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CASE REPORT

Accuracy of Narcotrend Index in Monitoring Depth of Anesthesia in Diabetics: a Case Report

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NARCOTREND index (NI) is based on studies of normal human brain electrical data. It uses an ordinary electrode to collect and analysis brain electrical signals immediately at any position of the head, to display the state of consciousness and depth of anesthesia of patients on the touch screen after automatic analysis and classification, so as to guide dose adjustment of anesthetics. NI may make the consciousness and depth of anesthesia monitoring safe, simple, accurate, and economic. It is important that NI is more accurate than classical electroencephalographic variables.¹ Weber et al² believed that the NI was an objective and true index in the evaluation of propofol sedation in children.

CASE DESCRIPTION

A 14-year-old girl with type 1 diabetes for two years was suffering from multiple hepatic adenomas for a week. Before operation, the blood glucose was 4.0-5.5 mmol/L. After induction of anesthesia and endotracheal intubation, propofol and remifentanyl were intravenously infused during the surgery and rocuronium of 0.2 mg/kg was administered intravenously every 30-40 minutes. Arterial and central venous catheters were placed and the

Narcotrend monitoring equipment (Compact MT monitor, Hannover, Germany) connected. During the operation, glucose was monitored every 30 minutes, and 10% glucose and 5% sodium bicarbonate were supplemented according to the blood glucose level. The rate of propofol and remifentanyl pump was adjusted according to the Narcotrend variables to maintain the NI within the range of 45-65.

During the first 30 minutes, the heart rate was 87 bpm and mean blood pressure was 76 mmHg. After the surgical incision, her heart rate and mean blood pressure increased to 111 bpm and 96 mmHg. and the blood glucose level was 3.3 mmol/L and NI was 52. Subsequently, the infusion speed of 10% glucose was increased, when the glucose value was raised to 4.7 mmol/L, the NI increased to 75, then the depth of anesthesia was reinforced by increasing the infusion speed of propofol and remifentanyl. While the heart rate and blood pressure returned to normal range, the NI decreased to 55 and the blood glucose level was 4.3 mmol/L. The patient was discharged 11 days after the surgery and no abnormalities were found in the follow-up month.

DISCUSSION

Glucose in patients suffering from type 1 diabetes will not be formed due to lack of glucose-6-phosphatase

activity, thus fasting before surgery may lead to low glucose and lactic acidosis.³ The brain needs a continuous supply of glucose to provide energy, therefore, to maintain normal glucose levels is important in order to ensure the normal function of the brain. Glass et al⁴ reported that EEG of the brain in the situation of insulin-induced hypoglycemia is similar to general anesthesia state.

Narcotrend is a new depth-of-anesthesia and state-of-consciousness monitoring system. The NI of the patient in this case fluctuated between 45 and 65, which shows an adequate depth of anesthesia. However, after the surgical incision, the heart rate and blood pressure of this patient increased gradually, meanwhile the blood glucose level was as low as 3.3 mmol/L. When the blood glucose level returned to normal, NI increased gradually, indicating the deepening of anesthesia, and the heart rate and blood pressure reduced to normal ranges at the same time. Thus it can be speculated that hypoglycemia may change patients' electroencephalogram. It will be not appropriate to adjust the depth of anesthesia solely based on NI in this situation.

In conclusion, NI may not accurately reflect the depth of anesthesia in patients with type 1 diabetes, who are

prone to hypoglycemia.

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