Awake during General Anesthesia with BispectralIndex Value of 35

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Awareness of intraoperative events in patients under general anesthesia is rare, but awareness during anesthesia is a serious complication that leads to anxiety and post-traumatic stress disorder. The Bispectral Index (BIS) has generally been accepted as a measurement of hypnosis under anesthesia. It is derived from a processed electroencephalogram and computer algorithm that assigns a numerical value based on the probability of consciousness. A 46-year-old, 65-kg male without underlying disease underwent elective surgery for ventral hernia. The patient in this case was administered an anesthetic that we frequently use and then average BIS value are 35. But he experienced awake during general anesthesia. We describe the first case of intraoperation awake under BIS 40 using desflurane.

Keywords: Anesthesia; Consciousness monitors; Intraoperative complication; Mental recall

INTRODUCTION

Awareness during anesthesia is a significant complication with potential long-term psychological consequences. Awareness during anesthesia can lead to anxiety and post-traumatic stress disorder [1]. The Bispectral Index (BIS) has generally been accepted as a measurement of hypnosis under anesthesia. BIS values between 40 and 60 indicate adequate general anesthesia for surgery widely known, and values below 40 indicate a deep hypnotic [2]. We report a case in which the patient experienced obvious recall of conversation of medical team at a BIS value of 35.

CASE REPORT

A 46-year-old, 65 kg male without underlying disease presented to the operating room for herniorrhaphy as a result of ventral hernia. He had a sinus bradycardia. He had no history of use of psychological drugs or alcohol abuse. His surgical histories were appendectomy, total gastrectomy due to stomach cancer, and segmental resection of jejunum.

All operation was done with general anesthesia. Electrocardiogram, peripheral oxygen saturation, and arterial blood pressure were continuously measured. A BIS sensor was fixed at the frontal positions as recommended (BIS XP; Aspect Medical Systems, Newton, MA, USA). Routine monitoring was started including an electrocardiogram, non-invasive arterial blood pressure, heart rate, SpO₂, end-tidal CO₂ concentration, and body temperature.

Patient received glycopyrrolate 0.2 mg intramuscular injection 30 minutes before operation. The BIS value before the induction of anesthesia was 94. After the administration of 40 mg intravenous lidocaine with venous occlusion for 30 seconds, anesthesia was induced with propofol 120 mg injection. To facilitate tracheal intubation, a bolus of rocuronium 0.6 mg/kg was injected immediately after loss of consciousness (verbal commend) occurred.

After intubation, general anesthesia was maintained with oxygen (50%), medical air (50%), and a continuous infusion of remifentanil (0.2 mcg/kg/min) using a syringe pump device. He received dexamethasone 10 mg after induction for prevention postoperative nausea and vomiting. Anesthesia was maintained with desflurane, in the range of 6% to 7% end-tidal.

Desflurane was titrated on BIS values, whereas remifentanil was based on hemodynamic monitoring. The initial BIS reading was 37, the average BIS during the surgical procedure was 35. Good
signal quality was indicated throughout. His heart rates were 60 beats per minute throughout surgery with systolic blood pressures ranging between 100 and 120 mm Hg (baseline, 140/90 mm Hg). At the end of surgery, neuromuscular blockade was reversed and desflurane discontinued. The patient awoke and was tracheally extubated.

During postanesthesia interviews 30 minutes and 24 hours after surgery the patient reported that he could recall our voices in the operating room “So protrude…” and feel pain. The patient was questioned about awareness of intraoperative events using the Brice methodology [3]. 1) What is the last thing you remember before going to sleep? 2) What is the first thing you remember waking up? 3) Do you remember anything in between going to sleep and waking up? 4) Did you dream during your procedure?

He answered as follow. 1) I heard that “Let’s breathe deeply.” 2) I am not sure my memory. 3) Conversation of medical team during operation. 4) No, I didn’t.

As previously stated, the patient had three times anesthesia history, but no prior history of intraoperative recall. Fortunately, he doesn’t continue to be troubled by recall and nightmares.

**DISCUSSION**

Awareness during anesthesia is a significant complication with potentially devastating psychological consequences. Explicit recall of intraoperative awareness is evident in approximately 0.2% of patients given relaxant anesthesia [4]. Although a BIS value between 40 and 60 is recommended for adequate depth of anesthesia, Glass et al. [5] demonstrated that a BIS value of 51 corresponded to a 95% chance of the patient being unconscious; i.e., a 5% chance of consciousness.

In this case, the patient could completely memorize to talk of medical team at a BIS value of 35 and desflurane, in the range of 6% to 7% end-tidal. There are not equipment malfunction. No artifact induced by electromyographic signals was associated with the low BIS value during emergence. Up to 70% of patients who suffer intraoperative awareness may experience after-effects, similar to a posttraumatic stress disorder [6].

A large prospective study showed an episode of intraoperative awareness in the BIS range of 55-59 [7]. The authors suggested that awareness can occur when BIS is at the upper limit of the recommended range. Kakinohana et al. [8] were described a nonagenarian patient who could respond completely to verbal commands at a BIS value of 52 and a blood propofol concentration of 0.74 µg/mL.

The patient in this case was administered an anesthetic that we frequently use and then average BIS value are 35. But he experienced awake during general anesthesia. We describe the first case of intraoperation awake under BIS 40 using desflurane. The BIS index can be useful in guiding dosing of anesthetic drugs and BIS values below 60 are associated with a low probability of consciousness. However, the present case indicates that BIS may not be predictive of depth of anesthesia in all patients.

In conclusion, when general anesthesia is administered, the possibility of awareness occurrence should always be considered regardless of the use of BIS.

**REFERENCES**