Title: GLYCOPYRROLATE COMPARED WITH ATROPINE IN YOUNG CHILDREN: EFFECTS ON HEART RATE FOLLOWING ADMINISTRATION OF SUCCINYLCHOLINE

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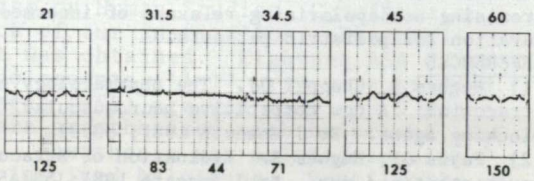
Introduction. The use of atropine to attenuate succinylcholine-induced bradycardias in children is well established.[1] Glycopyrrolate (Robinul) is recently reported to effectively block dysrhythmias following succinylcholine in children.[2,3] However, despite administration of atropine, severe bradycardias have been recorded immediately following induction of anaesthesia and administration of succinylcholine (Figure 1). This study compares the heart rate responses in young children given intravenous atropine or glycopyrrolate followed by succinylcholine.

Figure 1



Top figures indicate time in seconds from beginning of induction of anaesthesia. Bottom figures indicate heart rate. The control heart rate was 115 beats per minute. Administration of succinylcholine was completed at 21 seconds.

Methods. The study was approved by the Human Experimentation Committee of the Hospital for Sick Children. Forty children weighing less than 20 kg were studied. All patients were ASA-1 and not premedicated. Heart rate was recorded continuously with a lead II ECG printout during induction of anaesthesia. The experimental period was 78 seconds. Anaesthesia was induced with a #25 needle in the dorsal vein of the hand using sodium thiopentone (5 mg/kg), atropine (0.02 mg/kg) or glycopyrrolate (0.01 mg/kg), and succinylcholine (2 mg/kg) in individual syringes. Thiopentone was diluted to 5cc with sterile water and injected over 12 seconds. Atropine, glycopyrrolate, and succinylcholine were each diluted with sterile water to 2cc volumes and each injected over six seconds. Ventilation and intubation followed completion of the study period. Patients were randomly assigned to one of four groups; E1, E2, E3, and E4, ten patients in each group. Each group (E1, E2, E3, E4) differed in the time interval (six, ten, fifteen, and twenty seconds respectively) from completion of administration of the anticholinergic drug to the beginning of succinylcholine injection. Heart rates were calculated every three seconds using the R-R interval on the ECG printout. Percent changes in heart rate relative to control values were then analyzed in each group over the duration of the study period.

Results. The means of age, weight, and control heart rate of the children were 3.37 ± 0.39 years, 15.4 ± 0.92 kg, and 144.1 ± 57 beats per minute respectively. With glycopyrrolate there was a period in which the heart rate was below control in all four groups. The range of this period was from 25.5 - 54 seconds, group E4 having the longest period. In contrast, with atropine only groups E2 and E3 had heart rates below control for periods of 30 - 31.5 seconds respectively. Transient bradycardia (heart rate 20% below control) occur significantly more frequently with glycopyrrolate than with atropine ($x > 5.02$).

Table I

Experimental Groups	Maximum Decrease in Heart Rate: % Change from Control	
	Atropine	Glycopyrrolate
E1	0	-13
E2	-14	-20
E3	-11	-25
E4	0	-21

In all groups, the final maximum heart rate reached during the experimental period following the administration of succinylcholine was comparatively higher in all atropine groups.

Table II

Experimental Groups	Final Maximum Heart Rate: % Change from Control	
	Atropine	Glycopyrrolate
E1	+28	+18
E2	+20	+7
E3	+11	+5
E4	+29	-3

Conclusion. In regards to heart rate in young children the speed of onset and degree of the anticholinergic activity of glycopyrrolate is less than that of atropine. The differences, however, are not statistically significant.

References

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3. Cozanitis, D.A., Dundee, J.W., and Khan, M.M. Comparative study of atropine and glycopyrrolate on suxamethonium-induced changes in cardiac rate and rhythm. Brit. J. Anaes. 52: 291, 1980.