

Amyloidosis associated with feline leukemia virus in a white bengal tiger (*Panthera tigris tigris*)

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Abstract

Feline leukemia virus (FeLV) is the cause of neoplastic and degenerative disorders and immunosuppression in domestic cats. FeLV has never been reported in Bengal tiger (*Panthera tigris tigris*). Necropsy findings of a white Bengal tigress were a subcutaneous mass of 10 cm in diameter in the right rear limb which was classified as fibrosarcoma. In agreement with macroscopic and microscopic lesions, the morphologic diagnosis was consistent with a multisystemic disease characterized by fibrinonecrotic and suppurative broncopneumonia with multifocal severe bronchiectasis, severe icteric hepatomegaly and renal amyloidosis with membranoproliferative glomerulonephritis. Furthermore, a serum sample was positive to FeLV when diagnosed by ELISA. This report concluded that FeLV was associated with the pathological findings and death of the tigress.

Keywords: feline leukemia virus, amyloidosis, glomerulonephritis, Bengal tiger (*Panthera tigris tigris*)

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Introduction

Bengal tiger (*Panthera tigris tigris*) is an endangered species which has been preserved in captivity in different countries and under several rearing conditions. Although infectious diseases are the principal cause of death in captive wild animals, reports concerning health status of nondomestic felids are scarce (Munson et al., 2005). Feline leukemia virus (FeLV) is a well-documented cause of neoplastic and degenerative disorders and immunosuppression in domestic cats (Marker et al., 2003). Domestic cats are common inhabitants of zoos. If they are infected with FeLV, they can transmit the disease to captive nondomestic felids (Filoni et al., 2003, Marker et al., 2003, Mendes-de-Almeida et al., 2007, Sleeman et al., 2001). However, few surveys have been carried out in captive wild felids (Marker et al., 2003, Sleeman et al., 2001) and FeLV has not been reported in Bengal tiger, either in the wild or captivity.

Case history and clinical findings



Figure 1A M External aspect of the dead tigress showing poor body condition and bloody nasal discharge

Figure 1B Gross morphology of the subcutaneous neoplasia in the right rear limb showing white-yellowish coloration and vascularization. It was classified as a fibrosarcoma.

Pathological findings

At necropsy, the main identified lesions were in the urinary system, which included nephromegaly with severe coloration changes (jaundice), focal capsular adhesions and change in consistency of both kidneys (Figs. 2A, 2B and 2C). There were also sediments in the renal pelvis and bladder. Histopathological examination of the kidney revealed membranoproliferative glomerulonephritis with eosinophilic material in the interstice, increment in the number of the mesangial cells, presence of severe protein deposition in the glomerular capsule, proliferation of fibrous tissue in the glomeruli, and severe degenerative changes, necrosis and epithelial desquamation of the renal tubules. Amyloid was identified in the glomeruli and renal tubules by hematoxylin eosin and Congo red staining (Figs. 2D and 2E) and the connective and vascular tissues were differentiated with the van Gieson's stain. Other identified lesions consisted of bronchiectasis, anthracosis, pulmonary fibrosis, suppurative broncopneumonia and amyloid deposition in the lungs

Thus, the objective of this report was to document a case of FeLV in a captive female white Bengal tiger in Mexico. On January 20, 2015, a dead adult female white Bengal tiger which was housed in captivity was referred to the Pathology Laboratory of the College of Veterinary Medicine at the Autonomous University of Tamaulipas, Mexico. Anamnesis of the animal revealed a previous clinical history related to weakness, anorexia and progressive wasting, jaundice, proteinuria, hypoproteinaemia, uraemia and renal failure. These clinical signs lasted for two months before the death of the animal.

The dead tigress presented poor body condition, severe dehydration, pale membranes (anemia), bloody nasal discharge of viscous consistence and ulcerations in oral and nasal mucosa (Fig. 1A). In right rear limb there were skin ulcerations and a subcutaneous neoplasia of 10 cm in diameter, hard and firm in consistency and white-yellow in color, with vascularization and adhered and infiltrating subcutaneous, tendinous and muscular tissues. Therefore, this tumor was classified as a fibrosarcoma (Fig. 1B).

(Figs. 3A and 3B), hepatomegaly and splenomegaly with yellowish coloration changes, focal pancreatic necrosis, and severe multifocal ulcers and moderate diffuse hemorrhages in the gastric mucous. Once the macroscopic and microscopic lesions were analyzed, it was revealed that the morphologic diagnosis of the tigress was consistent with a multisystemic disease mainly characterized by fibrinonecrotic and suppurative broncopneumonia with multifocal severe bronchiectasis, severe icteric hepatomegaly and renal amyloidosis with membranoproliferative glomerulonephritis. In addition to the pathological findings, a serum sample of the tigress was positive to FeLV when analyzed by the ELISA-based Snap Combo feline leukaemia virus antigen/ feline immunodeficiency virus antibody test kit (IDEXX Laboratories, Westbrook, ME).

FeLV is rare in nondomestic felids (Sleeman et al., 2001) and a few studies have identified its presence in captive animals (Guimaraes et al., 2009, Marker et al., 2003). In contrast, other studies have reported the absence of FeLV in captive wild felids

(Filoni et al., 2003, Ramanathan et al., 2007, Sleeman et al., 2001). These contradictory findings could be due to differences in the studied species, geographical area, or both.

After initial infection in domestic cats, FeLV causes a severe immunodeficiency associated with other fatal diseases as follows: i) fibrosarcomas; ii)

myelosuppression syndrome characterized by anemia; iii) secondary infections in the upper respiratory tract, gingivitis and enteritis; and iv) enteropathy, characterized by chronic diarrhea and wasting (Jones et al., 1997). These lesions and health conditions were identified in the studied tigress.

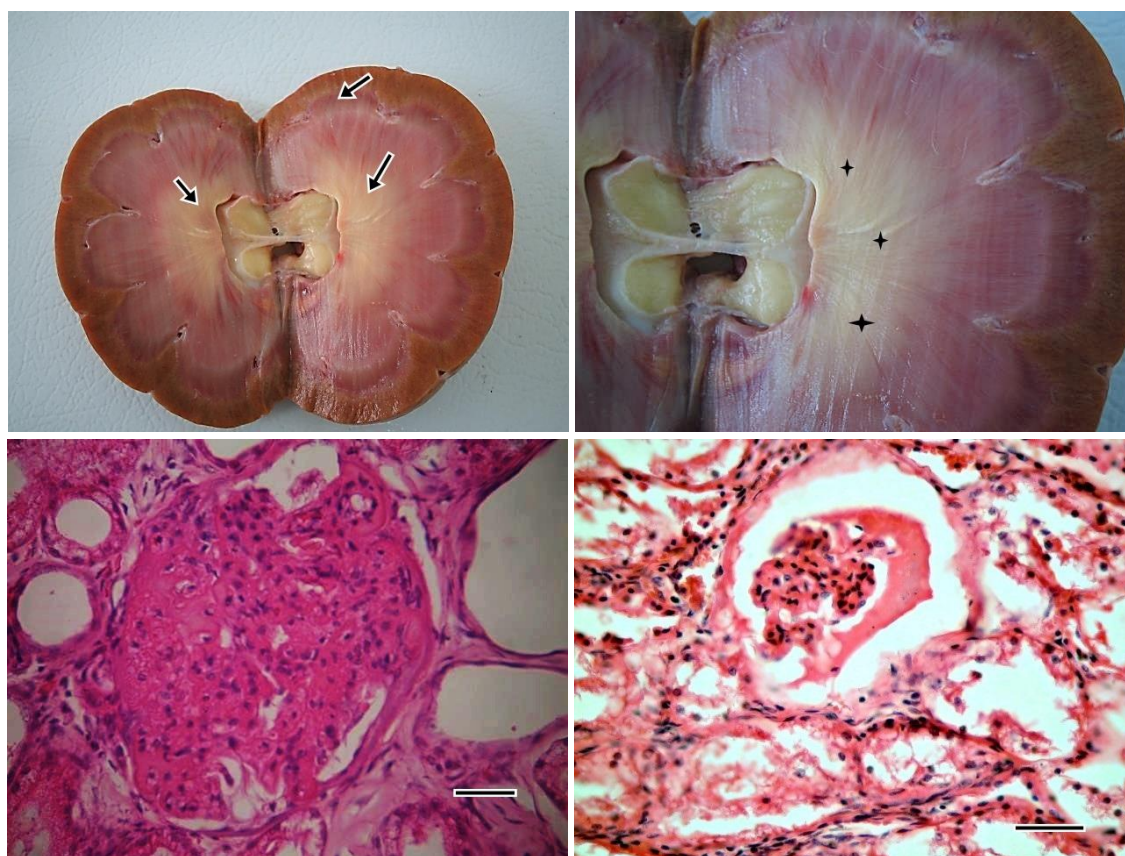


Figure 2 Renal lesions

Figure 2A Gross morphology of icteric kidney with focal capsular adhesions, hard consistency and several hemorrhages (asterisks)

Figure 2B and 2C Longitudinal cut of icteric kidney with presence of amyloid fibers (arrows)

Figure 2D Renal histopathological lesions. Moderate edema, multifocal infiltration of inflammatory cells, increase in glomerular size, focal hemorrhages and amyloid precipitation in glomeruli. HE (2D). Congo red. Tincion H&E and congo red, Obj. 40X.

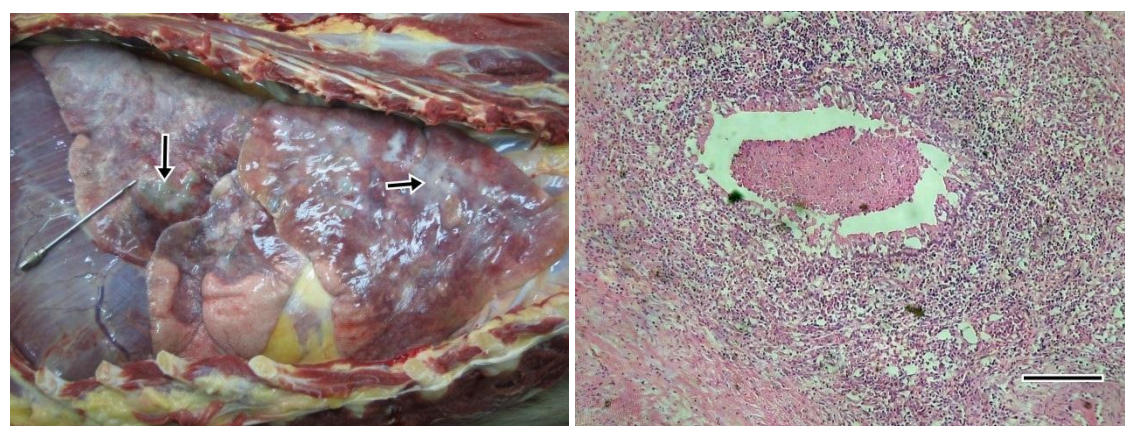


Figure 3 Pneumonic lesions

Figure 3A Chronic broncopneumonia associated with amyloidosis. Jaundice is evident.

Figure 3B Histopathological lesions consisted of severe and chronic broncopneumonia associated with infiltration of polymorphonuclear cells and exudates in bronchiolar lumen. HE, Obj. 40x.

In captive cheetahs, high frequencies of renal failure associated with glomerulosclerosis and renal amyloidosis, and gastritis, have been reported, but it is

mainly the former that is implicated in the death of this species (Bolton et al., 1999, Papendick et al., 1997). These lesions could be worsened by excessive daily

consumption of protein (Bolton et al., 1999), chronic and involuntary stress and old age of captive felids (Munson et al., 2005). FeLV could be transmitted to captive nondomestic felids if they come into contact with infected domestic cats (Sleeman et al., 2001). Colonies of infected feral domestic cats have been identified in zoological gardens (Mendes-de-Almeida et al., 2007). Consequently, preventive measures such as sanitation, immunoprophylaxis and control of feral domestic cats, and quarantine of nondomestic felids before translocation are required in order to avoid infection in captive nondomestic felids either endangered or not.

On the basis of the ELISA positive results, this report concluded that FeLV was associated with the pathological findings and death of the tigress. However, the presence and epidemiology of FeLV has not been scientifically reported in Mexico. This report emphasized the need for epidemiological surveys concerning FeLV in domestic cats to determine potential risks of transmission to captive felids.

Acknowledgements

The study was supported by the Universidad Autónoma de Tamaulipas under the project "Evaluación del estado de la salud animal en Tamaulipas". The publication of this paper was supported in full by the Fondo Mixto de Fomento a la Investigación Científica y Tecnológica CONACYT - Gobierno del Estado de Tamaulipas (México).

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บทคัดย่อ

ภาวะ Amyloidosis จากเชื้อไวรัส Feline Leukemia ในเสือเบงกอล

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เชื้อไวรัส Feline leukemia เป็นสาเหตุของความผิดปกติแบบ neoplastic และ degenerative และก่อกวนภูมิคุ้มกันในแมวบ้าน แต่เชื้อมีรายงานในเสือเบงกอล การศึกษานี้รายงานผลการชันสูตรเสือเบงกอล พบก้อนเนื้อชั้นผิวหนังชนิด fibrosarcoma ขนาด 10 ซม ที่ขาหลังขวา ผลการชันสูตรและผลทางพยาธิและจุลพยาธิวิทยา พบการเกิดโรคในหลายระบบ ได้แก่ fibrinonecrotic และ suppurative bronopneumonia และ ภาวะดีซ่านแบบรุนแรงและตับโต และ ภาวะ Amyloidosis ในไต ผลการตรวจตัวอย่างทางซีรัม วิทยาด้วยวิธีอีไลซา พบผลบวกต่อเชื้อไวรัส FeLV โดยสรุปรายงานนี้เป็นรายงานการติดเชื้อไวรัส FeLV ร่วมกับการรายงานผลทางพยาธิวิทยา

คำสำคัญ: เชื้อไวรัส feline leukemia amyloidosis glomerulonephritis เสือเบงกอล

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