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Anorexia in a Cat with Diabetes Mellitus

A 15-year-old spayed female domestic shorthair cat was presented for sudden onset of anorexia.

History. The cat had been receiving treatment for diabetes mellitus for 5 years at the time of presentation. Current therapy consisted of a canned diet formulated for diabetic cats and 2 units of insulin glargine (Lantus; www.lantus.com) SC Q 12 H. Loss of appetite occurred approximately 2 days prior to presentation and was accompanied by polydipsia and polyuria. The owner had not administered insulin in 24 hours.

Prior to illness, recent blood analysis revealed well-controlled diabetes mellitus (based on serum fructosamine in the normal range and associated clinical signs) and a normal biochemical profile.

Physical Examination. The cat was quiet, alert, and responsive. Mucous membranes were pink with a normal capillary refill time; however, it was assessed that the cat was 5% dehydrated. Abdominal palpation was limited due to obesity; the cat had lost 1.4 pounds since her visit 2 months prior, but was not on a weight-control protocol.

Initial Diagnostics. Quick assessment tests revealed mild metabolic acidosis with an increased anion gap. Systolic blood pressure was 110 mm Hg. Blood glucose was 393 mg/dL. Urine dipstick revealed glucosuria but no ketonuria.

Additional Diagnostics. A CBC, serum biochemical profile (**Table**), urinalysis, and urine culture via cystocentesis were performed to determine cause of anorexia. Biochemistry revealed azotemia and hyperglycemia; CBC did not reveal any significant abnormalities. In addition to glucosuria, the urinalysis revealed pyuria and bacteriuria although the urine culture was negative. Urine specific gravity was 1.020.

An abdominal ultrasound was performed to evaluate the liver, kidneys, pancreas, and gastrointestinal tract, revealing bilateral, dilated renal pelves (**Figure 1**) and a bladder stone. Thoracic radiographs were normal.

ASK YOURSELF ...

- What are the differential diagnoses in this case?
- In addition to a serum biochemical profile and serum fructosamine concentration, what additional laboratory tests should be considered in diabetic patients with sudden change in their water consumption?
- What is the diagnosis for this cat?
- What instructions should be given to owners whose diabetic pets stop eating?

CBC = complete blood count

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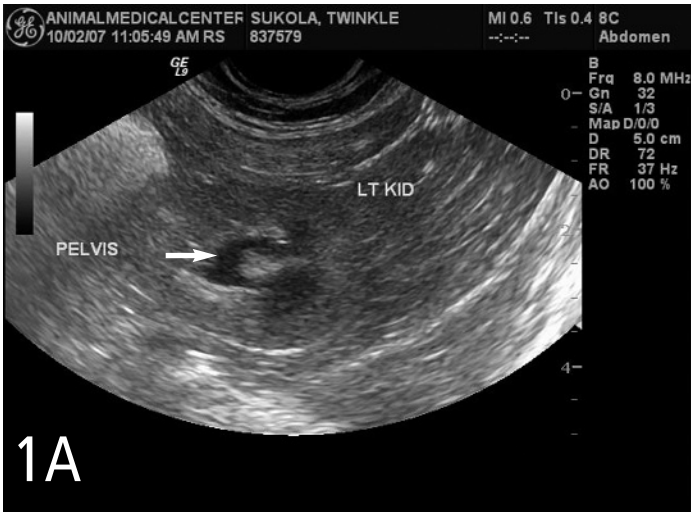
Laboratory Results

Variable	Result	Reference Interval
Complete Blood Count		
WBC (10^3/µL)	7.69	4.2–15.6
RBC (10^6/µL)	5.32	6–10
Hemoglobin (g/dL)	10.3	9.5–15
Hematocrit (%)	31.9	29–45
MCV (fL)	59.9	41–58
MCHC (g/dL)	32.2	29–37.5
Neutrophils (/mL)	6613	2500–12500
Lymphocytes (/mL)	615	1500–7000
Monocytes (/mL)	231	0–850
Eosinophils (/mL)	231	0–1500
Platelet count (10^3/µL)	138	150–600

Variable	Result	Reference Interval
Serum Biochemical Profile		
ALP (IU/L)	45	1–62
ALT (IU/L)	65	28–76
AST (IU/L)	38	5–55
GGT (IU/L)	0	0–6
Albumin (g/dL)	3.4	2.5–3.9
Globulin (g/dL)	3.3	2.4–5.3
Total protein (g/dL)	6.7	5.9–8.5
Total bilirubin (mg/dL)	0.2	0.0–0.4
Urea nitrogen (mg/dL)	76	15–34
Creatinine (mg/dL)	5.8	0.8–2.3
Glucose (mg/dL)	493	70–150
Cholesterol (mg/dL)	127	82–218
Calcium (mg/dL)	10	8.2–11.8
Phosphorus (mg/dL)	5.6	2.1–5.7
Total CO_2 (meq/L)	17	16–27
Chloride (meq/L)	111	104–128
Potassium (meq/L)	4.2	3.4–5.6
Sodium (meq/L)	148	145–158

ALP = alkaline phosphatase; ALT = alanine transaminase; AST = aspartate aminotransferase; CO_2 = carbon dioxide; GGT = γ-glutamyl transferase; MCHC = mean cell hemoglobin concentration; MCV = mean cell volume; RBC = red blood cells; WBC = white blood cells



Ultrasound images of both kidneys showing dilated pelves (*arrows*)

Diagnosis: Acute pyelonephritis

Given the azotemia, pyuria, and bacteriuria, acute pyelonephritis with acute renal failure was the most likely diagnosis. This diagnosis was also supported by the presence of dilated renal pelves.

The absence of well-concentrated urine in a dehydrated patient is supportive of renal failure. However, significant glucosuria also limits urine-concentrating ability. Any of these problems could account for the recent change in water consumption. It is interesting that this cat did not develop ketoacidosis, despite the presence of a source of insulin resistance in the form of infection.

It is unclear why the laboratory was unsuccessful in growing the organism seen on sediment evaluation. Possible reasons include previous antibiotic therapy, a fastidious organism, or a contaminant. The presence of pyuria in this patient makes contamination unlikely.

Treatment. The cat was hospitalized and received intravenous crystalloid fluids at a rate to address maintenance needs plus rehydration over a 24-hour period; potassium was supplemented in the fluids at a maintenance rate (20 meq/L). She also received enrofloxacin (Baytril, www.baytril.com) IV 5 mg/kg Q 24 H. This drug was selected based on its known ability to concentrate in the kidney and urinary tract. The owners were informed of the ophthalmic risks but understood the reasons for its selection.

The cat was also started on an H2-blocker as a treatment for the uremic gastritis that was contributing to the anorexia. During the hospitalization, she was treated with regular insulin IM Q 6 H at a dose based on her blood sugar. Regular insulin was selected due to its shorter duration of action and better titratability.

DID YOU ANSWER ...

- Differential diagnoses in regard to anorexia include metabolic causes, such as renal disease (acute renal failure, chronic renal failure, pyelonephritis); pancreatic disease (neoplasia, pancreatitis, exocrine pancreatic insufficiency); liver disease (hepatic lipidosis, cholangiohepatitis, neoplasia); and gastrointestinal disease (inflammatory bowel disease, neoplasia). Gastrointestinal disease is less likely in this cat, given the acute nature of the problem and absence of vomiting and/or diarrhea.
- Urinalysis, urine culture. Cats with diabetes are prone to urinary tract infection, regardless of diabetic regulation. For diabetic patients, the author considers a minimum database to include a serum biochemical profile, serum fructosamine concentration, urinalysis, and urine culture. These tests should be performed every 3 to 6 months or at any time the patient's regulation changes.
- Acute pyelonephritis. Classic clinical signs usually associated with pyelonephritis include anorexia, vomiting, depression, and renal pain, though only anorexia was seen in this cat. It is important to note that the absence of azotemia or growth of bacteria from a urine sample does not exclude a diagnosis of pyelonephritis. Other findings to consider would be renal asymmetry, renal pain, and/or renal pelvic changes on abdominal ultrasonography.
- Insulin should be administered at half the usual dose. It is important to remember that insulin has 2 major general functions: One is to respond to dietary intake of carbohydrates and results in the uptake and utilization of glucose. The other is to assure that glucose is available to tissues that require it; it is due to this function that insulin administration continues. In addition, small concentrations of insulin must be administered to prevent ketogenesis. Anorectic patients should be evaluated as quickly as possible to determine a cause and initiate treatment.

Monitoring. While in the hospital, the cat's blood sugar, electrolytes, PCV/TS, and body weight were monitored every 6 hours. Particular attention was paid to potassium to assure that serum concentrations did not plummet due to insulin administration, osmotic diuresis, and resolution of acidosis. In addition, her urine output was monitored and a urine dipstick for glucose and ketones was used once daily, as available.

Outcome. Within 48 hours of hospitalization and treatment, the cat started to eat on her own. Her body weight increased and her blood urea nitrogen and creatinine decreased to 37 mg/dL and 2.5 mg/dL, respectively. She was discharged 24 hours later. Discharge medications included enrofloxacin (22.7 mg PO Q 24 H × 30 days); famotidine (2.5 mg PO Q 24 H), lactated Ringer's solution (100 mL SC Q 24 H), and insulin glargine (1 unit SC Q 12 H) were administered until the first follow-up visit (1 week after hospitalization).

One week after discharge the cat was reported to be doing well at home with a fairly normal appetite, but still drinking and urinating excessively. Urine dipstick revealed glucose concentration between 1000 and 2000 mg/dL. Physical examination revealed stable body weight and adequate hydration.

One month after discharge, the owners reported reduced water consumption; urine dipstick glucose concentration was 250 to 500 mg/dL. Follow-up serum biochemical profile and urinalysis/culture via cystocentesis were performed 5 days after discontinuation of antibiotics. Biochemistry revealed stable azotemia; serum fructosamine was slightly out of range but the owners believed regulation was improved based on resolution of excessive drinking and urination. Urine sediment was benign and culture was negative.

See Aids & Resources, back page, for references, contacts, and appendices.

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H2 = histamine 2; PCV/TS = packed cell volume/total solids