patients.

Methods: We conducted a retrospective multicenter study including adult patients (≥ 18 years) treated with VA-ECMO in cardiac intensive care units (ICUs) at five clinical sites between January 2016 and March 2020, excluding patients with ICH upon admission. Differences in baseline characteristics and clinical outcome between VA-ECMO patients with and without ICH were analysed. Predictors of ICH were identified by uni- and multivariable regression models.

Results: Among 598 patients included, 70 (12%) developed ICH during VA-ECMO treatment with mean duration of 82 ± 84 h between ECMO initiation and ICH diagnosis. Out of these ICH, 23% were intraparenchymal, 20% subarachnoid, 10% subdural, 3%

intraventricular and 44% combined hemorrhage. In-hospital mortality in the ICH cohort was 81% and 1-month mortality 86%, compared to 63% ($p = 0.002$) and 64% ($p < 0.001$), respectively, in the non-ICH cohort. In a multivariable regression model, ICH was independently associated with diabetes mellitus (Odds Ratio [OR] 1.952, 95% confidence interval [CI] [1.082, 3.492], $p = 0.025$), platelet count (OR 0.990, 95% CI [0.982, 0.996], $p = 0.003$) and fibrinogen (OR 0.996, 95% CI [0.993, 0.998], $p = 0.002$).

Conclusion: ICH occurred frequently in VA-ECMO patients and was associated with a significantly higher mortality rate. Diabetes mellitus, low platelet count and low fibrinogen level are independent predictors of ICH. These findings may help to develop effective strategies to prevent and treat ICH and build the basis for further investigations to optimize clinical outcome in patients on VA-ECMO.