Echocardiographic predictors of VA ECMO weaning in patients with cardiogenic shock

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BACKGROUND Successful weaning from VA-ECMO is defined as device removal without further 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; it showed to be one of the most sensitive echocardiographic marker of haemodynamic profile in cardiogenic shock.

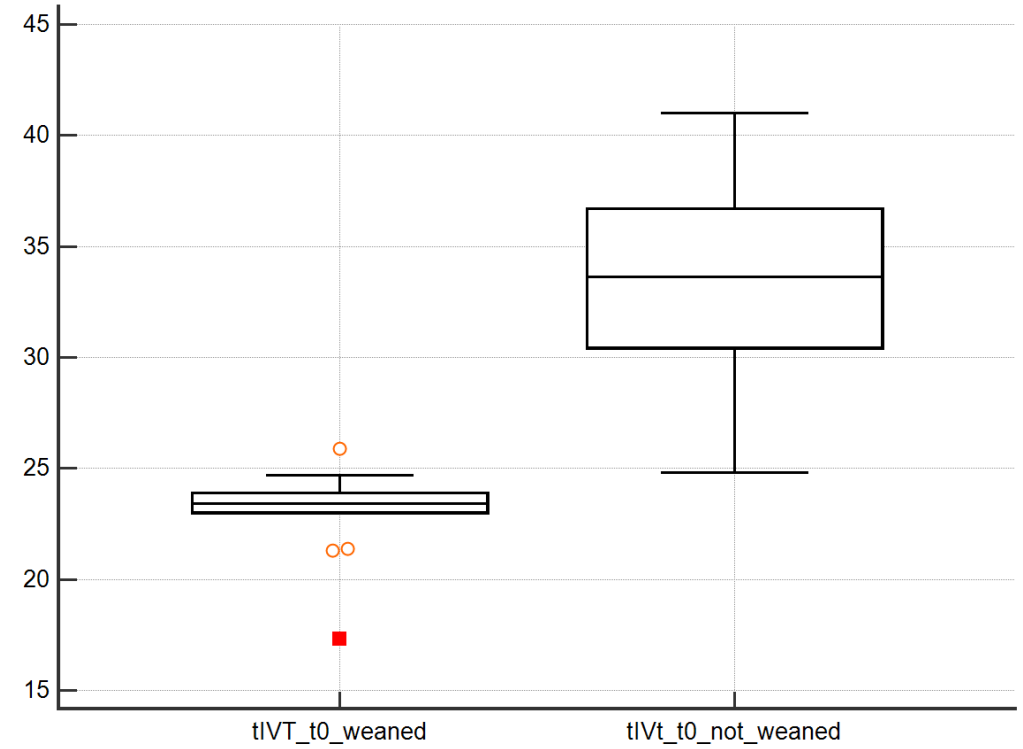
PURPOSE Primary endpoint was evaluated which echocardiographic parameter of cardiac performance (ejection fraction (EF) versus t-IVT) correlate with VA-ECMO weaning.

METHODS Single-center retrospective observational study of patients with refractory cardiogenic shock and cardiac arrest who underwent VA-ECMO cannulation from January 2013 to December 2017. We measured left ventricular t-IVT and EF at time of cannulation (t_0), during the first weaning trial after 48 hours (t_1) and, in those who survived, at last trial (t_2). Weaning protocol was standardized for all patients.

RESULTS 46 patients (76% male; 52±12.5 y.o.) underwent VA-ECMO cannulation. 17 patients (36%) died within 24 hours. 29 patients undertook weaning trial: 18 were weaned (62%) and 14 (48%) were discharged alive from ICU. At t_0, patients successfully weaned form VA-ECMO had shorter t-IVT (23.12 vs 33.6 sec/min; $p < 0.001$) and greater EF (11.4 vs 9.04, $p < 0.05$). Amongst those who were weaned, t-IVT modifications from t_0 to t_2 were more significant ($p <0.001$) than EF variations (p 0.002) – Figure 1.

CONCLUSIONS The mortality of patients undertaking VA-ECMO remains exceptionally high, especially in patients with refractory cardiac arrest. t-IVT at the baseline and its variations were more sensitive than EF in the VA-ECMO weaning evaluation.

Figure1. Boxplot of t-IVT and EF in weaned and not weaned patients (top) and their variation over time in successfully weaned group (bottom).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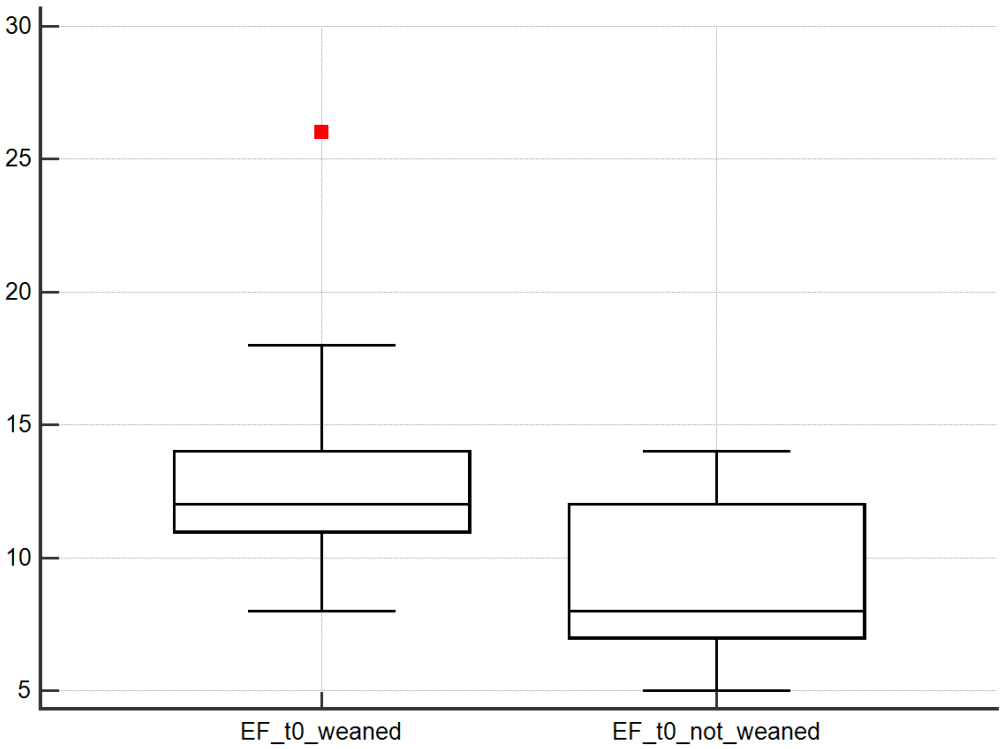
tIVT_t0_weaned
tIVt_t0_not_weaned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EF_t0_weaned
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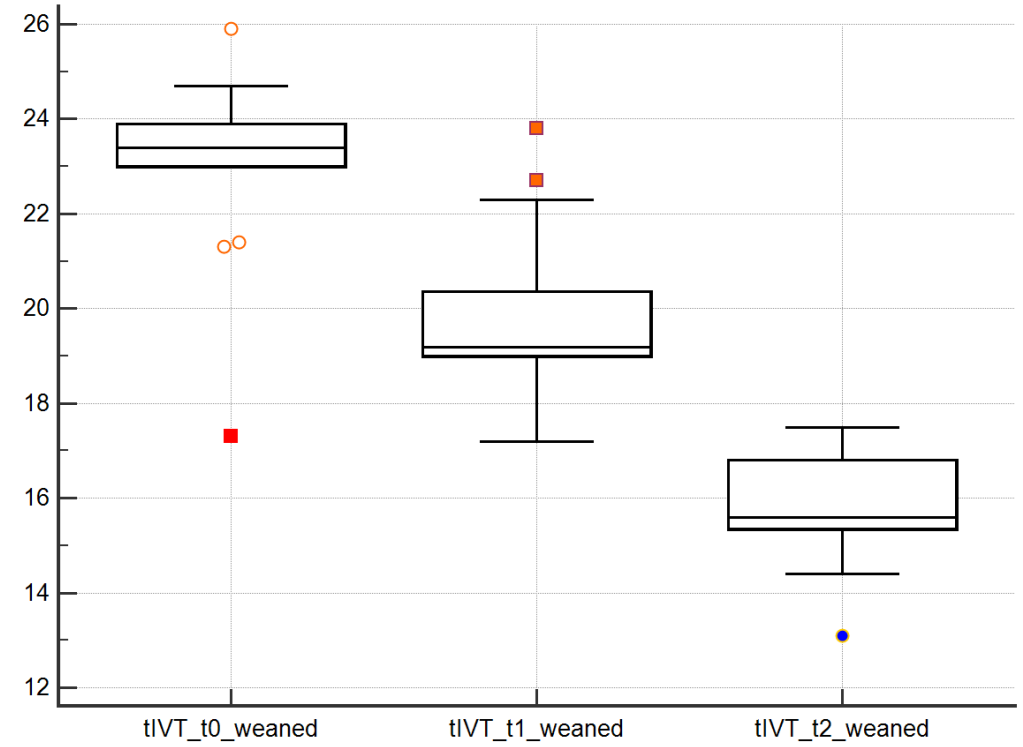
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tIVT_t0_weaned
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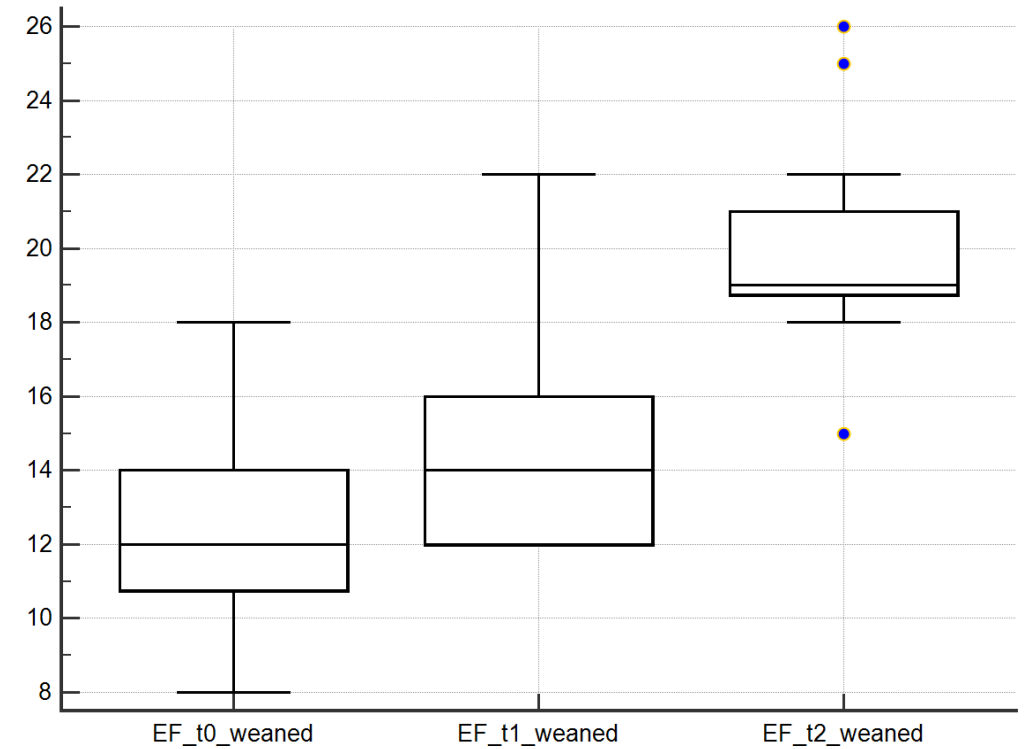
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EF_t0_weaned
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