

Paediatric cardio-pulmonary assist via central ECMO with an integrated left ventricular vent

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Introduction:

For children with low cardiac output, veno-arterial (VA) extracorporeal membrane oxygenation (ECMO) remains the mainstay of mechanical circulatory support. In experimental study using canine heart failure model, additional decompression of the left ventricle (LV) advances myocardial recovery. In spite of this experimental result, the utilization of an integrated LV vent on ECMO is not a common clinical practice. In this study, we reviewed our experience in temporary circulatory support via a central ECMO with integrated LV vent in children with cardiac failure refractory to medical management.

Methods and Results:

In year 2011 and 2012, five children acquired temporary circulatory support via ECMO with integrated LV vent. All cases are approached through median sternotomy. Arterial cannula was placed in ascending aorta. The right atrium was cannulated for venous return in all cases except in case 4, in which the bicaval cannulation was used. LV vent was inserted through right superior pulmonary vein and was connected to the venous line on ECMO, so that complete left heart decompression was achieved.

Case Nr.	Age	Diagnosis	Performed surgery	ECMO duration (d)	Short term outcome
1	12 y	Dilatative Cardiomyopathy	ECMO impl.	10	Berlin Heart Excor
2	13 y	Acute myocarditis	ECMO impl.	6	Discharged home
3	1 mo	Pulmonary Artery Atresia with MAPCAs	Unifocalisation and ECMO impl.	5	Discharged home
4	4 mo	Bland-White-Garland-Syndrom	Left coronary artery translocation and ECMO impl.	5	Discharged home
5	3 mo	Complete Atrioventricular Septal Defect Typ C	cAVSD repair and ECMO impl.	>1	still on ECMO

Conclusions:

ECMO represents a feasible and effective method to support critically ill patients with existed low cardiac output. Cautious selection of patients, accurate timing of ECMO implantation as well as postoperative management remain challenging. In the presence of low cardiac output and insufficient interatrial shunt, additional LV decompression via LV vent could avoid the left heart distension and might promote myocardial recovery. It helps to prevent pulmonary congestion and the associated pulmonary hemorrhage. According our experience, we recommend the use of ECMO with an integrated LV vent in children with intractable cardiac failure.