

A CASE OF ADULT SUBMERSION INJURY WITH CLINICAL AND RADIOLOGICAL EVIDENCE OF SEVERE BRAIN AND LUNG INJURY, AND SUBSEQUENT COMPLETE CLINICAL RECOVERY

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Dear Sir,

Non-fatal drowning carries significant morbidity, mainly from concurrent hypoxic brain injury and lung injury.⁽¹⁾ Treatment is supportive, although a significant number of patients have refractory hypoxaemia and hypercapnia despite aggressive ventilatory support.⁽²⁾ Extracorporeal membrane oxygenation (ECMO) has potential benefits for patients when mechanical ventilation is insufficient to maintain adequate gas exchange.⁽³⁾ We illustrate a remarkable case of rapid recovery, despite adverse clinical and radiological prognostic factors, after early initiation of ECMO.

A 29-year-old woman was taken to the emergency department 30 minutes after she had a drowning episode in a river while alcohol-intoxicated; she fell from a height of at least 3 m, possibly hitting a boat. The duration of submersion was approximately five minutes. The patient's pulse oximetry oxygen saturation levels (SpO₂) were 88%–90%, pulse rate was 126 beats/min, respiratory rate was 20 breaths/min, blood pressure was 136/88 mmHg and temperature was 36.0°C. Her Glasgow Coma Scale (GCS) score was E1V2M1. There were bilateral crepitations in her lungs and multiple abrasions on her body. The patient was intubated and mechanically ventilated.

Chest radiographs showed bilateral infiltrates (Fig. 1a); her serum sodium concentration was 137 mmol/L and serum potassium concentration was 3.61 mmol/L. Her blood alcohol levels were unavailable, as they are not included in routine screening. However, eyewitness accounts suggested that her pre-event GCS score was reasonably high. In view of the history of trauma, whole-body computed tomography (CT) was requested, which showed no evidence of active haemorrhage. However, CT of the brain showed diffuse loss of grey-white differentiation in the cortex and deep nuclei suggestive of significant hypoxic ischaemic encephalopathy. There was refractory hypoxaemia and severe lactic acidosis (i.e. pH 7.19, PaO₂ 54 mmHg, SaO₂ 74.5%, PaCO₂ 17 mmHg, HCO₃ 14.9 mmol/L and lactate 6.5 mmol/L) despite a high ventilatory setting (i.e. continuous mandatory ventilation, ventilation rate 14 breaths/min, tidal volume [VT] 500 mL, minute ventilation 7.0 L/min, positive end-expiratory pressure (PEEP) 15 mmHg and FiO₂ 100%), with a PaO₂/FiO₂ (P/F) ratio of 54 mmHg. Preparations were made for ECMO, and the patient was started on venovenous ECMO over the right and left groin, with a maximum flow rate of 3 L/min, five hours after submersion.

After initiation of ECMO, the patient's SpO₂ rapidly improved to 85% on Day 1 and 93%–100% thereafter. The patient made a rapid recovery, with her P/F ratio increasing from 54 mmHg before ECMO to 273.6 mmHg on Day 3 prior to explantation. Ventilator settings were set to maintain lung rest on ECMO (Day 1 pressure control ventilation: Fi 0.5, Pi 14 mmHg, PEEP 8 mmHg, achieved VT 60 mL; Day 3 pressure control ventilation: Fi 0.3, Pi 10 mmHg, PEEP 8 mmHg, achieved VT 271 mL). Serum lactate concentration also normalised from 6.5 mmol/L to 1.8 mmol/L within 18 hours of hospitalisation. The patient was progressively weaned off ECMO and explanted on Day 3, then extubated and transferred to the general ward on Day 5. She presented to the clinic six weeks later, showing complete resolution of the chest radiograph abnormalities (Fig. 1b) and complete neurological recovery.

ECMO is increasingly being used in drowning patients with respiratory failure refractory to ventilatory support. The speedy recovery and good outcomes of this patient were in line with the positive results seen in other studies.⁽³⁻⁵⁾ ECMO should be considered early in the course of resuscitation, even if there are adverse clinical and radiological features present. Pan-CT imaging can be used to exclude concurrent physical injury prior to instituting the anticoagulation required for ECMO.

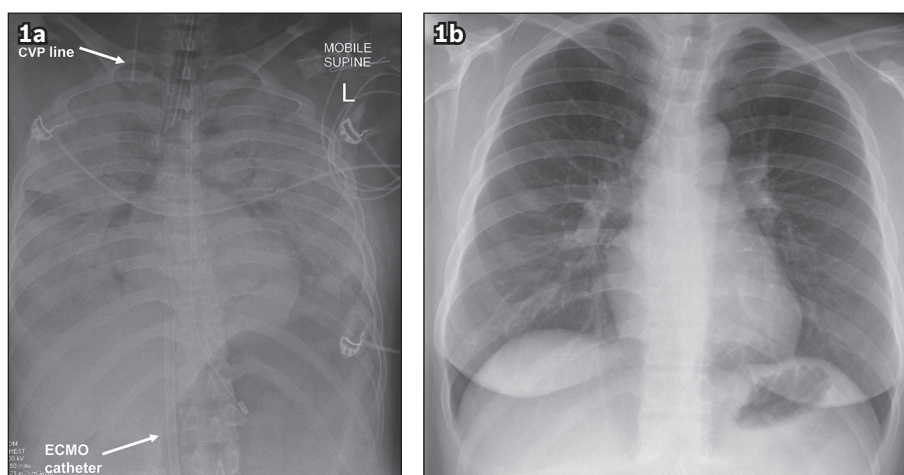


Fig. 1 Chest radiographs show (a) bilateral 'white-out' lungs from extensive consolidation at presentation to the emergency department; and (b) complete resolution of the radiological abnormalities six weeks later. CVP: central venous pressure; ECMO: extracorporeal membrane oxygenation

Yours sincerely,

Wen Jun Koh¹, Choon Peng Jeremy Wee², Duu Wen Sewa³, Ting Hway Wong⁴

¹Yong Loo Lin School of Medicine, National University of Singapore, ²Department of Emergency Medicine, ³Department of Respiratory and Critical Care Medicine, ⁴Department of General Surgery, Singapore General Hospital, Singapore. kohwenjun@u.nus.edu

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