

## What Is Your Diagnosis?

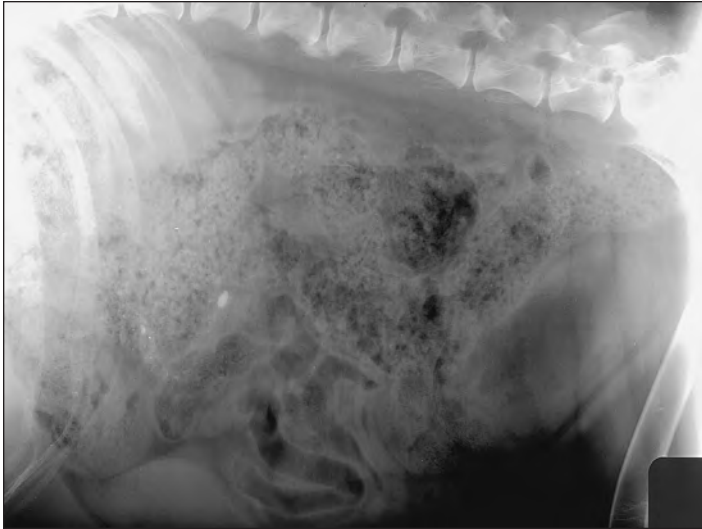


Figure 1—Lateral (left) and ventrodorsal (right) radiographic views of the abdomen of a 7-year-old castrated male dog with a 1-year history of intermittent hematuria.

### History

A 7-year-old castrated male German Shepherd Dog was referred because of a 1-year history of intermittent hematuria. Although hematuria had resolved in response to administration of trimethoprim-sulfonamide in the past, it had recently become refractory to that same treatment. The owners now described the noise of the dog's urine stream as similar to a sputtering garden hose. The only abnormalities detected during physical examination were mild paraparesis of the hind limbs with diminished conscious proprioception. Survey radiographs of the abdomen were obtained (Fig 1).

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

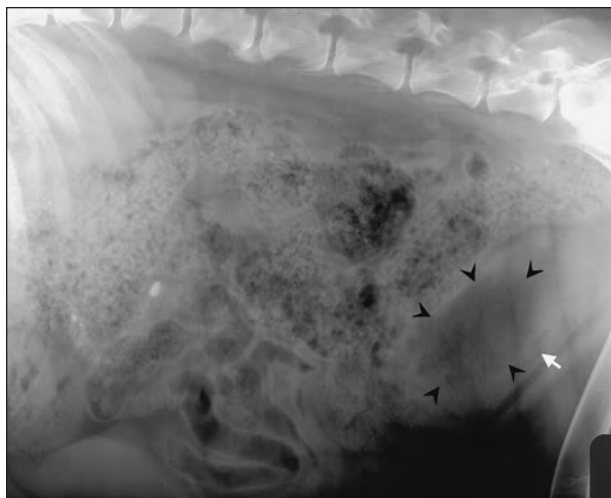


Figure 2—The same lateral radiographic view as in Figure 1. Air opacity is seen within the urinary bladder in the region of the lumen (arrow heads). In addition, foamy and linear air opacities are evident in the wall of the urinary bladder (arrow). Spondylosis is apparent in the mid-lumbar region of the vertebral column. Fecal material within the colon obscured the appearance of the urinary bladder on the ventrodorsal radiographic view.

## Diagnosis

**Radiographic diagnosis—Emphysematous cystitis (EC), pneumaturia, and lumbar spondylosis (Fig 2).**

## Comments

Emphysematous cystitis develops as the result of infection of the urinary bladder with gas-producing bacteria.<sup>1</sup> Diagnosis of EC is based on radiographic evidence of gas accumulation within the bladder wall and is often accompanied by pneumaturia, or gas inside the urinary bladder. In the absence of a history of procedures that may introduce gas (eg, cystotomy, cystocentesis, urinary catheterization), radiographic evidence of air in either the bladder wall or lumen is pathognomonic for EC. Ultrasonography will reveal gas shadowing and may be useful for identification of structural changes within the bladder associated with persistent or recurrent urinary tract infection (UTI).

Although EC typically develops as a result of infection with glucose-fermenting bacteria in humans and other animals with diabetes mellitus, it can develop in nondiabetic animals as well.<sup>1-4</sup> Laboratory abnormalities for the dog of this report included urine specific gravity of 1.025, eosinophilia, and mild increases in serum activities of liver enzymes. The urine also contained numerous RBC, WBC, and bacteria. In addition, results of a fecal examination revealed *Trichuris* spp. Abdominal ultrasonography revealed areas of acoustic shadowing within the bladder wall. The dog was treat-

ed with clavulanic acid-amoxicillin (16.5 mg/kg [7.5 mg/lb] of body weight, PO, q 12 h). Microbiologic culture of urine resulted in growth of *Escherichia coli* susceptible to the chosen antibiotic combination.

Two weeks later, the owners reported that clinical signs had resolved. Urinalysis revealed 20 to 30 RBC/HPF (40X), but neither WBC nor bacteria were detected. Emphysematous cystitis and pneumaturia were not evident on radiographs. Antibiotics were continued for 3 more weeks, and results of bacteriologic culture of the urine at that time were negative.

Although the expected prognosis for recovery from EC is good when appropriate antibiotics are administered and predisposing causes for UTI are eliminated, both UTI and EC recurred in the dog of this report. Three months after initial referral, *E coli* was again isolated from the urine. On the basis of altered antimicrobial susceptibility patterns, the dog was treated with ciprofloxacin (5.5 mg/kg [2.5 mg/lb], PO, q 12 h) for 4 weeks. Repeated bacteriologic culture of urine resulted in growth of *E coli* that was susceptible only to aminoglycosides and imipenem. Neither contrast cystography nor bladder wall biopsy revealed underlying bladder abnormalities other than those attributed to the UTI.

During the following year, the dog developed immune-mediated thrombocytopenia, degenerative myelopathy, and hepatic cirrhosis. In addition, surgery was required to remove a gastric foreign body. In response to the persistent UTI, the owners opted to administer amikacin on a periodic basis when clinical signs of infection worsened. This dog continues to have recurrent UTI and EC, but neither has progressed to radiographically detectable emphysematous pyelonephritis, a much more life-threatening clinical entity.<sup>5</sup>

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2. Root CR, Scott RC. Emphysematous cystitis and other radiographic manifestations of diabetes mellitus in dogs and cats. *J Am Vet Med Assoc* 1971;158:721-728.

3. Middleton DJ, Lomas GR. Emphysematous cystitis due to *Clostridium perfringens* in a non-diabetic dog. *J Small Anim Pract* 1979;20:433-438.

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5. Davies NL, Williams JH. Emphysematous cystitis in a non-diabetic cat. *J S Afr Vet Assoc* 1993;64:162-164.

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