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Diagnostic Imaging for Lung Lobe Torsion in a Miniature Pinscher

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Abstract : A four-year old, female Miniature Pinscher was presented with intermittent coughing. Thoracic radiography and ultrasonography revealed the consolidation of left cranial lung lobe surrounded by pleural effusion and the extraction of left lung lobe was performed through thoracotomy. This case has the clinical significance because lung lobe torsion was diagnosed by non-cardiac ultrasonographic examination, therefore surgical correction was performed without delay and led good outcome. Moreover, the authors believe the present case was the first report on lung lobe torsion in Miniature Pinscher dog.

Key words **:** Lung lobe torsion, Miniature Pinscher, thoracic radiography, non-cardiac thoracic ultrasonography, lobectomy

Introduction

Lung lobe torsion is life threatening disease. It is not frequent in dogs, and it was most frequently reported in large breed dogs such as Afghan Hounds (3). However, recently, acute respiratory distress caused by lung lobe torsion has been reported in small breed dogs (2). Prognosis for dogs with lung lobe torsion is guarded and the most important thing for improving prognosis is early diagnosis and adequate therapy. Lung lobe torsion can be diagnosed by clinical signs, thoracic radiography and exploratory thoracotomy (8). Furthermore, useful information for the state of dog can be obtained using non-cardiac ultrasound and bronchoscopy (4).

Case Histories

A four-year-old, female, Miniature Pinscher was presented with intermittent, progressive coughing for 1 week. The dog had traumatic accident, beaten by a vacuum cleaner, about 3 weeks ago and after then, activity of this dog was decreased. Physical examination revealed mild hyperthermia, tachycardia and tachypnea and cardiopulmonary sound was decreased over the left cranial thorax on auscultation.

Hematology and serum chemistry revealed mild leukocytosis (2,86 K/uL; normal range 6-12 K/uL) with left shift. In thoracic radiography, large amount of pleural effusion in left cranial pleural cavity, consolidated left lung lobe silhouetted with fluid, and displaced heart to right side were observed (Fig 1). Ultrasonography showed that homogeneous liver-like left cranial lung lobe with blunt apex was surrounded by anechoic fluid and the apex of consolidated caudal part of left cranial lobe was projected toward cranio-medial direction and cranial part toward caudo-lateral direction (Fig 2). The pulmonary vessel of caudal part had hyperechoic lumen and no signal in spectral doppler examination, but anechoic pulmonary artery of cranial part showed pulsed wave. Through thoracocentesis, approximately 110 ml of serosanguineous fluid was removed, and bacterial infection was ruled-out by aerobic and anaerobic culture.

Based on the results of a series of examinations, lung lobe torsion was diagnosed and thoracotomy was performed (Fig 3). The left cranial lobe with cranial and caudal parts surrounded by pleural effusion was torsed approximately 180 degrees and completely consolidated. After occlusion of the affected bronchus near the hilus without detorsing, the left cranial lobe was removed surgically. During and after surgery, condition of the dog was stable and was preserved. The dog could be discharged from hospital after 10 days and there was no relapse or other abnormal clinical signs during 1 month. Removed left cranial lobe was committed to Antech Diagnostics, Inc. (Memphis, USA). Histopathologically, moderately congested alveolar capillaries, dilated with blood and fibrin alveolar walls and congested and thickened pleura was observed. Severe diffuse subacute infarction and hemorrhage with associated multi-focal vascular thrombosis was found. There were dissecting septa of inflammatory granulation tissue, however, neoplastic lesion was not found.

Discussion

Lung lobe torsion (LLT) is life threatening disease. It is rare in dogs and it was most frequently reported in large breed

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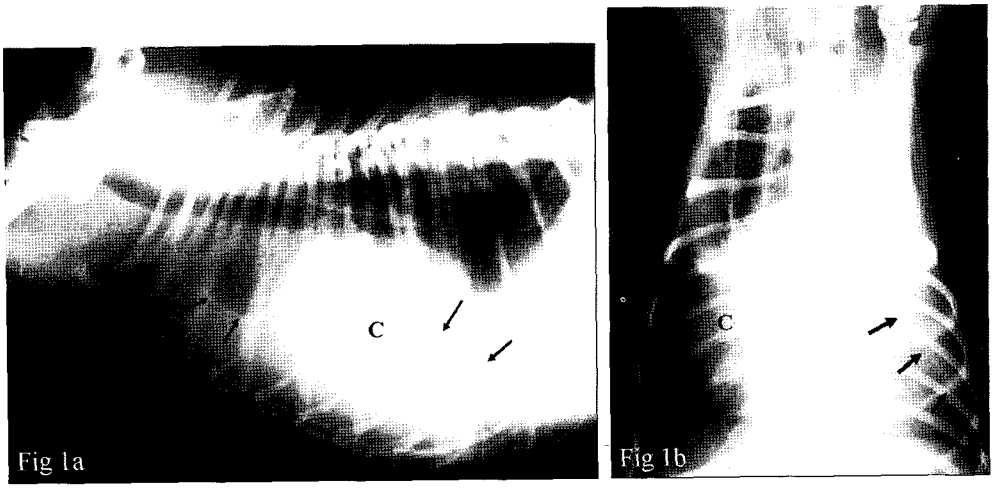

Fig 1. (a) Right lateral and (b) ventrodorsal view of thorax. There was large amount of pleural effusion in left pleural cavity (arrows) and consolidated left lung lobe was masked. Because of mass effect by increased volume of the left cranial lobe and pleural effusion, cardiac silhouette (c) was displaced to right side in ventrodorsal view.

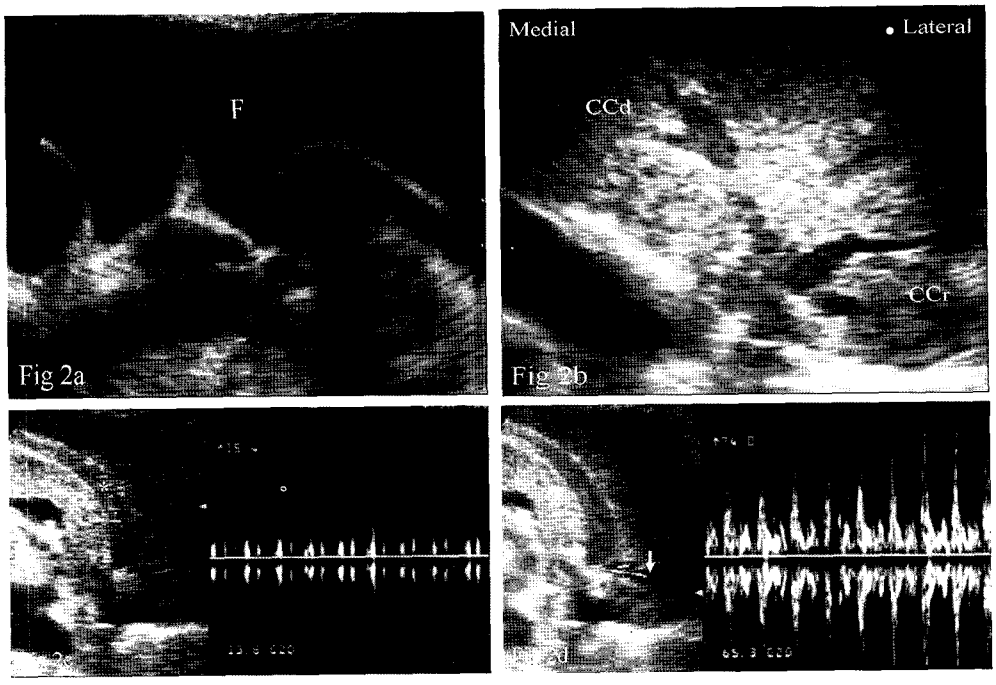

Fig 2. Non-cardiac ultrasonography. Large amount of pleural effusion (F) in left thoracic cavity and homogenous, liver-like echogenicity of the left cranial lobe were observed (a). Consolidated lung lobe containing pulmonary vessel and the apex of consolidated caudal part of left cranial lobe (CCd) was projected toward cranio-medial direction and cranial part (CCr) toward caudo-lateral direction (b). The tortuous pulmonary vessel (*) of caudal part had hyperechoic lumen and no signal in spectral Doppler examination (c), but anechoic pulmonary artery (arrow) of cranial portion showed pulsed wave (d).

dogs, particularly in Afghan Hounds (3). Recently, acute respiratory distress caused by LLT has been reported in small breed dogs such as Pug, Lhassa Apso, Pekinese, ShihTzu, Yorkshire terrier (1,2), but not in Miniature Pinscher. The underlying cause of LLT in this dog was not found. LLT can occur spontaneously but usually associated with predisposing conditions such as pleural effusion, pneumothorax, trauma, pneumonia, and manipulation during surgery (5,6,7). In this case traumatic accident occurred prior to development of LLT, therefore trauma could be presumed to be the predisposing factor.

Prognosis for dogs with LLT is guarded and the most important thing to improve prognosis is early diagnosis and appropriate therapy (5). LLT can be assumed based on acute onset of respiratory distress, pulmonary consolidation and

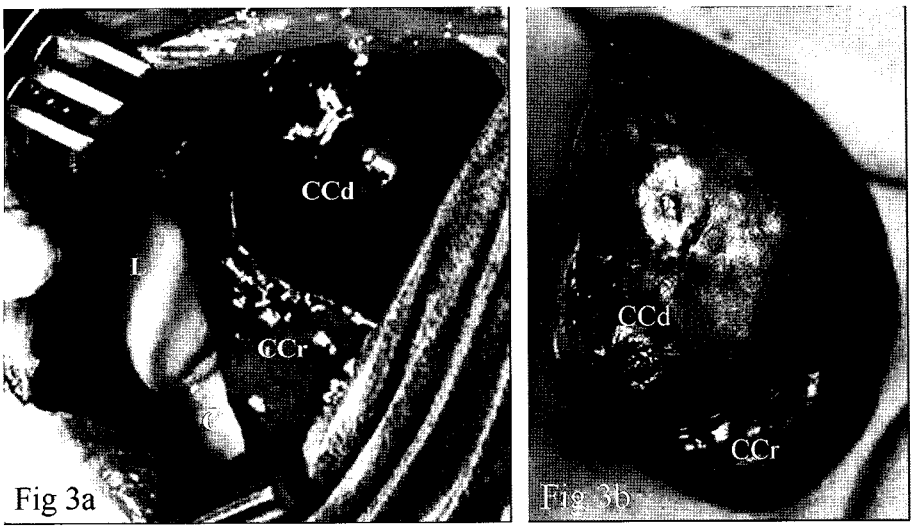

Fig 3. Left cranial lung lobe during surgery (a) and after extraction (b). Thoracotomy performed from left 4th intercostals space. Consolidated left cranial lobes were observed over the normal left caudal lobe (L) and heart. The volume of caudal part of left cranial lung lobe (CCd) was increased. The apex of cranial part of left cranial lobe (CCr) was toward caudo-lateral and caudal part was cranio-medial direction.

pleural effusion on thoracic radiography, and torsed and collapsed bronchus on bronchoscopy or exploratory thoracotomy (6,8). In this case, LLT could be assumed at once based on the abnormal position of lung lobe on thoracic ultrasonography, In most cases, LLT is accompanied by pleural effusion and lung lobe is consolidated and congested due to obstruction of pulmonary vein and interception of venous return (2). On thoracic ultrasonography, pleural effusion and reduced gas in pulmonary parenchyma provides a good window for imaging lung lobe (4). In this dog, LLT could be diagnosed based on abnormal position of apex of consolidated lobe and no spectral Doppler signal of pulmonary artery in ultrasonography. Ultrasonography is a useful and prompt method for screening the LLT before bronchoscopy and exploratory thoracotomy.

Conclusion

The authors believe the present case was the first LLT in Miniature Pinscher dog. Currently, as more and more LLT cases are available not only in large breeds but also in small breeds, the results of the present report could support that the LLT should also be included in establishing the updated differential diagnostic lists even in small breed dogs such as Miniature Pinscher that there have not yet been reported.

For improving prognosis, non-cardiac thoracic ultrasound is early, simple and noninvasive diagnostic method. The abnormal position of apex of consolidated lobe and no spectral Doppler signal can provide the critical clues for diagnosis of lung lobe torsion. Ultrasonography is a useful and prompt diagnostic imaging method for screening the lung lobe torsion.

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Miniature Pinscher 견에서 발생한 폐염전의 진단영상 1례

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요 약 : 암컷 4살령의 미니어쳐 핀셔가 간헐적인 기침 증상으로 본 원에 내원하였다. 흉부 방사선 검사와 초음파 검사를 통해 좌측 폐의 전엽이 경화되고 흉수가 동반된 것을 확인하고 개흉술을 통해 염전된 폐엽을 절제하였다. 본 증례는 흉부 초음파 검사를 통해 폐염전을 진단하여 신속히 수술적인 치료를 적용함으로써 좋은 예후를 얻을 수 있었다. 폐염전은 대형견종에서 호발하는 것으로 알려져 있으나 근래 소형 견종에서의 발생 보고가 증가하고 있다. 본 증례는 소형 견종 중 미니어쳐 핀셔에서는 처음 보고되는 폐염전 증례로 갑작스러운 호흡 곤란을 보이고 흉부 방사선 검사와 초음파 검사상 흉수와 폐경화, 비정상적인 폐엽의 방향 등의 이상 소견을 보이는 경우, 본 증례와 같이 이전에 폐염전이 발생한 보고가 없거나 드문 소형 견종에서도 폐염전을 감별 진단 리스트에 포함시켜야 할 것으로 생각한다.

주요어 : 폐염전, Miniature Pinscher, 흉부 방사선 검사, 흉부 초음파 검사, 폐절제술