

## What is Your Diagnosis?

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### *Signalment*

A six-year-old, spayed female Shih Tzu.

### *History*

The patient was presented at the Small Animal Teaching Hospital, Chulalongkorn University due to the chief complaints of hematuria and cystic calculi. In addition, the patient had the congenital anomalies of the left forelimb agenesis and heterochromia iridum.

### *Clinical examination*

The patient was in the consciousness and alertness. All of the general clinical conditions; for example: dehydration condition, mucus membrane color, heart sound and lung sound, were normal. In addition, all of the laboratory data were in normal limit.

### *Radiographic examination*

Abdominal radiographs were firstly obtained in both of dorsoventral and right lateral views to observe the cystic calculi. As the abnormality of the cranial abdomen was detected, standard radiographs of the thorax were subsequently performed.



**Figure 1** Plain abdominal radiographs on the right lateral view (A) and ventrodorsal view (B).

What is your diagnosis?

Please turn to next page for the answer.

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### Radiographic findings

At first, the plain radiographs of the abdomen were obtained to observe the caudal abdomen (Fig 1A and B). However, there was obviously evidence of the cranial displacement of the gastric axis (stomach silhouette) into the rib cage on the lateral radiograph (Fig 1A) whereas the ventrodorsal radiograph showed the cranial distension of the right crus of the diaphragm into the thoracic cavity (Fig 1B). In addition to the dislocation of the gastric silhouette, mild

splenomegaly and cystic calculi were also detected. According to the evidence of the suspected diaphragmatic abnormality, the standard thoracic radiographs were subsequently performed to observe the whole thoracic cavity (Fig 2A and B). On the lateral view of the thoracic radiograph (Fig 2A), there was evidence of the cranial displacement of the right crus of the diaphragm to the ventrocaudal thoracic area. Besides, on the VD view (Fig 2B), the gas-distended loop of the proximal duodenum was cranially displaced to the 9<sup>th</sup>-10<sup>th</sup> rib area.



**Figure 2** Plain thoracic radiograph of the right lateral view (A) and ventrodorsal view (B).

### Radiographic diagnosis

Right sided-diaphragmatic eventration.

### Discussion

Diaphragmatic abnormalities could be caused by the congenital development or acquired causes, which is mostly by the accident (Hunt and Johnson, 2003). Among the congenital diaphragmatic abnormalities, the dog could be possibly affected with the peritoneopericardial diaphragmatic hernia that is the most common congenital diaphragmatic abnormalities in dogs and cats, the congenital pleuroperitoneal hernia, which is a defect of the dorsolateral diaphragm with or without the central tendon defect that may concurrent with the cranial movement of the abdominal viscera into the thoracic cavity, or the rare diaphragmatic eventration that have been detected in this patient. In spite of the non-hernia condition, the radiographic evidences of the diaphragmatic eventration were resembled to the unilateral herniation due to cranial displacement of the diaphragmatic crus. However, in the case of diaphragmatic eventration, the elevation of the affected diaphragmatic crus appeared with the smooth hump on the normal contour of the hemidiaphragm, mostly found on the right crus. To differentiate radiographic signs from the phrenic nerve palsy that revealed alike radiographic signs, the history of patient and fluoroscopy for the sniff test were suggested to observe the paradoxical movement (Kansal et al.,

2009). According to the several congenital abnormalities affected in this patient, the diaphragmatic eventration could be the most possible cause that developed the radiographic signs.

### References

- Hunt GB and Johnson K 2003. Diaphragmatic, pericardial and hiatal hernia. In: Textbook of Small Animal Surgery. 3<sup>rd</sup> ed D Slatter (ed) Philadelphia: Saunder 471-487.
- Kansal AP, Chopra V, Chahal AS, Grover CS, Singh H and Kansai S 2009. Right-sided diaphragmatic eventration: rare entity. Lung india. 26(2): 48-50.