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Nitrous oxide added to propofol does not influence the increase in cerebral blood flow velocity elicited by surgical stimulation

To the Editor:

Nociceptive stimulation provokes an increase in cerebral blood flow (CBF), which may cause undesirable effects, such as an increase in intracranial pressure, in patients with brain pathology. It has been suggested that the stimulation-induced increase in CBF is more pronounced when cerebral vasodilating anesthetics are used, compared to vasoconstricting agents.^{1,2} Our previous study demonstrated in patients anesthetized with 1.7% sevoflurane plus 60% nitrous oxide (N₂O) that the increase in CBF velocity elicited by surgical stimulation was attenuated by prior constriction of cerebral vessels through hypocapnia and was augmented by dilation of them through hypercapnia.³ We currently investigated whether the addition of N₂O, a potent cerebral vasodilator, to propofol, a cerebral vasoconstrictor, augments the response of CBF velocity to surgical stimulation using transcranial Doppler ultrasonography.

Sixteen female patients (mean age = 42 yr, mean weight = 54 kg) undergoing elective gynecological surgery performed through a lower median abdominal incision were studied. Patients were anesthetized either with propofol alone (2 mg·kg⁻¹ bolus followed by continuous infusion at a rate of 10 mg·kg⁻¹·hr⁻¹, P group, *n* = 8) or propofol (the same regimen) plus 60% N₂O (PN group, *n* = 8), and were kept normocapnic and normothermic. Surgery began after a steady state was obtained. The changes in mean blood flow velocity in the middle cerebral artery (Vmca), together with the changes in bispectral index of the electroencephalogram (BIS value) were evaluated during the first nine minutes after surgical incision.

Both anesthetic regimens decreased Vmca in a similar manner by approximately 60% of awake values,

FIGURE Changes in velocity in the middle cerebral artery ($\Delta Vmca$), mean arterial blood pressure ($\Delta MABP$) and bispectral index (BIS) value after surgical incision. Results are presented as mean $\pm$ SD. Pre = the time just before incision. One through nine indicate minutes after incision. * $P < 0.05$ vs Pre for Groups P and PN.

concomitant with a decrease in BIS values to approximately 40. Vmca increased with incision in both groups (4–9 cm·sec⁻¹; mean value) but there were no significant differences in the magnitude of changes between groups P and PN (Figure A). Mean arterial blood pressure increased with incision (8–18 mmHg; mean value) but there was no significant difference between the two groups (Figure B). BIS values did not change after incision and there was no significant difference between the two groups (Figure C).

The results show that N₂O, in combination with propofol anesthesia, neither increases Vmca nor augments the increases in Vmca evoked by surgical stimulation. This suggests that N₂O has a negligible effect on CBF velocity, provided an adequate depth of background propofol anesthesia (BIS value $\approx$ 40) is achieved.

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