



## What Is Your Diagnosis?



**Figure 1**—Left lateral (A) and ventrodorsal (B) abdominal radiographic images of an 8-year-old 5.9-kg spayed female Dachshund that had been found collapsed in its kennel after sudden-onset vomiting, hemorrhagic diarrhea, and lethargy.



### History

An 8-year-old 5.9-kg spayed female Dachshund was presented for sudden-onset vomiting, severe hemorrhagic diarrhea, and lethargy. The dog had been at a boarding facility where earlier that morning the dog was found collapsed in its kennel along with a large amount of blood on the kennel floor. The previous night, the dog showed signs of little appetite and vomited a small amount.

On physical examination, the dog was laterally recumbent and minimally responsive, had a heart rate of 200 beats/min (reference range, 80 to 130 beats/min), tacky mucous membranes, and nondetectable indirect blood pressure (attempted measurements with oscillometry). The dog had a rectal temperature of 33.3 °C (reference range, 38.0 to 39.2 °C), and severe hematochezia was detected on rectal examination. Hematologic evaluation revealed hypoglycemia (38 mg/dL; reference range, 70 to 150 mg/dL), hypoalbuminemia (1.9 g/dL, reference range, 2.5 to 4.4 g/dL), high serum amylase activity (1,261 U/L; reference range, 200 to 1,200 U/L), high BUN concentration (75 mg/dL; reference range, 10 to 30 mg/dL), high Hct (62.6%; reference range, 37% to 55%), and prothrombin and partial thromboplastin times within reference limits. Warmed lactated Ringer solution (150 mL [20 mL/kg]) followed by 5 mL of 50% dextrose in sterile water were administered IV as boluses for stabilization, and abdominal radiography was performed for evaluation of the cause for vomiting and hematochezia (**Figure 1**).

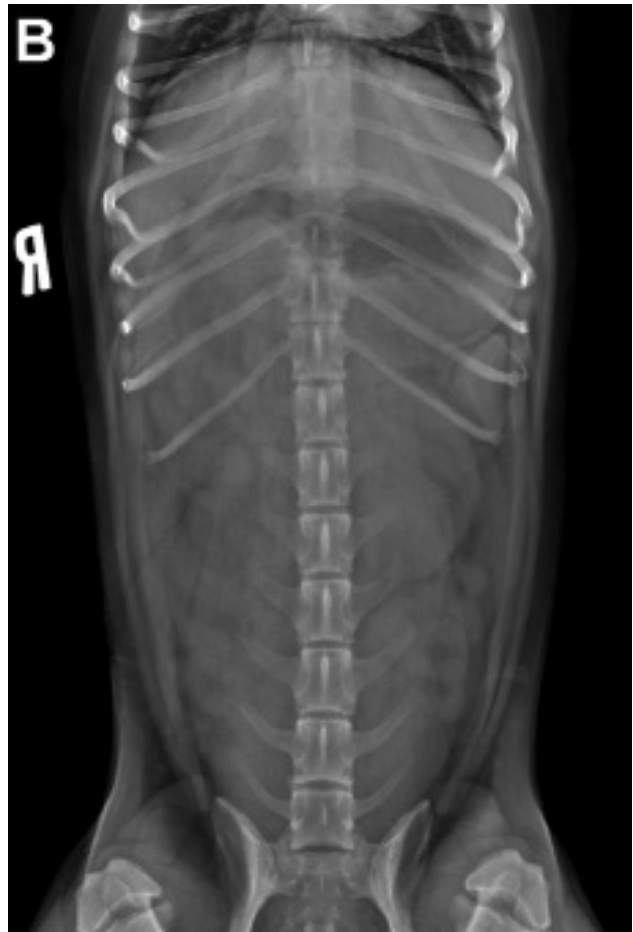
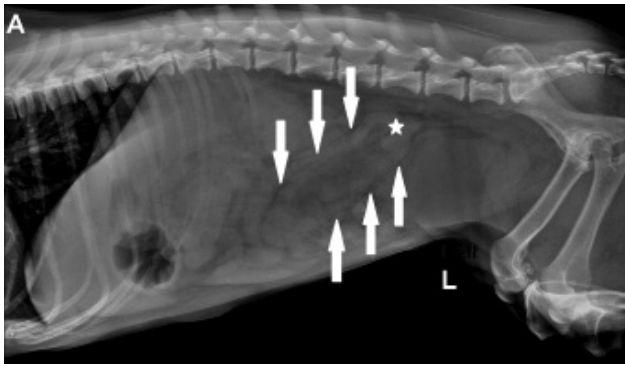
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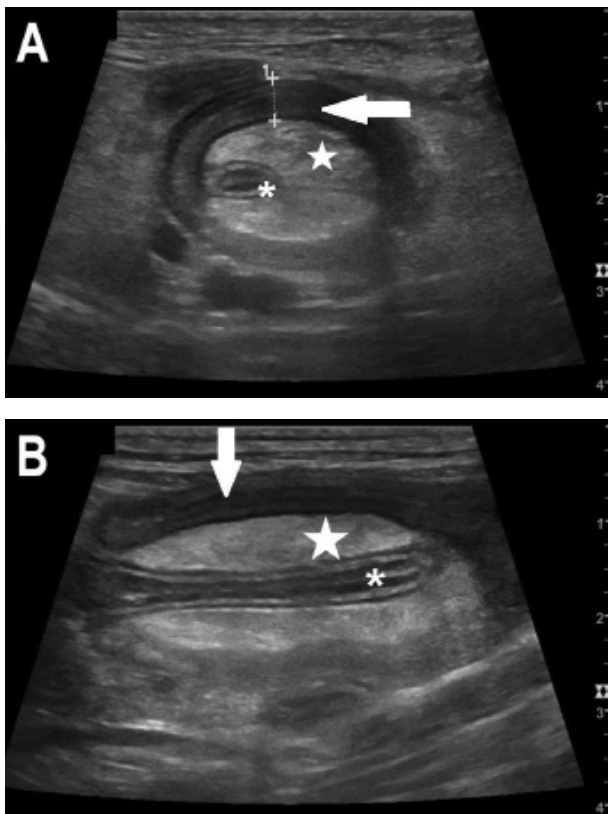
Formulate differential diagnoses, then continue reading.

### Diagnostic Imaging Findings and Interpretation

Abdominal radiographic findings included an enlarged, tubular structure in the mid to caudal region of the abdomen on the left lateral projection. Centrally, at the caudodorsal aspect of this tubular structure, there was a small, eccentrically located, well-defined round, soft tissue-opaque structure that was similar in size to most of the small intestines. Surrounding this round, soft tissue structure, was a centrally located, well-defined crescent-shaped fat opacity. Encompassing this centrally located, fat opaque material was a uniformly thick, well-defined, soft tissue rim. On the basis of these findings, we suspected a mechanical obstruction secondary to an intussusception, with the centrally located soft tissue structure representing the intussusceptum, the centrally located fat representing the intussuscepted mesentery, and the enlarged tubular structure representing the intussusciens (**Figure 2**).



**Figure 2**—Same images as in Figure 1. On the left lateral radiographic image (A) in the mid to caudal region of the abdomen, there is a large tubular structure (arrows) that has a small, centrally located, well-defined crescent-shaped fat opacity (star). These structures are not clearly identifiable on the ventrodorsal view (B).



**Figure 3**—Transverse (A) and long-axis (B) plane ultrasonographic images of intussusception identified radiographically in the dog described in Figure 1. An outer loop of jejunum (intussusciens; arrows) surrounds an inner loop of jejunum (intussusceptum; asterisks). The involved jejunal walls have a diffuse loss of layer definition and are thickened. There is also a large amount of hyperechoic fat opaque material, consistent with intussuscepted mesenteric fat (stars) between the inner layers of the intussusceptum and intussusciens. The scale on the right of each image is in centimeters.

Abdominal ultrasonography revealed a caudal abdominal abnormal structure with multilayered series of alternating hyperechoic and hypoechoic bands, loss of wall layer definition, and marked hyperechoic

mesenteric fat (**Figure 3**), confirming a distal jejunal-jejunal intussusception with intussuscepted mesenteric fat. Free fluid was also evident immediately adjacent to the intussusception. The stomach was distended with fluid, and the duodenum and segment of jejunum proximal to the intussusception were corrugated and had thickened walls. Results of color-flow Doppler ultrasonography of the intussusception indicated that blood flow was present in the involved intestines and mesenteric fat.

## Treatment and Outcome

Following radiographic identification and ultrasonographic evaluation of the intussusception, emergency surgical treatment and subsequent care were discussed with the owners. Ultimately, the owners elected euthanasia for the dog and declined necropsy.

## Comments

The dog of the present report had a less common clinical presentation of intussusception, given the jejunal-jejunal location and the age of the patient. Many conditions may predispose dogs to the development of intussusceptions, including intestinal parasitism, linear foreign bodies, previous abdominal surgery, and viral enteritis secondary to canine dis-

temper or parvovirus.<sup>1</sup> Intussusception is most commonly found in young dogs, and the most common location is the ileocolic junction,<sup>2</sup> whereas the dog of the present report was 8 years old with a jejunal-jejunal intussusception. In older patients, neoplasia may be an inciting cause, and such intussusceptions are typically seen at the ileocolic junction.<sup>3</sup> It was unknown whether intussusception was the cause of or a sequela to the concurrent vomiting and hemorrhagic diarrhea for the dog of the present report. No other abnormalities in the intestinal tract were detected on radiography or ultrasonography. Thus, given this dog's age and the rarity of idiopathic intussusception, we suspected that hemorrhagic gastroenteritis developed as a result of the stress of boarding and predisposed the dog to intussusception. The thickened but reduced definition in the layering of the affected intestinal walls seen on ultrasonography was thought to have been caused by inflammation, as previously described.<sup>4</sup> Other primary etiologies, such as infiltrative neoplasia, fungal granuloma, or immune-mediated enteropathy, were not definitively ruled out but were considered less likely.

Definitive diagnosis of intussusception with plain radiography is often difficult; however, radiographic findings for the dog of the present report had a pathognomonic appearance of a tube within a tube. Typically, the intussusceptum is surrounded by a crescent to comma-shaped gas bubble that outlines the leading edge of the intussusceptum, whereas the dog of the present report had a crescent-shaped fat opacity, representing the intussuscepted mesenteric fat between the walls of the intussusciens and intussusceptum. Another typical radiographic finding with intestinal intussusception is evidence of small intestinal mechanical obstruction. In the dog of the present report, our finding of a severely distended loop of small intestine in the mid to caudal region of the abdomen indicated surgical intervention was warranted.

Abdominal ultrasonography is the primary diagnostic tool used to definitively diagnose intussuscep-

tions, with the sensitivity and specificity reported to be 100% and 97.8%, respectively.<sup>5</sup> The described appearance is that of a target-like mass with alternating concentric rings of hyper- and hypoechoic tissue in transverse planes,<sup>5,6</sup> which was observed in the dog of the present report. Also, in this dog, color-flow Doppler ultrasonography confirmed blood flow in the involved intestines and mesenteric fat. This finding of adequate (vs inadequate) blood flow helped predict greater likelihoods of a reducible intussusception and successful surgical intervention.<sup>7</sup>

Findings for the dog of the present report were a reminder to keep intussusception on the differential diagnosis list for sudden-onset vomiting, severe hemorrhagic diarrhea, and lethargy in dogs, including older dogs. Results of our radiographic examination were atypical because intussusceptions are not commonly evident with plain radiography. Additionally, this dog had a less common location affected, and the intussusception was highlighted by fat, instead of gas. Ultrasonography is typically needed to diagnose intussusceptions; however, in this instance, ultrasonography was an ancillary procedure.

## References

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