

Title: THE EFFECTS OF ANTICHOLINERGIC AGENTS ON DYSRHYTHMIAS DURING ANESTHESIA WITH HALOTHANE IN CHILDREN

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**Introduction:** Cardiac dysrhythmias occur frequently in children during anesthesia with halothane.<sup>1</sup> Investigations of the effects anticholinergic agents have on the incidence of these dysrhythmias have yielded variable results.<sup>2</sup> In the present study, we examined 1) cardiac rhythm in children during induction of halothane anesthesia and administration of an anticholinergic agent, and 2) the effect of various levels of halothane anesthesia on cardiac rhythm in children given an anticholinergic agent.

**Methods:** After Institutional Review Board approval and informed consent from the parents, 31 children, ages 1-12 years, ASA I and II, scheduled for elective peripheral orthopedic surgery were studied. Each child was premedicated with oral meperidine, 3 mg·kg<sup>-1</sup>. Monitors included continuously recorded lead II EKG, BP cuff, precordial stethoscope, and pulse oximetry. Anesthesia was induced using N<sub>2</sub>O (70%)-O<sub>2</sub>-halothane (3% inspired). Patients then received intravenously either normal saline (NS), glycopyrrolate (0.01 mg·kg<sup>-1</sup>) or atropine (0.02 mg·kg<sup>-1</sup>) in a randomized blinded fashion. Atracurium (0.40 mg·kg<sup>-1</sup> iv) was given next, ventilation was controlled and inspired halothane was reduced to 1.5%. Five minutes later, 98.5% O<sub>2</sub> was administered, the trachea was intubated and ventilation was set to maintain end-tidal PCO<sub>2</sub> (PetCO<sub>2</sub>) = 32-36 mmHg. Thereafter, end-tidal halothane concentration (HALO<sub>ET</sub>) and PetCO<sub>2</sub> were measured using mass spectrometry. An esophageal EKG electrode was inserted and continuously recorded. N<sub>2</sub>O (50%)-O<sub>2</sub>-halothane (HALO<sub>ET</sub>=0.5 X MAC) was administered during skin incision. HALO<sub>ET</sub> was then increased by increments of 0.25 X MAC every 15 minutes until the end of the case or until HALO<sub>ET</sub> = 2.5 X MAC. All EKGs were processed by an Avionics Model 662A dysrhythmia computer. The incidence of dysrhythmias in each group were compared using Fisher's exact test.

**Results:** Sixty-one % (19/31) of the children experienced one or more dysrhythmias (Table). There was no difference in incidence of dysrhythmias among the three groups. Five children had a dysrhythmia on baseline recording, two with nodal rhythm, two with minor supraventricular dysrhythmias and one with ventricular ectopic beats. Nodal rhythm, the predominant dysrhythmia seen, occurred early during induction and usually resolved before the administration of study drug (Figure). No dysrhythmias developed later than the induction period or as a result of the study drug. Although there was a trend for heart rate and systolic blood pressure to decrease during induction,

bradycardia or hypotension requiring treatment did not occur.

**Discussion:** This study indicates that 1) a combination of factors attendant to halothane induction is highly dysrhythmogenic, 2) nodal rhythm occurs frequently during halothane induction and will resolve spontaneously, 3) the administration of an anticholinergic agent during halothane induction is safe but may be unnecessary in children > 1 year of age, and 4) the dysrhythmogenic factors that are present during induction of halothane anesthesia are attenuated during the maintenance phase even at deep levels.

**References.**

1. Katz RL, Bigger JT: Cardiac arrhythmias during anesthesia and operation. *Anesthesiology* 33:193-213, 1970
2. Mirakhor K: Premedication with atropine or glycopyrrolate in children: Effects of heart rate and rhythm during induction and maintenance of anesthesia. *Anaesthesia* 37:1032-6, 1982

	NO.	INCIDENCE OF DYSRHYTHMIAS	NR	SVD	VEB
SALINE	10	6	4	1	2
GLYCO-PYRROLATE	11	8	7	4	1
ATROPINE	10	5	3	1	1
	31	19	14	6	4

TABLE. NR = NODAL RHYTHM, SVD = SUPRAVENTRICULAR DYSRHYTHMIAS, VEB = VENTRICULAR EXTRASYSTOLIC BEATS.

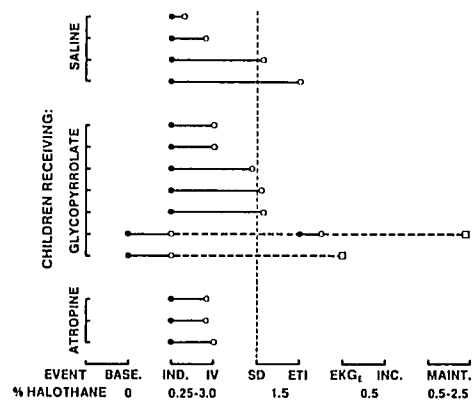


Figure. Onset (●) and resolution (○) of nodal rhythm. Atrioventricular dissociation = ---- (horizontal). Base. = Baseline, Ind. = Induction, IV = Insertion of iv catheter, SD = Study drug given (vertical ----), ETI = Endotracheal Intubation, EKG E = Esophageal EKG, Inc. = Incision, Maint = Maintenance of anesthesia.