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ULTRASOUND DIAGNOSIS

Phiwipha Kamonrat

History

A twelve-year-old, spayed female, Miniature Pinscher dog was presented at the Chulalongkorn University Small Animal Hospital with an acute hematuria and pollakiuria. Physical examination revealed slightly pale mucous membranes. The results of the hematological and serum biochemical profiles were within the normal ranges. Survey radiographs of the abdomen demonstrated mottled gas opacities within the urinary bladder wall suggesting an emphysematous cystitis. Urine samples were collected via cystocentesis after the ultrasound diagnosis was established and sent for routine analysis as well as for culture and sensitivity test. The urine did not contain glucose. There were numerous erythrocytes, leukocytes and bacterial rods in the urine sediment. *Klebsiella spp.* was isolated from the urine. An abdominal ultrasonography was performed to confirm a condition of emphysematous cystitis.

Ultrasonographic Findings

A real-time, ultrasonographic examination of an entire abdomen was performed using an 8 MHz microconvex, phased array transducer with the dog in dorsal recumbency. The echogenicity relationship of liver, spleen and kidneys were within a normal limit. The urinary bladder was mildly distended and contained echogenic urine sediment (Figs 1 and 2). The cranioventral aspect of the urinary bladder wall was slightly thickened, measured up to 6 mm in diameter and appeared as a typical hyperechoic interface with marked distal reverberation artifacts, suggesting the presence of gas. The urinary bladder was then scanned with the dog standing to distinguish the bladder wall gas from intraluminal gas and found that the reverberation produced by gas remained in the same location. These findings were consistent with an emphysematous cystitis.

Diagnosis

Ultrasonographic diagnosis – Emphysematous cystitis.



Figure 1 A longitudinal ultrasonographic image of an emphysematous cystitis in a twelve-year-old, spayed female, Miniature Pinscher dog in dorsal recumbency. The cranioventral aspect of the urinary bladder wall appears as a typical hyperechoic interface with marked reverberation artifacts. The bladder content is echogenic.

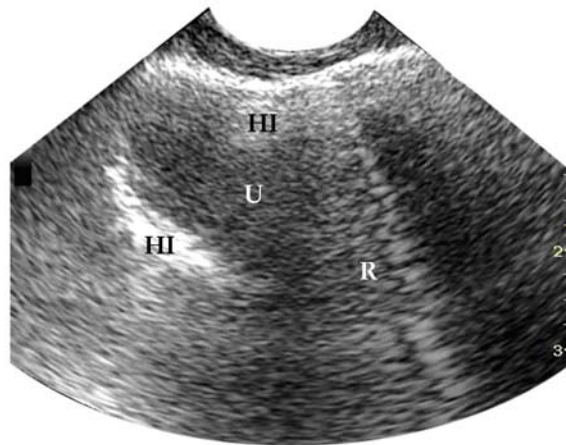


Figure 2 A corresponding schematic image of the urinary bladder scanned in figure 1. HI-hyperechoic interface in the cranioventral bladder wall; U-hypoechoic urine; R- reverberation artifacts.

Comments

Ultrasonography is a sensitive technique for detection of gas accumulated within the urinary bladder, especially of emphysematous changes at an early stage. The ultrasonographic appearance of intramural gas accumulation is multifocal irregular hyperechoic interface, localized within the bladder wall and follows the wall contour closely (Petite et al., 2006). Reverberation artifacts produced by the gas are seen distal to the hyperechoic interface. Gas entrapped in the bladder wall can be distinguished from free gas in the lumen that may have been introduced by previous catheterization, by using alternative patient position. The intramural gas from emphysematous cystitis will remain in the same location when the patient is recumbent or standing, whereas the free luminal gas will move with patient position. The bladder is often reduced in size and poorly filled with echogenic urine sediment. The bladder wall may be irregularly thickened.

In dogs, emphysematous cystitis is commonly seen with diabetes mellitus (Root and Scott, 1971) but it can occur in nondiabetic dogs, secondary to chronic urinary tract infection (Petite et al., 2006). The urine in this dog did not contain glucose and *Klebsiella spp.* was isolated from the urine. After the antibiotic therapy with marbofloxacin based on sensitivity test, no ultrasonographic or laboratory abnormalities, including urine glucose were found.

References

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- Root, C.R. and Scott R.C. 1971. Emphysematous cystitis and other radiographic manifestations of diabetes mellitus in dogs and cats. *J Am Vet Med. Assoc.* 158:721-728.