Letter

Severe heat stroke with multiple organ dysfunction

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See related research by Broessner *et al.* in issue 9.5 [http://ccforum.com/content/9/5/R498]

In a case report recently published in *Critical Care*, Broessner and coworkers [1] claim to have successfully treated a patient with heat stroke by using a specific cooling device. We should like to raise some important issues.

First, why were nonsteroidal anti-inflammatory drugs (NSAIDs) used acutely as a primary cooling method? No evidence supports the use of NSAIDs to reduce temperature during the acute phase of heat stroke. Moreover, they can be deleterious to the patient [2]. A rationale for the use of NSAIDs should be provided.

Second, why were conventional cooling techniques terminated after 8 hours when the graph (Figure 1 in the report by Broessner and coworkers [1]) indicates that body temperature was effectively lowered to below 39°C (the initial goal in treatment of heat stroke)? We question the cooling technique, because aggressive conventional cooling in the intensive care unit should achieve 39°C within 1 hour [3].

Third, were NSAIDs continued during use of the CoolGard® device? If so, then it would be difficult to assess the physiologic significance and effectiveness of the cooling device.

Finally, is it not likely that an ongoing infection (in this case sinusitis) could have played some causative role with respect to the severity and complications associated with the heat illness? Although the initial computed tomographic diagnosis and physical examination did not reveal any pathology, it was later reported that computed tomography was consistent with sinusitis maxillaris and aspiration pneumonia. These infections might have had an impact on the responses and later complications, but this possibility was not discussed as a potential contributing factor.

Authors' response

Gregor Broessner, Ronny Beer, Gerhard Franz, Peter Lackner, Klaus Engelhardt, Christian Brenneis, Bettina Pfausler and Erich Schmutzhard

We read with interest the letter by Drs Heled and Deuster regarding our case report of a novel intravascular treatment approach in heat stroke.

Immediate cooling and support of organ system functioning are the two main therapeutic objectives in patients with heat stroke [4]. As a consequence of that, we intended to lower the patient's highly elevated body core temperature by using conventional temperature control measures during the acute phase of the disease. Antipyretics are widely used to combat hyperthermia, although the use of pharmacologic agents in heat stroke is controversially discussed in the literature [4,5]. In our opinion, the role of antipyretic agents in heat stroke is still unclear, despite the fact that pyrogenic cytokines have been implicated in its development and may be influenced by such drugs.

Despite the aggressive use of conventional temperature control methods, including antipyretics and surface cooling techniques, for the first 20 hours of treatment (the red line in Figure 1 of our report [1]), we could not control the patient's body core temperature. Physical means to lower temperature, including surface cooling, have been shown to be ineffective in many studies because these methods can have limited efficacy as a result of skin vasoconstriction and shivering [5,6].

While using the novel intravascular treatment device, we did not add or continue any conventional treatment except for

opioids for analgesia, because control of body core temperature was achieved by endovascular treatment alone. This system has been shown to be more effective in preventing fever than conventional methods, such as antipyretic medications and surface cooling techniques [7].

We concede that the aspiration pneumonia and the sinusitis maxillaris might have had an additional effect on the severity of heat stroke in this particular case, although adequate antimicrobial treatment was started immediately and should have controlled these infections.

In our reported case conventional temperature control methods were ineffective in combating hyperthermia, but endovascular treatment was effective, feasible and instrumental in achieving a favourable outcome. Thus, further prospective randomized and controlled studies are warranted to evaluate the various treatment possibilities in heat stroke.

Competing interests

The authors declare that they have no competing interests.

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