Case Report

Extracorporeal membrane oxygenation (ECMO) and hypothermic arrest

Two years ago, a 14-year-old healthy boy drowned in a river near Milan. In Italy, the river is a popular place for swimming and other water activities. The boy was last seen by his family playing near the river. The family reported him missing, and a search was launched.

On arrival at the hospital, the boy was found to be unconscious and had no pulse. Immediate cardiopulmonary resuscitation (CPR) was started, and the boy was intubated. Blood tests revealed a pH of 7.26, a pCO₂ of 43 mmHg, and a pO₂ of 79 mmHg. The boy was transferred to the ICU for further management.

Despite initial efforts, the boy was pronounced dead on arrival. However, the family requested ECMO support, and the boy was transferred to the ECMO center. The ECMO team started the procedure, and the boy was connected to the ECMO circuit. The ECMO machine was set to provide continuous veno-venous hemofiltration and veno-arterial support.

After 48 hours of support, the boy showed signs of recovery. The ECMO was gradually weaned, and the boy was decanualized. The family was relieved to see their son recover.

This case report discusses the management of a young boy who suffered cardiac arrest and was resuscitated using ECMO. It highlights the importance of early CPR and the role of ECMO in improving survival outcomes. The case also underscores the need for better public education about drowning prevention.
tract) was managed with multiple transfusions of red blood cells and fresh frozen.

Fourteen hours after ICU admission, propofol and remifentanil administration was stopped to allow the first neurological assessment which showed the patient comatose, areflexic, with muscular hypertonia at both lower extremities and at the right arm. Only the ciliospinal reflex was evocable after intense stimulation. Propofol infusion was thus restarted.

The second day, acute renal failure requiring renal replacement therapy (highest value of serum creatinine registered = 2.83 mg/dL) and acute liver failure (highest transaminase value = 4925 U/L; highest total bilirubin value = 6.29 mg/dL) were evident. On the third day of hospitalization, propofol infusion was stopped again to permit a second neurological assessment that showed the patient with open eyes and able to obey to simple orders. After four days, in light of myocardial recovery, ECMO and IABP were removed. The fifth day, brain magnetic resonance was performed and showed thalamic ischemia and signs of reduced cortical diffusion and intracranial hypertension. Furthermore, during the same day amputation of the right leg was performed since irreversible ischemia of the right inferior limb occurred. Pharmacological inotropic support was stopped ten days after hospital admission. On the same day, the patient was transferred to the neurosurgical ICU.

Neurological status progressively improved, after 13 days of hospitalization the patient was awake and neurologically intact, reaching a complete recovery after 37 days of hospitalization, the day in which he was discharged at home. After few months, he went back to school and he speaks the four languages he spoke before the accident.

Patient’s relatives signed a written consent for the scientific use of the patient’s data. Ethics committee approval was waived according to Italian law.

This is the longest mild hypothermic drowning with excellent neurological recovery reported in literature. Indeed, the patient had near one hour and a half CRP before ECMO start; water temperature was 15 °C and patient’s body was found at 29.5 °C. Furthermore, the two years follow up confirmed the absence of neurological deficits. The only report with longer duration of submersion (83 min estimated) happened in icy water with the patient retrieved at 13.8 °C (profound hypothermia). The authors described an excellent neurological outcome even though ten months after the episode described the patient had generalized seizures requiring antiepileptic therapy initiation. Furthermore, in this case the patient was first treated with cardiopulmonary by-pass and only subsequently with ECMO.

This report questions the borders of futility of extracorporeal CPR and when “to stop” it. As a matter of fact, strict cooperation of emergency medical service and ECMO unit allowed this boy “back to life”.

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Conflicts of interest

The authors declare no conflict of interest.

Bibliografía


* Department of Anesthesia and Intensive Care, IRCCS San Raffaele Scientific Institute, Milan, Italy
+ VITA-Salute San Raffaele University, Milan, Italy
S.C. Sala Operativa Regionale, Emergenza Urgenza Metropolitana, ASST Grande Ospedale Metropolitano Niguarda, Milan, Italy

Corresponding author.
E-mail address: landoni.giovanni@hsr.it (G. Landoni).

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