

Suspected Unilateral Renal Dysplasia in a Cat with Intermittent Hematuria

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(Accepted: October 07, 2014)

Abstract : A 6-month-old, castrated male, Korean short-haired cat was referred with intermittent hematuria. Physical and laboratory examination including complete blood count and serum biochemistry profiles showed no specific findings. Ultrasonography revealed a cystic lesion of the mid-abdomen, which was approximately 2 × 2 cm in size. FNA cytology of cystic fluid showed numerous cholesterol crystals of varying size and shape and granulomatous inflammation. CT examination showed fluid-filled large cystic lesion in the left side of the abdomen. Taken together, this case was diagnosed as unilateral (left) renal dysplasia and cystic inflammation led by cholesterol crystallization in the left kidney.

Key words : hematuria, cat, renal dysplasia.

Introduction

Renal dysplasia is a developmental disorder of the renal parenchyma caused by incomplete inductive interaction between the mesonephric duct and metanephric blastema (8). The extent of the malformation varies from a grossly disorganized cystic dysplasia of whole kidney to a less severe segmental change of a part of the kidney (9). The dysplastic kidney usually becomes smaller than normal size of the kidney. Unilateral renal dysplasia is compatible with normal life if the other kidney is normal. When the disease is bilateral, renal failure ultimately develops. Renal dysplasia has been reported in dog, horse, lamb and calf (1,4,6,11). The disease is usually thought as hereditary disorder; however, its exact pathogenesis is not clear.

This report describes a case of unilateral renal dysplasia in a juvenile domestic cat.

Case

History and laboratory examination

A 6-month-old, castrated male Korean short-haired cat was presented with intermittent hematuria. Symptom was noticed 3 days before the presentation. On presentation, the cat was alert and responsive. Physical examination, CBC, and serum biochemistry profile were unremarkable. The cat was negative to feline immunodeficiency virus, feline parvovirus and feline leukemia virus on commercial diagnostic kit tests. Urinalysis could not be performed because of no urine in the urinary bladder.

Diagnostic imaging

Radiographic and ultrasonographic findings of the abdo-

men showed mild generalized hepatomegaly and a cystic lesion of the mid-abdomen. The cystic lesion was approximately 2 × 2 cm in size and had a layered appearance with numerous hyperechoic materials.

Cystic fluid cytology

FNA was performed from the lesion and after centrifugation of the collected fluid, the sediment was placed on a glass slide or a smear was prepared for cytology (Fig 1). Physically, the collected fluid was transparent, however had numerous refractile substances. The wet preparation of the fluid revealed nucleated cells (6 cells/high power field [hpf]), RBCs (15 cells/hpf), and numerous cholesterol crystals of varying size and shape (Fig 1). The Wright-Giemsa stained smear contained numerous RBCs, macrophages, and refractile substances of variable sizes and morphology. The refractile substances were visible in the cytoplasm of the macrophage or in the background of the smear. Occasional nondegenerative neutrophils, platelets and fibrocytes were observed.

Computed Tomographic examination

To identify the origin of the cyst and massive cholesterol crystallization, pre- and postcontrast computed tomographic (CT) examinations of the abdomen was performed. The CT examination revealed fluid-filled large cystic lesion in the left side of the abdomen, interpreted as a renal dysplasia and cholesterol crystallization in the left kidney (Fig 2).

Discussion

The report describes a case of the suspected renal dysplasia accompanied by massive cholesterol crystallization and inflammation diagnosed by ultrasonography, cytology and CT examination. Interestingly, in our case, the entire kidney had become a single cyst containing transparent fluid and large amounts of cholesterol crystals. Granulomatous lesions

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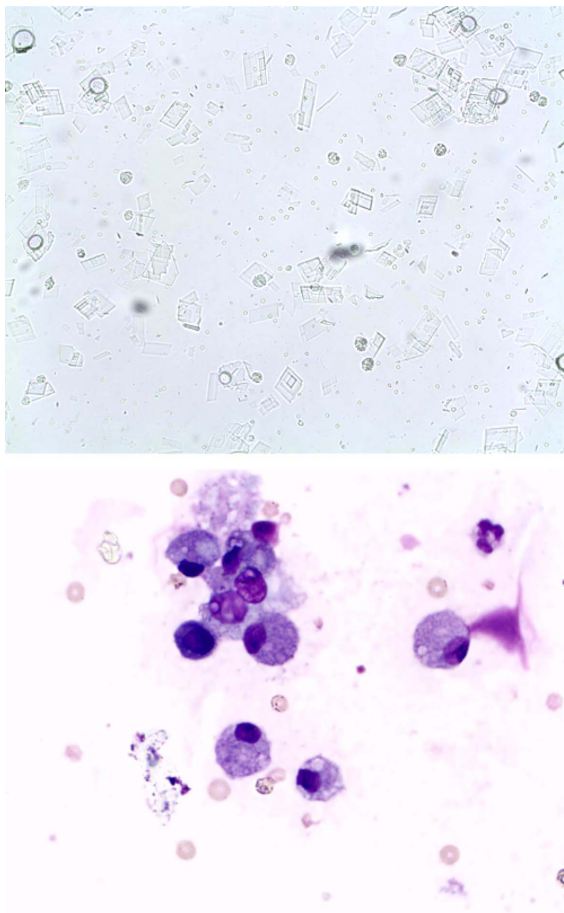


Fig 1. Wet (A) and smear preparation stained with Wright-Giemsa stain (B) of fluid sediment from a cystic lesion. $\times 200$ and $\times 1000$, respectively.

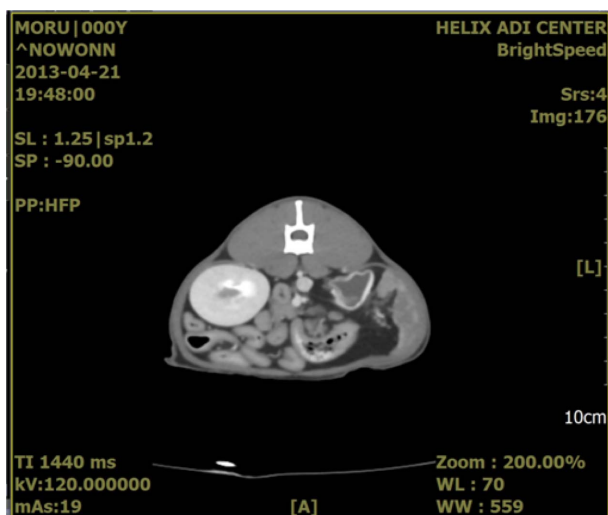


Fig 2. Postcontrast computed tomographic examination revealed fluid-filled cystic lesion in the left side of the abdomen, suggesting the renal degeneration.

were not remarkable in the degenerated kidney, although inflammation led by macrophages was observed. When considering the age of the patient, a cellular degeneration due to renal dysplasia, a development disorder of renal parenchyma, can be included in the differential diagnosis for this case (8).

Even though the disease is included in the category of hereditary disorder in animals, its genetic pathogenesis is not clear. In dogs, a 10-year retrospective study by Bovee (3) has indicated that the pattern and severity of the disease is highly variable amongst individuals, suggesting that the mode of inheritance does not follow a simple Mendelian inheritance. The proposed mode of inheritance is autosomal dominant with incomplete penetrance. In dogs, a mutation in the regulatory sequence in the promoter region, a missense or nonsense mutation resulting in the incomplete protein synthesis, and a splice mutation resulting in the reduction of mRNA level in retinoblastoma (RB) 1 gene, modifier gene or cyclooxygenase-2 (Cox-2) gene have been proposed as the molecular basis of the disease (10,13,15). In cats, however, there is no report on the molecular basis.

Histologically, a dysplastic kidney almost always contains cysts and has undifferentiated mesenchyme, abnormal lobar organization, and immature collecting ducts in humans (14). In dogs, the characteristic histologic findings include persistent metanephric ducts surrounded by primitive mesenchyme, immature glomeruli and tubules, and anomalous presence of interstitial fibrous tissue (4,7). In cats, the pathogenesis of feline renal dysplasia is unclear; however, a recent report has indicated that fetal infection of feline panleukopenia virus or idiopathic reason is related to the development of the malformed kidney. The histopathologic appearance is similar to that of a dysplastic kidney in humans (2).

Cholesterol crystal formation may take place in almost any organ as a response to cellular degeneration in association with necrosis, inflammatory response or prior hemorrhage (12). While the high concentration of cholesterol crystal may almost stimulate a granuloma in human, the cholesterol granuloma has also been reported in the brain of horse, middle ear and brain of dog, and uterus and brain of cat (5,7).

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혈뇨를 보이는 고양이의 편측성 신장이형성 증례

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요 약 : 6개월령의 증성화 수컷 고양이가 3일전 관찰된 간헐적인 혈뇨로 내원하였다. 신체검사 및 실험실 검사 결과 특이소견이 관찰되지 않았다. 초음파 검사 결과 복부 중간부분에서 2×2 cm 크기의 분리된 낭성 병변이 확인되었다. 병변 내부 물질의 세포학적 검사 결과 다량의 콜레스테롤 결정과 대식구 주종의 육아종성 염증반응이 확인되었다. CT 검사에서 낭성 병변은 복부 좌측에 위치하였다. 이상의 결과를 종합하여 환자는 편측성(좌측) 신장 이형성 및 콜레스테롤 결정에 의한 낭 내 염증으로 진단하였다.

주요어 : 혈뇨, 고양이, 신장 이형성