

CLINICAL AND DIAGNOSTIC INSIGHTS INTO HYPOTHYROIDISM IN A SHIH-TZU – A CASE REPORT

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ABSTRACT

Hypothyroidism in dogs is a common endocrine disorder resulting from deficient thyroid hormone production, leading to a reduced metabolic rate. A four-year-old, neutered female Shih Tzu was presented with a history of progressive weight gain, lethargy, bilateral symmetrical alopecia, and cold intolerance over the preceding three months. Physical examination revealed a dull coat, seborrhoeic dermatitis, bradycardia and mild obesity. Routine haematology and serum biochemistry were within normal limits except for mild hypercholesterolaemia. Thyroid function testing demonstrated low total thyroxine (T4) and free T4 levels with elevated thyroid-stimulating hormone (TSH), confirming primary hypothyroidism. The dog was treated with oral levothyroxine sodium at 20 µg/kg twice daily, resulting in significant clinical improvement within six weeks.

Keywords: canine hypothyroidism, shih tzu, levothyroxine therapy

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INTRODUCTION

Canine hypothyroidism is a common endocrine disorder caused by insufficient production of thyroid hormones (thyroxine, T4; triiodothyronine, T3), resulting in multisystemic clinical signs that are often insidious and nonspecific (Mooney, 2011;

Parry, 2013). The two principal aetiologies are primary acquired thyroid disease—most frequently lymphocytic (immune-mediated) thyroiditis and idiopathic follicular atrophy—whereas secondary (pituitary) and tertiary (hypothalamic) hypothyroidism are rare in dogs (Mooney, 2011; O'Neill *et al.*, 2022). Clinical presentation varies and commonly involves dermatological, metabolic, cardiovascular and neuromuscular abnormalities. Typical dermatologic findings include bilaterally symmetrical alopecia, hyperpigmentation, seborrhoea, slow regrowth of hair and a dull coat; systemic signs include lethargy, exercise intolerance,

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weight gain despite normal appetite, cold intolerance and bradycardia (Bugbee *et al.*, 2023; Mitrevska *et al.*, 2023).

Laboratory investigation commonly begins with measurement of total thyroxine (TT4) as a screening test; however, low TT4 can occur with non-thyroidal illness and certain medications, so interpretation must be cautious (Randolph *et al.*, 2015; Bennaim *et al.*, 2022). Free T4 measured by equilibrium dialysis (fT4-ED) and canine TSH (cTSH) measurement are valuable adjuncts; the combination of low TT4/fT4 and elevated cTSH has high specificity for primary hypothyroidism (Randolph *et al.*, 2015; Bennaim *et al.*, 2022; Bolton and Panciera, 2023). Ultrasonography is the method of choice for imaging the thyroid gland in dogs because of its superficial location and the ability to obtain high-resolution images using high-frequency transducers (Rajathi *et al.*, 2019).

Appropriate replacement therapy with levothyroxine leads to clinical and biochemical improvement in most cases, but therapeutic monitoring and awareness of factors that interfere with testing and absorption (concurrent medications, timing of administration, gastroenteric disease) are essential for optimum outcomes (van Dijk *et al.*, 2014; Bugbee *et al.*, 2023; Bolton and Panciera, 2023).

CASE HISTORY AND OBSERVATIONS

A four-year-old, neutered female Shih Tzu weighing 8.2 kg was presented to the Small Animal Medicine Unit of

a Veterinary Teaching Hospital with a history of progressive weight gain, reduced activity, bilateral symmetrical alopecia, and cold intolerance over the preceding three months. The owner also reported occasional scaling, dry coat and exercise intolerance, though appetite and water intake remained normal. No history of drug administration such as glucocorticoids, phenobarbital or sulphonamides was recorded in the previous six months.

On general physical examination, the dog was bright, alert and responsive, though notably lethargic. Rectal temperature was 102.1°F, heart rate was 58 beats per minute (mild bradycardia), and respiratory rate was 20 breaths per minute. The body condition score (BCS) was 6/9, suggestive of dog being overweight. Dermatological examination revealed bilaterally symmetrical truncal alopecia involving the lateral thorax, abdomen, and caudal thighs, accompanied by seborrhoeic scaling, comedone formation, and hyperpigmentation of alopecic areas (Fig1.1). The tail showed partial alopecia. No pruritus or ectoparasites were observed. Mild secondary bacterial infection could be appreciated. The skin was cold to touch, and hair regrowth on shaved areas was markedly delayed.

Ophthalmic and otic examinations were unremarkable. Cardiac auscultation revealed a soft sinus arrhythmia but no murmurs. Peripheral lymph nodes were normal in size and consistency. Neurological and musculoskeletal evaluations were within physiological limits, although mild generalised weakness was noted during ambulation.

Normocytic–normochromic anaemia was observed (haemoglobin 12.4 g/dL; packed cell volume 35%) with marked hypercholesterolaemia (382 mg/dL) and mild hypertriglyceridemia (156 mg/dL) were observed. The serum sample appeared mildly lipemic and turbid, consistent with the marked hypercholesterolaemia and mild hypertriglyceridemia observed in this case. The mild increase in ALT (122 IU/L) was likely secondary to hepatic lipid accumulation (hepatic lipidosis) rather than hepatocellular injury.

Normal urea (22mg/dL), creatinine (1.3mg/dL), glucose (86mg/dL), and electrolyte concentrations (Potassium: 4.2mmol/L; Sodium: 146mmol/L; Chloride: 118mmol/L) excluded significant renal, hepatic, or adrenal compromise.

Thyroid hormone profiling demonstrated TT4 at 0.6 µg/dL (reference 1.3–4.5 µg/dL), fT4 by equilibrium dialysis at 0.4 ng/dL (reference 0.8–2.5 ng/dL) and cTSH elevated at 0.78 ng/mL (reference < 0.5 ng/mL), confirming primary hypothyroidism. Based on these findings, other causes of low T4 such as non-thyroidal illness, drug interference, or pituitary disease were ruled out.

Radiographs showed mild hepatomegaly with increased soft tissue opacity but no evidence of systemic pathology. Echocardiography revealed normal chamber dimensions and systolic function. Abdominal ultrasonography revealed a diffusely hyperechoic liver and moderate subcutaneous thickening, changes often associated with hypothyroid metabolic

alterations (Sieber-Ruckstuhl *et al.*, 2022; Bennaim *et al.*, 2022). Based on the history, clinical features, biochemical abnormalities (hypercholesterolaemia), and thyroid function tests (low T4, low fT4, high TSH), a diagnosis of primary hypothyroidism was established.

TREATMENT AND DISCUSSIONS

The dog was initiated on oral levothyroxine sodium (LETHYROX 100, Intas Pharmaceuticals, India) at a dose rate of 20 µg/kg body weight twice daily, administered on an empty stomach to ensure optimal absorption. The owner was instructed to maintain consistent timing of administration and to avoid concurrent feeding for at least one-hour post-dosing. Only topical antibiotic–antiseptic therapy was recommended in this case, as it was deemed sufficient due to the mild nature of the pruritus.

Follow-up evaluations were scheduled at two, four and six weeks after initiation of therapy. At the two-week review, the owner reported a noticeable increase in alertness and activity. By the fourth week, improvement in coat texture, partial hair regrowth, and resolution of seborrhoea were evident. At six weeks, body weight had decreased by 0.5 kg, and the dog demonstrated a normal level of energy and responsiveness. Hair regrowth was noticeably improved after eight weeks of treatment (Fig.1.2). Repeat serum TT4 and TSH assays at the six-week interval revealed TT4 to be 2.5 µg/dL and TSH to be 0.32 ng/mL, indicating appropriate therapeutic response. The levothyroxine

dosage was maintained at the same level with plans for re-evaluation every three months. Nutritional management involved a balanced maintenance diet with moderate fat content and adequate high-quality protein.

Canine hypothyroidism is a chronic metabolic disorder resulting from deficient thyroid hormone secretion, leading to reduced basal metabolic rate and multisystemic manifestations (Mooney, 2011; Bennaim *et al.*, 2022). The condition most frequently affects middle-aged, medium to large breed dogs, though smaller breeds such as Shih Tzus may occasionally be affected (O'Neill *et al.*, 2022).

The clinical response to levothyroxine supplementation remains the gold standard for confirming hypothyroidism. Improvement in behaviour, activity, and dermatological changes typically occur within four to eight weeks of therapy (Randolph *et al.*, 2015; van Dijk *et al.*, 2014).

The observed hypercholesterolaemia and mild anaemia are hallmark biochemical indicators of hypothyroidism. Hyperlipidaemia results from decreased LDL receptor activity and reduced hepatic lipid metabolism (Beier *et al.*, 2015; Sieber-Ruckstuhl *et al.*, 2022).

In the present case, clinical improvement paralleled hormonal correction, demonstrating effective management. The absence of adverse drug reactions and gradual reversal of dermatological lesions further validated therapeutic success. Regular follow-up is crucial, as under- or over-supplementation can have serious consequences; excessive dosing may lead to tachyarrhythmias, polyphagia, or weight loss (Bugbee *et al.*, 2023; Bolton and Panciera, 2023).

CONCLUSION

Primary hypothyroidism was diagnosed in a Shih Tzu based on compatible clinical signs and confirmatory thyroid hormone profiling. Appropriate levothyroxine supplementation resulted in rapid clinical and biochemical improvement, highlighting the importance of considering hypothyroidism even in small breeds and the value of early diagnosis with regular therapeutic monitoring.

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Fig.1.1. Before Treatment



Fig.1.2. After Treatment (After 6 weeks)

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