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What Is Your Diagnosis?

In collaboration with the American College of Veterinary Radiology

History

A 2-year-old 4.3-kg spayed female domestic shorthair cat was presented with a 2-hour history of acute dyspnea, with no history of cough, sneezing, or nasal discharge. The cat had reportedly become anorectic and lethargic in the 24 hours prior to presentation. The cat had been adopted as a stray cat 2 years earlier but had been an indoor-only cat for the past year and regularly received routine heartworm, flea, and endoparasite prevention. Although there was no history of recent outdoor exposure, travel history in the 6 months prior to presentation included the states of Kansas, South Carolina, and Texas. One other cat lived in the household and was reportedly healthy.

Physical examination revealed a high rectal temperature (40.9 °C) and tachypnea (130 beats/min) with increased expiratory effort and no open-mouthed breathing. Thoracic auscultation revealed diffusely increased bronchovesicular sounds and normal cardiac sounds. The right mandibular lymph node was large (3 cm) and firm. Results of a fundic examination were unremarkable.

Oxygen saturation as measured by pulse oximetry was low (90%) while the cat was breathing room air but increased in response to oxygen supplementation. Results of point-of-care tests for FeLV, FIV, and heartworm infection were negative. A CBC demonstrated normocytic, normochromic nonregenerative anemia (Hct, 30% [reference interval, 35% to 50%]; reticulocytes, 10 X 10^3 cells/µL [reference interval, 10 to 60 X 10^3 cells/µL) and an inflammatory leukogram with a neutrophil count within reference limits (6,600 cells/µL; reference interval, 1,900 to 8,100 cells/µL) but high band neutrophil count (800 cells/µL; reference interval, 0 to 100 cells/µL). Serum biochemical testing demonstrated hyperbilirubinemia (0.6 mg/dL; reference interval, 0.0 to 0.2 mg/dL). Cytologic evaluation of a fine-needle aspirate of the right mandibular lymph node demonstrated marked neutrophilic inflammation and necrosis with intra- and extracellular cocci. Three-view thoracic radiography was performed **(Figure 1)**.

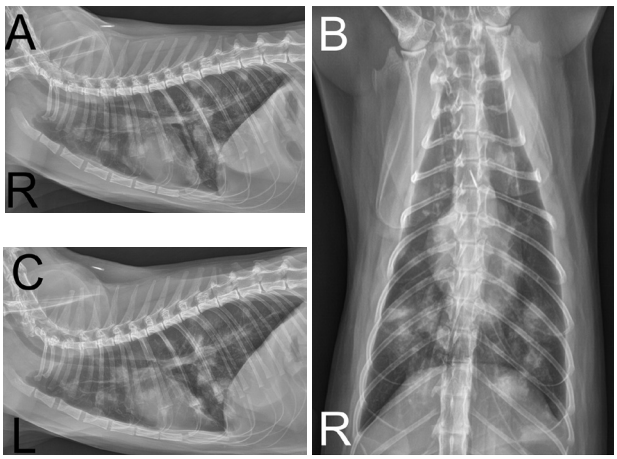

Figure 1—Right lateral (A), ventrodorsal (B), and left lateral (C) thoracic radiographic images of a 2-year-old spayed female domestic shorthair cat with acute dyspnea.

Formulate differential diagnoses, then continue reading.

Diagnostic Imaging Findings and Interpretation

There were multiple, ill-defined soft-tissue-opaque nodules of various sizes throughout the lungs but mainly within the caudal lung lobes **(Figure 2)**. The largest nodule measured approximately 14 mm in diameter. The cardiac silhouette, pulmonary vasculature, pleural space, and mediastinum were unremarkable. Primary differential diagnoses for multiple soft-tissue pulmonary nodules included granulomas, with highest priority given to fungal or parasitic disease, and neoplasia, with the latter considered less likely given the patient's signalment.

Treatment and Outcome

Fine-needle aspiration of the pulmonary nodules was performed under ultrasound guidance. Cytologic evaluation of the aspirates demonstrated marked inflammation consisting of degenerate neutrophils and a lesser number of foamy macrophages. There were numerous intra- and extracellular cocci and

Anna Watson, DVM[1]; Sarah Krueger, DVM[1]; Erica Chávez-Peón Berle, DVM[1]; David S. Biller, DVM, DACVR[1]; Linn Clarizio, DVM[2]; and Maria C. Jugan, DVM, MS, DACVIM[1]*

[1]Department of Clinical Sciences, College of Veterinary Medicine, Kansas State University, Manhattan, KS
[2]Department of Diagnostic Medicine/Pathobiology, College of Veterinary Medicine, Kansas State University, Manhattan, KS

*Corresponding author: Dr. Jugan (mjugan@vet.k-state.edu)

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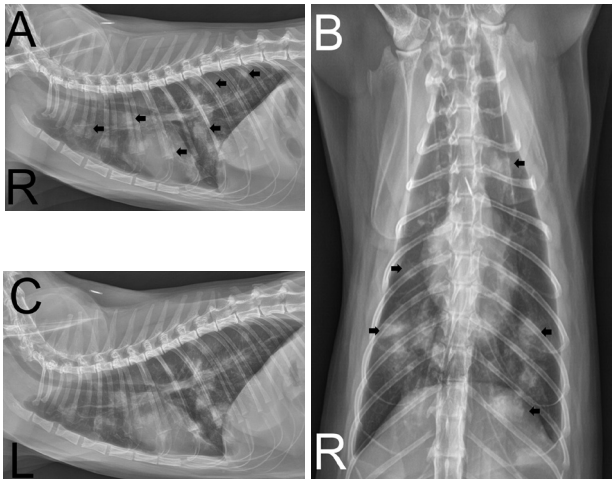

Figure 2—Same images as in Figure 1. There are multiple, ill-defined soft-tissue nodules throughout all lung lobes (arrows).

intra- and extracellular rod bacteria. Aspirate samples from the pulmonary nodules were insufficient for bacterial culture. However, aerobic culture of samples from the mandibular lymph node yielded abundant colonies of *Neissera animaloris*; results of anaerobic culture were negative for bacterial growth.

The cat was prescribed ampicillin-sulbactam (30 mg/kg, IV, q 8 h) while in the hospital and was then transitioned to amoxicillin-clavulanate (14.5 mg/kg, PO, q 12 h) at discharge. Recheck thoracic radiography was recommended 2 weeks following discharge. Unfortunately, the cat was not returned for a follow-up appointment but received a 4-week course of antimicrobial treatment. Two months after the initial presentation, the cat was reportedly normal at home, with no coughing or increased respiratory effort.

Comments

It has been established that certain radiographic lung patterns can be more commonly associated with specific pathologic disorders. For instance, acute bacterial pneumonia is an uncommon diagnosis in cats with diffuse, pulmonary parenchymal disease.[1,2] Although an alveolar radiographic pattern is commonly associated with aspiration pneumonia or pneumonitis and with atelectasis secondary to bronchial mucus obstruction in cases of feline inflammatory airway disease,[1] diffuse interstitial patterns have been described in cats with hematogenous pneumonia.[1,2]

Common differential diagnoses for a diffuse, structured interstitial pattern on feline thoracic radiographs include neoplasia (eg, lymphosarcoma or metastatic carcinoma)[1,2] and non-bacterial infectious diseases (eg, lung worms, fungal pneumonia, and toxoplasmosis),[1–4] with neoplasia being most common.

Although cytologic examination and bacterial culture were needed for a definite diagnosis in the case described in the present report, radiographic detection of a structured interstitial pattern identified a target for minimally invasive sampling, in contrast with bronchoalveolar lavage. As in the present report, ultrasound-guided fine-needle aspiration of the pulmonary parenchyma has been described as an accurate diagnostic test (80% to 100% accuracy).[2,3] Although a sufficient sample for bacterial culture was not obtained from the pulmonary fine-needle aspirate in this case, it was presumed that the etiologic agent for the pulmonary disease was the same as the bacteria isolated from the peripheral lymph node. *Neisseria* spp are generally considered commensal diplococcal bacteria of mucosal surfaces, including the oral cavity, in cats. However, a 2021 report by Makino et al[5] implicated *Neisseria* spp as the cause of pneumonia in 2 cats with a mixed alveolar to interstitial radiographic pattern and nodular gross appearance to the pulmonary parenchyma. The site of origin of the infection was undetermined for the cat in the present report and for cats in that previous report. However, inoculation via bite wounds was described in a case report of a dog by Cobiella et al,[6] and bite interaction with the other household cat was considered possible. Although the rod bacteria seen cytologically were not characterized by means of bacterial culture, they were presumed to be pathogenic owing to their intracellular localization. Aerobic, microaerophilic, and anaerobic bacterial organisms with rod morphology have been reported as causes of pyothorax and pneumonia in cats,[7] whether through traumatic inoculation or opportunistic infection by normal flora.

Obtaining a rapid and accurate diagnosis was likely key to the positive outcome in the present case, in that cats with acute dyspnea secondary to bacterial pneumonia may rapidly decompensate without antimicrobial treatment.[2] Hematogenous bacterial pneumonia, although uncommon in cats, should be considered as a differential diagnosis for acute respiratory distress with diffuse, structured pulmonary interstitial disease, especially in young cats with concurrent findings of fever and an inflammatory leukogram.

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