TITLE: A COMPARISON OF ELECTROENCEPHALOGRAPHIC SPECTRAL SIGNATURES DURING SEVOFLURANE AND ISOFLURANE ANESTHESIA

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Sevoflurane is a halogenated ether anesthetic which has a vapor pressure of 200 mm/mercury at 25° C. Its low blood:gas coefficient of 0.6 and pleasant smell make it suitable for use as an induction agent. This study was undertaken to compare the dose dependent electroencephalographic changes during isoflurane and sevoflurane anesthesia.

With approval by the animal investigation committee, twenty dogs were studied at 4 anesthetic levels (0.5, 1.0, 1.5, 2.0 MAC). Concentrations of 1.4 % and 2.0 % were used to achieve 1.0 MAC for isoflurane and sevoflurane respectively. Anesthesia was induced with either sevoflurane or isoflurane and nitrous oxide in oxygen (10 dogs per group). Endotracheal intubation was facilitated with pancuronium bromide and confirmed with end tidal CO_2 monitoring. Mechanical ventilation was adjusted to maintain end tidal CO_2 between 35 and 40 mmHg. Blood pressure was maintained within 20% of baseline using phenylephrine infusion when necessary. Isoflurane concentration was measured by infra-red spectroscopy using a Puritan-Bennett PB222 monitor. End tidal sevoflurane concentration was monitored with a specially calibrated PB222. Each MAC level was maintained for at least 15 minutes, or long enough to achieve the stable desired end tidal concentration. EEG signals were obtained from 5 subdermal needle electrodes placed in the frontal and occipital regions of the left and right cerebral hemispheres. Two channels of EEG waveform were amplified, filtered (0.05 -40 Hz), and recorded on FM tape. EEG spectral signatures consisting of average power in each of 4 frequency bands (0.5-4.0 Hz, 4.0-8.0 Hz, 8.0-12.0 Hz, and 12.0-40.0 Hz) were calculated for each dog at each of 4 MAC levels, using 20 second EEG epochs (digitized at 200 Hz) with ASYST spectral analysis software.

Cardiovascular variables (heart rate, blood pressure, and cardiac output) showed no significant differences between isoflurane and sevoflurane. Visual inspection of EEG waveforms showed intra-dog and inter-dog variability for a given agent, which was as pronounced as inter-agent variability. Burst suppression was observed at anesthetic concentrations above 1.5 MAC with both agents. No statistically significant differences between agents were found at any MAC levels in any frequency bands ($p < .01$). The large standard deviations shown in the spectral signature at 1.0 MAC (Fig. 1) exemplify the pronounced intra-agent variability.

It is important to note that no differences were observed between the burst suppression waveforms of isoflurane and sevoflurane. This suggests that sevoflurane (like isoflurane) is free of the seizure potential found with enflurane. The dose-related EEG changes observed in this study suggest that isoflurane and sevoflurane have similar cerebral effects.

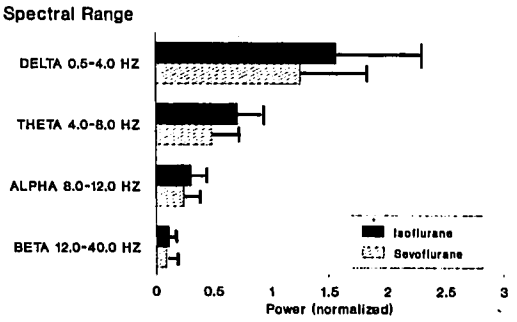

Fig. 1 -- Spectral signature at 1.0 MAC.

Title: PROPOFOL VERSUS METHOHEXITAL FOR ELECTROCONVULSIVE THERAPY

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Introduction: Methohexital has been shown to have the lowest incidence of cardiac arrhythmias following ECT.[1] Propofol has a favorable recovery and hemodynamic profile and thus is of interest for ECT. Previous investigations have shown decreased physical[2] and electrical[3] seizure duration. Propofol and methohexital have been compared for cardiac arrhythmias only with EKG monitor observation.[4] However, the reported incidence of arrhythmias with methohexital was lower than that seen with continuous recording.[1,4] We designed this study to assess the incidence of arrhythmias using continuous EKG recording.

Methods: 17 patients gave informed consent to our institutionally approved protocol. All patients received methohexital and propofol in random order. A unilateral electroconvulsive shock was given using the MECTA SR1.

Blood pressure and heart rate were recorded at one minute intervals. A blinded observer assessed recovery. A continuous EKG recording beginning 1 min before induction was later analyzed by a cardiologist in a blinded fashion. Data were analyzed with ANOVA or chi square where appropriate. $P < 0.05$ was considered significant.

Results: 34 treatments were analyzed. The mean dose of propofol was 1.05 mg/kg and 1.08 mg/kg for methohexital. There were no differences between groups in blood pressure and heart rate. The incidence of arrhythmias is shown in Table 1. Seizure duration was similar after methohexital (45 sec) and propofol (37 sec). Recovery times were similar.

Discussion: We did not find a difference between propofol and methohexital in incidence of arrhythmias or hemodynamic response. We do not confirm previous reports of decreased seizure duration. This conflict may be explained by the lower dosage of propofol (1.05 mg/kg vs 1.51 mg/kg[3] or 1.60 mg/kg[4]). Although recovery time was similar, patients may prove to be less confused after propofol. Propofol at this dose has not been shown to have adverse effects when used for ECT.

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References:

[1]Anesthesiology 69:A617, 1988 [3]Anaesthesia 43:459, 1988
[2]Comp Psych 19:541, 1978 [4]Anesthesiology 70:412,1989

Table 1: Incidence of Arrhythmias

	Propofol	Methohexital	
Bradycardia	35%	29%	NS
Tachycardia	71%	88%	NS
PVCs	29%	35%	NS
PACs	35%	60%	NS
Sinus Arrhythmia	24%	18%	NS