Title : EFFICACY OF AN EPIDURAL TEST DOSE IN CHILDREN ANESTHETIZED WITH HALOTHANE

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INTRODUCTION: As in adults, children are frequently given an epidural test dose with epinephrine prior to epidural injection of local anesthetic. In the event that the test dose is given iv, it is expected that epinephrine would cause an immediate and noticeable increase in heart rate (HR) (1, 2). However, children are sometimes anesthetized with halothane and premedicated with atropine when an epidural block is performed, and there are no data on the efficacy of a test dose in these circumstances. The goal of this study was to determine: 1) the ability of a standard test dose of epinephrine to signal an intravascular injection in children during halothane anesthesia; and 2) the effect of iv atropine administered prior to the test dose on the expected increase in heart rate.

METHODS : Forty-one ASA physical status I children, age 1 month to 10 yr (mean ± SD: 3.9 ± 3.1 yr) weight 3.9 to 28 kg (15.9 ± 8.2 kg) were included in the study. Approval by the Committee on Human Research and parental consent were obtained. All children were scheduled for minor surgery for which the anesthetic was 1 % halothane by mask, with an equal mixture of oxygen and nitrous oxide. Regional anesthesia was intentionally avoided. After children were anesthetized and vital signs were stable, they were randomly assigned to one of two groups: group I (n = 20) received 10 $\mu g.kg^{-1}$ of atropine followed 5 min later by 0.1 $ml.kg^{-1}$ of 1 % lidocaine with 1/200,000 epinephrine, the "test dose"; group II (n = 21) did not receive atropine prior to administration of the same test dose. A tracing of lead II of the ECG was continuously recorded in all patients and HR was determined at the start of the study (T1), 5 min after administration of atropine (T2) and 15, 30, 45, 60, 90, 120 and 180 seconds after administration of the test dose. Heart rate at T1, T2, and Δ HR from T2 were compared using two way repeated measures ANOVA followed by Student's t test when differences were further found with ANOVA. Each group was divided into two subgroups: those in whom HR increased less than or equal to 10 bpm; and those in whom HR increased more than 10 bpm. A Woolf G test was used to compare the difference in frequency distribution between the two groups. Results are expressed as the mean ± SD. $p < 0.05$ was considered statistically significant.

RESULTS: In this study, in which 0.5 $\mu g.kg^{-1}$ of epinephrine was administered as a test dose, no dysrhythmias were observed. HR at T1, T2, and Δ HR from T2 are presented in the table. In group I, HR was significantly increased at all times after the test dose whereas in group II it was significantly increased only at 45 and 60 s after the test dose. Furthermore, the increase in HR after the test dose was significantly greater at all times in group I compared with group II. Mean maximum increase in HR was 19 ± 7 bpm in group I and 13 ± 12 bpm in group II (fig). A total of 7 children (17 %) (6 in group II) had less than a 10 bpm increase in HR and 2 had no increase at all; this difference was significant.

DISCUSSION: Moore et al (1) have defined a positive response to a test dose in awake adults as an increase in HR of 30 bpm. In our study of anesthetized children this would have resulted in an unacceptable 93 % false negative response rate. We believe a test dose should give a true positive response 95 % of the time. Thus, we selected as our standard an increase of 10 bpm, the value we obtained in the group I children treated with atropine. Using this criterion, a false negative response occurred in 29 % of group II children. Thus, we recommend that atropine should be administered to children anesthetized with halothane who are to receive an epidural block. Since a false negative response occured in 1 of 20 children who received atropine, we support the often stated recommendation that the total volume of local anesthetic should always be injected in incremental doses.

REFERENCES: 1. MOORE DC, BATRA MS: The components of of an effective test dose prior to epidural block. ANESTHESIOLOGY 55: 693-696, 1981. 2. STONHAM J , MOSS P : The optimal test dose for epidural anesthesia. ANESTHESIOLOGY 58 : 389-390, 1983.

TABLE. Heart rate at T1 and T2, and Δ HR following the test dose. Mean values ± SD.
*$p < 0.05$ versus T2.

TIME	HEART RATE (bpm) GROUP I (atropine)	GROUP II (no atropine)
T1	100 ± 17	102 ± 20
T2	129 ± 21	100 ± 21
	Δ HEART RATE (bpm)	
15 s	11 ± 3 *	- 1 ± 6 NS
30 s	13 ± 7 *	2 ± 24 NS
45 s	18 ± 7 *	10 ± 11 *
60 s	16 ± 7 *	5 ± 10 *
90 s	8 ± 6 *	1 ± 11 NS
120 s	5 ± 5 *	- 2 ± 10 NS
180 s	4 ± 4 *	- 3 ± 10 NS

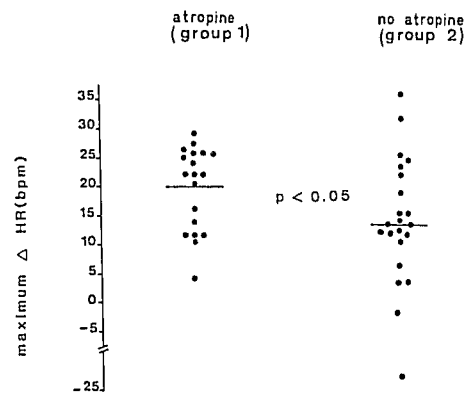

Figure. Maximum Δ HR in group I and in group II.