

Primary Renal Lymphoma in a Cat

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ABSTRACT

Background: Lymphoma is a hematopoietic tumor characterized by the clonal proliferation of malignant lymphocytes. It is the most frequently observed neoplasm in cats, accounting for approximately 33% of all tumors diagnosed in this species. Primary renal lymphoma accounts for approximately 1.5% of tumors diagnosed in felines and usually affects middle-aged to elderly cats and European breeds. This study describes a case of renal lymphoma in a feline, emphasizing the clinical, laboratory, imaging, and anatomopathological findings of this disease.

Case: A 3-year-old spayed mixed breed cat, weighing 3.3 kg, presented apathy, lack of appetite, prostration, polydipsia, restlessness, tremors, sudden incoordination, and increased abdominal volume. Blood counts, serum biochemistry, urinalysis, radiography, and abdominal ultrasonography were performed. Blood count showed leukocytosis, with many atypical lymphocytes and thrombocytopenia. Serum biochemistry revealed azotemia, mild hypokalemia, and low alkaline phosphatase levels. Radiography showed an increase in the kidney dimensions and asymmetry of the kidney silhouettes, indicating a mass effect. Ultrasonography revealed enlarged dimensions, irregular contours, and bilateral nodular features. However, the corticomedullary definition was preserved. Kidney cytology revealed a high number of lymphocytes in smears, with a predominance of medium to large lymphocytes, suggestive of lymphoma. The animal underwent chemotherapy with lomustine, vincristine, prednisolone, and doxorubicin; however, due to the recurrence of clinical signs, the animal died. Macroscopically, the kidneys were enlarged, irregularly contoured, and white in color. When cut, a loss of renal architecture was noted, with blurring of the cortical and medullary regions. Histologically, the renal architecture was obliterated and replaced by a monomorphic population of atypical lymphocytes. The histological diagnosis was compatible with diffuse renal large-cell, high-grade, immunoblastic lymphoma. Immunohistochemistry showed positive immunostaining for CD20 and PAX-5 in the cell cytoplasm and negative immunostaining for CD3. Ki67 was detected in approximately 40% of neoplastic cells. The final diagnosis was primary diffuse large B-cell renal lymphoma.

Discussion: The diagnosis of primary renal lymphoma was based on the occurrence of this tumor only in the kidneys of the animal. Renal lymphoma is the most common primary neoplasm affecting cat kidneys. The diagnosis of lymphoma in animals is based on cytological and/or histological examination. In addition, the final classification is performed using immunophenotyping (T and B cells), histology, and/or cytology to evaluate the cellular and nuclear characteristics, histological organization, and growth patterns of the lymphomas. The current clinical signs are related to renal failure, including neurological signs caused by uremia. There is a relationship between the occurrence of lymphoma in felines and retroviral infection; however, it was not possible to test the animal for retroviruses. The alterations observed in hematological examinations are related to the ongoing neoplastic process. The imaging findings in this case were similar to those observed in other studies on renal lymphoma. The treatment used in this study was the L-CHOP protocol, which has been associated with the treatment of different types of lymphomas in several studies on feline lymphomas. The median survival of cats with renal lymphoma is 50 days. In this case, the patient survived 30 days after hospital admission.

Keywords: kidney, neoplasm, necrosis, immunohistochemistry.

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INTRODUCTION

Lymphoma is a hematopoietic tumor characterized by the clonal proliferation of malignant lymphocytes [2]. It is the most frequently observed neoplasm in cats, accounting for approximately 33% of all tumors diagnosed in this species [4].

Lymphomas are categorized, according to their topography, as mediastinal, multicentric, or extranodal [11]. Extranodal lymphomas are diseases confined to anatomical sites other than the alimentary, mediastinal, or multicentric regions [13]. Extranodal lymphomas generally occur in the nasal region, central nervous system, eyes, larynx, skin, and kidneys of animals [13]. Renal lymphoma can occur in its primary form or can be associated with a multicentric or gastrointestinal form [15].

Primary renal lymphoma accounts for approximately 1.5% of tumors diagnosed in cats and generally affects middle-aged to elderly cats and European breeds [4].

Cats with renal lymphoma exhibit clinical signs of chronic kidney disease, polyuria, polydipsia, azotemia, and non-regenerative anemia or polycythemia [8].

Diagnosis can be made using ultrasound-guided aspiration cytology, and treatment can be performed using chemotherapy, radiotherapy, and surgery [8]. Primary renal lymphoma has a poor prognosis [1]. Thus, this study aimed to describe a case of renal lymphoma in a feline, emphasizing the clinical, laboratory, imaging, and anatomopathological findings of this disease.

CASE

A 3-year-old spayed mixed breed cat, weighing 3.3 kg, presenting with apathy, lack of appetite, prostration, polydipsia, restlessness, sudden tremors, and incoordination was attended. Physical examination revealed an increase in abdominal volume. Blood counts, serum biochemistry, urinalysis, radiography, and abdominal ultrasonography were performed.

A complete blood count revealed leukocytosis ($31,620 \text{ mm}^3$; ref.: $6,000\text{-}17,000 \text{ mm}^3$), with a large number of atypical lymphocytes (+++) and thrombocytopenia ($66,000 \text{ mm}^3$; ref.: $230,000\text{-}680,000 \text{ mm}^3$). Among the biochemical analyses, the levels of serum aspartate transaminase (45 IU/L ; ref.: $26\text{-}43 \text{ IU/L}$), alkaline phosphatase (22 IU/L ; ref.: $25\text{-}93 \text{ IU/L}$), urea (101 mg/dL ; ref.: $10.5\text{-}54.2 \text{ mg/dL}$), and potassium (3.3 mEq/L ; ref.: $3.8\text{-}4.5 \text{ mEq/L}$) levels were altered.

Radiographic examination revealed an increase in the kidney dimensions and asymmetry of the renal silhouettes, presenting a mass effect. The kidneys displaced the abdominal structures and caused bulging of the bilateral abdominal wall (Figure 1 A & B). The diagnosis was consistent with that of a neoplastic process. Abdominal ultrasonography revealed enlarged kidneys, bilaterally irregular and nodular-looking contours, and preserved corticomedullary definitions (Figure 2 A). Aspiration cytology of the kidneys was performed during ultrasonography.

Cytologically, high cellularity was observed in smears that were predominantly composed of

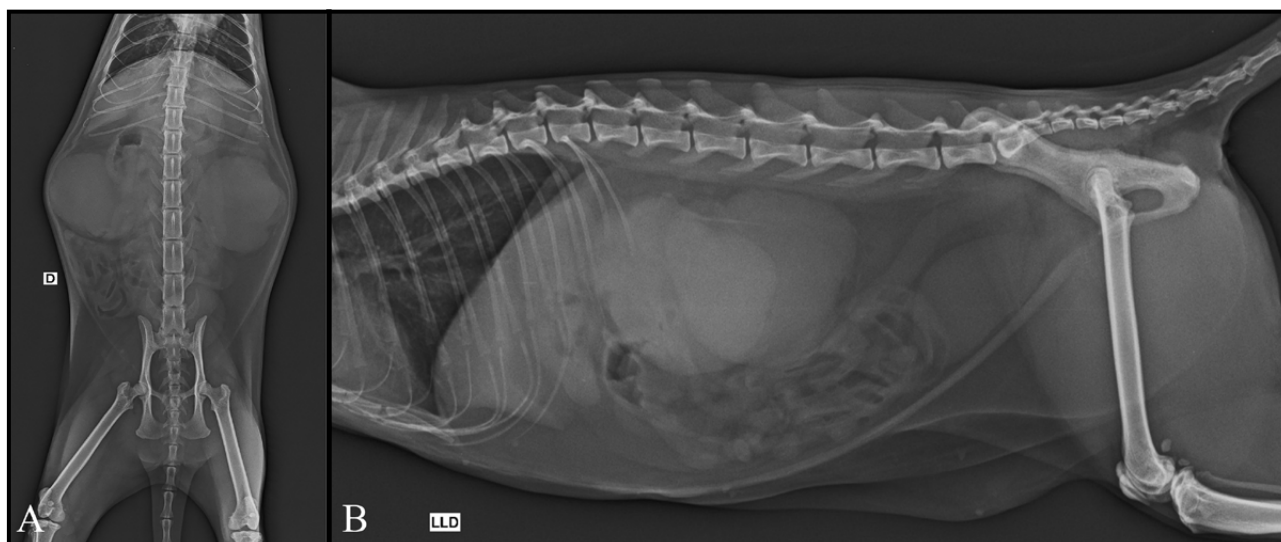


Figure 1. Primary renal lymphoma in a feline. A & B- Radiography with left lateral and ventrodorsal projections showing enlarged kidneys with irregular contours.

lymphocytes, with a predominance of medium to large lymphocytes. The cytoplasm was sparse and stained blue. The nuclei were irregularly rounded, with a few indentations and lacy chromatin. Nucleoli were inconspicuous. Cellular pleomorphism was discrete, and nuclear pleomorphism was moderate. Moderate anisocytosis and anisokaryosis were also observed (Figure 2B). Three mitotic figures were observed in 5 high-magnification fields. Cytological findings were suggestive of a large-cell, high-grade, immunoblastic lymphoma.

Urinalysis was performed by cystocentesis, in which the urine was clear and yellow, with a *sui generis* odor, density of 1,025, and pH of 6.5. In addition, there were 4 to 5 leukocytes per field, hyaline casts, kidney cells, and mucus.

The animal underwent chemotherapy with lomustine¹, vincristine², prednisolone³, and doxorubicin⁴-L-CHOP. Due to recurrence of the clinical signs, hypothermia, and respiratory difficulty, the animal died. Necropsy was performed.

Necropsy revealed that the kidneys were enlarged, had irregular contours, and were white. When cut, loss of renal architecture was noted, with blurring of the cortical and medullary regions (Figure 2 C & D). Furthermore, hydropericardium was observed.

Organ fragments were collected, stored in 10% buffered formalin, and subjected to histological analysis.

Histologically, neoplastic proliferation consisting of round cells with moderate anisocytosis and anisokaryosis was observed in the kidneys. The cytoplasm

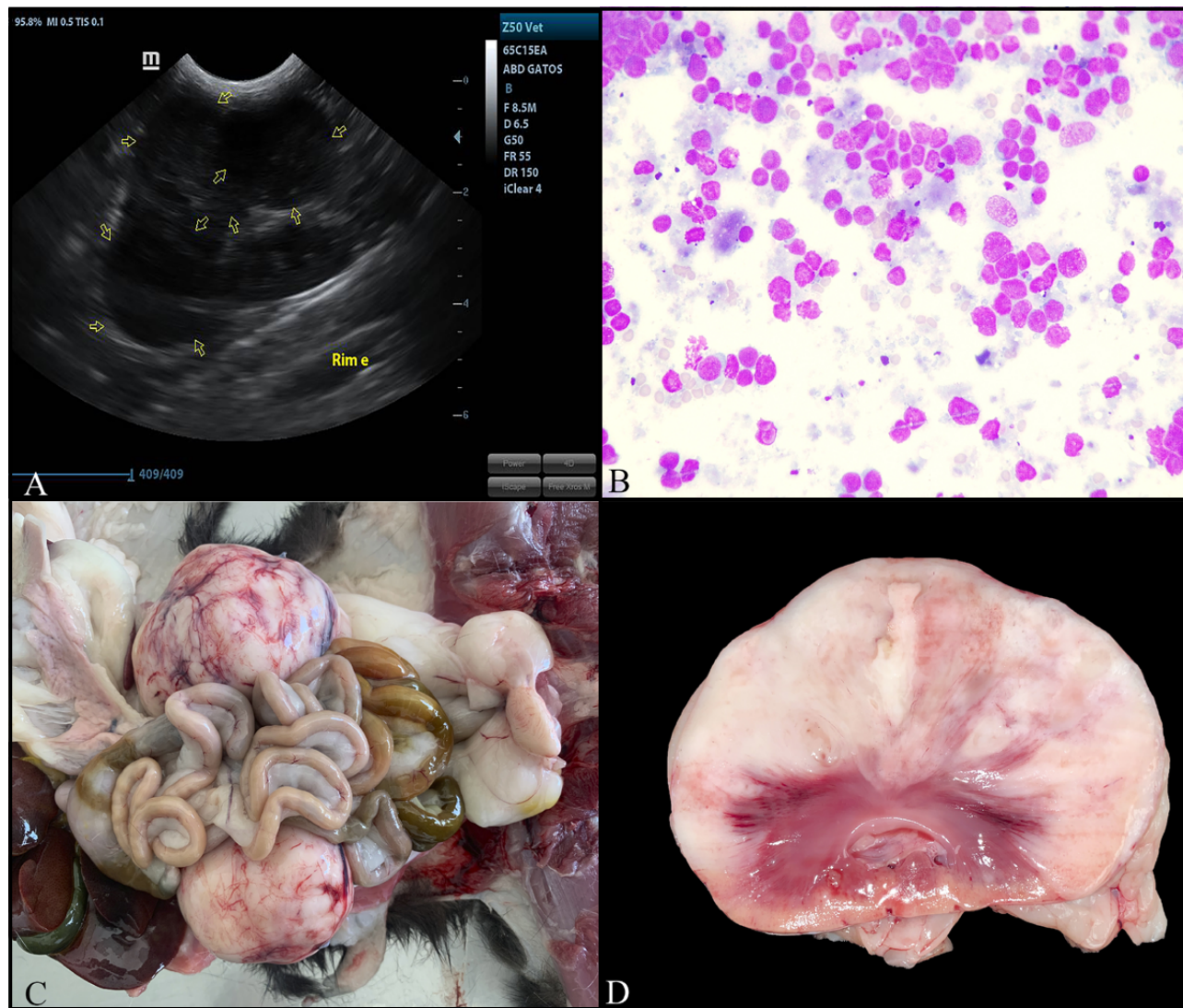


Figure 2. Primary renal lymphoma in a feline. A- Renal ultrasound showing multiple hypoechoic nodules in the renal parenchyma (yellow arrows). B- Aspiration cytology showing round cells with large nuclei and little cytoplasm [Romanowsky; obj.40×]. C- Enlarged and whitish kidneys are observed at necropsy. D- When cut, loss of differentiation between the cortical and medullary regions is observed.

was sparse, eosinophilic, and moderately delimited. The nucleus was round and central and had dispersed chromatin with one or two evident nucleoli (Figure 3A). The histological diagnosis was compatible with diffuse renal large-cell, high-grade, immunoblastic lymphoma.

Immunohistochemistry was performed to evaluate the expression of CD20⁵ (1:1000, polyclonal), PAX-5⁵ (24/PAX-5), Ki67⁵ (MIB-1), and CD3⁵ (1:500, polyclonal) in neoplastic cells. Immunohistochemistry showed positive immunostaining for CD20 and PAX-5 in the cell cytoplasm and negative immunostaining for CD3 (Figure 3 B & C). Ki67 was positive in approximately 40% of the neoplastic cells (Figure 3D). The final diagnosis was primary diffuse large B-cell renal lymphoma (DLBCL).

DISCUSSION

The diagnosis of primary renal lymphoma was based on the occurrences of this tumor only in the

kidneys of the animal. Renal lymphoma is the most common primary neoplasm affecting cat kidneys. Despite being the most frequently observed neoplasm in this organ, its proportion compared with that of other tumors is extremely low [4]. The prevalence of renal lymphoma in cats is 3.6%, and 10.4% of cases have been reported [7,15].

The final diagnosis was primary DLBCL. The diagnosis of lymphoma in animals is based on cytological and/or histological examination. In addition, the final classification was performed using immunophenotyping (T and B cells), histology, and/or cytology to evaluate the cellular and nuclear characteristics, histological organization, and growth patterns of the lymphomas [14]. DLBCL appears to be the most common lymphoma in cats according to several studies on this species [7,12].

Renal lymphoma occurs more frequently in middle-aged to older male cats and European breeds

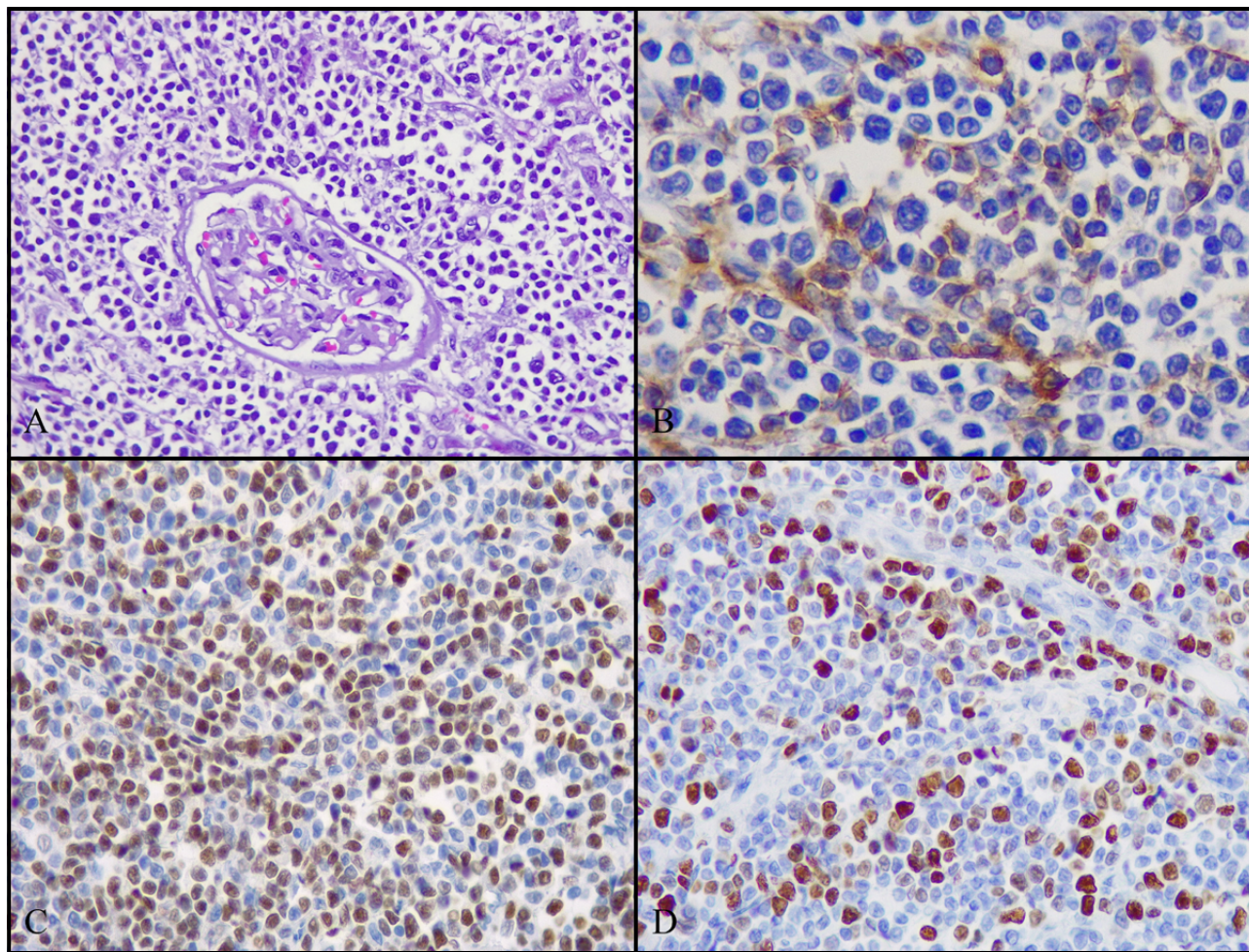


Figure 3. Primary renal lymphoma in a feline. A- A neoplastic infiltrate obliterating the renal parenchyma is observed. There is only one glomerulus interspersed with lymphocytes [HE; obj.40×]. B- Neoplastic cells showing positive immunolabeling for CD20 [obj.40×]. C- Neoplastic cells showing positive immunolabeling for PAX-5 [obj.40×]. D- Nuclear immunolabeling for Ki-67 in neoplastic cells [obj.40×].

[8,15]. However, in this study, the animal was a 3-year-old female spayed mixed breed cat.

The clinical signs in cats affected by renal lymphoma are mainly related to renal failure developed by the animals, with marked anorexia and weight loss. This neoplasm in cats is almost invariably bilateral, and approximately 40% of affected animals develop concomitant neurological signs owing to their uremic state [3,4]. In this case, the animal exhibited bilateral kidney involvement, clinical neurological signs, anorexia, and weight loss.

Retroviral infections are strongly associated with lymphoma development in cats, especially younger and adult cats [9]. An increase of approximately 60 times in the risk of developing this neoplasm is estimated in infected animals [12]. However, it was not possible to test this feline for retroviruses because of financial restrictions imposed by the owner. FeLV proviral DNA has been observed in 25%-50% of cases of feline renal lymphoma [7,12]. Furthermore, it is important to investigate other viruses that are known or suspected to be involved in the development of lymphoma, such as FIV and feline gammaherpesvirus, as they may also be involved in the development of renal lymphoma [12].

The imaging findings in this case were similar to those observed in a series of feline renal lymphoma cases [15].

The main hematological alteration observed in this study was thrombocytopenia. In felines, this alteration is primarily associated with infectious diseases, particularly viral infections and neoplasia [5]. Neoplasms can induce thrombocytopenia through various mechanisms, including myelophthisis, hemorrhage, microangiopathies, disseminated intravascular

coagulation, and immune-mediated mechanisms [5]. In the present case, marked lymphocytosis was observed in the presence of atypical lymphocytes in smears. It has been mentioned that lymphocytosis is a common alteration in cats, associated with infectious and neoplastic processes, with lymphoma being one of the main causes for this finding [10]. In addition, analysis of serum biochemistry showed azotemia, mild hypokalemia, and low alkaline phosphatase levels. These alterations are consistent with those reported in another study on feline renal lymphoma [15].

An L-CHOP protocol was employed in this study. This protocol has been used to treat different types of lymphomas in several studies on feline lymphomas [6,13,15]. Doxorubicin used in this protocol improved patient survival. However, the effectiveness of this drug in the treatment of feline renal lymphoma is controversial, with some studies indicating greater survival and others showing no statistical difference [6,13,15]. In this case, the patient survived 30 days after hospital admission. It has been mentioned that cats with renal lymphoma have a median survival of 50 days [15].

MANUFACTURERS

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Declaration of interest. The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this manuscript.

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