

Caroline shares a thoracic radiography Teatime Teaser



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Caroline graduated from the National Veterinary School of Alfort, Paris in 2009. After completing a rotating and a diagnostic imaging internship, Caroline undertook a residency in diagnostic imaging at the University of Ghent. She joined the team at Pride Veterinary Centre in 2016 and gained the ECVDI Diploma in 2017.

Test yourself with these Teatime Teaser questions

A 6-month-old, male intact cross breed dog was referred for further investigation of a four-day history of intermittent lethargy, anorexia and dyspnea. On physical examination, the patient was alert, the breathing was shallow and tachypneic, and the auscultation of the thorax revealed muffled sounds in the ventral thorax. The remainder of the routine clinical examination was unremarkable. The patient underwent standard 3-view thoracic radiography (Figure 1).

- Q1. Describe the radiographic findings from Figure 1. What is your radiographic diagnosis?
 - Q2. What is the pathophysiology of this disease?
 - Q3. What are the underlying causes?
 - Q4. Are some breeds predisposed? Which lobes are more commonly affected?
 - Q5. What is the imaging modality of choice for this pathology, and why?
 - Q6. Describe the imaging findings from Figure 2.
 - Q7. What treatment would you recommend?
- Answers on the next page...

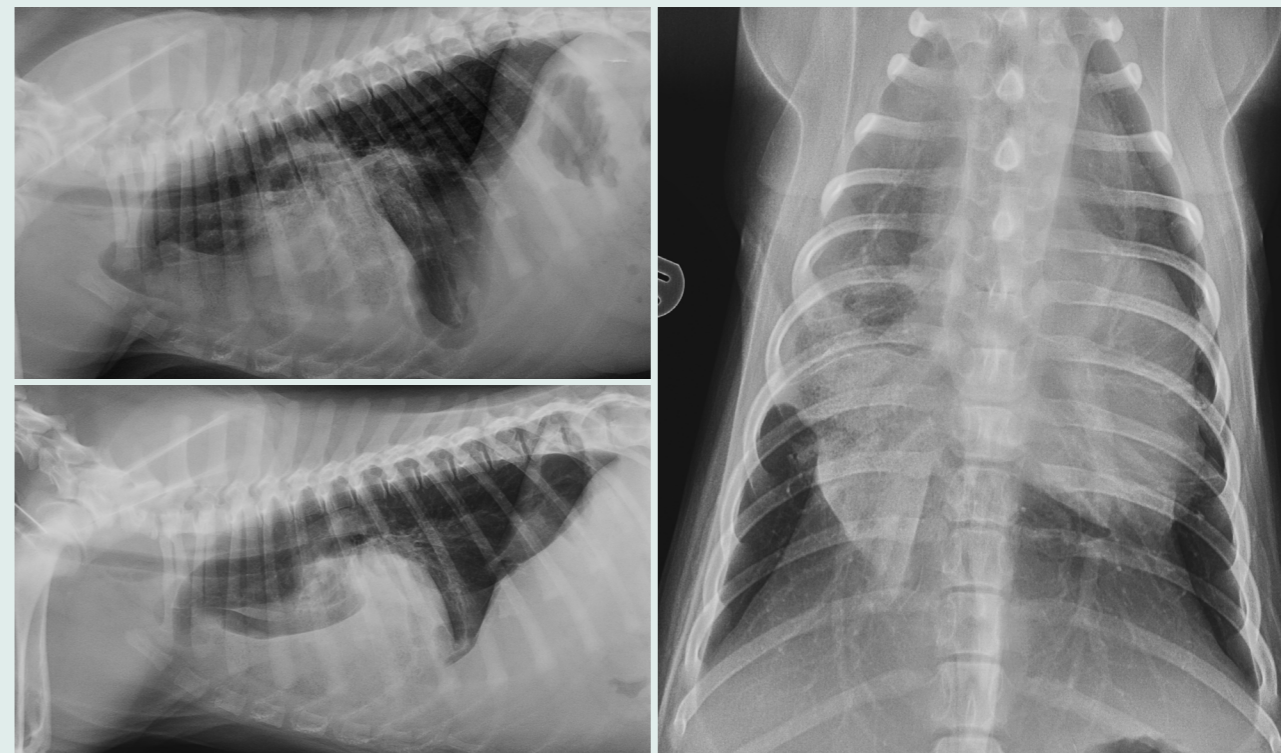


Figure 1

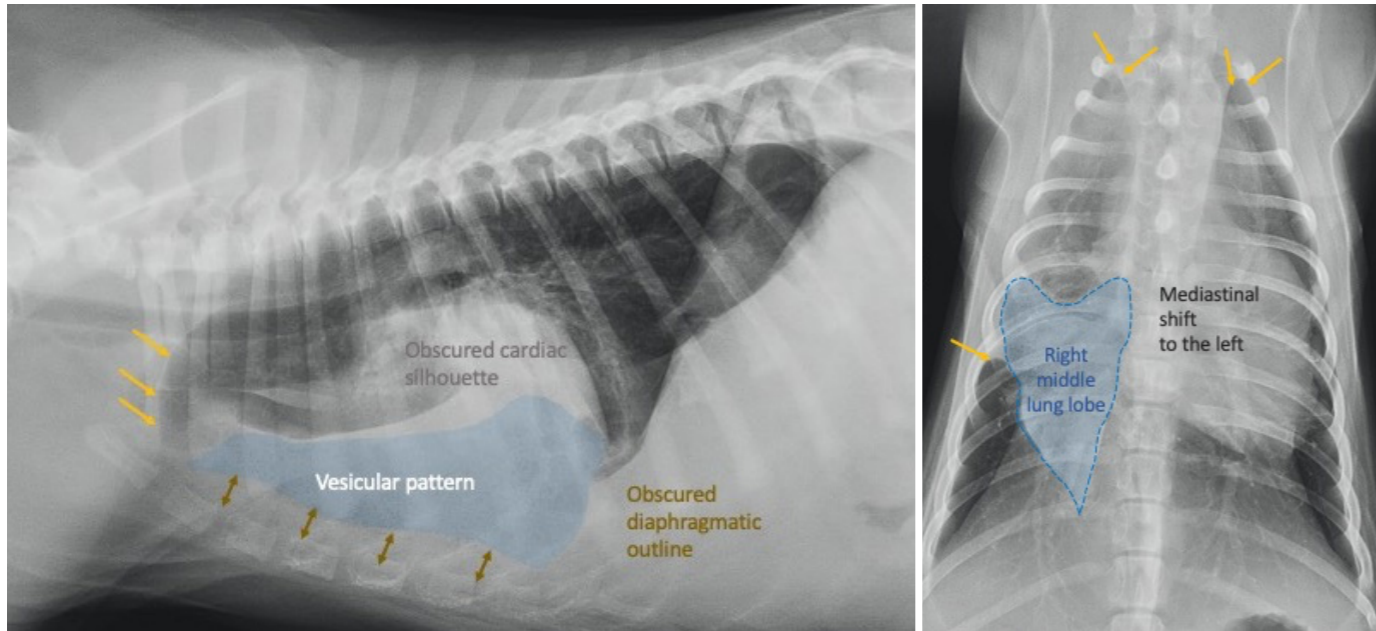


Figure 1 (with annotations)

Q1. Describe the radiographic findings from Figure 1. What is your radiographic diagnosis?

- Pleural effusion as evidenced by:
 - Marked retraction of lungs from thoracic wall
 - Increased soft tissue opacity with scalloped margins dorsal to the sternum on lateral views (brown arrows on Figure 2)
 - Obscured diaphragmatic outline ventrally
 - Rounded pulmonary edges on DV (yellow arrows)
 - The pleural effusion is asymmetrical and more severe on the right side.

- Abnormal shape and position of the right middle lung lobe (outlined by the blue dotted line).
- Marked enlargement of this lobe with contralateral mediastinal shift and displacement of the heart to the left.
- Vesicular pattern within the right middle lung lobe (“foaming appearance”) that is superimposed to the cardiac silhouette, cranial and ventral thorax (in blue).
- Absence of visualisation of the right middle lobar bronchus on all views.

The combination of these radiographic abnormalities is suggestive of **torsion of the right middle lung lobe and pleural effusion**.

Regarding the vesicular pattern, it is highly supportive of a lung lobe torsion but not pathognomonic and has been documented in necrotising pneumonia.

Q2. What is the pathophysiology of this disease?

The torsion of the affected lung lobe occurs around its axis, usually on/close to the hilus. This leads to twisting and occlusion of the bronchovascular structures, with a portion of the arterial flow remaining in the early phase after the torsion. Pulmonary venous hypertension and decreased lymphatic drainage from the lobe are compromised, both leading to pleural effusion. The twisted lung lobe becomes markedly enlarged with sequestration of blood, together with the development of emphysema and eventually lung lobe necrosis.

Q4. Are some breeds predisposed? Which lobes are more commonly affected?

- Large deep-chested dogs and in particular **Afghan hounds** are at increased risk for lung lobe torsion, with the **right middle lung lobe** being the lobe most commonly involved, most likely due to its narrow shape and relative mobility.
- In small breed dogs, **Pugs** appear to be predisposed to idiopathic lung lobe torsion compared to other small breed dogs for which lung lobe torsion is more commonly secondary to pulmonary or pleural disease. In Pugs, the **left cranial lung lobe** is the most commonly affected lung lobe.

Q5. What is the imaging modality of choice for this pathology, and why?

Computed Tomography (CT) of the thorax is considered the most valued tool for the diagnosis of lung lobe torsion in dogs, because:

- On CT the pleural effusion is not a limitation to the interpretation
- Compared with radiography, CT is superior to evaluate the course and abrupt ending of the bronchus in the affected lobe, which is the most essential sign to diagnose lung lobe torsion. Multiplanar reconstructions are particularly helpful to demonstrate the abrupt ending and minimal intensity projection technique (see Figure 2b) can assist in showing that the bronchus ends abruptly because it is twisted.

CT of the thorax was performed to confirm the radiographic diagnosis, evaluate the patency and course of the right middle lobar bronchus and rule out other lung lesions prior to surgery.

Q6. Describe the imaging findings from Figure 2

The right middle lung lobe is enlarged, with contralateral displacement of the heart into the left hemithorax. The lobe has increased, heterogeneous density with crescent-shaped, emphysema in periphery of the lobe, and does not enhance on the postcontrast image. The right middle bronchus is abruptly interrupted and presents a twist shape near to the hilus (red arrows). There is a mild amount of pleural effusion at the ventrolateral aspect of the right middle lung lobe.

These CT findings confirmed torsion of the right middle lung lobe. The remainder of the lungs was within normal limits, suggesting an idiopathic cause for the lung lobe torsion.

Q7. What treatment would you recommend?

Treatment of lung lobe torsion is **lobectomy of the affected lung lobe**. The lobe should not be untwisted prior to resection to avoid release of inflammatory cytokines and toxins. The surgical treatment is associated with high survival rate at discharge (92%) and excellent long-term prognosis. Patient breed and conformation do not influence survival rates, and secondary lung lobe torsions are not associated with higher risks of mortality compared to idiopathic cases. Finally, recurrence of lung lobe torsion is uncommon.

Our patient was treated with thoracotomy and lobectomy of the right middle lung lobe. He recovered uneventfully from the surgery and was discharged 48 hours after his procedure.

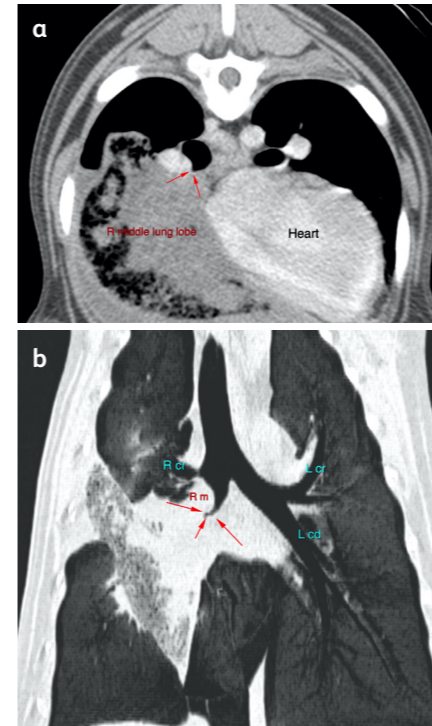


Figure 2 Transverse postcontrast CT image in soft tissue window (a) and dorsally reformatted CT image of the thorax using (b) lung window, the latter using minimal intensity projection technique

Q3. What are the underlying causes?

Lung lobe torsion can be **idiopathic or secondary** to various causes such as:

- Pleural effusion (for example due to chylothorax)
- pneumothorax
- pulmonary or pleural space disease
- neoplasia
- trauma
- or prior thoracic surgery
- Predisposing factors such as bronchial cartilage dysplasia in young dogs including brachycephalic dogs have been reported.