

Extra-corporeal membrane oxygenation (ECMO) for children after cardiac surgery

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OBJECTIVE: To review our experience in pediatric patients who supported by extracorporeal membrane oxygenation (ECMO) after cardiac surgery.

METHODS: Between Jan. 1998 and Dec. 2013, there were 80 ECMO runs in 73 pediatric patients after cardiac surgery at Mt.Fuji Shizuoka Children's Hospital. Seven patients who required 2nd ECMO support during the same hospitalization were excluded(2 discharged alive, and 5 dead) and 66 patients were included in this study. Retrospective analysis of their clinical course were performed from hospital records.

RESULTS: Median age and median weight was 1.9 month (day 0-21years) and 3.2 (1.6-70.4)kg, respectively. Thirty-three(50%) failed to wean off cardiopulmonary bypass and ECMO support was initiated in operating theater. Other 33 required ECMO support at ICU 34hrs(27min-14weeks) after the end of operation, because of sudden deterioration requiring cardio-pulmonary resuscitation(CPR) with chest compression(n=21) and for other reasons(n=12). The duration of CPR(from the begging of CPR to ECMO run) was 47 (15-104)min. Almost all patients were assisted by V-A ECMO with both atrial and aortic cannulation under opened chest.

Forty-four(67%) had single ventricle physiology and 38 of them underwent palliative surgery. Median duration of ECMO support was 116(1.5-523)hrs and 5 patients required open-heart surgical re-interventions during its support. Overall 48(73%) were successfully weaned off ECMO(alive more than 24hrs after ECMO discontinuation) and 38(58%) were discharged alive. As a major complication, brain damage was found in 5 patients(all of them were resuscitated before ECMO support). Successful ECMO weaning was not associated with ventricular physiology(UV vs BV, $p=1.00$), treatment stage(palliation vs correction, $p=1.00$) and E-CPR(CPR(+)) vs CPR(-), $p=0.770$).

CONCLUSION: Once the hemodynamics was properly established after cardiac surgery, ECMO can be a strong life-saving tool with few complications even in patients with single ventricle who dropped into circulatory collapse and resuscitation is required. Brain damage remains a major complication in E-CPR patients.