

**AVTCP Case Report # 1**  
**Case Log# 45**  
**Hyperthyroidism with Concurrent Chronic Kidney Disease (CKD)**  
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**Signalment:** Maya is a 3 kg 15-year-old spayed female Domestic Shorthair.

**Presenting Complaint:** Her owners were concerned because she seemed to be losing weight despite having a ravenous appetite. The client described her to be urinating more volume and having increased vocalization and agitation especially at night.

**History:** Maya was a mostly indoor cat with occasional trips to the backyard that were supervised by her owners. She was the only cat in a two-dog household. Her diet consisted of a commercial feline adult dry food fed free choice with canned food offered three to four times weekly. Previous records indicated that Maya had not had any veterinary care in 3 years. She was not current on vaccinations or on any flea control or heartworm prevention. Her previous veterinary hospital had noted that she was difficult to handle.

**Physical Examination Findings/Observations:** Maya was weighed while she was still in her carrier. The carrier was taken apart by removing the bolts and lifting the top off while she was still in it, and a feline facial pheromone sprayed towel was placed over the cat prior to beginning the physical examination to minimize stress. Her examination was conducted with minimal restraint. The towel covered cat was gently removed from the bottom of the carrier. The carrier was reassembled and weighed. The body weight was then calculated by subtracting the carrier weight from the original weight. She had lost 0.8 kg since her last recorded weight (3 years ago). Upon physical examination, her body condition score was 3/9 with a World Small Animal Veterinary Association (WSAVA) muscle condition score of C (moderate muscle loss)<sup>(1)</sup>. Her temperature was 101.2°F, heart rate 200 beats per minute and respiratory rate was 40 breaths per minute. There was a decreased skin turgor suggestive of 4-5% dehydration. Her CRT was 2 seconds and her oral mucous membranes were slightly pale. Her oral exam revealed moderate dental tartar with marked gingival inflammation. The rest of her physical examination was within normal limits including thyroid palpation and ocular evaluation. Her composite measure pain score (CMPS) was 3/20. Maya's owner was surprised at how well she had accepted the examination process. She stated that Maya had never been this calm previously.

**Problem List/Differential Diagnosis:** CKD, diabetes mellitus, hyperthyroidism, hypertension, feline lower urinary tract disease (FLUTD), stage 3 periodontal disease and cognitive dysfunction.

**Diagnostic Approach:** Maya's recommendations included the following; comprehensive chemistry profile with electrolytes, complete blood count (CBC), thyroid (total T<sub>4</sub>) and urinalysis submitted to an outside reference laboratory. An in-house thioglycolate broth urine culture and a blood pressure measurement. Her owner's were informed that there may be additional diagnostics necessary contingent upon the results of the lab work. The samples were collected in the exam room and the client was offered to stay with the cat while diagnostics were performed to minimize stress for all involved. Maya's owner was relieved to be able to stay with her and stated that her previous veterinary hospital had never allowed her to do so. Maya was gently placed in left lateral recumbency. Her systolic blood pressure was 160 mm Hg obtained from the right rear leg with a # 3 pediatric cuff. The blood pressure measurement was performed with a Doppler blood pressure monitor. Venipuncture was performed on the right medial saphenous vein via a 23g butterfly catheter. An ultrasound guided cystocentesis was performed with the patient in ventral-dorsal recumbency. The patient was gently handled using a towel technique for all the procedures. Maya's CBC results revealed a non-regenerative anemia with RBC 5.5 (7.12-11.46M/ $\mu$ L), HCT= 20 (28.2-52.7%), HGB 8.6 (10.3-16.2g/dL) Reticulocyte count = 5 (3-50 K/ $\mu$ L). All the WBC parameters were within normal limits. Chemistries revealed CKD IRIS Stage 2<sup>(2)</sup> with a BUN = 43 (16-37mg/dL) and a CREAT= 2.5 (< 1.6 mg/dL) IDEXX SDMA= 15 (0-14  $\mu$ g/dL), PHOS= 4.9 (2-9-6.3 mg/dL), Ca = 9.7(8.2-11.2mg/dL), the Calcium x Phosphorus product = 47.53 (ideal is under 70). All other chemistry values were within normal limits. Urinalysis revealed a low specific gravity of 1.019 but was otherwise unremarkable. Total T<sub>4</sub> was elevated at 5.5 (0.8-4.7  $\mu$ g/dL). Urine culture was negative after 72 hours. A urine protein creatinine was recommended for IRIS stage 2 sub-staging but was declined by the owner due to cost.

**Treatment Plan:** Treatment recommendations for Maya include 100mls LRS SC pending test results. Feline facial pheromone diffusers were recommended to decrease stress in her home environment. Upon review of the lab findings it was determined to start Maya on calcitriol at 2.5 ng/kg po Q24H, and LRS 100mls SC every other day for treatment of International Renal Interest Society (IRIS) stage 2 CKD based on creatinine and urine specific gravity results. Four treatment options were discussed regarding Maya's hyperthyroidism, they included; daily methimazole at 2.5 mg Q12H (oral or transdermal), dietary therapy (Hill's Y/D®), radioactive iodine treatment or thyroidectomy. Maya's owner chose to start transdermal methimazole. Vitamin B12 injections at 250 mcg SC weekly for 6 weeks, every other week for 6 weeks and then once monthly were recommended for the anemia. Maya's ideal body weight was determined to be 4 kg and dietary requirements of 190 calories per day was recommended. Maya

returned to the hospital every other day for chronic SC fluid administration and weekly for Vitamin B12 injections because the owners were not able to perform these treatments at home. Food distraction was used which allowed the treatment to be performed with minimal restraint. A progress examination and recheck lab work were performed 3 weeks after starting medications. Maya 's current weight was 3.2 kg, it had increased by 0.2 kg. Her heart rate had decreased to 160 and her systolic blood pressure was rechecked using the Doppler using the same technique as in the previous visit, it was stable at 158 mm Hg. Her owner stated that she seemed more comfortable and was less vocal at night. Her CMPS was 2/20. Her recheck lab work showed improvement with a total T<sub>4</sub> of 2.2µg/dL, BUN 37 mg/dL, CREAT 2.2 mg/dL, Ca 9.8mg/dL, PHOS 4.7 mg/dL and her HCT remained at 20%. It was recommended to keep Maya on the same dosage of methimazole (2.5 mg Q12H) and calcitriol (2.5 ng/kg Q24H) and continue the chronic SC fluid and Vit B12 administration. Professional dental cleaning and full mouth dental radiographs were recommended to address the periodontal disease as well as follow up exam and lab work in 3 months

**Final Diagnosis:** Hyperthyroidism with concurrent CKD IRIS stage 2, stage 3 periodontal disease

**Outcome:** Maya's owners chose to delay the dental cleaning and radiographs. Her 3 months follow up continued to show improvement. Her lab values were stable, her HCT increased to 26%, and her weight increased to 3.7 kg. Her body condition score had improved to 4/10, muscle condition score was a B (mild muscle loss) and her CMPS was 2/20.

**Conclusion/Case Summary:** Maya's quality of life improved by identifying and managing her risk factors.

Classic symptoms of hyperthyroidism include weight loss, polyphagia, polyuria, agitation and increased vocalization. The treatment options for Maya were limited to medical management due to not having radioactive iodine facility locally and the fact that Maya's owner did not want to travel great distances. All treatments for hyperthyroidism have the potential for worsening renal function. This is because hyperthyroidism increases blood flow to the kidneys via an increased cardiac output. When a patient undergoes treatment for hyperthyroidism increased cardiac output and renal blood flow is reversed which can result in the apparent worsening of renal function. The choice of a transdermal delivery system of methimazole made it easier for Maya's owner to be compliant with medication as well as limiting the side effects of transient anorexia, vomiting and lethargy that can be seen with oral administration. <sup>(3)</sup> The benefits of using methimazole in cats with concurrent CKD are that the effects are reversible. If renal values worsen while on medication it is recommended to decrease or discontinue administration. <sup>(4)</sup> It is common to see concurrent disease especially with our older patients. In Maya's case it was

important to start treatment for both her hyperthyroidism and CKD. Treatment of hyperthyroidism only can worsen azotemia. Treatment with oral calcitriol enhances gastrointestinal absorption of Calcium and thereby reducing PTH secretion. It is used to slow the progression of CKD. It is common to see anemia in cats with CKD due to reduced production of erythropoietin. Careful management to assess response to medication to see if renal function deteriorates, anemia worsens, or hypercalcemia exists is important.

**Discussion:** Maya had a history of not responding favorably to her previous conventional veterinary visits. Using Cat Friendly Practice handling and nursing care techniques during her visit and treatment enhanced the experience for the patient, client as well as the veterinary team. <sup>(5)</sup> Moving slowly, talking softly and letting the patient dictate the order of the exam is crucial. <sup>(6)</sup> Maya allowed examination and treatment with minimal restraint with the aid of towels, E-collar and feline facial pheromone products. Allowing the client to stay with the patient during diagnostics and treatment if they choose builds trust. Often cats are less stressed when their owners are present. The technician's role as patient advocate and in overseeing feline friendly handling and nursing care techniques were provided by the entire veterinary team directly influenced a favorable outcome for this patient.



## References

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