Dennis E. Brooks, DVM, PhD
Diplomate, American College of Veterinary Ophthalmologists
Professor Emeritus of Ophthalmology
University of Florida
brooksd@ufl.edu

EQUINE RECURRENT UVEITIS (Periodic ophthalmia, moon blindness, iridocyclitis)
Equine recurrent uveitis (ERU) is a common cause of blindness in horses. It is a group of immune-mediated diseases of multiple origins.

Recurrence of anterior uveitis is the hallmark of ERU. The disease is bilateral in approximately 20%.

While the pathogenesis is clearly immune-mediated, the specific causes of ERU are unknown. Hypersensitivity to infectious agents such as *Leptospira interrogans* serovars is commonly implicated as a possible cause. Autoimmune activity against retinal proteins and antigens is also an etiologic component of this disease.

The presence of living Leptospira organisms is not necessary for disease production.

Toxoplasmosis, brucellosis, salmonellosis, Streptococcus, Escherichia coli, Rhodococcus equi, borreliosis, intestinal strongyles, onchocerciasis, parasites such as Halicephalobus deletrix, and viral infections (e.g., equine influenza virus, herpes virus 1 and 4, arteritis virus, and infectious anemia virus) have also been implicated as causes of ERU with no consistency in isolation of these organisms from affected horses. Dead or dying microfilaria of *Onchocerca cervicalis* may release antigens to incite ERU following vascular migration to the eye of living microfilaria.

Leptospira infections in horses occur with exposure to urine or urine contaminated feed or water. Horses with insufficient vaccination or parasite prevention are more prone for viral and parasitic infections. The clinical signs of acute Leptospira infections are generally rather benign and selflimiting, although inappetence, fever, icterus or abortions may be seen.

Serologic testing for leptospirosis, brucellosis, and toxoplasmosis should be considered.

Results of serology can be difficult to interpret as many horses have positive titers with no evidence of ocular or systemic diseases. Not all horses positive for Leptospira have uveitis.

Leptospiral titers for *L. pomona*, *L. bratislava* and *L. autumnalis* should be requested in the United States. Positive titers for serovars of 1:400 or greater are of importance.

Serology for *Leptospira pomona* can be used for prognostic evaluation of the likelihood of blindness occurring in one or both eyes. Seropositive Appaloosas (100%) > seronegative

Appaloosas (72%) > seropositive non-Appaloosas (51%) > seropositive non-Appaloosas (34%) at having blindness occur in at least one eye within 11 years of the first attack.

Horses with ERU display increased lacrimation, blepharospasm, and photophobia.

Subtle amounts of corneal edema, conjunctival hyperemia, and ciliary injection will be present initially, and can become prominent as the condition progresses. Aqueous flare, hyphema, intraocular fibrin, and hypopyon may be observed. Vitreal opacity occurs in some horses.

Miosis is usually a prominent sign and can result in a misshapen pupil and posterior synechiae. Delayed or failure to achieve pharmacologic mydriasis is common when uveitis is active.

A complete ophthalmic examination should be performed to determine if the uveitis is associated with a corneal ulcer. The presence of a corneal ulcer precludes the use of topical corticosteroids, but not topical nonsteroidal drugs.

Intraocular pressure (IOP) is generally low, but ERU may be associated with intermittent and acute elevations in IOP.

Fibrin and iris pigment may be deposited on the anterior lens capsule.

Cataract formation may occur if the inflammation does not subside quickly.

Severe anterior segment inflammation often prevents an adequate fundic exam of the acutely affected eye.

Choroiditis may result in focal or diffuse retinitis, and exudative retinal detachments.
The vitreous may develop haziness due to leakage of proteins and cells from retinal vessels. Vitreal degeneration and liquefaction can occur.

In chronic cases, corneal vascularization, permanent corneal edema, synechiation, cataract formation, and iris depigmentation or hyperpigmentation can result. Secondary glaucoma and phthisis bulbi occur.

Retinal degeneration indicated by focal to generalized peripapillary regions of depigmentation in the nontapetum could result.

The optic nerve head can appear congested.

Inflammation of the pineal body is found in ERU.

Irreversible blindness is a common sequelae to ERU, and is due to retinal detachment, cataract formation or severe chorioretinitis.

In acute stages, lymphocytic infiltration with some neutrophils can be found in the uveal tract, resulting in edema and plasmoid vitreous. In addition, fibrin and leukocytes are present in the anterior chamber that manifests clinically as aqueous flare. Lymphocytes and plasma cells can surround the blood vessels of the iris, ciliary body, choroid, and retina. The chronic stages manifest corneal scarring, cataract formation, and peripapillary chorioretinitis with retinal degeneration and loss of photoreceptors.

ERU Therapy
The major goals of treatment of ERU are to preserve vision, decrease pain, and prevent or minimize the recurrence of attacks of uveitis. Specific prevention and therapy is often difficult, as the etiology is not identified in each case.

Treatment should be aggressive and prompt in order to maintain the transparency of the ocular structures.

Medications should be slowly reduced in frequency once clinical signs abate.

Therapy can last for weeks or months and should not be stopped abruptly or recurrence may occur.

Some horses require life-long therapy!

Overall, the prognosis for ERU is usually poor for a cure to preserve vision, but the disease can be controlled. The Appaloosa breed seems to suffer from the most severe cases.

It is imperative to immediately differentiate a painful eye in a horse as a result of ulcerative keratitis or stromal abscessation from the pain associated with ERU by employing a fluorescein dye test. While corticosteroids are the treatment of choice for ERU, they can lead to the rapid demise of an eye with a corneal ulcer or abscess.

The owner should be educated immediately about the potential recurrence, the blinding nature of this disease, and the possibility of enucleation to remove a painful eye if vision is lost.

Anti-inflammatory medications, specifically corticosteroids and nonsteroidal drugs, are used to control the generally intense intraocular inflammation that can lead to blindness. Medication can be administered topically as solutions or ointments, subconjunctivally, orally, intramuscularly, and/or intravenously.

Prednisolone acetate or dexamethasone should be applied initially.

When the frequent application of topical steroids is not practical, the use of subconjunctival corticosteroids may be used. Systemic corticosteroids may be beneficial in severe, refractory cases of ERU, but pose some risk of inducing laminitis and should be used with caution.

The nonsteroidal anti-inflammatory drugs (NSAID) can provide additive anti-inflammatory effects to the corticosteroids, and are effective at reducing the intraocular inflammation when a corneal ulcer is present. Cyclosporine A, an immunosuppressive drug, can be effective topically for ERU.

Flunixin meglumine, phenylbutazone, or aspirin (10 mg/kg BID PO) are frequently used systemically to control intraocular inflammation. Some horses become refractory to the beneficial effects of these medications, and it may be necessary to switch to one of the other NSAID to ameliorate the clinical signs of ERU.

Topical atropine minimizes synechiae formation by inducing mydriasis, and alleviates some of the pain of ERU by relieving spasm of ciliary body muscles. It also narrows the capillary inter-endothelial cell junctions to reduce capillary plasma leakage.

Although topically administered atropine can last several days in the normal equine eye, its effect may be only a few hours in duration in the inflamed ERU eye.

The ease with which mydriasis can be achieved with intermittent use of atropine is an important indication as to the stimulus intensity of the ERU.

Failure to achieve mydriasis with atropine indicates the stimulus for the ERU is quite prominent, and/or indicates the presence of synechiation.

Observation of signs of abdominal pain and careful monitoring of gastrointestinal motility by abdominal auscultation is important when using topically administered atropine in horses and foals, as gut motility can be markedly reduced by atropine in some horses. Should gut motility decrease during treatment with topically administered atropine, one can either discontinue the drug or change to the shorter acting mydriatic tropicamide.

The use of systemically of topically administered antibiotics is often recommended for ERU. Antibiotics should be broad spectrum, and appropriate for the geographic location of the patient. Topical antibiotics are indicated in cases of uveitis due to penetrating ocular trauma, or ulcerative keratitis.

Antibiotic treatment for horses with positive titers for Leptospira remains speculative but streptomycin (11 mg/kg IM BID) may be a good choice for horses at acute and chronic stages of the disease. Penicillin G sodium (10,000 U/kg IV or IM QID), doxycycline (10 mg/kg PO BID), and tetracycline (6.6 - 11 mg/kg IV BID) at high dosages may be beneficial during acute leptospiral infections.

Tissue plasminogen activator (TPA) has been used to accelerate fibrinolysis and clear hypopyon in the anterior chamber of horses with severe iridocyclitis. An intracameral injection of 50-150 microg/eye can be made at the limbus with a 27-gauge needle under general anesthesia. TPA should be avoided if recent hemorrhage (< 48h) is present.

Multivalent bovine leptospiral vaccines have been used in horses to treat intractable cases of ERU and to suppress herd outbreaks of leptospiral ERU, but their routine use as a preventative for ERU is controversial.

Alternative therapy for ERU
Homeopathic remedies (eg, poultices of chamomile and oral methylsulfonylmethane) for ERU have been used.

Acupuncture has been used to treat ERU.

Surgical considerations for ERU
In addition to medical treatment, pars plana vitrectomy in horses with ERU has been used successfully to remove fibrin, inflammatory cells and debris trapped in the vitreous in order to improve vision and delay the progression of the clinical signs.

Vitrectomy appears more beneficial in European warmbloods with ERU than in Appaloosas with ERU in the USA. The reasons for this are not known. Cataracts occur in a high percentage of cases post-vitrectomy in both regions. Retinal detachment can also occur postoperatively.

Sustained release intravitreal cyclosporine A implants may also be beneficial to treating ERU.

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