

Ocular manifestations and CT scan findings in a cat with suspected angioinvasive pulmonary neoplasia

Oculaire manifestaties en computertomografische bevindingen bij een kat met vermoedelijke angio-invasieve pulmonale neoplasie

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ABSTRACT

An eleven-year-old domestic long hair cat was presented with a history of stiffness of the hind limbs, lethargy, depression, partial anorexia and recent anisocoria. Ophthalmological examination revealed chorioretinal necrosis and angioinvasive pulmonary carcinoma was suspected. Computed tomography (CT) findings were consistent with the presumable diagnosis.

SAMENVATTING

Een elf jaar oude Europese langhaar werd aangeboden met een geschiedenis van stijfheid van de achterpoten, lethargie, depressie, partiële anorexie en recente anisocorie. Oftalmologisch onderzoek toonde chorioretinale necrose aan en angio-invasief longcarcinoom werd vermoed. De resultaten van het computertomografisch onderzoek bevestigden de vermoedelijke diagnose.

INTRODUCTION

Primary pulmonary neoplasia is relatively uncommon in cats and generally has a poor prognosis (Aarsvold et al., 2015). Because of the non-specific clinical signs, cats are often presented in a relatively advanced stage of the disease (Aarsvold et al., 2015). Cats may present with respiratory signs, weight loss, lethargy, lameness or may show no clinical signs (Aarsvold et al., 2015). According to the Veterinary World Health Organization, primary pulmonary neoplasia can be classified based on cell origin, cell morphology or anatomic location (Aarsvold et al., 2015). Pulmonary tumors are broadly classified as adenocarcinoma, adenosquamous carcinoma, squamous cell carcinoma or tumors of bronchial origin (Byers et al., 2006) and adenocarcinoma is the most frequently observed in cats, representing more than 50 % of reported cases of pulmonary tumors in cats (Aarsvold et al., 2015). In the cat, intraocular involvement of primary lung neoplasia (adenocarcinoma, squamous cell carcinoma, hemangiosarcoma and fibrosarcoma) has been reported (Cassotis et al., 1999). The majority of the reported cases of intraocular metastasis in the

cat have posterior uveal involvement, either alone or in conjunction with the anterior uvea (Cassotis et al., 1999). Lesions associated with neoplastic metastasis to the choroid typically result from the growth of neoplastic cells within the ocular tissues and the physical presence of a subretinal mass or masses (Cassotis et al., 1999). Radiographic findings in cats with lung tumors are variable but may include a solitary pulmonary mass in the caudal lungs, pleural effusion and signs of tracheobronchial lymph node enlargement (Aarsvold et al., 2015). Further diagnostic work-up includes bronchoalveolar lavage or transtracheal aspirate, ultrasound-guided or fluoroscopy-guided fine-needle aspirate or surgical lung lobectomy. Computed tomography (CT) enables more accurate surgical planning and identification of metastasis presurgery (Aarsvold et al., 2015).

CASE DESCRIPTION

An eleven-year-old domestic long hair cat presented to North Downs Specialist Referrals (UK) as an emergency due to a history of stiffness of the hind

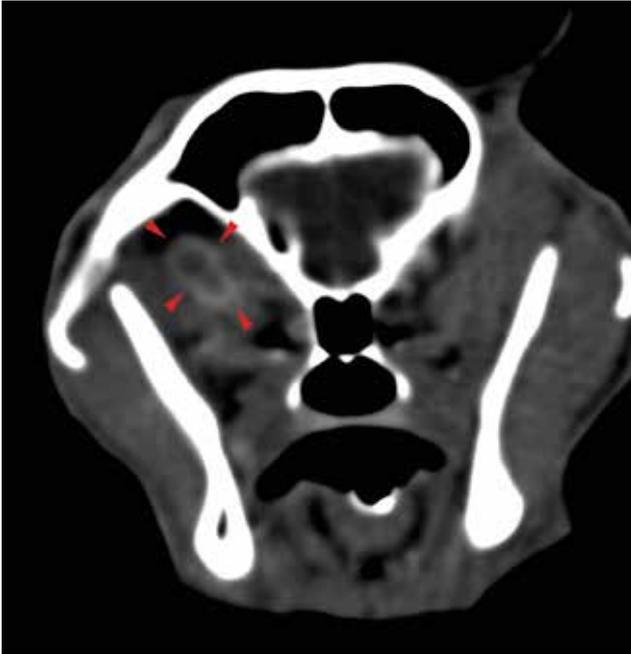


Figure 1. Rim contrast-enhancing lesion on the posterior compartment of the right eye.

limbs, lethargy and depression, partial anorexia and most recently anisocoria.

Three weeks prior to referral, stiffness of the hind limbs and reluctance to jump had been reported; otherwise, the patient was generally well with a slightly reduced appetite. Radiographs of the hips and stifles had been performed at the local veterinarian one week prior to referral, with unremarkable findings. A few days later, the cat was reluctant to move and had a crouched gait.

Upon presentation, physical examination revealed a grade III systolic murmur, the respiratory rate and effort were normal, and abdominal palpation was within normal limits. The cat was quiet but alert. The right eye had a fixed, dilated and non-responsive pupil.

Ophthalmological examination revealed menace response deficit in the right eye. Direct pupillary light reflex (PLR) was absent in the right eye but consensual reaction was present in the left. Direct PLR in the left eye was present and consensual reaction was present in the right eye. After sedation, retinal examination of the right eye was carried out and revealed a fully dilated pupil, smooth margins and the eye was poorly responsive. The lens and vitreous were unremarkable. There were multiple tan to black discolored regions throughout the entire fundus consistent with wedge-shaped foci of chorioretinal necrosis and moderate retinal vascular attenuation. Examination of the left eye was unremarkable.

The diagnostic plan included hematological and biochemical examinations that were unremarkable, except for mild neutrophilia. Abdominal radiographs showed a few small bilateral nephroliths but were otherwise normal. Computed tomography was elected

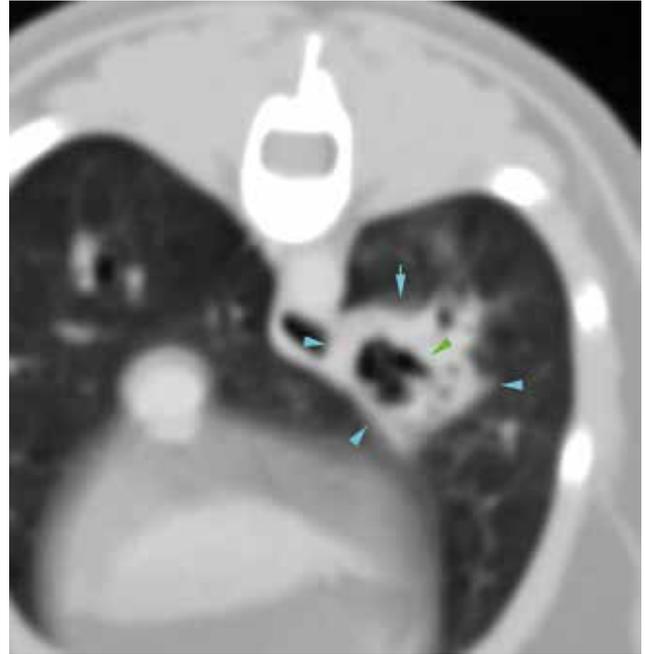


Figure 2. Large cavitary and bronchocentric soft tissue mass on the left caudal lung lobe.

as a cross-sectional diagnostic tool to assess head, thorax and cranial abdomen (including liver and spleen) due to suspicion of neoplasia primary and/or metastatic following the ophthalmological examination findings. On the head, an elongated (10mm x 6mm) iso-attenuating lesion with a moderately thick outer rim of contrast-enhancement was found in the posterior segment of the right eye (Figure 1). On the thorax, a rounded, 20mm-cavitated, bronchocentric pulmonary lesion was found in the left caudal lung lobe. This lesion had a moderate peripheral enhancement after administration of contrast (Figure 2). A few small, faint, soft tissue attenuation parenchymal lesions were located on both caudal lung lobes. Moreover, multiple coalescing nodules were present in the dorsal tip of the left caudal lung lobe (Figure 3). The tracheobronchial lymph nodes were moderately enlarged. In addition, five rounded to ovoid soft tissue attenuating muscular lesions, ranging from 5 to 16mm in diameter were located in the paraspinal muscles adjacent to C1 and T5 vertebrae and in the supra- and infrascapular muscles. These muscular lesions were mostly cavitated and with moderate contrast enhancement (Figure 4). The combination of lesions in the lungs, muscle and post segment of the right eye were consistent with a widespread neoplastic process. Fine-needle aspirations of the muscular lesions were taken. In-house examination of the slides by an ECVIM-boarded diplomate in internal medicine showed abnormal, undifferentiated cells with moderate to marked anisocytosis and anisokaryosis consistent with a neoplastic process. Angioinvasive pulmonary carcinoma with metastasis to the eye and muscles was strongly suspected. Full cytological and histological examinations of the masses

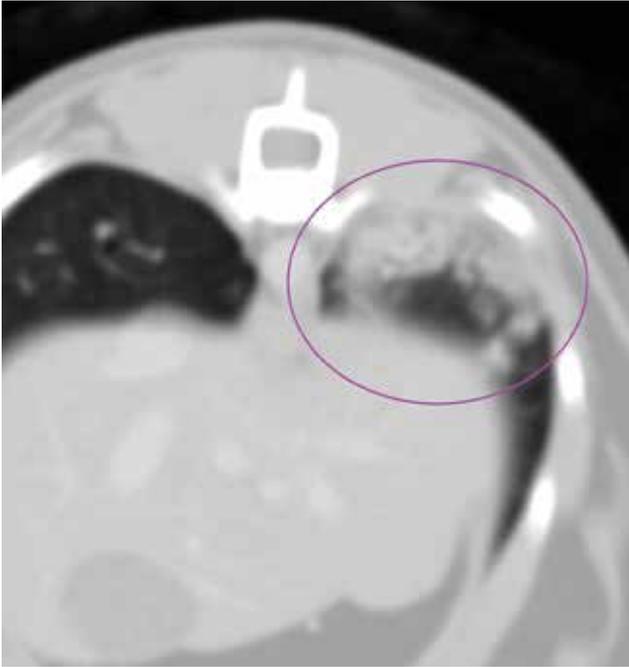


Figure 3. Large focal and sharply demarcated lesions in the dorsal aspect of the left caudal lung.

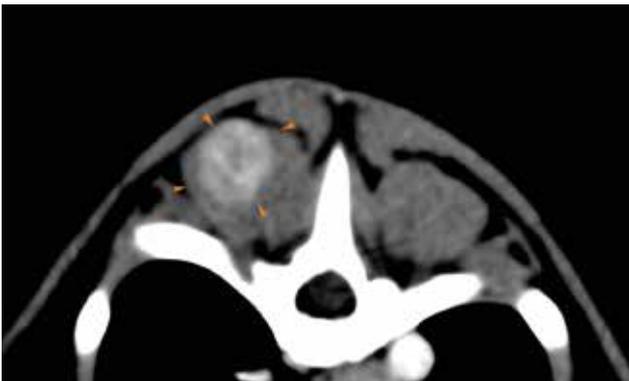


Figure 4. Rounded and heterogeneous nodular contrast-enhancing muscular lesion in the right epaxial muscle.

would have been appropriate to confirm the diagnosis. However, due to financial restraint, poor prognosis and the disseminated nature of the disease, euthanasia was elected. The owner declined post-mortem examination.

DISCUSSION

The most commonly reported ophthalmologic presentation for metastatic intraocular neoplasia to the eyes of cats is large retinal detachments and multifocal retinal hemorrhages (Cassotis et al., 1999). Comparatively, metastatic neoplasms to the choroid in humans manifest as serous retinal detachment, either as a solitary mass or as multiple creamy, yellow sub-retinal masses (Cassotis et al., 1999). In the present case, on CT examination, there was a lesion posterior

to the right eye, which was suspected to be associated with the physical presence of neoplastic cells or to be caused by a thrombi or emboli to the chorioretinal arteries. Moreover, infarction and secondary tapetal and sensory retinal necrosis were observed. On ophthalmoscopic examination, multiple tan to black discolored regions throughout the entire fundus consistent with wedge-shaped foci of chorioretinal necrosis and moderate retinal vascular attenuation were observed. Diagnostic differentials related to this finding included metastatic neoplasia (carcinoma), chorioretinitis due to systemic infectious disease, systemic hypertension, hyperviscosity syndrome, immune-mediated disease and viral infections, such as feline infectious peritonitis (FIP) and feline leukemia virus (FeLV) (Sandmeyer et al., 2009).

In a study describing four cases of confirmed angioinvasive pulmonary carcinoma, unilateral, wedge-shaped areas of chorioretinal degeneration most prominent in the tapetal fundus, were observed on ophthalmoscopic examination. The primary differential considerations in these cats were systemic hypertension, widespread chorioretinitis with secondary chorioretinal necrosis and lymphosarcoma (Cassotis et al., 1999). However, the absence of extensive serous exudation in the retina, and the fluorescein angiographic findings of chorioretinal non-perfusion to the tapetal fundus effectively ruled out these conditions (Cassotis et al., 1999). In this case, fluorescein angiographic examination was not performed, as the main suspicion based on presentation and history was angioinvasive pulmonary neoplasia, and therefore, a CT scan was elected as the main diagnostic tool.

A large focal, sharply demarcated lesion in the dorsal aspect of the lung lobe was strongly suspected to be the primary origin of a neoplasia, such as adenocarcinoma, squamous cell carcinoma, adeno-squamous carcinoma or tumors of bronchial origin. Primary lung neoplasia is uncommon in the cat (Cassotis et al., 1999). A multicenter retrospective study revealed that 65 of 86 cats with primary lung tumors showed evidence of metastasis (Cassotis et al., 1999; Hahn and McEntee 1997). Of the extrathoracic metastases found, nine were muscular, one was in bone and none were reported in ocular structures (Cassotis et al., 1999; Hahn and McEntee 1997). In the present case, rounded, ovoid, contrast enhancing, muscular lesions at multiple musculoskeletal sites were present, strongly suggesting metastatic lesions. Differential diagnosis for these muscular lesions included most likely, neoplastic infiltration, such as metastasis or round cell tumor, or less likely, multifocal inflammatory/infectious myositis.

A few muscular lesions were sampled with fine-needle aspiration, and in-house examination of the muscular cells exhibited cytological characteristics of malignancy, anisocytosis and anisokaryosis. The combination of the ophthalmological, imaging and the cytological findings suggested that angioinvasive

pulmonary neoplasia was the most likely diagnosis. The major limitation to this case report was the lack of histopathological diagnosis.

In summary, cats with evidence of chorioretinal infarctive lesions should be suspected of metastasis from primary pulmonary neoplasia. CT angiography is a useful screening diagnostic tool for the detection of the primary neoplasia and metastasis, and helps in biopsy guidance and surgical planning. Inversely, cats with primary pulmonary neoplasia should routinely have an ophthalmoscopic examination to rule out vascular occlusion from metastasis. Ischemic chorioretinopathy associated with primary bronchogenic carcinoma appears to be a unique neoplastic syndrome in the cat.

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