What Is Your Diagnosis?

Figure 1—Right lateral radiographic view of the cranial portion of the abdomen of an 11-year-old Great Dane with signs of abdominal pain of 2-hours' duration and resonant abdominal distention.

History

An 11-year-old female spayed Great Dane was referred for evaluation of signs of abdominal pain and distension. The dog had become recumbent 2 hours before referral, but clinical signs had not been noticed by the owners before that time. On physical examination, the dog appeared depressed and was tachycardic (heart rate, 180 beats/min) with pulse deficits. Its abdomen was distended and resonant on percussion, and its mucous membranes were pale with prolonged capillary refill time (2.5 seconds). Results of a CBC included a stress leukogram and thrombocytopenia (184,000 thrombocytes/μl; reference range, 200,000 to 700,000/μl). Serum biochemical analyses revealed hypoglycemia (glucose concentration, 123 mg/dl; reference range, 75 to 115 mg/dl), and mildly high BUN (27 mg/dl; reference range, 6 to 22 mg/dl) and calcium (11.9 mg/dl; reference range, 8.6 to 11.2 mg/dl) concentrations. Sinus tachycardia was confirmed by means of lead-II electrocardiography.

Intravenous administration of a balanced electrolyte solution* (90 ml/kg [40.9 ml/lb] of body weight) and prednisolone sodium succinate* (30 mg/kg [13.6 mg/lb]) resulted in improved perfusion (pink mucous membranes, capillary refill time < 2 seconds, and cessation of pulse deficits); however, the dog's heart rate remained high (180 beats/min). Adequate gastric decompression could not initially be achieved by means of orogastric intubation or gastrocentesis with an 18-gauge needle, but a second attempt to pass a stomach tube yielded approximately 4 liters of hemorrhagic fluid. Abdominal radiography was performed after the dog's condition was stabilized (Fig 1).

Determine whether additional imaging studies are required, or make your diagnosis from Figure 1—then turn the page ♦
and passive leakage through the wall of an intact but distended stomach.

A resonant and tympanic abdomen is suggestive of pneumoperitoneum. The diagnosis can be confirmed radiographically; free abdominal air appears as pockets of air opacity not contained within the intestine or stomach. Visualization of the diaphragmatic crura or cupula as thin, radiopaque structures provides definitive evidence of free abdominal air. If free abdominal air is suspected, a left lateral decubitus (left recumbent/horizontal beam) radiographic view, in which the film is exposed with the dog in left lateral recumbency and the horizontally directed x-ray beam is centered on the upper portion of the abdomen, may confirm the diagnosis. If present, free abdominal air will rise along the right side of the abdominal wall to the highest point, which is often caudal to the diaphragm and adjacent to the right liver lobes. Left recumbency is preferred so that air in the abdomen is not confused with gas in the gastric fundus. When peritoneal effusion accompanies pneumoperitoneum,serosal surfaces are poorly visible and abdominal opacity may be homogeneous.

In the dog of this report, pneumoperitoneum and peritonitis were the result of gastric rupture of undetermined cause. Vascular compromise secondary to partial gastric volvulus could have caused focal necrosis and eventual perforation. Primary gastric neoplasia with necrosis or gastric ulceration could have induced a focal weakness in the gastric wall resulting in rupture. Repeated attempts to pass the stomach tube may have traumatized devitalized tissue in the gastroesophageal region and resulted in iatrogenic rupture.

In people, pneumoperitoneum without rupture of a hollow viscus is rare. The large amount of free abdominal gas and effusion identified radiographically in this dog, without evidence of a penetrating wound or history of recent abdominal surgery, indicated that prompt surgical exploration was necessary.

Diagnosis
Radiographic diagnosis—Pneumoperitoneum with mild abdominal effusion, consistent with rupture of a large hollow viscus, such as the stomach or colon (Fig 2).

Comments
A tremendous amount of free gas was seen in the peritoneal cavity. The nondependent diaphragmatic crus was evident as a thin radiopaque structure. Organs located in the ventral portion of the abdomen were difficult to evaluate because of lack of detail. The caudal thoracic portion of the esophagus was distended with air.

Exploratory laparotomy was performed. Gas distention of the stomach was moderate; however, an 8 X 8-cm perforation surrounded by necrotic and devitalized tissue was found near the gastroesophageal sphincter. The peritoneal cavity contained approximately 4 liters of hemorrhagic fluid and gastric contents. The owner elected to have the dog euthanatized because of an extremely poor prognosis. Necropsy was not permitted.

Pneumoperitoneum is the presence of free air or gas within the abdomen resulting from pathologic change or iatrogenic introduction. Pneumoperitoneum has been detected after surgery or penetrating abdominal wounds, and has been classified as spontaneous when an inciting cause is not apparent. Causes for spontaneous pneumoperitoneum in dogs include splenic necrosis, gastric perforation associated with administration of nonsteroidal anti-inflammatory drugs, sequelae of positive end-expiratory pressure ventilation, leakage of gas through an abdominal drain site,