TITLE: DOES NITROUS OXIDE AFFECT CEREBRAL BLOOD FLOW VELOCITY UNDER NEUROLEPTANESTHESIA IN CHILDREN?

AUTHORS: J LEON, MD, B BISSONNETTE, MD
AFFILIATION: Department of Anaesthesia, Research Institute, Hospital for Sick Children, University of Toronto, Toronto, Canada M5G 1X8

Nitrous Oxide (N20) is the most commonly used inhalational agent. Its effect on CBF is still a matter of debate, with a slight increase or no effect. Most studies of the effect of N20 on CBF have been done with background volatile inhalational agents.1 Neuroleptanesthesia using fentanyl and diazepam has been studied and shown to decrease CBF and CMR02.2 We designed this study to determine the effects of N20 on cerebral blood flow velocity (CBFV) and cerebrovascular resistance index (RI+) in anesthetized children.

With approval of our Ethics Committee, 10 ASA I and II, fasting and unpremedicated children for elective urological procedures were studied. Anesthesia was induced with thiopentone 2 mg/kg, fentanyl 5 mcg/kg, Valium 0.3 mg/kg and vecuronium 0.1 mg/kg. After the trachea was intubated, anesthesia was begun by randomly assigning patients to either air or N20 in 30% 02. All patients received a continuous caudal or lumbar epidural block performed with 0.25% bupivacaine prior to incision. Ventilation was adjusted to achieve normocarbia. Fresh gas flows were maintained constant throughout the study. Normothermia was maintained. After initial measurements were made the patients were assigned to the opposite mixture. A time interval of fifteen minutes was allowed between gas changes to achieve steady-state. SAP, HR , O2 saturation, end-tidal N20 and inspired O2 were recorded. CBFV and RI+ in the middle cerebral artery (MCA) was measured through the temporal window with a TCD. CBFV and RI+ were analyzed using logarithmic regression and r^2 value. Statistical significance ($p<0.05$) within and between groups was determined with ANOVA and the SNK.

The mean (±S.D.) age and weight was 41.7±27.9 mo and 15.5±5.9 kg. The CBFV increased when N20/02 replaced the air/02 mixture (* p=0.009). The CBFV returned to baseline when the air/02 mixture replaced the N20/02 mixture. The CBFV decreased when air/02 replaced the N20/02 mixture (+ p=0.001). The CBFV returned to baseline when the N20/02 mixture replaced the air/02 mixture. There were no statistical differences between events 1 and 3 in both groups (fig 1). The RI+ showed no statistically significant changes at any time. HR, SAP, temperature and 02 staturation did not change significantly.

We showed that N20 increased CBFV independent of RI+ with no change in BP or HR. The lack of change in the RI+ suggests a coupling of the CBF-CMR02 match. It has been reported that N20 causes a 70% increase in CMRO2 by its stimulating effect on the electrocortical activity as a secondary effect on brainstem reticular centers.2 This cerebral 'hyperdynamic' state does not appear to be related to sympathetic activity which could explain our lack of change in RI+ while CBFV increased.

We thank MEDASONICS, Canada for providing the TCD.

1. Anesthesiology, 45:3; 1976. 2. BrJ Anaesth 50; 165,1978.

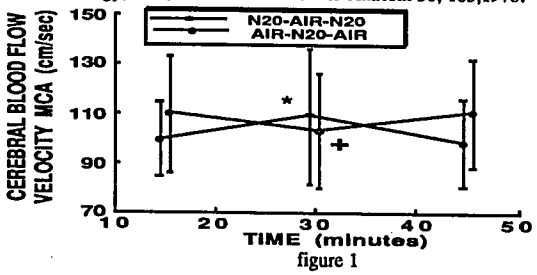

figure 1

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TITLE : PHARMACOKINETICS OF SUFENTANIL AND FENTANYL AFTER A LONG DURATION INFUSION

AUTHORS : M. Cathelin, M.D., J.C. Levron, M.D., B. Maroudy, M.D., G. Andrieu, M.D., P. Viars, M.D.
AFFILIATION : Depart. of Anesthesiology, Pitié Hospital. Laboratory Janssen. Paris France

Introduction : Opioids administered by a continuous i.v. infusion may be responsible for a post-anesthetic ventilatory depression. However, the pharmacokinetic profile of sufentanil (S), following the end of a continuous infusion, has not yet been reported. The present study was designed to compare the pharmacokinetic parameters of fentanyl (F) and S, both administered by a continuous infusion.

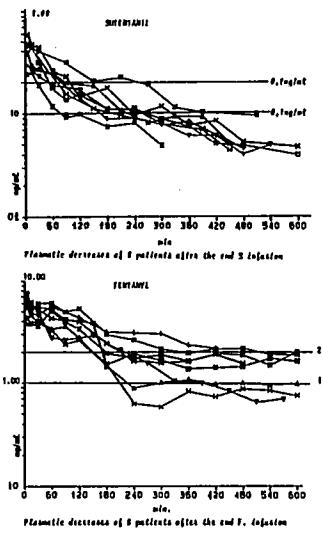
Material - Methods : Two groups of 8 patients undergoing maxillo-facial surgery (mean duration = F : 187 ± 61 min ; S : 183 ± 69 min) were included in this study. Anesthesia consisted of thiopental, succinylcholine, N20 in 02, and either F (bolus dose of 12 mcg.kg-1 followed by 6 mcg.kg-1.h-1) or S (bolus dose of 1 mcg.kg-1, followed by 0.5 mcg.Kg-1.h-1). Arterial pressure, heart rate, respiratory rate, and PaCO2 were obtained every 30 min during 4 hours after the end of the infusion. F and S plasma levels were measured by RIA during anesthesia and during 10 hours after the end of the infusion.

Results are expressed as mean ± s.d. Comparisons were made using a Mann-Whitney test.

Results : Extubation time was 59 ± 31 min after S, and 78 ± 52 min after F (n.s.). The pharmacokinetic values are shown in the table and in the figures.

	Vdβ (l/Kg-1)	Cl (ml/min-1)	T1/2β (min)
S	5.5 ± 2.2	916 ± 265*	273 ± 59*
F	6.6 ± 1.9	508 ± 111	581 ± 202

* p < 0.01



Conclusion : This study shows that, when compared with F, the faster elimination of S observed after the end of a continuous infusion, was related to its higher clearance, while Vdβ were not statistically different. When compared with a single bolus (1) S administered by a continuous infusion has a longer elimination and a larger Vdβ.

Reference
(1) Anesthesiology 61: 502, 1984