

FEATURES

Glaucoma: Diagnosis, Treatment, and Entle Adaptability

by Suzanne Olszowiec

What is Glaucoma?

Basically, glaucoma is increased pressure within the eye. The cells inside the eye produce fluid, which maintains the shape of the eye and provides nutrients. This fluid is called aqueous humour. Under normal circumstances, aqueous humour drains out of the eye through what is called the drainage angle. There are many ways to think of the drainage angle. Some imagine it to be a forest of trees and on the forest floor there are manholes the fluids drain through; others think of it as a sieve or as a sink drain.

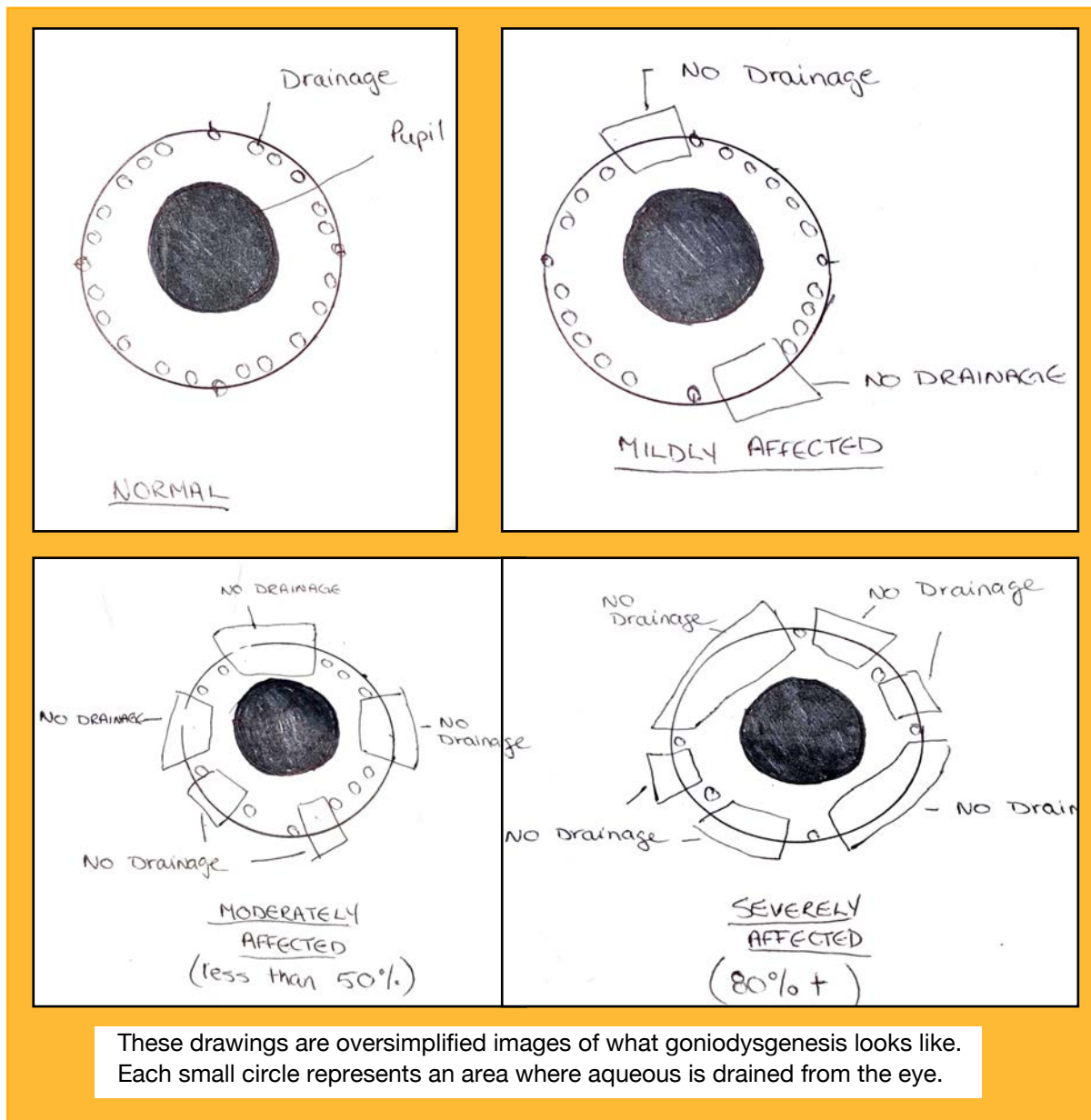
The best and simplest explanation of glaucoma I've heard is from Dr. Terri McCalla, of Animal Eye Care: "The balance of aqueous fluid production (the faucet) and drainage (the drain in the sink) is responsible for maintaining normal pressure inside the eye. In glaucoma, the drain becomes partially or completely clogged but the "faucet" steadily keeps producing aqueous, causing pressure to build inside the eye."

The "drain" can become clogged for different reasons—congenital abnormalities (goniodysgenesis), bacterial/viral infections, or trauma—all of which cause inflammation. Glaucoma is *very* painful in animals, especially during the acute phase.

What are the Types of Glaucoma?

There are two types of glaucoma: primary and secondary.

Primary glaucoma is an inherited condition. Primary glaucoma affects many breeds, including Basset Hounds, Jack Russell Terriers, Shih Tzus, Siberian Huskies, Flat-Coated Retrievers, and Entlebuchers. It usually begins in one eye, but in most



patients, it eventually affects both eyes. Once the first eye is lost to primary glaucoma, the second eye is usually affected within 8-31 months. "The best day with glaucoma was yesterday," was something I was told by Dr. Terri McCalla when my Entle Aspen developed glaucoma in her second eye eight months after losing the first.

Secondary glaucoma is caused when some other eye disease prevents normal fluid drainage from the eye. Examples of conditions which can result in secondary glaucoma include, but are not limited to, uveitis (inflammation in the eye, often induced by trauma), advanced cataracts, tumors or cancers of the eye, and displacement of the lens.

How is Glaucoma Diagnosed?

Diagnosis is made in part by evaluating Intraocular Pressure (IOP) with tonometry (measurement of the intraocular pressure with a tonopen/tonovet). Additionally, slit lamp biomicroscopy, indirect ophthalmoscopy, and gonioscopy are performed.

Usually what is found in one eye is similar to what is found in the second. One eye may be more severely affected than the other, but it is rare to find only one eye affected.

Diagnostic Tests

Tonometry is a test to measure IOP. Normal eyes are 10-25 mm Hg. Anything above 25 is considered glaucoma. Animals often develop IOPs greater than 50-60 mm Hg. It can't be overstated that particularly in the acute phase, glaucoma is *extremely* painful, and pain management is critical.

Gonioscopy involves placing a special "contact lens" on the eye to examine the drainage angle. The veterinary ophthalmologist looks to see if the "drain in the sink" is open (normal), closed, or a mixture.

We used to think that a gonioscopy exam only needed to be done once during your dog's life because the eye would not change. This has proven not to be true in other breeds, and I speculate it's not true for Entlebuchers either. That means it is important that breeding stock be evaluated yearly.

What will the gonioscopy show? The more closed the drainage is, the more likely the dog will develop an issue. This is not an absolute—some dogs with severely affected eyes will never develop glaucoma, while others that are less affected will.

For example, my dog Aspen had 98% of her drainage angle closed. Think of the drainage angle as a circle with holes around the perimeter, and for simplicity's sake, let's say there are 24 drainage holes (like in the sink drain analogy) per eye. There are significantly more, but I chose 24 to make the accompanying images easy to understand. In Aspen's case, that means 23.5 of the 24 holes (98%) were closed or non-existent. During gestation while Aspen was developing, her body didn't fully form open drains or they didn't develop at all. Instead there were solid bands of tissue where the holes should have formed. The greater the number of holes that did *not* develop, the less drainage there is, which increases the likelihood that the eye will not be able to drain appropriately.

These eyes may appear normal for years. Then there is a triggering event, like an infection in the eye or an injury to the eye, and glaucoma develops. Under normal circumstances, the eye was coping, but if any inflammation or change inside the eye occurs, then those drain holes can't keep up with the aqueous humour the eye is still producing. The intraocular pressure builds and now there is an acutely glaucomatous eye.

There are two additional diagnostic methods your vet may use. **Slit-lamp biomicroscopy** and **indirect ophthalmoscopy** allow the veterinarian to assess other structures in the eye such as the

lens, the retina, and the optic nerve, as well as evaluate for cataracts, etc.

Treatment Options

Referral to a board-certified veterinary ophthalmologist is important wherever possible. There are many different treatment options and considerations for glaucoma.

Medical Therapy. Usually eye drops are given to decrease fluid production. Examples of these medications are Dorzolamide, Brinzolamide, and Timolol. These fluid-production-reducing medications may be used in conjunction with drops that increase fluid drainage across the cornea. The most commonly used medications to increase fluid drainage are Latanoprost and Travoprost. They are typically used in acute cases and sometimes used long-term to prevent future pressure spikes. There are also oral medications used to treat glaucoma but these are generally less favored, at least in dogs.

Stress Management. Mitigating stress for a glaucoma patient is very important, as increased stress can cause an increase in IOP despite medication. Adding products like Adaptil (Dog Appeasing Pheromone) collars or diffusers, or one of the many anti-anxiety aids (Zylkene, Anxitane, Bio-Calm) can dramatically reduce stress.

Appropriate "Gear:" Dogs with glaucoma should never be walked in a collar. Instead, they should always be walked in a harness. Collars of any type put pressure on the neck, which can cause an increase in IOP. This is made worse by dogs that pull when they are excited. None of us have ever seen an Entle do that, right?! My dogs do wear flat collars when we walk to carry their identification, but their leashes are always attached to their harnesses, not their collars. Their medical records at the veterinary clinic all have a pop-up message warning staff that they are never to be walked on a collar.

Surgical Therapy. In a non-visual eye, the primary goal is to ensure that there is no pain. The surgical choices are enucleation or evisceration. Enucleation is when the entire globe (eye) is removed along with the tear ducts and eye lids, and the skin is closed. When healed, hair will cover the area. The advantage to an enucleation is the pain is resolved completely—there is no more glaucoma and no further medication is necessary (for that side). The disadvantage is that over time the muscles atrophy in the eye socket, and a depression forms. Some people elect to place a prosthetic (socket conformer) to help prevent this.

Evisceration is when the globe itself is opened, the insides are removed and replaced with a socket conformer to maintain the normal eyeball appearance. Some people feel this is more visually appealing. There is no true advantage to one surgery over the other. Enucleation can be performed by any veterinarian, but eviscerations are more commonly done by a veterinary ophthalmologist.

FEATURES *continued*

For visual eyes, or eyes which are potentially still visual, there are two types of laser surgery: transscleral cyclophotocoagulation and endolaser cyclophotocoagulation. In both cases, the *goal* is to reduce the number of aqueous producing cells, thereby permanently reducing the IOP. When endolaser cyclophotocoagulation is performed, often an artificial drainage valve—called an Ahmed Glaucoma Valve—is also placed.

The decision about which procedure to choose is best determined by the veterinary ophthalmologist and the client.

Chemical Ablation. Although less used in current veterinary medicine, there are times when a good option to reduce pain is chemical ablation. This is done by injecting an antibiotic called gentamicin *into* the globe (known as an intravitreal injection). This kills the cells and permanently reduces the IOP in 95% of patients, and 50% of these patients will develop shrinkage of the globe. This procedure is typically used for patients where prolonged anesthesia isn't an option as it can be done under a very short anesthesia.

Life With Dogs With Glaucoma

There have been eight Entlebuchers in my life. Thus far, five of my eight dogs have been diagnosed with goniodysgenesis of greater than 95% affected. Three of those dogs, who are all now deceased, ultimately lost both eyes to glaucoma.

One dog was not affected at all, one had minimal goniodysgenesis, affecting less than 10% of one eye and 5% of the other. Two of my current Entles with severe goniodysgenesis still have both eyes and are being treated prophylactically twice daily with drops. On their yearly ophthalmology exams, the veterinarian commented she was surprised that one of the two had not yet developed glaucoma, because her eyes have deteriorated so much since last year. The other gave me a scare earlier this year with an eye injury. My 8th Entle has goniodysgenesis, but it doesn't affect more than 50% of either eye.

When my first dog had her first episode of glaucoma, to say I was devastated would have been an understatement. I thought her life was over—what was she going to do without one eye?

Well, she showed me! She did tracking, went swimming in the ocean and in the pool, played hide 'n seek (she always won), and played with her favorite ball as hard as she ever did with her sight.

Then came the day when glaucoma struck her other eye. I had been mentally preparing for this, and there was no hesitation. "Aspen can do anything, life with no eyes, not even a challenge," said the veterinarian who enucleated her eye as an emergency that fated Friday evening.

While Aspen and I were in surgery, my husband went home to make a modification to our deck, putting railings down the stairs and along the only edge that didn't have one so she would be safe. The next day Aspen trotted out of the house, went to jump off the deck as usual, and ran smack into the new railings! She cried and we cried, wondering if we had made the wrong decision. Then suddenly this clever dog stood up, walked over to the new railings sniffed around, huffed over her shoulder, and ran down the stairs like those railings had always been there. She never hit them again. Dogs are incredible at cognitive mapping!

With her new commands (left, right, slow, stop, step up/down), Aspen never had another issue, even in new environments. She could do anything she had ever done sighted, and some things



Aspen and Linden swimming after they lost their eyes to glaucoma.

she excelled at in a way she never done before. Swimming was one of those things. She went to a dog pool every weekend. It was the place where she could play as hard as she wanted, and she couldn't get into any trouble. We played with a loud toy; she would swim full speed and a foot from the edge of the pool she would stop, grab the toy, turn around and swim as hard as she could back to the other end to play the game again and again and again.

Glaucoma sucks, but Entles manage really well and they truly don't feel bad about it if we as

owners don't. It's hard because for humans our sight is so important and is tied to our self-worth. But for dogs, their other senses, particularly smell, are much more important than sight. When the inevitable happens to my current dogs I will be heartbroken, but I know we will get through the initial shock and continue to live one Entle adventure at a time. As far as a

congenital condition goes, I have come to accept glaucoma as a part of my favorite breed.

What to Watch for and How Quickly You Should React

As a veterinary technician, I can tell you that eye issues go from nothing to “something” very quickly. Therefore, I always recommend you take your dog in right away for any eye problems. I have no hard rules, but if your dog has a red eye, or is squinting or rubbing the eye, then in my opinion they should be seen sooner rather than later. If you think there is a size difference between the eyes, make an appointment immediately. If you feel things just aren’t right, they probably aren’t, and I recommend a vet visit.



A Personal Story About Glaucoma

by Elaine Wilson

One spring Saturday morning, our Entle came in from doing her outside business and was squinting her right eye—it was watering. I thought she must have run into a branch or something, but as the day progressed, her eye seemed to be more painful. A visit to the vet didn’t really provide any answers, as no injury could be seen. She was given some drops to treat redness and irritation. I called the vet again after two days with no improvement. We were sent to an ophthalmologist via the emergency vet clinic in town. By now, our dog’s vision in her right eye was gone.

Primary glaucoma in dogs hits forcefully and painfully. Usually, by the time the diagnosis is made, it is too late to save vision, and treatment becomes comfort-related for the affected eye. I keep thinking that had we acted very quickly and asked for a pressure measurement at the initial vet contact, we could have moved to treatment immediately and perhaps (I know, not likely) salvaged a sliver of vision.

Web Resources

1. Veterinary Partner – Glaucoma (public) - <https://veterinarypartner.vin.com/default.aspx?pid=19239&id=6097123>
2. Animal Eye Care website (public) - <http://animaleyecare.net/diseases/glaucoma/>
3. VIN - a private forum for veterinarians

I am not a veterinarian. My best advice is, when in doubt, speak to your pet’s regular veterinarian—that person is the one *best* able to help you. However, if you have questions or just want to talk, I’m always happy to speak with people and answer questions to the best of my abilities. I can be reached by email at lturtleb@shaw.ca or by phone or text at 250.702.4416.

Our next concern became how to protect the vision in our dog’s other eye. Our consultations with veterinary ophthalmologists revealed many different approaches to glaucoma—from eye drops only, to laser treatments and valve placement. We received very different opinions from different doctors, e.g., “when, not if, the remaining eye will lose sight,” “take these supplements,” “maybe, if you want, we can try some laser,” and “we have options that have had some success—laser and/or valve placement.”

Availability of treatments can be very limited due to the scarcity of veterinary ophthalmologists. Living in a large city allowed us to consult more than one ophthalmologist and have choices about treatment paths to pursue. We opted to actively try to preserve our dog’s remaining vision by having an Ahmed valve placed, and later some laser therapy. She did eventually lose her sight, but according to the vet, the treatments doubled her length of time without blindness.



**So, You Want to Show Your Entle?
Part 5: Agility
will be in the Feb. 2020 issue!**

Please tell us what you think!

Our authors and editors work hard on the articles that fill every issue of the Entlebook. They *really* want to hear what you think!

Please fill *Our Readers Speak* column with your comments in our next issue! This issue has several articles we hope will inspire you to comment. Your comments can be kudos, build on what you’ve read, present a different point of view, or even challenge what you’ve read. When appropriate, we will ask authors to comment on your comments.

The deadline for submitting your comments is January 20th. However, we recommend you submit your comments sooner, right after you have read an article and it is still fresh in your mind. Please email your comments to entlebook@nemda.org.