1966

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Bronchogenic Adenocarcinoma in the Dog

Kay Harken

HISTORY AND CLINICAL FINDINGS:

A nine-year-old male Irish Setter was presented at the Iowa State University Stange Memorial Clinic on July 28, 1966. The owner noticed that the dog had become listless and weakened about the first of July and had become progressively worse since that date. The animal was in a very weakened state and the mucous membranes appeared cyanotic.

The blood picture revealed that the animal was not anemic but had an elevated white blood cell count. The blood urea nitrogen was 97 mg% and the serum glutamic pyruvic transaminase was 25 Units. Microfilaria from a blood sample were identified as *Dirofilaria immitis*. This was congruent with the history that the dog had moved from Arkansas two years previously and had always lived near a river or other body of water. No information was available as to whether the dog had been treated for heartworms previously.

Radiographs were taken of the thorax and abdomen. Upon examination, the radiographs revealed that both the right and left ventricle of the heart were greatly enlarged. There was an area of increased density that appeared either around the heart or in the left cardiac lobe of the lung. The lungs exhibited extreme congestion. No other radiographic findings of clinical importance were noted.

Other clinical findings included a heart murmur of undetermined origin. A diagnosis of chronic pneumonia and heartworms with resulting cardiac insufficiency was made clinically.

The dog was treated with penicillin, saline and dextrose intravenously. A liquid, pre-digested diet was given as the dog was very debilitated and not eating. The animal did not show any response to the therapy and died on August 2, 1966.

GROSS NECROPSY FINDINGS:

Examination of the lungs revealed a diffuse pulmonary congestion with multiple areas of consolidation. The bronchial tree was filled with a blood tinged mucus. What appeared to be a scar from a healed abscess was noted on the left cardiac lobe of the lung. There were no enlargements or abnormalities noted in the bronchial lymph nodes.

The surface of the heart exhibited many linear pale areas especially on the left heart. Upon opening the right heart, no adult heartworms were found. Multiple focal white areas, however, were noted under the endocardium of the right heart. The pulmonary artery and the vena cava exhibited no evidence of adult heart...
worms. The myocardium of the left heart appeared to be diffusely infiltrated with many apparently septic infarcts in various stages of healing. A vegetative valvular endocarditis was noted on the left atrioventricular valves. The gross picture of the entire left heart was one of a severe myocarditis of long standing.

The liver was markedly congested. Two circumscribed cystic lesions 3 cm. in diameter were noted near the surface of the liver. The cystic areas appeared to be blood-filled.

The kidneys exhibited multiple renal infarcts of both long and short duration. Within the left pectoral muscles a small lesion resembling an old abscess was noted. A similar lesion was noted near the aorta.

Sections were taken for histologic examination. A sample of blood was taken at the time of necropsy and microfilaria of *Dirofilaria immitis* were identified from the sample. A bacterial culture of the heart was negative.

**HISTOLOGIC EXAMINATION:**

Sections of the lung revealed that the apparent abscess noted on the left cardiac lobe was a bronchogenic adenocarcinoma. The neoplastic cells were cuboidal to columnar in shape with hyperchromatic nuclei. Mitotic figures were present but were not abundant. The neoplastic cells, arranged along a sparse connective tissue stroma, formed tubules and acini which in many areas mimicked the formation of fetal alveoli. Papillary growths of the neoplasm extended into the bronchi and bronchioles (fig. 1). Many of the alveoli were filled with the neoplastic cells as were the blood vessels and the lymph channels. Areas of densely packed tumor cells exhibited central necrosis. Adjoining areas of the lung were congested and pale-staining fluid filled the alveoli. One area of the lung showed profuse fibrous proliferation which Moulton describes as an area of active invasion.3

The liver exhibited centrolobular fatty infiltration. Thrombosis of the veins was present in the cystic lesions observed on post mortem. These enlargements of the veins displaced the liver tissue causing some atrophy.

The muscle fibers of the left heart were diffusely infiltrated with masses of the neoplastic cells. Many of the neoplastic cells in the central areas were necrotic as were many of the muscle fibers in these areas. The neoplastic cells were arranged in an acinar pattern much like those in the lung. The focal pale areas observed in the right heart were found to be masses of the tumor cells apparently carried to the right heart by the coronary circulation.

The cortex of the kidney exhibited well defined areas of infarction by the tumor cells. The arrangement was much like that seen with any emboli carried to the end arteries of the kidney. In these areas the neoplastic cells had obliterated much of the normal kidney structure.

The mass of tissue removed from the
DISCUSSION:

Lung tumors of the dog are relatively rare although there is increasing frequency of their occurrence in the literature. The symptoms associated with carcinoma of the lung in the dog are very similar to those exhibited by the same condition in man. In the work by Nielsen and Horava on pulmonary neoplasms of the dog, those dogs with a carcinoma of the lung without other complicating diseases exhibited about the same clinical signs. Such clinical signs were anorexia, persistent cough or pneumonia that failed to respond to antibiotics, weight loss, and weakness. Because of the vague clinical signs and the difficulty in detecting a rapidly growing carcinoma radiographically, many carcinomas are not diagnosed clinically.

In the present case the picture was further obscured by the fact that microfilaria of *Dirofilaria immitis* were identified from a blood sample. The clinical signs exhibited by the animal were especially congruent with a diagnosis of heartworms with a resulting cardiac insufficiency. The only means by which this rapidly growing carcinoma could have been detected was by radiography using a contrast media in the lungs. Since the symptoms of the animal, the history, and the clinical findings substantiated the clinical diagnosis too, such procedures were not indicated.

In cases of a refractive pneumonia of undetermined origin, a rapidly failing patient exhibiting a chronic cough or other signs associated with lung cancer, a diagnosis of carcinoma of the lung remains a possibility.

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