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EDITORIAL

Entropy-Guided Depth of Anesthesia in Critically Ill Polytrauma Patients

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The critically ill polytrauma patient is a real concern for the trauma and intensive care team, both due to direct traumatic complications and also because of the post-traumatic secondary complications.[1,2] Regarding the management of the multiple traumas critically ill patient, a key point is control damage surgery (CDS).[3] Appropriate monitoring of general anesthesia is crucial in this case to prevent secondary hemodynamic events of the depth of hypnosis. In current clinical practice, the depth of anesthesia is assessed indirectly through clinical and hemodynamic changes such as tachycardia, bradycardia, hypertension or hypotension.[4] However, in the case of critically ill patients, special attention should be paid to hemodynamic events due to both direct trauma and secondary physiopathological effects. Thus, the adaptation of general anesthesia depending on these modifications alone does not have increased specificity and accuracy. An intensively studied method for monitoring the depth of anesthesia is represented by Entropy (GE Healthcare, Helsinki, Finland).[5] Entropy is based on the electroencephalogram (EEG) method and gives information on the cortical state of the patients and the level of hypnosis. From a structural point of view, Entropy is formed by State Entropy (SE) and Response Entropy (RE).[6,7] From the clinical point of view, SE is the patient's hypnosis, it has values between 0–91 and is composed of EEG data in a range of 0.8–32 Hz. RE is between 0 and 100 and consists of EEG data ranging from 0.8 to 47 Hz. In this case, the Entropy level at 100 represents awake state, and 0 represents the suppression of cortical neuronal activity. Abdelmageed *et al.* conducted a study on the use of sevoflurane in anesthesia guided by Entropy, highlighting a significant decrease.[8] Vakkuri *et al.* performed a multicenter study evaluating the depth of anesthesia based on Entropy monitoring. Following the study, they identified a significant decrease in propofol consumption ($p < 0.001$). Moreover, they reported a significant shortening of the post-anesthetic recovery time for patients who had complex monitoring of hypnosis.[7] Wu *et al.* studied the use of sevoflurane and hemodynamic stability in patients with general anesthesia guided by Entropy in contrast to classical methods. They reported statistically significant consumption of sevoflurane in patients receiving Entropy monitoring (27.79 mL ± 7.4 mL vs. 31.42 mL ± 6.9 mL, $p < 0.05$).[9]

A high percentage of polytraumatized patients have cranio-cerebral traumas requiring neurosurgical interventions. In this regard, there could be a number of problems with the accuracy of Entropy monitoring. However, Sharma *et al.* reported in a study on supratentural craniotomy patients that Entropy monitoring is feasible in this surgical procedure because of the flexibility of sensor placement.[10]

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Finally, multiple traumas critically ill patients show increased hemodynamic instability within the first 24 hours post-trauma. Also, a high percentage of these patients are admitted into the operator block in hypovolemic shock. Things tend to complicate if we overlap the hemodynamic post-traumatic instability with hemodynamic instability due to an overdose of anesthetic agents. In this regard, it can be deduced that by optimizing the dosage of anesthetic substances, a hemodynamic management adapted to the needs of each patient can be performed.[11] In conclusion, we can state that optimizing general anesthesia according to the needs of each individual patient can bring significant benefits in terms of patient safety and clinical outcomes in critical patients. Moreover, the titration of anesthetics through Entropy monitoring significantly reduces the adverse effects of inappropriate general anesthesia.

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