ICU
MANAGEMENT & PRACTICE

Early Systemic Insults Following Traumatic Brain Injury

Traumatic brain injury (TBI) is a major cause of death and disability globally, with outcomes heavily influenced by both the severity of the initial injury and subsequent secondary injury mechanisms. Systemic insults (SIs), such as hypoxaemia and hypotension, can worsen outcomes by exacerbating the cascade of events following the initial damage.

Previous studies have highlighted the negative impact of SIs on TBI outcomes, including increased mortality and disability. SIs can affect various cellular and molecular processes post-TBI, including inflammation, microglial activation, coagulation, and blood-brain barrier function. However, it remains unclear whether worse outcomes are directly caused by increased neurological injury from SIs or associated with more severe overall injury. Objective quantification of the impact of SIs on acute neurological injury and therapy needs is lacking, hindering understanding of their mechanisms and potential mitigation strategies.

The CENTER-TBI study aimed to analyse data from ICU patients to investigate the occurrence and factors associated with SIs, assess biomarker profiles related to SIs, and evaluate their correlation with 6-month outcomes. The study also explored differences in acute care needs and interventions during ICU stays between patients with and without SIs, espeically focusing on therapies to reduce intracranial pressure.

Out of 1695 TBI patients, 24.5% experienced SIs, with 16.1% encountering hypoxaemia, 15.2% facing hypotension, and 6.8% experiencing both. Biomarker levels varied based on SI type, with patients experiencing hypotension or both SIs showing elevated levels of S100B, Tau, UCH-L1, NSE, and NfL. The ratio of neural to glial injury was higher in patients with hypotension compared to those with no SIs or hypoxia alone. At six months, 22% of patients died, and 45% had unfavourable outcomes (GOSE ≤ 4). Mortality was higher in patients who experienced at least one SI compared to those who did not (31.8% vs. 19%).

These findings highlight the importance of early identification and characterisation of patients at risk for SIs through a targeted assessment and measuring the impact of these insults by examining levels of neuronal and glial injury biomarkers. Such data could enhance the understanding of the physiological processes following SIs and improve the comprehension of their effects on outcomes. Additionally, the results suggest integrating biomarkers into established prognostic models involving SIs to enhance precision in prognosis and decision-making, particularly within multimodal strategies and assessments. However, the lack of interaction between biomarkers and SIs on outcomes indicates the need for further research to fully comprehend the behaviour of biomarkers post-SIs, including exploring changes over time and the dynamics of cerebral damage.

Source: Intensive Care Medicine
Image Credit: iStock

Published on : Tue, 9 Apr 2024