

CASE STUDY: EFFECTIVENESS OF CRITICOOL® IN MANAGING REFRACTORY FEVER IN CRITICALLY ILL NEUROLOGICAL PATIENTS

THE CHALLENGE OF FEVER IN NEUROCRITICAL CARE

Fever is common among neurocritical care patients following subarachnoid hemorrhage, severe traumatic brain injury, or ischemic stroke. It should be promptly identified and managed because it can increase cerebral oxygen consumption and metabolism, elevate cerebral blood flow and intracranial pressure, promote the release of excitatory neurotransmitters, and increase blood-brain barrier permeability. Studies have also associated hyperthermia with prolonged intensive care unit stays, higher mortality, and poorer neurological outcomes.

Given these risks, our aim was to evaluate the effectiveness of CritiCool®, an advanced targeted temperature surface cooling system.

"CritiCool® was essential to control fever in this patient and in consequence intracranial pressure. This contributed to improving the patient's final neurological outcome."

—Amanda Barros Cano, Anesthesiology Resident, Hospital General Alicante (Dr. Balmis), Alicante, Spain



INJURY SEVERITY AND INITIAL INTERVENTION

A 31-year-old man was admitted to the intensive care unit at Hospital General Alicante (Dr. Balmis) with a severe traumatic brain injury and an initial Glasgow Coma Scale score of 7. A CT scan revealed left-sided subdural and epidural hematomas with mass effect, as well as a subarachnoid hemorrhage.

The patient underwent an emergency decompressive craniectomy, followed by the placement of an intracranial pressure monitor that enabled the clinical team to monitor cerebral temperature and brain tissue oxygenation.

During his ICU stay, the patient developed two major complications: persistent intracranial hypertension and refractory fever. In response, the clinical team initiated temperature management with CritiCool® to achieve normothermia.

CLINICAL TREATMENT: ACHIEVING NORMOTHERMIA WITH CRITICOOL®

The patient developed a fever 48 hours after admission to the ICU. We followed an escalated approach. Blood cultures were obtained, empiric antibiotic therapy was initiated, and the patient received the antipyretic paracetamol.

When the fever persisted, conventional physical cooling methods, including cooling blankets, were introduced. These measures proved insufficient, prompting the clinical team to initiate advanced temperature management with CritiCool®. The target temperature was set between 36.5°C and 37°C, successfully bringing the patient's fever under control.

The exact origin of the fever remained unclear and was likely multifactorial. The patient was diagnosed with COVID-19 and subsequently developed ventilator-associated pneumonia. A central fever component was also suspected. Central fever can occur following severe traumatic brain injury due to dysregulation of the hypothalamic temperature-control system. It is often characterized by high temperatures that are difficult to manage with antipyretic medication alone.

After four days of treatment, CritiCool® was discontinued because the patient's temperature had stabilized. However, treatment had to be restarted six hours later when the fever returned. CritiCool® was successfully discontinued after 10 days in the ICU, as the infection began to resolve and the patient showed signs of neurological improvement.

FROM TREATMENT TO RECOVERY

Despite the poor prognosis at admission, the patient survived. At discharge, he presented residual global aphasia and right hemiplegia; however, his overall neurological outcome was better than initially anticipated. At the time of this report, the patient was awaiting cranioplasty.

Several conclusions can be drawn from this clinical case:

- Fever management should be considered a priority in critically ill neurological patients because elevated body temperature may contribute to secondary neurological injury.
- Conventional fever-control methods may not always be sufficient, particularly in patients with severe traumatic brain injury and intracranial hypertension.
- CritiCool® provided several advantages: **more accurate temperature regulation and faster achievement of normothermia.**
- This clinical experience supports considering the early use of targeted temperature management systems in high-risk neurocritical care patients, with the goal of preventing fever rather than responding only after it develops.

TREATMENT PROGRESSION FOR PERSISTENT FEVER

