What Is Your Diagnosis?

Figure 1—Left lateral (A) and ventrodorsal (B) radiographic views of the thorax of a female domestic shorthair cat from a local shelter that developed diarrhea following ovariohysterectomy.

History

A 1-year-old sexually intact female domestic shorthair cat from a local shelter was admitted to the University of Wisconsin School of Veterinary Medicine for ovariohysterectomy. Physical examination findings were unremarkable; heart and lungs sounded normal on auscultation. Following routine ovariohysterectomy, the cat developed diarrhea and a fecal flotation test was performed. On the basis of findings on fecal flotation testing, 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. On the ventrodorsal view, notice the 3 indistinct nodular interstitial areas (arrows) in the right caudal lung lobe. On the left lateral view, it is evident that the most cranial lesion is a well-defined cyst, while the caudal-most nodules remain poorly defined (arrows). There is a heavy bronchial pattern. Mild cardiomegaly, pulmonary artery enlargement, and sternal lymphadenopathy are evident.

Radiographic Findings and Interpretation

Three focal areas of increased opacity, including 1 discrete thick-walled, gas-filled pulmonary nodule and 2 poorly defined consolidations, are evident in the right caudal lung lobe (Figure 2). Throughout the lung fields, a diffuse bronchial pattern is apparent; there is increased opacity in the area of the sternal lymph node. Additional findings include a mildly enlarged cardiac silhouette with pulmonary artery enlargement. The discrete gas-filled cyst and soft tissue nodules combined with a bronchial pattern are most consistent with paragonimiasis. Less likely diagnoses are bacterial abscess, metastatic neoplasia, or bronchoalveolar carcinoma. A heartworm antibody test result was negative, and mild tricuspid regurgitation caused by dysplasia was detected on echocardiography. There was no evidence of cardiac chamber or wall enlargement and no evidence of pulmonary hypertension.

Comments

The geographic distribution of the intermediate hosts of the trematode Paragonimus kellicotti limits the disease to cats of the Midwestern and Southeastern United States. However, with the common practice of moving sheltered animals long distances after natural disasters, veterinarians in all geographic areas should be aware of diseases that previously were regionally localized.

The appearance of pulmonary paragonimiasis on radiographic views of the thorax varies with the stage of infection. The initial finding is patchy consolidation caused by a hemorrhagic air space as a result of worm migration, followed by the formation of a cystic cavity around the developing fluke. Communication from the cyst to a bronchiole allows air to enter the cyst and may also result in localized bronchiectasis. Radiographic changes in cats have been reported to be early ill-defined nodules, with progression to well-defined cystic nodules by 65 days after infection.

Two intermediate hosts are necessary for completion of the life cycle of *P. kellicotti*, the first being an aquatic snail. Cats become infected with *P. kellicotti* after ingesting freshwater crayfish, the second intermediate host, infected with metacercariae. Metacercariae excyst in the stomach or intestines of cats and migrate in the peritoneal cavity, penetrating the diaphragm into the pleural cavity. Lesions of both the pleural surface and lung parenchyma may result from the formation of cystic cavities around the fluke, where it matures and produces eggs. *Paragonimus kellicotti* flukes, which are the size of coffee beans, often develop in the right caudal lung lobe because of the close proximity of the small intestine to the right caudal lobe. Eggs produced in the cystic cavities communicate with bronchioles and are coughed up and swallowed, exiting in feces approximately 5 to 7 weeks after infection.

The cat of this report did not have any signs of respiratory disease prior to anthelmintic treatment, despite multiple lesions of *P. kellicotti* and the recent history of anesthesia. The most common clinical sign associated with pulmonary paragonimiasis is coughing. Pneumothorax has been reported to be associated with rupture of the parasitic cyst or communication of the cyst with the pleural surface. Cats may lack clinical signs, as in this infected cat, and only by the detection of *P. kellicotti* eggs on fecal flotation testing is infection detected. *Paragonimus kellicotti* eggs are less buoyant than other parasite eggs, making fecal sedimentation techniques preferred for earlier diagnosis of infection.

Paragonimiasis was treated with fenbendazole (50 mg/kg [22.7 mg/lb], PO, q 24 h for 14 days), and diarrhea was treated with metronidazole (16 mg/kg [7.3 mg/lb], PO, q 12 h for 10 days) and SC administration of lactated Ringer’s solution. The cat developed a slight cough. Inflammation or infection associated with parasitic death was suspected. The cat was treated with doxycycline (5 mg/kg [2.3 mg/lb], PO, q 12 h for 3 weeks) and theophylline (25 mg/kg [11.4 mg/lb], PO, q 24 h for 2 months). On recheck evaluation 2 months after treatment, the cat no longer had a cough and findings on physical examination were unremarkable. Fecal flotation and sedimentation testing were repeated and yielded negative results. Thoracic radiography revealed resolution of the thick-walled cysts, but the bronchial pattern persisted.