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What Is Your Diagnosis?

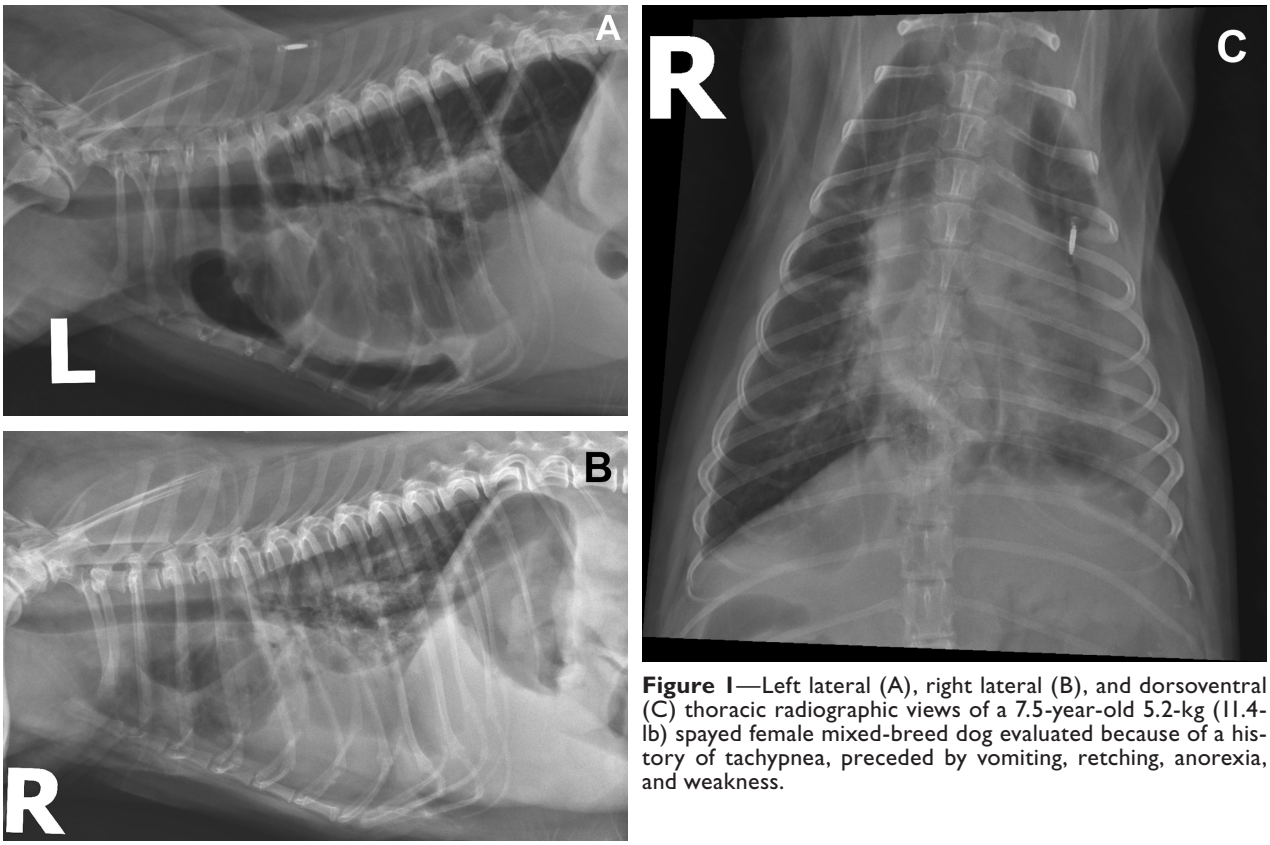

Figure 1—Left lateral (A), right lateral (B), and dorsoventral (C) thoracic radiographic views of a 7.5-year-old 5.2-kg (11.4-lb) spayed female mixed-breed dog evaluated because of a history of tachypnea, preceded by vomiting, retching, anorexia, and weakness.

History

A 7.5-year-old 5.2-kg (11.4-lb) spayed female mixed-breed dog was referred to the Ontario Veterinary College Emergency Service because of a 5-day history of vomiting, retching, and progressive tachypnea. One day after the onset of clinical signs (multiple episodes of vomiting and retching), the dog was evaluated by the referring veterinarian. Results of a CBC and serum biochemical analyses performed at that time were within reference limits, and the referring veterinarian administered maropitant citrate (1.0 mg/kg [0.45 mg/lb], SC). The vomiting did not abate, and 3 days after the onset of clinical signs, the dog developed intermittent tachypnea, pyrexia (40.1°C [104.2°F]; reference range, 38.3° to 39.2°C [100.9° to 102.6°F]), and signs of abdominal pain. Abdominal radiography was performed by the referring veterinarian, and no gastrointestinal obstruction was identified. Over the next 2 days, the dog's respiratory rate continued to increase, and the dog's appetite and strength decreased.

Five days after the onset of clinical signs, the dog was evaluated at the Ontario Veterinary College Emergency Service. On initial examination the dog was tachypneic (60 breaths/min; reference range, 18 to 24 breaths/min), tachycardic (160 beats/min; reference range, 80 to 120 beats/min), pyrexic (40.0°C [104.0°F]), and moderately dehydrated. Thoracic auscultation revealed decreased lung sounds in the right ventral lung field. Abnormalities on initial clinicopathologic analyses included low blood glucose concentration (63 mg/dL; reference range, 80 to 12 mg/dL) and high BUN concentration (30 to 50 mg/dL; reference range, 6 to 25 mg/dL). Thoracic radiographs were obtained **(Figure 1)**.

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

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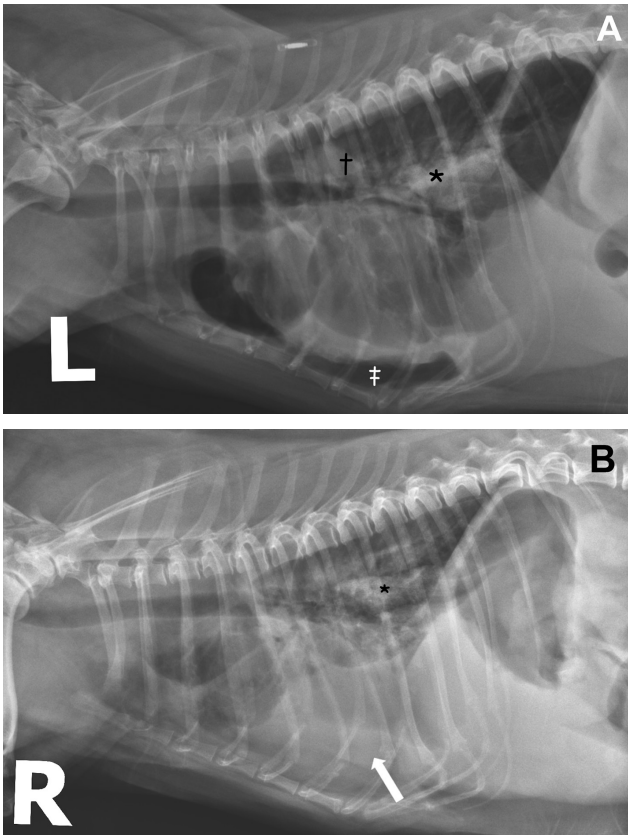

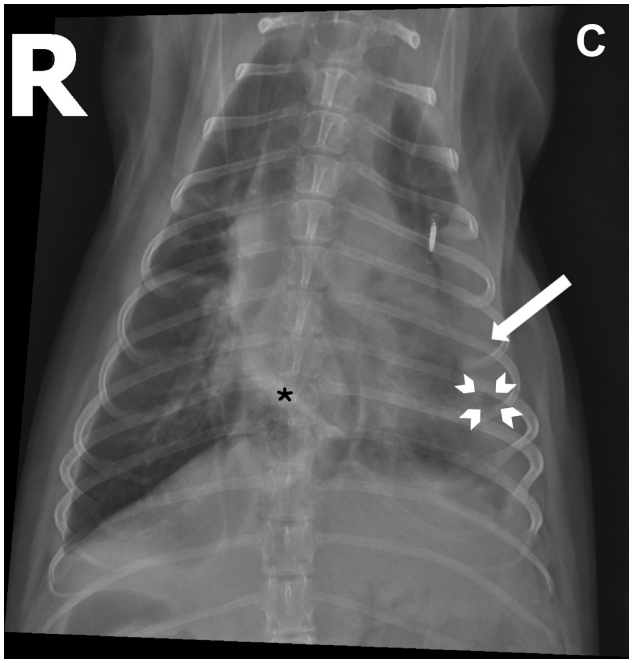

Figure 2—Same radiographic images as in Figure 1. A soft tissue-to-mineral opaque structure is evident in the area of the caudal region of the esophagus (asterisk; A through C). A moderate amount of pleural fluid is in the left hemithorax (arrow; B and C). Several gas bubbles are present in the pleural space, with the largest adjacent to the left caudal lung lobe (arrowheads; C). A focal soft tissue opacity (dagger; A) is evident dorsal to the carina, consistent with loculated pleural effusion or a second esophageal foreign body. The heart is elevated from the sternum, with no visible pulmonary vasculature between the heart and sternum (double dagger; A). A positive silhouette sign, owing to the presence of a diffuse interstitial pulmonary pattern, partially obscures pulmonary vasculature in the left caudal lung lobe.

Diagnostic Imaging Findings and Interpretation

Thoracic radiography revealed a 3.4-cm-long, soft tissue-to-mineral opaque, poorly defined linear structure in the caudal region of the esophagus between the base of the heart and the diaphragm. On the dorsoventral radiographic view, this abnormal structure was obliquely oriented in the caudal region of the esophagus and was superimposed with T9. In addition, on the left lateral radiographic view, a focal soft tissue opacity dorsal to the carina was evident as well as elevation of the heart from the sternum, with no visible pulmonary vasculature between the heart and sternum. Further, moderate pleural effusion in the left hemithorax with retraction of the caudal regions of the left cranial and left caudal lung lobes from the thoracic wall and mild rounding and scalloping of the lung margins was evident on the dorsoventral and right lateral radiographic views. Several gas bubbles were present in the pleural space, with the largest located adjacent to the left caudal lung lobe and superimposed with the eighth intercostal space as observed on the dorsoventral radiographic view. A positive silhouette sign, owing to the presence of a diffuse interstitial pulmonary pattern, partially obscured pulmonary vasculature in the left caudal lung lobe.

On the basis of findings from physical and radiographic examinations, a foreign body in the caudal region of the esophagus was diagnosed. Given the identified foreign body and left-sided pneumohydrothorax without prior thoracocentesis, an esophageal perforation secondary to the foreign body was also likely. The interstitial pulmonary pattern was attributed to pulmonary atelectasis, and the rounding of the lung lobe margins was attributed to pleuritis. The soft tissue opacity dorsal to the carina was considered to represent loculated pleural effusion because the opacity appeared too dorsal to be within the esophagus. However, because the dorsal and ventral aspects of the esophagus in that area could not be confidently identified, a second esophageal foreign body was also a differential diagnosis.

Treatment and Outcome

Thoracocentesis was performed and yielded a cloudy pink to white fluid. Results of cytologic examination of the fluid sample indicated substantial numbers of degenerated neutrophils with intracellular cocci and bacilli. The tentative diagnosis of esophageal foreign body with secondary perforation and pyothorax was discussed with the owners. The owners elected to have the dog euthanized and a necropsy performed. The necropsy was performed by a board-certified veterinary pathologist and revealed an enlarged (2.5-cm-diameter), firm section of the caudal region of the esophagus that contained a 3 X 2 X 1.5-cm bone foreign body that was surrounded by friable yellow material, consistent with fibrin and ingesta. Removal of the foreign body revealed 2 well-demarcated, 2-cm-diameter red depressions in the esophageal

lumen mucosal surface. In the center of 1 depression was a 0.5-cm-diameter, round, full-thickness perforation through the esophageal wall. The dog's mediastinal fat was subtly roughened with scattered red pinpoint foci, consistent with congestion. The thorax contained approximately 50 mL of cloudy pink to white fluid, and the lung lobes were collapsed and mottled pink and red, consistent with partial aeration. Parenchymal collapse was more prominent in the left lung lobes. Bacterial culture of the pleural fluid isolated *Enterococcus faecium* and *Lactobacillus paracasei*. Results of histologic examination of pulmonary parenchyma and pleural tissue indicated atelectasis and mild neutrophilic pleuritis.

Comments

An esophageal foreign body constitutes a veterinary emergency. The duration of time that a foreign body is in the esophagus positively correlates with the degree of esophagitis and duration of hospitalization.[1] Further, esophageal perforation is a sequela in the most severe cases.[2]

Thoracic radiography is extremely sensitive (> 96%) in detecting esophageal foreign bodies.[2] In many cases, a single lateral radiographic view is sufficient for accurate diagnosis because the most common esophageal foreign body in dogs is bone, the mineral opacity of which is easily differentiated from the adjacent soft tissue opacity of the esophagus.[3,4] Furthermore, there is usually marked gas accumulation evident in the orad and aborad compartments of the esophageal lumen.[4] However, orthogonal radiographic views provide much more information than a single radiographic view, and the radiographic examination of the dog in the present report reflected the importance of obtaining at least 2 orthogonal views. In some cases, definitive diagnosis of an esophageal foreign body and perforation is not possible by radiographic examination alone.[2] Such could occur with summation of a soft tissue opaque foreign body with the surrounding esophagus and has also been documented in dogs with mineral foreign bodies.[3] In the dog of the present report, the concurrent pneumohydrothorax decreased the conspicuity of the esophageal foreign body, and the lack of substantial gas distension in the orad and aborad compartments of the esophageal lumen was considered atypical.

The radiographic diagnosis of esophageal perforation is not well described in the veterinary literature; however, in human medicine, a number of radiographic signs that accompany esophageal perforation have been described.[5] The most acute finding (< 1 hour after a foreign body becomes lodged in the esophagus) is mediastinal emphysema, followed by mediastinal widening and pleural effusion that occurs several hours later. Pneumohydrothorax can also occur, and the pleural effusion is usually right-sided if the mid region of the esophagus is affected and left-sided if the defect is more distal.[5] Similar but not identical results describing esophageal foreign bodies in combination with pneumohydrothorax have been reported in dogs.[6] Compared with dogs without esophageal perforation, dogs with perforation are less stable and may have abnormal respiratory signs (including tachypnea and hyperpnea) and derangements in vital signs consistent with systemic inflammatory response syndrome or sepsis.[6] In the dog of the present report and those described in a previous report,[6] no mediastinal gas or effusion was seen, even though the presence of such is a key early sign of esophageal perforation in humans. Similarly, in a large retrospective study[3] of 19 dogs with esophageal foreign bodies and perforations, pneumothorax was present in 14 dogs, pyothorax in 4, and pneumomediastinum in 3. The reason for the low occurrence of pneumomediastinum is not known; however, pneumomediastinum is an acute finding, and the low occurrence in dogs may be because dogs are generally examined later after incidents than are humans. Thus, dogs may be initially evaluated more commonly after pneumomediastinum has already progressed to pneumothorax, with or without pleural effusion.

The dog in the present report had clinical and radiographic signs that mirrored those seen in human medicine[5] and the aforementioned veterinary report.[6] The predominantly left-sided pneumohydrothorax in combination with the soft tissue-to-mineral opaque structure in the caudal region of the esophagus raised the suspicion for an esophageal foreign body and subsequent perforation at that location. However, in cases where an esophageal foreign body with or without perforation is suspected but not readily identified, further information can be obtained with thoracic CT.[7] If advanced imaging is not available, contrast esophagography can be contemplated, although risks of aspiration pneumonia must be considered. Because of the concern for contrast medium-induced mediastinitis and the potential need for surgery, we recommend to first perform contrast esophagography with a low-osmolarity iodinated contrast medium to help diagnose large esophageal perforations. In dogs with negative results from such esophagography, following with a barium study may help identify small perforatons.[4]

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