

Gwen Sila, DVM, and Harriet Davidson, DVM, MS, Diplomate ACVO, Michigan Veterinary Specialists, Southfield, Michigan

Intraocular Hemorrhage

Hemorrhage into the eye can result from primary intraocular conditions or can be secondary to systemic disease.

Any disease that causes uveitis or vasculitis can lead to leakage of blood vessels and subsequent hemorrhage. Bleeding into the anterior chamber is termed *hyphema*. It may present as a distinct clot (**Figure 1**), a ventral collection of settled red blood cells (**Figure 2**), or a diffuse red appearance. Posterior segment bleeding can also vary in appearance, consisting of vitreal hemorrhage that makes the retina impossible to visualize or focal hemorrhages surrounding retinal arteries or veins.

It is important to differentiate true retinal hemorrhage from a subalbinotic fundus that lacks pigmentation and thus allows the orange vasculature of the choroid to be seen (**Figures 3 and 4**). Subalbinotic funduses are most common in blue-eyed and merle-coated animals.

Causes & Diagnostics

Some common causes of intraocular hemorrhage in both dogs and cats include infectious diseases, which cause vasculitis, uveitis, systemic hypertension, intraocular tumors (both primary and metastatic), trauma, and coagulopathies. Both general history and physical examination

are important. Careful questioning to determine the animal's travel history to regions with endemic tick-borne diseases, such as ehrlichiosis and Rocky Mountain spotted fever; potential exposure to anticoagulant rodenticides; and the possibility of trauma to the eye is essential.

A minimum database of complete blood count, serum biochemical profile, and urinalysis should be obtained. Doppler blood pressure will help rule out systemic hypertension. Especially in older animals, a metastatic thoracic study is a reasonable diagnostic step to look for evidence of neoplasia. If coagulopathy is suspected, clotting times should be determined. Should a systemic disease process be identified, treatment of the condition should be initiated.

Examination should include fluorescein staining to ensure there are no corneal abrasions, which might alter treatment. Measurement of intraocular pressure is important as it is frequently altered with hyphema. Dilation of the opposite eye to evaluate the fundus may be helpful in determining bilateral conditions.



1
Clot in the anterior chamber of a 15-year-old domestic shorthair cat. The hemorrhage was caused by systemic hypertension secondary to renal disease.



2
Hyphema that has settled ventrally. Faint corneal edema, mild buphthalmos, and scleral injection are also present. This dog had a resorbing cataract that led to retinal detachment and anterior lens luxation (both diagnosed with ocular ultrasonography) that caused both anterior- and posterior-segment hemorrhage. The eye was eventually enucleated.

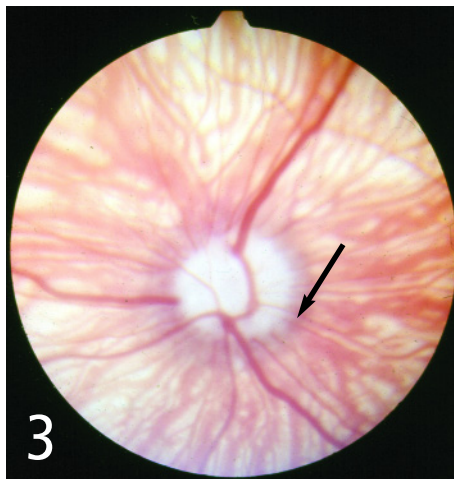
Courtesy Dr. Cassandra Bliss

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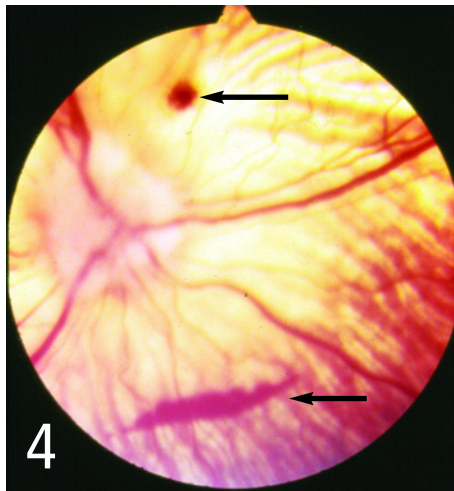
Treatment & Prognosis

Antiinflammatory Medication

Initial treatment should involve a topical antiinflammatory medication. Uveitis can be both the cause and a result of hemorrhage. As the immune system attempts to clear blood from the eye, an inflammatory response results. The purpose of the antiinflammatory medication is to prevent further damage. Topical steroids are an excellent choice as long as corneal ulceration is not present. Frequency of application will depend on severity of disease: With diffuse hyphema in a painful eye, application 4 times a day is sometimes necessary. In a less painful eye



Normal subalbinotic and atapetal fundus. Note the retinal veins and arteries (*arrow*) overlying the deeper choroidal vessels, which are visible because the tapetum and choroidal pigment are absent.



Subalbinotic atapetal fundus in a dog with retinal hemorrhage (*arrows*). The hemorrhage was secondary to radiation therapy for a nasal carcinoma.

with an organized clot or resolving hyphema, once-daily treatment may suffice.

Topical antiinflammatory agents do not penetrate into the posterior segment and are not useful for vitreal or retinal hemorrhage. In these cases, oral steroids may be helpful. Topical nonsteroidal antiinflammatory drugs may help control uveitis, but theoretically could inhibit platelet aggregation and potentiate hemorrhage.

Glaucoma Considerations

Glaucoma is a common sequela to hyphema. In cases of hyphema with glaucoma, it is preferable to avoid prostaglandin analogs because they may potentiate inflammation. In addition, systemic drugs, such as mannitol and glycerin, are not useful for intraocular hemorrhage because they require an intact blood–aqueous barrier to exert their osmotic effects. Topical carbonic anhydrase inhibitors and topical beta-blockers are more appropriate therapeutic choices.

Atropine

If intraocular pressures are normal, topical atropine can be used to stabilize the blood–aqueous barrier and prevent painful ciliary spasm. Typically, atropine is administered once or twice daily depending on degree of inflammation. Intraocular pressure should be monitored to avoid glaucoma.

Prognosis

The overall prognosis for an eye with hyphema varies. Development of glaucoma or uncontrolled uveitis is a negative prognostic indicator for vision. Diffuse hyphema that is slow to resolve may indicate a retinal detachment because detachment tends to cause repeated bleeding episodes. Vitreal hemorrhage is also commonly seen with retinal detachments and may take several weeks to resolve.

When to Consider Referring

If the underlying cause cannot be determined or the eye is not responding adequately to treatment, referral to an ophthalmologist is recommended. Ultrasonography may help diagnose intraocular tumor, lens luxation, scleral rupture, or retinal detachment.

Complicated cases that involve corneal ulceration require careful monitoring because topical antiinflammatory drugs can impede corneal healing. Advanced procedures, such as conjunctival pedicle grafting or corneal–conjunctival transposition, may be indicated for repair.

When the visual axis is blocked by a clot in the anterior chamber, an injection of tissue plasminogen activator into the eye may be indicated. This agent induces fibrinolysis and clot break-up. The goal of such a procedure is to facilitate clot removal to restore vision. When the hyphema is more diffuse and is obscuring vision, the ophthalmologist may recommend inserting a special probe into the anterior chamber to irrigate and aspirate the hemorrhage.

The Referral Process

When referring a patient to an ophthalmologist, it is important to forward recent blood analysis results and a detailed history of medications. Results of all diagnostic tests (both ophthalmic and systemic) should be forwarded. Drawings or descriptions of past corneal or anterior segment pathology may be invaluable. Providing a date with any drawings and diagnostic tests allows the ophthalmologist to better evaluate the pet's response to treatment.

When Referral Is Not an Option

Pets should be weaned off medications over a period of weeks to months and monitored periodically to ensure that the problem does not recur and intraocular pressure does not change. Some animals may require life-long treatment.

Enucleation is recommended for chronically painful and blind eyes or when medical therapy is cost-prohibitive. The benefit is twofold: the animal's comfort level is improved and the underlying cause of the disease process can sometimes be determined with histopathologic analysis. Enucleated globes should be submitted to a pathologist who is comfortable with ocular pathology. ■

See Aids & Resources, back page, for references, contacts, and appendices.

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