5-minute Guide to Amphibian Disease

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Table 1. Common Drugs Successfully Used in Amphibians

Fenbendazole or moxidectin/ ivermectin	Nematode infections
Metronidazole	Protozoan infections
Enrofloxacin, amikacin or trimethoprim-sulfa preparations	Bacterial infections
Itraconazole	Fungal infections
Furosemide	Promote fluid excretion

THE AMPHIBIAN PATIENT IS often presented late in the disease process, and the presenting signs are commonly limited to anorexia, weight loss and/or fluid retention. A review of the husbandry and feeding history should be part of any workup. Diagnostic information may be obtained in a manner similar to that used with other vertebrates, although the small size of many patients limits the quantity and usefulness of diagnostic samples.

Thorough physical examination may reveal fractures, impactions, swellings, masses, fluid accumulations or skin and eye abnormalities. Blood can be collected from peripheral superficial veins, but collection is generally more reliable from the heart. Although hematologic and biochemical values vary and only limited normal values are available, analysis of the blood sample may offer important diagnostic clues. Fresh feces should be examined for the presence, identification, and number of protozoan and metazoan parasites and ova. Analysis (e.g., cytologic evaluation and assessment of total protein content) and culture of coelomic and subcutaneous fluid should be pursued in the presence of fluid accumulation. Skin scrapings, exfoliative cytology, fine-needle aspirates and biopsies are other useful diagnostic tools. Radiographs may be obtained with standard equipment or, preferably, by using high-definition x-ray equipment, such as dental or mammography units. Ultrasonography may help identify coelomic masses or fluid accumulation and assist in guiding transcutaneous aspiration or biopsy. Laparoscopy, using a small fiberoptic arthroscope, offers internal visualization.

Careful post mortem examination of diseased specimens followed by histopathologic examination is crucial in diagnosing and treating problems affecting several animals. Common clinical manifestations, selected differential diagnoses and diagnostic options are presented in Table 2.

Once a tentative or final diagnosis has been made, amphibians may be subjected to standard surgical and medical treatment. Amphibians have low metabolic rates but high rates of fluid turnover, placing them between mammals and reptiles in the pharmacokinetic spectrum. Oral, subcutaneous and topical/transcutaneous are the most common treatment routes.

Adult amphibians are carnivorous, and nutritional support may be provided by tube feeding commercially available cat foods or formulas. Fluid therapy may be accomplished by placing the animal in a shallow pool of clean water or, for more immediate effect, by subcutaneous or intraperitoneal injection of 3 parts nonlactated balanced electrolyte solution to 1 part 5% dextrose. Optimizing ambient temperature and humidity will aid in recovery.

Table 2. Differential Diagnosis for Clinical Signs in Amphibians

SYSTEM	CLINICAL SIGNS	DIFFERENTIAL DIAGNOSIS	DIAGNOSTICS
General	Anorexia	Inadequate husbandry (temperature, humidity, food offered, crowding), physiologic causes (behavioral or environmentally induced), generalized infection (viral, bacterial, fungal), chytridiomycosis, GI parasitism, GI impaction, ocular/CNS disease	History, review husbandry/diet, physical exam, fecal exam, gastric lavage, hematology, radiography, ultrasonography, endoscopy, laparoscopy, laparotomy
	Emaciation	Husbandry, malnutrition, GI impaction, GI parasitism, pulmonary parasitism, chronic infection, organ failure, neoplasia	History, review husbandry/diet, physical exam, fecal exam, hematology, radiography, ultrasonography, endoscopy, laparoscopy, laparotomy
Coelom enlargement	Firm swelling	Gastric or intestinal impaction, overeating, bacterial septicemia ("red leg"), coelomic mass (abscess, granuloma, neoplasia), organomegaly, retained ova, peritonitis, cystitis	Palpation, transillumination, fecal exam, radiography, ultrasonography, gastric lavage, aspirate and cytology, biopsy, endoscopy, laparoscopy, laparotomy
	Edema/ascites	Renal disease, heart failure, lymph heart failure, bacterial septicemia ("red leg"), viral disease, peritonitis, hepatic failure, hypoproteinemia, retained ova	Palpation, transillumination, aspirate and cytology, fluid analysis (total protein), bacterial culture, hematology
	Organomegaly	Hepatitis, splenitis, bacterial septicemia, chlamydiosis, mycobacteriosis, fungal infection	Palpation, transillumination, radiography, ultrasonography, aspirate and cytology, laparoscopy, laparotomy, bacterial/fungal culture, biopsy
Skin	Discoloration	Bacterial septicemia ("red leg"), thermal burns, excessive UV light exposure, chytridiomycosis or other fungal infection, viral infection, chlamydiosis, gas bubble disease (aquatic species)	Skin scraping, wet mount, cytology, bacterial/fungal culture, biopsy
	Ulceration	Trauma, bacterial dermatitis, bacterial septicemia, mycobacteriosis, chlamydiosis, fungal infection, excessive UV light exposure, nematodiasis, gas bubble disease (aquatic species)	Skin scraping, wet mount, cytology, bacterial/fungal culture, biopsy

Rectal prolapse in a Colorado River toad (*Bufo alvarius*).

Fungal dermatitis (chromomycosis) in an Eyelash leaf frog (*Ceratobatrachus guentheri*).

SYSTEM	CLINICAL SIGNS	DIFFERENTIAL DIAGNOSIS	DIAGNOSTICS
Skin	Masses	Mycobacteriosis, fungal infection, protozoan cyst, cestodes, mites, mineral deposit, neoplasia	Aspirate and cytology, bacterial/fungal culture, biopsy
	Focal hyperplasia	Chytridiomycosis or other fungal disease, nematodiasis	Skin scraping, biopsy
	Cottony growth	Saprolegniasis (aquatic species)	Skin scraping, wet mount, biopsy
Gastrointestinal	Prolapse of cloaca, rectum, bladder or oviduct	Tenesmus, GI parasitism, GI foreign body, gastroenteritis, peritonitis, retained ova, neoplasia	Aspirate, biopsy, fecal exam, radiography, ultrasonography, reduce prolapse and reevaluate
	Gastric prolapse	GI parasitism, toxins, terminal illness	Fecal exam, reduce prolapse and reevaluate
	Regurgitation	GI parasitism, gastroenteritis, GI impaction, GI foreign body, toxicosis	Fecal exam, radiography, ultrasonography
	Diarrhea/mucoid stool	GI parasitism, gastroenteritis, GI foreign body	Fecal exam, bacterial culture
	Lack of stool	GI impaction, GI foreign body, GI parasitism	Radiography, ultrasonography
Musculoskeletal	Masses	Abscess, granuloma, mycobacteriosis, protozoan cyst, cestodiasis, metabolic bone disease, neoplasia	Radiography, aspirate and cytology, biopsy
	Skeletal abnormalities	Fracture, trauma, metabolic bone disease (Ca/P imbalance, vitamin D deficiency), spindly leg syndrome, developmental malformation (secondary to malnutrition, toxicosis)	Review husbandry/diet, radiography
Ocular	Ocular abnormalities	Trauma, bacterial conjunctivitis, bacterial keratitis, panophthalmitis, corneal ulcer, corneal lipidosis, corneal edema, cataract	History, ophthalmic exam, cytology, bacterial culture, hematology, plasma cholesterol
Central nervous system	CNS signs, head tilt, paresis/paralysis	Trauma, thiamine deficiency, bacterial / chlamydial meningitis, toxicosis, septicemia, terminal illness	Empirical treatment

"Spindly leg syndrome" in a green-and-black poison dart frog (*Dendrobates auratus*).

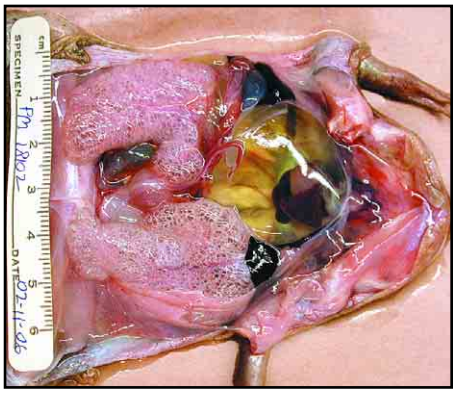
Cutaneous granulomas caused by *Mycobacterium chelonia* in a Puerto Rican crested toad (*Peltophryne lemur*).

Bacterial dermatitis (*Aeromonas* sp.) in a Puerto Rican crested toad (*Peltophryne lemur*).

Massive fluid retention caused by chronic renal failure in a White's tree frog (*Litoria caerulea*).

Lipid keratopathy in a White's tree frog (*Litoria caerulea*).

Bite wound in a Colorado River toad (*Bufo alvarius*) inflicted by a Mexican beaded lizard (*Heloderma horridum*).



Massive pericardial effusion in a Surinam toad (*Pipa pipa*) with idiopathic myocardial fibrosis.

Subcutaneous cestode (*Spargana*) in a tomato frog (*Dyscophus antongilii*).

Blood collection by cardiac puncture in a young Colorado River toad (*Bufo alvarius*).

Bacterial septicemia ("Red leg") in a Bell's horned frog (*Ceratophrys ornata*).

For an in-depth review of diseases, diagnostics and therapeutics of amphibians, readers are referred to Wright KM, Whitaker BR (eds): Amphibian Medicine and Captive Husbandry. Malabar, FL, Krieger Publishing, 2001, www.krieger-publishing.com**.**