

ENDOCRINOPATHIES IN DOGS: HOW TO RECOGNISE AND TREAT CASES

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Filippo De Bellis discusses the diagnostic procedures for endocrine disorders, such as hypothyroidism, Sertoli cell tumours and hyperoestrogenism

Summary

Endocrine diseases are commonly seen in veterinary practice and many have the potential to affect skin and adnexal structures. The specific actions of many hormones to the skin are often poorly understood and, additionally, controversies are augmented by the lack of standardised diagnostic tests. Common clinical dermatological features include: symmetrical, non-inflammatory alopecia; dull, dry and faded coat that is easily epilated; post-clipping alopecia; scaling and comedo formation; ceruminous otitis externa; variable pigmentary disturbances; easily bruised skin and poor wound healing; increased susceptibility to infections; and demodicosis. Pruritus is not a common feature unless concurrent infections are present. Histological features include: atrophic pattern showing hairs in telogen or catagen growth phase with few or no anagen hairs; possibly atrophy of follicular epithelium and adnexae; and varying degrees of surface and follicular hyperkeratosis. The aim of these notes is to describe the endocrinopathies more often reported in association with skin diseases, mentioning the diagnostic criteria and the therapeutical options available to manage these conditions.

Key words

hormones, skin, endocrinopathies, dog

Hypothyroidism

HYPOTHYROIDISM is considered to be the most common endocrine disorder in dogs and is characterised by numerous clinical signs affecting the skin and other organs associated with a deficiency of thyroid hormone activity.

Adult-onset hypothyroidism is a primary irreversible destruction of the thyroid gland – this is due to either lymphocytic thyroiditis (also referred to as autoimmune thyroiditis) or idiopathic thyroid degeneration.

Due to the variety of clinical presentations, the disease's long pre-clinical phase and the poor specificity of some diagnostic laboratory tests, it is also the most commonly over-diagnosed endocrine disease.

• Systemic signs

- Weight gain/obesity (without polyphagia).
- Lethargy/mental dullness.
- Weakness.
- Cold intolerance.
- Exercise intolerance.
- Hypothermia.
- Bradycardia.
- Ocular disorders.
- Reproductive disorders.

Although the majority of these signs are classically associated with hypothyroidism, many dogs may appear active and alert- and show normal temperature.

• Dermatological signs

- Dull, dry, brittle hair coat.
- Alopecia, affecting mainly trunk and abdomen ([Figure 1](#)).

- Seborrhoeic dermatitis.
- Ceruminous otitis externa.
- Pyoderma.
- *Malassezia* dermatitis (especially in the intertriginous areas).
- Pruritus may be variable and related to seborrhoea and infections.
- Hyperpigmentation.
- Lichenification.
- Comedones.
- Hypertrichosis.
- Thickened, cool, puffy skin (myxoedema), sometimes with a tragic facial expression ([Figure 2](#)).

• **Diagnosis**

Because of the variety of clinical signs, the list of differential diagnoses is extensive.

Investigation of thyroidal disease is based on laboratory tests, but because no one test is diagnostic, the results have to be evaluated in light of the patient's history and clinical signs.

• **Non-specific laboratory tests**

- Haematology: normocytic, normochromic, non-regenerative anaemia (in approximately 30 per cent of cases).
- Serum biochemistry: hypercholesterolaemia (up to 75 per cent of cases).
- Skin biopsy: this may reveal non-diagnostic changes consistent with endocrinopathy, but may be useful to rule out other diseases with more specific histopathological features.

• **Thyroid testing.**

Diagnostic tests include those that look into thyroid pathology (thyroiditis) and those that look into thyroid function.

– **Antithyroglobulin antibodies (TgAA).** Through this test, we can understand if there is an active inflammatory process in the thyroid.

However, even with positive results, thyroid function may be normal. This test may have a positive predictive value (it can detect thyroid pathology before a change in thyroid function) and suggests that patients (where values of TT4, FT4d and TSH are normal) should be scheduled for more frequent monitoring, rather than being considered candidates for treatment.

– **Total thyroxine (TT4).** This test is highly sensitive (100 per cent), but poorly specific (as low as 75 per cent). As a result, dogs with TT4 concentration within the normal limits may be assumed to be euthyroid (unless there is interference with anti-T4 antibodies). However, values below the normal range may also be due to non-thyroidal illness or may represent a response to drug administration (glucocorticoids, phenobarbital, sulphonamides and NSAIDs). This test has the advantage of being inexpensive and readily available.

– **Free thyroxine by equilibrium dialysis (FT4d).** This test measures a fraction of T4 unbound to proteins and is, therefore, less influenced by non-thyroidal illness or medications. However, it is more expensive and less available than TT4.

– **Endogenous thyroid stimulating hormone (TSH).** In dogs with hypothyroidism, TSH levels should be higher than normal. However, 25 per cent of hypothyroid dogs may have normal TSH levels, and 10 per cent of euthyroid dogs may show elevation of the TSH.

– **TSH stimulation test.** This is considered to be the most reliable test and consists of measuring the TT4 before and four to six hours after administering 0.1IU/ kg of human recombinant TSH. However, it is expensive and has limited availability.

It is clear that for investigating hypothyroidism, the baseline should be selection of the correct patient, followed by measurement of TT4 along with TSH. Clear results (low TT4 and high TSH) are suggestive of hypothyroidism; results in the “grey zone” (low TT4 and normal TSH) leave us with a diagnostic dilemma and other tests (FT4d, TSH stimulation test) may be considered, along with repeating TT4/TSH at a later stage or instituting a therapeutic trial.

• Treatment

– **Levothyroxine supplementation.** Induction dose of 0.02mg/kg bid. In most dogs, treatment can be reduced to 0.02mg/kg sid. Monitoring (four to six hours post-pill) is needed after four weeks.

Hyperadrenocorticism

Hyperadrenocorticism or Cushing’s syndrome in dogs is a common condition that results from the chronic overproduction of cortisol. This can be due to a pituitary tumour (pituitary-dependent

hyperadrenocorticism – PDH) or to an adrenal neoplasia (adrenal-dependent hyperadrenocorticism – ADH). It is a serious and complicated disease with a wide range of clinical signs, and frequently complicated by other conditions – such as diabetes mellitus.

Hyperadrenocorticism is mostly seen in older dogs, and females appear over-represented. Several breeds have been described as predisposed, including poodles, dachshunds, terriers and beagles.

- **Systemic signs**

- Polyuria/polydipsia.
- Polyphagia.
- Muscle wasting.
- Ligament laxity.
- Lethargy.
- Distended, pendulous abdomen ([Figure 3](#)).
- Hepatomegaly.
- Dyspnoea.
- Exercise intolerance.
- Reproductive disorders.

- **Dermatological signs**

- Bilaterally symmetrical nonpruritic truncal alopecia.
- Hyperpigmentation ([Figure 4](#)).
- Hypotonic skin ([Figure 4](#)).
- Comedones ([Figure 5](#)).
- Telangiectasia.
- Phlebectasia.

- Calcinosis cutis.
- Scaling.
- Pyoderma ([Figure 5](#)).
- *Malassezia* dermatitis.
- Adult-onset demodicosis.
- Non-truncal alopecia is common in poodles and Yorkshire terriers, especially on the muzzle.

• **Diagnosis**

The diagnosis is based on history, systemic and dermatological signs and diagnostic procedures.

• **Diagnostic tests (non-specific)**

- Haematology: stress leukogram with neutrophilia, monocytosis, lymphopaenia and eosinopenia. Thrombocytosis is commonly seen.
- Serum biochemistry: marked elevation in serum alkaline phosphatase (ALKP), alanine aminotransferase (AST), moderate hyperglycaemia, hypercholesterolaemia, hypertriglyceridaemia, low blood urea and hypothyroxinaemia.
- Urinalysis: reduction of specific gravity, glycosuria and calcium oxalate crystals. Urinary tract infections are common.
- Imaging findings: adrenal tumour, adrenal hyperplasia, hepatomegaly and tracheobronchial calcifications.
- Skin biopsy: this may reveal non-diagnostic changes consistent with endocrinopathy, but may be useful to rule out other diseases with more specific histopathological features. Histopathology can be more specific when the classic features of an atrophic dermatitis are associated with dermal collagen fibres, calcification and calcification of the hair follicle basement membrane.

• **Specific tests**

It is important that suspicion, based on non-specific tests, is present before the definitive diagnosis tests are performed, as misleading results can be obtained. Several dynamic function tests are available.

- **Adrenocorticotrophic hormone (ACTH) stimulation test.** This is the most commonly used screening test and can help to differentiate spontaneous from iatrogenic hyperadrenocorticism. It has a sensitivity of 85 per cent in PDH and 65 per cent in ADH cases. It can be influenced by stress.
- **Low-dose dexamethasone suppression test.** More sensitive and reliable, it can, however, also be affected by stress and cannot detect iatrogenic forms or be used for monitoring treatment.
- **Urinary cortisol: creatinine ratio.** This can be used to exclude hyperadrenocorticism if results are negative, but it has a very low specificity.

Once a diagnosis is reached, other tests can be used to further differentiate between PDH and ADH. These include the highdose dexamethasone suppression test, ultrasound of adrenal glands and measurement of endogenous ACTH.

• Treatment

Trilostane is the licensed drug in the UK. It is usually given once daily at 3mg/kg to 5mg/kg. Peak activity occurs between two and six hours.

Monitoring is carried out by an ACTH stimulation test, two to five hours post-drug administration at 10, 30 and 90 days, then every four to six months.

Other therapeutic options include non-licensed drugs (mitotane, l-deprenyl or ketoconazole), radiotherapy, hypophysectomy and adrenalectomy.

Sex-hormone dermatoses

Sex-hormone dermatoses are uncommon causes of dermatological disease in dogs and may be of gonadal or adrenal origin. Most of the dermatoses associated with sex-hormone imbalance are ill defined. Generally, there is absence of systemic signs, and the skin lesions tend to initially affect the caudal ventrum and genitalia, spreading to the limbs, flanks and neck. Seborrhoeic dermatosis and ceruminous otitis externa are reported. The diagnosis is based on the clinical signs and the patient demonstrating neoplasia or abnormal sex hormone levels. Assays for various sex hormones are available – very high levels are suggestive, but there is a wide grey area. Pre and post-ACTH levels might be useful if abnormal adrenal sex hormone production is suspected. Dermatoses associated with testicular tumours are well-described syndromes.

Testicular tumours

Sertoli cell tumours are reported to be the most common type of testicular tumour to cause symmetrical alopecia.

Symmetrical alopecia is rarely associated with seminomas or interstitial cell tumours. More than one type of tumour may be present simultaneously.

Sertoli cell tumour in male dogs

• Cause

Functioning testicular neoplasm with subsequent hyperproduction of oestrogens or other hormones. It is seen in older, entire male dogs.

• Systemic clinical signs

- Testicular mass or retained neoplastic abdominal testicle.
- Pendulous prepuce.
- Feminisation in some dogs – gynaecomastia, attractiveness to male dogs.
- Oestrogen-induced bone marrow suppression (rarely).

• Dermatological clinical signs. These are not always present and may consist of:

- alopecia affecting the abdomen, neck, caudal aspects of the thighs, tail and perineum ([Figure 6](#));
- linear perpetual erythema;
- seborrhoeic dermatitis;
- otitis externa;
- bacterial pyoderma; and
- *Malassezia* dermatitis.

• Diagnosis

- Occasionally elevated basal oestradiol.
- Testicular ultrasonography may help to detect non-palpable tumours.
- Histopathology of testis.

- Response to castration.

- **Treatment**

- Castration.

Hyperoestrogenism in intact female dogs

- **Systemic clinical signs**

- Gynaecomastia.
- Vulvar hypertrophy.
- Abnormal oestrus cycle.
- Haematological abnormalities (anaemia, ecchymoses, petechiae, epistaxis, melaena or haematuria) associated with bone marrow suppression.

- **Dermatological clinical signs**

- Alopecia – affects the abdomen, neck, caudal aspects of the thighs and perineum.
- Seborrhoeic dermatitis.
- Otitis externa.
- Bacterial pyoderma.
- *Malassezia* dermatitis.

- **Cause**

Polycystic ovarian disease, ovarian neoplasia or iatrogenic.

- **Diagnosis**

- Diagnosis is straightforward in dogs with both oestral and cutaneous abnormalities.
- It is important to rule out other causes.
- Ultrasonography is useful in delineating ovarian abnormalities.

– Interpretation of sex hormone levels is very difficult in most cases.

- **Treatment**

– Ovariohysterectomy.

Hyperandrogenism

- Dermatological clinical signs: caudal and perianal gland hyperplasia ([Figure 7](#)); patchy ano-genital hyperpigmentation; and seborrhoeic dermatitis.

- **Cause**

Testicular neoplasia or functional abnormalities in older dogs. Exceptionally, it may occur in spayed female dogs affected by PDH.

- **Diagnosis**

– History.

– Physical examination.

– Blood testosterone levels.

– Response to castration.

– Testicular ultrasonography may help to detect nonpalpable tumours.

– Histopathology of testis.

- **Treatment**

– Neutering.

References

- Ferguson D C (2007). Testing for hypothyroidism in dogs, *Veterinary Clinics of North America: Small Animal Practice* **37**: 647-669.
- Graham P A (2006). Diagnosis and treatment of canine hypothyroidism, *Proceedings of 21st Annual Congress of the ESVD-ECVD*: 33-37.
- Paradis M and Cerundolo R (2003). An approach to symmetrical alopecia in the dog. In Foster A and Foil C (eds), *BSAVA Manual of Small Animal Dermatology* (2nd edn), BSAVA:

83-93.

- Rosychuk R A W (1998). Cutaneous manifestation of endocrine disease in dogs, *Compendium on Continuing Education for the Practising Veterinarian* **20**: 287-302.
- Scott D W, Miller W H and Griffin C E (2001). Endocrine and metabolic diseases, *Small Animal Dermatology* (6th edn), W B Saunders, Philadelphia: 780-885.
- Tappin S (2009). Canine endocrine alopecia associated with systemic signs, *Proceedings of the BVDSG Spring Meeting*: 19-29.