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Successful therapeutic management of canine hypothyroidism in a spitz dog

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Abstract
A ten-year-old neutered female spitz dog was presented to the Dermatology Unit of Madras Veterinary Teaching Hospital with the complaint of chronic dermatitis, erythematous scaly lesions, generalized alopecia and pruritis. On clinical examination bradycardia was noticed. Examination of integumentary system revealed bilateral symmetrical alopecia, epidermal collarette, pustules and rat tail appearance. Thyroid profile revealed low Total T_4. Based on clinical signs and thyroid profile the case was diagnosed as hypothyroidism. The animal was treated with Tab. Levothyroxine @ 0.01mg/kg body weight BID for 10 days and gradually increased to 0.02 mg/kg body weight BID and supplemented with oral Palmitoylethanolamide. After one month of treatment the animal showed clinical recovery and the owner was adviced to maintain the pet on oral levothyroxine.

Keywords: Hypothyroidism, levothyroxine sodium, symmetrical alopecia

Introduction
Hypothyroidism is the commonly encountered endocrinopathy in dogs resulting from decreased production of thyroxine (T_4) and triiodothyronine (T_3) from follicular cells of thyroid gland (Ettinger *et al*., 2017) [2]. Etiology of hypothyroidism can be classified as primary, secondary and tertiary if the underlying cause is within thyroid gland, pituitary and hypothalamus respectively, further also classified as congenital and acquired depending on the age it develops. Primary hypothyroidism occurs either due to lymphocytic thyroiditis which is an autoimmune disease in which infiltration of lymphocytes, macrophages and plasma cell occur in thyroid gland or idiopathic atrophy in which replacement of thyroid tissue by adipose and connective tissue leads to decrease in production of thyroid hormone (Dixon *et al*., 2001) [1]. Primary hypothyroidism accounts for 95% of diagnosed cases, with lymphocytic thyroiditis and idiopathic follicular atrophy accounting for 50% diagnosed cases, each (Naveen *et al*., 2024) [5]. This condition is commonly encountered in age group of 4-10 years old. Neutered males and spayed females have a higher chance of getting hypothyroidism compared with the sexually intact animal (Gupta *et al*., 2023) [3]. Most common clinical manifestation include obesity, seborrhea, alopecia, weakness, lethargy, bradycardia and pyoderma.
The present case describes hypothyroidism in a neutered female spitz dog and its successful therapeutic management.

Case History and Observations
Ten years old neutered female spitz dog weighing 24 Kg was presented to Dermatology Unit of Madras Veterinary College Teaching Hospital with the history of chronic dermatitis, generalized alopecia and itching in the past two months. The owner reported sudden increase in body weight of the animal, reduced appetite and lethargy. On physical examination the animal was obese with distended abdomen, epidermal collarette on dorsal region (Figure 1), pustules, scaly lesion, rat tail appearance (Figure 2) and symmetrical alopecia (Figure 3). On clinical examination all vital parameters were within normal range except mild bradycardia (H/R-55 bpm). Hematobiochemical examination revealed mild non regenerative anemia with elevated ALP, AST and cholesterol levels.

Thyroid profile test revealed elevated TSH, decreased free T_4 and Total T_4. Based on clinical presentation, physical examination and laboratory investigation the present case was diagnosed as Canine hypothyroidism and treatment was planned accordingly.

Pre treatment

Fig 1: Epidermal collarette

Fig 2: Rat tail appearance

Fig 3: Generalised bilateral symmetrical alopecia

Table 1: Thyroid profile

Parameters	Values	Reference
Total T_4 (nmol/L)	19.43	34.86±4.30
Free T_4 (ng/dl)	0.81	0.96±0.05
TSH (µIU/ml)	0.005	0.02±0.01
Reference range: Naveen *et al*., 2024 [5]		

Post treatment

Fig 5: Improved coat condition post-treatment

Fig 6: Hair regrowth and resolved rat tail appearance

Treatment and Discussion

Treatment was initiated with Tab. Levothyroxine @ 0.01 mg/kg body weight orally BID for 10 days and the dose increased to 0.02 mg/kg body weight BID PO from second week onwards. The secondary bacterial infection was treated with Tab. Cefpodoxime @ 10 mg/kg SID PO for one week and supplemented with oral Palmitoylethanolamide SID PO for two weeks. After one month of treatment, resolution of dermatological symptoms (Figure 4 and Figure 5) was observed gradually and increase in appetite was reported. The owner was advised to continue the Levothyroxine medication.

Hypothyroidism is the natural deficiency of thyroid hormone, caused by immune mediated destruction of thyroid gland or by natural atrophy of thyroid gland or as a congenital problem. Breed wise predisposition commonly present in spitz, Labrador and German shepherd (Sathish Kumar *et al*., 2007) [7]. Major physiological effects of thyroid hormone are increased metabolic rate, positive inotropic and chronotropic effect, catabolic effect in muscle and adipose, stimulate erythropoiesis and regulate cholesterol level (Naveen *et al*., 2024) [5].

Dogs suspected for hypothyroidism shows common clinical signs related to metabolic abnormalities are lethargy, obesity, exercise and cold intolerance and dermatological abnormalities includes alopecia, dry coat, pyoderma, seborrhea and also various neuropathies, myxedema coma, lipid corneal dystrophy, bradycardia may also be noticed (Ettinger *et al*., 2017) [2]. The clinical presentation of this case was in accordance with the characteristic features of hypothyroidism. The haematology of decreased Hb, PCV, RBC and the serum biochemistry of elevated alkaline phosphatase, serum triglycerides, creatine kinase and hypercholesterolemia correlated with Naveen *et al*. (2024) [5].
Diagnosis was made based on history, clinical signs and measurement of serum T_4, free T_4 and TSH concentration as recommended by Peterson *et al*., 1997 [6].
Thyroid Hormone Replacement therapy was initiated with levothyroxine sodium at the dose rate of 0.02 mg / kg PO every 12 hours because of shorter serum half-life of T_4. L-T_4 sodium preserves normal regulation of T_4 to T_3 deiodination, which allows physiological regulation of individual tissue T_3 concentration (Jaiswal *et al*., 2018) [4]. This was in accordance with our case study. The clinical response was observed by fourth week onwards with evidence of regrowth of hair and resolution of recurrent pyoderma.

Conclusion
The present case study reports hypothyroidism in a 10-year-old neutered female spitz dog diagnosed based on clinical signs and confirmed with thyroid profile results of the dog. The condition was successfully treated with oral levothyroxine, supplemented with oral Palmitoylethanolamide and complete resolution of dermatological signs was observed.

Conflict of Interest
Not available

Financial Support
Not available

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