Subcapsular Hematomas Associated with Renal Lymphoma in a Cat: A Radiographic Study[1]

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INTRODUCTION

Radiographic technics including intravenous urograms and angiography have been used successfully in assessing renal enlargement in man (1, 3, 4). Infiltration of renal parenchyma by tumor cells will increase the susceptibility to hematoma formation as a result of even mild trauma (2). A diagnosis of renal masses with superimposed hematomas may be correctly made by comparing the apparent renal size in the survey radiographs with the nephrogram and with the delayed images from the abdominal angiogram (2, 4). This report describes the use of these technics in a cat with subcapsular hematomas associated with renal lymphoma.

CASE HISTORY

A 15-month-old castrated male domestic short-haired cat was referred to The Johns Hopkins Division of Animal Medicine with palpable bilateral renal enlargement. The owner had observed weight loss and progressive abdominal enlargement in the cat for several months prior to its admission. The animal had been immunized with panleukopenia and pneumonitis vaccines while a kitten.

The cat was alert and moderately active. The abdomen was markedly distended. On palpation both kidneys were greatly enlarged. They were asymmetrical, had relatively smooth surfaces and were firm in texture. The peripheral lymph nodes were not enlarged. The remainder of the physical examination was negative. A tentative diagnosis of renal lymphoma was made, and the animal was hospitalized for further diagnostic procedures.

The white blood cell count was 14,500 mm^3 (77 mature neutrophils, 1 band neutrophil, 20 lymphocytes, 1 monocyte, 1 eosinophil). There were no atypical cells present. The PCV was 28%, and the total protein was 9.2 gm%. A SUN of greater than 75 mg% and a creatinine of 4.8 mg% indicated severe renal failure. Serum amylase was 800 Somogyi units and transaminase levels were normal. Urinalysis revealed a specific gravity of 1.022. The sediment contained many WBC's, RBC's, epithelial cells and waxy casts.

Survey radiographs of the abdomen revealed bilateral renal enlargement (Fig. 1). The outline of the left kidney was much larger than the right. An intravenous urogram using 12 ml of sodium diatrizoate[5] intravenously allowed visualization of the collecting structures (Fig. 2). The resulting nephrogram was very faint and irregular in the lower poles of the

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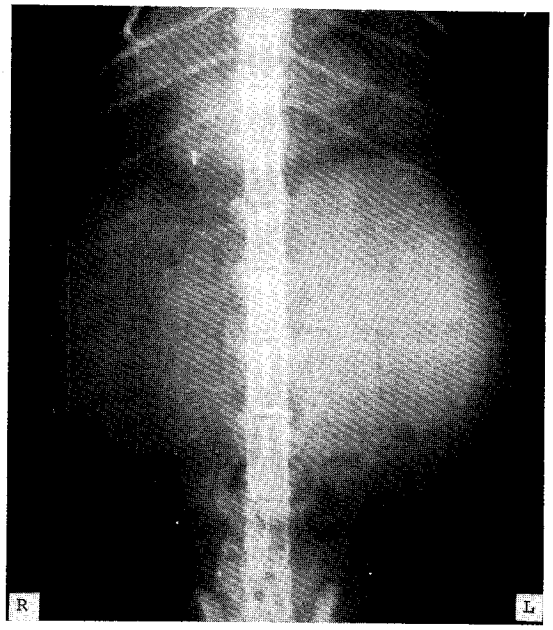

Fig. 1. Abdominal radiograph: enlargement of both kidneys is present, much greater on the left than right.

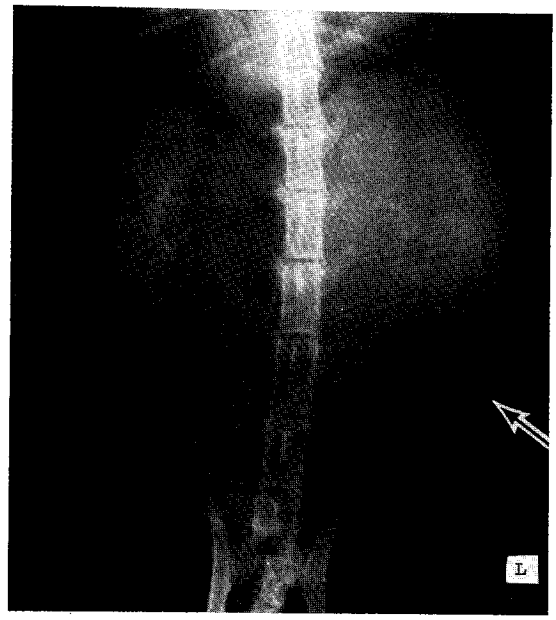

Fig. 2. Intravenous urogram: the calyceal structures are visualized bilaterally and are less well delineated on the left than right side. On the left, the nephrogram (concentration of contrast) is less dense in the lower pole of the kidney suggesting a nonfunctioning rim surrounding the lower pole (arrow).

kidneys, especially on the left side (Fig. 2). In addition an arteriogram of the renal arteries was performed by surgically exposing the left femoral artery following sedation with 75 mg ketamine[6] and 15 mg promazine[7] administered intramuscularly. Visualization of the catheter placement was accomplished by fluoroscopy. Radiographs were obtained at two per second for 3 seconds, one per second for 2 seconds, and one every 2 seconds for 6 seconds following injection of 10 ml of radiopaque dye[8] into the femoral catheter with a mechanical injector at 180 psi. Exposure factors were 80 kV at 60 mA at $^1/_{30}$ second. In the "early" or arterial phase of the angiographic study the intrarenal arteries appeared to be straightened and somewhat stretched (Fig. 3). Both special radiographic technics also demonstrated compressed parenchyma in the caudal pole of the left kidney. This area was surrounded by a soft tissue density that appeared to conform to the general renal outline. A great disparity in size was observed when the nephrogram in Figure 4 was compared with the apparent renal size suggested by the left renal outline in Figure 1. This observation suggested

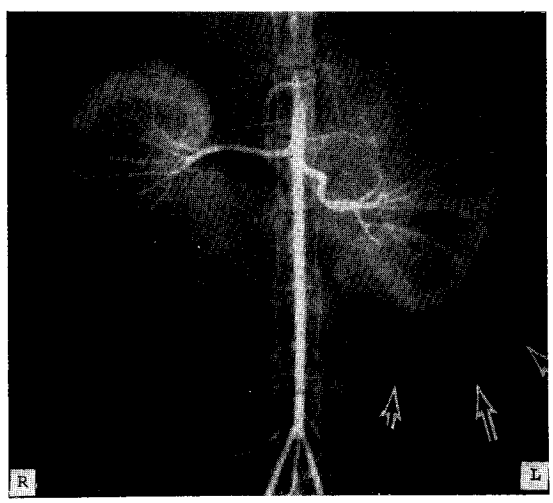

Fig. 3. Abdominal angiogram (early phase): intrarenal vessels are straightened in their course and appear to be stretched and thin without abnormalities. A soft tissue mass is present and surrounds the contrast in the parenchyma of the left kidney (arrows point to mass border).

[6] Vetalar, Parke, Davis & Company, Detroit, Mich.

[7] Sparine, Wyeth, Wyeth Laboratories, Philadelphia, Pa.

[8] Renografin 76, Squibb, New York, N. Y.

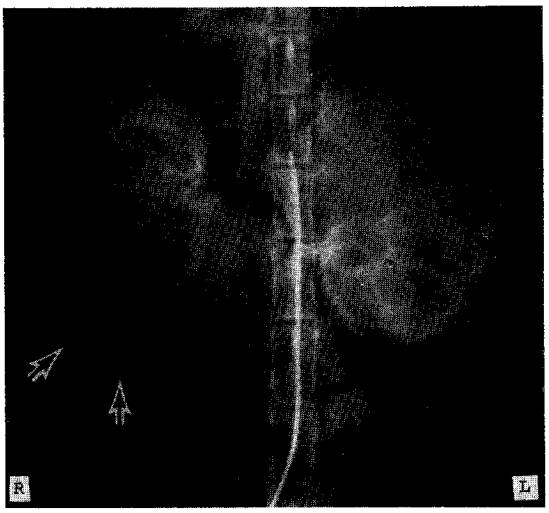

Fig. 4. Abdominal angiogram (delayed phase): nephrogram in left lower pole is compressed by surrounding soft tissue mass. On the right, nephrogram is irregular in lower portion of kidney (arrows).

Fig. 5. Midsagittal section through kidneys showing enlargement and almost total replacement by tumor. A hematoma is seen on the left kidney in the region of the caudal pole (arrow).

the presence of an area at the caudal pole of the left kidney which might represent inflammation, hematoma or nonfunctioning renal tissue.

The cat died following an open renal biopsy. A necropsy was performed immediately.

At necropsy both kidneys were enlarged (left 9x7x8 cm, right 7.5x7x5 cm), pale, and had slightly irregular cortical contours (Fig. 5). The majority of parenchymal structures were replaced by whitish-tan homogeneous tissue which bulged slightly from the cut surfaces. A large mass of clotted blood (approximately 20 ml) distended the capsule over the ventral caudal pole of the left kidney; a smaller hematoma (approximately 5 ml) capped the caudal pole of the right kidney.

The kidneys had very cellular neoplastic infiltrates that either separated tubules and glomeruli or replaced them entirely. The tumor cells had cytologic features of malignant histiocytes and occurred either in monotonous sheets (Fig. 6A) or were intermixed with eosinophils, lymphocytes and multinucleated giant cells (Fig. 6B). The mixed areas morphologically resembled Hodgkin's disease of man. In some respects the overall pattern of the tumor was more consistent with a pleomorphic histiocytic lymphoma. Tumor was also present in the right atrium, adrenal glands, skeletal muscle, liver and spleen. The subcapsular hematomas noted grossly were confirmed histologically.

DISCUSSION

Utilizing survey radiographs and renal arteriograms for renal size comparison, diagnosis of tumor masses with hematomas surrounding the caudal poles of the kidneys was made successfully in a cat. The possibility that these nonuniform areas which did not show opacification by collection of the angiographic contrast media were inflammatory sites was eliminated on the basis of negative clinical pathologic findings. The presence of normal renal vasculature decreased the possibility that these areas were nonfunctioning renal tissue or necrotic tumor. The angio-

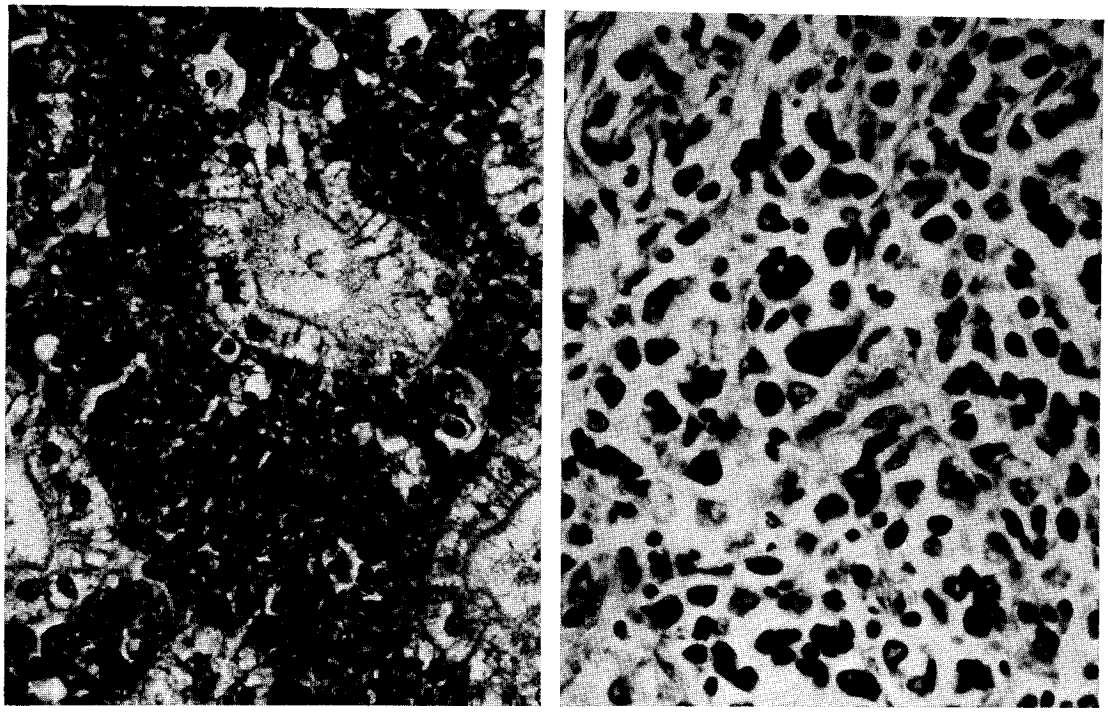

Fig. 6. A. Renal tubules are separated by large, histiocytic tumor cells. Mitotic figures are present. (H & E) 500×. B. The same kidney as Figure 6A is completely replaced by pleomorphic neoplastic infiltrates. The histiocytic tumor cells are accompanied by a large, binucleate giant cell, by lymphocytes and a few granulocytes. (H & E) 675×.

graphic changes in neoplastic renal infiltration in humans characteristically show stretching of the vessels without neovascularity or tumor "stain" (persistence of contrast) (4). These studies tend to support the view that similar manifestations would be present in the cat. By this method most primary renal neoplasms can be excluded. Avascular areas surrounding a pole of the kidney which do not contain contrast on the nephrogram phase of the study are most likely subcapsular hematomas.

SUMMARY

The antemortem diagnosis of renal enlargement with associated subcapsular hematomas was made in the cat with the use of survey radiographs, intravenous urograms and angiography. By comparing the apparent size of the kidneys as seen in survey radiographs with their actual parenchymal size as demonstrated by renal arteriography, a diagnosis of nonfunctional bilateral caudal pole renal masses was made. Pathologic examination confirmed renal lymphoma and caudal pole hematomas.

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ZUSAMMENFASSUNG

In der Katze wurde die prämortale Diagnose einer Vergrösserung der Nieren mit assoziierten subcapsulären Hämatomen mit Hilfe von Kontrollradiographien, intravenösen Urographien und Angiographien getroffen. Durch Vergleich der auf den Radiographien ersichtlichen Grösse der Nieren mit der wirklichen Grösse des renalen Parenchyms, wie sie durch renale Arteriographie demonstriert wurde, konnten nicht funktionelle renale Massen am caudalen Pol diagnostiziert werden. Die pathologische Untersuchung bestätigte ein renales Lymphomatom und Hämatome am caudalen Pol.

RÉSUMÉ

Un diagnostic ante-mortem de gros reins avec des hématomes sous-capsulaires associés a été porté chez le chat à l'aide de radiographies de contrôle, urographies intre-veineuses et angiographies. Le diagnostic de masses rénales du pôle caudal des deux côtés et non-fonctionnelles a pu être fait en comparant la grosseur apparente des reins comme on peut la voir sur les radiographies de contrôle par rapport à la taille réelle du parenchyme rénal comme elle est mise en évidence par l'artérographie rénale. L'examen pathologique a confirmé le lymphome rénal et les hématomes du pôle caudal.