

# Electrical Cardiometry in Extracorporeal Membrane Oxygenation Patients

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## **INTRODUCTION:** -

Cardiac output (CO) monitoring is important in patient connected to extracorporeal membrane oxygenation (ECMO) either Veno-Venous (VV) ECMO or veno- arterial (VA) ECMO - In VV ECMO patient's adequate oxygenation is achieved with ECMO flow above 60 % of cardiac output and in VA ECMO patients adequate hemodynamic is maintained with ECMO flow 50-70 ml / kg/min.

## **AIM:**

Validate cardiac output measured by electrical cardiometry (ICON™) using transthoracic echocardiography in patients connected to ECMO (either VA ECMO or VV ECMO)

## **METHODS:** -

CO was estimated using electrical cardiometry (ICON OSYPKA medical, Germany) using bioimpedance technology through 4 electrodes connected to the left side of the body with good signal quality for accuracy of measurements {signal quality indicator (SQI) ranging from 70 to 100}

- Echocardiography measurements were taken using Pulsed Wave (PW) doppler over left ventricular outflow track (LVOT) (2-3 cm away from aortic valve in apical 3 or 5 chamber views) to calculate LVOT Velocity Time Integral (LVOT VTI). - Stroke Volume (SV) = LVOT VTI × Cross sectional area (CSA) of LVOT (calculated from parasternal long axis 0.5

cm from aortic valve). -CO = SV × Heart Rate (HR) - The two measurements were taken at the same time in 10 patients treated with ECMO (6 patients were connected on VV ECMO (675 paired values) and remaining 4 patients on VA ECMO (343 paired values) - In VV ECMO patients, CO calculated by echocardiography and estimated by ICON equal native CO - While CO estimated by ICON in VA ECMO patients equals native CO measured by echocardiography and ECMO flow

## **RESULTS:**

There were significant correlations between cardiac output estimated using ICON compared to echocardiography in both patients connected to VV (4.8 to 12.7 L/min with mean 8.97 L/min ± 2.1 Vs 4.6 to 12.4 L/min with mean 8.42 L/min ± 1.84 by echocardiography) and VA ECMO (4.3.61 to 8.46 L/min with mean 8.535 L/minute ± 1.13 Vs 4.01 to 7.25 L/minute with mean 5.2 L/min ± 0.72 by echocardiography) (r = 0.915 and 0.808 for VV and VA respectively) (p < 0.001). Intraclass Correlation coefficient and Cronbach's Alpha analysis were used to assess the agreement between the two measurements and there was a statistically significant agreement (P value > 0.001).

## **CONCLUSION:**

ICON is a valuable noninvasive and continuous tool for the assessment of cardiac output in patients supported with ECMO.

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