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Exotic Animal Ophthalmology

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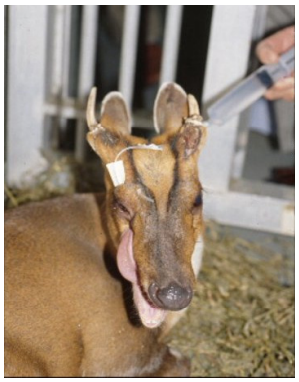
Ophthalmic diseases in exotic species (pretty well anything that isn't a dog, cat or horse) are for the most part very similar to those seen in the domestic species. However there are many examples in the different groups of wild and exotic species of rather unique conditions. The concept of "same" or "different" is frequently repeated when comparing ocular conditions in exotics to those seen in domestic species. Exotic species with eye disease present a unique set of problems for the general practitioner and ophthalmologists. Although true of veterinary medicine in general the notion that the patient either improves or burns with or without our intervention seems especially true for eye diseases in exotics.

Twenty years ago veterinarians were faced with variation and unique diseases in a handful of domestic species. Now with growth of the exotic pet market the range of variation is truly immense. The rate of proliferation of new exotic pets has exceeded our progress in studying their diseases. Gradually we are identifying the common eye diseases and are learning effective ways to treat some of these conditions. However just as in medicine in general we still must accept that some diseases are untreatable with the present state of our knowledge – a difficult concept for the veterinarian to admit and equally frustrating for the pet owner to appreciate.

When dealing with exotic species it is important that the practitioner have a working knowledge of restraint methods, limitation of the ocular examination techniques available and some idea of the common problems in the various classes and orders of animals. Exotic species present a considerable challenge with regards to effective therapy. Repeated handling and restraint to apply medications can be stressful for the animals well as hazardous for the owner/veterinarian. Wherever possible surgical treatment should be considered if it could safely be performed and hasten resolution of the ocular disease. Applications of medications in slow release formulations and remote means to apply medications to the eye should be utilized to the maximum when treating exotic species.



Below is a short review of some of the common conditions encountered in exotic species.

Species variation

Although most exotic species have eyes built on the same design as domestics animals there are peculiar anatomical and physiological differences that contribute to the uniqueness of the diseases with which they are afflicted. For instance air sacs, uniquely present in birds are commonly the site of bacterial infections with extension to the periorbital sinuses. The presence of a spectacle in snakes and some lizards predisposes to one of the commonest eye conditions seen in these species (and also is a major limiting factor in applying topical ocular therapy). Large orbital venous sinuses make

enucleation a stressful procedure (for the surgeon) in lagamorph and mustelids and enormous orbital lacrimal-type glands may result in considerable pathology in nutritionally deprived chelonians. Amphibians, reptiles and birds have hyaline cartilage in the sclera and many species of reptiles and birds have additional structural support from ossicles over the ciliary region. These structures doubtless affect any measurement of intraocular pressure due to increased scleral rigidity, limit access to the inside of the eye for paracentesis and require decalcification prior to histopathological examination. Due to differences in muscle type and afferent and efferent neural pathways there are considerable variations in pupillary responses to light in lower vertebrates. This makes interpretation of pupillary light reflexes difficult and also restricts pharmacological mydriasis for funduscopy using the parasympatholytic drugs used routinely in mammals. Assessing vision in exotic species can be difficult since reliance on menace responses and avoidance behavior are often meaningless in lower vertebrates.

Physiological variation in the response of the eye to trauma (including surgery) is considerable. For instance primate eyes are relatively less responsive to injury whereas many of the ungulate and carnivore species with which we deal are more prone to what appears to be an excessive inflammatory response. The corneas of some species (cats, cattle) will heal no matter how we abuse them, whereas those of other species (equine, canine) are bent on self-destruction despite our best efforts. In some of these examples we know enough to relate the ocular inflammatory or healing response to particular biochemical differences in inflammatory mediators between species. In many cases however the reasons for interspecies differences remain an enigma.

Parasympatholytic drugs used to examine the posterior segment of the eye of mammals are variably effective or useless in lower vertebrates. Many classes have striated iris muscles. Although various non-depolarizing neuromuscular blocking drugs will cause mydriasis either applied topically or injected intracamerally this is not without risk of systemic muscle paralysis.

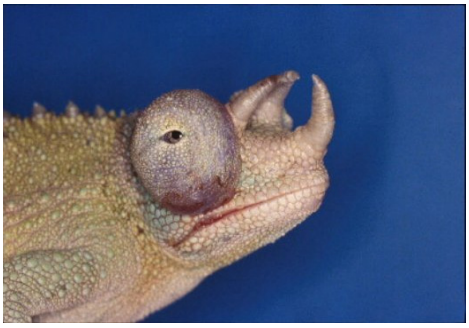
Amphibians.

Although cataracts and even glaucoma occasionally occur in amphibians the commonest eye conditions in captivity appear to be infectious and nutritional. Acute or peracute bacterial infections (particularly associated with *Aeromonas hydrophila* and other Gram –ve species) occur in stressed animals often with high morbidity and mortality in large collections. Uveitis, keratitis and panophthalmitis are seen often with signs of more systemic disease. Rarely can antibiotic therapy be instituted fast enough to save affected animals.

Lipid keratopathy (with or without systemic involvement) is common in captive frogs and toads (less commonly in urodeles) of various species. Deposits of lipids with vascularization and pigmentation of the cornea occurs in animals fed a diet high in fat (mice/crickets on high fat diet). Once lipids are deposited in the cornea nutritional therapy is rarely effective.

Reptiles.

Ocular malformations (especially microphthalmos) occur with some frequency in captive bred reptiles possible a consequence of inbreeding, or environmental conditions.



Blepharitis, usually of bacterial or fungal etiology occurs commonly in reptiles, occasionally extending to involve and destroy the globe. Swelling of the eyelids and conjunctiva are seen in lizards and chelonians. Conjunctivitis may be associated with these infections. Orbital abscesses are commonly encountered in some groups of lizards (especially chameleons). Cultures of eyelid abscesses are indicated and surgical curettage required to remove inspissated pus from lesions. Systemic antibiotics (based of sensitivities) are administered for long periods. Most of these infections are associated with Gram –ve bacterial isolates and are very difficult to manage. Some of these animals may be immunosuppressed and susceptible to infection with a range of pathogens. Systemic involvement resulting in inappetence, malaise and eventually death often occur.

Neoplasms (fibropapillomas, fibrosarcomas) occur around the eyelids with some frequency – the occurrence of epizootics in chelonia and lizards have suggested that there is probably an underlying infectious (viral?) etiology. Surgical debulking is rarely effective in curing these diseases.

The spectacle of snakes and some lizards presents peculiar problems unique to these animals. The spectacle may fail to be shed at ecdysis. This mostly occurs in snakes kept in excessively dry conditions or which are dehydrated or nutritionally deficient. Occasionally the problem is exacerbated by ectoparasites (mites and ticks) feeding at the peripheral margin of the spectacle. Usually correcting the animal's hydration and environmental moisture just prior to shedding corrects the abnormality at the nest shed. Physical removal of the spectacle should be avoided initially since without care the underlying normal spectacle is easily torn loose. Although a partially lost spectacle will heal with successive ecdysis, exposure keratitis will develop if the entire spectacle is lost.

Blockage of the nasolacrimal duct (which cannot occur in chelonians since it is absent) results in a backup of tear secretion in reptiles with a spectacle. Most notably this occurs in snakes and geckos. The fluid content may initially be clear but later become turbid and flocculent. Often culture of the fluid reveals bacteria such *Aeromonas spp* and *Pseudomonas spp*. The presence of protozoa in these infections of the corneospectacular space has been demonstrated repeatedly although their role in the disease is uncertain. Although some of these blockages and infections will clear spontaneously, in many cases the infection is unrelenting and progresses to panophthalmitis or extends into the periocular tissue spaces. Affected animals should be investigated for evidence of systemic infections. Fluid beneath the spectacle should be aspirated for cytology (bacterial and protozoa) and culture/sensitivity. Fluid can be drained through an incision in the ventral spectacle and antibiotics applied to the eye at this site. Systemic antibiotics are often required.

Corneal disease (ulcers, lipid dystrophies) occurs occasionally and where possible are treated empirically as in mammals. Uveitis is rarely diagnosed in reptiles although it does occur associated with systemic infectious disease. Treatment utilizes topical (where applicable) and systemic antibiotic therapy and both steroid and non-steroidal anti-inflammatory drug therapy.

Although cataracts often occur in older reptiles (etiology unknown) few ophthalmologists are brave (or foolhardy enough) to attempt surgical removal with current technology.

Vitamin A deficiency occurs with frequency in chelonians kept in captivity. Although this is often reported in rapidly growing aquatic species fed meat diets deficient in vitamin A – it also occurs in terrestrial species (box-turtles) inappropriately kept in captivity. Squamous metaplasia of the orbital glands and ducts and epithelial desquamation blocks the ducts of the orbital glands. Swelling of the orbital glands is associated with orbital and eyelid edema and conjunctivitis. Viscera are also involved. If animals are still eating oral supplementation is the best means of therapy. If inappetant, cautious use of parenteral Vitamin A will resolve the condition.

Birds.

There is considerable variation in the shape and anatomy of the avian eye in different orders. This has practical significance when considering enucleation – some globes (especially in some raptors) are too large to extract intact through the orbital opening. Voluntary control of the iris sphincter is especially well developed in birds making it difficult to interpret pupillary light reflexes in these animals.

In birds (probably occurs in lower vertebrates as well if investigated) ocular malformations (eye size and shape) can occur in response to rearing under particular lighting conditions.

Inflammation and infection of the eyelids and conjunctiva in birds have been related to various organisms. Poxvirus commonly causes proliferative lesions of the eyelids in many species (often seen in psittacines). Lesions may be limited to the lids and beak and resolve spontaneously with lid scarring and chronic secondary keratoconjuctivitis or occur in a fatal form involving the mouth and respiratory tract. No specific therapy is effective although prevention of secondary bacterial dermatitis, keratoconjunctivitis and pneumonia relies of topical and systemic antibiotics and topical lubricants. Vitamin A deficiency can present with similar lesions. Vitamin A should be supplemented when treating any suspected poxvirus infections.

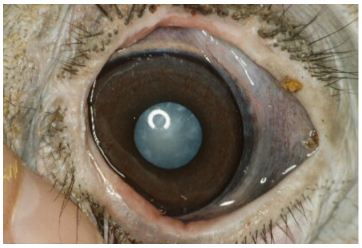
Various other viruses (including Marek's disease (herpesvirus), Newcastle disease (paramyxovirus) may affect poultry and other exotic species causing keratitis, uveitis and cataracts.

Various bacterial species can be isolated from the periocular sinuses of birds with conjunctivitis and swelling in the sinuses. Incision into the sinuses is required to obtain exudate for culture and sensitivity. Pus in birds is often inspissated and requires curettage and flushing to drain the affected areas (especially the infraorbital sinus). Systemic broad spectrum antibiotics (eventually based on culture/sensitivity results) are needed to treat these infections.

In general Gram +ve bacteria predominate in the normal conjunctival sac (as in mammals). A wide spectrum of pathogens (including Gram +ve bacteria, Gram –ve bacteria such as *Pseudomonas, E. coli, Salmonella, Mycoplasma, and Mycobacterium* have been isolated from birds with conjunctivitis. Culture and use of appropriate antibiotics topically and systemically are indicated.

Inflammation of the eyelids can result in scarring and blepharophimosis – a condition seen in birds more often than other species. Surgical therapy is rarely effective. Other causes of periocular inflammation and keratoconjunctivitis include fungal infections (Candida), and various endo- and ectoparasites (spirurids, trematodes and *Knemidokoptes*).

Cataracts occur with some frequency in birds – inherited or associated with inflammation or trauma (or possibly diet). Cataract surgery (phakofragmentation) may be effective in some of the species with larger globes (especially raptors). Visual limitation (with cataracts or aphakic after surgery) may limit the ability of some species to be rehabilitated to the wild.



Corneal ulcers and uveitis occur occasionally in birds. Ulcers should be cultured in view of exotic pathogens, which might be involved. We have safely used aminoglycosides and quinolones topically for therapy of corneal ulcers in birds. Uveitis is usually treated empirically with topical NSAIDs (flurbiprofen) or corticosteroids and if indicated systemic antibiotics.

Retinal degenerations may be inherited or occur secondary to inflammation or trauma. Retinal lesions are quite commonly diagnosed in raptors presented with ocular trauma and can influence decisions about release back into the wild.

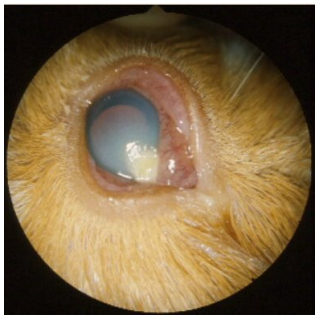
Enucleation should be approached with caution in birds, apart from the anesthetic risks, the possibility of blood loss and damage to the normal optic nerve or cardiac arrest. In owls the large globe can be removed by extension of a lateral canthotomy to the aural opening or by collapsing the globe prior to removal.

Mammals

Exotic mammals are affected with very similar eye diseases as encountered in their domestic relatives – this is especially true of for infectious diseases. Poxvirus lesions of the lids occur commonly in various ungulate species; infectious bovine keratoconjunctivitis-like lesions occur in various species of deer and cattle associated with *Moraxella* or *Neisseria* spp; exotic felids may be affected with herpesvirus induced keratoconjunctivitis and uveitis and chorioretinitis due to coronavirus (FIP) infection. Exotic canids have been infected with canine adenovirus.

Some species have diseases similar to those of domestic mammals but caused by unique pathogens – for instance keratoconjunctivitis in koalas due to *Chalmydia psittaci* infection is similar to that seen in guinea-pigs caused by the same agent. Rabbits develop blepharitis due to *Treponema cuniculi* (responsive to penicillin) and recurrent conjunctivitis related to URT infections with *Pasteurella multocida*, which may be extremely difficult to cure with even prolonged antibiotic therapy.

Conjunctivitis and nasolacrimal disease are common in rabbits (*Pasteurella*), rodents (*Streptococcus, Pasteurella, Mycoplasma*, sialodacryoadenitis virus) and can maintain a level of disease in collections, which is difficult to eradicate. Signs include epiphora, brown tear staining and hair loss and periocular dermatitis.



Corneal ulceration is not uncommon in mammals. In view of the broad gamut of potential pathogens, culture is recommended with initial empirical treatment with a broad spectrum antibiotic (triple antibiotic for superficial lesions, ciprofloxacin for deeper lesions with marked inflammation. Topical atropine is ineffective in some species (rabbits). Deep lesions of the cornea are often better treated surgically since application of a conjunctival flap is a convenient way to promote healing and reduce the need to frequently medicate the eye.

Uveitis occurs with much the same etiologies as in domestic species. Therapy requires detailed workup in case of underlying systemic involvement. Empirical therapy with corticosteroid or NSAIDS and parasympatholytic drugs is effective in many cases.

Cataracts have may be idiopathic and associated with uveitis. Inherited cataracts occur in rodents and presumably other species. In the absence of inflammation cataract removal may be effective (using phakofragmentation) in larger species. Use of the same anti-inflammatory regimens as in domestic species is appropriate, although there is considerable variation in the reported success rate when removing cataracts in exotic species.

Glaucoma can likewise occur in exotics – in some species (rabbits, Russian hamsters) there are genetic etiologies. The therapy of glaucoma in exotics is as hit and misses as in domestic species – often with poor prognosis. Surgical globe evisceration and prosthesis or enucleation may be the most effective therapy if application of medication is difficult in these species.

Further Reading.

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