Muriel

9 year old female cat

Patient Nine-year-old female cat
Presenting Complaints Mild PU/PD, intermittent vomiting sometimes containing hairballs, weight loss
Physical Exam Moderate dental tartar, unkempt coat, dirty tail (signs of diarrhoea), tachycardia, dry mucous membranes, decreased skin tugor (estimated dehydration: 5% to 7%) and palpable thyroid nodule.

Haematology

Moderately elevated haemoglobin is discovered; the red blood cell count is also at the upper limit of the reference range. Given Muriel's hydration level, a hypothesis of dehydration must be considered first. Hyperthyroidism could also explain this phenomenon. We also note the presence of neutrophilic leukocytosis along with very moderate lymphocytosis with no alarming signs of "immature (unsegmented) granulocytes." An adrenaline rush associated with a state of fear or excitement could cause these nonspecific elevations. The hypothesis of active inflammation can be initially ruled out.

ProCyte Dx (April 22, 2015 4:45 PM)

Test	Results	Reference Interval	LOW / NORMAL / HIGH
RBC	10.97 x 10^12/L	6.54 – 12.20	
HCT	47%	30.3 – 52.3	
HGB	17 g/dL	9.8 – 16.2	HIGH
MCV	46 fL	35.9 – 53.1	
MCH	14.5 pg	11.8 – 17.3	
MCHC	35.9 g/dL	28.1 – 35.8	HIGH
RDW	19.6 %	15 – 27	
RETIC	14.9 K/µL	3.0 – 50.0	
PLT	220 K/µL	151 – 600	
WBC	18.57 x 10^9/L	2.87 – 17.02	HIGH
NEU	11 x 10^9/L	1.48 – 10.29	HIGH
LYM	7 x 10^9/L	0.92 – 6.88	HIGH
MONO	0.23 x 10^9/L	0.05 – 0.67	
EOS	0.32 x 10^9/L	0.17 – 1.57	
BASO	0.02 x 10^9/L	0.01 – 0.26	

Chemistry

The biochemistry assessment rules out diabetes mellitus (normal blood glucose). The liver enzymes is unremarkable. Given the history and commemorative signs, chronic kidney failure (CKF) is among the diagnostic hypothesis to explore.

The biological assessment does indeed reveal kidney failure (elevated IDEXX SDMA™, urea and creatinine in the same proportions) with no consequences on her mineral metabolism or electrolyte levels. The UREA/CREAT ratio does not support exclusively prerenal kidney injury. An elevated IDEXX SDMA™ indicates a decreased GFR (glomerular filtration rate). Blood IDEXX SDMA™/creatinine measurements will be necessary after rehydration of the animal to definitively determine the stage of kidney failure. A urinalysis and urine protein/creatinine ratio (UPC) are performed to complete the kidney function test.

The strong clinical suspicion of hyperthyroidism is confirmed by the measurement of total T_4.

Catalyst Dx (April 22, 2015 4:45 PM)

Test	Results	Reference Interval	LOW / NORMAL / HIGH
GLU	8.21 mmol/L	3.9 – 8.8	
UREA	13.92 mmol/L	5.7 – 12.9	HIGH
CREA	238.68 µmol/L	71 – 212	HIGH
SDMA	16 µg/dL	0 – 14	HIGH
PHOS	1.91 mmol/L	1.00 – 2.42	
Ca	2.33 mmol/L	1.95 – 2.83	
TP	68 g/L	57 – 89	
ALB	26 g/L	23 – 39	
GLOB	42 g/L	28 – 51	
ALB/GLOB	0.6		
ALT	80 U/L	12 – 130	
ALKP	86 U/L	14 – 111	
GGT	1 U/L	0 – 1	
TBIL	2 µmol/L	0 – 15	
CHOL	3.76 mmol/L	1.68 – 5.81	
Na	152.0 mmol/dL	150.0 – 160.0	
K	3.8 mmol/dL	3.5 – 5.8	
Cl	116 mmol/dL	112.0 – 129.0	
T_4	137.5 nmol/L		HIGH
UPC Ratio	1.2		HIGH

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Urinalysis

Urine specific gravity is mildly increased and is compatible with the clinical identification of dehydration. The urine protein:creatine ratio is moderately elevated, especially in light of an inactive urine sediment (no blood or inflammatory cells or other formed cellular elements present).

Compleet Urinalysis: Cystocentesis (April 22, 2015 4:50 PM)

Dipstick		Urine Culture	
Colour	Yellow	Leukocytes/hpf	0
Clarity	Clear	Erythrocytes/hpf	0
Urine density (refractometer)	1.045	Epithelial cells/hpf	0
Protein	2	Cylinders/hpf	0
Glucose	Negative	Crystals	0
Bilirubin	Negative	Bacteria	0
Blood	Negative		
pH	6.5		

A complete urinalysis is performed before any rehydration:

- Urine density with the refractometer: given Muriel's dehydration, a higher urine density was to be expected (retaining water). Here, she is within the normal range for a normally hydrated animal. This supports the hypothesis of kidney failure with partial loss of the kidney's ability to concentrate urine.

- Dipstick: The dipstick should still be interpreted in light of the urine density value measured with the refractometer. Here, a urine protein level of 2 + is shown. It needs to be confirmed and quantified by performing a urine protein/creatinine (UPC) ratio.

- The UPC measured at 1.2 confirms proteinuria: By repeating the UPC measurement, we are able to confirm persistence of proteinuria. The UPC also provides prognostic information and because UPC and mortality are directly linked: the higher the UPC ratio, the worse the prognosis. Here, Muriel's prognosis is uncertain. Once the stage of CKF (chronic renal failure) is established using the IDEXX SDMA™/creatinine measured after Muriel is rehydrated, we can determine a substage by comparing the UPC value obtained with the IRIS classification table. The UPC value at the time of diagnosis will serve as a reference and make it possible to assess treatment effectiveness and update the prognosis. Of course, specific treatment will be put in place to combat this proteinuria.

- Urine culture: No bacteria or cell elements are found; sediment is inactive, which initially rules out inflammation of the lower urinary tract, which could have accounted for the proteinuria. Given the lack of signs of inflammation of the lower urinary tract or hyperproteinaemia, the hypothesis of proteinuria of kidney origin is favoured.

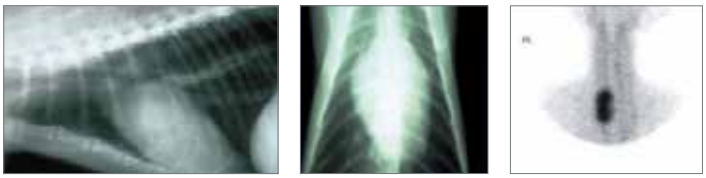
Blood Pressure

Systolic blood pressure is measured at 180 mm Hg. After repeating the test, Muriel's hypertension was confirmed.

Imaging

Chest x-ray

Cardiomegaly is noted and characterized by biatrial enlargement producing this characteristic image of a "saint-valentine heart" on the ventrodorsal view.



Scintigraphy

The marking is visible only on the right. When there is hyperthyroidism in cats, bilateral involvement is also possible.

Diagnosis

Muriel is suffering from hyperthyroidism associated with chronic renal failure.

Treatment plan

Hyperthyroidism can increase cardiac output, reduce peripheral vascular resistance, increase blood flow in the renal artery and increase the globular filtration rate (GFR). All of these mechanisms can not only lead to the apparent decline (and thus undervaluation)of blood urea and creatinine, but also to glomerular hypertension and hyperfiltration. This can potentially cause or aggravate intercurrent kidney failure. The latter may be biologically unapparent at first.

Systemic hypertension and secondary renal failure may be associated with hyperthyroidism. Monitoring SDMA and creatinine as well as the UPC is therefore very important once a diagnosis is made. Once hyperthyroid treatment is initiated, the UPC may normalize or continue to increase if the chronic kidney failure is progressing. Very close monitoring of this patient is recommended.

For more information
www.idexx.eu

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