ULTRASOUND DIAGNOSIS

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History

A nine-year-old, castrated, Cocker Spaniel dog was referred to the Chulalongkorn University, Small Animal, Veterinary Teaching Hospital for an evaluation after a one-week history of depression, anorexia and exercise intolerance. Physical examination revealed pale mucous membranes and heart murmur sounds. The abdomen was markedly tensed on palpation. Abnormal clinical parameters included elevated serum alkaline phosphatase (220 units), leukocytosis (2.36 x 10^4 white blood cells/µl, 81% neutrophils, 13% lymphocytes, 6% monocytes) and anemia(3.57 x 10^6 red blood cells/µl, 8 g/dl hemoglobin, and 26% hematocrit) with a blood morphology showing anisocytosis. Thoracic radiographs revealed interstitial and bronchial lung infiltration with a normal heart size. On ECG, premature ventricular complexes were present. Plain radiographs of the abdomen showed a ground glass appearance, indicating a peritoneal effusion. Abdominal organ silhouettes were obliterated by the peritoneal fluid. An abdominal ultrasonography was performed to obtain more specific information.

Ultrasonographic Findings

Ultrasonographic evaluation of the abdomen was performed using a real time scanner with an 8-5 MHz broadband, convex, phased array transducer. A large quantity of echogenic peritoneal fluid, showing swirling of the suspended echogenicities, was observed. Sagittal and transverse scans of the spleen showed a 6.5 x 7.5 cm, lobulated, echogenic mass, protruding from the splenic head and body (Figures 1A and 2A). Multiple, small, hypoechoic foci were diffused throughout this mass. Multiple, 5-8 mm, hypoechoic nodules were observed within the renal cortex of both kidneys. A 6 x 7 cm, lobulated, heterogeneous mass, containing multiple, 2-20 mm, anechoic foci, was also identified between the liver and the spleen (Figures 1B and 2B). The echo-texture of the liver appeared normal. The urinary bladder contained anechoic urine with some echogenic sediments.

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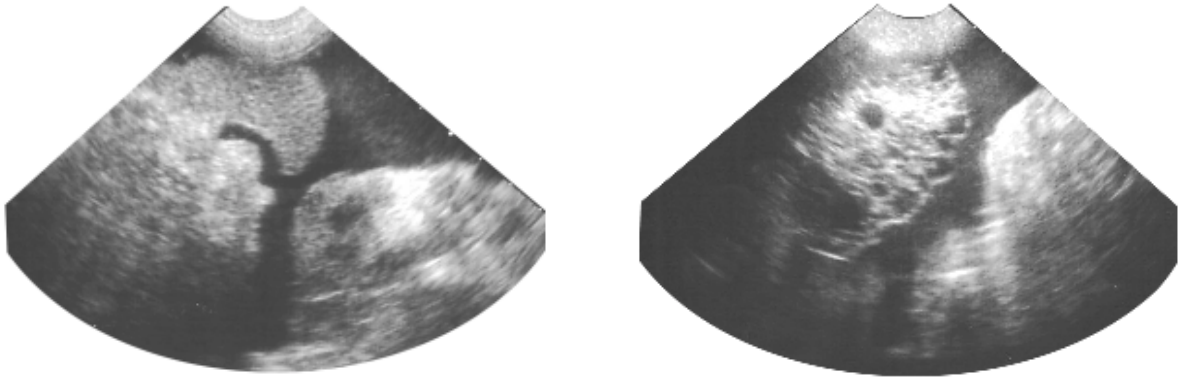
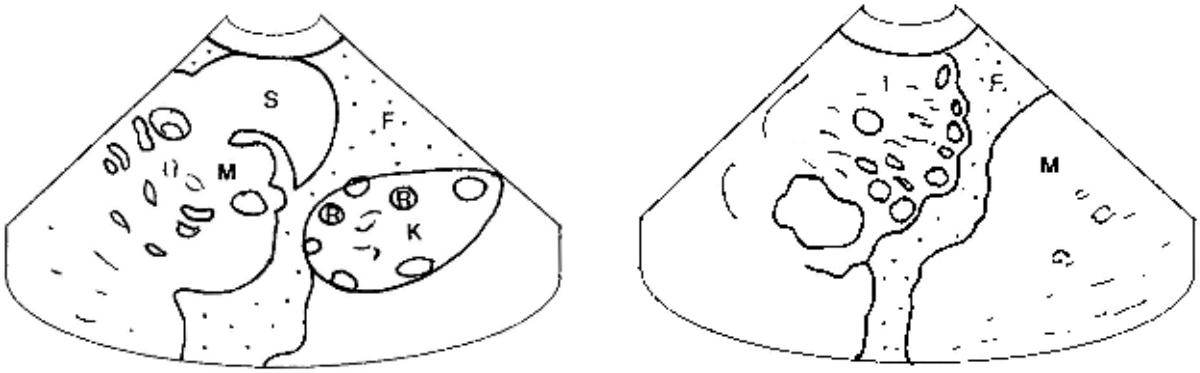


A B

Figure 1 Transabdominal ultrasonograms of a nine-year-old, castrated, Cocker Spaniel dog in dorsal recumbency. A large quantity of echogenic peritoneal fluid, with swirling of the suspended echogenicities, was observed in real time. A. A lobulated, echogenic mass, with diffuse hypoechoic foci, was protruding from the spleen. Multiple, hypoechoic nodules were observed within the renal cortex. B. A lobulated, heterogeneous mass, containing multiple anechoic foci, was present between the liver and the spleen.



A B

Figure 2 Schematics of the relative positions of the structures scanned in figure 1. F -echogenic peritoneal fluid; S -spleen; M -splenic mass; K -left kidney; R -renal mass; I -intra-abdominal mass.

Diagnosis

Ultrasonographic diagnosis—— Peritoneal effusion associated with metastatic neoplasia.

Comments

It appears that ultrasonography is a more sensitive imaging technique than survey radiography in detecting free abdominal fluid (Henley et al., 1989). Intra-abdominal organs become easier to identify and assess because they are separated by a large anechoic space of free fluid. Clear blood or fluid is black on ultrasound images and becomes more echogenic when it contains protein, cells or debris. Intra-abdominal haemorrhage may appear echogenic, with multiple echoes from red blood cells within the fluid, which often show a swirling movement in real time (Mattoon and Nyland, 2002). Peritonitis and carcinomatosis can have multifocal echogenicities from cells, fibrin, or other debris. Ultrasonographic examination of the abdominal organs for determining a potential origin of the fluid is recommended. Common causes of haemorrhagic effusions are splenic and liver tumors. Transudates may be associated with elevated central venous pressure, right-sided heart failure and liver disease.

A definitive diagnosis of the type of fluid requires aspiration for analysis. In this dog, cytologic examination of the fluid from abdominocentesis revealed active mesothelial and inflammatory cells. Although tumor cells were not found in the peritoneal fluid from this dog, a final diagnosis of metastatic neoplasia was strongly suggested by the evidence of the heterogeneous echotexture of multifocal masses which appeared on several visceral organs, which also combined with the information from the history, clinical signs, physical examination and laboratory tests. However, a definitive diagnosis of intra-abdominal masses also requires a fine-needle biopsy and histology.

References

Henley, R.K., Hager, D.A. and Ackerman, N. 1989. A comparison of two-dimensional ultrasonography and radiography for the detection of small amounts of free peritoneal fluid in the dog. Vet. Radiol. 30(3): 121-124.

Mattoon J.S. and Nyland, T.G. 2002. Abdominal fluid, lymph nodes, masses, peritoneal cavity, and great vessel thrombosis. In: Small Animal Diagnostic Ultrasound 2nd ed. T.G. Nyland and J.S. Mattoon (eds.) Philadelphia: W.B. Saunders Company. 82-91.