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WHAT'S NEW IN VETERINARY OPHTHALMOLOGY?

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INTRODUCTION

The practice of veterinary ophthalmology has experienced numerous advances in the past twenty years that have dramatically improved the management of ocular disease. Advancements in the fields of pharmaceuticals, surgical equipment and techniques, education seminars, diagnostics and client awareness has allowed the practitioner to enjoy improved success in managing ophthalmic disease. This information will update the practitioner about the most recent advances in the management of ocular disease.

EXAM ROOM EQUIPMENT

The Tono-pen tonometer has markedly advanced the management of glaucoma in the canine patient as practitioners are diagnosing this condition earlier in the disease process. This directly relates to an improved prognosis as medical and/or surgical management may be instituted earlier in the disease process. Although initially expensive, this tonometer will recover the investment rapidly as every "red" eye should have an intraocular pressure measurement. It will help the practitioner decide how effective glaucoma therapy has been and in cases of uveitis, when treatment may be stopped (pressure returns to normal range). The Tono-pen is an applanation tonometer that measures force over area when touched to the cornea. Four readings are obtained and averaged on a digital screen. The percent error is reported. The Tono-pen is less accurate (personal opinion) at extremely low intraocular pressures (less than 5 mm/Hg) or extremely high intraocular pressures (>60 mm/Hg). A new tonometer is available (Tono-Vet) and is a hand held device that works with a small plastic pin under magnetic control. The pin is activated and projects out of the hand held device six times, touching the axial cornea and measures intraocular pressure. Both tonometers require that the practitioner use them often to become proficient.

The following are Tono-pen tips that will help practitioners obtain accurate readings:

1. Do not push too hard on the cornea.
2. Keep several fingers on the head/nose region for stability.
3. Keep the Tono-pen horizontal with the ground.
4. Do not exert pressure on the globe through the eyelids.
5. Do not obtain a reading when the animal is retracting the eyelids.
6. Topical anesthetic is recommended but is not always necessary. It is invaluable in those patients that resist tonometry.
7. The tip cover should not be too tight or too loose.
8. The second, third and fourth readings are almost always lower (push out aqueous?).
9. Perform routine calibration and cleaning with compressed air.

New types of equipment are available that aid in the practice of veterinary ophthalmology. Indirect ophthalmoscopic lenses are more readily available and less expensive (Welch Allyn) than the past. Indirect ophthalmoscopy remains the best overall method to examine the ocular fundus. Welch Allyn has the panophthalmoscope available (monocular direct) for the past several years. Light weight head band illumination/magnification systems are available to help perform minor surgical procedures (Welch Allyn, Heine).

NEW DISEASE

Bartonella may be a very important disease on the horizon in veterinary medicine. While recognized for years in human medicine, evidence suggests that veterinary medicine is soon to follow.

Bartonella is a facultative intracellular gram-negative bacteria. They adhere to red blood cells and endothelial cells, thus allowing it to invade nearly every organ in the body. *Bartonella* has been found in North America, Europe, Asia, Australia, South America and the Middle East. Most commonly thought of as cat scratch disease, this condition occurs in immunocompetent individuals with an encounter with a cat. The cat flea is involved in the spread of the bacteria (in the flea and flea feces). Cats likely transmit the infection to people by depositing flea feces into human skin via scratch or bite. *Bartonella* can cause 22 human diseases! Most commonly, it has been associated in people with cat scratch disease, bacillary angiomatosis, and fever of unknown origin, eye disease, neurological disease and infectious mononucleosis-like syndrome. It complicates Lyme disease may cause it to be refractory to therapy. It has occurred in people living with declawed cats and in some cases, people with no known exposure to cats. It has been isolated from an *Ixodes scapularis* tick. Spread to other tick species is likely.

In dogs, *Bartonella vinsonii* was isolated from a dog with endocarditis in 1993. It has been associated with pyogranulomatous lymphadenitis, myocarditis, arrhythmias, bone pain, fevers, nonregenerative anemia, cutaneous vasculitis, polyarthritis, anterior uveitis, and meningoencephalitis. Laboratory findings may include neutrophilic leukocytosis, thrombocytopenia and anemia. Eosinophilia and monocytosis have been found. Isolation of the organism is difficult but PCR and serology are useful diagnostic tools. There is strong association of infection with *Bartonella* and tick borne diseases in the dog.

Prevalence among cat populations varies: Seven percent of cats are infected in Minnesota, seventeen percent are infected in New Jersey and twenty eight percent are infected in Virginia. *Bartonella* is suspected to be associated with gingivitis, stomatitis, oral ulcers, **conjunctivitis, anterior uveitis, chorioretinitis**, sinusitis, fever and lymphadenopathy. In some cases, almost 60 percent of affected animals are strongly positive for *Bartonella* infection. Some cats with chronic unresponsive herpes disease test positive to *Bartonella* and improve with treatment. Cats with myocarditis, inflammatory bowel disease and neurological abnormalities are testing positive. Risk factors are environment (shelter, stray), multicat household, fleas, living with *Bartonella* positive cat or person with cat scratch disease.

Therapeutic options include azithromycin (10mg/kg once daily for 3-6 weeks, expensive), tetracycline and enrofloxacin. Antibody titers decline slowly over 3-6 months. Wedgewood

Pharmacy (800-331-8272) sells azithromycin as an oral elixir that is more cost effective.

Testing is easily performed! Most infected cats show no signs of illness although some cats have up to 1,000 bacteria in each milliliter of blood. *Bartonella* testing may be performed by The National Veterinary Laboratory, Inc., P.O. Box 239, Franklin Lakes, New Jersey 07417 (877-685-5227). The test detects antibody against the bacteria.

ADVERSE DRUG REACTIONS

Irritation and/or hypersensitivity are common with certain agents. Clinical signs may include acute chemosis, conjunctival hyperemia, blepharospasm and excessive lacrimation. Topical atropine and tropicamide may be irritating to the conjunctiva. Topical pilocarpine and trifluridine are inherently irritating by nature of their formulation. Aminoglycoside antibiotics (Neomycin in cats) may be irritating and could cause clinical signs similar to the disease being treated. Anaphylaxis and death has occurred in several cats to topical neomycin. Formulated cyclosporine may cause irritation the eye due to the oil or the vehicle.

Topical steroids are **not** associated with elevated intraocular pressure in animals. Chronic and frequent topical application of topical steroids may induce immunosuppression and iatrogenic Cushing's disease. Topical latanoprost (Xalatan) may darken the iris over time. Travoprost and bimatoprost were formulated to avoid this complication. Timolol may lower the heart rate and may be contraindicated in patients with heart disease.

Inadvertent exposure to certain agents to pet owner's eyes may also occur. Atropine prescribed for a pet's eye has been inadvertently applied/rubbed into the owner's eye and the resultant mydriasis caused an emergency room physician to suspect neurological disease. A MRI was performed!

Baytril (fluoroquinolone antibiotic) should not be prescribed at doses higher than 5 mg/kg day in the feline species as retinal degeneration and blindness may develop. Etogesic (nonsteroidal anti-inflammatory drug for arthritis in dogs) has been associated with keratoconjunctivitis sicca.

NEW DRUGS

Tacrolimus is a new drug to veterinary ophthalmology. It is used for the treatment of keratoconjunctivitis sicca and other inflammatory disorders. Its use is extralabel and is recommended twice daily. It is prepared by compounding pharmacies as a 0.02 percent ointment and 0.03 percent solution. Tacrolimus is a compound similar to cyclosporine although it works at a different receptor site. Early studies (poster presentation, ACVO Annual Meeting, 2002) suggest improvement in Schirmer tear test levels in 94 percent of patients and subjective improvement in clearing of corneal scarring and pigment. The author has been using Tacrolimus in the treatment of KCS and other inflammatory corneal conditions for over 2 years with very few adverse side effects. In some cases unresponsive to cyclosporine, there has been marked improvement in tear test levels and corneal clarity.

Lubrithal is a topical high viscosity lubricating agent containing carbomer, a unique viscous gel. Lubrithal is produced in Ireland. It is packaged in large 15 gram tubes and is very beneficial in the management of keratoconjunctivitis sicca and other disorders affecting the tear film or exposure. Lubrithal rapidly covers the entire cornea and improves patient comfort.

GLAUCOMA THERAPY

Xalatan (latanoprost), a prostaglandin analogue, is the most significant medical therapy advancement for canine glaucoma in the past 10 years. This single drug may be more effective alone than any previous medical therapies in combination. One drop of Xalatan may decrease the intraocular pressure from the mid 40's to the mid teens in 1 hour. Xalatan should be applied once daily at night and is contraindicated in cases of anterior uveitis. In some cases, twice daily therapy is necessary. Miosis and iris darkening are common side effects. As glaucoma is a multi-drug disease, other topical and systemic therapies are commonly used in conjunction with latanoprost. Travoprost and bimatoprost are also available and appear to be similarly effective (cheaper).

Azopt (brinzolamide, 1 percent) and Trusopt (dorzolamide hydrochloride, 2 percent) are topical carbonic anhydrase inhibitors employed to decrease the production of aqueous humor. Topical carbonic anhydrase inhibitors appear to be more effective than Timolol in the management of canine glaucoma. They are applied to the affected eye three times daily. These anti-glaucoma medications may be used as prophylactic treatment in eyes that may be at increased risk for glaucoma.

Surgical intervention for glaucoma is indicated when medical therapy is not effective and is better performed early in the disease process. Early and aggressive management of this condition is necessary as glaucoma is not curable. Elevated intraocular pressure causes degeneration of the retina and optic nerve and its effects tend to be cumulative. In veterinary ophthalmology, the trend is toward surgical management earlier in the disease process and includes diode laser cyclophotocoagulation, anterior chamber shunts (alone or in combination) and cyclocryosurgery. Cyclophotocoagulation is transscleral laser energy applied over the ciliary body to cause partial dysfunction of its secretory capability. Secondary cataract formation and hyphema are possible. Anterior chamber shunts are used as a temporary means to divert aqueous drainage from the compromised iridocorneal angle. Ocular hypotony may occur after placement. Over time, anterior chamber shunts often obstruct with fibrin and scar tissue. Combination therapy may be most effective as the anterior chamber shunt helps maintain intraocular pressure in the normal range (10-20 mm/Hg) while the effects of the laser surgery occur (over several weeks). Adjunct medical therapy is often necessary and may include oral carbonic anhydrase inhibitors: methazolamide, 2 mg/kg BID, Timolol 0.5 percent BID, Azopt 1 percent or Trusopt 2 percent TID, Demacarium bromide 0.25 percent BID, Latanoprost 0.005 percent QD, Prednisolone acetate 1 percent TID-QID.

Antioxidants and calcium channel blockers are on the horizon as adjunct therapy in the management of glaucoma. These compounds may help to spare damage to the optic nerve.

INDOLENT ULCERS

Refractory ulcers represent a condition where abnormal basement membrane is produced by the epithelial cells. This prevents normal adherence of the migrating epithelial cells to the corneal stroma and the characteristic loose lip of epithelium is created at the edge of the superficial erosion. Indolent ulcers are always superficial and other causes that delay healing must be investigated (tear test, frictional irritants, exposure, etc). Grid keratotomy (GK) or multiple

punctate keratotomy (MPK) are employed by most veterinary ophthalmologists in the treatment of this condition. Unfortunately, this technique is commonly **misused** in the treatment of deep ulcer, stromal ulcer, infected ulcers, corneal sequestrum and descemetocoeles. Aside from the inherent danger in touching a needle to the cornea, infectious agents could be introduced deeper into the stromal layers and complicate the healing process. GK and MPK **should not** be used in the treatment of feline corneal ulcers as corneal sequestrum may develop.

MELTING ULCER (INFECTED)

Topical fluoroquinolones (Ciloxan, Ocuflax, Quixin, Vigamox, Zymar) are very effective in treating *Pseudomonas* spp. infections of the cornea. In addition, topical tetracycline (Terramycin) is very helpful in arresting the rapid stromal dissolution process. Ciloxan Q1-2 hours and Terramycin QID may be applied upon the initial diagnosis of a melting ulcer. This combination therapy has completely replaced serum and acetylcysteine compounding in my practice. Terramycin is very effective in binding iron and preventing bacterial protein synthesis. Together, these medications have arrested vision threatening infections in many cases that would have either required surgery to structurally support the cornea or enucleation.

CORNEAL STRUCTURAL SUPPORT

Biosist is a material manufactured from the submucosa of porcine small intestine. It provides a scaffold for cells and tissue and is useful in the management of deep corneal ulcers and superficial keratectomy sites.

CATARACT SURGERY

The results of cataract surgery are most successful when phacoemulsification is performed. Most cataract surgeons place intraocular lens implants (15 mm, 42 Diopter rigid or newer foldable lenses) to better correct vision. The main

factors that have increased the success of cataract surgery are earlier surgical intervention via phacoemulsification (immature stage best), controlling lens induced uveitis, placement of an intraocular lens, smaller absorbable sutures (9-0 vicryl or dexon), more frequent and longer term follow-up, improved means of selecting patients (electroretinogram and ocular ultrasound) and owner compliance. Animals with lens induced uveitis may undergo diode laser retinopexy three weeks before cataract surgery to reduce the chance of retinal detachment.

CHERRY EYE SURGERY

The "pocket technique" has been recognized as one of the more successful techniques to correct this condition. Since originally described, several additional steps have been suggested to improve surgical success. The basic steps of the surgery involve creating two parallel incisions on either side of the gland. These two incisions are then sutured together with 6-0 vicryl as the prolapsed gland is positioned ventrally. Care is taken to either bury the knots or suture them on the palpebral surface of the nictitans. Several surgeons have suggested adding a second layer of suture material over first to decrease tension on the incision. In addition, knots are suggested to be tied on the palpebral surface (pass the needle through the nictitans) of the nictitans to avoid corneal frictional irritation.

GENETIC TESTING

Optigen (607-257-0301, www.Optigen.com) is a service company that provides DNA based diagnosis of inherited diseases in purebred dogs. Their main focus is inherited retinal diseases in dogs and only a small blood sample is needed. By identifying carriers, expensive test breeding or inconclusive electroretinogram results may be avoided. Carrier and affected dogs may have other desirable traits and may then be bred to clear dogs.