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Ultrasound Diagnosis

Phiwipha Kamonrat

History

A seven-year-old, spayed female, mixed-breed dog was referred to the Chulalongkorn University, Small Animal, Veterinary Teaching Hospital with clinical signs of anorexia, vomiting and depression for three weeks. There was no history or evidence of trauma. The dog had been managed conservatively with a protein-restricted diet for chronic renal failure, with measured blood urea nitrogen between 40-60 mg/dl and creatinine 3.5 mg/dl, over a year period by a referring veterinarian. Physical examination revealed pale mucous membranes and a slightly tense abdomen on palpation. The result of a complete blood count showed an anemia (3.4×10^6 red blood cells/ μ l, 11 g/dl hemoglobin, 32% hematocrit) with a blood morphology of anisocytosis. Striking findings on the serum biochemical analyses included elevated blood urea nitrogen (138 mg%) and creatinine (10 mg%) concentrations. Urinalysis was unremarkable. Survey radiography demonstrated a mild pleural effusion and a mild abdominal ground-glass appearance indicating ascites. Both kidneys cannot be outlined and any radiopaque urinary calculi were not evident. An abdominal ultrasonography was performed to narrow the spectrum of information not obtainable by the survey radiography.

Ultrasonographic Findings

Real-time, ultrasonographic images were obtained using an 8 MHz microconvex, phased array transducer with the dog in dorsal recumbency. A moderate volume of anechoic fluid was detected in the peritoneal cavity. With longitudinal and transverse scans of both kidneys, a thin layer of anechoic fluid surrounded the kidney was detected (Figure 1 and 2). The overall renal tissue appeared hyperechoic, relative to hepatic and splenic parenchyma. The diameters of right and left kidneys were 3.3x4.9x3.5 and 3.6x5.0x3.7 cm, respectively. Both kidneys had poor corticomedullary definition and uneven cortical contour. Small hyperechoic areas were diffusely notified in the renal medulla. These renal parenchymal changes were suggestive of chronic pyelonephritis. There was an anechoic space around the renal crest, measuring 5 and 7 mm of the right and left kidneys, respectively, which was indicative of a renal pelvic dilation. A ureteral dilation was not evident. The urinary bladder was seen markedly distended with urine containing sediments. The urinary bladder wall was smooth, echoic, and 1 mm thick. Liver and spleen were normal in echotexture.

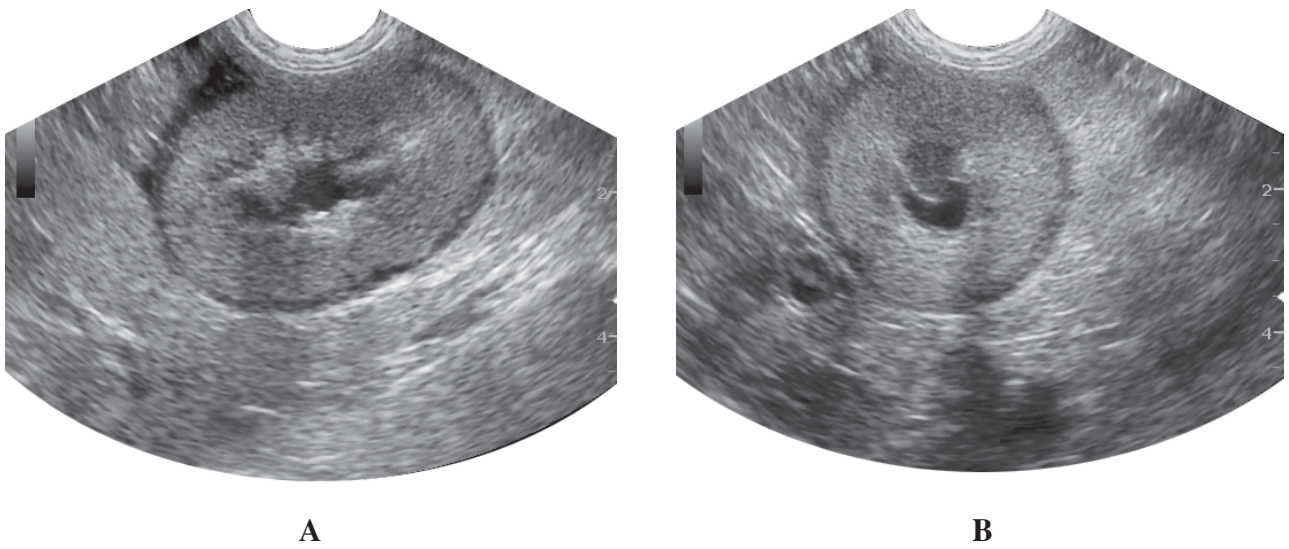


Figure 1 Sagittal (A) and transverse (B) ultrasonographic images of the left kidney of a seven-year-old, spayed female, mixed-breed dog, with chronic renal disease, showing the small subcapsular perirenal accumulation of fluid and demonstrating the poor renal corticomedullary definition and focal hyperechoic medulla with pelvic dilation.

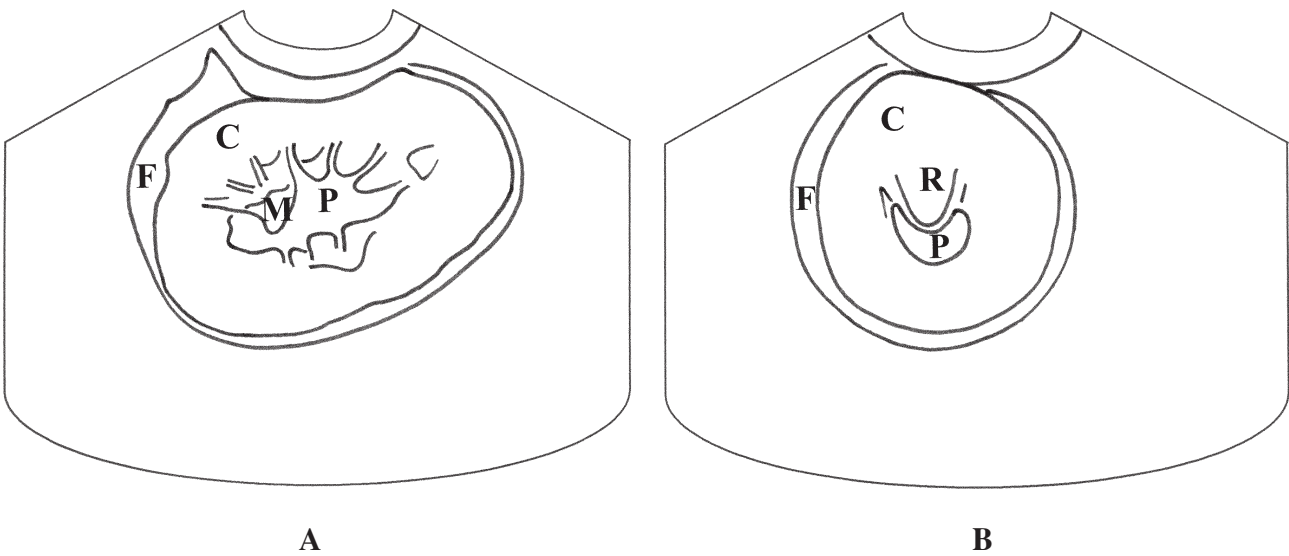


Figure 2 Schematics of the relative positions of the structures scanned in figure 1. F -anechoic perirenal fluid; C -renal cortex; M -hyperechoic focus within renal medulla; P -anechoic renal pelvis; R -renal crest.

Diagnosis

Ultrasonographic diagnosis — Bilateral sub-capsular perirenal fluid with renal failure.

Comments

A subcapsular perirenal fluid is an accumulation of small amounts of fluid between the renal parenchyma and its surrounding capsule. It is ultrasonographically characterized as a thin layer of anechoic fluid around the kidney. The amount of perirenal fluid is usually much less than that seen with perinephric pseudocysts or perirenal retroperitoneal fluid. Fluid accumulation can occur unilaterally or bilaterally and tends to progress. The fluid content may be urine, blood, transudates or exudates. Differentiation can be made with fluid analysis following fine needle aspiration. The cause of the perirenal fluid is not fully understood. It has been linked with underlying renal disease. An association with perirenal fluid occur in dogs due to ethylene glycol toxicity (Adams et al., 1991), leptospirosis (Forrest et al., 1998), obstructive uropathy (Nyland et al., 2002) and acute renal failure (Holloway and O'Brien, 2007) has been reported in dogs.

In this dog, an underlying cause of the renal failure was not determined but an acute decompensation of preexisting chronic renal failure was suspected. Additional sonographic findings that were consistent in appearance with chronic nephritis included a diffuse increase in renal echogenicity, poor corticomedullary differentiation, focal hyperechoic areas in the renal medulla and renal pelvic dilation.

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