

LENS LUXATION OR The Loose Lens Condition

Within the eye, the chief focusing device is the crystalline lens which is most often referred to as just the **lens**. The lens is located behind the **iris** (colored portion of the inside of the eye) within a recess of the **ciliary body**. When the eye is observed normally, the lens is visible deep within the eye and can be seen held within the eye by small fibers called **zonules**. The zonules are attached to the lens and to the ciliary body to keep it in position. Additionally, fluid (**aqueous humor**) fills the front of the eye (**anterior chamber**) and is constantly being made and lost from the eye. Aqueous humor maintains the normal pressure of the eye known as intraocular pressure (IOP). The aqueous humor is made by the ciliary body filtering blood. The aqueous humor then normally flows through the pupil and exits the eye to re-enter the blood through a small cleft between the **cornea** (clear portion in front of the eye) and the iris.

What is a Luxated Lens?

If the zonules break, for any reason, the lens can either become partially loose (**subluxated**) or completely loose (**luxated**). When the lens is luxated to the rear (into the vitreous body), it is known as being **posteriorly luxated**. If the lens is completely loose and falls forward (into the anterior chamber) it is known as being **anteriorly luxated**.

What Causes Lenses to Loosen?

Several causes of zonular rupture and lens luxation are known:

First, in many terrier breeds, lens luxation occurs due to a hereditary rupture of the lens zonules. The condition is most common in the Jack Russell terrier and the Sealyham and Bedlington terriers.

Secondly, any individual patient can develop zonule rupture if there has been serious trauma or inflammation within the eye (uveitis). In cats, subluxated lenses are due to unknown causes and lens luxation occurs most commonly due to uveitis. When uveitis is present, several blood tests are necessary to determine the exact cause of the uveitis in the dog or cat.

Thirdly, lens luxations and subluxations may be congenital (present at birth) due to genetic defects. These are seen in very young patients.

Finally, in any patient, when glaucoma (elevated IOP) has been present for some time, the eye will enlarge and the lens will become loose. For this reason, it is important to discover which came first, the loose lens or the glaucoma.

What are the Consequences of a Luxated Lens?

Because of the flow of aqueous humor through the pupil and out of the eye (as noted above) an anteriorly luxated lens is extremely serious and can cause blinding and painful consequences. An anterior luxated lens will often cause secondary glaucoma or papillary block glaucoma. This occurs due to the lens (or the vitreous body that also moves forward with the lens) physically obstructing the flow of aqueous humor. Within 72 hours of the IOP within the eye becoming elevated, irreversible damage to the optic nerve and retina begins to occur. A posteriorly luxated lens can also cause glaucoma due to a mechanism which is poorly understood. Liquified vitreous material can obstruct the flow of aqueous humor causing glaucoma.

Occasionally in cats, the lens will move forward without becoming completely loose. This appears to be due to aqueous humor which normally moves through the pupil into the front of the eye instead goes into the back of the eye into the vitreous body. This results in an elevation of pressure (glaucoma) due to the iris-corneal space being compressed.

Additional damage to the eye occurs when the lens is luxated anteriorly. The lens will rub on the cornea and damage or kill the cells which line the cornea (**endothelium**). The endothelium is important because its main function is to pump into the anterior chamber any aqueous humor which leaks into the corneal tissue. If the endothelium is damaged or are missing, then fluid will collect within the corneal tissue (edema) which can in turn result in recurring painful corneal ulcers and vision loss due to the cornea becoming opaque.

Lastly, when the lens becomes loose, it will become a cataract. Additionally, if the lens has been loose long enough, the capsule around the lens material may rupture and/or weaken. If this occurs, serious inflammation (uveitis) develops.

What is the Treatment for a Luxated Lens?

The treatment for a luxated lens depends on whether the patient is visual in the affected eye or if there is the possibility of vision. In many patients with a longstanding luxated lens, the lens becomes cataractous (cataract) which obstructs the view of the retina and optic nerve. If a light is shined into the eye with a luxated lens and the pupil of the other eye responds, there is a chance of vision. Lens removal surgery is then recommended in a patient with a luxated lens to help the cornea remain healthy and maintain vision. Possible complications of this surgery include the following: slight bleeding within the eye which usually clears in 1 to 2 weeks. Serious bleeding within the eye which will prevent vision from returning. The lens capsule coming off the lens during surgery which will necessitate a procedure called an anterior vitrectomy needing to be performed. Retinal detachments can occur following this surgery (because this can occur, we perform a laser retinopexy to “spot-weld” the retina to HELP prevent this from occurring.) Infections are possible. Chronic uveitis is possible which could require lifetime treatment.

If the pupil in the opposite eye does not respond or if the view of the retina and optic nerve reveals severe damage due to glaucoma, then the chance of vision is very minimal. In these patients, lens removal will not restore vision, will probably not restore normal IOP since irreversible damage will have occurred, and may result in intraocular bleeding if iris-to-lens adhesions have developed. If the eye is blind and glaucoma is present, then either a **silicone implant** inside the eye (an intraocular

prosthesis) or an **enucleation** (removal of the eye) would be best for the patient to relieve discomfort and prevent further complications. One technique employed to result in a cosmetic, pain-free eye for your pet is the placing of an intraocular prosthesis. The technique involves removal of the contents from the inside of the eye which leaves the outer shell of the eye and implanting a silicone implant within the wall of the eye. The shape of the eye is maintained and the eye moves normally. If you think of making a 'forever' grape by scooping out the insides and placing a marble within the grape skin and finally sewing the skin of the grape closed, you have some idea of how the surgery works. Following the initial postoperative treatment, minimal care is needed and the eye is maintained in a relatively normal cosmetic appearance while being pain-free. Complications of this technique are that corneal ulceration occasionally occurs in about 3% of patients following surgery (due to drying) and scarring of the cornea (resulting in a gray appearance.) Alternatively, the blind, painful eye may be removed (enucleated). At our hospital, after the eye is removed, an orbital silicone sphere is placed within the orbit, the skin is stitched shut and the hair will re-grow over the surgery site. The use of the sphere gives your pet the appearance of having the eye shut. The possible complication to this technique is possible infection. All surgeries require that your pet be anesthetized.

What About a Subluxated Lens?

Treatment for lenses which are subluxated depends on whether the IOP is normal or elevated. If the IOP is normal, then ophthalmic drops are used to insure that the pressure remains normal. In this situation, frequent re-examinations are performed over time to assess whether the lens is becoming looser or is staying in its place. If the IOP is elevated, then laser surgery is recommended to help reduce the production of aqueous humor and thus stabilizing the IOP in the normal range.

What About the Other Eye?

During the initial examination, the opposite eye will be examined to ascertain if the zonules are apparently intact. If the lens appears to be loose due to a hereditary cause, then the lens in the second eye should be removed to prevent the consequences described above. If the lens appears to be normal, then regular lens in the first eye is loose due to inflammation, then we will attempt to find the cause and treat that cause. In this way, the lens of the opposite eye should stay in its normal position.

If you have any questions which aren't discussed in this handout, please ask any of us at Veterinary Ophthalmology Services.