TITLE: CEREBRAL VASODILATING EFFECT OF SEVOFLURANE VS ISOFLURANE

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Sevoflurane (S) has been reported to have similar cerebral effects in comparison to Isoflurane (I)[1]. However, little is known concerning their effect on brain microcirculation. This study is designed to compare the changes of diameter (ID) and blood flow (Q) in single pial arterioles and intracranial pressure (ICP) at different minimal alveolar concentration (MAC) of S and I.

Female rats (200-250 g, n20) were anesthetized with 2% S or 1.5% I with O_2 for surgical preparation. Femoral arterial pressure (BP) was recorded. Normal blood gases and pH were maintained. A left parietal craniotomy with an encapsulated cranial window was prepared for biomicroscopy and simultaneous recording of ICP changes. Arteriolar ID was measured by image shearing. In selected pial arterioles Vrbc (mm/sec) was measured by the dual-slit photometric method and correlation technique. Q ($x10^{-3}$ mm^3/sec)[2] was calculated. MAC of S and I were determined by a method previously described.[3]

Administration of 1.0 MAC S (1.98%) resulted in a 15% fall in BP and increase in ID (7.5%), ICP (7%) and Q (19%), all ($P<0.05$). At 1.5 MAC there was a 30% decrease in BP and increase in ID (13%), ICP (21%) and Q (29%), all $P<0.01$. At 2.0 MAC there was 35% decrease in BP, 24.5% increase in ICP, 16% increase in ID, 35% increase in Q, all $P<0.01$. Administration of 1.0 MAC I (1.26%) resulted in a 20% fall in BP and increase in ID (21.5%), ICP (17%) and Q (41.5%), all $P<0.01$. At 1.5 MAC there was a 35% decrease in BP and increase in ID (32.5%), ICP (25%) and Q (64.3%), all $P<0.01$. At 2.0 MAC there was a 40% fall in BP and increase in ID (39%), ICP (28%) and Q (76%), all $P<0.001$. (Fig. 1)

The effects of S and I in the rat resulted in dose related hypotension, pial arteriolar dilatation, increase in Q and ICP. These findings demonstrate that I is a potent cerebral vasodilator and augment CBF in comparison to S.

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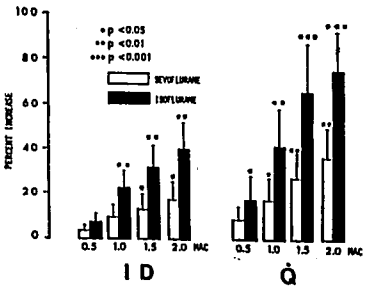

Fig. 1 Bar graph represents diameter (ID) and volumetric flow (Q) changes at different Sevoflurane (S) and Isoflurane (I) MAC value.

TITLE: EFFECTS OF ESMOLOL ON CEREBRAL MICROCIRCULATION

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Both verapamil and sodium nitroprusside have been shown to be cerebral vasodilators in addition to having a systemic hypotensive effect(1). Esmolol (E) either alone or in combination with other agents has been used for both the treatment of hypertension and to induce hypotension(2,3). There has been little information concerning the effect of E on cerebral microcirculation.

The purpose of this study is to evaluate the effect of bolus doses (500 mcg/Kg) of E on the diameter (ID) of single pial microvessels while simultaneously monitoring changes in intracranial pressure (ICP) and mean arterial pressure (MAP).

Rats, 200-300 grams(n9) were anesthetized with isoflurane 2.5%. Femoral arterial BP was recorded. The femoral vein was cannulated for infusion of vecuronium (0.3mg/Kg) and for injection of E. Blood gases and pH were maintained by controlled ventilation via tracheostomy. A left parietal craniotomy with an encapsulated cranial window was done for biomicroscopy. Changes in ID of selected arterioles were measured. ICP was measured through an outlet port of the cranial window.

Boluses of E were given to rats at varying concentrations of isoflurane at both normal and decreased pCO2. Changes in ID, MAP and ICP were consistent with results of a previous study evaluating the effects of isoflurane on cerebral microcirculation (4). Although there was an additional decrease in MAP with bolus administration of E, there were no changes in either ICP or ID.

In contrast to other intravenous hypotensive agents, E does not dilate cerebral vessels. Thus, E may be a more appropriate agent to control hypertension in patients with intracranial pathology.

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References

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