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EEG-Bispectral Index Monitoring of Midazolam-Ketamine Anesthesia

ABSTRACT

The EEG-bispectral index (BIS) is a processed EEG monitor that has been validated as a measure of the hypnotic effect of anesthetic drugs. In this study we evaluated BIS changes with a combination of midazolam and ketamine during anesthesia induction. Twenty ASA class I and II adult female patients undergoing elective surgeries were enrolled in this study. No premedication was given to patients. EEG was recorded continuously from frontal electrodes using an Aspect A-2000 monitor on arrival at the operating room. Blood pressure and heart rate were also recorded every 2 min throughout surgery. After obtaining steady baseline readings of the above parameters, patients received midazolam 0.05 mg/kg I.V. followed by ketamine 1.5 mg/kg I.V. 3 min later. At 5 min after ketamine administration, rocuronium 0.6 mg/kg I.V. was given to facilitate endotracheal intubation after which inhalation of sevoflurane 1.5 MAC in 60% N₂O and 40% O₂ was used for anesthesia maintenance. The value of BIS during the awake basal state was 92 ± 3 , and it gradually decreased to 83 ± 7 at 3 min after the administration of Midazolam; all patients were sedated but were readily rousable. After ketamine administration, all patients lost consciousness within 2 min, and the BIS values increased to 90 ± 5 , 95 ± 3 , and 96 ± 2 at the 3rd, 4th, and 5th minutes, respectively. Upon administration of the inhaled anesthetic, the BIS index gradually declined to below 60 in about 6 min and remained below that value throughout surgery. After termination of anesthetics, all patients awakened within 15 min with a BIS index above 70. No patient had any recall, delirium, or hallucinations when questioned in the Post Anesthesia Recovery Unit. It is generally accepted that a BIS index below 60 indicates adequate hypnosis which has been validated with all intravenous anesthetics including midazolam. Our study showed that ketamine, on the contrary, produced elevated BIS values after midazolam as the patient entered the anesthetic state. Monitoring the depth of ketamine anesthesia remains a difficult problem.

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