

Ophthalmic Examination Made Simple

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An ophthalmic examination should not be a daunting experience. Interpretation of examination findings may be challenging; however, the examination follows a logical, anatomical order. Furthermore, it does not require expensive equipment. In fact, the most important items required are non-ophthalmic (see **What You Will Need**).

STEP-BY-STEP ■ OPHTHALMIC EXAMINATION

STEP 1: GROSS INSPECTION



1 Mild blepharospasm in the left eye of a cat diagnosed with feline herpesvirus 1-associated dendritic ulcers. Signs of mild pain are best observed from a distance, without touching the facial area.

Observe the patient as it walks into the room. An unfamiliar environment, like the examination room, may highlight visual deficits that can later be evaluated in more detail. After completing the history and physical examination, begin the ocular assessment by carefully observing the patient from a distance. At this point, avoid touching the patient's facial area as this may cause distortion of the palpebral fissure.

While observing the patient, consider:

- Are both eyes open normally? Is there evidence of pain (**Figure 1**) or photophobia? Is the animal blinking normally?
- Are the eyes of normal size and position? Is there evidence of exophthalmos or buphthalmos? Are the pupils of equal size?
- Is the eyelid conformation normal? Is there evidence of entropion or ectropion (usually of the lower lid)? Is the third eyelid elevated?
- Is there ocular discharge? What is its nature?

What You Will Need

- Room that can be darkened
- Transilluminator
- Magnifying loupe
- Schirmer tear test strips
- Fluorescein stain strips
- Tonometer
- Topical anesthesia
- Tropicamide solution
- Ophthalmoscope
- Fine forceps
- Swabs

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STEP 2: ASSESS VISION

Vision is most commonly tested by evaluating the menace response. This involves making a sudden, threatening gesture, which should elicit a blink response. The menace response involves cerebral cortical integration and interpretation and, therefore, is not a reflex. The menace response should be evaluated in one eye, while the other eye is covered (**Figure 2**). Avoid touching the patient's eyelashes/hair or causing wind movement; this may lead to a false-positive response. Consider making the menace gesture from behind a glass partition.



2 The menace response test administered by making a threatening gesture with the hand. The untested eye is covered, and care is taken not to touch the facial hair, to prevent a false-positive response.

Author Insight

Medications (sedatives, opioid analgesics) can alter mental status, and the menace response may be missing in a visual animal. Reasons for a false negative include facial nerve paralysis (ruled out by testing the blinking reflex), young age (usually <10–12 weeks), and patient's mental status.

STEP 3: EVALUATE PUPILS

After the light has been dimmed, pupil dilation should be evaluated. In the dim light, stand far enough away from the patient to visualize both pupils simultaneously, using the tapetal reflection. The tapetal reflection also serves to highlight (by means of retroillumination) any ocular opacities, particularly in the lens or vitreous humor.

Next, use a bright light to evaluate the pupillary light reflex (PLR). Unlike the menace response, the PLR is a subcortical reflex. Its afferent arm depends on the integrity of the retina, optic nerve, optic chiasm, and proximal optic tracts up to the pretectal nuclei. Therefore, it does *not* test vision, and a normal PLR may be found in a cortically blind animal. The PLR is usually present (although it may be diminished or slow) in animals suffering from outer retinal degeneration, cataracts, and other causes of subcortical blindness. Nevertheless, the PLR is an important test as it helps localize lesions cause vision loss.

If one of the pupils does not react to light, or if it cannot be visualized (eg, cases of severe corneal edema or hyphema), the consensual PLR should be checked (**Figure 3**). Alternatively, check the dazzle reflex; this is also a subcortical reflex, which is manifested as a bilateral, partial blink in response to a very bright light.



3 Severe hyphema following head trauma in a dog. As the pupil cannot be seen, checking the consensual PLR or dazzle reflex has great prognostic value.

Author Insight

A common cause of a false-negative PLR is a weak source of stimulating light. Use a fully charged focal trans-illuminator to elicit the reflex.

PLR = pupillary light reflex

STEP 4: EXAMINE ANTERIOR EYE STRUCTURES

Continue the examination in a dark room using magnification and a focal light source. The anterior eye structures are examined in anatomical order.

STEP 4A EYELIDS & EYELASHES

Evaluate the size of the palpebral fissure; look for a narrowed or enlarged fissure. Carefully examine the skin for discharge and for signs of dermatologic disorders (eg, dermatitis, alopecia, scaling, swelling, crusting, and ulceration). Pay particular attention to the eyelid margin; normally, the entire margin should be in close contact with the globe (**A**). Lack of contact may be caused by ectropion (drooping lid). If the margin, or parts of it, cannot be seen, the lid may be inverted (entropion). Eyelash abnormalities may be better visualized if the lid is slightly retracted. Dark lashes can then be highlighted against the background of the white conjunctiva.

STEP 4B THIRD EYELID & CONJUNCTIVA

At rest, the third eyelid should be mostly retracted and hardly visible. The inner aspect of the third eyelid margin may be examined after application of topical anesthetic and eversion of the lid with fine forceps. Look for foreign bodies or hyperplasia of lymphatic follicles.

Similarly, examine the conjunctiva lining the inner aspect of the eyelids and globe for moistness, as well as any change in color, congestion, edema, prominent vessels, masses, thickening, discharge, or subconjunctival hemorrhage (**B**).

STEP 4C CORNEA & SCLERA

The normal cornea should be smooth and transparent. Any deviation from these characteristics represents pathological changes. Look for loss of transparency (**C**) caused by:

- Edema—a bluish haze of the stroma with an “orange peel” outline
- Pigmentation—deposition of melanin in the epithelium or superficial stroma, usually caused by chronic irritation
- Vascularization—individual blood vessels that appear branching if the vascularization is superficial or chronic, and/or “brush-bristle”-like if deep or acute
- Cellular infiltration—white-to-yellow haze in the stroma with indistinct borders and in the presence of other signs of active inflammation
- Lipid or mineral deposition—glistening white speckles in the stroma
- Fibrosis—a white, feathery opacity of the stroma, which presents with well-defined borders and no other signs of inflammation.

Look for surface irregularities, which may be caused by ulceration, perforation and iris prolapse, granulation tissue, feline corneal sequestration, keratoconus, or foreign bodies. Evaluate the corneal diameter. An enlarged diameter may indicate glaucoma, while a reduced diameter will indicate a phthisical or microphthalmic eye. In unilateral cases, one can easily compare the corneal diameter of the presenting eye to that of the normal eye. If uncertain, or in bilateral cases, the corneal diameter should be measured using the markings on a Schirmer tear test strip. The corneal diameter is breed-dependent, but is 18–22 mm in most dogs, and 16–18 mm in most cats. Alternatively, use an ultrasound machine to measure the axial length of the globe, which should be about 21 mm in most dogs and cats.



The eyelids of the right eye are in correct anatomical position, firmly in contact with the globe, and the eyelid margin of the entire lower lid can be visualized.



The outer surface of the third eyelid can be inspected by pressing on the globe (through the upper lid), thus causing protrusion of the third eyelid. The palpebral conjunctiva of the lower eyelid is also inspected at the same time by everting the lower eyelid.



Corneal edema and superficial vascularization in a dog with leishmaniasis. Blepharitis is also present.

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STEP 4D ANTERIOR CHAMBER

Assess the depth of the anterior chamber (best visualized from the side), as it may be increased or decreased in various intraocular diseases. Normally, the aqueous humor should be clear. Look for any opacities or masses, including:

- Blood
- Fibrin—amorphous white to yellow strands or clots in the anterior chamber (D)
- Hypopyon—inflammatory cells in the anterior chamber
- Aqueous flare—microscopic inflammatory material in the anterior chamber, which causes scattering of a well-focused light slit
- Luxated lens—a clear or opaque sphere in the anterior chamber
- Persistent pupillary membranes—fine strands of iris with a base in the iris collarette, and a distal tip that may be free floating, or touching the lens capsule, corneal endothelium, or a distant part of the iris
- Uveal cysts—single or multiple, free-floating or fixed fluid-filled “balloons” that have well-defined borders and can be transilluminated
- Vitreous strands—fine, gray-to-white wisps that can be seen entering the anterior chamber at the pupillary margin

STEP 4E IRIS & PUPIL

Look for alterations in pupil shape, which may be caused by:

- Anterior or posterior synechiae—adhesion of the iris to the cornea or the anterior lens capsule, respectively, will result in an irregularly shaped pupil, and decreased or absent iris motility
- Iris atrophy—loss of iris tissue, especially near the pupil margin, resulting in holes or very thin iris, which can be retroilluminated
- Hypoplasia or coloboma—congenital absence of iris tissue, leading to iris bowing, or formation of holes or notches in the iris (E)

Changes in pupil color may indicate cataract, hemorrhage, or retinal detachment. The pupil may be miotic in uveitis, mydriatic in glaucoma and various retinal diseases, and abnormally dilated or constricted in various nervous system diseases.

Examine the surface of the iris for any masses or changes in color. These may be caused by inflammation, hemorrhage, pigmentary changes, atrophy or neoplasia. Fluttering of the iris may indicate lens luxation.

STEP 4F LENS

A comprehensive lens examination requires dilation of the pupil. The lens may be examined with direct illumination and visualization, or by retroillumination using tapetal reflection. The two main pathologies are opacities, which would indicate cataract or luxation (F). Anterior lens luxation can be diagnosed rather easily, as the anterior chamber is mostly filled with a clear or opaque sphere, usually causing corneal edema and severe pain. Posterior lens luxation should be suspected when the anterior chamber is deeper than normal and the iris is fluttering, as it no longer rests on the lens. The lens may sometimes be seen resting horizontally in the bottom of the vitreal cavity, and the optic nerve head and retinal vessels may be seen without the aid of an ophthalmoscope.



Hypohemorrhagic hyphema and fibrin in the anterior chamber cause loss of aqueous humor transparency.



The pupil is abnormally shaped as a result of iris coloboma in the nasal half of the pupil (6 to 12 o'clock). The red reflection through the pupil indicates a subalbino fundus, which is a normal variation.



A nuclear cataract visible with direct illumination in the eye of a dog.

Author Insight

Elderly dogs with nuclear sclerosis are frequently presented for cataracts. Dilate the pupil and use retroillumination to reach a correct diagnosis.

STEP 5: OPHTHALMOSCOPY

Ophthalmoscopy should be conducted in a dark room, following pupil dilation. Carefully inspect the entire fundus, evaluating changes in the tapetum, non-tapetum, blood vessels, and optic disc.

Additional Tests

- Schirmer tear testing is used to evaluate tear production and diagnose keratoconjunctivitis sicca. It should be conducted early in the examination, as any ocular manipulation may induce reflex tearing, and prior to the topical administration of any diagnostic or therapeutic eye drops.
- Fluorescein staining is used to diagnose corneal ulcers. Superficial corneal disease may be diagnosed using Rose Bengal, which stains devitalized epithelium.
- Samples for bacteriology, mycology, and cytology may be taken as indicated. Bacteriology and mycology samples should be taken before any drops are put in the eye, as solutions frequently contain preservatives.
- Nasolacrimal patency is evaluated by passage of fluorescein from the eye to the nose, by cannulating the nasolacrimal system, and by dacryocystorhinography.
- Ultrasonography is frequently used in ophthalmology. Main indications are for imaging the retrobulbar area and the posterior segment when they cannot be visualized (eg, because of hyphema or cataracts). CT and MRI techniques may be used in certain cases.
- Additional tests, including gonioscopy (evaluation of the iridocorneal angle as part of a glaucoma diagnosis) and electroretinography (recording electrical responses of the retina to flashes of light, to determine retinal function) may be available in referral centers. ■ **cb**



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Monocular indirect ophthalmoscopy is used to examine the fundus.

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Perform an ophthalmoscopic examination of all patients, not just ophthalmic cases. This will help practitioners gain the required proficiency and familiarity with normal fundus variations.

For further suggested reading, see page 89.



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