

Successful wean from ECMO after pediatric out-of-hospital cardiac arrest with bystander CPR in a patient with status asthmaticus and aspiration

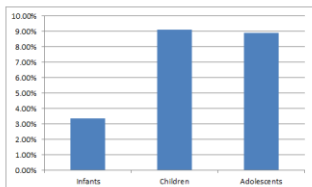
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Introduction

Pediatric out-of-hospital cardiac arrest (OHCA) with bystander CPR is an uncommon event and is generally described as having exceptionally poor survival with severe neurological consequences.

Specific neurocognitive deficits can often be found in pediatric patients who have had exposure to extracorporeal membrane oxygenation².

Pediatric OHCA survival rates¹



Preservation of neurologic function in pediatric OHCA

Optimization of initial resuscitation → early CPR, faster arrival of EMS, shockable rhythm (all are independent predictors of survival, as is older age)

Post-resuscitation care → Admission high acuity unit, early deployment of ECMO

Rehabilitation → Neurology consultation, aggressive PT/OT, speech therapy

Discussion

ECMO is employed as a treatment modality in severe cases of status asthmaticus. However, it is a fairly rare occurrence for a patient to receive bystander CPR from an untrained individual while in status asthmaticus before ECMO institution, who is then successfully weaned without any neurological sequelae.

When used to support recent CPR, ECMO was shown to be able to rescue approximately one third of patients in whom death was otherwise certain¹.

Overall, the major risks factors for poor ECMO outcomes are renal dysfunction, pulmonary hemorrhage, pre-existing neurological injury, CPR during ECMO, and arterial blood pH <7.2.

Neurologic injury is a frequent complication in children undergoing ECMO, specifically after in-hospital CPR. Children with cardiac disease, severe metabolic acidosis before ECMO, and complicated ECMO course have increased odds of sustaining neurologic injury.

This presents a case where timely institution of ECMO after bystander CPR resulted in a favorable outcome in the face of multiple risk factors for morbidity and mortality.

References

- Atkins V et al. (2009) Circulation, 119(11):1484-91.
- Schiller RM et al. (2017) Crit Care Med, 45(10):1742-1750.
- Kane DA et al. (2010) Circulation, 122(11 Suppl):S241-8.

HPI

7-year-old girl with poorly controlled moderate-severe persistent asthma who became unresponsive at home, and received two rounds of chest compressions, with ROSC within 5 minutes. She had significant emesis throughout CPR. On EMS arrival, had a pulse and shallow breathing, 100% O₂ via NRB mask and given 5mg albuterol, 1mg ipratropium, and 45mg solumedrol.

Was intubated in the ED, and ECMO cannulation occurred due to poor oxygenation and ventilation.



← **Admission CXR**
Hyperexpansion of lungs with severe air trapping. No pneumothorax or pleural effusion.

Hospital Day 5 →

Before de-cannulation of ECMO circuit. Bibasilar opacities are improving. No pulmonary edema. No pleural effusion or pneumothorax. Heart size is normal.

