

## Ultrasound Diagnosis

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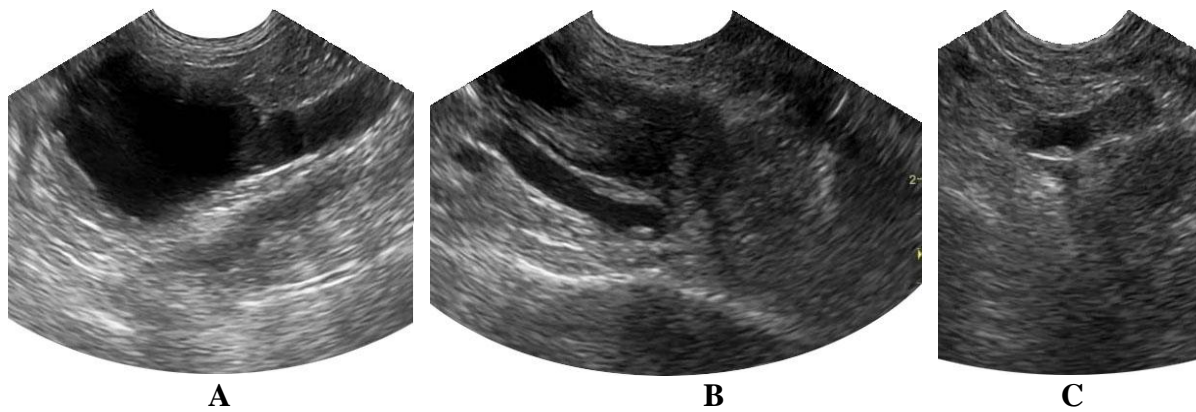
### *History*

A twelve-year-old, 6-kilogram-body weight, castrated, Poodle dog was presented at the Chulalongkorn University, Small Animal, Veterinary Teaching Hospital with an acute clinical sign of urinary incontinence. The dog was alert and had a normal appetite. Survey radiographs of the abdomen revealed cystic and urethral calculi. Cystotomy was then performed to remove those calculi. A tissue specimen of urinary bladder mucosa was also biopsied from the dorsal aspect of the bladder neck for a histopathological evaluation, which was later diagnosed as a transitional cell carcinoma of the bladder. Three weeks after the operation, the dog had developed clinical signs of polyuria and intermittent tenesmus. The dog had been food-restricted and had a good appetite. Physical examination revealed pink mucous membranes and a mildly tensed caudal abdomen, on palpation. The initial data that was obtained consisted of a complete blood count, a serum biochemistry profile and urinalysis. The abnormal clinical values included mild elevation of serum alkaline phosphatase (105 IU/L), blood urea nitrogen (43 mg%) and creatinine (1.6 mg%) concentrations. An abdominal ultrasonography was performed to investigate the internal organs, especially the urinary bladder and the surrounding structures.

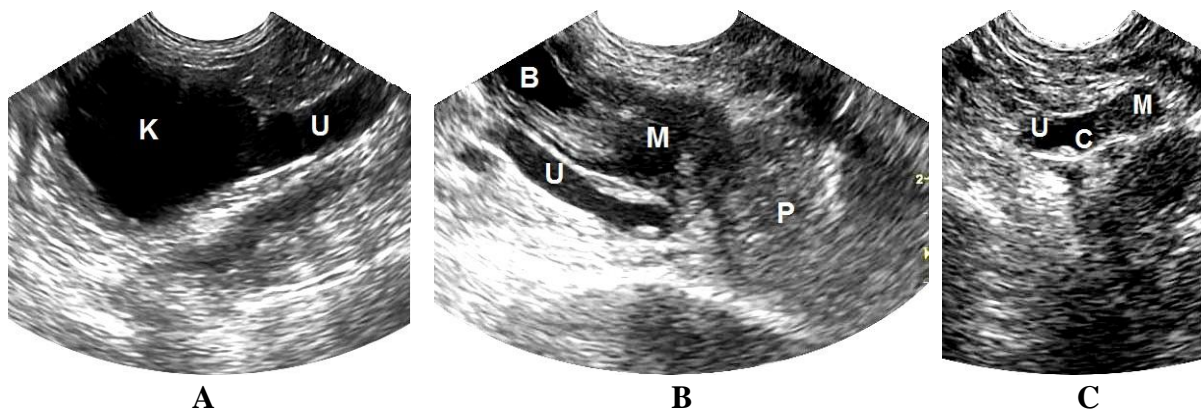
### *Ultrasonographic Findings*

Trans-abdominal ultrasonographic evaluation of the abdomen was performed using a real-

time, 8 MHz microconvex, phased array transducer with the dog in dorsal and lateral recumbency. The overall liver was hyperechoic to the right kidney and hypoechoic to the spleen, indicating a normal echogenicity relationship. The size of both kidneys was within the normal range but the echotexture was changed. The right kidney contained a hyperechoic medullary rim sign and a mild dilation of renal pelvis (approximately 8 mm in diameter). The left kidney was mostly replaced by hypoechoic fluid, with only 4-6 mm thick rim of parenchyma remaining, representing a severe hydronephrosis (Figure 1A and 2A). There were also bilateral hydroureters, appearing anechoic dilation of the entire region of each ureter. These findings were more severe on the left side (the diameters of the right and the left dilated ureters were 4 and 11 mm, respectively). The urinary bladder contained a small amount of anechoic urine, with some sediments. The urinary bladder neck contained an irregular, 5-11 mm thick, broad-based, heterogeneously echogenic mass, consistent with transitional cell carcinoma (Figure 1B and 2B). This mass was more associated with the left-laterodorsal aspect of the bladder-neck wall and projecting into the left distal ureter, causing a severe hydroureter. A hyperechoic material with acoustic shadowing, 3.3 mm in diameter, which represented a calculus, was also detected within the left dilated distal ureter (Figure 1C and 2C). The prostate gland was also enlarged and heterogeneous in echotexture with an irregular margin. Ultrasonography of surrounding lymph nodes appeared within normal limits.



**Figure 1** Longitudinal sonograms of the invasive transitional cell carcinoma of a twelve-year-old, castrated, Poodle dog. A. Evidences of left hydronephrosis and hydroureter are secondary to the obstruction caused by the mass of the bladder neck. B. An irregular, heterogeneously echogenic mass, consistent with transitional cell carcinoma, encircles the neck of the urinary bladder and extends into the left distal ureter. C. The distal portion of the left ureter contains a hyperechoic calculus, with acoustic shadowing, and is dilated by the projecting mass.



**Figure 2** Schematics of the relative positions of the structures scanned in figure 1. K -kidney; U -ureter; B -urinary bladder; M -mass; P -prostate gland; C -calculus.

### Diagnosis

Ultrasonographic diagnosis – Invasive transitional cell carcinoma of the urinary bladder.

### Comments

The most common bladder mass in the dog is transitional cell carcinoma. It is usually characterized by focal urinary bladder wall thickening with a wide-based sessile, papillary or polypoid mass protruding into the bladder lumen (Leveille et al, 1992). It occasionally infiltrates through the bladder wall, resembles the diffuse wall thickening in a case of chronic cystitis. The ultrasonographic appearance of this mass tends to be heterogeneously hypoechoic, isoechoic or hyperechoic with an irregular intraluminal margin. An aspiration, biopsy or both are necessary to differentiate the presence of bladder neoplasia from polypoid cystitis, adherent blood clots and mural hematomas. It may be better to use the technique of ultrasound-guided catheter biopsy (Lamb et al, 1996) because of the possibility of seeding the needle track with tumor cells when the aspiration technique was chosen. Transitional cell carcinomas are highly

invasive and possibly local spread to the ureters, urethra, prostate and other adjacent tissues. When an invasive mass of the urinary bladder is detected, the sublumbar lymph nodes should be ultrasonographically evaluated to aid the staging of a suspected neoplasm. Kidneys and ureters should also be scanned for evidence of dilation due to the obstruction caused by the mass.

### Reference

- Lamb CR, Trower ND and Gregory SP. 1996. Ultrasound-guided catheter biopsy of the lower urinary tract: Technique and results in 12 dogs. J. Small Anim. Pract. 37:413-416.
- Leveille R, Biller DS, Partington BP and Miyabayashi T. 1992. Sonographic investigation of transitional cell carcinoma of the urinary bladder in small animals. Vet. Radiol. Ultrasound. 33:103-107.