

# Anorexia, Vomiting, & Ocular Discharge in a Dog

A 4-month-old, female Maltese terrier was presented with a 2-day history of anorexia, vomiting, and bilateral ocular discharge.

**History.** The owners reported that the first sign—diarrhea (initially bloody, then dark)—was noted 4 days earlier, although no diarrhea had been seen the past 2 days. The owners also noticed that the puppy had become depressed and anorexic. The puppy vomited 4 to 5 times over the past 48 hours; each episode was associated with attempts to administer an oral electrolyte and carbohydrate solution. She had been drinking water on her own the past 2 days.

There was no history of previous health problems, a quality diet was being fed, and routine vaccinations had been administered.

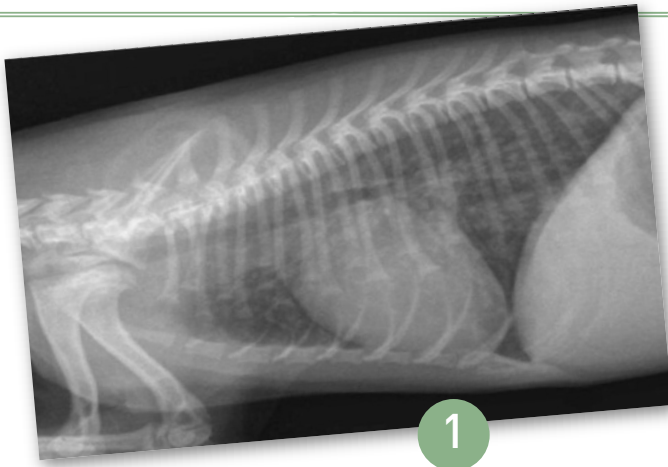
**Physical Examination.** The puppy was depressed with a rectal temperature of 98.7° F; a heart rate of 114 beats/minute; labored respirations at 48 breaths/minute, with an abdominal component and increased bronchovesicular sounds; a bilateral mucoid ocular discharge, with blepharospasm and icterus noted on sclera; a tense abdomen; and marked dehydration.

**Diagnostics.** The abnormal results of the complete blood count, serum biochemical profile, and urinalysis are shown in the Table.



**Table. Abnormal Laboratory Results**

Variable	Result	Reference Interval	Variable	Result	Reference Interval
Leukocyte count ( $\times 10^3$ cells/mcL)	23.3	6–17	Potassium (mmol/L)	7.2	3.8–5.5
Segmented neutrophils ( $\times 10^3$ cells/mcL)	17.5	3–11.5	Chloride (mmol/L)	89	109–124
Monocytes ( $\times 10^3$ cells/mcL)	35	1–8	Sodium (mmol/L)	142	141–156
Hematocrit (%)	32	37–55	Alkaline phosphatase (U/L)	1415	12–122
Urea nitrogen (mg/dL)	237	8–30	Bilirubin (mg/dL)	4.2	0.1–0.4
Creatinine (mg/dL)	5.2	0.5–1.4	Urine specific gravity	1.010	
Phosphorus (mg/dL)	19.3	2.3–6.5	Bilirubinuria	1 +	

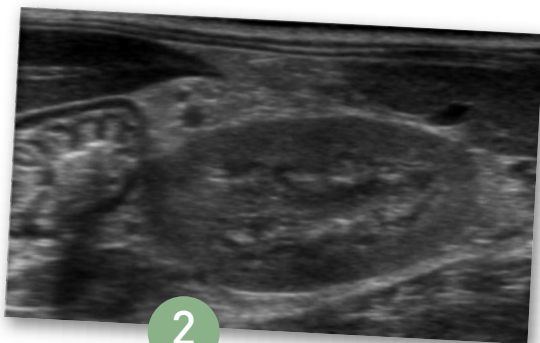


1

Note the underlying reticulonodular pattern throughout the lungs evidenced by a generalized increase in soft tissue opacity and multiple linear and circular soft tissue opacities.

Thoracic radiographs (**Figure 1**) showed a diffuse bronchointerstitial pattern (reticulonodular). Abdominal radiographs demonstrated generalized hepatomegaly, gas-filled intestinal loops, and poor serosal detail. On abdominal ultrasound, the liver was hypoechoic and the cortices of both kidneys were hyperechoic (**Figure 2**). Functional ileus was present throughout the gastrointestinal tract.

The Schirmer’s tear test result was 0 mm/min in both eyes.



2

The cortex of the left kidney is hyperechoic, making it isoechoic to the spleen (**upper right**) and hyperechoic to the liver (**upper left**).



**ASK YOURSELF ...**

- What are the differential diagnoses for the multitude of laboratory abnormalities identified in this patient?
- What are the possible causes of the reticulonodular pulmonary pattern?
- Which diagnostic studies would help rule out or confirm the differential diagnoses of most significant concern?

CONTINUES

## DIAGNOSIS: LEPTOSPIROSIS



The urine polymerase chain reaction (PCR) test for pathogenic leptospires was positive, confirming the diagnosis of leptospirosis; the urine was from a sample submitted on day 1 of hospitalization. Although initial titers for leptospirosis (microscopic agglutination test) were positive to serovar Icterohemorrhagiae at 1:200, convalescent titers acquired 4 weeks later were negative for all serovars tested. The significance of the titer to Icterohemorrhagiae is unknown and may have reflected a paradoxical reaction or a false-positive test. The failure to seroconvert at 4 weeks may be a consequence of the dog's age at the time of infection.

Leptospirosis is one of the most common causes of acute renal failure, particularly when the dog is still polyuric. It can infect dogs of any age and result in multiorgan disease, including nephritis, cholestasis or hepatitis, enteritis, vasculitis, hemolysis, pneumonia, uveitis, conjunctivitis, and meningitis.

**Acute Renal Failure.** There are numerous potential causes of acute renal failure to consider, but many can be eliminated from the differential list based on history and findings on the minimum database. Toxins, such as raisins, ethylene glycol, and ibuprofen, are often suspected. However, there are typically other significant findings, such as calcium oxalate monohydrate crystals and severely hyperechoic kidneys (ethylene glycol) or profound sedation (ibuprofen), in addition to renal failure. If pyelonephritis is suspected, sediment evaluation of the urine can identify the presence of pyuria and bacteriuria.

When the cause of acute renal failure is not obvious after routine diagnostics, leptospirosis should always remain high on the differential list, especially in cases of polyuric renal failure.

Treatment should be initiated for leptospirosis pending confirmation, and continued diagnostic workup for other causes may be warranted.

**Cholestasis.** When hepatic involvement accompanies kidney failure in leptospirosis, it commonly manifests as marked elevations in serum alkaline phosphatase (ALP) and bilirubin, but typically with no or only mild elevations in serum alanine transaminase (ALT). In contrast, dogs with leptospirosis that manifests as liver disease without kidney failure typically have marked elevations in ALT and bilirubin with less significant increases in ALP.

**Pulmonary Disease.** Although relatively uncommon, dogs with leptospirosis may develop dyspnea associated with alveolar hemorrhage. This is a consequence of vasculitis induced by the organism; it manifests radiographically as a coalescing miliary or reticulonodular pattern. Supportive care with oxygen supplementation is often sufficient if the dog shows a rapid response to antibiotic therapy.

**Keratoconjunctivitis Sicca.** Conjunctivitis and ocular discharge are commonly reported findings in dogs with leptospirosis, but diminished tear production has not been previously documented. Although it cannot be stated that leptospirosis was responsible in this case, tear production was improved to 10 mm/min in both eyes (OU) 4 weeks later. It is possible that inflammation of the lacrimal glands from leptospirosis resolved with specific treatment, allowing return of normal tear production.

**Treatment.** Antibiotic therapy is typically initiated with ampicillin, administered intravenously at 22 mg/kg IV Q 8 H. Once the patient is no longer vomiting and can tolerate oral medications, a switch to doxycycline, 5 mg/kg Q 12 H, is made and continued for 3 to 4 weeks.

ACTH = adrenocorticotropic hormone; ALP = alkaline phosphatase; ALT = alanine transaminase; PCR = polymerase chain reaction

CONTINUES

**READ MORE**

Would you like to read more on this topic? Check out Dr. Harkin's Consultant on Call article—Canine Leptospirosis—published in the June 2005 issue and available at [cliniciansbrief.com](http://cliniciansbrief.com).



**DID YOU ANSWER...**

- The anemia is mild in this case, although the presence of azotemia could support a nonregenerative anemia from chronic renal failure. However, the anemia could be secondary to blood loss (gastrointestinal) or hemolysis (presence of hyperbilirubinemia). Identifying the pathophysiology of anemia in leptospirosis is of little clinical importance as it resolves with specific therapy for leptospirosis.

The leukocytosis with a mature neutrophilia and monocytosis are suggestive of a chronic inflammatory process, as is seen in fungal or rickettsial infections.

Azotemia should always be evaluated in the context of differentiating prerenal, renal, and postrenal causes. The presence of isosthenuria supports renal azotemia, although the blood urea nitrogen:creatinine ratio of > 30 suggests that there is likely a significant prerenal component to the renal azotemia.

Given the lack of history supporting corticosteroid administration and the patient being a small breed dog, cholestasis is the cause for the elevated ALP. The most common cause of renal failure with concurrent cholestasis is

leptospirosis, however, other differential diagnoses to consider include bilateral pyelonephritis with septic cholestasis, salmonellosis, acute necrotizing pancreatitis, and canine distemper. Hypoadrenocorticism would be considered due to the electrolyte abnormalities and azotemia (and absence of lymphopenia), but is much lower on the list of differentials.

- The main causes to consider for a reticulonodular pattern include viral pneumonia, hematogenously acquired bacterial or fungal pneumonia, and hemorrhage.
- A SNAP Fecal Parvo Test ([idexx.com](http://idexx.com)) is warranted for any puppy entering the hospital with a history of diarrhea and systemic illness. Leptospirosis serology and PCR on urine for pathogenic leptospires are both indicated and provide greater diagnostic yield than either test by itself. A urine culture, regardless of the inactive sediment, is also indicated. A baseline cortisol test would likely eliminate this differential diagnosis without the expense of an adrenocorticotrophic hormone (ACTH)-stimulation test.

Intravenous fluids are initiated with the goal of replacing fluid deficits within the first 10 to 12 hours, in addition to supplying fluids to cover maintenance requirements and any other ongoing losses. It is usually better to overestimate the deficit, unless the patient has become oliguric or anuric. If the patient is polyuric, continued fluid therapy is simplified by monitoring the dog's weight closely (every 4–6 H) to detect subtle changes in hydration status. When oliguria or anuria ensues, measurement of central venous pressure and urine production becomes critical. Dogs that become oliguric can be treated with mannitol and furosemide, but anuric renal failure would require hemodialysis or peritoneal dialysis.

Urine production can become marked during resolution of azotemia, often necessitating fluid rates that exceed 20 to 30 mL/kg/H. Fluid rate is gradually reduced once the dog begins eating and drinking sufficiently on its own. The dog in this case report received a maximum fluid rate of 40 mL/kg/H; azotemia was resolved 4 days after admission to the hospital and the dog was discharged the following day.

**FIND MORE**

See Aids & Resources, back page, for references and suggested reading.