Title : EFFECT OF HALOTHANE ON BARORECEPTOR RESPONSE IN NEWBORN AND ADULT RABBITS

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Introduction: Hypotension often occurs when infants and children are anesthetized[1]. Normally, hypotension is compensated for by an increase in heart rate via the baroreceptor reflex. However, we found no evidence of baroreceptor response in premature infants undergoing anesthesia and surgery for ligation of a patent ductus arteriosus[2]. This study's deficiencies were failure to measure anesthetic concentration and failure to systematically raise arterial pressure and examine the concomitant changes in R-R interval as measured from the ECG. To resolve these problems we sought to systematically study baroreceptor responses during halothane anesthesia in newborn and adult rabbits.

Methods: We studied 4 8-10 day old and 10 adult rabbits. Catheters were inserted with local anesthesia. The ECG and arterial pressures were recorded on magnetic tape for later analysis with the aid of a computer. We determined the slope of the R-R interval vs systolic pressure (baroreceptor response) and we determined the R-R interval occurring after the initial rise in systolic pressure which best correlated with the rise in pressure (lag time). 0.030-0.040 mg of neosynephrine were injected to stimulate the baroreceptors while the animals were awake and at 0.5, 1, and 1.5 MAC halothane.

Results: Table 1 shows the changes in baroreceptor response with anesthesia. The response progressively decreased in both groups as anesthesia was deepened. The newborns' response was significantly less ($p<0.05$) than the adults' at all levels of anesthesia. At 0.5 MAC 80% of the response was lost in the newborn while the adults lost only 32% of their response.

The effects of anesthesia on lag time is shown in Table 2. While the lag time increased with increasing depths of anesthesia there was no significant difference between groups at any anesthetic level.

Discussion: The decreased baroreceptor response found during anesthesia in this study would limit the animals' ability to compensate for a reduction in arterial pressure. This may be a significant problem for the newborn whose depression of the response is greater and who is primarily rate dependent for cardiac output due to his relatively noncompliant, "stiff" left ventricle. Thus a decrease in systolic pressure may be less well tolerated in the newborn than in the adult, even at low anesthetic doses.

The prolongation of the lag time with halothane has not been described before to our knowledge. The site of this "block" is unknown.

References

1. Robinson S, Gregory GA: Urine specific gravity as a predictor of hypordemia and hypotensive response to halothane anesthesia in the newborn. ASA Abstracts pp 37-38, 1977

2. Gregory GA: Baroreceptors and anesthesia in infants < Kg at birth. ASA Abstracts pp 375, 1978

Table 1

The Effect of Halothane on Baroreceptor Response

| | Infant | Adult |
|---|---|---|
| | Peak Slope | |
| Awake | 1.94 ±1.27 | 1.95 ±.81 |
| .05 MAC | 0.40 ±.205* | 1.33 ±.28 |
| 1.0 MAC | 0.23 ±0.081* | 1.05 ±.35 |
| 1.5 MAC | 0.07 ±0.080* | .60 ±.20 |

*$p<0.05$

Table 2

The Effect of Halothane on Lag Time

| | Infant | Adult |
|---|---|---|
| | lag time (sec) | |
| Awake | .67±.25 | .75±.65 |
| .05 MAC | 1.25±.51 | 1.19±.61 |
| 1.0 MAC | 1.11±.96 | 1.50±.63 |
| 1.5 MAC | 2.44±.44 | 1.87±.30 |