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## ULTRASOUND DIAGNOSIS

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## ULTRASOUND DIAGNOSIS

Phiwipha Kamonrat

### *History*

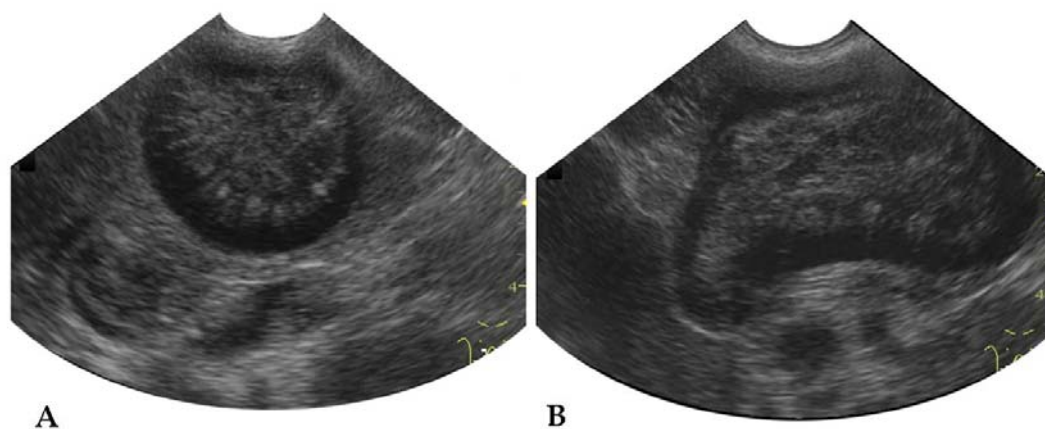
A six-year-old, spayed female, Poodle dog was presented at the Chulalongkorn University, Small Animal Hospital for depression and urinary incontinences. The dog was panting and in lateral recumbency. Physical examination finding showed icterus mucous membranes, a crackle lung sound, abdominal distention with a moderate pain on palpation of the cranial abdomen. The body temperature was normal (101.2°F). The initial data that was obtained consisted of a complete blood count, a serum biochemistry profile, urinalysis and radiographic evaluation. Abnormal clinical values included elevation of serum alkaline phosphatase (5,545 IU/l), blood urea nitrogen (49 mg%) and creatinine (2.6 mg%). Survey radiographs revealed a left-sided heart enlargement with a right middle lobar pneumonia, hepatomegaly and a soft tissue mass of either liver or gall bladder. The hepatobiliary system was ultrasonographically examined to differentiate the mass seen on radiographs.

### *Ultrasonographic Findings*

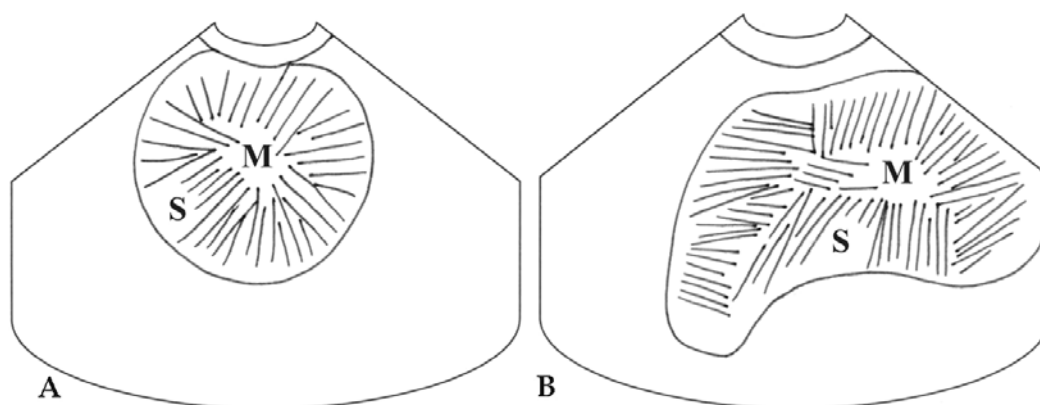
An ultrasonographic examination of the hepatobiliary system was performed using an 8 MHz microconvex, phased array transducer with the dog in dorsal recumbency. Echogenicity of the hepatic parenchyma was decreased, relative to the kidneys and the spleen and the hepatic veins were subjectively distended. These changes were likely associated with hepatic venous congestion. The gallbladder was markedly distended, about 40 ml in volume (Fig 1 and 2). It was filled with a large amount of heterogeneously echogenic bile that appeared as thin striations radiating toward its center, referred to as kiwifruit-like bile pattern. This feature was a pathognomonic sign for a gallbladder mucocele. When the dog was repositioned, the appearance of the mucocele did not change. The gallbladder wall was smooth and symmetrically thin, less than 1 mm. The common bile duct was distended, about 6-10 mm in diameter, and contained an echogenic bile at distal duct, consistent with an intraluminal mucinous plug causing biliary obstruction.

### *Diagnosis*

Ultrasonographic diagnosis – Gallbladder mucocele.



**Figure 1** Transverse (A) and longitudinal (B) sonograms of the gallbladder of a six-year-old, spayed female, Poodle dog, in dorsal recumbency. The gallbladder was subjectively enlarged and showed a kiwifruit-like bile pattern of thin echogenic striations, consistent with mucocele. The appearance of the gallbladder mucocele did not change when the dog was repositioned.



**Figure 2** Schematics of the relative positions of the structures scanned in Fig 1. M: Gallbladder mucocele, S: Pattern of echogenic striations.

### Comments

The normal gallbladder is ultrasonographically seen as an anechoic, smooth-margined, round to oval structure. Its normal size varies depending on whether the animal has recently eaten. Gallbladder volume can be calculated, according to the ellipse formula,  $\text{volume} = \pi/6 \times (\text{W} \times \text{L} \times \text{H})$  (Finn-Bodner et al., 1993).

Gallbladder mucoceles are excessive accumulations of mucous within the largely distended gallbladder. The primary causes of mucocele formation may be associated with biliary stasis and mucosal hyperplasia. The gallbladder overdistention may eventually lead to pressure necrosis of the wall and ultimately to gallbladder wall rupture. The ultrasonographic appearance of mucoceles varies in echogenicity. They may appear as formed echogenic biles or have characteristic bile patterns of stellate or kiwifruit-like (Besso et al., 2000). In the stellate pattern, the hypoechoic inspissated bile cast is seen along the gall bladder inner wall and the more central echogenic bile is confined in the stellate appearance. In the kiwifruit-like or finely striated pattern, the inspissated bile cast appears as thin echogenic striations at the periphery of the gallbladder radiating toward the small echogenic center, resembling a cut-open kiwifruit. The appearance of gallbladder mucocele does not change

when the animal is repositioned, which differs from biliary sludge that is gravity dependent and will change position and shape. Intraluminal mucinous plugs can extend into the common bile duct and cause obstruction. However, biliary duct distention is not always present with biliary obstruction secondary to mucoceles. Gallbladder rupture can be diagnosed on ultrasound by the loss of continuity in the gallbladder wall, along with the presence of pericholecystic hyperechoic fat or fluid.

Gallbladder mucoceles may be an incidental finding during ultrasonography in many animals. In these patients, conservative medical treatment and patient monitoring by follow-up ultrasound examination are suggested. A surgical treatment is recommended when clinical or biochemical signs of hepatobiliary disease are present.

### References

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- Finn-Bodner, S.T., Park, R.D., Tyler, J.W., Twedt, D.C. and Curtis, C.R. 1993. Ultrasonographic determination, *in vitro* and *in vivo*, of canine gallbladder volume, using four volumetric formulas and stepwise-regression models. *Am J Vet Res*. 54(6):832-835.