CASE REPORT

Successive Torsion of the Right Middle and Left Cranial Lung Lobes in a Dog

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Abstract

This case report describes the torsion of two lung lobes in a dog. The animal was first presented for a torsion of the right middle lung lobe. Following the surgical resection of that lobe, the dog suffered another torsion of the left cranial lung lobe (cranial and caudal segments).

Key words: Torsion, lung lobe, pleural effusion, dog.

Résumé

Le présent rapport décrit la torsion successive de deux lobes pulmonaires chez un chien. L'animal a d'abord été présenté pour une torsion du lobe moyen droit. Suite à la correction chirurgicale de ce premier problème, il y a eu torsion du lobe pulmonaire cranial gauche (segments cranial et caudal).

Mots clés: torsion, lobe pulmonaire, effusion pleurale, chien.

Introduction

Although lung lobe torsions have been described previously, recurrence of the condition is rare in the dog and cat (1, 2, 3, 4, 5, 6). Clinical and radiographic signs are nonspecific for this particular problem and make the condition difficult to diagnose.

History, Clinical Signs and Treatment

A four year old male Doberman was presented to the Small Animal Hospital of the University of Montreal for a respiratory problem. The dog was depressed, anorexic and had been experiencing respiratory difficulty for the previous five days. Treatment with antibiotics and glucocorticoids by the referring veterinarian was unsuccessful. There was no history of trauma, heart disease, or chronic cough.

On physical examination, the dog showed depression, inspiratory dyspnea and was reluctant to walk. Rectal temperature was 39.6°C, pulse rate was 112 and regular. The animal was uncomfortable lying down and would remain standing with the thoracic limbs abducted. Mucous membranes were pink and capillary refill time was 1 second. Auscultation of the chest revealed bilateral attenuated heart and lung sounds in the lower third of the thorax. Digital percussion of the thorax also demonstrated dullness in the ventral portion of the chest bilaterally. The rest of the examination was normal. A tentative diagnosis of pleural effusion was made and the dog was hospitalized for evaluation.

A lead II electrocardiogram showed normal sinus rhythm with a heart rate of 120 beats per minute (bpm). There was no evidence of ectopic rhythms. The R waves were of low amplitude (0.5 mV) and all other measurements were normal. The electrocardiogram (EKG) was compatible with pleural or pericardial effusion although there was no evidence of electrical alternans.

Lateral and ventrodorsal radiographs (Figures 1 and 2) showed evidence of bilateral pleural effusion. The effusion appeared more abundant in the right hemithorax. There was complete consolidation of the right middle lung lobe and the lateral projection showed air bronchograms within this lobe.

Thoracentesis was performed and a red opaque fluid was removed for analysis. Cytological examination of the fluid showed numerous reactive mesothelial cells and neutrophils. Tumor cells or bacteria were not seen. Hematology showed a mild neutrophilic leukocytosis and biochemical determinations (glucose, urea nitrogen, ALAT, alkaline phosphatase and electrolytes) were normal. Total proteins, albumin, and globulins were within normal limits. Aerobic and anaerobic bacterial and mycotic cultures of the fluid were negative for growth.

The primary lesions appeared limited to the lungs and was strongly suggestive of a right middle lung lobe torsion. The evaluation of the pleural fluid (elevated WBC count and high protein content) suggested a severe nonseptic inflammatory reaction within the chest. Differential diagnoses that could account for the torsion included chronic pleural disease (neoplastic, inflammatory) or a diaphragmatic hernia. Primary spontaneous torsion of the right middle lobe was also considered. An exploratory thoracotomy was performed on the same day. An incision was made at the fourth right intercostal space. This approach allowed direct visualization of a severely congested, enlarged right middle lobe. The lobe had a clockwise torsion. There was also evidence of patchy chronic pleuritis.

The lung lobe was excised and, as much as possible, the abnormal pleura was peeled off. There were no other abnormalities in the chest cavity. The excised lobe and pleura were submitted for histopathological evaluation. Routine closure was performed and recovery was uneventful. Amoxicillin was prescribed orally for ten days.

Histopathological examination indicated a severely congested and necrotic lung lobe with a nonspecific inflammatory reaction in the pleura.

Four days after surgery there was still a small amount of free pleural fluid and the lungs were well expanded. The dog was discharged six days after admission. Respiration was normal and the dog was active.

Four and one-half months later, the dog was again presented for dyspnea as well as a cough which had started suddenly three days prior to presentation.

Rectal temperature was normal, heart rate was 128 bpm, regular, and marked inspiratory dyspnea was present. Auscultation and percussion of the chest

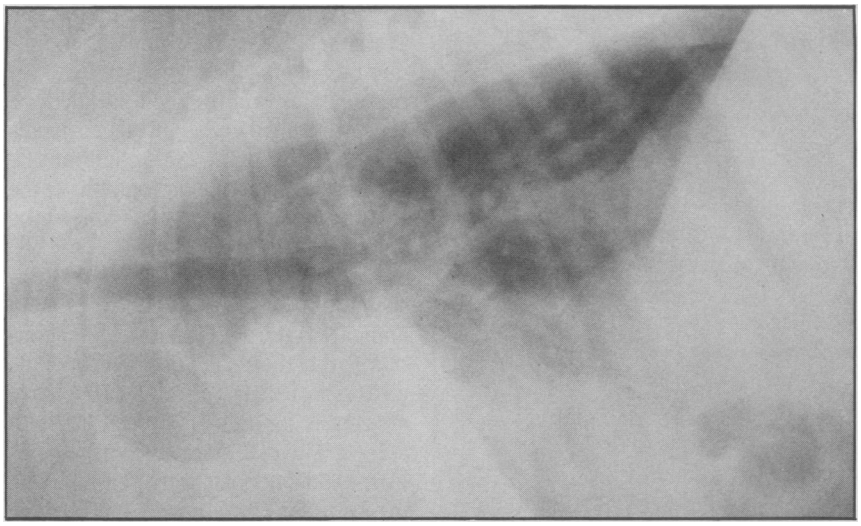

Figure 1. Lateral projection of the thorax showing consolidation of a lung lobe with air bronchograms. There is also evidence of moderate pleural effusion.

revealed the same signs as on the initial presentation. Pleural effusion was again suspected and thoracic radiographs confirmed the presence of free pleural fluid. A trocar chest tube was inserted in the ninth right intercostal space in order to drain the chest cavity.

After removal of 1500 mL of hemorrhagic pleural fluid radiographs of the thorax were repeated (Figures 3 and 4). They showed complete consolidation of the left cranial lung lobe. A diagnosis of lung lobe torsion was again made.

A second exploratory thoracotomy was performed at the left fifth intercostal space. The left cranial lung lobe was found to be enlarged, dark and severely congested. The main pedicle of both segments of the lobe showed a definite torsion. The pleura appeared inflamed. The common bronchus and blood vessels were ligated and the lobe excised. The dog recovered uneventfully and, although there was still a slight amount of fluid in the chest cavity, the dog was discharged six days postoperatively.

The dog was reexamined five weeks later and was slightly dyspneic but active. Radiographs of the chest showed moderate pleural effusion probably resulting from the chronic pleural inflammatory problem. A diuretic was prescribed in order to control the accumulation of fluid. Furosemide (Lasix, Hoechst Canada Inc., Montreal, Quebec) was given once daily for five days, then every other day for two weeks. The owner reported that the diuretic treatment controlled the respiratory problem and that the dog was no longer dyspneic.

Eight months later the dog was doing well but required the diuretic at half-dose on a daily basis.

Discussion

Lung lobe torsions occur rarely in the dog and even less so in the cat (1, 2, 3, 4, 5, 6). Deep chested breeds are predisposed (5). The conformation of the chest of the Doberman falls into this category.

In both dogs and cats, the right middle lobe is involved more frequently. This case was presented initially with a torsion of this particular lobe. It has been suggested that the right middle lobe is particularly predisposed to torsion of the pedicle because of the narrowness of the lobe, its weak attachments and its localization amongst mobile structures such as the chest wall, the heart and the right cranial lobe (8). A simultaneous torsion of both segments of the left cranial lobe can also occur since both lobes share a common primary bronchus (4). Torsions of the caudal lobes or of the right cranial lobe are very rare although the right cranial lobe can be involved with a torsion of the right middle lobe (7, 8).

The exact mechanism for the torsion is frequently unknown. It can be a spontaneous event or the result of trauma (8). The condition is frequently encountered in patients having pleural effusion due to other known causes. The pleural effusion causes a certain degree of atelectasis and instability of the lobes, which could facilitate torsion (4). Some cases have been reported following repair of a diaphragmatic hernia and a thoracotomy for the ligature of a patent *ductus arteriosus* (4, 7).

In this case, there was no history of trauma prior to either presentation. The initial torsion of the right middle lobe appeared to be spontaneous. It is difficult to say whether the pleural disease was present prior to the torsion, and then, initiated chronic pleural effusion which caused the lung lobe torsion or if the pleural effusion and chronic pleuritis resulted from a primary, spontaneous lung lobe torsion. The explanation for the pleural reaction is that the accumulation of fluid in the thoracic cavity irritates the pleura, may cause chronic pleuritis and recurrent pleural effusion (8). As a consequence, persistent pleural effusion could have been responsible for the subsequent torsion of the left cranial lobe.

Clinical signs of lung lobe torsions are nonspecific and relate to abnormal pulmonary function secondary to pleural effusion. Tachypnea, dyspnea,

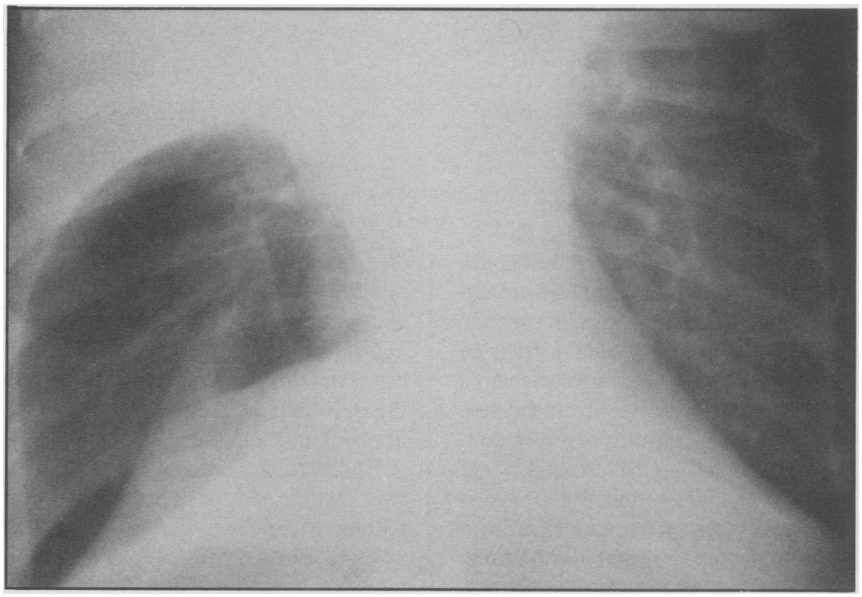

Figure 2. Ventrodorsal view of the thorax showing consolidation of the right middle lung lobe and pleural effusion.

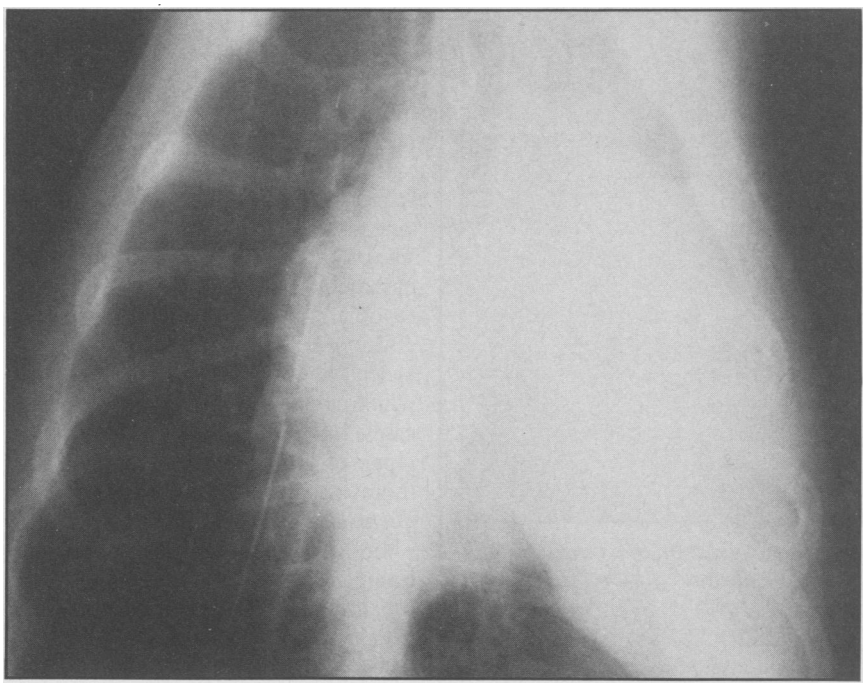

Figure 3. Lateral view of the thorax after insertion of a chest tube and removal of 1500 mL of fluid showing a slight increase in density in the cranioventral area of the thorax and minimal pleural effusion.

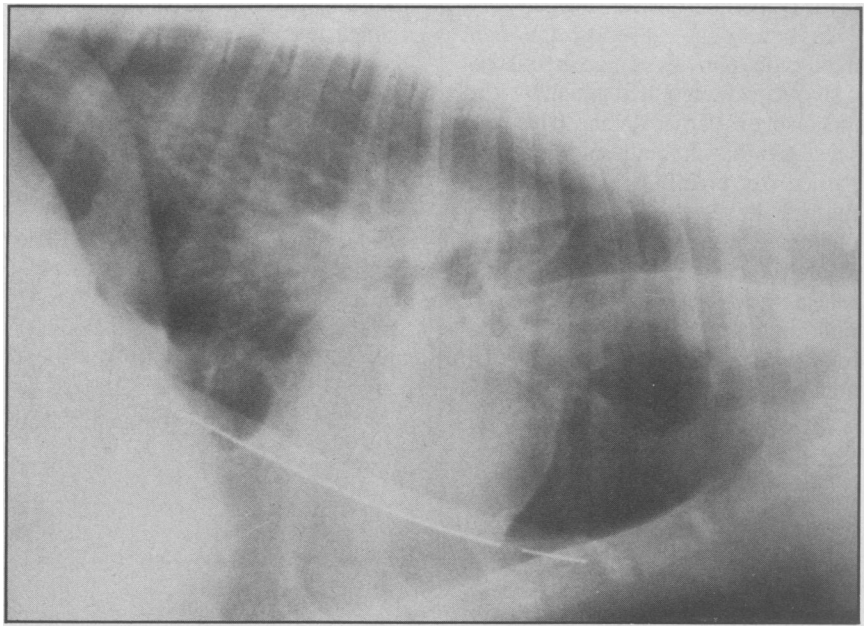

Figure 4. Ventrodorsal view after thoracentesis showing complete consolidation of the left cranial and middle lobes. The chest tube is in the right thoracic cavity.

fever, lethargy, anorexia, vomiting, dry cough and hemoptysis may be present (8). Torsion of the vascular pedicle allows arterial blood to enter the twisted lobe because of its higher pressure while venous return is being totally obstructed. The lung lobe becomes severely congested and enlarges. Serum and blood may ooze from the surface of the twisted lobe and accumulate in significant amounts in the chest cavity. The animal is usually brought for examination once the effusion has accumulated in sufficient amounts to cause clinical signs. Necrosis of the lung lobe may be responsible for more leakage of body fluids and induce a neutrophilic leukocytosis and fever. Rupture of the affected lobe can result in severe hemorrhage into the thoracic cavity, anemia and possibly hypovolemic shock.

Radiographic signs of lung lobe torsion include pleural effusion, consolidation and increased volume of the affected lobe as well as the presence of air bronchograms. The latter may be seen early in the condition but tends to disappear as air is gradually resorbed or as the bronchi fill with fluid (9). The initial radiographs (Figures 1 and 2) demonstrated the presence of air bronchograms in the right middle lobe suggesting that it was of recent occurrence. Air bronchograms could not be demonstrated on the radiographs of the torsion involving the left cranial lobe (Figures 3 and 4).

Since the radiographic signs are nonspecific, it may be difficult to make a clinical diagnosis of torsion. Other conditions that should be considered include all causes of pleural effusion, pulmonary atelectasis, pulmonary infections with alveolar involvement, thromboembolism and neoplastic diseases. The diagnosis may be confirmed by positive contrast bronchography, bronchoscopy or exploratory surgery. Treatment is removal of the affected lobe.

In our own experience, the prognosis for this condition is usually favorable in spontaneous cases unless chronic pleuritis is present. An underlying cause should be looked for and, if possible, eliminated to ensure long-term success. In this case it was necessary to maintain the dog on a low dose diuretic therapeutic regimen to control the persistent pleural effusion.

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