

## Management of hypothyroidism associated neuropathy in a Labrador dog-a case report

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### Abstract

Hypothyroidism is one of the endocrinological disorder commonly found in the dogs. A male 48 Kg Labrador dog of 4 years age presented at the Veterinary Clinical Complex (VCC), Rajasthan University of Veterinary and Animal Sciences (RAJUVAS) Bikaner with the complaint of inability to bear weight and progressive ataxia from last 20 days. Clinical examination showed lethargy, grunting, obesity and lateral recumbency. The haemato-biochemical analysis showed mild anaemia and hypercholesterolemia. Thyroid profile test results showed marked decreased total T3, total T4 and free T4 and elevated TSH. The patient was diagnosed for hypothyroidism associated neuropathy. The dog was treated with oral levothyroxine-sodium. The dog recovered completely after 15 weeks without any visible side effects.

**Keywords:** Hypothyroidism, Neuropathy, Dog

Hypothyroidism is one of the endocrinopathy commonly found in the dogs caused by decreased production of thyroid hormone. Thyroid gland normally synthesizes thyroid hormones, such as thyroxine (T4) and triiodothyronine (T3), which are warranted for normal metabolic functions of the body. The clinical findings of hypothyroidism are vague and diffuse, and relatively of low accuracy in most biochemical tests (Diaz *et al.*, 2007). Clinical signs are often nonspecific and insidious in onset. Many other diseases can have clinical signs similar to hypothyroidism, which may lead to an incorrect diagnosis (Bruyette, 2020). A variety of neurologic signs, such as cranial neuropathies, central nervous system (CNS) signs, and generalized peripheral neuropathies have been reported (Coates, 1997; Srivastava *et al.*, 2013). In recent years, the development of newer diagnostic tests, e.g. free thyroxine, canine thyroid stimulating hormone, thyroglobulin autoantibodies, has significantly improved our ability to reliably differentiate hypothyroidism from other clinically similar disorders (Mooney, 2011).

### Case History and Observations

A four-year-old male Labrador, weighing 48 kg was presented at the, Veterinary Clinical Complex (VCC), College of Veterinary and Animal Science (CVAS), Rajasthan University of Veterinary and Animal Sciences (RAJUVAS) Bikaner with the complaint of vomiting for

6 days, inability to bear weight and progressive ataxia from last 20 days now converted to lateral recumbency. The hind limbs were more affected than the forelimbs with progressive ataxia. The dogs received ceftriaxone, metoclopramide, nervine tonic along with 5% DNS to treat the vomiting for last 5 days by referring veterinarian. The dog showed improvement in vomiting but no response in ataxia.

On initial clinical examination the dog showed signs of profound lethargy, grunting, obesity and lateral recumbency but could remain in sternal recumbency when positioned so. It was noted that the dog showed response towards external stimuli on forelimbs and hind limbs. There was no abnormality observed in otoscopic examination. Food and water intake, as well as urination and defecation were decreased. Though there was slight drooling after consumption of water and food. General responsiveness towards voice commands was decreased. The cranial nerve and spinal nerve reflexes were normal. After clinical examination, the dog under went for laboratory examination for haemato-biochemical tests and thyroid profile tests to determine exact cause of illness. The results of laboratory findings are mentioned in the Table 1.

The haematological analysis showed mild anaemia with decrease in haemoglobin, haematocrit value and total RBCs count. The biochemical analysis results revealed hypercholesterolemia. Thyroid profile test results showed marked decreased total T3, total T4

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and free T4 and elevated TSH from the normal range.

### Treatment and Discussion

On the basis of above clinical profile and laboratory findings, the case was diagnosed of hypothyroidism associated neuropathy. The treatment was initiated with oral of levothyroxine-sodium (Thyroactiv 100<sup>®</sup>; Leeford Healthcare Ltd, India), 200 µg q12h for 7 days. This resulted in amelioration of the nervous symptoms of drooling of food and water from mouth,

regaining of ability to stand and walking with support. Then the dose was adjusted and the owner was advised for a course of one week of 300 µg q12h. The owner reported marked improvement in walking and reduction in body weight (42 Kg) but not complete cure. The dog was called for re-evaluation after one week and the dose of levothyroxine-sodium was increased up to 400 µg q12h for 8 weeks. After the complete treatment the dog's general condition was excellent; it was bright, alert, and responsive with normal gait. The levothyroxine-sodium

**Table 1: Haematological and serum biochemical parameters of the dog**

Parameters	unit	Values found	Reference values
Haemoglobin	g/dL	9.3	11.9–18.9
Packed cell volume	Per cent	31.2	35–57
RBC count	10 <sup>6</sup> /µL	4.54	4.95–7.87
WBC count	10 <sup>3</sup> /µL	9.5	5.0–14.1
Neutrophils	Per cent	68	57–85
Lymphocyte	Per cent	24	8–21
Monocyte	Per cent	6	2–10
Eosinophils	Per cent	2	0–9
Basophils	Per cent	0	0–1
Platelet (PLT) count	(lakh/µL)	2.52	2.11–6.21
Mean corpuscular volume	fl	70.9	66–77
Mean corpuscular haemoglobin concentration	g/dL	34.4	32.0–36.3
Mean corpuscular haemoglobin	pg	22.5	21.0–26.2
Glucose	mg/dL	86	76–119
Total protein	g/dL	7.10	5.4–7.5
Albumin	g/dL	3.20	2.3–3.1
Globulin	g/dL	3.90	2.7–4.4
ALT	U/L	48.30	10–109
AST	U/L	45.20	13–15
ALKP	U/L	67	1–114
Bilirubin-Total	mg/dL	0.64	0.20–1.30
Bilirubin-Direct	mg/dL	0.16	0.00–0.30
Bilirubin-Indirect	mg/dL	0.48	0.12–0.1.00
BUN	mg/dl	29.70	8–28
Serum creatinin	mg/dl	1.29	0.5–1.7
Cholesterol	mg/dl	840.21	135–278
TT3	ng/dL	28	30–70
TT4	µg/dL	0.59	0.93– 3.50
Free T4	ng/dL	0.76	1.17–3.50
TSH	ng/mL	0.96	0.03–0.5 or < 0.5
Calcium	mg/dl	9.8	9.1–11.7
Magnesium	mg/dl	1.9	1.6–2.4
Sodium	Mmol/L	148	142–152
Potassium	Mmol/L	3.40	3.9–5.10
Chloride	Mmol/L	114	110–124

was given in tapered doses after that. A 100 µg q12h was reduced weekly upto 4 weeks, then 50 µg q12h for 1 weeks and complete withdrawal of medicine was made. Upon re-evaluation, the dog was in admirable health, clinical symptoms were completely resolved.

Generally hypothyroidism is associated with reduced metabolism characterized by weight gain, increased cholesterol levels, reduced lipolysis and gluconeogenesis resulting fatty acid losses (Malik and Hodgson, 2002). Jaggy *et al.* (1994) stated that in hypothyroidism, nerves do not conduct electrical impulses normally. Sometimes single nerve (focal neuropathy) can get entrapped as they exit the skull or spinal cord as they swell with myxedema. Vitale and Olby (2007) suggested that the presence of thrombi in the vessels supplying the pelvic limbs causes vascular occlusion resulting paraparesis and reduced withdrawal reflexes which are result of decreased perfusion of the pelvic limbs. The appearance of the blood vessel walls is consistent with atherosclerosis of these vessels. Ischemic peripheral neuropathy with occlusive peripheral vascular disease due to atherosclerosis in human patients (Nukada *et al.*, 1994; Weber and Ziegler, 2002) and dogs (MacGregor *et al.*, 2004) has been associated with hypothyroidism.

Complete blood count and serum biochemistry profile was performed in this case to rule out other diseases before thyroid-specific tests were conducted. A mild nonregenerative anemia presumably anaemia resulting from decreased production of erythropoietin, and lack of a direct effect of thyroid hormones on bone marrow (Malik and Hodgson, 2002). Hypercholesterolemia are common in hypothyroid dogs due to increased concentration of circulating cholesterol usually reported in approximately 75% of cases, and may be accompanied by hypertriglyceridaemia (Dixon *et al.*, 1999). As per Kantrowitz *et al.* (2001) the sensitivity and accuracy of a serum TT3 was doubtful for hypothyroidism diagnosis as observed in the present case. High concentrations of canine TSH in association with low concentrations of total T4 likely represent primary hypothyroidism with a high degree of specificity (Dixon and Mooney, 1999; Boretti and Reusch, 2004). High fiber diet dilutes energy density of the diet and reduces voluminous intake. Increased physical activity is very much useful along with dietary therapy; it promotes body fat loss (Phinney, 1992). Based on the above facts, owner was advised to provide animal protein and fiber rich diet to the dog on a daily basis.

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