TITLE: THE EFFECT OF KETAMINE AND HALOTHANE ON SPLANCHNIC CIRCULATION IN PIG

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There are controversial reports about the effects of general anesthesia on the splanchnic circulation (1,2). We studied and compared the splanchnic and systemic hemodynamics under ketamine and halothane anesthesia. **METHOD**: Pittman-Moore pigs were chronically instrumented with arterial, venous (Swan-Ganz) and portal venous catheters. Blood flows in celiac artery (Qc) superior mesenteric artery (Qsm), and renal artery (Qre) were measured with ultrasonic, transit time flow probes. The pigs received either ketamine 20 mg/kg iv (K, n=6) or halothane (H, n=6). Data were recorded at the following time points: before anesthesia (baseline) and 10 minutes after ketamine administration (surgical plane) and when endtidal halothane concentration was 1.5% (surgical plane). Resistance of the celiac (Rc), mesenteric (Rsm), renal bed (Rr) and systemic circulation (Rt) were calculated with standard formula. Cardiac output (CO) was measured by the thermal dilution technique. Statistical evaluation was performed by using the Dunnet's test and t-test, with significance at $p<0.05$. **RESULTS**: There was no difference between the baseline data of either group. During ketamine anesthesia CO showed a small nonsignificant decrease. There was no change in celiac, mesenteric or renal blood flows. Rc, Rsm, Rr and Rt remained unchanged. During halothane anesthesia CO, celiac blood flow and renal blood flow decreased significantly. These values are significant different from baseline and from data measured under ketamine anesthesia. The mesenteric blood flow decreased both considered as an absolute value and calculated as a percentage of CO. The resistance of the mesenteric bed increased significantly from 26.2±3.4 to 37.4±2.1•10^3 dynes•cm-5•sec. There was no change in celiac, renal and total resistance.

BLOOD PRESSURE AND BLOOD FLOW

	MAP mmHg	CO l/min	Qsm ml/min	Qc ml/min	Qre ml/min
K baseline	110±6	2.8±0.3	305±40	231±30	148±20
anesth	103±7	2.3±0.3	279±60	232±13	124±11
H baseline	102±3	2.7±0.2	296±32	217±19	151±17
anesth	71±3#	1.7±0.2#	136±11#	134±12#	97±17#

RESISTANCE (10^3 dynes•cm-5•sec)

	Rt	Rsm	Rc	Rr
K baseline	0.74±0.06	28.4±3.9	37.0±4.3	61.7±10.8
anesth	0.86±0.07	32.3±6.3	32.9±4.0	63.6±4.8
H baseline	0.69±0.04	26.2±3.4	36.3±3.2	53.0±7.1
anesth	0.79±0.09	37.4±2.1*	39.4±4.9	55.4±9.3

* $p<0.05$ vs baseline # $p<0.05$ vs baseline and halothane anesth

CONCLUSION: With halothane anesthesia there is a fall in cardiac output and mean arterial pressure that leads to a reflex increase in vascular resistance to the abdominal viscera. CO is maintained with ketamine, consequently blood flow to the abdominal organs remains unchanged. Ketamine may therefore be a superior anesthetic for use in critical ill patients whose visceral blood flow may already be compromised.

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TITLE: ISRADIPINE REVERSES CORONARY CONSTRICTOR EFFECTS OF DEXMEDETOMIDINE

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High doses of dexmedetomidine (DM) has been found to cause, in addition to central sympatholytic and anesthetic potentiating effects, general vasoconstriction including the coronary vascular bed[1]. This effect, which is accompanied by a fall in cardiac output, is reversed by calcium channel blocking agents[2]. We studied the coronary effects of lower doses of DM and their reversal by isradipine (ISR), a new calcium entry blocker with less myocardial depressant action[3].

After approval by the animal research committee, we anesthetized 8 dogs with thiopental and halothane in N_2O/O_2. ECG and heart rate (HR), arterial and left ventricular end-diastolic pressure (MAP, LVEDP), and flow in the left anterior descending coronary artery (CFLOW) were measured continuously. Cardiac output (CO) and arterial & coronary venous blood were obtained at intervals as follows: at baseline; after injection of 1, 3, and 10 μg/kg DM; during and after ISR infusion; and after atipamezole (AT), a selective alpha$_2$-antagonist. Data (means ± SEM) were examined with GLM ANOVA and Fisher's LSD tests; $P<0.05$ was taken as significant.

Doses of 1 to 10 μg/kg DM dose dependently increased MAP and LVEDP, lowered HR, CO, and CFLOW, and increased regional myocardial O_2 extraction (Fig). Calculated coronary vascular resistance (CVR) rose 7 fold. ISR returned all values to control, but DM effects returned partially after stop of the ISR infusion. AT reversed all hemodynamic effects of DM.

The vasodilator effects of ISR effectively reversed not only the pressor effect of DM but also its effects on systemic and coronary flow. It is tempting to ascribe the changes in cardiac function to the restoration of coronary flow and normalization of tissue oxygen extraction, but these observations did not distinguish between lowering of cardiac load and restoration of coronary flow.

References:
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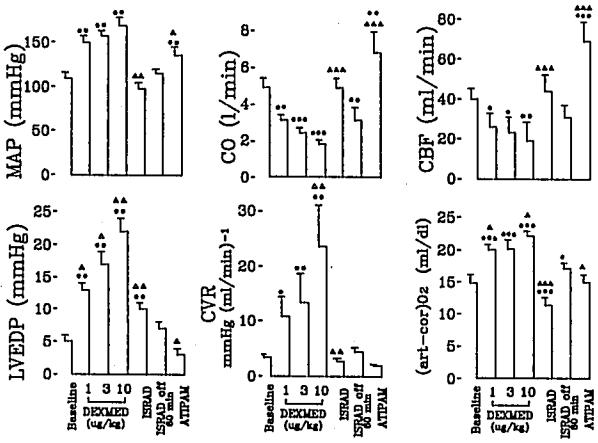

compared to baseline
* < 0.05
** < 0.01
*** < 0.001

compared to preceding value
△ < 0.05
△△ < 0.01
△△△ < 0.001