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## ULTRASOUND DIAGNOSIS

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## ULTRASOUND DIAGNOSIS

Phiwipha Kamonrat

### *History*

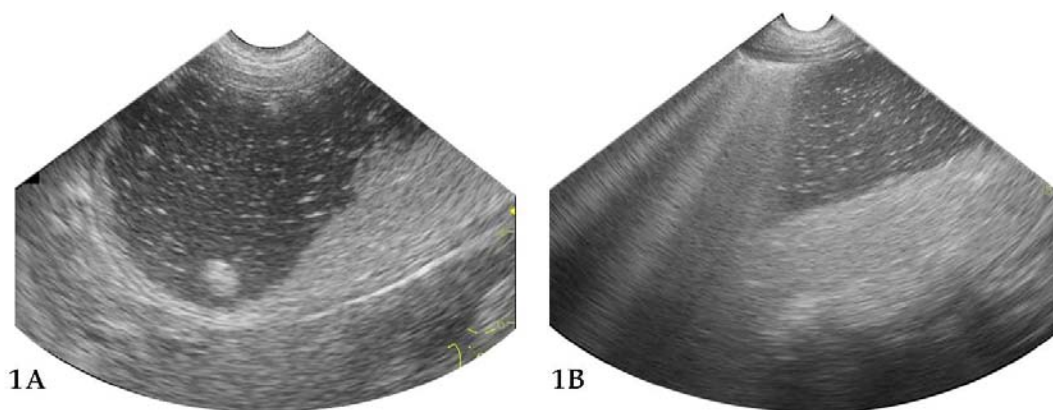
A four-year-old, intact male, Saint Bernard dog was presented at the Chulalongkorn University, Small Animal, Veterinary Teaching Hospital because of the chronic intermittent vomiting for five months. The dog had a mild depression and a less appetite. Four weeks ago, the dog went for surgical correction of gastric dilatation-volvulus by gastropexy. The dog had started to vomit on and off again during the last two weeks. A physical examination revealed pink mucous membranes, normal hydration status and abdominal distension. An abdominal tense was notified on palpation. Laboratory blood work showed a mild leukocytosis with neutrophilia ( $17,300 \times 10^3$  white blood cells/ $\mu\text{l}$  and 92% neutrophils). No blood parasite was found. Abdominal radiographs revealed a markedly gas and soft tissue-distended stomach displacing bowel loops caudally. There was no evidence of gastric rotation or splenic torsion. After a decompression of the dilated stomach by passing orogastric intubation, abdominal ultrasonography was performed to differentiate the gastric lesions especially a gastric outflow obstruction.

### *Ultrasonographic Findings*

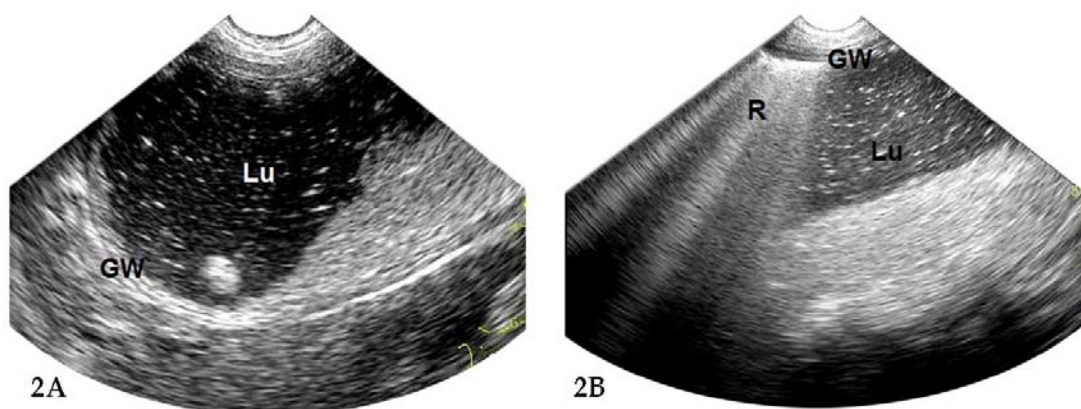
Real-time, ultrasonographic images of the stomach were obtained using an 8 MHz microconvex, phased array transducer with the dog in dorsal recumbency. After a fast of 12 hours and a decompression of the stomach prior to ultrasonography, the stomach was still markedly dilated with luminal contents (Figure 1A and 2A). The alternating hyperechoic and hypoechoic layer definition of the gastric wall was preserved. Gastric wall measured 2 mm in thickness, which was within a normal range in dogs. Gastric contents consisted of a large amount of anechoic fluid mixed with echogenic food particles and hyperechoic gas (Figure 1B and 2B). Gas in the lumen created reverberation artifacts that masked the gastric far wall. In real-time scanning, there was continual gastric peristaltic movement, about 4-5 contractions per minute, without the movement of fluid and chyme into duodenum. Most of the contents still swirl in the lumen, however, there were no any morphologic changes of pyloric sphincter or duodenum detected. These findings might be related to a condition of a delayed gastric emptying time. Ultrasonography of other abdominal organs including the rest of the intestinal tract appeared normal in echotexture.

### *Ultrasonographic Diagnosis*

Severe gastric dilatation without pyloric outflow obstruction



**Figure 1** Ultrasonographic images of the stomach of a four-year-old, intact male, Saint Bernard dog in dorsal recumbency. A. After a fast of 12 hours, the stomach was still markedly dilated with luminal contents. The echogenicity and layering of the gastric wall were preserved. B. Gastric contents included anechoic fluid, echogenic food particles and hyperechoic gas with related reverberation artifacts.



**Figure 2** Schematics of the relative positions of the structures scanned in figure 1. GW –gastric wall, Lu –gastric lumen; R–reverberation artifact created by gas.

### Comments

Ultrasonographic and radiographic studies compliment each other to confirm the presence and causes of gastric dilatation. The ultrasonography will add more information of the gastric wall thickness, layering and motility, peritoneal fluid and regional lymphadenopathy. In normal dogs, the gastric wall thickness ranges from 2 to 5 mm depending on distension of the stomach and measurements taken at the rugal or the interrugal level (Penninck, 2008). The five ultrasonographic layers of normal gastric wall are recognized as hyperechoic mucosal surface, hypoechoic mucosa, hyperechoic submucosa, hypoechoic muscularis and hyperechoic subserosa/serosa. Loss of layering is associated with pathologic changes but gas-related artifacts and limited resolution of ultrasound equipment may mask the visualization of the wall layer definition. Ultrasound is a valuable diagnostic tool for stomach motility evaluation. The normal gastric peristaltic movement ultrasonographically averages 4-5 contractions per minute. Gastric emptying time in dogs has been evaluated by serial measurement of antral area and volume after a test meal as developed by Bolondi et al.'s method (Choi et al., 2002). The identification of stomach distension with fluid, food

and gas contents, and the lack of passage of these contents through the pylorus in this dog may signify mechanical obstruction but ultrasonographic changes of pyloric sphincter or duodenum were not identified. Therefore endoscopy was employed for real time evaluation of the stomach and found only a mild hyperemia of the gastric mucosa without a mechanical obstruction of the pyloric sphincter or proximal duodenum.

### References

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- Penninck D. 2008. Gastrointestinal tract. In: *Atlas of Small Animal Ultrasonography*. 1st ed. D. Penninck and M.A. Anjou (eds.) Ames: Blackwell Publishing. 281-318.