1969

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Pneumothorax: 
A Case Report and Differential Diagnosis

Larry Arp and Douglas Hildebrand*

Introduction

Acute cases of dyspnea are seen periodically by most veterinary practitioners. In order to treat these cases in a rational manner, an accurate diagnosis must be made. This paper reviews one such case seen at Stange Memorial Clinic and also discusses the differential diagnosis of the various conditions causing acute dyspnea.

Case Report

A six month old male golden retriever was admitted to Stange Memorial Clinic with severe dyspnea. The client related that the dog was struck by an automobile the previous day.

On physical examination, the mucous membranes were normal and there were no signs of internal hemorrhage. The dog would eat small amounts of dog food. Breathing was less labored when the dog was in a sitting position.

Auscultation and percussion revealed no significant abnormalities. A tentative diagnosis of diaphragmatic hernia was made, and the dog was sent to radiology to confirm the diagnosis. Dorsal-ventral and lateral radiographs were taken of the thorax. Brief observation of the dorsal-ventral radiograph indicated a long, dense structure in the right hemithorax. This structure was thought to be a loop of small in-
testine. The history and clinical signs along with the radiograph seemed to indicate that this was probably a diaphragmatic hernia.

The next day, an exploratory laparotomy was done to confirm and repair the probable diaphragmatic hernia. No lesions were found in the abdominal cavity, and the diaphragm was intact. A definitive diagnosis of pneumothorax was made after noting the abnormal caudal bulging of the diaphragm. About 600 cc. of air was withdrawn with a needle and syringe through the diaphragm. The dog showed immediate improvement in his respiration. Some dyspnea was still evident the next day, and 350 cc. of air was removed by thoracentesis. Respiration was near normal by the following day, and thoracentesis produced no more air from the thoracic cavity.

Eight days after relieving the pneumothorax, a follow up radiograph was taken. Only a small space of pneumothorax remained. The dog went on to make an uneventful recovery.

The case that has just been discussed illustrates the problem that presents itself in the diagnosis of acute respiratory syndromes exhibiting dyspnea. Although it is difficult to make a definite diagnosis without radiography and other clinical aids, this case is an example of the methods by which such a case can be diagnosed, and the regimen of treatment producing a successful recovery. A differential diagnosis will be discussed in the following paragraphs.

Discussion

The history can be very helpful in differentiating the various causes of acute dyspnea. In pneumothorax a very acute, abrupt onset is seen. Usually there is either a history of trauma or a chronic bronchopneumonia preceding clinical signs. Acute left sided heart failure and exposure to irritant gases or toxic substances can produce pulmonary edema which is also evidenced by acute dyspnea. So, a history of previous heart disease or
the contact with a toxic substance most likely would indicate pulmonary edema if dyspnea is present and there is no other history. A very acute onset of dyspnea with a history that is not suggestive of other diseases is typical of some cases of bronchopneumonia. Acute allergic reactions at times exhibit marked dyspnea. It may be very difficult to associate this attack with anything in the animal's history unless there is indication of a drug sensitivity. A history of trauma is helpful in the diagnosis of hemothorax and chylothorax. However, it is possible that chronic neoplasms of the thoracic cavity can also cause hemothorax. Diaphragmatic hernias are almost invariably the result of trauma, but congenital diaphragmatic hernias have been reported. Signs of dyspnea are usually noticed shortly following the injury, but some cases have remained inapparent for up to four weeks after the accident.

The clinical signs are important in that the type and character of respiration may be helpful in the differential diagnosis. Pneumothorax is characterized by rapid, deep respiratory movements. Abdominal breathing is pronounced, and the animal will sit with the front part of the body elevated. Systemic signs are usually highly incriminating in bronchopneumonia and/or pleuritis. Pyrexia, anorexia, coughing and a high leukocyte count are highly suggestive. The allergic and anaphylactic responses are characterized by mainly an inspiratory dyspnea. Also, there may be a temperature rise in these cases. These hypersensitivities will usually respond to therapy consisting of corticosteroids, bronchial dilators, and antihistamines. An animal with a hemothorax or chylothorax will most likely develop a labored breathing gradually over several days, unless the condition is particularly severe. With hemothorax, in addition to the respiratory signs, a progressive peripheral circulatory failure will probably be seen. The clinical signs of a diaphragmatic hernia are very similar to the signs
associated with pneumothorax. The dyspnea might be slightly slower to develop than in pneumothorax, but usually by the time the veterinarian sees these cases, no large difference in their breathing character, type or rate can be noticed. Here again, the animal will favor the sitting position and abdominal respiration will be prominent. So, for practical purposes, it is impossible clinically to differentiate pneumothorax from a diaphragmatic hernia without the use of radiography.

In some cases of respiratory disease accompanied by severe dyspnea, an analysis of thoracic fluids is helpful. These thoracic fluids are obtained by using sterile technique and performing a thoracentesis. In a pleuritis, the thoracic fluid would be brown to red-brown and very turbid. Most likely, this fluid would have a foul odor and a specific gravity of greater than 1.020 which is characteristic of exudates. On microscopic examination, many leukocytes would be evident. A thoracic fluid that was red and upon microscopic examination revealed mainly erythrocytes could be evidence of just a hemothorax or hemothorax associated with either pneumothorax or a diaphragmatic hernia. A thoracic fluid that appeared milky or milky-pink and was positive to a test for fats, such as staining with Sudan stain, would be diagnostic for chylothorax. Also, it should be noted that the milky nature of the fluid does not change upon centrifugation or standing.

Auscultation and percussion of the lungs of a dog with bronchopneumonia, along with other clinical signs will help to establish the diagnosis. In pneumothorax, at times, an increased resonance can be heard. In a diaphragmatic hernia, the apex beat of the heart can be shifted cranially as well as an absence of respiratory sounds. This might be described as a dullness, and if on the left side is probably due to the stomach, and if on the right is probably due to the liver herniating. At times, if there is torsion of the herniated stomach, there will be increased resonance upon percussion of the left thorax.

Radiology is an essential clinical aid in the differential diagnosis of pneumothorax and diaphragmatic hernia. A lateral radiograph of a pneumothorax will usually
show an elevated heart shadow, i.e., a wide air density band can be seen between the heart apex and the thoracic floor (fig. 1 and 3). An air density area can also be seen between the partially collapsed lung and the thoracic wall (fig. 1, 2, and 3). The diaphragm is a smooth, complete line in a radiograph of a pneumothorax.

Different organs may herniate into the thoracic cavity in a diaphragmatic hernia. Therefore, the radiographic findings are quite varied. If only the small intestine herniates, one can often see air in the gut in the thoracic cavity (fig. 4). The stomach may herniate on the left side and completely mask the heart shadow if full of ingesta, but will appear as a well demarcated hollow structure if gaseous distension has begun. Oral contrast media is very helpful to confirm herniation of the stomach and small intestine. A lateral radiograph is very useful in determining whether or not the diaphragm is intact.

Some confusion is possible when pneumothorax is concurrent to fibrinous pleuritis (fig. 3). Air becomes trapped in fibrinous pockets and appears very similar to an intestine viewed end-on radiographically. Even with this confusing factor one can readily see elevation of the cardiac shadow and be reasonably certain of pneumothorax.

With these points in mind, the clinician should have little difficulty in differentiating the previously mentioned conditions if all diagnostic aids are utilized.

REFERENCES