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Case Report
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Bispectral Index May Not Reflect the Depth of Anesthesia Accurately in Children of Diabetes

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Abstract

The Bispectral Index (BIS) is based on a great amount of data accumulated from Electroencephalographic (EEG) studies of the normal human brain. It was designed to measure the effects of anesthetics on the brain *via* a computerized analysis using EEG to monitor the depth of consciousness in anesthetized patients. The BIS is a new system for monitoring the depth of anesthesia induced consciousness. This analysis is used to guide an individualized anesthetic protocol wherein the sedative dosage may be adjusted. The BIS may thus make monitoring the depth of anesthesia-induced consciousness much safer, simpler and more accurate. It is thus important that the Bispectral Index (BIS) is more accurate than classic EEG monitoring.

Introduction

The Bispectral Index (BIS) is based on a great amount of data accumulated from Electroencephalographic (EEG) studies of the normal human brain. It was designed to measure the effects of anesthetics on the brain via a computerized analysis using EEG to monitor the depth of consciousness in anesthetized patients. This analysis is used to guide an individualized anesthetic protocol wherein the sedative dosage may be adjusted. The BIS may thus make monitoring the depth of anesthesia-induced consciousness much safer, simpler and more accurate. It is thus important that the BIS is more accurate than classic EEG monitoring [1]. Louvet et al., [2] reported that BIS is an objective, accurate index for evaluating propofol sedation in children.

Case Presentation

A 10 years old boy with type I diabetes presented with an abdominal tumor. His preoperative blood glucose level was 4.2 to 5.3 mmol/l. He underwent routine anesthesia induction with endotracheal intubation, intravenous infusion of propofol, remifentanil and cisatracurium during the surgery. Arterial and central venous catheters were connected to the BIS monitoring equipment. Intraoperatively, his glucose was monitored every 30 min, with 10% glucose and 5% sodium bicarbonate supplemented according to his blood glucose levels. The propofol and remifentanil pump rates were adjusted to maintain the BIS between 45 and 65. During the first 30 min after routine anesthesia induction, the patient's heart rate and blood pressure were within the normal range. After the skin incision, however, both parameters gradually increased. So long as the blood glucose concentration was 3.0 mmol/l, the BIS remained between 45 and 65. After increasing the infusion rate of 10% glucose, however, the blood glucose concentration rate to 5.0 mmol/l and the BIS increased to 86. At that point, we increased the depth of anesthesia, causing the BIS to decrease to 50, with the heart rate and blood pressure returning to the normal range. The patient had an uneventful recovery and was discharged home on postoperative day 9. No abnormalities were found at the 2 months follow-up visit.

Discussion

Patients suffering from type I diabetes do not produce glucose if there is an absence of glucose-6-phosphatase activity. Hence, fasting before surgery may lead to low glucose and lactic acidosis [3]. Because the brain requires a continuous supply of glucose to provide energy, it cannot maintain its normal function when the glucose concentration is low. Glass et al., [4] reported that the general anesthesia state in the presence of insulin-induced hypoglycemia is reflected in the brain EEG pattern. The BIS is a new system for monitoring the depth of anesthesia induced consciousness. In the present case, the BIS first fluctuated between 45 and 65, which indicated that the depth of

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anesthesia was sufficient. After the surgical incision, however, the heart rate and blood pressure gradually increased, with the blood glucose level dropping and the BIS thus increasing. After we increased the depth of anesthesia, the glucose level returned to normal. The BIS decreased gradually, and the heart rate and blood pressure returned to normal levels. It is thus obvious that hypoglycemia may change the patient's EEG. Thus, it would not be appropriate to adjust the patient's anesthesia depth based on the BIS in this situation. In short, the BIS may not accurately reflect the depth of anesthesia of children with type I diabetes that are prone to hypoglycemia.

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References

1. Liu PP, Wu C, Wu JZ, Zhang MZ, Zheng JJ, Shen Y, et al. The prediction probabilities for emergence from sevoflurane anesthesia in children: A comparison of the perfusion index and the bispectral index. Paediatr Anaesth. 2018;28(3):281-6.

2. Louvet N, Rigouzzo A, Sabourdin N, Constant I. Bispectral index under propofol anesthesia in children: a comparative randomized study between TIVA and TCI. Paediatr Anaesth. 2016;26(9):899-908.

3. Tribl G, Howorka K, Heger G, Anderer P, Thoma H, Zeitlhofer J. EEG topography during insulin-induced hypoglycemia in patients with insulin-dependent diabetes mellitus. Eur Neurol. 1996;36(5):303-9.

4. Glass PS, Bloom M, Kearse L, Rosow C, Sebel P, Manberg P. Bispectral analysis measures sedation and memory effects of propofol, midazolam, isoflurane, and alfentanil in healthy volunteers. Anesthesiology. 1997;86(4):836-47.