Overview of Reptile medicine

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Reptilian medicine has evolved greatly in recent decades. Management and clinical examination techniques are of critical importance. And because most of Reptiles are very close depend on their environmental conditions, husbandry records are more than important. Review information on apparently healthy animals and the sick individual is part of the diagnostic process. Before any therapy is instituted, the clinician must carefully consider questions on husbandry situation of the patient, especially its nutritional status. There is no sense for instance to institute an antimicrobial therapy without correcting zootechnical deficits.

Like any other taxon, Reptiles can present a large variety of diseases: infectious and parasitic processes, non infectious diseases... But again, in a very general way, and that is true for any wild and exotic animal, the majority of the diseases come from an inadequacy between the specific requirements and the zootechnical parameters proposed to the subject. If semiology is not always correlated with the etiology, nevertheless there are some pathognomonic symptoms for dominant diseases that is essential to know.

Infectious diseases

Bacterial diseases

Bacterial diseases are an important cause of illness and mortality in all reptilian species. Again, the therapeutic plan will begin first by correcting environmental and nutritional deficiencies, which are the most important predisposing causes of diseases in reptiles. Without this first step, there is no sense in starting other treatments. Environmental temperatures should be maintained near the upper limit preferred by the species to enhance immune function. Higher metabolic rates of anorectic reptiles may necessitate force-feeding. Fluid therapy should be considered as well. Ideally, severely affected reptiles should be isolated and antibiotic therapy initiated. In general, good sanitation is paramount in prevention of all diseases. The enclosure should be set up to reduce stress, with addition of hide boxes. Arboreal animals should be furnished with a secluded branch on which to lie on.

Although a wide variety of bacteria have been incriminated as either primary or secondary pathogens, infections caused by Gram-negative bacteria are most common. *Aeromonas hydrophila*, *Klebsiella oxytoca*, *Morganella morganii*, *Providencia rettgeri*, *Pseudomonas aeruginosa*, and *Salmonella arizonae* are prominent among the microorganisms isolated from healthy and ill captive reptiles. These bacteria can remain dormant and become invasive when conditions decrease the immune resistance of the host and/or follow primary viral infection. Anaerobic infections are more common than once thought and may be involved in up to 40% of all bacterial infections.

Abscesses caused by traumatic injury, bite wounds, or poor environmental conditions are seen in all orders of reptiles. Differential diagnoses include parasitic nodules, tumours, and haematomas. Isolates of the anaerobic organism *Peptostreptococcus* and of the aerobes *Pseudomonas*, *Aeromonas*, *Serratia*, *Salmonella*, *Micrococcus*, *Erysipelothrix*, *Citrobacter freundii*, *Morganella morganii*, *Proteus*, *Staphylococcus*, *Streptococcus*, *Escherichia coli*, *Klebsiella*, *Arizona*, and *Dermatophilus* have been recovered from reptilian abscesses, often in combinations. Antibiotic administration will always be combined with surgery that can be quite invasive in large abscesses, in order to remove as much material as possible.

Aural abscess are commonly seen in chelonians, most frequently in box turtles and aquatic turtles. Marked swelling is seen at the tympanic membrane, and caseous material is present. *Proteus sp*, *Pseudomonas sp*, *Citrobacter sp*, *Morganella morganii*, *Enterobacter sp*, and other bacteria have been isolated. The tympanic membrane must be incised, followed by an aggressive curettage and flushing of the area, with diluted povidone-iodine or chlorexidine..

All snakes and some lizards possess a transparent spectacle located over the cornea. Subspectacle infections are common in snakes. Drainage is achieved by surgically removing a small wedge from the spectacle and flushing with an antibiotic solution directly onto the globe and within the space. In the other orders, conjunctivitis is sometimes seen, ranging from mild inflammation to panophthalmitis, and
may occur as a result of ascending infectious stomatitis. Topical antibiotic ointments are used in
turtles, lizards without spectacles, and crocodilians.

Trauma, local abscessation, parasitism, or environmental stress may induce septicaemia, a common
cause of death. *Aeromonas* and *Pseudomonas* spp. are frequently isolated in such cases. Petechiae
may be found on the ventral abdomen, and chelonians develop erythema of the plastron.

Infectious stomatitis is frequently seen in snakes, and less so in lizards and turtles. The disease
course begins with petechiae in the oral cavity, followed by caseous material appearing along the
dental arcade, and the infection can extend into the bony structures of the mouth. *Aeromonas* and
*Pseudomonas* spp. are most frequently isolated. Debridement, irrigation with antiseptics, systemic
antibiotics, and supportive therapy are indicated. Stomatitis is a secondary infection. The animal’s
environment should be modified as necessary to aid in recovery.

Respiratory infections are common in reptiles. The incidence can be influenced by respiratory or
systemic parasitism, unfavorable environmental temperatures, unsanitary conditions, concurrent
disease, malnutrition, and hypovitaminosis A. In snakes with neurologic symptoms, one should always
consider involvement of a viral disease process. Turtles often have an underlying vitamin A deficiency.
Increased temperatures are important not only to stimulate the immune system but also to help
mobilize respiratory secretions. If the reptile does not respond to environmental correction and the
antibiotic therapy, a culture and sensitivity along with histology should be performed.

Infections with *Mycoplasma* spp. are most often seen in terrestrial tortoises correlated with respiratory
signs (upper respiratory tract disease), and also in crocodiles correlated with pneumonia and
polyarthritis. Upper respiratory tract disease has been found in free living desert tortoises (*Gopherus
agassizii*) and is assumed to be one of the causes of the decline in the population. Tortoises show
nasal discharge, conjunctivitis and inappetance and in severe cases, the bones can be affected. It is a
chronic infection which lowers the immune response and allows opportunistic organisms to invade. All
tortoises which have been in contact with the mycoplasma are considered to be lifelong carriers.

Detection of mycoplasma using PCR is possible using tissue harvested from the nasal cavity or the
lungs of dead tortoises.

*Mycobacteria* are classical aetiological agents of granulomatous reactions in human and animal hosts.
Mycobacterial infections have been reported frequently in a wide variety of reptiles, including snakes,
turtles, lizards, and crocodiles. Species isolated from lesions include *M. avium*, *M. chelonae*, *M.
fortuitum*, *M. intracellulare*, *M. marinum*, *M. phlei*, *M. smegmatis*, *M. tamnophyes*. The disease in
reptiles is often associated with cutaneous lesions but systemic illness accompanied by non-specific
signs such as anorexia, lethargy and wasting also occurs. At necropsy, greyish-white nodules may be
observed in many organs and in the subcutis. Histopathological examination shows typical
granulomatous inflammation with multinucleated giant cells, a common feature of these lesions. Unlike
mammalian tubercles, calcification has not been observed in reptiles.

A fast diagnosis can be facilitated by acid-fast staining of skin scrapings or tissue biopsy. Culture and
PCR are used to confirm diagnosis. Reptilian mycobacteria should be considered as a possible
zoonosis although confirmed cases of transfer of mycobacteria from reptiles to humans are rare and
the significance for public health is unclear.

All reptiles should be considered positive for *Salmonella* until the contrary has been proven. Reptiles
are well known carriers of *Salmonella* spp. Lizards, snakes and tortoises in particular are natural
reservoirs for this bacterium. Clinical salmonellosis, however, is rare in Reptiles: *Salmonella*
appears to be unable to cross the intestinal barrier in healthy animals. The importance of *Salmonella*
infections is its zoonotic potential and *Salmonella* isolates from reptiles should be considered virulent for
humans.

**Viral diseases**

Herpesviruses seem to be of major importance in marine turtles and terrestrial tortoises. The disease
has been recognized in a variety of European, North American, South American and African tortoises.
Clinical symptoms usually start with serous nasal discharge; salivation and loss of appetite, evolving
with thick caseous membranes cover the tongue and pharynx. Some tortoises show diarrhoea. In
chronic cases, difficulties in swallowing food are seen. Sensitive species like Hermann’s tortoise (*T.
hermanni*) or exotic species of terrestrial tortoises will succumb to the infection within days, whereas
more resistant species such as the spur-thighed tortoise (*Testudo graeca*) or marginated tortoise
(*Testudo marginata*) will develop antibodies and may recover after some weeks. Oral swabs should be
investigated virologically using cell culture or Herpesvirus-PCR. The antibodies are usually determined using a neutralization test in cell culture is used to determine the circulating antibody titre.

Venomous snakes of the families Crotalidae and Viperidae seem to be particularly susceptible to Ophidian paramyxovirus, a virus that has also been found in Colubrids and Boids. Mortality rates in crotalids are up to 100%. In collections of crotalids, sudden death is often noticed without any symptoms. Most snakes show respiratory and sometimes neurological signs.

Inclusion body disease is a highly prevalent disease in boid snakes. It sporadically occurs in colubrid and viperine snakes but it is not clear whether “IBD” in non-boid snakes has the same aetiology. Boid species that appear to be most sensitive to IBD are B. constrictor and tree boas (Corallus spp.), whereas pythons appear to be much less often affected than boas. IBD is thought to be associated with retrovirus infection. Ectoparasites (snake mites O. naticris) may play a role in spreading the disease in any collection of snakes. Symptoms include mainly regurgitation, followed by inappetance and progressive nervous symptoms, eventually resulting in the death of the animal. Screening for the presence of IBD can be achieved by taking organ biopsies. Biopsies form the liver and oesophageal tonsilar tissue may contain a large eosinophilic intracytoplasmic inclusion in affected snakes.

Adenovirus infections of lizards have become increasingly important and especially in young bearded dragons (P. vitticeps). The virus is able to cause illness and sudden death. Sometimes neurological signs or an unusual dark colouring of the skin can be observed. All cases of sudden death in collections of Bearded Dragons should be necropsied and investigated for the presence of Adenoviruses, using histological or molecular biological methods.

Parasites
Endoparasites are an important cause of disease in captive reptiles with very different clinical symptoms depending on the parasite species and the degree of infestation. Protozoa, nematodes, cestodes and trematodes may be observed. Many intestinal parasites, such as the ciliate Balantidium, may be normal residents but can also be involved in gastrointestinal disease. An examination for endoparasites should be performed as part of the routine check of all reptiles. These may play an (underestimated) role in the development of stomatitis. Ectoparasites are very common in wild caught reptiles but also in captive breds, as many reptile collections are infected with mites. The mite Ophionyssus naticris is the most common reptile ectoparasite in captivity. It has a world-wide distribution affecting mainly snakes and to a lesser extent lizards, but it can also attack humans, causing papular vesiculo-bullous eruption of the skin.

Non infectious diseases
Nutritional metabolic disorders are very largely dominated by hypovitaminosis A and the osteofibrosis (deficiency and/or phosphorus excess). The treatment is etiologic and of good prognostic with early treatment.

Traumas to the carapace of Chelonians are a quite frequent occurrence. In all cases, emergency care (hydration, body reheating, antisepsy of the wounds, withdrawal of the foreign bodies on fractures) must precede any orthopedic treatment. The techniques of osteosynthesis of carapace of tortoise proposed by various authors use is metallic materials: screwed plates, pins, wire, adhesives or resins, only or associated glass fiber fabrics.

The dystocias are frequent in the captive reptiles. If the correction of the living conditions and a medical treatment (oxytocin, calcium) remains without effect, the surgery is necessary. The causes of dystocias in the reptiles remain often uncertain. The obstructive dystocias can be caused by a malformation of eggs, old osseous traumatisms (spinal column…), the compression of eggs by faecalomas or stones… Chelonians are susceptible for these affections. The nonobstructive dystocias can follow improper conditions of maintenance (temperature, moisture, substrate, photoperiod, shelters, etc) or the absence of site of laying. The stress can secondarily involve in a hyperprogesteronemy, inhibiting the contraction of the oviducts right before the laying. The other causes include nutritional problems, metabolic, traumatic, a general weakness of the specimen (partner or not to a concomitant, infectious
pathology or not), the absence of fecundation (the absence of male), the competition between females (for the same site of laying or the same male), etc.
The management of a dystocia includes/understands hygienic treatments (re-establishment of the environmental parameters, rehydration...), medical (oxytocin, calcium injection) or surgical or an association of the three.

References


