

TITLE: THE EFFECT OF DESFLURANE ON CEREBROSPINAL FLUID PRESSURE IN NEUROSURGICAL PATIENTS

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Introduction. Desflurane, a new volatile anesthetic with a blood:gas partition coefficient of 0.42, may be an attractive choice for intracranial neurosurgical procedures since rapid awakening is necessary for prompt neurologic evaluation. Canine studies indicate that desflurane, like the other volatile anesthetics, is a potent cerebral vasodilator(1). This effect may result in increases in intracranial pressure in patients with abnormal intracranial elastance. The purpose of this study was to determine the effect of desflurane on cerebrospinal fluid pressure (CSFP) in neurosurgical patients with supratentorial mass lesions.

Methods. With Institutional Review Board approval, ten adult patients undergoing craniotomy for supratentorial mass lesions were studied. Prior to induction of anesthesia, an indwelling radial artery catheter and lumbar subarachnoid 19 gauge malleable needle were inserted for continuous arterial blood pressure (BP) and CSFP monitoring. Anesthesia was induced with thiopental (4-7 mg/kg), and muscle relaxation was achieved with vecuronium (0.2 mg/kg). Ventilation was adjusted to maintain PaCO₂ at 26 mmHg ± 2 mmHg (SD). Desflurane was administered following intubation of the trachea and end-tidal

concentration was maintained at 7.1% ± 0.6%. BP was maintained within 20% of the patient's average ward value with esmolol and/or phenylephrine. Lactated Ringer's solution < 500 ml was given as needed prior to dural incision. CSFP was recorded with the patient awake (control), following induction, intubation, institution of desflurane, and every 5 min until the dura was incised. Data were compared using paired t-test, with p < 0.05 considered significant.

Results. The mean preoperative CSFP was 11 mmHg ± 4 mmHg with a range of 3-18 mmHg. The CSFP decreased in all patients after the administration of thiopental, followed by a variable increase with laryngoscopy and intubation. Following administration of desflurane a sustained increase in CSFP was observed in all patients until the dura was incised. Maximum increases in CSFP occurred 45-75 min following administration of desflurane. CSFP's after desflurane administration were significantly higher than control. The maximum CSFP following desflurane administration was 19 mmHg ± 6 mmHg (p < 0.002 versus awake) with a range of 13-33 mmHg.

Discussion. The dose-dependent cerebral vasodilatation produced by desflurane would be expected to cause an increase in ICP in the presence of normocapnia. The results of this study indicate that in neurosurgical patients with supratentorial mass lesions, CSFP increased following the administration of desflurane despite prior establishment of hypocapnia.

References

1. Lutz LJ, et al: Anesth Analg 70:S272, 1990.

TITLE: MIDAZOLAM FOR COINDUCTION OF THIOPENTAL ANESTHESIA IN PATIENTS

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Midazolam-thiopental anesthetic synergism has been reported in animal experiments and in surgical patients.¹ It was explained by the ability of barbiturates to modulate benzodiazepine receptors. Subsequent study indicated that, in rats, benzodiazepine-barbiturate anesthetic synergism is not one-sided and that midazolam potentiates the hypnotic effect of pentobarbital to the same extent as pentobarbital potentiates hypnotic effect of midazolam.² If this relationship is also true for humans, then thiopental-induced unconsciousness can be potentiated by very small, subanesthetic doses of midazolam. To prove this hypothesis we studied the effect of a very small dose of midazolam on the thiopental dose-response curve for induction of anesthesia.

Fifty ASA physical status I or II adult unpremedicated patients participated in the randomized, double-blind study approved by the Human Investigation Committee. The abolition of the ability to open eyes on command was used as an end point of anesthesia. The patients were assigned to one of the two groups in which thiopental dose-response curve was determined with and without the addition of

midazolam. The dose of midazolam was fixed (0.02 mg·kg⁻¹), the predetermined doses of thiopental varied (from 1 to 4 mg·kg⁻¹, 5 doses with 5 patients per dose). Midazolam (or saline) was injected (i.v.) first, followed 1 min later by thiopental. The dose-response curves were determined with probit analysis.

Midazolam reduced the thiopental dose required to induce all patients (see ED₉₉ in Table) by 2.5 times (p<0.02). The clinical implication is that appropriately given doses will decrease the amount needed of both drugs with probable decreased toxicity and quicker recovery. Potentiation of the hypnotic effect of thiopental by a very low dose of midazolam (1/10 of hypnotic ED₅₀) suggests that midazolam may allosterically enhance the interaction of thiopental with barbiturate binding sites.

REFERENCES: 1. Anesth Analg 67:342-345, 1988; 2. Anesth Analg 70:S205, 1990

Table

Level of Response	Thiopental (mg·kg ⁻¹)		Change in Thiopental Potency Ratio (%)	P value
	Saline	Midazolam		
ED ₀₁	0.98	1.04	--	NS
ED ₁₀	1.46	1.25	+ 17	NS
ED ₅₀	2.38	1.57	+ 52	0.001
ED ₉₀	3.87	1.97	+ 96	0.003
ED ₉₉	5.75	2.37	+ 143	0.016