

# What Is Your Diagnosis?

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Figure 1—Transabdominal ultrasonographic image of a foal with abdominal distension. The top of the figure is dorsal. The ultrasound probe was placed caudal to the umbilicus in a transverse plane.

## History

A 10-day-old Thoroughbred colt was examined for possible neurologic disease. Clinical signs observed before admission included apparent blindness, seizures, abnormal behavior (wandering, sticking head between fence planks, and head pressing), and diarrhea. Physical examination revealed signs of depression and moderate abdominal distension. The foal had several seizures during the initial evaluation. Diazepam and phenobarbital were administered to control them and provide sedation to facilitate placement of an intravenous catheter.

Results of a CBC were within reference ranges except for mild leukocytosis (13,500 WBCs/ $\mu$ L; reference range, 6,000 to 12,000 WBCs/ $\mu$ L). Serum biochemical analyses revealed hypoproteinemia (5.6 g/dL; reference range, 6.0 to 7.6 g/dL); hyperglycemia (150 mg/dL; reference range, 80 to 110 mg/dL); hyperbilirubinemia (3.7 mg/dL; reference range, 0.8 to 2.0 mg/dL); and high activities of creatine kinase (19,350 U/L; reference range, 50 to 250 U/L), aspartate aminotransferase (373 U/L; reference range, 80 to 240 U/L), lactate dehydrogenase (1,720 U/L; reference range, 52 to 240 U/L), alkaline phosphatase (791 U/L; reference range, 50 to 150 U/L), sorbitol dehydrogenase (310 U/L; reference range, 50 to 250 U/L), and  $\gamma$ -glutamyltransferase (50 U/L; reference range, 6 to 24 U/L). Electrolyte abnormalities included hyperphosphatemia (7.3 mg/dL; reference range, 3.0 to 6.0 mg/dL), hyponatremia (105 mEq/L; reference range, 136 to 144 mEq/L), and hypochloremia (70 mEq/L; reference range, 92 to 102 mEq/L). Blood ammonia concentration was within reference limits. Transabdominal ultrasonography was performed (Figure 1).

Determine whether additional imaging studies are required, or make your diagnosis from Figure 1—then turn the page →

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Figure 2—Same ultrasonographic image as in Figure 1. Notice the free fluid within the abdomen and the small urinary bladder, identified by the paired umbilical arteries (arrowheads) and urachus (arrow). The top of the figure is dorsal. The ultrasound probe was placed caudal to the umbilicus in a transverse plane.

### Diagnostic Imaging Findings and Interpretation

Transabdominal ultrasonography revealed a large volume of free fluid within the peritoneal cavity and a small urinary bladder (Figure 2).

### Comments

Uroperitoneum with associated electrolyte abnormalities was suspected on the basis of ultrasonographic findings of a greater than normal volume of peritoneal fluid and a small urinary bladder, which was identified by the umbilical arteries and urachus. Abdominocentesis was performed; peritoneal fluid was voluminous and pale yellow. The concentration of creatinine in the peritoneal fluid was 8.2 mg/dL, and the serum creatinine concentration was slightly high at 2.1 mg/dL (reference range, < 2 mg/dL). Exploratory laparotomy was performed, and an approximately 8-cm tear in the dorsal aspect of the urinary bladder was identified and repaired.

Uroperitoneum can be the result of rupture of the urinary bladder, ureter, or urachus. Urinary bladder rupture is more common in colts than fillies, and defects occur most commonly in the dorsal aspect of the bladder, where the bladder is thinnest. Trauma to the umbilical remnants, sepsis, or increased intra-abdominal pressure during foaling may predispose foals to rupture of the urinary tract. Diagnosis of uroperitoneum usually involves ultrasonography and collection of peritoneal fluid. A ratio of peritoneal fluid to serum creatinine concentration > 2 generally confirms uroperitoneum, although occasionally some affected

foals may have a lesser ratio.<sup>1-3</sup> Retrograde infusion of agitated sterile saline (0.9% NaCl) solution into the bladder via a urinary catheter during ultrasonography may reveal gas bubbles leaking from the defect into the peritoneal cavity.<sup>2</sup>

Clinicopathologic abnormalities commonly detected in foals with uroperitoneum include azotemia, hyperkalemia, hypochloremia, and hyponatremia.<sup>1-3</sup> However, a retrospective study<sup>3</sup> of 31 cases found that these classically reported electrolyte abnormalities were detected in less than half of affected foals. It is possible that foals in which the condition is acute may not have had sufficient time for equilibration of electrolytes and water across the peritoneum. Neurologic abnormalities may develop, depending on the severity and rapidity of development of hyponatremia. Hyponatremia leads to fluid shifts into the CNS and resultant cerebral edema.<sup>4</sup>

After surgery, the foal was treated with isotonic saline solution IV, broad-spectrum antimicrobials, ketoprofen, thiamine, and dimethyl sulfoxide. The foal became neurologically normal after surgery and was discharged without any complications.

1. Dunkel B, Palmer JE, Olson KN, et al. Uroperitoneum in 32 foals: influence of intravenous fluid therapy, infection, and sepsis. *J Vet Intern Med* 2005;19:889-893.
2. Conwell R. Uroperitoneum. In: Robinson NE, ed. *Current therapy in equine medicine 5*. St Louis: WB Saunders Co, 2003;857-858.
3. Kablack KA, Embertson RM, Bernard WV, et al. Uroperitoneum in the hospitalized equine neonate: retrospective study of 31 cases, 1988-1997. *Equine Vet J* 2000;32:505-508.
4. Kraft MD, Btaiche IF, Sacks GS, et al. Treatment of electrolyte disorders in adult patients in the intensive care unit. *Am J Health Syst Pharm* 2005;62:1663-1682.