

Title: CARDIOVASCULAR EFFECTS OF RECTAL METHOHEXITAL IN CHILDREN

Authors: RB Forbes, M.D., DL Dull, M.D., DJ Murray, M.D., and KL Croskey, D.O.

Affiliation: University of Iowa College of Medicine, Department of Anesthesia, Iowa City, Iowa 52242

Introduction. Rectal methohexital is a safe, effective technique for the induction of anesthesia in young children.^{1,2} However, the cardiovascular changes associated with administration of rectal methohexital have not been investigated. The purpose of this study was to evaluate the cardiovascular effects of rectal methohexital in children using two-dimensional (2-D) and pulsed Doppler echocardiography.

Methods. After obtaining institutionally approved informed parental consent, twelve children, ASA I or II, less than five years of age scheduled for elective surgery were studied. Fifteen minutes prior to the induction of anesthesia, each child was evaluated using 2-D and pulsed Doppler echocardiography. The cardiovascular parameters obtained included blood pressure and heart rate, left ventricular length and area in systole and diastole, pulmonary artery diameter and pulsed Doppler echocardiographic determination of the velocity of pulmonary blood flow. Following the initial echocardiogram, anesthesia was induced using 25 mg/kg of a 2% solution of methohexital administered rectally. Immediately following the onset of sleep, defined as loss of consciousness, unresponsiveness to verbal stimulus and absence of voluntary movement when unstimulated, a second 2-D and pulsed Doppler echocardiogram was obtained. The children were then transferred to the operating room and anesthesia was continued with halothane and oxygen.

Data obtained by 2-D and pulsed Doppler echocardiography was used to calculate cardiac output, cardiac index, stroke volume and ejection fraction. Results are expressed as mean \pm SEM. Changes in cardiovascular function that occurred following administration of rectal methohexital were compared to control values using analysis of variance and significance was accepted at $p < 0.05$.

Results. The demographic data are shown in Table 1. Following induction of anesthesia with methohexital there was a significant increase in heart rate. Mean arterial pressure, left ventricular end diastolic and end systolic volume, cardiac output, cardiac index, stroke volume and ejection fraction did not change significantly following 25 mg/kg rectal methohexital (Table 2).

TABLE 1

Demographic Data (Mean \pm SEM)

Age (months)	32.4 \pm	3.8
Weight (kg)	13.3 \pm	1.0
Height (cm)	90.2 \pm	3.9
Body Surface Area (M ²)	.33 \pm	.02

TABLE 2

Hemodynamic Data (Mean \pm SEM)

	Pre-induction		Post-induction	
Heart Rate (bpm)	113.9 \pm	6.6	126.1 \pm	4.5*
Mean Arterial Pressure ₂ (mmHg)	72.9 \pm	2.4	68.2 \pm	2.0
Cardiac Index (l/min/m ²)	5.0 \pm	0.7	5.2 \pm	0.3
Stroke Volume (ml)	14.2 \pm	2.1	14.3 \pm	1.4
Ejection Fraction (%)	58 \pm	10	58 \pm	5

* $p < 0.05$

Discussion. Previous investigators have reported that rectal administration of methohexital in children was associated with an increase in heart rate and no change in systolic blood pressure.² However, children in that study also received atropine and no direct determination of cardiac function was made. In this investigation administration of 25 mg/kg rectal methohexital in the absence of atropine also was associated with tachycardia, but arterial pressure, cardiac index and stroke volume were maintained. While side effects, including respiratory depression, may occur following administration of barbiturates, we conclude that rectal administration of methohexital for induction anesthesia in healthy pediatric patients has minimal cardiovascular effects.

References.

1. Liu LMP, Gaudreault P, Friedman PA, Goudsouzian NG, Liu PL: Methohexital plasma concentrations in children following rectal administration. *Anesthesiology* 62:567-570, 1985.
2. Laishley RS, O'Callaghan AC, Lerman J: Effects of dose and concentration of rectal methohexitone for induction of anesthesia in children. *Can Anaesth Soc J* 33:427-432, 1986.