Table 1. Treatment of *Pseudomonas* Infection, Ceruminous Otitis, and Hyperplastic Ears

Type of Otitis	Treatment Principles
Pseudomonas infection	Deep ear cleaning
	Identify and manage primary disease
	Treat according to culture and sensitivity results
	Topical therapies: tobramycin, polymyxin B sulfates, Tris-EDTA, silver sulfadiazine, ticarcillin, Burow's solution
	Aggressive systemic therapy recommended: oral antimicrobials (eg, fluoroquinolones), injectable agents (eg, amikacin, imipenem)
	Concurrent glucocorticoid therapy
	Treat for 2 wk past negative cytology and culture
	When cleared, start antiyeast treatment to prevent *Malassezia* infection
	Intermittent antiseptics for maintenance
Ceruminous otitis	Topical application of wax softener containing squalene 2-12 h before cleaning
	Deep ear cleaning
	Control secondary infections
	Weekly cleaning with basic ear cleanser
	Systemic therapy with vitamin A or retinoids
Hyperplastic changes	Potent topical glucocorticoids and systemic prednisone for hyperplastic changes
	Triamcinolone acetonide injection or long-term cyclosporine if ears not cleared in 3–4 wk
	Laser ablation if canal is calcified
	Control infections with appropriate topical and systemic antimicrobials
	Long-term therapy of weeks to months is indicated

Tris-EDTA=tromethamine edetate disodium dihydrate.

the concentration of medication should be increased [Pye CC et al. *Vet Dermatol* 2013]. Tromethamine edetate disodium dihydrate (Tris-EDTA) is synergistic with some antibiotics, clearing antibiotic-resistant *Pseudomonas* infections. Tris-EDTA significantly potentiates the bactericidal activity of silver sulfadiazine against multidrug-resistant *P aeruginosa* [Buckly LM et al. *Vet Dermatol* 2012 (abstr FC-20)].

Ceruminous otitis most often accompanies familial seborrhea and may involve various infectious agents. The ear wax thickens and is difficult to remove. Progressive hyperplastic changes occur. Treatment consists of cleaning and control of infections (Table 1). Hyperplasia (lichenification) promotes a microclimate favoring microbial growth and prevents distribution of topical medications. Swelling may be due to inflammation and edema or fibrosis, including cartilage ossification. Diagnostic evaluation includes palpation of the ear canals and bullae for calcification or fibrosis; pain indicates bullae involvement. Otoscopic examination and imaging studies can help determine the extent of involvement. Hyperplasia and any infections should be treated as described in Table 1.

Dr. Noxon concluded that most difficult otitis cases develop when there has been a breakdown in communication or a failure to strictly adhere to the best ear management practices. Thorough ear cleaning and control of infections are necessary.

Diagnosis and Treatment of Digestive System Disorders in Reptiles

Written by Toni Rizzo

Digestive system disorders in reptiles are a diagnostic challenge because of the variations in gastrointestinal (GI) anatomy and physiology among species of reptiles. Christoph Mans, DVM, University of Wisconsin, Madison, Wisconsin, USA, presented an update on the latest advances in diagnostic techniques and therapy that have provided practicing veterinarians with tools for improved diagnosis and treatment of GI disorders in reptiles commonly maintained as companion animals.

Diagnosis is based on evaluation of the animal's history and clinical signs, tests for parasites, and imaging studies. Environmental temperature should be considered a factor in digestive problems because of its effects on enzyme secretion, peristalsis, and intestinal absorption. Generally, digestion cannot take place at temperatures <45°F (7°C) and is slow between 45°F and 60°F (7° to 15°C). Other factors to look for are anorexia and weight loss, regurgitation in snakes, vomiting in lizards, diarrhea, constipation, cloacal tissue prolapse, and abdominal or coelomic distention.

If a parasite is suspected, a fecal sample or cloacal wash may be microscopically examined on a direct wet mount or stained smear. *Cryptosporidium* and *Entamoeba invadens* can be diagnosed with polymerase

chain reaction. Pseudoparasites, or "pass-through" parasites, may be accidentally ingested with prey or soil that are not infectious to reptiles. Pollen, spores, or food mites might also be mistaken for a parasite.

Radiography is useful for evaluating tympany, foreign bodies, and constipation. However, plain x-ray films provide insufficient information about the liver or obstructions and filling defects. Contrast radiography is more effective for visualizing the upper GI, organ size, GI obstructions, and filling defects. Results can be affected by temperature, the disease process, and the type and volume of contrast media. Barium sulfate is an excellent contrast medium and should be used at 5 to 25 mL/kg. Diatrizoic acid is faster and less radiopaque; the usual dose is 5 to 7 mL/kg.

Ultrasound is used to assess scales, scutes, and shells, as well as GI obstruction and ileus. Hyperechoic fat bodies in snakes and lizards can be identified with ultrasound. Computed tomography (CT) is superior to radiography and ultrasonography. CT with or without iodinated contrast media is useful for evaluating the GI, respiratory, urogenital, and skeletal systems. It is faster than contrast radiography for detecting impactions and obstructions. The liver can be evaluated for hepatic lipidosis and other disorders.

Periodontal disease can be a cause of digestive and eating disorders. Etiologies include inappropriate diet, age, plaque formation, gingival recession, and osteomyelitis. Diarrhea in herbivorous reptiles may be due to inappropriate diet, such as too little fiber or too much sugar. Endoparasites, including pinworms, coccidia, flagellates, and *Strongyloides*, are also a cause of diarrhea. Other GI conditions seen in reptiles include tympany, constipation, foreign bodies, and liver disorders. Vomiting is a common ailment in reptiles and is associated with a poor prognosis in lizards. Gastric ulceration with possible perforation has been observed in green iguanas. Neuroendocrine carcinomas can affect bearded dragons and are highly malignant. The etiology, diagnosis, and treatment of digestive disorders in reptiles are described in Table 1.

Table 1. Digestive Disorders in Reptiles

Etiology	Diagnosis	Treatment
Diarrhea		
Dietary (low fiber, high sugar) Endoparasites: pinworms, coccidia, flagellates, *Strongyloides* Subclinical infections common	Fecal parasitology	Cage sanitation Oral, topical, parenteral Fenbendazole Ivermectin (not in turtles or tortoises) Emodepside/praziquantel: nematodes, trematodes, cestodes
Tympany		
Excessive microbial gas Reduced gas elimination: low temperature, ileus, obstruction	Contrast radiography Fecal parasitology	Enteral fluid therapy Metronidazole
Constipation		
Metabolic Obstruction Lack of activity Low-fiber diet Obesity	Diagnostic imaging to detect obstruction	Based on underlying cause Enema Enteral fluid therapy Soaking Correct diet and environment
Foreign bodies		
Incidental ingestion Active ingestion	Diagnostic imaging	Endoscopic Surgical
Liver disorders		
Infectious: bacterial, parasitic, viral Hepatic lipidosis: physiologic (females during reproduction), pathologic	Physical examination and history Biochemistry profile: liver enzymes, bile acids, total bilirubin Computed tomography: < 20–30 Hounsfield units correlates with hepatic lipidosis Ultrasonography Radiograph not sensitive Liver biopsy: endoscopic, surgical, percutaneous Histopathology Microbiology	Based on primary cause Antimicrobial Nutritional support: esophagostomy tube