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Title : THE EFFECTS OF NITROUS OXIDE ON THE BARORECEPTOR RESPONSES OF NEWBORN AND ADULT RABBITS

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Introduction. Hypotension is common when infants are anesthetized with potent inhalational agents[1]. These same anesthetics severely depress the baroreceptor response of both human and rabbit infants much more so than they do in adults.[2,3] Nitrous Oxide (N20) is often used as the sole anesthetic in infants because it is thought to have insignificant cardiovascular effects, although the data to support this view is lacking. Thus we sought to determine to what degree N20 effected the baroreceptor responses of infants and adult rabbits.

Methods. We studied four 10 to 18 day old rabbits. Arterial and venous catheters and a tracheotomy were inserted with the aid of local anesthesia. The ECG and arterial pressure were recorded on magnetic tape for later computer evaluation of the slope (least squares) of the R-R interval at each systolic pressure (i.e. baroreceptor response) following the injection of 0.03 to 0.04 mg of neosynephrine intravenously. Baro-responses were determined awake and during 40, 60 and 70 percent nitrous oxide inhalation.

Results. Nitrous oxide administration caused a progressive decrease in the slope of heart rate on systolic blood pressure, more so in the infant than in adult (Fig. 1). At 40 percent nitrous oxide the infants baroresponse was depressed 50 percent from control while that of the adult was only depressed 20 percent. Seventy percent nitrous oxide depressed the infants baro-response 70 and the adults 43 percent. There was no change in $PaCO_2$ or pH in either group and the PaO_2 was always above 90 torr. There was no significant difference in heart rate. The infant's arterial pressure decreased 13 torr from control with 70 percent nitrous oxide, while that of the adults increased three torr on average.

Discussion. There is greater depression of the baroresponse in the infant rabbits, despite the fact that 70 percent nitrous oxide is only 0.4 MAC in the infant compared to 0.63 MAC in the adult. When the depression of baro-response with 40 percent nitrous oxide (0.4 MAC) in the adult is compared to the depression of baro-response with 70 percent nitroux oxide (0.43 MAC) in the infant the difference is even more striking. The infant's baro-response is 80 percent depressed and the adult's is only 20 percent depressed. The depression seen in the infant with 70 per cent nitrous oxide is similar to that seen with 0.5 MAC halothane[3], suggesting that the depression of baro-response in the newborn is more related to MAC than to the specific anesthetic agent used. The reasons for this is unknown but may be related to: 1) more cardiac depression by nitrous oxide in the infants 2) different intrinsic capability of the infant's baroreceptors 3) incomplete autonomic inervation of the infant's heart.

References.

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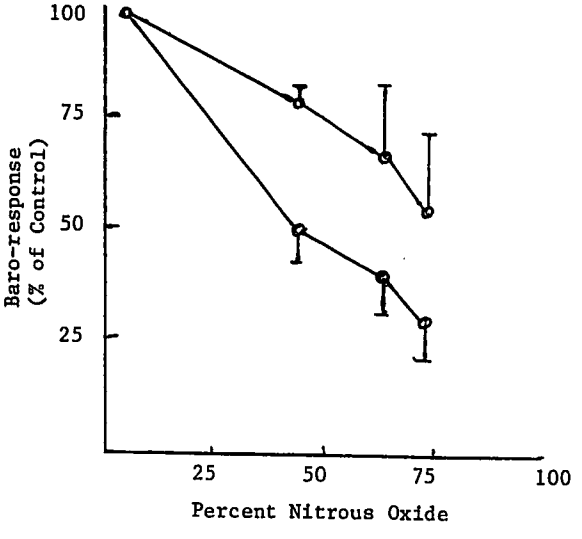

Figure 1. The effects of nitrous oxide on the baroreceptor responses of the adult and newborn rabbit. (means _ SEM)

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