Title: EFFECTS OF HIGH-DOSE PANCURONIUM AND ENDOTRACHEAL INTUBATION ON INTRAOCULAR PRESSURE IN CHILDREN

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Introduction: High-dose pancuronium (0.15 mg/kg) provides rapid relaxation for endotracheal intubation in patients with full stomachs and open eye injuries.[1] However, high-dose pancuronium followed by endotracheal intubation may increase heart rate, blood pressure, and sympathetic tone in children, thereby increasing intraocular pressure (IOP).[2] To determine the effect of high-dose pancuronium followed by endotracheal intubation on IOP in children, we compared the IOP during induction of anesthesia in one group receiving pancuronium followed by endotracheal intubation to a second group receiving succinylcholine followed by endotracheal intubation.

Methods: With approval from the committee on human research, informed consent was obtained from the parents of 14 children, ages 2 months to 10 years. The children were ASA class 1 or 2 with no history of intraocular disease or glaucoma, fasting, and unmedicated. Anesthesia was induced with sodium thiopentone (5 mg/kg) and atropine (0.02 mg/kg). Following loss of the eyelid reflex, either pancuronium (0.15 mg/kg) (n=7) or succinylcholine (1.5 mg/kg) (n=7) was administered as an intravenous bolus. After ventilating with oxygen for 1 minute, the trachea was rapidly intubated. Ventilation was controlled with 1.0-1.5% inspired halothane in a 70% nitrous oxide/30% oxygen gas mixture to maintain an end-tidal pCO_2 between 35 and 40 mm Hg (Puritan-Bennett CO_2 analyzer). IOP, heart rate, and blood pressure were measured as the eyelid reflex was lost (time zero), each minute thereafter for 5 minutes, and then at 10 minutes. Measurements at 1 minute were recorded immediately prior to intubation. IOP was measured using a portable Perkins applanation tonometer. Skin incision followed the 10 minute measurement.

Statistical significance ($P < 0.05$) was determined using the Bonferonni t test, analysis of variance, and the Student-Newman-Keuls test.

Results: The mean age and weight, and measurements of IOP, heart rate, and blood pressure at time zero were not significantly different between the two groups (Table 1). The percent change in IOP from time zero was determined for each patient and the mean values for each group compared in Table 2. Neither coughing nor straining occurred at laryngoscopy and intubation. In the pancuronium group, IOP did not change after the bolus of pancuronium (1 min) but did significantly increase immediately after laryngoscopy and intubation (2-4 min), whereas in the succinylcholine group, IOP significantly increased after the bolus of succinylcholine (1 min) and remained increased following laryngoscopy and intubation (2-5 min) (Table 2). In both groups, IOP returned to time zero values by 10 minutes. There was no difference in the maximum percent increase in IOP between the two groups. In both groups, heart rate increased significantly at all times compared to time zero values and blood pressure increased significantly after laryngoscopy and intubation.

Discussion: Pancuronium 0.15 mg/kg does not increase IOP immediately after an intravenous bolus in children. However, succinylcholine, 1.5 mg/kg does increase IOP immediately after an intravenous bolus. Laryngoscopy and endotracheal intubation increase IOP during pancuronium and light anesthesia to the same extent as an intravenous bolus of succinylcholine prior to laryngoscopy. In contrast, laryngoscopy and endotracheal intubation do not significantly increase IOP further during succinylcholine and light anesthesia. We conclude that 0.15 mg/kg pancuronium does not increase IOP immediately after intravenous administration in children. However, the combination of pancuronium and light anesthesia during endotracheal intubation in children with open eye injuries may increase IOP to the same extent as intravenous succinylcholine.

References:

1. Brown EM, Krishnaprasad D, Smiler BG. Pancuronium for rapid induction technique for tracheal intubation. Can Anaesth Soc J 26:489-91, 1979

2. Bennett EJ, et al. Pancuronium bromide: A double-blind study in children. Anesth Analg 52:12- 18, 1973

TABLE 1

	Age	Wt	IOP	HR	BP
Pancuronium (n=7)	7.4 ±1	22 ±2	13.7 ±.8	124 ±7	105 ±4
Succinylcholine (n=7)	4.8 ±1	20 ±4	14.3 ±1	120 ±12	91 ±5

Data are mean ± SE. Age (yr), Wt=weight (kg), IOP (mm Hg), HR=heart rate (bpm), BP=systolic blood pressure (mm Hg).

TABLE 2: Mean % Change in IOP

Time (min)	1	2	3	4	5	10
Pancuronium	13ϕ ±5	59* ±9	48* ±11	41* ±7	22 ±12	8 ±6
Succinylcholine	56ϕ* ±12	76* ±14	71* ±33	54* ±33	33* ±12	-2 ±10

Data are mean % change ± SE
* $P < 0.05$ compared to time zero IOP
ϕ $P < 0.05$ between the pancuronium and succinylcholine groups