Cardiovascular Effects of Hyoscine Butylbromide in Pediatric Halothane Anesthesia

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Halothane is presently widely used primary agent in pediatric anesthesia. Halothane depresses cardiovasucular activity, which is a result of direct negative inotropic action on myocardium, cardiac slowing due to action on the sinoatrial node, and reduction of peripheral resistance.

It is commonly emphasized the importance of using atropine when giving halothane to children, in order to prevent vagal activity, bradycardia and decreased output.

Since hyoscine butylbromide was introduced as a useful vagolytic and drying agent for children as well as adults during general anesthesia in 1975[1], only two brief reports on the prevention of the oculocardiac reflex with this drug have been published[2,3], This study was conducted to assess the effects of hyoscine butylbromide on the heart rate and blood pressure during halothane anesthesia in children.

Methods

The study was approved by the Ethics Committee of the hospital and informed consent was obtained from parents. Thirty ASA physical status I children (15 boys and 15 girls) scheduled for elective inguinal hernia repair were selected. Mean age and weight of the patients were 5.3 ± 2.2 (SD) years and 19.3 ± 4.6 (SD) kg, respectively. No premedication was administered. In the operating theatre, precordial stethoscope, blood pressure cuff and ECG monitor were applied, then the heart rate (HR) and the mean blood pressure (MBP) were measured by Dinamap 1846 monitor (Critikon) and taken as preinduction value. Anesthesia was induced with halothane in increasing the inspired concentration in a mixture of N_2O/O_2 (2:1) under spontaneous ventilation. After induction, an intravenous catheter was inserted. HR and MBP were measured at least 2 min after the end-tidal holothane concentration had reached to 1.5% (Normac, Datex), then hyoscine butylbromide 0.4 mg/kg was administered intravenously. Further measurements of HR and MBP were made every 1 min for 10 min while end-tidal halothane concentration was kept constant at 1.5% after hyoscine butylbromide administration. The data were analyzed using the Student's paired t-test. Statistical significance was assumed when $P < 0.01$.

Results

HR and MBP decreased significantly following halothane anesthesia. However, HR increased above the preinduction value after hyoscine butylbromide administration, and remained higher than the preinduction value throughout the study. MBP reached to the preinduction level 2 min after

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Table 1. Heart rate (beats/minute) and mean blood pressure (mmHg) changes following halothane anesthesia and hyoscine butylbromide administration. Values expressed as mean (SD)

N=30		Pre.	Hal.	1m.	2m.	3m.	4m.	5m.	6m.	7m.	8m.	9m.	10m.
HR	Mean	104	85	133	142	142	142	141	140	138	137	135	134
	SD	(16)	(13)	(15)	(9)	(9)	(9)	(9)	(9)	(9)	(8)	(8)	(8)
	VS. Pre.		⋆	⋆	⋆	⋆	⋆	⋆	⋆	⋆	⋆	⋆	⋆
	VS. Hal.			⋆	⋆	⋆	⋆	⋆	⋆	⋆	⋆	⋆	⋆
MBP	Mean	82	67	79	78	76	76	74	73	74	74	72	73
	SD	(8)	(7)	(8)	(8)	(9)	(8)	(10)	(10)	(8)	(8)	(8)	(7)
	VS. Pre.		⋆	NS	NS	⋆	⋆	⋆	⋆	⋆	⋆	⋆	⋆
	VS. Hal.			⋆	⋆	⋆	⋆	⋆	⋆	⋆	⋆	⋆	⋆

Pre: Preinduction period, Hal.: Halothane 1.5%, 1m.: 1 min. after hyoscine butylbromide iv. administration, NS = not significant, $\star = P < 0.01$

administration of hyoscine butylbromide. Thereafter, MBP became lower than the preinduction value but was significantly higher than the level measured following induction prior to hyoscine butylbromide administration (table 1).

Discussion

These data demonstrate that intravenous hyoscine butylbromide is highly effective in antagonizing the negative chronotropic effect of halothane in children.

Hyoscine butylbromide is a quaternary derivative of hyoscine, and has been widely used for its spasmolytic effect on GI tract, biliary and ureteric muscle[4]. Much attention has not been paid on its strong vagolytic action during anesthesia[1-3,5]. Atropine is frequently used in halothane anesthesia to attenuate the cardiovascular depressant effects of halothane[6-8]. In contrast to our results of hyoscine butylbromide on MBP, it is reported that atropine failed to increase blood pressure during halothane anesthesia in children[9].

Hyoscine butylbromide has several advantages over atropine when used as an intravenous agent during halothane anesthesia for short procedures in children, i.e. the onset of action is fast and there is no initial bradycardia as occasionally seen with atropine[4,10]. The duration of action is shorter than that of atropine, so children after short procedure such as inguinal hernia repair are not expected to suffer from dry mouth for a long time postoperatively. Hyoscine butylbromide does not possess the sedative and amnesic properties due to central anticholinergic action[4,11], so early postoperative excitement and delirium, which are occasionally associated with atropine[12], can be avoided.

The intravenous hyoscine butylbromide, because of its rapid onset, might be particularly useful in teatment of bradycardia during anesthesia in infancy, since the action of atropine is delayed in the presence of bradycardia in infants[13].

In conclusion, intravenous hyoscine butylbromide can be an attractive alternative for intravenous atropine during pediatric halothane anesthesia for short procedures.

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