

Feline Hyperthyroidism CE

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Overview

Feline Hyperthyroidism was first described by Peterson in 1979. It is now recognized as the most common endocrinopathy in cats.

98% of hyperthyroid cats have benign adenomas.

A variety of etiologies have been put forth why we now see more hyperthyroidism. Exposures to certain chemicals have been implicated. One interesting hypothesis is that plastic lining to canned foods may be a risk factor.

Hyperthyroidism is an age related disease with the peak of cases diagnosed being 12 to 14 years of age.

A variety of classic signs are noted. These include weight loss, polyphagia, hyperactivity, polyuria, vomiting, and diarrhea.

Examination Findings

Exam findings can include palpable cervical mass. Some thyroid gland may be intra-thoracic and not palpable.

Other common findings include lack of body condition, heart murmur, tachycardia, gallop rhythm and hyperactivity in the exam room. Less common are aggression, unkempt fur, increased nail growth, alopecia, congestive heart failure, and ventral neck flexion.

Remember to include hyperthyroidism on your rule-out list for the older cat, it's that common.

Other Parameters

Other blood parameters may be changed. A common one is an elevation in SAP and/or ALT.

Pertechnetate scintigraphy

Pertechnetate scintigraphy can be used to definitely diagnose hyperthyroid tissue. It is not routinely performed because of the cost of equipment, cost to owners, pet needing to be very sedate or anesthetized, and the fact that most cases can be diagnosed by other means.

Scintigraphy can be used to see if a malignant thyroid tumor has spread. By itself, it does not directly diagnose malignancy, just the spread of the tumor.

Direct Blood Testing

No blood thyroid test is 100% accurate. TT4 and TT3 have an accuracy of about 70%. TT4 is the standard tests on most in-house chemistry machines. If the TT4 is high and the cat is showing typical signs, assume the cat is hyperthyroid.

Free T4 by equilibrium dialysis (fT4-ED) is about 90% accurate. It is best used for early or mild hyperthyroid cats. It does have a tendency to be falsely elevated in non-thyroidal disease.

In cats with high normal TT4 (> 2.5) and classic signs, >75% of these cats are hyperthyroid. These are typically confirmed with a fT4-ED.

As a general statement, TT3 is less reliable than TT4 for high thyroid values.

For the general practitioner, the development of a feline validated TSH concentration will probably be the best test. The current TSH on the market (such as Michigan State's) is canine and there is some cross reactivity with feline TSH. But at this time it appears only valid for diagnosing hypothyroidism in cats.

A good primer is at

http://www.animalhealth.msu.edu/Sections/Endocrinology/Thyroid_Feline.php

M.S.U. does describe a T3 Suppression test and details are at the same website.

Most reference labs have combination test panels that test a variety of thyroid hormones.

Euthyroid Sick Syndrome

This syndrome is characterized by a decreased TT4 and elevated fT4. Common causes include concurrent illness such as diabetes mellitus, CRF, hepatic insufficiency and infections. Medications such as anesthetics, phenobarbital, primidone, diazepam, SMZ-TMP and glucocorticoids can also cause decreased TT4.

The more severe the illness, the lower the TT4.

Renal Manifestations of Hyperthyroidism in Cats¹

Glomerular Filtration Rate

Several studies have been performed on cats and show that GFR decreases with treatment for hyperthyroidism. The decline in GFR is detectable 1 month after treatment for hyperthyroidism but then remains stable for at least 6 months.

Urea and Creatinine

Urea and creatinine concentrations are inversely related to GFR; therefore, values typically increase after treatment of hyperthyroidism as GFR falls. Increases in creatinine concentration occur fairly consistently in hyperthyroid cats after treatment, although in many instances, these increases occur within the laboratory reference range. Creatinine concentration is also reflective of the patient's muscle mass; thus, in an emaciated hyperthyroid patient, the creatinine concentration may be low for several reasons before treatment.

Assessment of urea concentrations in hyperthyroid cats is more complicated. Urea concentrations tend to be decreased by hyperthyroidism because of the effects on GFR, but an increase in dietary protein intake and protein catabolism may tend to increase urea concentration. Mild elevation of urea is common in untreated hyperthyroid cats and is poorly correlated with the development of significant azotemia after treatment. For these reasons, in the discussions that follow, only elevation of creatinine is considered as evidence of significant azotemia.

Urinalysis

Polyuria or polydipsia was observed in up to 74% of cats with hyperthyroidism in early reports of the condition. Thus, it is important to recognize that some hyperthyroid cats are polyuric or polydipsic without having any evidence of renal disease and that this problem may resolve with treatment for hyperthyroidism. It has been suggested that psychogenic polydipsia, possibly caused by heat intolerance, may play a pathogenic role in some cats.

Mild proteinuria is frequently present in cats with hyperthyroidism. The proteinuria tends to resolve with treatment, even in cats that develop azotemia. It is thought that the proteinuria is a reflection of the glomerular hypertension and hyperfiltration that is known to occur in the hyperthyroid state. Alternatively, changes in urinary protein excretion may reflect differences in tubular protein handling. Although, as discussed previously, a change in the structure of the glomerular barrier has been proposed as a cause for the proteinuria observed in hyperthyroid animals, the rapid decrease in protein excretion with treatment for hyperthyroidism seems to make this explanation less likely.

Unfortunately there is no current test to accurately test post-treatment azotemia potential. An article in the *Journal of Feline Medicine and Surgery* recommends a trial of methimazole of 10 days and checking the creatinine at the end of the trial as one way of testing for azotemia in the hyperthyroid cat.

Another report states whether the cat is azotemic post treatment or not does not impact the life expectancy of the cat.

It is felt that untreated or poorly treated hyperthyroidism leads to hypertension leading to increased GFR which can cause more kidney damage.

N-acetyl- β -D-glucosaminidase enzyme may be a future test we can use in determining kidney damage prior to treatment.

***Cardiovascular Manifestations of Hyperthyroidism in Cats*¹**

Several derangements of the cardiovascular system have been reported in cats diagnosed with hyperthyroidism. As in human beings, one of the more consistently documented abnormalities is tachycardia.

Systolic murmurs and gallop rhythms are frequently documented in hyperthyroid cats. Hyperkinetic femoral pulses and a prominent left apical precordial beat are also common physical examination findings. Murmurs are most often grade I to grade III/VI, and their intensity often varies with heart rate. In older reports, the murmurs were generally attributed to mitral or tricuspid regurgitation. More recently, the murmurs have often been documented with color-flow Doppler echocardiography as being caused by dynamic left or right ventricular outflow tract obstruction. The gallop rhythm is attributed to rapid ventricular filling.

Diagnostic Imaging

Thoracic radiographs may show evidence of left-sided cardiomegaly in cats with hyperthyroidism, and in a small proportion, there is evidence of CHF. Echocardiographic abnormalities classically associated with hyperthyroidism include left ventricular hypertrophy, left atrial and ventricular dilation, and increased fractional shortening. It is important to realize, however, that alterations in ventricular wall thickness and chamber dimensions are typically subtle in hyperthyroid cats; indeed, most echocardiographic measurements are within the normal range. Consistent with this observation, changes in chamber dimension and wall thickness

associated with establishment of euthyroidism are usually small. The variable that is most consistently decreased by treatment is the fractional shortening.

Congestive Heart Failure

The prevalence of CHF in cats with hyperthyroidism also seems to be declining. In cats diagnosed with hyperthyroidism at the Animal Medical Center in New York, CHF was present in 12% of cats in the early 1980s but in only 2% in 1992 to 1993. Similarly, a study in the United Kingdom found that only 4 (3.1%) of 126 cats diagnosed with hyperthyroidism had CHF, and 2 of these 4 cats had concurrent intrinsic cardiac disease. Taken together, these reports suggest that hyperthyroidism is an uncommon cause of cardiac failure in the absence of preexisting cardiac disease. CHF occurs infrequently in hyperthyroid human patients.

Blood Pressure

Hyperthyroidism is frequently cited as an important cause of systemic hypertension in cats. Studies of cats presenting with hypertensive retinopathy or choroidopathy have included only a few cats with hyperthyroidism, however, suggesting that extreme elevation of blood pressure may be relatively infrequent with this condition. Similarly, ocular examinations performed in a large series of hyperthyroid cats did not identify changes consistent with hypertension.

Interestingly, a proportion of cats actually seem to develop hypertension after treatment for hyperthyroidism.

Treatment Options

- Medical – Methimazole, carbimazole
- Surgery – Removal, ethanol ablation
- ¹³¹I

Medical treatment

Methimazole has been the mainstay for many years for hyperthyroidism treatment. Many clients like it because it is non-invasive and the ongoing cost can be manageable.

Typically it is an oral liquid or pill. Transdermal methimazole works for some pets.

Dosing is 2.5 to 15 mg per day. It can be given QD to TID.

Rechecks of CBC and T4 are necessary monthly for the first 4 months then semi-annually after that. The dose of methimazole is titrated as needed.

Side effects (more common in first 4 months) include anemia and leucopenia. These can be life threatening. Typically they resolve after discontinuation of the medication. Restarting the medication at a lower dose may alleviate the problem.

Life expectancy is 2.5 years.

Surgery

Surgery can be effective in controlling hyperthyroidism. Both surgical removal and ethanol ablation have been used.

Surgery can be technically difficult since the parathyroid glands are closely associated to the thyroid glands.

Ethanol ablation has been performed. Can be technically difficult and a steep learning curve.

Life expectancy is 1 to 3 years.

i-131

Radioactive iodine is now considered the gold standard.

I-131 is non-invasive, cures 95-97% of cats with first injection. Of that number requiring a second injection, about 90% will cure with a second injection. That does leave a very small number of cats that the i-131 does not work on. Most of the failures will be malignant neoplasia (e.g., thyroid adenocarcinomas).

Life expectancy = 4+ years.

Side effects include voice change, hypothyroidism (controlled with T4 supplementation. Many times temporary), dysphagia.

The biggest issue is that the cats are radioactive and need to be quarantined. Typically this period is 4-5 days. When the pet is at or below the allowed radiation level, they are discharged to the owners with instructions on post-care.

The T4 is rechecked in 30 days then every 6 months afterwards. It would be good to recheck the creatinine at these times.

Post-care of i-131

Basically, strict hygiene for 2 weeks. NO cuddling, especially around neck. Wash hands after handling. All stool and urine is collected for 2 weeks (a 5 gallon plastic bucket with cover works well). At the end of two weeks, close bucket and date for 3 months (technically 82 days – 10 half lives of i-131). At the end of 3 months, can be disposed like regular trash.

Overview of Treatments

- Methimazole. Cheaper short term but more expensive long term. 2.5 years life expectancy. Owner has to give daily medication.
- Surgery. Cost varies, may equal i-131. High recurrence rate. One to 3 years life expectancy. Can be technically difficult.
- i-131. Higher initial cost. High cure rate. 4+ years life expectancy. Pet in isolation for 4-5 days, owner needs to be aware of radiation issues (especially first 2 weeks post-dismissal).

References

1. Cardiovascular and Renal Manifestations of Hyperthyroidism, VCNA-Small Animal. Syme HM. Vol 37, Issue 4, Pgs 723-743. Jul 2007.