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# Ultrasound Diagnosis

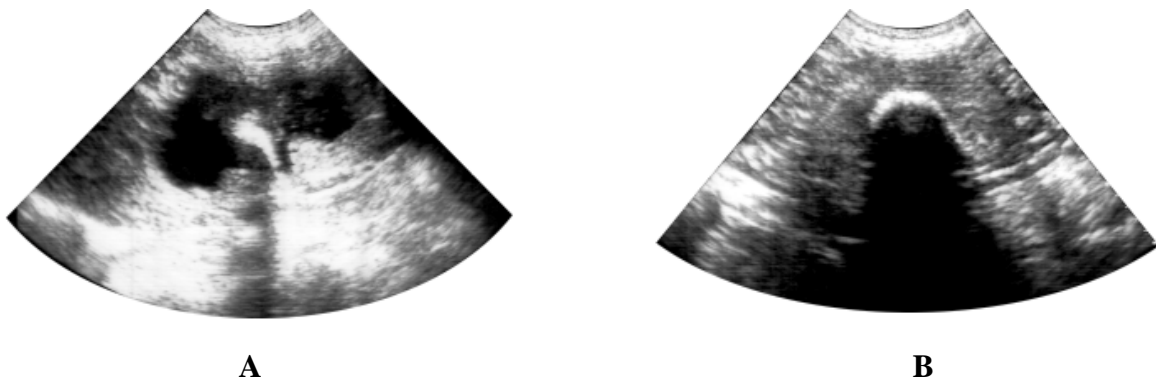
Phiwipha Kamonrat

## History

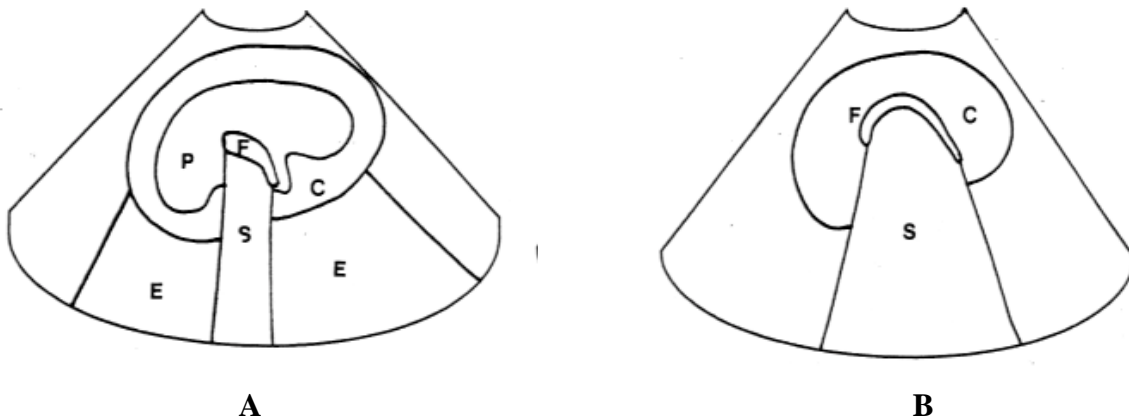
A nine-year-old, female, Pekingese was referred to the Chulalongkorn University, Small Animal, Veterinary Teaching Hospital with clinical signs of anorexia, depression, and vomiting. A physical examination revealed markedly pale mucous membranes and mild dehydration. The red blood cell count was  $3.08 \times 10^6$  per  $\mu\text{l}$ , with 8 g/dl hemoglobin and 27% hematocrit. The blood morphology showed poikilocytosis. Striking findings on the serum biochemical analyses included elevated blood urea nitrogen (286 mg%) and creatinine (9.2 mg%). Abdominal palpation suggested cystic calculi, which was confirmed by radiography. Radiography also revealed bilateral renal calculi.

## Ultrasonographic Findings

A real-time scanner with an 8-5 MHz broadband, convex, phased array transducer was used to examine both kidneys in sagittal and transverse planes. The right and left kidneys were 3 by 5 cm and 2 by 3 cm in diameter, respectively. Both kidneys contained echogenic foci, with distal acoustic shadowing, within the pelvis (Fig. 1 and 2). The diameters of the right and left renal foci were 1.3 by 3 cm and 1.5 by 1.5 cm. The right renal pelvis was anechoic and dilated (2 by 3.6 cm width). There was no evidence of dilation of the left renal pelvis. The peripheral renal cortex was hyperechoic to the liver and hypoechoic to the spleen. The thickness of the right and left renal cortices were 5 and 7 mm, respectively. Bilateral ureters appeared normal.



**Figure 1** Sagittal ultrasonographic images of the right kidney (A) and left kidney (B) of a nine-year-old, Pekingese dog in dorsal recumbency. Echogenic foci, with distal acoustic shadowing, characterized as calculi were present within the pelvis of both kidneys. The right renal pelvis was anechoic and dilated with a peripheral thin cortex. Acoustic enhancement was also seen distal to the dilated pelvis.



**Figure 2** Schematics of the relative positions of the structures scanned in Figure 1. F-echogenic renal calculus; S-distal acoustic shadowing; P-anechoic renal pelvis; C-echogenic renal cortex; E-distal acoustic enhancement.

### Diagnosis

Ultrasonographic diagnosis — Bilateral renal calculi with a mild hydronephrosis.

### Comments

Ultrasonography and radiography complement each other in the diagnosis of renal disease. Ultrasonography is less invasive than pyelography and should be used first if there is suspicious of abnormalities of the renal pelvis and proximal ureter. The dorsal-plane image of the kidney is the plane in which the pathologic changes of the renal pelvis and ureter are the easiest to evaluate. The normal renal pelvis appeared in the dorsal plane as an echogenic area, corresponding to the connective tissue constituting its wall, and in a transverse plane as a double v-shaped echogenic line. The two commonest lesions of the renal pelvis are renal calculi and hydronephrosis.

Renal radiopaque and radiolucent calculi sonographically produce hyperechoic foci with distal acoustic shadowing. Large pelvic calculi tend to be centrally located. Pelvic dilation makes visualization of calculi much easier. With hydronephrosis, a central

symmetric anechoic region, that extends into the diverticula, replaces the normally hyperechoic renal sinus (Nyland et al., 2002). Ultrasonography may enable detection of hydronephrosis before clinically significant enlargement occurs. Recently, hydronephrosis is classified into 4 categories, which are functional dilatation, dilatation with stasis, mild hydronephrosis and advanced hydronephrosis (Felkai et al., 1995). In this dog, a mild hydronephrosis was observed in the right kidney, in addition to the renal calculus.

### References

- Felkai Cs., Voros K. and Fenyves B. 1995. Lesions of the renal pelvis and proximal ureter in various nephro-urological conditions: an ultrasonographic study. *Vet. Radiol. Ultrasound*. 36(5): 397-401.
- Nyland T.G., Mattoon J.S., Herrgesell E.J. and Wisner E.R. 2002. Urinary tract. In: *Small Animal Diagnostic Ultrasound*. 2<sup>nd</sup> ed. T.G. Nyland and J.S. Mattoon (eds.) Philadelphia: W.B. Saunders Company. 158-195.