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ECMO after cardiac surgery in infants: does early cardiac catheterization improve outcome?

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Objectives - To report our experience with cardiac catheterization performed during extracorporeal membrane oxygenation (ECMO) in children who underwent cardiac surgery in our Institution.

Methods - We retrospectively reviewed our ECMO registry (February 2011-October 2015) and identified patients who underwent cardiac catheterization while on ECMO. All patients had complex congenital heart disease and had undergone cardiac reparative or palliative surgery in the past 48 hours. Indication for cardiac catheterization was hemodynamic and anatomical assessment when weaning from ECMO was not possible after 48 hours and surgical complication was suspected.

Primary outcome was considered weaning from ECMO. We sought to observe if cardiac catheterization influenced primary outcome.

Results - Fifty-three consecutive patients (mean age 50 days) received artero-venous ECMO support for cardiac arrest or failure to wean from cardio-pulmonary bypass. Fifteen cardiac catheterizations were performed on 13 patients (24.5%).

Catheterization was diagnostic in 12 and interventional in 3 cases. In 8/13 (61%) catheterization modified therapeutic approach. A structural anomaly requiring repeat surgery was detected in 5 cases. In details, catheterization identified a left ventricular outflow obstruction after arterial switch, a pressure gradient through a Damus-Kaye anastomosis, too tight a pulmonary branch banding after hybrid stage I palliation and two cases of right ventricular outflow obstruction after Fallot repair. Interventional catheterization was performed in 2 patients with narrowing of the right pulmonary artery after comprehensive Norwood stage I-II, readily treated with successful stenting. Also, coil embolization of systemic-to-pulmonary collateral was performed during catheterization in one patient who was then scheduled for repeat surgery the day after, based on the evidence of elevated right ventricular pressure. In one case catheterization diagnosed pulmonary arterial hypertension and epoprostenol was started.

Weaning from ECMO support was achieved in 9/13 patients (70%), a mean of 3.2 days after cardiac catheterization/surgery. Conversely, 18/40 patients (45%) who did not undergo cardiac catheterization were weaned from ECMO. The Odds Ratio for the probability of weaning from ECMO was higher after cardiac catheterization (OR 2.750).

Conclusions – Cardiac catheterization during ECMO provides useful information that can actively modify treatment approach. Weaning from ECMO is positively influenced by early cardiac catheterization.