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PROSPECTIVE EVALUATION OF A PARENTERAL NUTRITION FORMULA IN CRITICALLY-ILL NEONATAL FOALS

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Purpose of the work. Critically-ill foals often require parenteral nutrition (PN) when they are too weak and recumbent or during gastrointestinal conditions such as ileus or enteritis. This prospective observational study evaluated the administration of a standardized formula of PN in critically-ill foals, comparing serum concentrations of glucose and triglyceride (TG) between foals treated or not with PN, describing the associated complications (hyperglycemia, hypertriglyceridemia and phlebitis), the amount of energy administered per day and the association with outcome. The study examined also if the administration of PN was significantly associated with the presence of Systemic Inflammatory Response Syndrome (SIRS) or with a sepsis score ≥ 11 and if these conditions increased the risk of hypertriglyceridemia or hyperglycemia. Age-specific normal values of serum TG concentration were measured to define our reference range.

Materials and used methods. All sick foals prospectively enrolled in the study received a standardized clinicopathological evaluation at admission. All the foals affected by Perinatal Asphyxia Syndrome (PAS), septicemia and enteritis were included in the study. Sick foals were divided into two groups: the group N (nutrition) received PN during hospitalization for longer than 12 h and the group C (control) did not. A standard PN solution was formulated by mixing under strict aseptic conditions 1000 ml of 50% glucose, 1000 ml of 8.5% amino acids and 500 ml of 10% lipids (non-protein energy/gram of nitrogen ratio 165.44 Kcal/g; final caloric content of the solution 2590 Kcal). The PN solution starting rate was 1 ml/Kg/h, gradually increased every 4 h to the maximum rate of 2 ml/kg/h if the foal tolerated the infusion (blood glucose concentration between 4.44-10 mmol/L, monitored every 1-4 h).

Serum TG concentration was measured in all the foals that received PN treatment before the beginning of PN and prior to the gradual decrease of the infusion rate. In the group C, TG and blood glucose concentration were measured at admission and after 48 h. Serum TG concentration of 14 healthy foals at 24, 48 and 72 h of life was measured and compared with 1-way ANOVA for repeated measures. Kruskal-Wallis test with Bonferroni’s correction, Mann-Whitney test and Fischer’s exact test were used to analyze the recorded data. A p value <0.05 was considered significant.

Outcomes. The study included 14 healthy foals and 41 sick foals, 21 in the group N and 20 in the group C, with a survival rate of 87.8%.

Mean TG concentration in healthy foals was 0.55 ±0.35 mmol/L, 1.19 ±0.91 mmol/L and 1.74 ±0.96 mmol/L at 24, 48 and 72 h after birth, respectively. A significant difference (p <0.01) was revealed between 24 h and 72 h values and between 48 h and 72 h values.

In the group N, mean blood glucose concentration at admission was 4.55 ±3.33 mmol/L. During PN administration, hyperglycemia was detected in 15/21 (71.43%) foals. Only one foal developed hypoglycemia during insulin infusion.

Mean energy provided with PN was 46.08 Kcal/Kg/day (range 27.78-75).

In the group C, the mean blood glucose concentration at admission was 6.20 ±2.66 mmol/L and 8.28 ±1.61 mmol/L after 48 h. At 48 h of hospitalization no foal was hypoglycemic and 4/17 (23.53%) foals were hyperglycemic.
In the group N, mean serum TG concentration was 1.84 ±2.39 mmol/L prior to PN and 1.17 ±1.37 mmol/L at the end of PN.

On the basis of age-specific normal range, 4 foals showed hypertriglyceridemia before PN and 2 foals at the end of PN.

In the group C, mean serum TG concentration was 1.40 ±1.17 mmol/L at admission and 1.02 ±0.50 mmol/L after 48 h. On the basis of age-specific normal range, 5 foals showed hypertriglyceridemia at admission.

Phlebitis was not observed in both groups.

Statistical analysis revealed that blood glucose concentration after 4 hours of PN treatment was higher (p <0.01) than prior to the beginning of PN and that foals of group N could have a higher probability to develop hyperglycemia (p <0.05), with a relative risk = 3.03. No other statistically significant difference was found.

Conclusions. Based on the results of this study, there are no medical contraindications to adding lipids to PN formulations. The formula used are really simple to prepare and the protocol easy to apply, improving the possibility to use PN in critically-ill foals.

Bibliography


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