Bilateral Thyroid Follicular Atrophy in a Young Canadian Lynx (Lynx canadensis)

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Abstract
A 1.5 year old intact male Canadian Lynx (Lynx canadensis) presented to the referring veterinarian with a 1 year history of poor appetite, lethargy, and weakness with eventual development of neurologic signs (vestibular signs, ataxia). At necropsy, gross lesions were few and non-specific. The lynx had decreased amounts of subcutaneous adipose stores and decreased skeletal muscle mass. Histologically, the thyroid glands were bilaterally decreased in size and approximately 75% of the thyroid gland was replaced by mature adipocytes. The remaining thyroid follicular cells are cuboidal and form follicles of varying sizes (10 µm-100 µm) with a mild amount of colloid. No other significant histologic abnormalities were identified. The histopathologic findings are consistent with bilateral thyroid follicular atrophy. This is the first report of bilateral thyroid follicular atrophy in a young Canadian Lynx.

Keywords
Thyroid follicular atrophy; Hypothyroidism; Lynx; Lynx canadensis; Endocrine

Hypothyroidism is occasionally diagnosed in veterinary medicine and has a reported prevalence from 0.2% to 0.8% in dogs [1]. Hypothyroidism may be congenital, acquired, or idiopathic. A range of clinical abnormalities are reported in hypothyroid animals; dermatologic abnormalities, reproductive abnormalities, neurologic abnormalities, and cardiovascular abnormalities have been reported. There is a single report of adult onset hypothyroidism in a Canadian Lynx (Lynx canadensis) [2]. In that case, a 19 year old lynx presented with acute anorexia was reluctant to move, and markedly have low serum levels of total thyroxine and total triiodothyronine. A day after the original presentation, the lynx began exhibiting horizontal nystagmus. On histologic examination, 60-90% of the thyroid glands were replaced by mature adipose tissue. To the authors’ knowledge, this is the first report of bilateral thyroid follicular atrophy in a young Canadian Lynx.

A 1.5 year old intact male Canadian Lynx (Lynx canadensis) was evaluated by the referring veterinarian on multiple occasions. The animal was first evaluated at 6 months of age for several days by duration of lethargy and anorexia. The owners also reported that the animal was smaller than their other similarly aged lynx. Physical examination revealed a slight skin turgor consistent with mild dehydration. A complete blood count and serum biochemistry was performed. The CBC was within normal limits. The serum chemistry panel showed elevations of blood urea nitrogen (59 mg/dL; reference range, 16-36 mg/dL), phosphorus (7.8 mg/dL; reference range; 3.1-7.5 mg/dL), calcium (11.5 mg/dL; reference range, 7.8-11.3 mg/dL), albumin (4.5 g/dL; reference range, 2.2-4 g/dL), and decreased chloride (109 mmol/L; reference range, 112-129 mmol/L). Subcutaneous lactated Ringer’s solution (300 mL) was administered and amoxicillin drops were prescribed (18 mg/kg PO BID) for 10 days. Six months later, the animal presented to the referring veterinarian for lethargy and anorexia. Physical examination was unremarkable. Complete blood count and serum biochemistry was performed. The CBC was within normal limits. The serum biochemistry panel showed elevated blood urea nitrogen (49 mg/dL; reference range, 16-36 mg/dL), phosphorus (9.5 mg/dL; reference range; 3.1-7.5 mg/dL), calcium (11.4 mg/dL; reference range, 7.8-11.3 mg/dL), albumin (4.5 g/dL; reference range, 2.2-4 g/dL), and total bilirubin (1.3 mg/dL; reference range, 0-0.9 mg/dL). Subcutaneous lactated Ringer’s solution (450 mL) was given and a subcutaneous injection of cefovecin sodium (Convenia) was administered (8 mg/kg). When the animal was approximately 1 year old, the lynx presented for a head tilt. On physical examination there was no palpebral reflex in the left eye. Cefpodoxime proxetil (Simplicef) was prescribed (6 mg/kg PO SID) for 14 days. Three months later, the lynx presented for falling over and a sunken left eye. On physical examination, there was no palpebral reflex in the left eye. Cefpodoxime proxetil (Simplicef) was prescribed (11 mg/kg PO SID) for 30 days. No response was noted by the owner, and the animal was switched to enrofloxacin (Baytril, 2 mg/kg SQ BID).

Magnetic resonance imaging was performed and no significant findings were observed within the brain. Cervical spinal fluid was obtained for culture, and no bacteria were isolated. Enrofloxacin was prescribed (2 mg/kg SQ BID). The animal was also administered dexamethasone (1-2 mg/kg SQ SID) and triple antibiotic ointment for the corneal ulcer in the left eye (BID). Feline infectious peritonitis, Toxoplasma gondii, and Cryptococcus neoformans titers were obtained and were negative. Panacur granules were prescribed (1 tsp PO SID) for 5 days and a subcutaneous ivermectin injection (0.4 mg/kg) was administered.

Based on the clinical signs, physical examination findings and ancillary testing the differentials at this point were broad and included aberrant parasite migration, endocrinopathies, and metabolic abnormalities. Given the inability to reach a definitive diagnosis and the progression of clinical signs, the lynx was humanely euthanized. The lynx was submitted to the Veterinary Diagnostic Laboratory at the University of Illinois for post mortem examination.

Gross necropsy examination revealed few abnormalities. The animal was in poor nutritional condition characterized by having...
a minimal amount of subcutaneous and visceral adipose tissue and decreased muscle mass. The animal weighed 9.1 kg. The left cornea has a focal ulcer that measured 1 cm in diameter. The serosal surface of the urinary bladder had a mild, locally extensive region of reddening (hemorrhage).

A set of tissues (brain, spinal cord, heart, lung, thyroid gland, salivary gland, liver, kidney, spleen, small intestine, mesenteric lymph node, adrenal gland, pancreas, and urinary bladder) were collected and fixed in 10% neutral buffered formalin for histologic examination. Formalin fixed tissues were processed routinely in paraffin, sectioned at 4 µm, and stained with hematoxylin and eosin. Immunohistochemistry (IHC) for thyroglobulin and calcitonin (Dako, Carpentaria, California) using a horseradish peroxidase-streptavidin method were performed on sections per manufacturer’s guidelines.

Significant histologic abnormalities were limited to the thyroid glands. Histological examination of the thyroid glands revealed that approximately 75% of the normal architecture of the thyroid follicular cells were lost and replaced by mature adipocytes (Figure 1). The remaining thyroid follicular cells were cuboidal and formed follicles of varying sizes (10 µm-100 µm). Thyroid follicles contained a mild amount of eosinophilic colloid. Scattered within the mature adipose tissue were nests of C-cells which were confirmed with immunohistochemical staining (positive immunoreactivity for calcitonin). Inflammatory cells were not identified within the thyroid gland. Minimal numbers of nematodes were identified within the lumen of the small intestine. No significant histological abnormalities were identified within other tissues examined.

Based on the historical, clinical, and necropsy findings, this animal was diagnosed with bilateral thyroid follicular atrophy (hypothyroidism).

Hypothyroidism can be congenital, acquired, or idiopathic. Reports of both congenital and idiopathic hypothyroidism in dogs have features similar to the idiopathic hypothyroidism seen in this case. In these cases, typical clinical signs included dwarfism, subnormal central nervous system development, and failure to grow at a normal rate [3]. A family of giant schnauzers diagnosed with congenital hypothyroidism exhibited clinical findings that included macroGLOSSIA, hypothermia, delayed dental eruption, ataxia, abdominal distention, epiphysial dysgenesis, and delayed skeletal maturation [4]. In a family of Scottish deerhound puppies, similar clinical findings were noted and additional clinical findings of shortened limbs, broad heads, difficulty walking, weakness, and absence of epiphyseal growth centers were observed [5]. Reported serum abnormalities include decreased serum thyroxine levels, increased thyroid stimulating hormone levels, non-regenerative anemia, hypercholesterolemia, and hypocalcaemia [3,4]. Thyroid follicular atrophy secondary to thyroiditis was considered a differential diagnosis; however, the lack of fibrosis or significant inflammation (such as lymphoid follicle formation) made this less likely. In dogs, replacement of the thyroid gland by marked increases in collagen surrounding small follicles or groups of follicles [4].

Neurologic signs are uncommonly reported in cases of idiopathic hypothyroidism in dogs. In one study, cases of twenty-nine dogs with idiopathic hypothyroidism were reviewed and nine dogs in this case series presented with peripheral vestibular deficits [6]. Both the peripheral and/or central nervous systems may be affected in cases of canine hypothyroidism [1,7]. Reported neurologic signs include exercise intolerance, weakness, ataxia, deficits of conscious proprioception, and decreased spinal reflexes [1].

The lynx in this report had a history of anorexia, lethargy, and smaller stature, which progressed to the animal falling over and observation of a head tilt. Unfortunately serum T3, T4, and thyroid stimulating hormone levels were not obtained prior to euthanasia. The serum biochemistry abnormalities including the elevated blood urea nitrogen and albumin were likely due to dehydration, which was diagnosed clinically. A cause for the mild hypochloremia could not be determined and may have been due to loss from the upper gastrointestinal tract (i.e. vomition). In cases of hypothyroidism, hypercalcemia is occasionally reported and is the result of increased intestinal absorption and reduced urinary excretion [8]. The hyperphosphatemia may be physiologic as this was a young animal or possibly secondary to a decreased glomerular filtration rate that resulted from the hypothyroidism. Histologically, the examination of multiple tissue sections did not reveal any other significant disease processes besides the bilateral thyroid atrophy that would result in the clinical signs reported in this animal.

The information reported here describes idiopathic thyroid atrophy in a young Canadian Lynx. Idiopathic thyroid atrophy has not been previously reported in a young Canadian Lynx. In conclusion, idiopathic thyroid atrophy should be added to the differential list in cases of nonspecific weakness, lethargy, and anorexia with progression to neurologic signs in this species.

References


8. Popovtzer MM (2010) Disorders of Calcium, Phosphorus, Vitamin D, and Parathyroid Hormone Activity, Renal and Electrolyte Disorders. (7thedn), Lippincott Williams & Wilkins, Philadelphia, USA.