TITLE: **CATECHOLAMINES AND PLASMA RENIN ACTIVITY DURING ADENOSINE AND SODIUM NITROPRUSSIDE INDUCED HYPOTENSION**

AUTHORS: A.M.Lam, M.D., F.R.C.P.C., H.R.Winn, M.D., M.S.Grady, M.D.

AFFILIATION: Dept. of Anesthesiology and Neurosurgery, University of Washington,Seattle,WA 98104

Introduction: Complications from the stress response to induced hypotension(H) include reflex tachycardia and rebound hypertension. Adenosine(ADO) is a potent systemic vasodilator and has been used as a hypotensive agent clinically[1].The purpose of this study is to compare the stress response during ADO- to SNP-induced H.

Methods: The study was approved by the Human Subjects Review Committee and we administered ADO or SNP to 20 patients to achieve H during cerebral aneurysm clipping. Anesthesia was induced with thiopental 3-5 mg/kg, fentanyl 2-3 µg/kg, vecuronium 0.1 mg/kg, and lidocaine 1mg/kg. Following tracheal intubation anesthesia was maintained with N_2O/O_2 (50%) and isoflurane 0.5-1.0%, and $P_{ET}CO_2$ at 30-35 mmHg. Lasix (20 mg) and 20% Mannitol (500 ml) was given to every patient. When H was required, ADO (5.3 mg/ml, Astra Pharmaceuticals) or SNP (0.01% solution) was commenced. ADO was started at 20 µg/kg/min and increased in 20 µg/kg/min increments every 30 seconds and SNP was started at 1 µg/kg/min and incremented by 1 µgkg/min every minute until mean BP of 50-55 mmHg was achieved. Blood samples were drawn for determination of serum epinephrine(EPI), norepinephrine(NOREPI) and plasma renin activity(PRA) using HPLC immediately prior to H, during stable H and 30 minutes after H. ANOVA and unpaired t-test were used for statistical analysis .

Results: The target BP,duration of H, and control values prior to H was similar in both groups. During H, EPI and NOREPI levels rose and the increase of NOREPI in SNP group was higher than that in the ADO group. PRA rose significantly during SNP infusion and remained elevated in the after H period. No reflex tachycardia was seen in either group but BP was significantly higher in the SNP group after discontinuation of the infusion.

		SNP(n=8) (mean ±sem)	ADO(n=7) (mean ±sem)
AGE (± SD)		52 ± 14	48 ± 12
EPI (pg/ml)	Before H	295 ± 27	403 ± 59
	During H	614 ± 152	480 ± 101
	After H	353 ± 64	342 ± 68#
NOREPI (pg/ml)	Before H	363 ± 56	328 ± 37
	During H	981 ± 203*	598 ± 95
	After H	339 ± 46	378 ± 61
PRA (ng%/3hr)	Before H	532 ± 105	432 ± 117
	During H	1164 ± 183*	394 ± 112
	After H	815 ± 187*	358 ± 98

* $p \leq 0.05$ # n=6 because of contamination of 1 sample

Discussion: SNP-induced H is associated with increases in catecholamines and PRA. In contrast, adenosine-induced H was only associated with a small increase in EPI. We conclude that the stress response is attenuated during ADO-induced H .

Reference: 1. Anesthesiology 71:A583, 1989.

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TITLE: **CEREBRAL BLOOD FLOW VELOCITY AND INTRACRANIAL PRESSURE RESPONSE TO SUFENTANIL - A DOSE RESPONSE STUDY**

AUTHORS: T.A. Slee M.D., A.M. Lam, M.D., F.R.C.P.C., H.R. Winn, M.D.

AFFILIATION: Dept. of Anesthesiology, University of Washington, Seattle, WA 98195

Sufentanil has been reported to be a cerebrovasodilator in dogs[1] and to increase intracranial pressure (ICP) in patients with tumors[2]. No increase in cerebral blood flow (CBF), however, has ever been reported in man. In the present study we investigated the dose-response of middle cerebral artery velocity (MCAV) and ICP to sufentanil in patients with neurologic disease (head trauma, tumor, or aneurysm).

METHODS: The study was approved by the institutional human subjects review committee. All patients were induced with thiopental 4-6 mg/kg, vecuronium 0.1 mg/kg, lidocaine 1.5 mg/kg and maintained on nitrous oxide 50% and isoflurane 0.4-0.6% following intubation. A subarachnoid bolt for ICP monitoring was either already in-situ or placed following induction. During mild hyperventilation (PCO2 of 28-32 mmHg) and stable hemodynamics patients either received sufentanil 0.5 µg/kg (L, n=8) or 1.0 µg/kg (H, n=6) intravenously. Left MCAV recorded transtemporally using a transcranial doppler (Medasonics) and ICP were measured every minute for 10 minutes. In addition, the low dose was also given to 5 nonneurologic patients and MCAV measured in a similar manner. Phenylephrine was administered whenever mean arterial blood pressure (MAP) fell by more than 30% compared to control. One way ANOVA for repeated measures and Dunnett's test were used for statistical analysis.

RESULTS: Heart rate decreased significantly in all groups but MAP decreased significantly only in the H group (despite administration of phenylephrine). MCAV declined in both groups but only reached statistical significance in the L group. ICP was unchanged in the L group but increased in the H group (Table 1). The increase in ICP was never preceded by increase in MCAV but coincided with the decrease in MAP. The decrease in MCAV in the nonneurologic patients did not reach statistical significance.

DISCUSSION: Since cerebral vasodilation involves predominantly the arteriolar resistance vessels and not the conducting vessels, change in blood flow velocity in the latter should reflect change in blood flow although the absolute value cannot be derived. Based on this assumption, we were not able to demonstrate any direct cerebrovasodilatory effect from sufentanil. The increase in ICP in the high dose group appeared to result from indirect vasodilation as part of the autoregulatory response secondary to systemic hypotension.

REFERENCES:
1. Anesth Analg 70:138-46, 1990.
2. J Neurosurg Anesthesiology 1:3-7, 1989.

Table 1

TIME		0 min	1 min	2 min	3 min	4 min	5 min	6 min	7 min	8 min	9 min	10 min
MCAV	L	50±7	52±7	44±6	42±5*	41±5*	43±7*	45±6	47±6	49±6	49±6	50±9
cm/s	H	44±5	42±5	40±4	40±4	40±4	41±5	41±5	41±3	40±4	42±5	42±4
ICP	L	13±4	12±4	12±3	11±3	11±3	11±3	11±3	11±3	11±3	11±3	11±3
mmHg	H	11±4	14±5	15±5*	14±5	14±5	14±5	14±5	15±5*	14±5	14±5	14±5
MAP	L	80±5	87±9	80±9	78±9	75±6	74±6	74±6	76±5	75±5	78±6	75±5
mmHg	H	88±10	83±9	73*±10	67*±10	68*±11	72*±10	72*±10	70*±10	75±11	79±11	78±10

all values are mean ± sem * p<0.05 compared to 0 min