

MONITORING THE CANINE AND FELINE DIABETIC PATIENT

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Introduction

Diabetes mellitus (DM) is a common and treatable small animal endocrinopathy. However, it is a dynamic disease that requires long-term management. Successful management of the diabetic patient is multi-faceted and requires understanding of the disease itself, frequent patient reassessment, and open client communication and education to set treatment goals. The veterinary technician has a vital role in managing the diabetic patient.

Diabetes mellitus is a state of chronic hyperglycemia due to either destruction or dysfunction of the pancreatic beta cells. Type 1 DM (formerly known as insulin-dependent diabetes) is characterized by immune-mediated beta cell destruction leading to an absolute insulin deficiency and most frequently affects canines. Type 2 DM (or non-insulin-dependent diabetes) is most common in the feline and results from insulin resistance and beta cell dysfunction. Type 2 diabetics may achieve remission if prompt and sustained glycemic control can be achieved.

Patient Presentation and Diagnostics

Polyuria, polydipsia, polyphagia, and weight loss are common clinical signs in patients suffering from diabetes mellitus; however, it is not uncommon for lethargy and weakness to be present. Ketoacidosis may develop in uncontrolled diabetics, and in those cases, the patient may also have the presence of generalized systemic signs, such as inappetence, anorexia, vomiting, and profound lethargy.

Laboratory testing, such as baseline bloodwork, including a CBC, serum chemistry, and urinalysis, should be performed. Diabetics often have lymphopenia, mature neutrophilia, elevated cholesterol, triglycerides, alkaline phosphatase (ALP), alanine aminotransferase (ALT). Significant acid/base imbalances and dehydration may be present in advanced cases. Glucosuria is typically present when the BG concentration exceeds approximately 200 mg/dL in dogs and 250–300 mg/dL in cats. Urine glucose testing strips reflect the average blood glucose during the time frame the bladder fills with urine. Because of this, various degrees of glucosuria are common in diabetic patients. A negative urine glucose may indicate that a DM patient is exceptionally well-regulated with tight glycemic control or that the insulin dose is too high for that pet. The pet owner at home can use urine glucose strips, which may help rule out DM in patients suspected of stress hyperglycemia.

Diabetic patients are susceptible to urinary tract infections (UTIs). The clinical signs can be masked by polyuria, and the presence of a UTI complicates diabetic management. A urine culture is often recommended because a lack of bacteriuria does not rule out a UTI in a pet with dilute urine. A pancreatic lipase immunoreactivity (PLI) test to rule out pancreatitis may be recommended depending on the patient's clinical signs.

Fructosamine testing reflects average glycemia control over approximately the past two weeks and, therefore is particularly helpful in ruling out stress hyperglycemia. Since fructosamine formation is related to the degree and duration of hyperglycemia, it is unreliable in cases of insulin overdose, as the Somogyi rebound effect can result in increased, decreased, or even normal values. It should be remembered that even well-regulated diabetics are hyperglycemic at some points. These patients can have elevated fructosamine levels; conversely, uncontrolled diabetic patients can have normal levels. However, monitoring fructosamine trends every three to four months in place of blood glucose curves in patients with good glycemic control may be reasonable.

Blood glucose curves (BGC) are the only diagnostic tool in our arsenal that allows us to determine the duration of action and nadir of insulin in a particular patient – which is why they are often considered the gold standard of diabetic monitoring for insulin dosage adjustment. The goal with any BGC is to obtain a representative curve on a “normal” day. The patient’s feeding routine, insulin administration, and physical activity should all be the same as they would be on any other given day. Even with everything being the same, BGCs will naturally be variable from one day to the next. It is essential not to become overly fixated on individual measurements or BGCs as monitoring the patient’s overall clinical status and ongoing trends is often more valuable. The decision to perform BGCs in-hospital vs. in-home and via traditional veterinary glucometers vs. a continuous glucose monitoring system (CGMS) like the FreeStyle® Libre should be based on the best method for that individual patient and their owner.

Treatment

Treatment consisting of insulin administration and appropriate nutritional recommendations will reduce the patient’s clinical signs and improve their quality of life. The detrimental consequences of diabetes, such as diabetic neuropathy, cataract formation, immunosuppression, infections (dermatological, urinary tract, etc.), and impaired wound healing can be significantly reduced when a patient is well-regulated.

A diet recommendation should be based on a comprehensive nutritional assessment. The best choice for most patients is a commercial therapeutic diabetic diet. However, it should be noted that it is not uncommon for the diabetic patient to have concurrent diseases that may alter this recommendation. Consulting with a veterinary nutritionist or calling a veterinary nutritional consultation line may be very helpful in these circumstances.

Both cats and dogs will have altered metabolism of nutrients and benefit from twice-daily meals that are given concurrently with insulin administration. A diet rich in fiber (soluble and insoluble) can improve glycemic control by reducing postprandial hyperglycemia in our canine patients. Diets high in fiber can also aid in providing calorie restriction in obese dogs. Alternatively, felines benefit from a high protein and low carbohydrate diet. By reducing carbohydrate loads, beta cell demand is also reduced, allowing the opportunity to break the cycle of glucotoxicity, which may assist in attaining diabetic remission. High protein diets can also improve satiety, reduce lean muscle loss, and lower the incidence of hepatic lipidosis in at-risk cats.

Management

Owner monitoring of clinical signs is essential in successful diabetic management. If a patient has no clinical signs and their body weight is stable or increasing, their diabetes is likely well-regulated. Owners should be encouraged to monitor and report their pet's appetite, diet changes, water intake, urination habits, exercise, and any changes in the routine. However, the placebo effect can occur with owner observations; therefore, treatment recommendations should not be based solely on owner feedback. Fortunately, there are multiple tools in our diabetic management toolbox to help guide treatment recommendations.

Resources

1. American Animal Hospital Association (AAHA) Diabetes Educator Certificate Course
<https://www.aaha.org/education/online-training/aaha-diabetes-educator-certificate-course/>
2. 2018 AAHA Diabetes Management Guidelines Management for Dogs and Cats
<https://www.aaha.org/aaha-guidelines/diabetes-management/diabetes-management-home/>
3. 2015 International Society of Feline Medicine (ISFM) Consensus Guidelines on the Practical Management of Diabetes Mellitus in Cats
<https://journals.sagepub.com/doi/pdf/10.1177/1098612x15571880>
4. American Association of Feline Practitioners (AAFP) Diabetes Educational Toolkit
<https://catvets.com/diabetes-toolkit/>