

## Ultrasound Diagnosis

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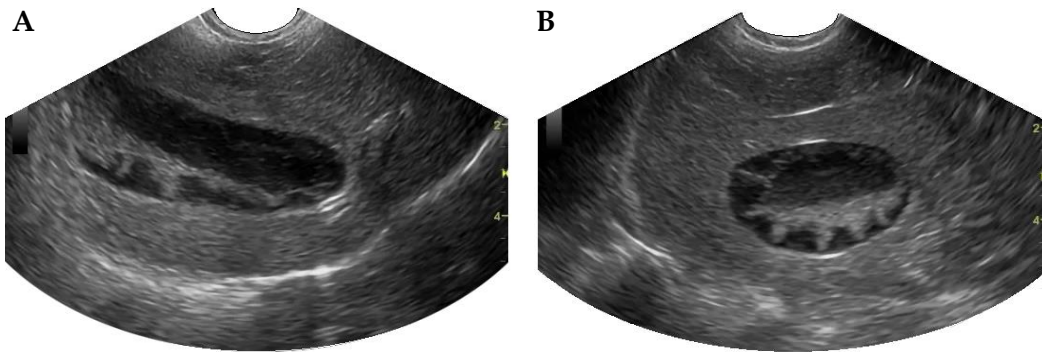
### *History*

A seven-year-old, 7-kilogram-body weight, intact male, mixed Miniature Pinscher dog was presented at the Chulalongkorn University, Small Animal, Veterinary Teaching Hospital for a general health check prior to undergoing the castration operation. Physical examination revealed pink mucous membranes and a pendulous abdomen without pain on palpation. A murmur heart sound was also detected. The dog had recently had a progressive abdominal enlargement with clinical signs of polyuria, polydipsia and polyphagia. A routine blood work, urinalysis and radiographic examination were performed. Abnormal clinical values included elevation of serum ALT (573 IU/L) and ALP (399 IU/L). Abnormal radiographs identified mild cardiomegaly, mild hepatomegaly and bilateral renal mineralization. An abdominal ultrasonography was performed to investigate a hepatic disorder.

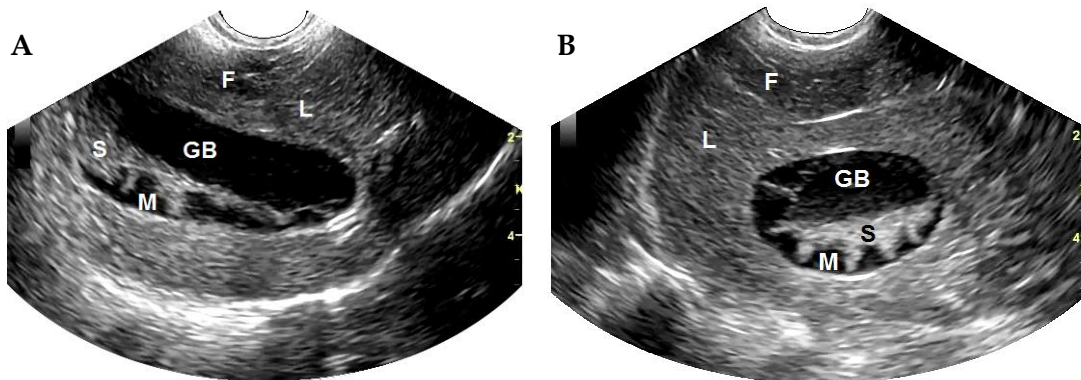
### *Ultrasonographic Findings*

Trans-abdominal ultrasonography evaluation of the abdomen was performed using a real-time, 8 MHz microconvex, phased array transducer with the dog in dorsal recumbency. Echogenicity of the hepatic parenchyma was relatively hyperechoic to the

falciform fat and the kidney and hypoechoic to the spleen. The gall bladder was moderately distended, about 25 ml in volume (Figs. 1 and 2). It was filled with a moderate amount of echogenic biliary sludge in the dependent portion of the lumen, forming a stellate pattern surrounded by a hypoechoic to anechoic rim at the inner periphery of the gall bladder, consistent with mucous. This feature was a pathognomonic sign for a partial gall bladder mucocele. The gall bladder wall was smooth and symmetrically thin, equal to 1.2 mm thick. The right and left adrenal glands were mildly enlarged, measured 7 and 8 mm in thickness, respectively. This finding of bilateral adrenal hyperplasia together with the clinical signs of polyuria, polydipsia and polyphagia in this dog were consistent with hyperadrenocorticism. Both kidneys contained several foci of mineralization of renal diverticuli. There was no distention of the common, extrahepatic or intrahepatic bile ducts; therefore, ongoing biliary obstruction was unlikely. Abdominal free fluid and ultrasonographic signs of peritonitis were not evident. Ultrasonography of other abdominal organs appeared within normal limits. The ultrasonographic diagnosis of partial gall bladder mucocele was likely an incidental finding in this case.



**Figure 1** Transverse (A) and longitudinal (B) sonograms of the gall bladder of a seven-year-old, 7-kilogram-body weight, intact male, mixed Miniature Pinscher dog, in dorsal recumbency. The gall bladder was subjectively enlarged and showed a stellate like bile pattern of echogenic biliary sludge in the dependent portion of the lumen, consistent with partial mucocoele.



**Figure 2** Schematics of the relative positions of the structures scanned in figure 1. F - falciform fat; L - hepatic parenchyma; GB - gall bladder; S - echogenic biliary sludge; M - mucous.

### Diagnosis

Ultrasonographic diagnosis – Partial gall bladder mucocoele.

### Comments

Gall bladder mucocoeles are excessive accumulations of mucous within the largely distended gall bladder, caused by biliary stasis and mucosal hyperplasia. The gall bladder overdistention may eventually lead to pressure necrosis of the wall and ultimately to gall bladder wall rupture. Gall bladder mucocoeles commonly occur in older dogs of small to medium-sized breeds and may be asymptomatic or present with clinical signs of extrahepatic bile duct obstruction, cholecystitis and gall bladder wall rupture. Therefore, clinicopathologic abnormalities are nonspecific for differentiating the gall bladder mucocoele from other hepatobiliary disorders. The more specific and reliable imaging tool to diagnose the gall bladder mucocoele is abdominal ultrasonography.

Ultrasonography is considered the gold standard for diagnosis of canine biliary mucocoele. The ultrasonographic appearance of mucocoeles varies in echogenicity of biliary sludge that does not change when the animal is repositioned. This character differs from biliary sludge accumulated in normal gall bladder, which is usually considered nonsignificant in dogs (Brömel et al., 1998). This nonsignificant biliary sludge is gravity dependent which will change

position and shape after repositioning the patient. Besso et al. (2000) proposed a possible continuum between ultrasonographic bile patterns with gall bladder mucocoeles from immobile echogenic bile to stellate pattern to finely striated “kiwi fruit” appearance, as immobile hypoechoic mucous at the inner periphery of the gall bladder is better visualized ultrasonographically when surrounded by centrally displaced echogenic bile. In the stellate pattern, the hypoechoic inspissated and the more central echogenic bile is confined in the stellate appearance. In the kiwifruit-like or finely pattern, the inspissated bile cast appears as thin echogenic striations at the periphery of the gall bladder radiating toward the small echogenic center, resembling a cut-open kiwifruit. Similar to this case, gall bladder mucocoeles may be an incidental finding during ultrasonography in many animals.

### References

- Besso JD, Wrigley RH, Gliatto JM and Webster CRL 2000. Ultrasonographic appearance and clinical findings in 14 dogs with gall bladder mucocoele. *Vet Radiol Ultrasound*. 41(3): 261-271.
- Brömel C, Barthez PY, Léveillé R and Scrivani PV 1998. Prevalence of gall bladder sludge in dogs as assessed by ultrasonography. *Vet Radiol Ultrasound*. 39 (3): 206-210.