

## Acinar adenocarcinoma of the lung in a cat: case report

[Adenocarcinoma acinar pulmonar primário em gato: relato de caso]

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### ABSTRACT

Among the diseases that cause dyspnea in felines, primary pulmonary neoplasia is rare and tends to affect senile cats. This study reports the case of a seven teen year old FeLV infected cat who was diagnosed acinar adenocarcinoma of the lung and kidney metastasis. It presented prostration and anorexia and was hospitalized with dyspnea and pleural effusion. Chest radiography indicated increased radiopacity in the cranial portion of the right hemithorax, compatible with presence of intrathoracic mass and the cytologic analysis of pleural effusion suggested feline infectious peritonitis. The animal died two days after, and the definitive diagnosis was concluded after necropsy and histopathological examination. Pulmonary adenocarcinoma should be included with differential diagnosis of respiratory diseases in cats, especially the elderly.

Keywords: neoplasia, lung, feline, carcinoma

### RESUMO

*Entre as doenças que causam dispneia em felinos, a neoplasia pulmonar primária é rara e costuma acometer gatos senis. Este trabalho tem por objetivo relatar o caso de um felino, de 17 anos, portador do vírus da leucemia felina, diagnosticado com adenocarcinoma acinar pulmonar primário com metástase no rim e na pleura parietal. O paciente apresentava histórico inespecífico, sendo as principais queixas prostração e anorexia, e foi internado apresentando dispneia e efusão pleural. A radiografia torácica indicou aumento da radiopacidade na porção cranial do hemitórax direito, compatível com presença de neoformação intratorácica. A citologia da efusão foi sugestiva de peritonite infecciosa felina. O animal veio a óbito dois dias após o atendimento inicial e o diagnóstico definitivo foi determinado por meio da necropsia e da avaliação histológica. O adenocarcinoma pulmonar deve ser incluído como diagnóstico diferencial de doenças respiratórias em gatos, principalmente idosos.*

Palavras-chave: neoplasia, pulmão, felino, carcinoma

### INTRODUCTION

Among the diseases that cause dyspnea in cats, primary lung cancer is rare and usually affects senile cats (Clements *et al.*, 2004). Unlike metastatic lung cancers, which are common, primary tumors tend to occur in less than 0.5% of cases (North and Banks, 2009) and are mostly malignant (Goldfinch and Argyle, 2012). Among them, adenocarcinoma is the most common tumor (Morris and Dobson, 2001).

Affected animals have clinical signs compatible with respiratory tract disease or may even show clinical signs referring to metastases in other organ systems, including dyspnea, cough, anorexia, and lethargy (Hahn, 2002).

Management of the dyspneic cat can be extremely challenging since, due to the respiratory condition, the necessary diagnostic procedures may not be tolerated. In these patients, initial management should be carried out for stabilization and only after proceeding

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with diagnostic tests. A detailed history and radiographic examination are important tools (Sauvé *et al.*, 2005). Three radiographic projections may be necessary to ensure visualization of small masses and to locate the affected lobe (Morris and Dobson, 2001).

Confirmation of lung neoplasia can be done by cytology of pleural effusion obtained by thoracentesis, cytology of tracheal lavage, samples obtained by bronchoscopy or fine needle aspiration of lung mass (Goldfinch and Argyle, 2012). Marked changes in the blood count or biochemical tests are not expected in patients with lung cancer (Morris and Dobson, 2001).

In the case of isolated tumors, in which there is no evidence of disease in another organ, thoracotomy is recommended, provided the patient can tolerate anesthesia. In these cases, computed tomography evaluation has been used for presurgical planning (Rebhum and Culp, 2013). Since most primary tumors in cats are carcinomas, there is usually no effective response to chemotherapy. The lungs are particularly sensitive to the side effects of radiotherapy; therefore, this therapy is generally not recommended for these patients (Morris and Dobson, 2001).

Survival and prognosis are more favorable when there is no evidence of lymph node involvement and the presence of metastases, as these are negative prognostic factors (Hahn, 2002). Histologic grade is also a prognostic marker, with differentiated tumors having a better survival time than moderately or poorly differentiated tumors (Wilson and Dungworth, 2002).

This report aimed to describe a case of a feline with primary lung cancer.

### **CASE REPORT**

A 17-year-old, male, neutered, mixed-breed cat, who lived free and lived with smokers, was treated at the Hospital de Clínicas Veterinárias of the Federal University of Rio Grande do Sul. During the anamnesis, the tutor reported a single episode of vomiting two days ago, followed by anorexia and prostration. The patient had been tested for feline leukemia virus (FeLV) and feline immunodeficiency virus (FIV) infection,

the results of which were positive for FeLV and negative for FIV.

On clinical examination, the patient had a body score of 4 (considering a scale from 1 to 9), dehydration estimated at 8%, expiratory dyspnea, muffled cardiopulmonary auscultation, and pale mucous membranes. The other parameters were within the reference values for the species.

The patient was positioned in sternal decubitus and underwent thoracentesis, using a scalp number 21 and a 20mL syringe. The puncture was performed between the seventh and eighth intercostal space, in the ventral region, after local trichotomy and antisepsis performed with 70% alcohol and 2% chlorhexidine. 30mL of light-yellow liquid was drained from the left side only. Physicochemical analysis and cytology of the effusion classified it as a modified transudate rich in protein, suggestive of feline infectious peritonitis.

A chest X-ray in three projections was performed (right lateral, left lateral and dorsal ventro). It was possible to observe dorsal deviation of the trachea and increased radiopacity in the most cranial portion of the left hemithorax, compatible with pleural effusion. An increase in radiopacity was also observed in the topography of the accessory lobe, compatible with the presence of intrathoracic neof ormation.

On abdominal ultrasound, the splenic lymph node was evident and hypoechoic, the kidneys asymmetrical, the left kidney measuring 3.47cm and the right measuring 2.99 cm, and a moderate decrease in the corticomedullary relationship in both. The requested blood tests were: complete blood count, platelet count, dosage of albumin, alkaline phosphatase, alanine aminotransferase, creatinine and urea. The leukogram revealed discreet monocytosis (945 monocytes/ $\mu$ l) (reference value: 0-850/ $\mu$ l), lymphopenia (405 lymphocytes/ $\mu$ l) (reference value: 1500-7000) and the presence of toxic neutrophils. Biochemistry evaluation revealed increased serum alkaline phosphatase activity (123/ $\mu$ l) (reference value: 93/ $\mu$ l).

The animal was hospitalized and received supportive treatment, including oxygen therapy, fluid therapy, feeding via nasogastric tube, analgesia with methadone at a dose of 0.25mg/kg

*Acinar adenocarcinoma...*

every six hours, and B complex vitamin supplement, dying two days after hospitalization.

The patient's body was sent for necropsy examination. In this examination, the macroscopic changes were presence of 120mL of serous and translucent reddish fluid in the thoracic cavity, in addition to adherence of the parietal and visceral pleura. The pleura showed

whitish multifocal nodules in the intercostal muscles (Figure 1). The lungs were hypocrepitant, with whitish multifocal nodules and the accessory lobe was being replaced by a mass with a smooth surface and soft consistency measuring 3.0 x 2.5 x 3.0cm (Figure 2). The kidneys also had nodules measuring approximately 0.9 x 0.7cm located in the cortical region.



Source: M.V. Lúcia Hechter  
Figure 1. Parietal pleura with multiple whitish nodules.



Source: Pathology Sector of the Federal University of Rio Grande do Sul.  
Figure 2. Smooth, soft, white mass located in the accessory lobe.

On microscopic examination, almost all the lung showed neoplastic proliferation composed of epithelial cells arranged in acini and papillae, sometimes forming a solid pattern supported by fibrovascular stroma. There was marked anisocytosis and anisokaryosis and, on average, two mitotic figures per field. In the pleura, there was marked proliferation of connective tissue with fibrin deposition. The nodules of the intercostal muscles presented multifocal areas with neoplastic cells with characteristics similar to those described above. In the renal cortical region, there was a neoplastic infiltration also similar to that present in the lung. The final diagnosis, after histopathological examination, was pulmonary acinar adenocarcinoma with metastasis in the kidneys.

### DISCUSSION

Primary lung tumors typically occur in older cats and are increasing in incidence due to the longer life expectancy of these animals. In humans, the increase in casuistry is due to the presence of environmental pollutants and cigarette use (Goldfinch and Argyle, 2012). Although a study has shown that cats exposed to cigarette smoke are more likely to develop oral squamous cell carcinoma and gastrointestinal lymphoma (Bertone *et al.*, 2003), there is no proven relationship with the development of primary lung tumors.

Clinical signs can be nonspecific such as anorexia and weight loss, however patients most commonly present with productive or non-productive cough, pleural effusion, lethargy, dyspnea, and hemoptysis (Morris and Dobson, 2001). Radiography is widely used to make the diagnosis along with clinical signs (Wilson and Dungworth, 2002). In this case, nonspecific and specific clinical signs were present: lethargy, anorexia, dyspnea and pleural effusion, radiography was an important auxiliary tool, and the findings were confirmed in the necropsy examination.

Adenocarcinoma accounts for 60% to 70% of feline lung tumors, whereas bronchoalveolar carcinoma, squamous cell carcinoma, and adenosquamous carcinoma are less common (Rebhum and Culp, 2013). Most adenocarcinomas have a locally aggressive behavior with a tendency to distant metastases

(Morris and Dobson, 2001). They are usually a solitary mass and affect the most caudal lung lobe (Villalobos and Kaplam, 2007).

The caudal lung lobes showed microscopic neoplastic infiltration, suggesting locally aggressive behavior. However, the solitary mass was in the accessory lobe, different from what the literature suggests as more usual. Clinical staging was performed; however, renal metastases were only seen at necropsy.

Blood changes are not common, but may occur in some cases, including anemia or neutrophilic leukocytosis. Biochemical abnormalities, such as azotemia, may be associated with metastases (Goldfinch and Argyle, 2012).

The patient's leukogram showed mild monocytosis, leukopenia and the presence of toxic neutrophils. Monocytosis and toxic neutrophils are alterations associated with the presence of an inflammatory process. Lymphopenia is an alteration that may be present in the leukogram of cats positive for FeLV (Miyashiro and Gomes, 2015). As the thoracic neoplasm is an inflammatory focus, this could be the cause of the monocytosis and the presence of toxic neutrophils. Since the patient had FeLV infection, the lymphopenia could be due to the presence of the virus in the body.

FeLV infection increases the risk of developing lymphoma, leukemia, myeloproliferative disorders, and immunosuppression (Villalobos and Kaplam, 2007). However, there is still much clarification to be done about FeLV, and the types of tumors that may be associated with the virus (Morris, 2013). The neoplasm in question is not commonly associated with FeLV, but it is difficult to determine how much immunosuppression, or the oncogenic potential of the virus may have contributed to the development of the neoplasm.

There was no relevant alteration in the biochemical tests, although there was the presence of metastasis in the kidney. Urinalysis was not performed, as it was not possible to perform the collection in a timely manner, however, this would be an indicated test, due to the patient's age, and would provide elucidating information about how much the renal

metastasis, discovered after death, was affecting renal function.

In cases with pleural effusion, a modified transudate-type fluid is usually obtained via thoracentesis (Goldfinch and Argyle, 2012). The presence of neoplastic cells in pleural effusion is rare (Rebhun and Culp, 2013). Modified transudates have a protein concentration of up to 3.5mg/dL. Neoplastic effusions, when characteristic, may present the presence of reactive lymphocytes, mitosis figures, multinucleated cells with evident nucleolus and the presence of non-classifiable amorphous material (Melo and Martins, 2009). Analysis of the patient's pleural effusion showed a transudate rich in protein, with a protein concentration of 4.5mg/dL, no neoplastic cells were observed. The analysis was not very clear in this case, and the final diagnosis was made in the necropsy examination.

In the reported case, the rapid worsening of the disease did not allow further diagnostic tests to be performed. For the same reason, no specific therapy was instituted, only symptomatic therapy being carried out. The radiography was consistent with the final diagnosis, but the cytology of the pleural effusion was of little use as a means of diagnosis, with only the histopathological examination elucidating for the resolution of the case.

### CONCLUSION

Pulmonary adenocarcinoma should be included in the differential diagnosis of respiratory diseases in cats, especially elderly ones. The disease shows itself with nonspecific clinical signs, the cytological evaluation of the pleural effusion is not elucidative and the definitive diagnosis must be reached through histopathological evaluation.

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