TITLE: BLOOD GLUCOSE LEVELS AND CURRENT PEDIATRIC GUIDELINES

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INTRODUCTION: Simplified guidelines for intraoperative fluid and electrolyte therapy have been proposed in pediatric patients (1), but have not been precisely evaluated. Therefore, the goal of this study was to evaluate blood glucose and electrolyte changes following the guidelines of F.A. Berry (1), recommanding the administration of 25 ml.kg^{-1} of hydrating solution during the first operative hour in children age 3 and under, and 15 ml.kg^{-1} for those age 4 and over, maintenance hourly fluid therapy being identical for the subsequent hours and adapted to trauma severity.

METHODS: Consent was obtained from parents and Ethics Committee. Children (3 mths-10yrs) ASA I scheduled for elective non-hemorrhagic operations were randomly assigned to receive a balanced salt solution containing either 5% (n=24) or 2.5% (n=23) dextrose. The rate of IV fluid was set according to the guidelines described above. In addition, children between 3 and 4 years of age were assigned to receive 20 ml.kg^{-1} during the first hour. After the first hour, fluids were administered at a rate of 6 or 8 ml.kg^{-1}.h^{-1} depending on the severity of surgical trauma. Blood samples were obtained just before starting IV fluid therapy and at admission to the recovery room for measurements of blood glucose, osmolality, protein and serum electrolytes. Repeated analysis of variance was used for statistical analysis. Data are mean +/- SD.

RESULTS: The two groups did not differ with respect to weight, age, duration of surgery, preoperative blood glucose values (4.2 +/-0.8 vs 4.6 +/- 0.8 mol.l^{-1} in D5 and D2.5 groups). The lowest preoperative blood glucose level was 2.4 mmol.l^{-1}, despite fasting time exceeding 8 hours in all but 7 children. In both groups (D5 and D2.5), mean blood glucose levels increased during surgery (to 12.0+/-2.9 mmol in D5 group, p<0.001; to 8.3 +/-2.1 in D2.5 group, p<0.001); this increase was however more important in the D5 than in the D2.5 group (p<0.001). In each group, blood glucose increased significantly more in children of less than 4 years of age than in those age 4 and over (9.3+/-2.8 and 4.6+/-2.2 mmol in children age under 4 in D5 and D2.5 groups respectively; 5.5 +/-2.3 and 2.5 +/-1.1 in children age over 4 in D5 and D2.5 groups). In children age 4 and under, sodium values decreased more than in those age 4 and over (3.8+/-0.5 vs 2.1 +/-0.3 mEq.l^{-1}, p<0.05).

DISCUSSION: This study confirms both the low risk of preoperative hypoglycemia, even after a prolonged fasting time in infants and children, and the marked postoperative hyperglycemia, when a 5% dextrose solution is used during surgery. The fluid therapy guidelines currently evaluated seem to be appropriate in older children, but a moderate dilutional hyponatremia was observed in the younger ones, despite using recommended balanced salt solutions. This suggests reduced possibilities of water handling in response to these large quantities of parenteral fluid in infants and children. A larger number of patients is needed to confirm these preliminary data.

REFERENCE: (1) ASA Refresher Course 1989

A1093

TITLE: PERIOPERATIVE EFFECT OF ANESTHESIA ON SUPER-OXIDE PRODUCTION IN NEONATES AND INFANTS.

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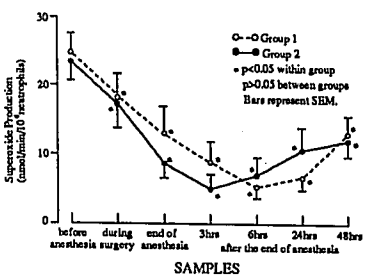
Neonates and infants are susceptible to bacterial infection perioperatively. Release of superoxide anion (O_2^-), which is one of the reactive oxygen species, from neutrophils plays a crucial role in the host defence system against bacterial infection. It has been reported that anesthetics has the inhibitory effect on O_2^- production *in vitro*. General anesthesia reportedly decreased singlet oxygen generation in children. However, no report on the effect of anesthesia on O_2^- production in neonates and infants has been published because of requirement for large amount of blood sample. Recently we have made it possible to measure O_2^- production even in small blood samples by improving the conventional method for measurement of cytochrome C reduction.[1] The present study was designed to examine the effect of anesthesia (inhalation or opiate) on O_2^- production at the perioperative periods in neonates and infants.

METHODS: After institutional approval and parental informed consent, we studied 20 unpremedicated patients (ASA I or II) aged between 2 weeks and 10 months undergoing abdominal surgery. They were randomly classified into 2 groups according to anesthetic methods; Group 1 (n=10): maintained with 1-2% enflurane, 40% nitrous oxygen (N_2O) and oxygen, and Group 2 (n=10): maintained with fentanyl (10-20 μg/kg), 40% N_2O and oxygen. In all patients anesthesia was induced with halothane (up to 2.5%), N_2O and oxygen. Blood (1 ml) was drawn before anesthesia, during surgery, at the end of anesthesia, and 3, 6, 24, and 48 hrs after the end of anesthesia to measure FMLP induced O_2^- production using the modified conventional method of O_2^--dependent cytochrome C reduction[1] after isolation of neutrophils. Statistical analysis was performed using paired and unpaired Student's t-tests.

RESULTS: There were no significant differences in demographic data of patients (age, weight, gender, and duration of anesthesia, *etc.*) between groups 1 and 2. In two groups, O_2^- production was within normal ranges before anesthesia but began to decrease at the end of anesthesia. In group 1, decrease in O_2^- production was maximal 6 hrs after the end of anesthesia with return toward basal value apparent by 48 hrs after anesthesia. On the other hand, in group 2, it was maximal 3 hrs after anesthesia. There was no difference in the magnitude of the decrease between two groups. (Fig.)

DISCUSSION: Consistent with the report that anesthesia has immuno-supressive effect including impairment of neutrophils' microbicidal activity, general anesthesia with enflurane or fentanyl was associated with prolonged depression of O_2^- production in neutrophils of neonates and infants. Although whether these data have clinical significance is yet to be determined, the possibility that susceptibility to bacterial infections for neonates and infants perioperatively may be attributable to inhibition of O_2^- production by anesthesia exists.



REFERENCES: 1. Pediatric Research 26:227-231, 1989.