Title: MIDAZOLAM INFUSION MODIFIES PRE-BYPASS HEMODYNAMICS UNDER HIGH DOSE ALFENTANIL ANESTHESIA

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Introduction. The combination of benzodiazepine and high dose opioid in order to avoid recall and muscle rigidity can be associated with non suitable hemodynamic changes (1, 2). This study compares the administration of high dose alfentanil alone and associated with midazolam in patients undergoing coronary artery bypass graft surgery.
Methods. 20 patients with normal left ventricular function were randomly assigned into two equal groups after institutional approval and informed consent : group A (alfentanil) and group MA (midazolam + alfentanil). Premedication was lorazepam 2.5 to 5 mg in group A and midazolam 0.1 mg/kg in group MA. A radial artery and a Swan-Ganz catheters were inserted prior to induction. Volume loading (500 ml lactated Ringer's solution) was administered before induction in group MA.

Anesthesia was induced by a continuous infusion of alfentanil (10 mg over 5 min) and maintained at a rate of 60 mg/hr until sternotomy and 30 mg/hr later on. Patients in group MA received in addition midazolam 5 mg over 5 min at induction, 12 mg/h until sternotomy and 6 mg/h after on. Increases in blood pressure or heart rate by more than 20% of T0 value were treated with alfentanil 2.5 mg and isoflurane if necessary. Prebypass volume loading was restricted to 500 ml lactated Ringer's solution.

Marquette 7010 surgical monitor (MQ) measured ST segment variability from baseline (0.04 seconds before the start of the QRS complex) at a point 60 msec after the J point, in three leads, I, II and V5. EKG ischemia was defined as: ST elevation or ST segment downsloping ≥ 1 mm and lasting at least 1 minute.

Hemodynamic parameters were recorded every minute using MQ connected to a PC computer. Data are reported (table 1) before anesthesia (T0), after induction (T1), intubation (T2), incision (T3), sternotomy (T4) and sternal retraction (T5).

Results are expressed as mean ± SD and statistical analysis used chi-square, ANOVA and Student t-tests when appropriate. P<0.01 was considered significant.

Results. Groups did not differ with respect to age, body surface area and usual cardiac treatment (7 patients in group MA and 6 in group A were treated with a beta-blocking agent, 6 patients in group MA and all in group A with a calcium antagonist). Loss of consciousness occured within 72 ± 10 seconds in group A, 44 ± 8 in group MA (p<0.01).

Heart rate (HR) cardiac index (CI), mean arterial pressure (MAP), pulmonary capillary wedge pressure (PCWP) and systemic vascular resistance (SVR) are reported in Table 1. No difference can be demonstrated between groups at any time. No hemodynamic change was seen in group A. MAP decreased significantly in group MA at T1, T2 and T3 compared to T0. 2 patients in group A and none in group MA (NS) required additional boluses of alfentanil, 1 in group A required isoflurane.

One patient in each group developed a ST segment depression after surgical incision (group MA) and after sternotomy (group A). Myocardial ischemia was associated with a mean arterial pressure/rate quotient of 1.42 (group MA) and 1.1 (group A). The patient of group MA who suffered myocardial ischemia developed a post-operative myocardial infarction despite complete revascularization.

Comments. When associated with high dose alfentanil, midazolam shortened the time to loss of consciousness and induced a decrease in MAP without an increased risk of myocardial ischemia.

	HR b/min	MAP mmHg	PCWP mmHg	CI L/min/m^2	SVR dyn.s/cm^5
T0 A	63±13	100±10	8.6±4.0	2.7±0.6	1557±440
MA	*63±07*	*103±7*	*10.7±1.3*	*3.0±1.0*	*1448±558*
T1 A	69±15	90±11	10.3±4.1	2.8±0.9	1378±370
MA	*64±10*	*80±13#*	*10.7±1.8*	*2.7±1.0*	*1212±302*
T2 A	72±14	91±10	9.7±3.6	2.9±1.1	1336±371
MA	*65±12*	*83±10#*	*9.9±2.1*	*2.6±0.7*	*1326±310*
T3 A	67±14	88±9	8.1±3.7	2.3±0.7	1611±545
MA	*62±11*	*84±14#*	*10.7±1.9*	*2.2±0.8*	*1609±466*
T4 A	67±14	94±12	8.8±3.9	2.5±1.0	1644±567
MA	*61±11*	*93±16*	*11.2±2.4*	*2.2±0.7*	*1709±444*
T5 A	69±15	99±16	8.4±4.9	2.5±0.8	1731±620
MA	*66±11*	*94±13*	*12.0±2.7*	*2.3±0.5*	*1712±595*

#p<0.01 groups A and MA vs T0

References.
1. Howie MB. J Cardiothorac Anesth, II, n°6, 841-843, 1988
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Title: THE EFFECT OF ANESTHETIC TECHNIQUE ON RIGHT CORONARY ARTERY DISEASE PATIENTS WHO HAVE ELEVATED PULMONARY ARTERY PRESSURE

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Introduction: Whether the stress of cardiac surgery is better controlled with inhalational agent versus narcotic has not been performed for patients with coronary artery disease and pulmonary hypertension.

We investigated the effect of forane versus fentanyl anesthesia in patients who angiographically demonstrate right coronary disease and known pulmonary hypertension.

Methods: With institutional approval and patient consent 25 patients with mean pulmonary artery pressures of 32 mmhg or more were randomized into two groups. Both groups were treated identically up to anesthetic induction. At this point group A received fentanyl 50 ug/kg over 4 mins with vecuronium or pancuronium for induction. The isoflurane group (group B) received thiopentone and vecuronium or pancuronium followed by isoflurane up to 2% for 10 minutes prior to intubation. This group could also receive fentanyl up to 5 ug/kg with induction if needed.

Hemodynamic profiles including right ventricular ejection fraction catheter reading were taking at standard intervals prior to intubation up to cardiopulmonary bypass.

Results: Demographic data was similar with an overall mean PAP of 48 ± 17 torr before induction. No fentanyl was given in Group B.

Heart rate remained stable in both groups ranging from 70 to 76. Few of these patients had full beta-blockade.

Forane reduced the MAP compared to the narcotic group at intubation and sternotomy. Ischemia, as evaluated by ST-segment analysis, was not significantly observed in either group. Mean pulmonary artery pressure and pulmonary resistance decreased significantly in both groups compared to baseline but not to each other. Isoflurane tended to have a lower SVR than the narcotic group but not significantly so. The right ventricular ejection fraction and cardiac output were not statistically changed from baseline nor from each other. There was a negative correlation between RVEF and pulmonary vascular resistance in both groups. There was no morbidity associated with either technique.

Discussion: This study compared a narcotic technique and its preservation of myocardial function versus isoflurane and its vasodilatory and possible myocardial depressant and coronary steal effects. Though some of the vasodilatory effects of isoflurane were noted, the two techniques produced remarkably similar results. Isoflurane anesthesia required more manipulation of the inspired concentration whereas the narcotic group had standard doses at standard times. The similar clinical responses between the two techniques were unexpected.

Table 1. Demographics (N=25)

	Fentanyl	Isoflurane
Age (yrs)	56 ± 16	50 ± 15
BSA (m^2)	1.9 ± 0.2	1.8 ± 0.2
CI (L/min/m^2)	3.0 ± 1.1	3.2 ± 1.0