TITLE: THE EFFECTS OF SEVOFLURANE ON CBF, ICP, $CMRO_2$, AND THE EEG ARE SIMILAR TO THOSE OF ISOFLURANE IN THE RABBIT

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Introduction: Sevoflurane(S) is a volatile anesthetic soon to be marketed in Japan.Its low blood/gas solubility ratio compared to that of isoflurane(I) (0.59 vs. 1.41) suggests that it may have advantages over I in neurosurgical patients where a rapid wakeup is desireable(1). We therefore directly compared the effects of S on cerebral blood flow(CBF), the cerebral metabolic rate for oxygen($CMRO_2$), intracranial pressure(ICP) and the electroencephalogram(EEG) to those of I in order to explore the possible suitability of S for use in neurosurgery.

Methods: New Zealand white rabbits were induced with 4% halothane, paralyzed with pancuronium and intubated. Halothane was then discontinued and anesthesia was maintained with 70% N_2O and IV morphine sulfate(10 $mg*kg^{-1}$ bolus followed by a 2 $mg*kg^{-1}*hr^{-1}$ infusion). Animals were placed in a head frame and all surgical preparation was done following the local injection of 0.25% bupivacaine. Monitored variables were mean arterial pressure(MAP), arterial blood gases(ABGs), end tidal(ET) CO_2, ET volatile anesthetic, temperature(servocontrolled to 37°), EEG, sagittal sinus(SS) and cortical(CTX) CBF(H_2 Clearance), ICP(Cisterna Magna) and $CMRO_2$. Following the surgical preparation, the animals were allowed to stabilize for 30 min before any measurements were made and normocapnia($PaCO_2$) was maintained at all times. MS/N_2O served as the backround anesthetic and was continued throughout the entire experimental sequence. All variables were measured first during the MS/N_2O anesthetic only (Control), then during 0.5 MAC volatile anesthetic, then during 1.0 MAC volatile anesthetic and finally again during the MS/N_2O anesthetic following a 30 min washout of the 1 MAC volatile anesthetic. Once a desired ET level was achieved, 10 min was allowed to pass before any measurements were made. During volatile anesthetic administration, MAP was supported at pre-volatile anesthetic levels with an infusion of angiotensin II. Statistical analysis of the ICP, $CMRO_2$, CBF, MAP and ABG data was accomplished using a repeated measured analysis of variance with corrected paired t-tests within groups where indicated. Between group comparisons were made using unpaired t-tests.

RESULTS: MAP and ABGs were not different between groups at any time, nor within groups during any of the measurement periods. ICP increased significantly in both groups during 0.5 MAC and 1 MAC volatile anesthetic administration compared to control(Figure 1). CBF did not change significantly in either group during any anesthetic state in either the SS or CTX(Table 1). $CMRO_2$ decreased significantly in both groups only during 1 MAC administration(Figure 2),the decrease being about 50% in both groups.In both groups, 1 MAC volatile anesthetic administration caused the EEG to demonstrate a deep burst suppression pattern.

DISCUSSION: The effects of I on CBF, $CMRO_2$, ICP and the EEG seen in the present study agree well with previous observations in the rabbit and other species(2,3).These data demonstrate that in the rabbit, the effects of S on these same variables appeared very similar to those of I. This, coupled with the known relative insolubility of S in blood, suggest that S, like I, may have utility as an anesthetic agent for use in neurosurgical patients.

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TABLE 1 - CBF Responses to S or I(Mean±S.D.)

SS	MS/N_2O	0.5 MAC	1 MAC	MS/N_2O
S	74±24	86±42	95±52	61±28
I	81±31	78±31	82±27	71±24
CTX				
S	69±22	67±30	65±29	67±26
I	72±18	65±22	59±18	68±19

SS=Sagittal Sinus, CTX=Cortex, S=Sevoflurane
I=Isoflurane

FIGURE 1 ICP RESPONSE TO S OR I

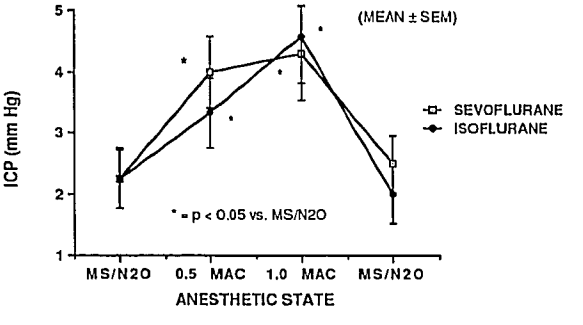

FIGURE 2 CMRO2 RESPONSE TO S OR I