

## Esophageal Squamous Cell Carcinoma in Cats

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### ABSTRACT

**Background:** Esophageal neoplasms are rarely reported in cats. The frequency rate is less than 0.5% and those neoplasms are usually malignant. Esophageal squamous cell carcinoma (SCC) is an idiopathic epithelial neoplasm, invasive and metastatic that can induce partial or complete obstruction of the esophageal lumen. There is no breed or sex predisposition, and it is more common in cats over 8-years-old. Esophageal SCC is more frequent in the middle third of the esophagus. The prognosis is poor, as the cats are usually diagnosed at an advanced stage. This report aims to describe clinical, endoscopic, radiographic, and pathological features of two cases of esophageal squamous cell carcinoma in cats.

**Cases:** A 11-year-old neutered male cat presenting regurgitation, weight loss, anorexia and dyspnea was referred to veterinary internal medicine care. Simple and contrast-enhanced radiographic images of the cervical and thoracic regions showed an alveolar pattern in the cranial lung lobes and signs of esophageal lumen irregularity and dilatation in the mediastinum topography. The upper digestive endoscopy showed a dilated esophageal lumen, and an irregular mass was observed in the thoracic esophagus involving the entire esophageal circumference. Biopsy fragments were collected, and the histopathological result was compatible with squamous cell carcinoma. The second case was a 10-year-old neutered male cat presenting hyporexia, regurgitation, dyspnea, tachypnea, and abnormal breath sounds. The ultrasound of the chest showed 3 amorphous hypoechogenic and heterogeneous areas in the right and left hemithorax between parietal and visceral pleura. The cytological examination was compatible with a malignant epithelial tumor. The patient died 3 months after the onset of clinical signs. At gross exam, it was observed a friable, irregular, and ulcerated mass of 5.0 x 3.0 cm in the middle third of the esophagus. Metastatic foci in the lungs and liver were also observed. The histopathological diagnosis was esophageal squamous cell carcinoma, with metastases to liver and lungs. Microscopically, in both cases, were seen a proliferation of polyhedral epithelial cells in the mucosa, arranged in nests or trabeculae with central keratinization. These cells presented oval to rounded nuclei, loose chromatin, prominent nucleolus, and abundant eosinophilic cytoplasm, with marked anisocytosis and anisokaryosis, supported by a thin fibrovascular stroma. In the second cat the neoplastic cells infiltrated the esophageal submucosa, including lymphatic vessels and muscle layer. Lung and liver metastases from the SCC had a cellular pattern similar to the primary neoplasm.

**Discussion:** Esophageal squamous cell carcinoma is extremely rare in cats. The SCC begins in the squamous layer of the mucosa and can infiltrate the muscular layer or protrude into the esophageal lumen, leading to clinical signs, as seen in these 2 cats. The differential diagnoses for esophageal SCC include foreign bodies, esophageal strictures, and infiltrative or compressive non-esophageal tumors. Although uncommon, esophageal tumors should be considered when evaluating elderly cats with regurgitation and weight loss. The diagnosis of esophageal SCC was confirmed by histopathological findings collected endoscopically or during necropsy. As noted in both cases, the prognosis of SCC is generally unfavorable, usually due to the difficulty in treatment and diagnosis in a late stage of the disease.

**Keywords:** feline, esophagus, neoplasms, metastasis, cancer.

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## INTRODUCTION

Esophageal neoplasms are rare and represent less than 0.5% of all cancer in the cats and dogs [8]. In humans, a Tumor Nodes and Metastases staging classification for esophageal epithelial neoplasms has been proposed according to the location of the neoplastic cells [7]. In Veterinary Medicine, there are no data on esophageal neoplasm staging, probably due to the small number of esophageal neoplasms reported and the advanced stage of the disease when the diagnosis is made [7].

Although rare, SCC is the most commonly diagnosed primary esophageal neoplasm in cats from 8 to 10 years of age and there is no racial predisposition [3,5]. SCC usually occurs in the middle third of the esophagus and presents as an ulcerated mass with an irregular surface, leading to annular thickening of the esophageal wall and obstruction of the lumen [2,7]. The tumor can be locally invasive or spread to regional lymph nodes [2,5,7] and lungs [5,7]. Metastases are reported in 50% of affected cats [7]. There is no defined etiology for esophageal SCC in cats [7]. In humans, the possible causes of esophageal cancer, in addition to genetic predisposition, are the use of alcohol and tobacco [9]. Clinical signs of esophageal neoplasms are insidious and slowly progressing. Animals may have dysphagia, regurgitation, weight loss, and manifestations associated with aspiration pneumonia [8]. The prognosis for esophageal SCC is poor due to its aggressive nature and limited treatment options [3,6]. This report aims to describe clinical, endoscopic, radiographic, and pathological findings of 2 cases of esophageal squamous cell carcinoma in cats.

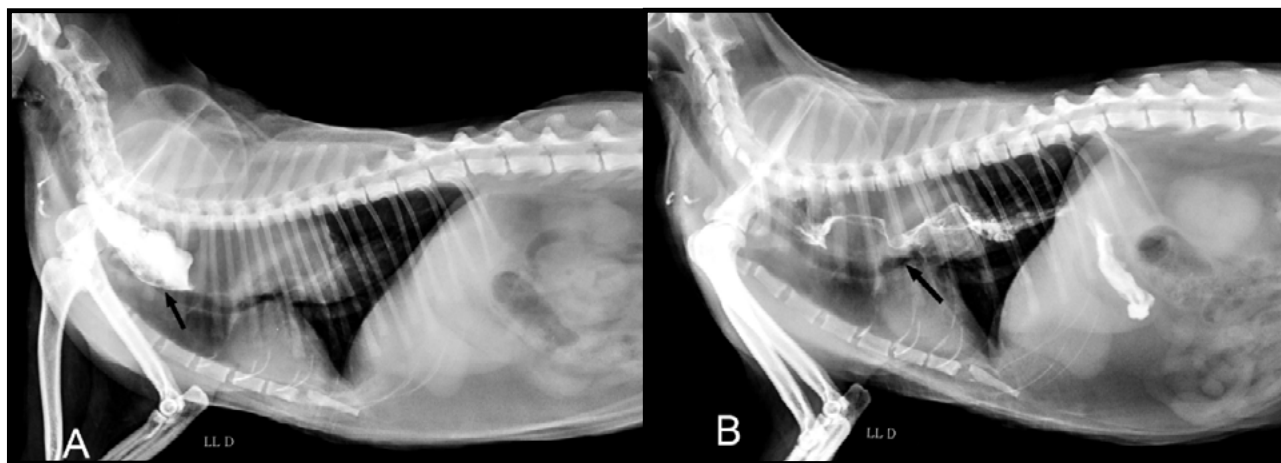
## CASES

The animals were client-owned and written consents forms were signed.

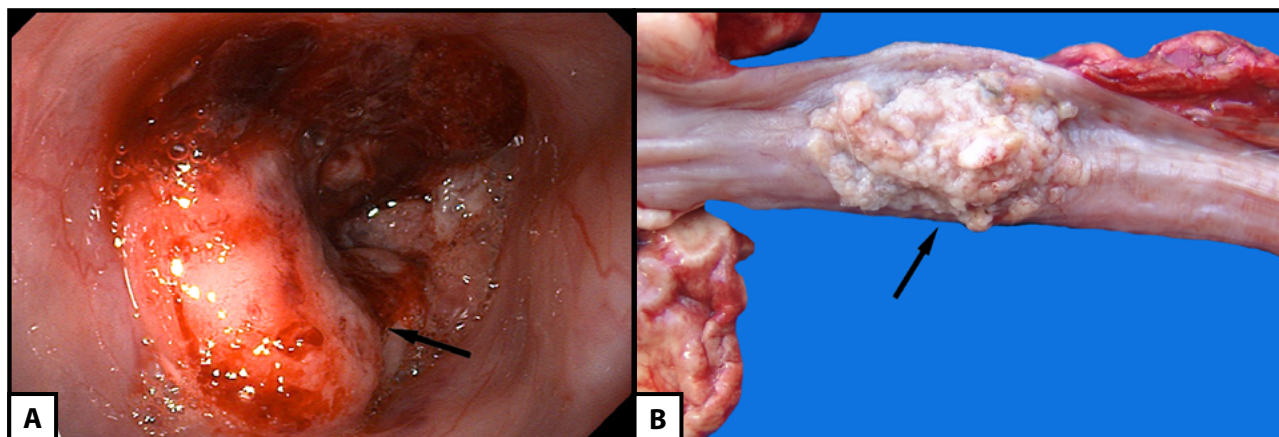
**Case 1.** A 11-year-old neutering male domestic shorthair cat was referred to the veterinary hospital of Lavras Federal University (UFLA) due to a history of hyporexia and regurgitation of foamy material for 10 days and weight loss for 2 months. The animal had been treated with antiemetics, antimicrobials, and liver protectors without success. At the time of the diagnosis, the animal was regurgitating all the solid or pasty food, dehydrated, with a poor body condition, muscle atrophy, and febrile. All other clinical parameters were within the normal range.

The laboratory exams revealed mild non-regenerative normocytic normochromic anemia. The biochemical parameters of urea, creatinine, alanine aminotransferase, alkaline phosphatase, gamma-glutamyl transferase, bilirubin, sodium, potassium, calcium, phosphorus, albumin, and globulin were within the reference ranges. The electrocardiogram showed sinus rhythm and waves with morphology, duration, and amplitude within the normal range.

Simple radiographs of the cervical and thoracic region showed lung fields with an alveolar pattern in the cranial lobes, suggesting aspiration, inflammatory or infectious process. A structure with soft tissue radiopacity was seen in the topography of the thoracic esophagus, displacing the trachea ventrally. The contrast-enhanced study showed esophageal dilatation in the topography of the mediastinum and signs of esophageal lumen irregularity (Figure 1A & 1B).



**Figure 1.** Feline esophageal squamous cell carcinoma. *Case 1:* Contrast-enhanced lateral radiographs. A- Immediately after ingestion of contrast medium, showing localized dilatation in the middle esophagus (arrow). B- Ventral displacement of the trachea and irregularities in the esophageal path and lumen (arrow).



**Figure 2.** Feline esophageal squamous cell carcinoma. A- *Case 1*: Esophagoscopy showing neoformation involving the entire esophageal lumen (black arrow). B- *Case 2*: Esophagus with an irregular mass projecting into the lumen and lungs with whitish multifocal nodules (black arrow).

The animal was referred for an upper digestive endoscopy that showed a cervical esophagus presenting a dilated lumen and a large amount of foamy material. An irregular mass was observed in the thoracic esophagus involving the entire esophageal circumference. The surface of the mass was irregular, hyperemic, with areas of erosion and hemorrhage (Figure 2A). It was not possible to advance the endoscope caudally to the mass. Five fragments of the lesion were collected using flexible 2.3 mm endoscopic biopsy forceps. Fragments ranged from 0.3 cm to 0.6 cm were placed in 10% formalin and sent for histopathological analysis. Tissues sections were routinely processed for paraffin-embedding, and stained with Hematoxylin and Eosin (HE)<sup>1</sup>. Histopathological examination revealed a squamous cell carcinoma, with moderate anisocytosis and anisokaryosis, evident nucleoli, and forming cell nests with central foci of keratinization. Due to the poor prognosis of the disease, the owner chose to humanely euthanize the animal.

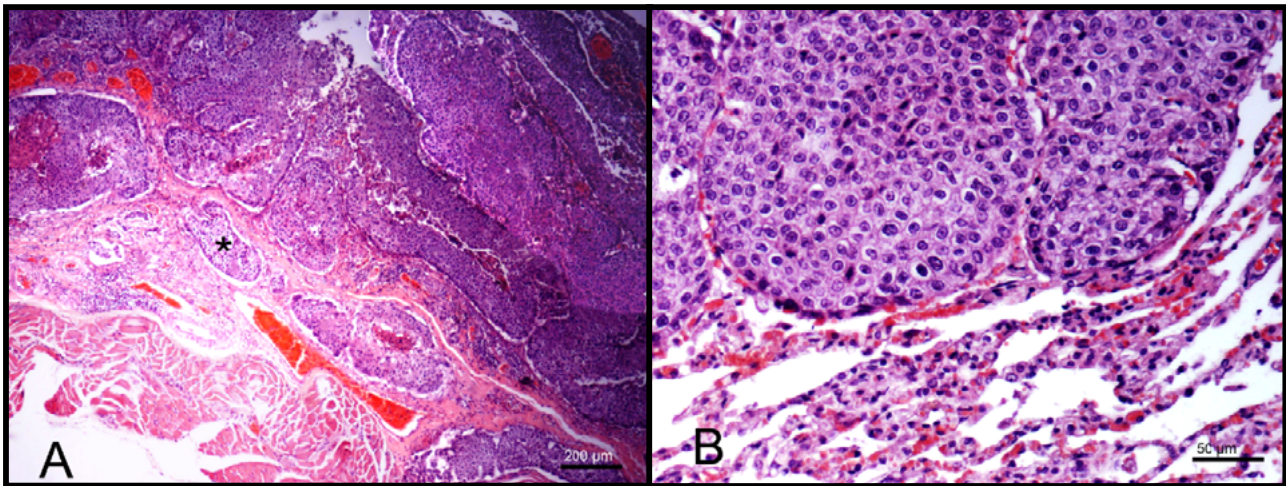
**Case 2.** A 10-year-old neutering male domestic shorthair cat was referred to the veterinary hospital of the UFPA due to hyporexia and recent episodes of regurgitation. The physical exam revealed dyspnea, tachypnea, abdominal breathing, and abnormal pulmonary sounds. The blood count revealed leukocytosis due to neutrophilia with a left shift.

Chest ultrasound was performed and showed 3 amorphous hypoechogenic and heterogeneous areas in the right and left hemithorax between parietal and visceral pleura. The images were suggestive of neoplasia or abscess and focal pleural effusion. Ultrasound-guided cytology of the lesions was performed and submitted to fast panoptic staining.

The cytologic exam revealed poorly differentiated, grouped, and individualized epithelial cells. The cells were polyhedral, with ample cytoplasm, rounded nucleus, loose chromatin and single and prominent nucleoli, and moderate anisocytosis and anisokaryosis. The diagnosis was a malignant epithelial tumor. Supportive treatment was prescribed but the animal died 3 months after the onset of clinical signs.

At necropsy, the animal had a low body condition, cyanotic oral mucosa, and a mass of 5.0 x 3.0 cm, whitish, friable, with an irregular and ulcerated surface in the middle third of the esophagus, projecting into the lumen. Multifocal to coalescent firm and white nodules measuring 0.5 to 2.0 cm were observed in the lungs (Figure 2B). Also, the liver showed several whitish foci of 0.2-0.4 cm in diameter.

Histopathological exam revealed proliferation of polyhedral neoplastic epithelial cells in the esophageal epithelium, with rounded nuclei, loosely arranged chromatin, 1 or 2 prominent nucleoli, and abundant eosinophilic cytoplasm. There were moderate anisocytosis and anisokaryosis and few mitotic figures were seen. The cells were arranged in nests and trabeculae, with central keratinization, and supported by a delicate fibrovascular stroma. The neoplastic cells infiltrated the submucosa, including lymphatic vessels and muscle layer (Figure 3A). Among the neoplastic cells, there were discrete multifocal lymphoplasmacytic and neutrophilic inflammatory infiltrates. Lung (Figure 3B) and liver metastases from the SCC had a cellular pattern similar to the primary neoplasm. Foci of marked intratumoral necrosis, calcification, and hemorrhage were observed in the lungs.



**Figure 3.** Feline esophageal squamous cell carcinoma. *Case 2:* A- Neoplastic proliferation of squamous epithelial cells with formation of nests in the esophageal mucosa, submucosa and lymphatic vessels (asterisk) [HE; Bar= 200  $\mu$ m]. B- Lung metastasis [HE; Bar= 50  $\mu$ m].

### DISCUSSION

In cats, primary esophageal SCC is extremely rare. The cats reported in this study were 10 and 11-year-old, similar to the age described in others studies [1,3,5]. The SCC occurred in the middle third of the esophagus, in both cats, leading to a reduction of the esophageal lumen. In the second cat, the tumor started in the squamous layer of the esophageal mucosa, infiltrated the submucosa and muscle layer. These characteristics were observed in other study [2,5,7]. Also, pulmonary metastases as occurred in the second cat, are reported in 50% of affected cats [7]. The most common clinical signs are vomiting, lethargy, anorexia, weight loss, and dehydration, similar to those observed in the reported cases [1,3].

Radiographic exams of animals with esophageal SCC may reveal esophageal dilatation cranial to the neoplasm, with gas or contrast retention, indicating motility dysfunction [3,10,11]. The radiographic findings of cat 1 were similar to those reported in the literature, which also describes narrowing of the esophageal lumen and tissue thickening, tracheal displacement and/or aspiration pneumonia [3]. The endoscopic findings of cat 1, as narrowing of the esophageal lumen due to solid and irregular mass, often ulcerated, friable and hemorrhagic, were similar to those described in the literature [5,11]. The biopsy of several fragments of the lesion was essential for the diagnosis and was performed as recommended, with multiple deep biopsies, as the accentuated inflammatory reaction and local necrosis can obscure the underlying lesion [4]. Differential diagnoses for endoscopic and radiographic

findings may include foreign bodies, esophageal stenosis, and non-esophageal infiltrative or compressive tumors [3].

The animals were humanly euthanized due to the poor prognosis of the disease. Chemotherapy has no efficacy in esophageal carcinoma in cats. Radiotherapy has limited use in patients with tumors in the intrathoracic segment of the esophagus due to the low tolerance of the heart and lungs to radiation [1]. Histopathological examination showed epithelial cells arranged in trabeculae and nests, with moderate anisocytosis, anisokaryosis, and cell keratinization, a histological pattern characteristic for SCC [7]. Necrosis and inflammatory infiltrate with lymphocytes and neutrophils in the neoplasm were also observed on histopathological examination. Ulceration, bacterial infection, and neutrophilic inflammation are common findings on the SCC surface, which could lead to the misdiagnosis of ulcerative esophagitis if only superficial biopsies were performed [7].

In conclusion, there is little information about esophageal carcinoma in cats. It is a neoplasm with a poor prognosis, especially when diagnosed in a late stage. Reports have shown that, although uncommon, the diagnosis of esophageal SCC should be considered in elderly cats presenting clinical manifestations of esophageal obstruction.

### MANUFACTURER

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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 paper.

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