Medical management of feline hyperthyroidism: what's new?

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Summary

HYPERTHYROIDISM in cats is a disease resulting from elevated levels of circulating thyroid hormones. These hormones have a general stimulatory effect on multiple body systems, causing a range of clinical signs. Surgery and radioactive iodine therapy provide a permanent cure for the condition, although this may not be a feasible option in all cases, thereby necessitating complex medical management. Reduction of circulating thyroid hormones can be achieved through administration of oral antithyroid drugs. However, management must also address the effects on other body systems, some of which may have been damaged permanently through the disease process. This article aims to cover the current thinking regarding the ongoing medical management of hyperthyroidism in cats.

Key words

feline hyperthyroidism, thyroid, medical management, antithyroid medication

MOST of us in practice will be familiar with the presentation of a hyperthyroid cat. A thin, elderly cat with a dishevelled look and feisty character is a common presentation. Hyperthyroidism was first diagnosed in the late 1970s, but we are still learning about this complex disease and improving our management of these patients.

Hyperthyroidism is caused by an overproduction of thyroid hormones (T3 and or T4) which, in excess amounts, have a general stimulatory effect on multiple body systems. The overproduction is most commonly caused by multinodular adenomatous hyperplasia (benign tissue growth) in one or, more commonly, both thyroid lobes (Mooney, 2010). Once diagnosed, there are three potential treatment options (Figure 1).

Treatment will depend on the clinical status of the patient and availability of resources, but mostly on the wishes of the owner. Radioactive iodine and surgery result in permanent resolution of the condition. Management using antithyroid medication provides effective control as long as the medication is being given, but also requires the concurrent problems to be addressed (Figure 2).

Antithyroid medication

Two drugs are licensed for treatment of hyperthyroidism in cats – methimazole and carbimazole (carbimazole is converted to methimazole in the body). Both drugs effectively inhibit thyroid hormone production and are given orally. Dosing is based on the results of total T4 concentrations that are measured every two to three weeks during the initial stabilisation phase and every three to six months, or as clinically indicated, in stabilised cats (Mooney, 2010).

Delivering oral medication to hyperthyroid cats is complicated by the need for frequent dosing, the animals' fractious temperament, the presence of anorexia and intestinal disease in some cats (Figure 3a). Although neither methimazole nor carbimazole are available specifically for cats as transdermal products, several studies have demonstrated efficacy of this delivery method in hyperthyroid cats (Lècuyer et al, 2006). Transdermal application is via the underside of the ear pinnae. Drug therapy may cause some transient reactions such as vomiting, anorexia and depression and it is not curative – withdrawal of medication results in the rapid return of clinical signs.

Ongoing management

Hyperthyroidism and renal function

As hyperthyroidism is more common in older cats, some degree of concurrent renal disease is not uncommon. However, this may not be clinically evident due to the effects of the thyroid hormones on renal function. Elevated levels of T4 increase glomerular filtration rate and renal blood flow, resulting in decreased blood creatinine levels and masking the presence of any underlying renal insufficiency (Gunn-Moore, 2011). In addition, a decrease in body muscle mass means fewer metabolic waste products are produced (Williams, 2011). Once the hyperthyroidism is treated and the cat becomes euthyroid, renal perfusion and glomerular filtration rate will decrease. Clinical signs of renal disease may then become apparent or significantly worsen and the cat may develop renal failure. It is therefore recommended that a trial period of medical treatment be instigated, prior to any permanent treatment, to establish renal function once the hyperthyroidism has been

controlled. To date, no single parameter to consistently predict patients whose renal function will deteriorate following treatment has been identified.

Hypertrophic cardiomyopathy

The presence of hyperthyroidism in cats is associated with the development of hypertrophic cardiomyopathy, although the exact mechanism of association is currently unknown (Mooney, 2010). The left ventricle becomes enlarged as a secondary response to the effects of the thyroid hormones on the heart directly and indirectly via changes to the circulatory system. These effects include systemic hypertension, increased heart rate and myocardial contractility, sympathetic nervous system activation and an increase in the cellular oxygen demand (Ware, 2009). The existence of cardiac disease can make hyperthyroid patients extremely fragile and susceptible to stress, so careful handling is essential to avoid precipitating an acute deterioration in their condition. Clinically significant hypertrophic cardiomyopathy may be treated with an ACEinhibitor and beta-blocker, although treating the thyroid disease will help alleviate some of the contributing factors.

Gastrointestinal tract disorders

Hyperthyroid cats commonly present with gastrointestinal signs, such as diarrhoea, due to malabsorption and intestinal hypermotility (Nelson, 2009). This increased activity results in rapid depletion of B vitamins and folate levels. Both B12 and folate are necessary for enterocytes to replete and repair. Supplementation with folic acid is recommended in cats with persistent diarrhoea and will often result in its resolution (Gunn-Moore, 2011).

Systemic hypertension

Elevated blood pressure is seen in 20 to 85 per cent of hyperthyroid cats (Gunn-Moore, 2011) caused by the stimulatory effects of the thyroid hormones on heart rate, myocardial contractility and through activation of the renin-angiotensin-aldosterone system. Target organs damaged by high blood pressure include the eyes (retinal detachment), brain (dementia, cerebrovascular accidents), kidney (chronic kidney disease) and heart (hypertrophic cardiomyopathy) – and as hypertension in hyperthyroid cats is often clinically silent, the damage may have been occurring for some time (Nelson, 2009).

Blood pressure measurement should therefore constitute part of the routine diagnostic work-up for hyperthyroid patients once a retinal examination has taken place to ensure the stress of handling and measuring blood pressure in an already hypertensive cat will not contribute to any pre-existing ocular damage (Gunn-Moore, 2011). Blood pressure monitoring should continue regularly throughout the disease state and anti-hypertensive therapies, such as amlodipine +/– an ACE-inhibitor, should be initiated when necessary.

Urinary tract infections

Hyperthyroid patients are at increased risk of developing urinary tract infections as high levels of circulating thyroid hormones have an immunosuppressive effect (Nelson, 2009), and a low specific gravity, due to polydipsia and polyuria, promotes bacterial growth. Many hyperthyroid cats are asymptomatic and may not even demonstrate elevated white blood cell counts in their urine, despite the presence of an infection. Routine urine culture in all newly diagnosed hyperthyroid cats is recommended so that appropriate therapy can be initiated.

Iatrogenic hypothyroidism

Regular monitoring of total T4 levels should be performed to ensure the medication is effective and thyroid hormone levels are decreasing, and also to prevent hypothyroidism developing. Approximately 35 per cent of cats treated with methimazole will develop iatrogenic hypothyroidism (Williams, 2011). Hypothyroid cats are more likely to develop renal problems and azotaemia and hypothyroid azotaemic cats have a shorter life expectancy (Williams, 2011). It is therefore important to monitor cats regularly to ensure drug therapy is maintaining a euthyroid state.

Conclusions

Management of hyperthyroid cats may be difficult, requiring concurrent conditions to be addressed in order to maintain quality and length of life for patients. Indeed, the effects of thyroid hormones can cause permanent damage and life-threatening changes to some organs. The sole administration of an antithyroid medication for feline hyperthyroidism is now less likely.

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