



Glaucoma

What is glaucoma?

In simplistic terms, glaucoma refers to high intraocular pressure (IOP). This leads to damage to various intraocular structures and blindness generally results. It is important to think of glaucoma as a symptom, not a disease in itself. As such, we cannot just diagnose “glaucoma”; we must determine the cause of the high pressure. This is essential because each type of glaucoma needs to be treated very differently, and some treatments suitable for one type of glaucoma will actually make other types worse, leading to devastating consequences for the eye.

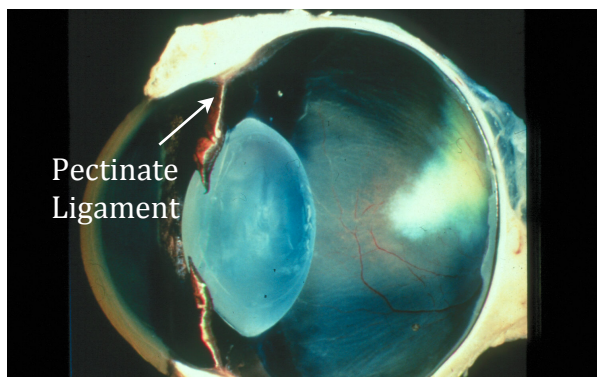
There are various different types of glaucoma. It can be a primary disease or it can be secondary to other types of problems inside the eye (for example lens luxation, tumours or inflammation). In man, glaucoma is usually a chronic insidious disease but in dogs the pressure rise is generally very sudden and this leads to an acute problem. In cats most glaucoma is secondary, either to inflammation or tumours.

Primary glaucoma in dogs

Aetiology

Glaucoma can be an inherited disease in certain breeds of dog. This is termed primary glaucoma and it is a bilateral disease, i.e. it will affect both eyes. Usually one eye becomes blind and the other eye generally follows within 12 - 18 months. The Australian Canine Eye Scheme (ACES) is working to reduce the incidence of this devastating disease by detecting those breeding dogs that are prone to glaucoma, enabling well informed breeding decisions to be made.

Primary glaucoma is caused by a defect in the fluid outflow pathways inside the eye called pectinate ligament dysplasia (PLD). The



pectinate ligament spans the iridocorneal angle (the angle between the iris and the cornea) where the fluid inside the eye (the aqueous) leaves the eye. This iridocorneal angle is like the drain in a sink - the angle needs to be open and clear of obstructions in order for the pressure inside the eye to remain normal. In PLD the angle is abnormal (analogous to a blocked drain), predisposing them to glaucoma. Although animals are born with this PLD, they generally do not get glaucoma until they are 3-5 years old, but the age of onset of the disease can vary enormously.

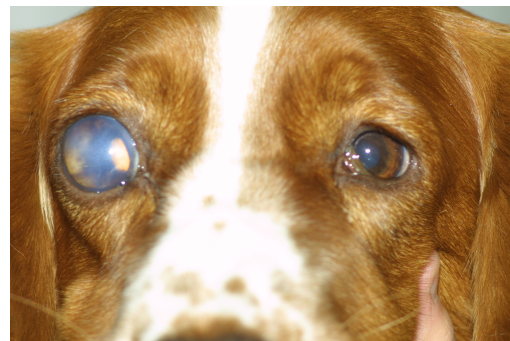
Symptoms

The symptoms are a sudden onset of redness, clouding and blindness in the affected eye, and the pupil becomes dilated and unresponsive to light.

In the acute stage the condition is painful, but later the patient seems to become more tolerant of the pain. Humans with glaucoma often refer to the pain as an ache (an eyeball ache or a head ache) rather than an acute painful eye. As such it can be difficult for us to know if an animal is in pain with glaucoma because they do not necessarily have their eye closed even though they may be suffering chronic pain.



Chronic glaucoma leads to enlarging of the eye, termed buphthalmos.

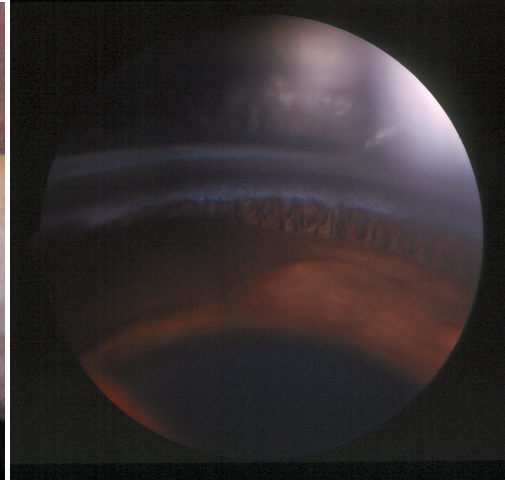


Diagnosis

Primary glaucoma is diagnosed by gonioscopy (from Gk, *gonio* = angle, *scope* = to view).



Gonioscopy being performed



Gonioscopic view of the drainage angle

This is a very important test to have done as this will help to determine the cause of the glaucoma. If primary glaucoma is confirmed this means that the other eye is at risk of developing the disease. This is very important because we know that if we prophylactically treat a predisposed eye we can prevent or at least delay the onset of glaucoma in the second eye (see below). Knowing that an eye may become affected by glaucoma also allows us to be in a position to act quickly when glaucoma does strike the second eye, perhaps using high power medications in the short term or early intervention surgically (see below).

Treatment

Glaucoma is an unforgiving condition. Once the pressure becomes elevated the eye only has a maximum of 24-48 hours before it becomes permanently blind. It therefore must be recognised as soon as possible and its cause accurately determined as quickly as possible so that the correct treatment can be implemented. Sometimes medical treatment can be utilised to good effect in the short to medium term, but long term successful treatment generally requires surgical intervention using either

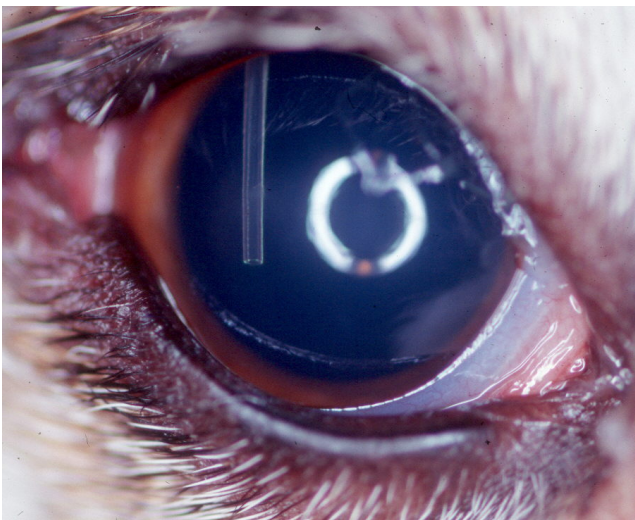
gonio-implant (shunt) surgery or laser treatment.

Medical treatment

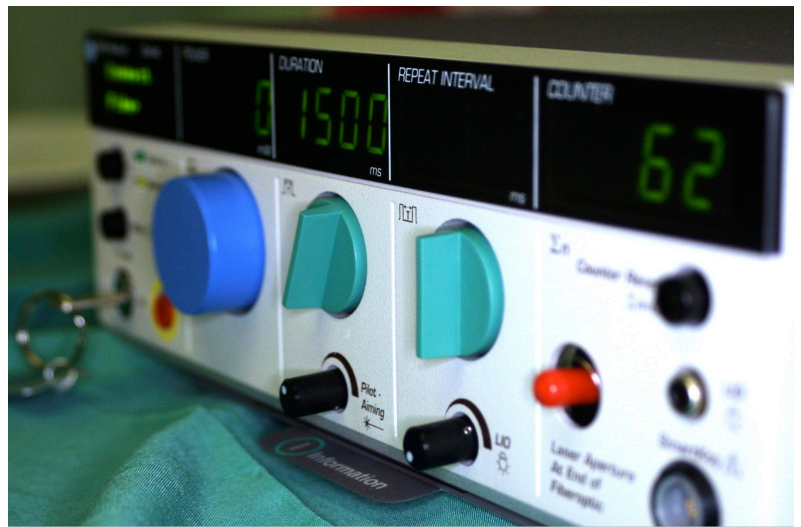
The best medical treatment for primary glaucoma is the use of a prostaglandin analogue medication. These medications are generally very effective at reducing the IOP, at least for a while. Although these drugs are the best treatment for primary glaucoma, they can make secondary glaucoma much worse, hence the need for accurate identification of the cause of the glaucoma (i.e. gonioscopy, ultrasound etc). Specialist assessment is generally recommended before these potentially dangerous drugs are used.

Surgical treatment

Surgery provides the best chance for long term control of glaucoma. Surgery may involve placing a gonio-implant into the eye to provide an alternative outflow for the fluid inside the eye, or it may involve using laser surgery to reduce the production of the fluid inside the eye (trans-scleral cyclophotocoagulation).



A gonio-implant (shunt) inside an eye



Laser treatment for glaucoma is often the best way to preserve vision in glaucoma affected eyes

These surgeries can provide the only hope to save vision (or even the eye itself) in many cases. When all else

fails and the eye is permanently blind, painful and requiring long term medication, enucleation (removal of the eye) or placing an intra-scleral prosthesis may become indicated.

Treatment of a predisposed eye

If an eye is known to be predisposed to primary glaucoma (i.e. if PLD is found on gonioscopy) then prophylactic treatment using carbonic anhydrase inhibitor drops is generally advised. This may help to prevent or at least delay the onset of glaucoma in the second eye.

Emergency treatment of a predisposed eye at home

In addition to this permanent medication, an emergency glaucoma kit can be recommended. As glaucoma can strike at inconvenient times (such as in the middle of the night or while on holiday with your pet) it may be useful to be prepared for the condition to strike. Having a prostaglandin analogue on hand is generally advised, and this drop can be administered hourly until proper assessment can be achieved. In addition the use of glycerine (glycerol) at a dose rate of 1½ g per kg of body weight administered orally using a syringe (while withholding all oral liquids and foods) can also help reduce the IOP for approximately 10 hours in emergency situations, buying valuable time until the eye can be assessed by a specialist ophthalmologist. Glycerol is available over the counter at most pharmacies.

Secondary glaucoma in dogs

Successful treatment of secondary glaucoma involves treating the underlying cause, possibly together with a topical carbonic anhydrase inhibitor. Causes of secondary glaucoma include:

- lens luxation
- intraocular neoplasia
- uveitis

Glaucoma in cats

Glaucoma in cats is generally secondary to uveitis, or in some cases intraocular neoplasia. Primary glaucoma is much less common in cats.

Glaucoma in cats is poorly responsive to topical prostaglandin analogues

and generally a topical carbonic anhydrase inhibitor is recommended, together with treatment of the underlying cause.