



# Veterinary Ophthalmology Services

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## GLAUCOMA

### What is Glaucoma?

Glaucoma is the elevation of pressure inside the eye (**intraocular pressure**) beyond a specific point at which vision is no longer possible. Glaucoma is a frequent cause of blindness in humans and in our pets. To understand glaucoma, it is necessary to understand how the fluid inside the eye normally flows and maintains normal intraocular pressure. Fluid inside the eye (**aqueous humor**) is produced behind the colored area of the eye (iris) in a portion of the eye called the ciliary body. This aqueous humor is made by filtering blood. The fluid flows through the dark hole in the eye (**pupil**). Finally the aqueous humor drains from the eye at the junction of the clear cornea and the colored iris (**drainage angle**) inside the eye and then the aqueous rejoins the blood. The drainage angle is a sieve-like network. This aqueous humor is made inside the eye and passes from the eye at the same rate. This results in a stable intraocular pressure of 15-20 mm of Hg. Glaucoma is the consequence of a blockage of the outflow of aqueous humor and a subsequent build-up of pressure inside the eye. The resulting high pressure compresses the optic nerve and results in loss of vision and pain with enlargement of the eye.

### Are There Types of Glaucoma?

There are two categories of glaucoma. Primary glaucoma occurs without any other obvious disease in the eye. Secondary glaucoma occurs when some other cause is present. Another way to categorize glaucoma is based on how the drainage angle appears on examination. The drainage angle may be open, narrowed, closed, or abnormally developed. **Primary glaucoma** is known to occur in certain purebred breeds of dogs and is thought to be inherited. Breeds in which we see primary open-angle glaucoma (an abnormal narrowing of the outflow channel) is seen in American and English Cocker Spaniels. In a developmental abnormality of the drainage angle (**goniodysgenesis**) the outflow is decreased during times of inflammation. This condition is commonly seen in the Basset Hound, American and English Cocker Spaniel, Samoyed, Flat-coated Retriever and Chow Chow. **Secondary glaucoma** is the result of some intraocular condition that interferes with the natural flow of aqueous humor. Conditions that commonly cause secondary glaucoma include the result of ocular inflammation (**uveitis**), lens dislocation (**luxation**), neoplasia (cancer), previous surgery and/or injury to the eye. Glaucoma results in blindness by blocking the nerve impulse through the optic nerve. Once the optic nerve has been permanently damaged, there can be no restoration of vision. With early medical and occasionally surgical therapy, your pet's vision may be maintained. Frequently, with extreme elevations of pressure, the eye becomes permanently blind and painful very rapidly. The aim of therapy at that point is to keep your pet pain-free and maintain a cosmetic eye.

### How is Glaucoma Diagnosed?

The diagnosis of glaucoma is based on history, clinical signs, measuring the intraocular pressure [**tonometry**] and visually examining the drainage angle using a process known as

**gonioscopy.** We cannot use the signs of "pain" as a criteria as our pets cannot tell us of their pain directly. Clinical signs of glaucoma include some or all of the following: excessive tearing, a green or yellow eye discharge, a reddened eye, an eye that suddenly looks blue, an eye with a pupil that is large and will not move when light is shined into it, a pet who sleeps a lot, a pet who hides under the bed or a pet who suddenly becomes frightened or irritable. People with glaucoma often report a constant headache that medication will not help. An eye with glaucoma becomes enlarged in later stages of the disease. Tonometry is the measurement of pressure within the eye. A variety of techniques can be used to estimate intraocular pressure, including Shiotz tonometry and applanation tonometry. In our clinic, we use the highly accurate applanation tonometer. Gonioscopy is a technique used to evaluate the drainage angle. It involves placing a dome-shaped contact lens [goniolens] on the corneal surface after numbing the eye with topically applied anesthetics. This lens allows us to directly visualize the drainage angle. Gonioscopy occasionally requires sedation, but in most pets it can be performed after the use of topical anesthetic only. The technique is essential to evaluate the eye that doesn't have glaucoma for risk of a future problem.

### **Is My Pet Likely to Get Glaucoma?**

Breeds which are highly predisposed to glaucoma include:

- Afghan hound
- Akita
- Alaskan Malamute
- Basset Hound
- Beagle
- Border Collie
- Boston Terrier
- Bouvier des Flanders
- Cairn Terrier
- Canadian Welsh Corgi
- Chihuahua
- Chow Chow
- Dachshund
- Dalmatian
- Cocker Spaniel, American or English
- Dandie Dinmont Terrier
- English Springer Spaniel
- Giant Schnauzer
- Great Dane
- Maltese
- Manchester Terrier
- Miniature Pinscher
- Norfolk Terrier
- Norwegian Elkhound
- Norwich Terrier
- Pembroke Welsh Corgi
- Poodle, all types
- Saluki
- Samoyed
- Shih Tzu
- Scottish Terrier
- Sealyham Terrier
- Siberian Husky
- Smooth-coated Fox Terrier
- Tibetan Terrier
- Welsh Springer Spaniel
- Welsh Terrier
- West Highland White Terrier
- Whippet
- Wire-haired Fox Terrier

This is not to say that every dog in the aforementioned breeds WILL get glaucoma. It does mean that every dog in these breeds COULD get glaucoma. Puppies from these breeds should be checked early in life and at regular intervals throughout life to examine their drainage angles and have their intraocular pressures measured.

## **How is Glaucoma Treated?**

Many of us have friends or relatives who have glaucoma. They simply place drops in their eyes several times a day and have very few problems that result in vision loss. In some people medication will not resolve the glaucoma and surgery is necessary. This is what we face in animals all the time and this is what makes glaucoma very difficult to treat in domestic animals. After the initial diagnosis of glaucoma is made, your pet may need aggressive treatment with medication if there is any hope of saving vision.

## **What if My Pet Cannot See Any Longer?**

The goal of surgery in this situation is to help make your pet pain-free. One technique employed to result in a cosmetic, pain-free eye for your pet is the placing of a silicone implant inside the eye [intrascleral prosthesis]. The technique involves removal of the contents from the inside of the eye—leaving 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 post-operative 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 following surgery (due to drying) and scarring of the cornea (resulting in a gray appearance). Finally, the blind, painful eye may be removed (enucleated). After the eye is removed, the skin is sutured closed and the hair will re-grow over the surgery site and a slight amount of pigment will be left. This surgery again requires that your pet be anesthetized. The possible complication to this technique is possible infection.

## **What Are the Long Term Chances for My Pet?**

Glaucoma is seldom diagnosed early enough to restore vision in the first eye affected. Therefore, during the initial examination time will be spent to evaluate the "good" eye. Eventual outcome depends upon early accurate diagnosis, appropriate medical therapy, and regular and consistent reevaluations to save the vision of the remaining eye. Occasionally laser surgery or placement of a shunt can be considered.

## **Conclusion**

Glaucoma remains a leading cause of blindness in veterinary patients. Because of the nature of the disease, many pets are presented at a time when it is not possible to restore vision to the first affected. **Glaucoma is very difficult to treat in our pets.** The goal of the Veterinary Ophthalmologist in treating a pet with glaucoma is to restore vision when possible and, if vision is not possible, to help your pet remain pain-free. Additionally, we want to maintain vision in the second eye as long as possible. Your Veterinary Ophthalmologist teamed with your regular Veterinarian will recommend appropriate therapies suitable for your pet and your circumstances.