Cardiac catheterization in patients with congenital heart disease on ECMO: Aimless action or helpful tool? – A review of 31 cases

Fakler U (1), Ackermann K. (1), Balling G. (1), Hörer J. (2), Eicken A. (1), Ewert P. (1)
1 German Heart Center, Dept of Pediatric Cardiology and Congenital Heart Disease
2 German Heart Center, Dept of Cardiovascular Surgery, Technische Universität München, Munich, Germany

Introduction: Hemodynamic instability after surgery for congenital heart disease (CHD) may be treated symptomatically by ECMO. Immediate diagnostic on ECMO is warranted to evaluate the cause of hemodynamic instability and to initiate timely surgical or interventional treatment. Cardiac catheterization (CC) may detect otherwise not identifiable causes of hemodynamic instability and offers the possibility of simultaneous intervention. We aimed at evaluating the diagnostic and therapeutic value of CC in patients (pts.) with CHD on ECMO and to assess the mortality and morbidity related to CC.

Methods: Data of 68 surgical patients, and 6 non-surgical pts., who were treated with ECMO between 2006 and 2012 were analyzed. Median age was 8 months (range: 5 days–51 years), median weight was 4.9 kg (range: 2.0 – 126 kg).

Results: Indications for ECMO were failure to wean from cardio-pulmonary bypass (n=29), low cardiac output syndrome on the ICU (n=18), cyanosis (n=9), and ongoing cardio-pulmonary resuscitation (n=18). 33 CC on ECMO were performed on 31 pts. There was no intraprocedural mortality, no major bleeding, and no complication related to the CC. All interventions were performed successfully. In 13 pts. CC was followed by medical treatment only. Eight pts. had interventions during CC. Four pts. received an intervention and a reoperation. Six pts. underwent reoperations. The following procedures were performed on ECMO: Stenting of the pulmonary artery (n=3), of an aortopulmonary shunt (n=1), of the superior caval vein (n=1), of a coronary artery (n=3), local lysis in a coronary artery (n=1), in a pulmonary artery (n=1), in the A. mesenterica superior (n=1), balloonatrioseptostomy (n=2), angioplasty of an aortopulmonary shunt (n=1). Three pts. underwent >1 intervention. Hospital survival of pts. with CC on ECMO was 35% vs. 43% of all pts. on ECMO (p<0.05).

Conclusion: CC and interventions can be performed safely and effectively on ECMO. The findings revealed by CC led to interventional, surgical, or medical treatment in 32% of the pts.. Cardiac catheterization is an important diagnostic and sometimes therapeutic tool, especially in these critically ill patients. However, hospital survival of patients with CC on ECMO is lower compared to all pts. on ECMO.