

Exotic Pet

P R A C T I C E

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SCIENTIFIC ARTICLE

Alternative Treatment for Tortoises with Upper Respiratory Disease Syndrome

Sharmie D. Johnson, D.V.M.

We appreciate reader contributions. This article reflects independent investigation by one of our subscribers, Sharmie D. Johnson, D.V.M., of Arrow Animal Hospital in Glendale, Arizona. Readers interested in submitting materials should write or call for guidelines. Contact Colleen Cook, Mosby, Inc., 11830 Westline Industrial Dr., St. Louis, MO 63146.

Preliminary Report

Upper respiratory disease syndrome (URDS) affecting tortoises has plagued veterinary practitioners for many years. The affected animals have varying degrees of rhinitis, debility, anorexia, dehydration, and conjunctivitis. The cause of this condition is still under investigation. Currently, the causative organism is thought to be *Mycoplasma agassizii*.^{1, 2} In the past, other bacteria, and even a herpesvirus, have been incriminated.³

Isolation of *Mycoplasma* spp. can be difficult. Culture, polymerase chain reaction (PCR), and enzyme-linked immunosorbent assay (ELISA) technology are used to make the definitive diagnosis. Species of *Pasteurella*, *Streptococcus*, *Staphylococcus*, *Aeromonas*, *Klebsiella*, and *Pseudomonas* bacteria can often be cultured from the upper respiratory tract of affected animals. Uncertainty about the causative organism has resulted in the empirical use of many antibiotics with mixed success. The purpose of this preliminary drug trial was to assess the effectiveness of a newer generation antibiotic in: (1) the elimination of clinical signs of URDS in affected animals, (2) the prevention of relapses as was seen with other antibiotics, and (3) the prevention of disease in neighboring animals.

For the past year, a drug trial using azithromycin (Zithromax) has been conducted on desert tortoises (*Gopherus agassizii*) at a local wildlife rehabilitation facility. Azithromycin is a newer generation macrolide antibiotic used primarily for the treatment of community acquired pneumonia in humans (for both typical and atypical pathogens). It has bacteriocidal properties when used at higher concentrations and is active against species of *Mycoplasma*, *Streptococcus*, and *Staphylococcus*.

Azithromycin has been used successfully in the majority of tortoises treated for URDS in this study. The 24 tortoises studied have shown amelioration of the clinical signs of disease. The tortoises were selected based on clinical signs of rhinitis for greater than 7 days duration. The complete health history of many of these tortoises was unavailable. Most of the tortoises had been donated to the wildlife facility. All of the animals were fed the same diet and housed individually under the same conditions, except for the 2 tortoises owned by the author (these were maintained at my house). All animals were tested for intestinal parasites and were treated accordingly.

Two animals in the study were brought to the wildlife facility before

hibernation with severe bilateral rhinitis and conjunctivitis. After 3 doses of azithromycin, the clinical signs were completely resolved, and the animals resumed eating. They were then allowed to hibernate. Both have remained free of symptoms for 9 months.

Sixteen tortoises were donated by a local zoo. These were young tortoises, approximately 2–3 years of age, that had been used for diet research. All the tortoises were dehydrated, some were partially anorexic, and all had soft shells. Six of these animals had rhinitis and conjunctivitis. The remaining animals were treated because of their proximity to the affected animals. All 6 of the affected tortoises had complete resolution of clinical signs and resumed eating by 1½ weeks after treatment; they have remained symptom-free to date (3 months). The other 10 animals never showed

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clinical signs of URDS. Two of these 10 tortoises died. One had been treated for 2 days, and the other was too small to force oral medication.

Four other adult tortoises with rhinitis (mixed sexes) were treated; all have remained symptom-free for 3 months.

A pair of adult tortoises owned by the author were also treated. The female was asymptomatic, but the male had anorexia, dehydration, and severe catarrhal rhinitis. Cultures taken from the male's nares and oronasopharynx showed only normal flora. Based on the assumption of *Mycoplasma* infection, administration of azithromycin was started; no response was seen. A second course of azithromycin was started 4 weeks later, again with no response. Then, a 7-day course of enrofloxacin (Baytril) was added in combination with the azithromycin, and the rhinitis resolved by the end of the treatment.

No side effects were seen in any of the animals treated. Based on the necropsy results, the one death that occurred after starting the administration of azithromycin was attributed to the severe debility of the animal before the start of the treatment. The one animal that failed to respond initially likely had a drug resistance, because ultimately there was a response to a change in antibiotics.

All the animals from the wildlife rehabilitation facility were given the drug because *Mycoplasma* was presumed to be the primary disease-causing organism. This presumption is based on the extensive work of Dr. Jacobson.¹ Financial support at the center is severely limited, and because of this no laboratory tests were performed. Prior attempts to isolate *Mycoplasma* using PCR and ELISA technology proved to be too expensive.

The treatment dose was 10 mg/kg for the first day, and then 5 mg/kg per day for the next 4 days using azithromycin oral suspension. This is the dose used in human medicine. In humans it is thought that *Mycoplasma* might persist for several weeks after resolution of clinical signs and that shedding can continue for as long as 14 weeks after infection.⁴ The same may be true for tortoises. This drug might be effective because of its extended half-life and the coverage it provides against many of the bacterial pathogens that are cultured routinely from the upper respiratory tract of diseased tortoises. In humans, the half-life of azithromycin reaches 68 hours after the fifth dose.⁵ It follows nonlinear pharmacokinetics and produces an increase in half-life with each successive dose. After 5 days of treatment the drug is detectable in tissues for up to 20 days.⁶ This is why the drug is given for such a short course. In cats, the serum half-life is 35 hours, and the tissue half-life ranges from 13 to 72 hours. The volume of drug distribution is 23 L/kg. In dogs, the plasma and tissue half-lives are 29 and 90 hours, respectively, and the volume of distribution is 12 L/kg. Oral absorption is high, with bioavailability of 58% in cats and 97% in dogs. Azithromycin tissue concentrations can be 100 times the serum concentration, and leukocytes can concentrate 200 times that found in the serum. The leukocytes can distribute the drug to infected tissue through chemotaxis.⁷ To the best of our knowledge, no research has been done regarding half-lives and bioavailability of azithromycin in reptiles.

The animals in this study, as well as those currently undergoing treatment, will be followed for 1 year to assess the efficacy of preventing relapse. At that time, enough data will be available for submission to agencies for funding to pursue formal drug testing. It is too soon to determine whether the newer generation of macrolide antibiotics such as azithromycin are a cure for this disease, however, the initial evidence seems to be promising.

Please note that if bacteria are present that are not sensitive to azithromycin (*Aeromonas* spp., *Klebsiella* spp., and *Pseudomonas* spp.), and

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PRACTICE TIPS

Amy B. Worell, D.V.M., Dipl. A.B.V.P.

Blood Feathers

When examining a bird for the first time, show your new client what a blood feather looks like. Explain how it develops, how to take care of a bleeding blood feather, and send them home with septic powder for possible emergencies.

Care of Exotic Pets

Teach your staff how to explain care, management, and nutritional requirements to all owners of exotic pets. This information should be discussed before the doctor enters the examination room so the doctor's time can be used most effectively for the presenting medical problem. Because many medical problems are related to diet and management, clients should be educated on proper care and nutrition for their pets.

ROUNDTABLE

Treating Bladder Sludge in Rabbits

Q. What is bladder sludge?

Dr. Tynes: More commonly referred to as hypercalciuria, the term refers to the calcium "sand" that accumulates in the bladder, preventing normal micturition. Microscopically, the sludge is composed of calcium oxalate, carbonate, and ammonium phosphate crystals.

Dr. Worell: This term is synonymous with the accumulation of mineral debris within the bladder lumen; the mineral is usually a calcium precipitate. Sludge is descriptive of the accumulated material that resembles sewage sludge. The material is actually a suspension of solid or semisolid particles in urine and appears as a white pasty material.

Q. What causes it?

Dr. Tynes: The cause is most likely multifactorial. Anything that leads to high levels of serum calcium, such as feeding free-choice pelleted diets, alfalfa hay, and over-supplementation with vitamins or minerals may contribute to bladder sludge. Many affected rabbits are obese and inactive.

Dr. Worell: The cause is unknown, but there are several postulates: genetic predisposition, high-calcium (alfalfa-based) diet, abnormal calcium metabolism with urinary tract precipitates, decreased frequency of urination with accumulation of pre-

cipitates, and possible underlying renal disease.

Q. How is it diagnosed?

Dr. Tynes: Diagnosis is best accomplished with radiographs and urinalysis.

Dr. Worell: I consider it to be a radiographic diagnosis. A radio-dense material is seen on the ventral aspect of the bladder floor or filling the entire bladder.

Q. What is the treatment?

Dr. Tynes: Treatment includes fluid therapy and manual expression of the bladder.

Dr. Worell: This depends on the severity of the condition at presentation. I recommend a blood profile and urinalysis after radiographic diagnosis. Underlying urinary tract infections should be treated. Diuresis using fluids is helpful in resolving the sludge itself. Converting the rabbit from an alfalfa-based diet to meals consisting of some other grass hay (e.g., timothy) is advised. If the sludge cannot be removed via diuresis, sedation and placement of a urinary catheter to flush the bladder are needed. If the bladder is totally compacted, a cystotomy may be required. The condition can recur, and periodic radiography might be worthwhile.

Q. Can it be prevented?

Dr. Tynes: Prevention aims at limiting the pellets and offering free-choice grass hay (not just alfalfa hay). Mineral supplementation should be discouraged. Increased exercise and decreased caloric intake may help as well.

Dr. Worell: I don't know whether we have a good answer regarding prevention. Currently, dietary management is recommended to try and prevent the problem. If a pet is genetically predisposed, we may not have much success with prevention. I'd be anxious to hear whether laboratory rabbits have this problem.

Q. What are the clinical signs? Is there a sex predilection?

Dr. Tynes: In my experience, affected rabbits usually demonstrate difficulty urinating and straining to urinate; hematuria may be present. When expressed, the urine is abnormally thick and pasty. I have not seen any sex predilection.

Dr. Worell: Signs are varied. They may include increased frequency in urination, urine staining on perineal hairs, sludge precipitate on the hairs, or straining to urinate. Occasionally, sludge is seen radiographically in asymptomatic rabbits. I do not know of a sex predilection, although I think I have seen it more frequently in female rabbits.

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if the animal fails to respond to this antibiotic, a second antibiotic should be used concurrently based on culture and sensitivity results.

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CASE REPORT

Pyothorax in a Ferret

Peter G. Fisher, D.V.M.

We appreciate reader contributions. This article reflects independent investigation by one of our subscribers, Peter G. Fisher, D.V.M., of Pet Care Veterinary Hospital in Virginia Beach, Virginia. Readers interested in submitting materials should write or call for guidelines. Contact Colleen Cook, Mosby, Inc., 11830 Westline Industrial Dr., St. Louis, MO 63146.

A 5-year-old neutered male ferret (*Mustela putorius furo*) was brought

in for anorexia and lethargy 14 days after undergoing a left-sided adrenalectomy and pancreatic islet cell tumor removal. The ferret was approximately 8% dehydrated, in respiratory distress, and had a subnormal temperature of 37°C (98.6°F). The ferret had lost 252 g of body weight and was emaciated. A diagnostic work-up included a CBC, chemistry profile, urinalysis, and whole body radiographs. The CBC showed anemia (packed cell

volume, 26%) and a leukocytosis (WBC, 15,400/ μ L) with a left shift and stress leukogram, neutrophils (14,014/ μ L), bands (462/ μ L), lymphs (462/ μ L), and monocytes (462/ μ L). The chemistry panel revealed a slight hypokalemia (potassium, 4.4 mEq/L), hypoglycemia (glucose, 72 mg/dL), and elevated alanine aminotransferase (113 IU/L). The urinalysis showed a pH of 6.0, proteinuria with a specific gravity of 1.012, and a sedi-

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ment revealing many neutrophils and rod-shaped bacteria. Radiographs demonstrated a primarily right-sided pleural effusion.

A thoracentesis was performed, and approximated 30 mL of a thin tan-colored fluid was removed. The fluid was examined cytologically and a purulent exudate was revealed, composed of numerous neutrophils with an occasional macrophage and rod-shaped bacteria. A sample of fluid was submitted for culture and sensitivity. Based on these laboratory findings, a diagnosis of pyothorax and bacterial cystitis was made.

The owners were given a guarded prognosis but opted to pursue surgery. The ferret was masked down and anesthesia was maintained with isoflurane. A 24-gauge cephalic catheter was placed and 0.9% saline with 2.5% dextrose and 20 mEq KCl/L was started. Next, a thoracostomy tube was placed on the right side using a 15-inch, number-8 French Davol brand pediatric feeding tube with additional fenestrations added. The tubing was tunneled under the skin from the 10th rib space to the seventh intercostal space; there it was inserted into the chest cavity using a hemostat to bluntly penetrate the intercostal musculature and pleura before introduction of the tube. The chest tube was sutured in place with 4-0 nylon and bandaged. Approximately 30 mL of additional fluid was drained, then 10 mL warmed 0.9% saline was instilled into the chest cavity. The ferret was gently rotated and the fluid was removed. To ensure proper nutritional support, an esophagostomy tube was placed using a number-10 French red rubber feeding tube, sutured and bandaged in place. Pending culture results, the ferret was given cefazolin (30 mg IV q8hr) and Baytril (2.2 mg IM q12hr), and fluids were administered 8 mL/hr until the ferret was rehydrated.

Butorphanol (0.5 mg IV q12hr) was given for pain management for 48 hours after the operation.

The ferret was kept in an incubator and the administration of antibiotics was continued as described, with the exception that Baytril was given by way of the esophagostomy tube starting the day after the operation. Fluids were maintained at 5 mL/hr. The thoracostomy tube was aspirated every 8 hours followed by instillation of 10 mL of warmed saline. The saline was left in the chest for 5 minutes, then was removed. Nutritional support, consisting of 10 mL Hill's A/D brand gruel (q8hr) via the esophagostomy tube, was also started on day 2.

Recovery was slow; the ferret remained immobile and recumbent for 48 hours after the operation. On the third day the ferret began to improve and was more alert and responsive. A liquid mixed nutrient meal (Isocal HCN, Mead Johnson, Evansville, IN) was offered and readily taken by mouth. The IV catheter was pulled and the ferret was fed the Hill's A/D gruel and water 3 times daily via the esophagostomy tube. The culture of the pleural effusion grew out *Escherichia coli* that was responsive to both enrofloxacin and cephalothin. Antibiotic therapy was continued via the esophagostomy tube and consisted of injectable Baytril (2.2 mg q12hr) and cephalexin suspension (30 mg q8hr). On the fifth postoperative day, the thoracostomy tube was pulled because minimal serous fluid was aspirated from the tube and the ferret was maintaining normal body temperature and was alert.

The ferret was sent home on the sixth day after the surgery, and the owners were instructed on how to feed the ferret using the esophagostomy tube. The feedings, as well as the Baytril and cephalexin, were continued for 4 weeks, at which

time the ferret had gained 180 g and was bright and alert. Because the ferret was eating well on its own, the esophagostomy tube was pulled and antibiotics were discontinued. Four weeks later the ferret had gained an additional 50 g and appeared clinically normal.

This case report demonstrates the successful management of pyothorax in a ferret with methods used routinely in treatment of this problem in our feline patients.

UPCOMING MEETINGS

North American Veterinary Conference, Orlando, FL; January 9-13. Contact the North American Veterinary Conference Headquarters at 4421 NW 39th Ave., Bldg. 1-A, Gainesville, FL 32606. (352) 375-5672.

Western Veterinary Conference, Las Vegas, NV; February 14-18. For information write to 2425 East Oquendo Rd., Las Vegas, NV 89120; e-mail: wvc@lvdi.net; (702) 739-6698.

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