Acute and Chronic Renal Disease: Diagnosis, Treatment, and Prognosis in Lizards

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Kidney related diseases are a major cause of illness and death in captive lizards. Improper captive husbandry and diet are the most common predisposing causes of chronic renal failure, which is typically seen in adult lizards. Whereas acute onset of renal disease is often due to infectious or toxic causes (including medications) and appears to affect any age animal and is typically more sporadic in occurrence.

Anatomy and physiology

To properly understand and appreciate the problems of renal disease in lizard species, a few basics must be understood. All lizards remove the by-products of protein metabolism through the excretion of uric acid (urates) through the kidneys. High levels of uric acid can cause gout in dehydrated animals.

In lizards, the urine produced by the kidneys flows down a duct to the cloaca, where it then passes into the bladder (if present) or cranially into the distal colon for storage prior to excretion.

History and physical examination

Acute renal disease in lizards is typically characterized by a relatively rapid onset of depression, lethargy, production of little or no urine, and weakness. The medical history may reveal the prior use of drugs that can be toxic to the kidneys (i.e., aminoglycosides) or exposure to toxins or poisons. Frequently these animals were well maintained with a good level of nutrition and a reasonable level of husbandry. Therefore, on physical examination, most lizards with acute renal disease will be of a good weight and reasonable body condition.

In chronic renal disease, there will often be husbandry (low humidity, mild long-term water deprivation/chronic low grade dehydration) or nutritional factors (high protein diets, excess vitamin D3 supplementation) that may indicate the potential for renal disease. These animals tend to have a history of reduced appetite, poor weight gain or weight loss, and occasionally increased drinking in the animal. On physical exam the animals are usually of poor body condition, dehydrated, and may have some abdominal pain.

Diagnosis

Because the medical history and signs can vary, the veterinarian must often rely on a complete blood count, serum chemistry panels, and urinalysis. Radiographs (x-rays) are helpful in most lizards for assessing kidney size, especially if the kidneys are enlarged. Radiography can also be used to demonstrate the presence of renal calculi (kidney stones) and/or gout. A kidney biopsy is the most important diagnostic and prognostic tool when evaluating renal disease.

Treatment

In acute renal disease/failure the goal is to keep the animal alive until sufficient healing and recovery have taken place. Though the initial prognosis may be guarded if imbalances are corrected, the chance for complete recovery does exist. The animal needs to be rehydrated and monitored through periodic laboratory testing.

If uric acid levels are significantly elevated, allopurinol may be given to reduce production of uric acid by the liver. If obstruction of the urinary system exists (e.g., due to a kidney stone), it will often have to be treated surgically before proper urine flow can be re-established.

If the kidney disease is due to a toxin, it needs to be removed from the environment and the gastrointestinal tract. Acute hypercalcaemia (i.e., from acute vitamin D3 overdose) can result in calcification of the kidney, and in such cases, prednisolone, calcitonin, and fluid therapy are often administered. Acute renal disease due to a bacterial infection should be treated with antibiotics and a culture and sensitivity on the urine should be performed.

In many cases, the owner may not observe the early signs of chronic renal disease/failure, and the animals are very ill by the time they are examined by a veterinarian. In these cases, the goal of therapy is first, to stabilize the animal and then determine the cause of the renal disease (i.e., neoplasia, abscessation, tubulonephrosis, etc.), and perform specific therapies including surgery, if needed, to resolve the immediate crisis. Long-term therapy involves evaluating and possibly reducing the protein intake of the diet. Herbivorous lizards should not be given any animal or insect protein. Carnivorous tegus and monitors should be offered less concentrated protein sources (i.e., whole minced chicken or mice, Hill's u/d diet). Insectivorous lizards should be offered lower protein insects such as mealworms and earthworms, avoiding higher protein cockroaches, wax worms and locusts. If however, weight loss occurs because too much protein is lost in the urine, an increase in high quality protein should be offered lower protein insects such as mealworms and earthworms, avoiding higher protein cockroaches, wax.
dietary protein may be required. Long-term allopurinol therapy may be used to reduce uric acid production. If the animal's blood level of phosphorous is high, phosphate binders (e.g., aluminum hydroxide or calcium acetate) may be used. Oral calcium supplements, such as Neo-Calglucon (Nutrobal) may be needed. The use of full spectrum light (i.e., Zoo Med Reptisun 5.0 or Iguana Light) or preferably if possible direct unblocked exposure to natural sunlight should be provided to induce the natural production of vitamin D3. The serum levels of calcium and phosphorus and the ratio should be monitored on a regular basis. Proper humidity levels need to be maintained in the habitat, the animal may need to be soaked in water periodically, and water may need to be added to the food items. Anabolic steroids and vitamin B complex injections may be used stimulate the animal's appetite.

If acute renal disease or failure is not resolved, or chronic renal disease progresses untreated €“ then the outcome will most often be gout. Acute episodes of gout may be treated symptomatically but widespread visceral gout is the result of end stage kidney disease and the prognosis is usually grave.

Prognosis

As mentioned, gout is the end result of an inability of a reptile to properly excrete uric acid. Dietary management may be warranted when animals are at risk for gout, or when a case is diagnosed early in its course. In animals, dietary management is achieved when rations are formulated with ingredients that are low in purines and that promote acidification of the urine.

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<th>Examples of Foods Low &amp; High in Purines &amp; To Promote Acidification</th>
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<tr>
<td>Low Purine Foods: Breads, cereals, dairy, fruits, eggs, most vegetables, nuts.</td>
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<tr>
<td>High Purine Foods: Asparagus, mushrooms, meats (esp. organ meats), fish.</td>
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<tr>
<td>Potentially Acid Foods: Breads, cereals, rice, corn, lentils, cranberries, plums, prunes, dairy.</td>
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<tr>
<td>Potentially Alkaline Foods: Beets &amp; beet greens, chard, dandelion, kale, mustard, spinach, turnip greens, molasses, fruits (except above), dairy.</td>
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Very little research has been done in determining the proper treatment of gout in reptiles, and it is therefore not known/document for certain whether or not the medications used in humans will achieve the same desired effects in reptiles. Also, in human medicine, the dosages for these drugs have been well established. Little information has been published for their use in reptiles. Therefore, the dosages used for reptile patients have been calculated extrapolating from the human dosages. These drugs are not without side effects €“ and therefore caution must be exercised when using these medications.

Summary

Kidney related diseases are a major cause of illness and death in captive reptiles and amphibians. I believe that improper captive husbandry and diet are the most common predisposing causes of chronic renal failure in these animals. Providing the appropriate husbandry of each species will lessen the potential for renal problems in the future.