What Is Your Diagnosis?

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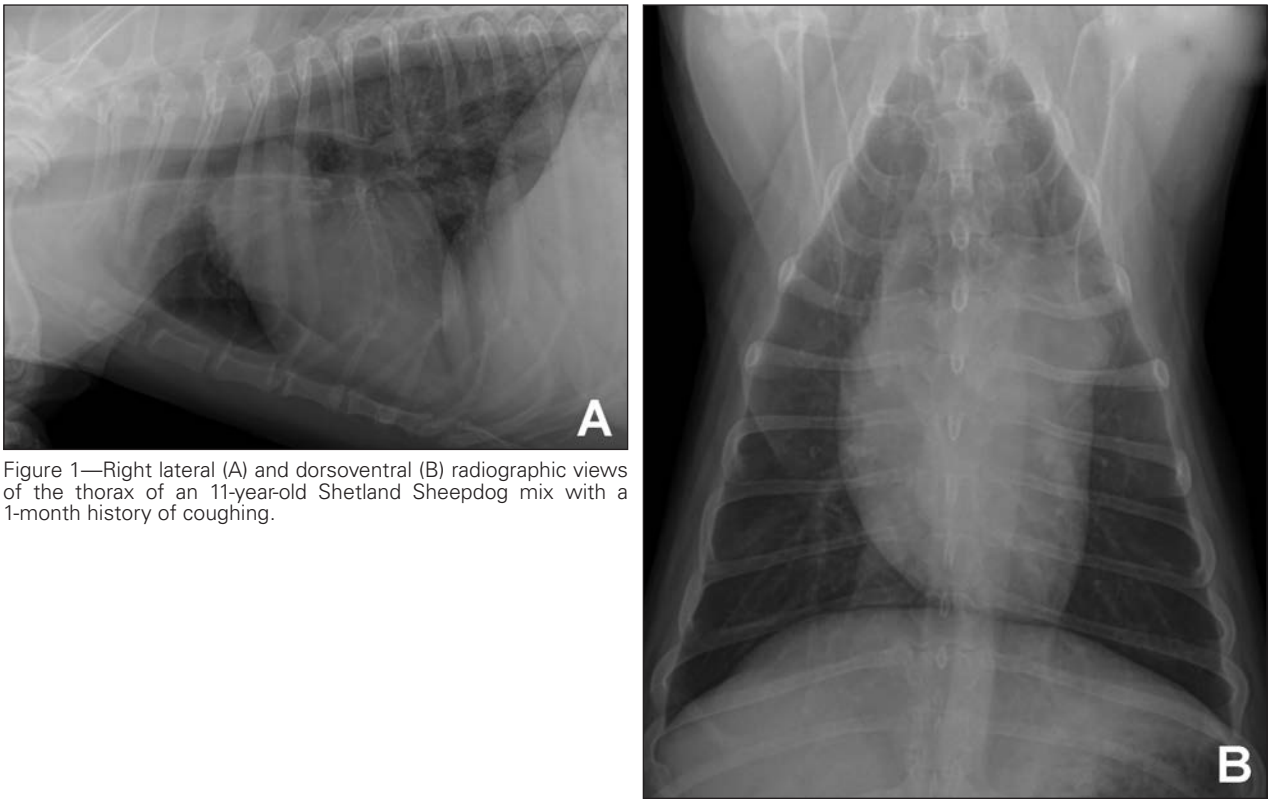

Figure 1—Right lateral (A) and dorsoventral (B) radiographic views of the thorax of an 11-year-old Shetland Sheepdog mix with a 1-month history of coughing.

History

An 11-year-old 9.1-kg (20.0 lb) castrated male Shetland Sheepdog mix was referred because of a 1-month history of coughing. No abnormalities were found on physical examination. No clinical improvement had occurred with previous empirical treatment with antimicrobials. Thoracic radiographs had been taken by the referring veterinarian to evaluate pulmonary and cardiovascular structures (**Figure 1**).

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

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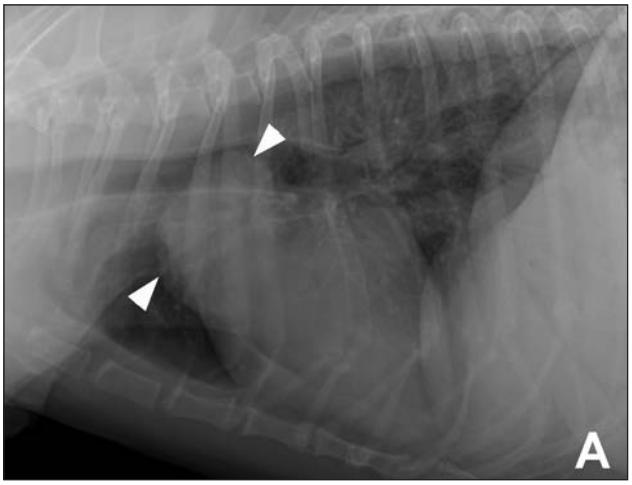

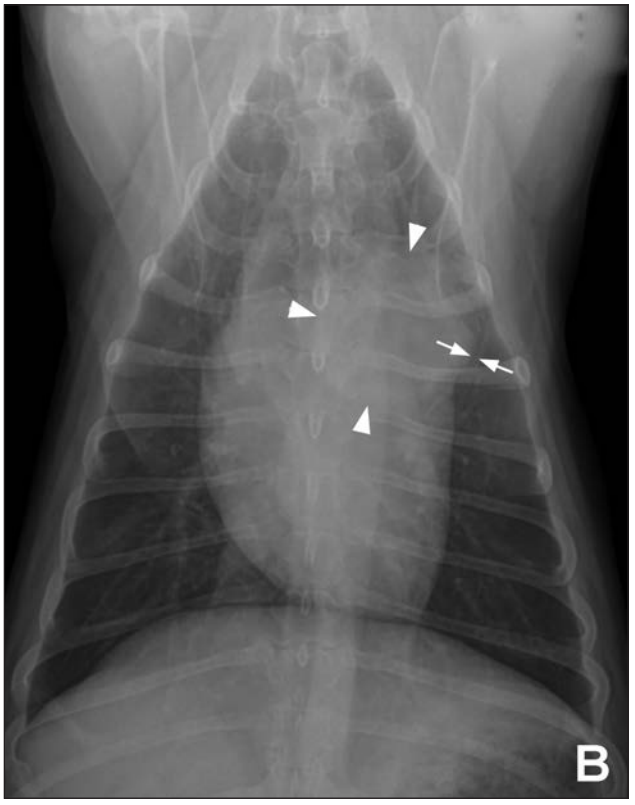

Figure 2—Same radiographic images as in Figure 1. An oval, soft tissue opacity mass is seen in the region of the main pulmonary artery, at the craniodorsal aspect of the cardiac silhouette on the right lateral view (arrowheads) and at the left cranial aspect of the cardiac silhouette on the dorsoventral view (arrowheads). On the dorsoventral view, notice the margins of the compressed left cranial lobar principal bronchus (arrows).

Diagnostic Imaging Findings and Interpretation

An ovoid, soft tissue opacity mass is evident at the craniodorsal aspect of the cardiac silhouette on the right lateral view and confluent with the left cranial aspect of the cardiac silhouette on the dorsoventral view, appearing similar to an enlargement of the main pulmonary artery (**Figure 2**). There is caudolateral displacement and compression of the left cranial principal bronchus at the level of the fourth and fifth intercostal spaces. The remaining thoracic structures appear normal.

A heart base tumor was suspected on the basis of these findings, with other possible differential diagnoses of right atrial mass, pulmonary artery aneurysm, tracheobronchial lymphadenopathy, or left cranial pulmonary mass directly abutting the cardiac silhouette. An echocardiogram was obtained to further evaluate the suspected mass. A 2.5 × 3.5-cm, hypoechoic, mildly heterogenous mass was visible within or adjacent to the main pulmonary artery. Blood flow in the pulmonary artery was laminar with a normal flow velocity of 1.1 m/s, revealing no evidence of obstruction to flow through the main pulmonary artery. It was not possible to determine whether the mass was intraluminal or extraluminal on the basis of echocardiography alone, and advanced imaging was recommended.

Computed tomography and pulmonary CT angiography were performed. The mass was visualized immediately to the left of the main pulmonary artery, craniomedial to the left cranial lobar bronchus. The mass was of soft tissue attenuation (50 to 60 Hounsfield units), measured 5 × 3 × 3.5 cm, and caused compression of the main and left pulmonary arteries as well as the left cranial lobar bronchus (**Figures 3 and 4**). There was no evidence of either pulmonary metastasis or intraluminal vascular invasion by the mass. Delayed postcontrast imaging was not performed.

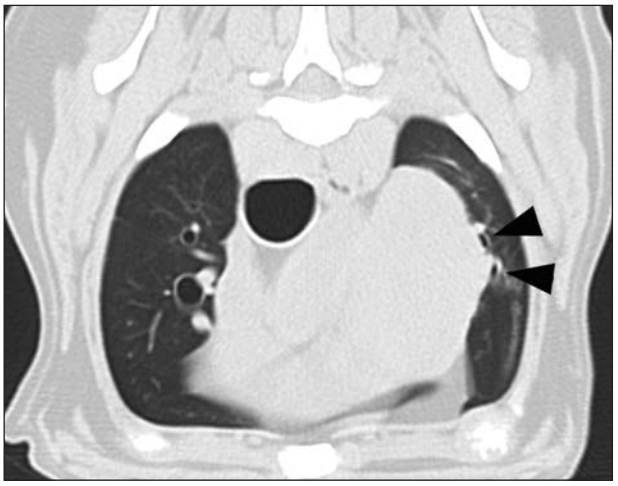

Figure 3—Transverse CT image (lung algorithm; window width, 1,600 Hounsfield units; window level, 550 Hounsfield units; slice thickness, 3 mm) of the thorax taken at the level of the caudal aspect of T3 of the same dog as in Figure 1. Bronchial compression by the heart base mass (arrowheads) is evident.

Treatment and Outcome

The treatment options presented to the owner of this patient included thoracotomy for attempted resection and complete pericardiectomy or thoracoscopic partial pericardiectomy. Given the age of the patient and the slow-growing nature of the heart base tumor, the owner decided not to directly address the

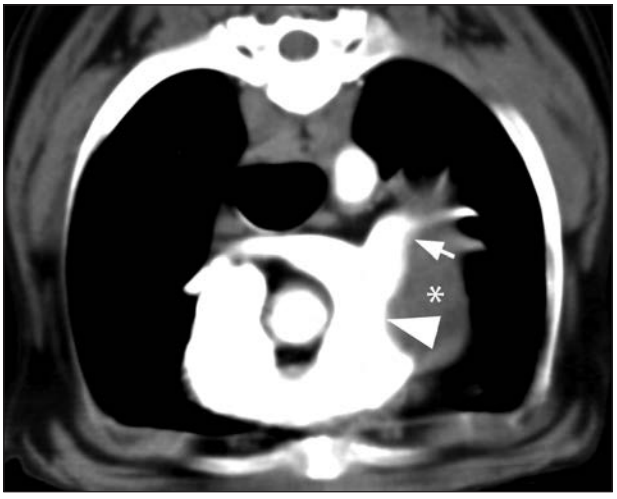

Figure 4—Transverse oblique reconstruction CT angiogram of the main pulmonary artery of the same dog as in Figure 1. A heart base mass is identified (asterisk). Compression of the contrast-filled main (arrowhead) and left (arrow) pulmonary arteries is present.

mass and to treat the cough on the basis of clinical signs.

Comments

Masses originating at the heart base may include hemangiosarcomas, chemodectomas, ectopic thyroid carcinomas, and other rare tumors. Although hemangiosarcoma is by far the most common cardiac tumor,[1] the location, echotexture, and clinical behavior of this patient's tumor suggested that hemangiosarcoma was less likely.

The most common heart base tumor is chemodectoma, a neuroendocrine tumor originating from the chromaffin cells of the aortic body.[1] Chemodectomas are slow to metastasize, but patients often develop pericardial effusion, cardiac tamponade, or signs of right-sided congestive heart failure, including anorexia, weight loss, weakness, abdominal distention, dyspnea, and occasionally cough.[2] Cough is typically due to mainstem bronchial compression secondary to large volume pericardial effusion. The dog of this report likely was coughing secondary to direct bronchial compression by the mass. The definitive treatment for heart base tumors is excision; however, most of these masses are not resectable and pericardiectomy alone (total or subtotal) has been shown to increase survival time of patients with chemodectomas to a median of 730 days from a median of 42 days in those without the procedure.[3]

Although a definitive histopathologic diagnosis was not made in this case, a combination of radiography, 2-D and color flow Doppler echocardiography, and CT was used to characterize the mass and to guide treatment recommendations. A cranial mediastinal mass may be suspected on radiographs given a soft tissue opacity on or close to midline that deviates the trachea.[4] Differentiation of a mediastinal mass from a lung mass may not be possible on plain radiographs.[4] Given the superimposition of anatomic structures and poor contrast resolution inherent in radiography, alternate imaging techniques such as CT and echocardiography play a complementary role in the evaluation of thoracic masses.[5–7] Echocardiography allows measurement of the lesion and visualization of the involvement of surrounding structures.[7] Computed tomography can provide additional information, including identification, location, and extent of pathological changes.[5] Computed tomography is often helpful in planning resection or debulking because it provides 2-D images through multiple planes of the body with greater detail of different tissue types and potentially allows 3-D reconstruction of individual structures. Radiography alone is often the mainstay imaging modality for the detection of pulmonary metastases but provides a low sensitivity for their identification.[6] The use of CT greatly improves the ability to detect pulmonary metastases, which are often not visible on radiographic images.[6] In this case, CT was also able to confirm bronchial compression as a cause for the patient's main clinical sign of coughing.

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