An 11-year-old healthy boy drowned and was resuscitated a few minutes after his collapse.

An electrocardiogram (ECG) and full neuromuscular recovery were obtained in adequate function after extracorporeal membrane oxygenation.

After the support for cardiac arrest was regained, intravenous administration of hemodilution with estrogens was performed immediately after admission, over 24 hours.

The ECG showed the presence of systolic, diastolic activity, and atrio-ventricular disturbances.

Introduction

Hypothermia and intracranial hypertension after drowning are not uncommon in children and emergency medical services (EMS) reports. However, there are few cases of drowning with hypothermia and extracorporeal membrane oxygenation (ECMO) and full neuromuscular recovery. These cases are important for understanding the process of drowning and the importance of the body temperature.

Case Report

A 11-year-old healthy boy drowned and was resuscitated a few minutes after his collapse. On arrival, the patient was unconscious, with hypothermia and intracranial hypertension.

Emergency medical services (EMS) reports indicated that the patient was not breathing and did not have a pulse. The EMS team performed cardiopulmonary resuscitation (CPR) and extracorporeal membrane oxygenation (ECMO) was performed immediately after admission.

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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.

References


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