Isoflurane increases, but sevoflurane decreases blood concentrations of melatonin in women

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Patients and methods

With the approval of the Ethics Committee for Medical Research of Kochi Medical School, and after obtaining informed consent from the patients, we recruited 18 American Anesthiology Association (ASA) physical status I patients who were scheduled for elective gynecological surgery. Patients with a medical history or physical evidence of significant cardiovascular disorders, alcohol or drug abuse, sleep disorders, or neuro-psychiatric disorders were excluded from the study.

All patients received diazepam, 0.25 mg · kg⁻¹ orally in the ward, 1 h before anesthesia. In the operating room, at 8:30 a.m., an 18- or 20-gauge intravenous catheter was placed in the basilic vein of one of the patient’s hands. The first blood samples for control were collected through this catheter. Then, 35 ml · kg⁻¹ · h⁻¹ of acetylated Ringer’s solution was administered during the induction of anesthesia. The inhalational anesthetics, in 4 l · min⁻¹ oxygen, were delivered into a circuit system. Respiratory gases were sampled at a mask elbow connector. All patients were monitored with noninvasive arterial pressure, EKG, pulse oximetry, end-tidal anesthetic, and CO2 concentration and FIO2.

Patients were randomized into two groups: an SEV group (n = 9) and an ISO group (n = 9). In the SEV group, anesthesia was induced by increasing the inhalation concentration of sevoflurane to 7% and maintained by 7% sevoflurane. In the ISO group, anesthesia was induced by increasing the inhalation concentration of isoflurane to 5% and maintained by 5% isoflurane through a circuit system.
tional concentration of sevoflurane in 100% oxygen by 0.5% every three breaths, up to 7%, and the concentration was maintained at 7% for 5 min before obtaining the second blood samples from the basilic vein of the other hand. In the ISO group, induction of anesthesia was made in an incremental way, similar to that in the SEV group, using isoflurane up to 5%. Then, anesthesia was maintained with 5% isoflurane for 5 min before taking the second blood samples. Ventilation was manually assisted to maintain end-tidal CO₂ between 30 and 35 mmHg. Heart rate (HR) and systolic arterial pressure (SAP) were recorded at the time of blood sampling.

The sampled blood for the melatonin measurement was immediately centrifuged. The serum was stored at −80°C and was analyzed within 3 days. Melatonin concentration was measured by high-performance liquid chromatography with electrochemical detection (HPLC apparatus; IRICA, Kyoto, Japan) [14]. The analytical detection limit was 15 pg/ml. The intra- and interassay coefficients of variance were less than 5%.

Data values are presented as means ± SD. Demographic data were analyzed with the Mann-Whitney U-test. Statistical analyses of the melatonin concentrations were performed using the Wilcoxon signed-ranks test to compare differences within each group and the Mann-Whitney U-test to compare differences between the groups. A P value of less than 0.05 was considered statistically significant.

Results

The two groups were comparable with respect to age, body weight, and height (Table 1). The two groups had similar preanesthetic values for serum melatonin concentration (Fig. 1), SAP (Fig. 2), and HR (Fig. 3). The circulating melatonin levels during anesthesia significantly increased from 65 ± 60 to 170 ± 90 pg·ml⁻¹ in the ISO group (P < 0.05), whereas these levels decreased, from 60 ± 50 to 30 ± 30 pg·ml⁻¹ in the SEV group (P <