



Primary hypothyroidism due to thyroid carcinoma in a feline

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ABSTRACT: Hypothyroidism is rarely observed in cats. This article reports the case of a thirteen-year-old feline with a one-year history of bilateral cervical swelling that had majorly grown in size two weeks prior to the animal's admission. The cat presented with dysphonia, lethargy, weight gain, and constipation. On physical examination, hypothermia was observed, with a rectal temperature of 36.5 °C. Fine-needle aspiration cytology suggested thyroid neoplasia. The serum levels of total T4 and thyroid stimulating hormone (TSH), along with the exclusion of non-thyroid diseases, confirmed the diagnosis of hypothyroidism. This is the first report of feline hypothyroidism in Brazil secondary to thyroid neoplasia, classified as a follicular-compact carcinoma and confirmed by histopathology.

Key words: feline, follicular-compact carcinoma, hypothyroidism.

Hipotireoidismo primário devido a carcinoma de tireóide em um felino

RESUMO: Hipotireoidismo é uma doença rara na espécie felina. Esse trabalho relata um felino de treze anos de idade com histórico de inchaço cervical bilateral há um ano, que havia crescido principalmente duas semanas antes da admissão do animal. O felino apresentava disfonía, letargia, ganho de peso e constipação. No exame físico, hipotermia foi observado com temperatura retal de 36,5 °C. Citologia aspirativa de agulha fina sugeriu neoplasia de tireóide. A dosagem sérica de T4 total e TSH junto com a exclusão de doenças não tireoidianas confirmaram o diagnóstico de hipotireoidismo. Esse é o primeiro relato de hipotireoidismo felino no Brasil devido a uma neoplasia de tireóide, classificado como carcinoma folicular-compacto, confirmado na histopatologia.

Palavras-chave: felino, carcinoma folicular-compacto, hipotireoidismo.

INTRODUCTION

Hypothyroidism in felines is a relatively rare condition. Similar to its presentation in other species, feline hypothyroidism is caused by a chronic lack of thyroxine (T4) and triiodothyronine (T3), which are produced by the thyroid gland (GUNN-MOORE, 2005; PETERSON, 2013). The condition can develop primary to thyroid dysfunction, secondary to a deficiency in TSH, and tertiary to an inadequate release of thyrotropin-releasing hormone (TRH) (BERGEN et al., 2016).

Primary hypothyroidism, in which the disease occurs naturally, rarely occurs in felines (CROWE, 2004), with only three documented cases reported until 2015 (PETERSON, 2015). In cats, the

majority of cases occur iatrogenically, secondary to the treatment of hyperthyroidism with radioactive iodine or methimazole, or post thyroidectomy (BERGEN et al., 2016).

Thyroid tumors are more frequently in dogs and cats than in other species, corresponding to 1–4% of all neoplasias and 10–15% of head and neck tumors in these species. Most thyroid tumors do not release hormones into the circulation; however, in some cases, hypothyroidism and hyperthyroidism can occur (ATASEVER et al., 2004).

In the available database, no other report of primary hypothyroidism due to thyroid neoplasia in a cat is available. This research described the first report of feline thyroid carcinoma in Brazil in which hypothyroidism developed, clarifying

clinical signs, and laboratory and necropsy findings to present further information about this condition in this species.

A male thirteen-year-old cat with no defined breed was admitted to the Hospital Veterinário Universitário of the Universidade Federal de Santa Maria with a history of lethargy, constipation, and dysphonia, characterized by hoarseness. There was also bilateral swelling in the ventral region of the neck, reported to have appeared over one year and to have grown massively two weeks prior to admission. The animal was obese, weighing 6.8 kg even though it was fed only light cat food in small portions during the day. On physical examination, the cat was hypothermic, with a rectal temperature of 36.5°C, hydrated, with pink mucosae, and without any signs of cardiac or respiratory alteration. Palpation of the thyroid region revealed bilateral multilobulated swelling.

Hematological and biochemical analyses revealed slight lymphopenia (1.065/ μ L, reference value [RV] 1.500–7.000/ μ L) and thrombocytopenia (282.000/ μ L, RV 300,000–800,000/ μ L). A serum dosage of thyroid hormones was requested, revealing decreased total T4 (8.7 ng/mL, RV 12–47 ng/mL) using the radioimmunoassay method (2470 WIZARD2[®] Gamma Counter – PerkinElmer) and increased TSH (5.14 ng/mL RV 0.01 – 0.5 ng/mL) by Thyroid Stimulating Hormone (TSH) Coated Tube RIA Kit – MP Biomedical.

Fine-needle aspiration cytology (FNAC) of the thyroid gland revealed that the swelling was compatible with a neoplastic process, possibly adenoma or adenocarcinoma, requiring histopathological evaluation for confirmation.

The animal was brought back to the hospital after two weeks due to dyspnea and respiratory stridor. Blood examinations, thoracic radiography, and thyroid ultrasound were performed to reevaluate the animal and to support the thyroidectomy procedure. The owner did not select the recommended surgical procedures (thyroid biopsy and thoracoscopy).

Hematology revealed persistent slight lymphopenia (1.125/ μ L, RV 1,500 – 7,000/ μ L) and biochemical examinations showed a slight increase in creatinine (2 mg/dL, RV 0.8–1.8 mg/dL). Thoracic radiography revealed a discrete bronchial pattern suggestive of initial bronchitis. Ultrasonography of the thyroid showed that the dimensions of both glands were increased, and the heterogeneous parenchyma was compatible with the neoplastic process. Additionally, treatment with levothyroxine was instituted, initially at a low dosage, gradually

increasing throughout three weeks up to a total of 10 μ g/kg SID.

After two days, the animal was brought to the hospital for urinalysis and ultrasound to detect intra-abdominal metastasis. However, the patient presented with severe dyspnea and cyanosis, which required oxygen for better respiratory comfort. After stabilization of the patient, a new chest radiograph was obtained, in which an unstructured interstitial pattern was observed in the caudal and accessory pulmonary lobes, which was suggestive of pulmonary metastasis and mild pleural effusion. Thoracocentesis was performed without success in draining the fluids. Owing to the animal's severe health condition and poor prognosis, the cat was euthanized. The patient's body was forwarded for necropsy to confirm clinical suspicion of thyroid neoplasia.

Macroscopic (Figure 1) analysis showed that the structure of both thyroid glands was completely replaced with a multilobulated mass, with metastases to the lungs, trachea, and lymph nodes, such as the lateral retropharyngeal, deep lateral cervical, deep middle cervical, and left prescapular lymph nodes.

In the abdomen, there was a large amount of fat deposition and pancreatic hyperplasia, but the remaining organs were normal. Histological analysis revealed that neoplastic cells were structured in follicles with some more solid areas, characterizing follicular compact carcinoma.

Although, many clinical signs that appear in dogs are the same as those in felines, there are some differences that make diagnosis more difficult. The main clinical signs observed in cats with hypothyroidism are not specific and can include lethargy and weight gain even under normoxia or hyporexia. Less frequently, bradycardia and hypothermia are observed. Common clinical signs in dogs, such as total alopecia, are not usually observed in cats; however, they can develop hyperkeratosis, hyperpigmentation, seborrhea, and pyoderma (BLOIS et al., 2010; PETERSON, 2013). The animal in this report presented with lethargy, weight gain, constipation, dysphonia, and hypothermia; however no cutaneous alterations were observed.

There was no evidence of hypercholesterolemia or normocytic normochromic anemia, as described in another case of a cat with spontaneous hypothyroidism (RAND & BEST, 1993). Hypothyroidism in cats can decrease the glomerular filtration rate and exacerbate azotemia; therefore, renal function should be monitored (NELSON, 2015). Hypothyroidism is diagnosed based on the serum

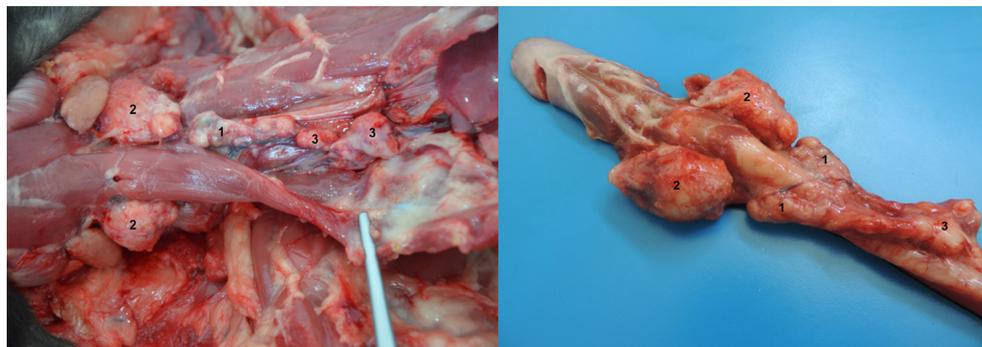


Figure 1 - Necropsy of a male cat, with no defined breed, presenting with thyroid carcinoma. A: The thyroid lobes are seen (1) very enlarged and irregular. Metastasis affects the retropharyngeal lymph nodes (2) and deep cervical lymph nodes (3). R: Ventral view of the carcinoma affecting both thyroid lobes (1) in a cat. The metastasis obliterated the structure of the retropharyngeal (2) and deep cervical (3) lymph nodes.

dosage of total thyroxine or free thyroxine and TSH through radioimmunoassays (PETERSON, 2013). In this report, the total thyroxine dosage was determined, revealing a decrease in hormone levels below the reference values. TSH levels were increased, corroborating the literature.

In studies of hypothyroidism in felines, free T4 is relatively poorly specific, with more than 20% of sick euthyroid animals showing increased serum free T4 concentrations (PETERSON et al., 2015; MOONEY, 1996). In dogs with hypothyroidism, a serum T4 concentration lower than 0.5 $\mu\text{m}/\text{dL}$ in

combination with appropriate clinical signs, physical findings, and routine blood tests support the diagnosis, especially without concomitant disease (NELSON, 2007). Due to the rarity of the case, no data provided information on the dynamics of examinations in the case of felines affected by hypothyroidism due to a thyroid tumor, but the diagnosis is possible based on the association of findings in the tests performed and the consistent clinical signs.

Histopathological examination of the patient's thyroid showed complete replacement of normal thyroid tissue with neoplastic cells (Figure 2).

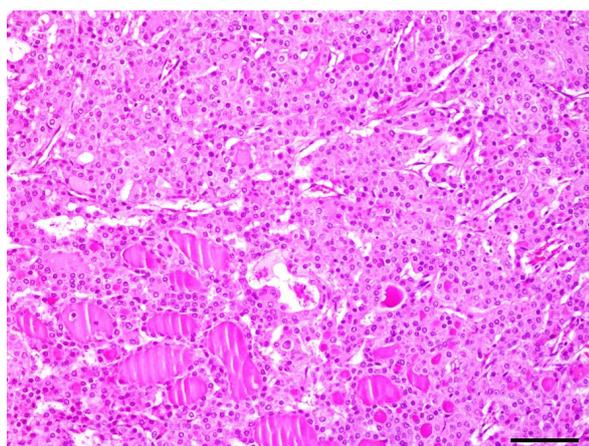


Figure 2 - Photomicroscopy of follicular-compact thyroid carcinoma. The parenchymal structure of both thyroid glands is completely replaced with neoplastic cells arranged in follicles (follicular pattern; lower left side), with more solid areas (compact pattern; upper right side). Hematoxylin-eosin. Obj. 20 \times .

Hypothyroidism develops without normal functional tissues. A study on dogs presenting with thyroid neoplasia demonstrated that animals diagnosed with follicular-compact carcinoma are commonly associated with hypothyroidism (CASTILLO et al., 2016).

This is the first case of hypothyroidism in a feline species due to follicular compact thyroid carcinoma, highlighting the importance of evaluating for this illness whenever there is thyroid impairment.

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DECLARATION OF CONFLICT OF INTERESTS

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of the article "PRIMARY HYPOTHYROIDISM DUE TO THYROID CARCINOMA IN A FELINE: A CASE REPORT".

AUTHORS' CONTRIBUTIONS

Equal contribution of all authors.

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