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Echocardiographic predictors of VA ECMO weaning in patients with cardiogenic shock

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Background Veno-arterial extracorporeal membrane oxygenation (VA ECMO) is an advanced treatment for refractory cardiogenic shock (CS) and cardiac arrest (CA). Successful weaning from VA ECMO is defined as device removal without requirement for re-cannulation over the following 30 days. There are few data available regarding timing and protocols of VA ECMO weaning. Total isovolumic time (t-IVT) is an echocardiographic parameter of systo-diastolic interaction and ventricular efficacy. Along with MAPSE (mitral annular systolic plane excursion), it showed to be the most sensitive echocardiographic marker of haemodynamic profile in cardiogenic shock.
Purpose To evaluate whether clinical and echocardiographic data are able to predict successful VA ECMO weaning.
Methods Single-centre retrospective observational study of patients with refractory CS and CA who underwent VA ECMO insertion from January 2013 to December 2017. Primary endpoint of the study is to evaluate t-IVT and MAPSE as predictors of successful VA ECMO weaning at implantation (t0) and at first weaning trial after 48 hours (t1).
Results Preliminary results of 46 patients (76% male; 52±12.5 y.o.) underwent VA ECMO cannulation. 33 patients (71%) underwent VA ECMO for CA, 3 patients for fulminant myocarditis, 2 for pulmonary embolism, 8 for CS post STEMI and 2 for Tako-Tsubo and drug intoxication. 17 patients (36%), all with refractory CA, died within 24 hours and they did not get the weaning trial. 29 patients undertook weaning trial: 18 were weaned (62%; 39% overall population) and 14 (48%; 30% overall population) were discharged alive from ICU. The patients successfully weaned from VA ECMO had shorter t-IVT at the time of implantation (25.3 vs 27.3 s/min; p 0.003); MAPSE was not significative. The variation (?) of t-IVT from t0 to t1 was the strongest predictor of ECMO weaning (p <0.001) in comparison with MAPSE (p 0.002), ejection fraction (p 0.03) and LV end diastolic volume (p 0.066). All the patients weaned had an aortic VTI >9.5 cm (12.2±2.7 cm). Table 1 shows patients' characteristics at 48 hours from VA ECMO implantation.
Conclusions The mortality of patients undertaking VA ECMO remains high, especially in refractory CA. Amongst the echocardiographic parameters tested, t-IVT at the baseline and its ? from VA ECMO implantation to first weaning trial was the strongest predictor of VA ECMO weaning.

	Weaned	Not weaned
t-IVT	18.6 (±1.45)	24.4 (±4.6)*
Ejection fraction	11.4 (±2.56)	9.2 (±3.8)
ECMO duration days	7±1.8	2.1 (±0.8)*

* p <0.001