Semilobar Holoprosencephaly in a Morgan Horse

Thomas Koch, Alexandre Loretii, Alexander de Lahunta, Anna Kendall, Deanna Russell, and Dorothee Bienzle

A 6½-month-old Morgan filly was examined because of a history of abnormal behavior, teeth grinding, hypothermia, and electrolyte disturbances when weaned. She was from a breeding farm with several other Morgan horses. The 11-year-old dam had been purchased the year before as a proven broodmare, which had several previous foals. Breeding, gestation, and birth of this foal were normal. She was raised with 4 other mares and their offspring on pasture with free access to shelter in an open barn. Supplementary feeding consisted of oats and timothy hay. The owners reported that the foal showed unusual behavior, such as lack of apprehension of people, lack of distress from maternal separation, and a higher activity level than other foals of the same age. The foal extensively chewed the dam’s tail and mane, masticated oats slowly with rapid jaw movements without actually swallowing them, and ground her teeth. She frequently nibbled the handler’s clothes without biting, ate pebbles, and played with the salt block in the paddock. At 4½ months of age, she was treated for suspected gastrointestinal ulcers and weaned. The referring veterinarian examined her 5 days after weaning because of dull demeanor and excessive teeth grinding. The foal was in thin body condition, hypothermic (37°C, 98.6°F), and tachycardic (60 beats per minute [bpm]) and had decreased borborygmi. Major abnormalities on serum biochemistry were severe hypernatremia (166 mmol/L; reference range 136-144 mmol/L) and hyperchloremia (128 mmol/L; reference range 94-104 mmol/L), azotemia (urea, 11.3 mmol/L; reference range 4.2-8.9 mmol/L), and hyperfibrinogenemia (5.2 g/L, reference range 1.6-2.9 g/L). The only abnormality on the CBC was hemococoncentration (PCV, 0.57 L/L; reference range 0.28-0.44 L/L). The foal was treated with penicillin procaine \( G \) (20,000 IU/kg [9072 IU/lb] IM q12h) and rifampin* (5 mg/kg [2.7 mg/lb] PO q8h). The next day the tachycardia worsened (120 bpm) and the foal was estimated to be 5-8% dehydrated. IV fluid therapy with lactated Ringer solution* (LRS) was initiated, and the antibiotic was changed to ceftiofur* (2 mg/kg [0.91 mg/lb] IV q12h). The foal and dam were rejoined, and the foal’s clinical status improved with resumption of nursing. Serial laboratory testing showed persistent hypernatremia (160 mmol/L) and hyperchloremia (123 mmol/L), azotemia (urea 11.3 mmol/L and creatinine 168 mmol/L; reference range 80-130 mmol/L), hyperglycemia (8.7 mmol/L; reference range 3.7-6.7 mmol/L), high aspartate aminotransferase activity (662 U/L; reference range 259-595 U/L), and high creatine kinase (CK) activity (1,196 U/L; reference range 108-430 U/L). The foal’s condition improved and IV fluids were discontinued. Cefitiofur administration was discontinued and trimethoprim-sulfamethoxazole* (25 mg/kg [11.3 mg/lb] PO q12h) was administered for 3 days. During the next month the foal was stable but the abnormal behavior persisted. She was weaned again, and within 5 days marked behavior changes such as circling, throwing the head around compulsively, and severe hind-end shivering recurred. At examination, the foal was dull, tachycardic (60 bpm), was hypothermic (33.6°C, 92.5°F), had dark red mucous membranes, and was estimated to be 5% dehydrated. Laboratory findings were similar to those of the previous tests except for high fibrinogen (7.1 g/L). The foal was again rejoined with the dam, treated with intra-muscular penicillin, and referred.

At examination at the Ontario Veterinary College, the foal was 6½ months old, quiet but alert and responsive, and in moderate body condition (151 kg, 333 lb). Cranial nerve examination revealed normal mental status, but the pupils were enlarged and the pupillary reflex was delayed. Laboratory assessment showed the same abnormalities previously detected, including hypernatremia (151 mmol/L), hyperchloremia (112 mmol/L), hyperglycemia (7.6 mmol/L), high CK activity (526 U/L), high alkaline phosphatase activity (554 U/L; reference range 119-329 U/L), high glutamic dehydrogenase activity (21 U/L; reference range 1-7 U/L), high haptoglobin (1.91 g/L; reference range 0.1-1.7 g/L), hypobilirubinemia (total bilirubin, 13 umol/L; reference range 21-57 umol/L; free bilirubin, 11 umol/L; reference range 18-55 umol/L), hypercholesterolemia (3.18 mmol/L; reference range 1.70-2.70 mmol/L), and hyperfibrinogenemia (4.0 g/L). Food was withheld overnight to allow gastroscopy. Teeth grinding and excessive chewing, especially of the salt block, were noted. Overnight the foal also played with the water bucket for prolonged periods of time. The next morning she was lying in a sternal position. Seizure activity recurred minutes later while she was repositioned into sternal recumbency. Serum ammonia levels were below limit of detection (10 mmol/L). Mild hypernatremia (147 mmol/L) and hyperchloremia (110 mmol/L).

*From the Departments of Clinical Studies (Koch, Kendall) and Pathobiology (Loretii, Russell, Bienzle), University of Guelph, Guelph, Ontario, Canada; and the Department of Biomedical Sciences, College of Veterinary Medicine, Cornell University, Ithaca, NY (de Lahunta).
Dr Loretii is also affiliated with the Section of Veterinary Pathology, Department of Veterinary Clinical Pathology, Faculty of Veterinary Medicine, Federal University of Rio Grande do Sul, Porto Alegre, RS, Brazil.
Reprint requests: Dr Thomas G. Koch, Clinical Studies, Veterinary Teaching Hospital, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada, N1G 2W1; e-mail: tkoch@uoguelph.ca.
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