

# Two Cases of Congestive Heart Failure in Lizards

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*Abstract:* Two cases of congestive heart failure in lizards and their treatment are presented: a 6-year-old male bearded dragon and a 13-year-old male green iguana. Both cases presented with inappetence, lethargy, and marked blepharedema. CBC and serum chemistry for both patients were unremarkable. Congestive heart failure and atrial enlargement were diagnosed by echocardiography. Treatment including oxygen, supportive care, and furosemide was initiated. The lizards both showed significant clinical improvement, and no renal side effects were seen. Survival was modest at 2-5 months. Congestive heart failure should be considered as a differential diagnosis for lethargic reptiles, particularly when blepharedema is seen. Treatment with furosemide is considered to improve quality of life.

## Introduction

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Heart disease has not been well described in reptiles, and reptile cardiology may be considered to be in its infancy.<sup>1</sup> It is possible that heart disease in reptiles is under-represented, due to the non-specificity of signs (lethargy, weakness).<sup>2</sup> Congestive heart failure (CHF) has been infrequently reported in this class, notably in a Burmese python described with congestive heart failure secondary to caseous bacterial endocarditis.<sup>3</sup> To our knowledge, congestive heart failure has not been previously reported in lizards.

Ascites and peripheral edema have been reported as signs of heart disease in reptiles.<sup>2</sup> Blepharedema as a sign of heart failure has not been previously described, but may be explained by the large retrobulbar venous sinus many of these species possess. The mechanism of obstructed venous return may result in similar signs to the exophthalmos sometimes seen in rabbits with thoracic disease such as thymoma or cardiac disease.

The loop diuretic furosemide is a mainstay of treatment of CHF in mammals. Because reptile kidneys do not have loops of Henle, furosemide has long been thought to be of little use in these species.<sup>2</sup> However, in mammals, furosemide is thought to have some effect on the renal proximal tubules,<sup>4</sup> and anecdotally may result in diuresis in reptiles.

Pimobendan is an inodilator: a medication with both inotropic and vasodilator effects. Its use has not been previously reported in lizards, and due to the adverse response seen in one of our cases to a single dose, it requires further investigation before it can be recommended for routine use.

## Clinical Report

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### Case 1

A 6-year-old male bearded dragon was presented to the Angell Animal Medical Center Critical Care Unit for inappetence and dysphagia. On physical examination, the lizard was quiet with a large, smooth, and mildly compressible round structure palpable in the right caudal coelom. Severe blepharospasm, exophthalmos, and blepharedema were present, and improved when the patient was held in an upright vertical position. The lizard had an increased respiratory rate following handling, and a quiet grade 1 heart murmur was intermittently present during auscultation.

The lizard was admitted for support and diagnostic testing. CBC and chemistry were within normal limits. A coelomic ultrasound was performed, and revealed a large amount of coelomic effusion, as well as minimal cardiac contractility. A large fluid-filled structure was partly surrounded by hepatic parenchyma, consistent with either an enlarged gall-bladder or a hepatic cyst. Foreign material was present in the colon, and an obstruction could not be ruled out.

An echocardiogram was performed and revealed a subjectively enlarged right atrium, possible ventricular thickening and decreased motion suggestive of ventricular hypertrophy, along with pericardial and cranial coelomic effusion. A tentative diagnosis of congestive heart failure was made. Furosemide (Salix, Intervet International, Summit, NJ) was recommended to be given at 2mg/kg SQ q12h for 3 doses prior to repeating the echocardiogram.<sup>5</sup>

Following the third dose of furosemide, a repeat echocardiogram was performed. The patient was more alert and active, and the echocardiogram revealed an improvement in coelomic and pericardial effusion. The pleural effusion was resolved. Serum chemistry remained unchanged. Pimobendan (Vetmedin, Boehringer Ingelheim, St. Joseph, MO) was compounded to a 1.25 mg/mL suspension, and prescribed at 0.2 mg/kg PO q24h.

Within 12 hours of the first dose of pimobendan, the bearded dragon was again lethargic and would barely lift its head. Pimobendan was discontinued, and the furosemide continued. The patient became more active by the following day, and was discharged to his owner on furosemide and syringe-feeding (Critical Care Herbivore, Oxbow Animal Health, Murdock, NE).

On recheck examination one week later, the bearded dragon was reported to be eating on its own. The patient was bright and alert, with mild blepharedema, and normal hydration. The right atrial enlargement appeared unchanged on echocardiogram with no apparent fluid in the thorax or coelom. No change in treatment was recommended at this time.

Two days later, the patient was presented to the Critical Care Unit for open mouth breathing, lethargy, and decreased water intake. The patient was quiet and depressed, with increased blepharedema. The patient was admitted to the hospital for supportive care, including oxygen support and continued furosemide therapy. Blood work was unremarkable aside from a moderate lymphocytic leukocytosis of  $18.4 \times 10^3/\mu\text{l}$  and a CK of 2,753 U/L. Ceftazidime was initiated at 20 mg/kg IM q72h. Upon discontinuation of oxygen support five days later, the bearded dragon remained very active and passed normal feces. The lizard was discharged on furosemide at 1 mg/kg PO q6h.

On recheck 3 weeks into treatment (10 days after discharge), the lizard seemed improved. However, the owner reported that the blepharedema was near-resolved in the mornings, but would progressively worsen throughout the day. A recheck chemistry panel at this time was unremarkable. Three weeks after initiating ceftazidime, a CBC was performed and revealed a severe leukocytosis of 53,700, characterized by a severe lymphocytosis

( $46.2 \times 10^3/\mu\text{l}$ ). The majority of the lymphocytes were granular lymphocytes. Possible causes of granular lymphocytosis include viral infection, other causes of immune stimulation (of cell mediated immunity), and chronic lymphocytic leukemia (CLL, Patty Ewing, DVM, MS, DACVP, personal communication). If the lymphocyte count were to continue to increase in magnitude over time, CLL would be more likely. Evaluation for causes of immune stimulation was recommended as a more likely cause of granular lymphocytosis, but declined by the owner. Two weeks later, the patient died at home, and no necropsy was able to be performed.

## Case 2

An approximately 13-year-old male green iguana presented to the Critical Care Unit for abdominal distension, hypoxemia, decreased feces and urate production, lethargy, and abnormal posturing (described by the owners as arching his body but differently from the typical defecation posture). The owners also reported that the iguana had slowed down over the last few years. Previous medical history included impacted femoral pores, a suspected back injury, and degenerative joint disease.

On initial examination, the iguana was quiet but alert and mildly dehydrated. It was thin with a body condition score of 2/5, moderate generalized muscle wasting, and weighed 3.83 kg. Mucous membranes were slightly pale and tacky, and the heart rate was between 40-50 beats per minute. The respiratory rate was 8 breaths per minute with normal lung sounds, and an occasional mild coughing noise was noted. There was significant bilateral blepharidema. The caudal pole of the left kidney was palpable percloacally, and the caudal pole of the right kidney was possibly palpable. The femoral pores were dilated, slightly inflamed, and impacted with large amounts of keratinaceous exudate. The lizard was ambulatory in all four limbs, but had left forelimb weakness. The impacted femoral pores were debrided and the pores were flushed with dilute chlorhexidine solution.

A complete blood count revealed a mild leukocytosis of  $13.9 \times 10^3/\mu\text{l}$  and a significant anemia (hematocrit of 8.5%) with a total protein of 5.8 g/dl. The AST and CK were elevated at 172 U/L and 3,643 U/L, respectively. The uric acid was slightly elevated at 7.3 mg/dl. Whole body cross-table lateral and dorsoventral radiographs revealed coelomic fluid with a fluid level visible on the lateral view, consistent with coelomic effusion. Degenerative changes were seen in the right elbow; the left elbow was only partially imaged. A small, mineralized foreign body was noted in the cranial gastrointestinal tract.

An echocardiogram revealed mild pleural effusion and trace pericardial effusion. The atria appeared dilated bilaterally, while the ventricle appeared possibly thickened with adequate wall motion. The walls of the pulmonary trunk were hyperechoic, suggestive of mineralization. Differential diagnoses for the biatrial enlargement included ventricular cardiomyopathy and chronic valve disease. Differential diagnoses for the pleural and pericardial effusions included cardiogenic/congestive heart failure, neoplasia, infection, vasculitis, or other systemic disease. Differential diagnoses for great vessel mineralization included normal variant in geriatric iguana, nutritional abnormality, or other systemic cause.

Furosemide therapy at 2 mg/kg PO q8h was initiated. A chemistry panel repeated 24 hours following the first dose revealed an elevated uric acid level of 15.4 mg/dl; the furosemide was subsequently decreased to 1 mg/kg PO q48h. The iguana was evaluated by our Pain Management service and treated with vitamin B12 aquapuncture for joint pain. Chlorhexidine solution and silver sulfadiazine cream were prescribed topically for the femoral pores, and Critical Care-Herbivores was sent home for assisted feedings.

On recheck examination 3 days later, the lizard was reported to be improved in appetite, mobility, and blepharidema. On examination it was bright and alert, adequately hydrated, and the blepharidema was significantly reduced. Some femoral pores were still impacted, and keratinaceous material was removed from both sides.

An echocardiogram revealed no pericardial effusion and significantly decreased pleural effusion. The AST, CK and uric acid levels were improved at 59 U/L, 817 U/L, and 2.3 mg/dl respectively. CBC revealed a persistent anemia (HCT 6.4%) and the iguana was given a single dose of iron dextran at 12 mg/kg IM. There was a severe leukocytosis of  $39.6 \times 10^3/\mu\text{l}$  characterized by a lymphocytosis ( $28.5 \times 10^3/\mu\text{l}$ ), and a blood culture was performed and yielded anaerobic growth of *Bacteroides caccae* and aerobic growth of *Proteus vulgaris*. Metronidazole at 20 mg/kg PO q24h and enrofloxacin at 5 mg/kg PO q24h were prescribed.

On recheck examination 2.5 weeks after initiated treatment, the owner reported that the patient was significantly improved, with an improved appetite and normal eliminations. The iguana was bright and alert, with very mild blepharedema. A repeat echocardiogram was much improved, with scant pleural effusion and no pericardial effusion. A chemistry panel was submitted and yielded a hyperglycemia (193 mg/dl) of uncertain significance. Remaining values were normal, including the uric acid (3.7 mg/dl). Metronidazole, enrofloxacin, and furosemide were recommended to be continued. A follow-up with pain management was recommended.

One month after the initiation of treatment, the owner reported that the patient was significantly improved, with an improved appetite and normal eliminations. At this time he was still receiving the metronidazole, enrofloxacin, and furosemide as prescribed. The iguana was thin but bright and alert, adequately hydrated, with a single femoral pore impacted. No blepharedema was appreciated. Antibiotics were recommended to be continued for 2 more weeks and furosemide continued q48h.

Two months into treatment, the patient was doing well at home, still receiving furosemide, with both antibiotics discontinued. There were no new findings on physical exam at this time aside from continued weight loss (3.62 kg). Trace pericardial effusion and mild pleural effusion were noted on echocardiogram. Anemia was still present but improved (19%), and the blood glucose continued to increase to 530 mg/dl, respectively. The owner was aware that this was concerning although of unknown significance, but elected not to pursue additional diagnostics at that time. It was recommended to increase the furosemide by 10% to 1.1 mg/kg PO q48h.

Four months into treatment, the iguana was presented to the Critical Care Service for open mouth breathing of less than 24 hours duration, recent sneezing and clear nasal discharge, and decreased energy level and appetite of approximately 2 weeks duration. On examination, the patient was dull, dehydrated, keeping its eyes closed, with possible crackles auscultated on the left thoracic cavity, and severely muscle wasted (3.45 kg). Furosemide was administered at 4 mg/kg IM, and admitted for oxygen, supportive care and further evaluation. The lizard's anemia was worse (15%) and bile acid was elevated at 54 U/L. Radiographs were unchanged in coelomic effusion and degenerative changes of the elbows. The caudal trachea appears narrowed, possibly secondary to dorsal cardiac displacement. Echocardiogram showed trace coelomic effusion and no pericardial effusion. Both atria appeared severely dilated, more so than on the previous study. Differentials included progression of heart disease, or secondary to the effects of chronic anemia. The ventricle appeared normal with adequate wall motion, and the aorta and pulmonary trunk appeared to be of normal diameter.

No further episodes of dyspnea were noted, but the patient remained quiet and inappetent. The owners were aware his prognosis was guarded, and elected to defer additional testing. The iguana was discharged on furosemide and syringe-feeding. Darbepoetin alfa (Aranesp, Amgen, Thousand Oaks, CA) was prescribed at 0.5  $\mu\text{g}/\text{kg}$  SQ q7d.

On recheck examination two weeks later, the hematocrit had decreased to 11.0%; the remainder of the CBC and chemistry were unremarkable. On echocardiogram both atria appeared slightly smaller compared to the previous study, with a trace of coelomic effusion and no pericardial effusion. Furosemide was recommended to be continued. Due to the chronic severe anemia, sucralfate (Carafate, Aptalis Pharmaceutical, Bridgewater, NJ) was prescribed and a fecal exam was recommended to rule out intestinal parasites. Additional diagnostics including a CT to rule out neoplasia was recommended but declined by the owners. The iguana presented to our Critical Care Unit dead on arrival 4 days later. A necropsy was not permitted.

## References

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