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Letter to the Editor

Neuroprotective treatment strategies after rewarming from accidental hypothermia

Sir,

We read with great interest the article by E. Ruttmann et al. [1], where the characteristics and outcome of patients with hypothermic out-of-hospital cardiac arrest are explored. Both the use of cerebral CT-scan as prognostics and the use of intensive neuroprotective protocols including intracranial pressure monitoring after rewarming in these patients are discussed. We want to highlight these issues by describing a case included in our recently published paper regarding outcome after extracorporeal rewarming from accidental hypothermia [2].

An eleven years old avalanche victim was buried for about 140 min before he was rescued. He had spontaneous respiration and circulation after extrication, but was deeply comatose. During transportation to hospital he developed cardiac arrest, and he was therefore rewarmed from 23.2 °C by use of cardiopulmonary bypass. After successful weaning, a normal cerebral CT-scan was confirmed and the next morning he was successfully awakened. He was then mentally oriented with no neurological dysfunction. Hours later, the patient gradually lost consciousness and a new CT-scan revealed signs of developing cerebral edema. Neurointensive care protocol was then initiated, including deep sedation, mannitol, mechanical normoventilation, and intracranial pressure monitoring. In spite of neuroprotective therapy, including infusion of thiopental, intracranial pressure could not be controlled and the situation escalated when the pupils dilated. Decompressive craniectomy was performed, and intracerebral microdialysis was established per-operatively to further improve monitoring and optimizing treatment. Intracerebral Lactate/Pyruvate ratio and Glycerol concentrations (Fig. 1) decreased during the following hours after the decompression. Intracranial pressure was controllable the next days, and intracerebral microdialysis confirmed acceptable brain metabolism. After three days, cerebral CT-scan confirmed decreasing cerebral edema, and the patient could be awakened successfully. Further recovery was uneventful and the removed scull bone was re-implanted 41 days after the decompressive craniectomy.

The patient is today completely restituted, with no long-time sequela.

We feel important to stress the fact that aggressive monitoring and treatment for secondary brain edema and ischemia was of uttermost importance for this patient. We do not know whether the developing secondary edema was a result of the primary accidental hypothermia, the cardiac arrest and ischemia [4] or the cardiopulmonary bypass. Cerebral CT-scans, intracranial pressure monitoring and cerebral microdialysis were used to guide treatment in this case. We are fully aware of the lack of evidence for such an invasive approach [1]. However, we advocate a strict focus on the brain in the immediate post-resuscitation period after accidental hypothermia. In this context, Ruttmann et al. [1] warn about early false-positive cerebral CT-scans (CT-scans where unfavorable outcome is falsely predicted). We describe a patient where the initial CT-scan was normal, but quickly became pathologic. We will argue for a liberal approach for repeated examinations in this setting. A potential benefit from intracranial pressure monitoring and cerebral microdialysis has to be weighed up against potential bleeding complications, especially when supportive extracorporeal membrane oxygenation, necessitating anticoagulation, is used [5].

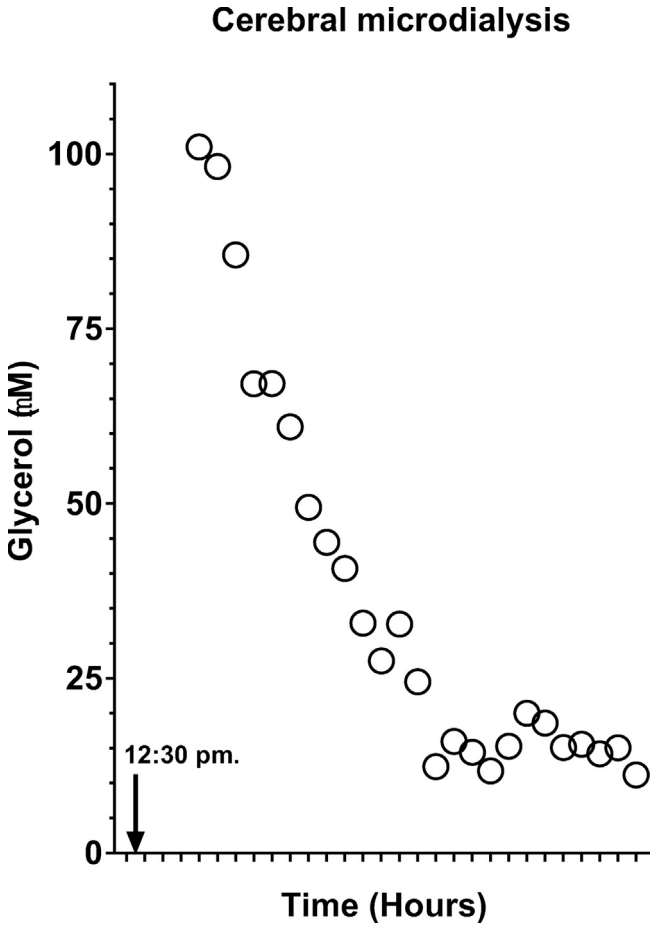

Fig. 1. Cerebral microdialysis was established per-operatively during cranial decompression. The patient returned to the intensive care unit at 12:30 pm (arrow). The first glycerol-value obtained from the microdialysate was recorded at 16:13 pm, indicating even higher initial glycerol values at the time when decompression was performed. Intracerebral glycerol is proposed to be a marker for membrane phospholipid degradation in acute brain injury [3].

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Conflicts of interest

The authors declare that they have no competing interests.

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Øyvind Sverre Svendsen *
Department of Anesthesia and Intensive Care, Haukeland University Hospital, 5021 Bergen, Norway

Ketil Grong
Department of Clinical Science, Norway

Paul Husby [a,b]
[a] *Department of Anesthesia and Intensive Care, Haukeland University Hospital, 5021 Bergen, Norway*
[b] *Department of Clinical Science, Faculty of Medicine, University of Bergen, 5021 Bergen, Norway*

* Corresponding author.
E-mail address:
oyvind.sverre.svendsen@helse-bergen.no
(Ø.S. Svendsen)

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