

## Review Article

## Management of Orbital Diseases

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Orbital diseases are common in dogs and cats and can present on emergency due to the acute onset of many of these issues. The difficulty with diagnosis and therapy of orbital disease is that the location of the problem is not readily visible. The focus of this article is on recognizing classical clinical presentations of orbital disease, which are typically exophthalmos, strabismus, enophthalmos, proptosis, or intraconal swelling. After the orbital disease is confirmed, certain characteristics such as pain on opening the mouth, acute vs. chronic swelling, and involvement of nearby structures can be helpful in determining the underlying cause. Abscesses, cellulitis, sialoceles, neoplasia (primary or secondary), foreign bodies, and immune-mediated diseases can all lead to exophthalmos, but it can be difficult to determine the cause of disease without advanced diagnostic imaging, such as ultrasound, magnetic resonance imaging, or computed tomography scan. Fine-needle aspirates and biopsies of the retrobulbar space can also be performed.

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**Introduction**

As it can be caused by a variety of disease processes, orbital disease can be subtle (chronic) or acute in its presentation. The orbit is a confined space without capacity to expand; thus, clinical signs can be primary or secondary. Primary signs include decreased retrobulbar protrusion, exophthalmos, or strabismus. Secondary signs such as chemosis, lagophthalmos, exposure keratitis, conjunctival hyperemia, increased intraocular pressure, scleral indentation, or third eyelid protrusion can also be present<sup>1</sup> (Fig 1).

Trauma-related diseases of the orbit, such as proptosis, retrobulbar hemorrhage, abscesses, or orbital fractures, may present acutely to the veterinarian. Sometimes patients with orbital disease, whether acute or more chronic, may present on an emergency basis because of intense pain, noticeable facial and periorbital swelling, inability to blink or fully open the mouth, third eyelid protrusion, epistaxis, facial asymmetry, or decreased appetite and lethargy. Although these signs may be nonspecific, they often accompany orbital issues.

It is important to be able to accurately diagnose orbital disease as it can commonly be mistaken for conjunctivitis or other causes of a “red eye.” If orbital disease is not recognized or certain orbital problems are misdiagnosed, appropriate treatment may not be initiated and infections and tumors can worsen.

**Orbital Anatomy**

Understanding orbital anatomy is important in the diagnosis and treatment of orbital diseases. The orbit is a complex structure that contains the eye and retrobulbar soft tissues. It contains muscle, fat, nerves, blood vessels, and the bony orbit.<sup>2</sup> Any alteration in any of these structures can lead to a change in eye position or motility.<sup>3</sup> Dogs and cats have an incomplete bony orbit,

which means that the lateral wall and floor of the orbit are not bony. The lateral orbital wall is made up of the lateral orbital ligament that attaches the zygomatic process of the frontal bone to the frontal process of the zygomatic bone.<sup>1</sup> In species with an incomplete bony orbit, the masticatory muscles also play a role in support of the orbit and globe.<sup>3,4</sup>

The orbit is closely related to the masticatory muscles, nasal cavity, paranasal sinuses, mouth, and zygomatic salivary gland.<sup>3</sup> The relationship of the orbit to these structures in the head is extremely important when investigating clinical orbital disease because dental disease, facial fractures, inflammatory muscle diseases, head and periocular infections, and neoplasia can greatly affect globe position.

**Clinical Signs and Approach to Exophthalmos**

Orbital diseases result in alterations in orbital volume, which typically leads to some degree of exophthalmos (increased orbital volume) or enophthalmos (decreased orbital volume).<sup>5</sup> Exophthalmos is the most common presentation associated with space-occupying masses or abscesses. The 2 main presentations of retrobulbar swelling are intraconal and extraconal, the latter being more common. The classical presentation of extraconal swelling is exophthalmos because the globe and normal orbital structures are displaced. Extraconal swelling can also cause lateral, medial, dorsal, or ventral deviation (strabismus) in eye position. Clinical signs of orbital disease can be relatively nonspecific, but the history and duration of disease as well as evidence of painful swelling vs. nonpainful swelling can be helpful to distinguish orbital inflammation (abscess or cellulitis) from orbital neoplasia (Fig 2).

The first step in the clinical approach is to determine if the eye is truly exophthalmic.



**Fig. 1.** Exophthalmos and third eyelid elevation in a mixed-breed dog with a tooth root abscess. (Image courtesy of Ellen Belknap.)

### Distinguish Exophthalmos From Other Causes of a “Red Eye”

- *Observe the eyes from a distance and from above the patient's head.* Look for the eye to extend beyond the orbital rim (Fig 3).
- *Retropulse the globes!* They should retropulse the same as each other. When retropulsing, use index fingers and gently press on the closed upper eyelids of both eyes at the same time. Depending on the breed of dog (dolichocephalic > mesaticephalic > brachycephalic or cat), the eye should significantly or slightly retract in the orbit when pressed gently (Fig 4).
- *Examine for vision.* Occasionally, with exophthalmos, the eye would be blind due to optic nerve compression or involvement or a retinal detachment (severe extraconal swelling can sometimes cause focal retinal detachments). However, vision is usually normal with exophthalmos and is typically absent in cases of buphthalmos and chronic glaucoma.
- *Examine for third eyelid elevation.* Approximately half of the exophthalmic globes have subtle or severe third eyelid elevation, which is rarely present with buphthalmos.
- *If possible, examine the tissue posterior to the last upper molar.* You may see or palpate swelling behind the last molar. Reluctance to open the mouth due to pain may require sedation or general anesthesia to examine (Fig 5).

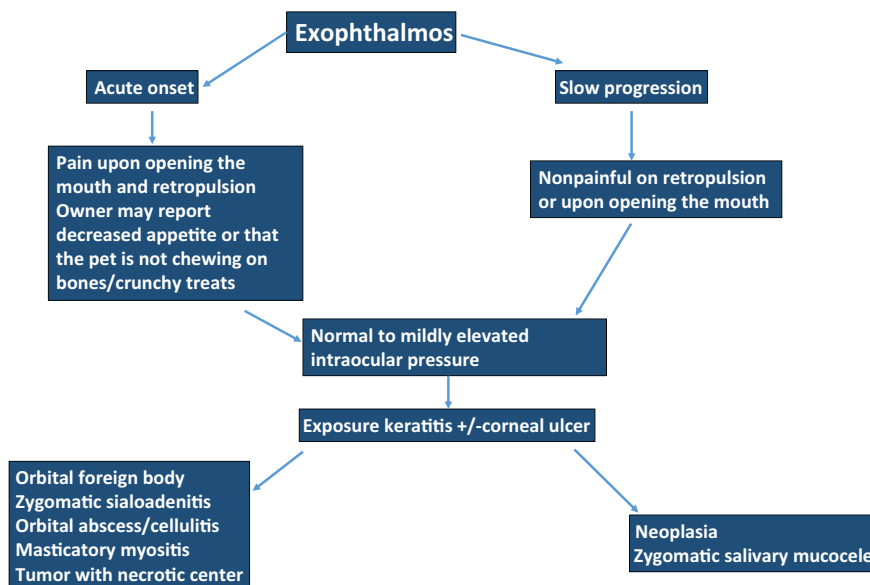
- *Check intraocular pressure.* Exophthalmos can sometimes cause mildly elevated intraocular pressure (20–30 mm Hg), but this is usually in severe cases. Exophthalmic globes should not have classical signs of glaucoma, such as diffuse corneal edema, mydriatic pupils, and buphthalmos (Fig 6). If still unsure of buphthalmos, measure horizontal corneal diameter of both eyes. If the globe is of normal size, it should not differ more than 1 mm from the fellow eye.<sup>1</sup>
- *Determine whether exophthalmos is intraconal or extraconal.* If there is inflammation or a mass in the extraconal area, the globe is likely to be either exophthalmic or have strabismus depending on the severity and location of the swelling. The patient is also more likely to have third eyelid elevation. If swelling is within the intraconal area, the globes are deviated directly along the direction of the orbital axis and it is rare to have third eyelid involvement.
- *Always try to open the mouth.* If the swelling or mass is inflammatory (abscess or cellulitis or necrotic tumor), the patient experiences extreme pain when the ramus of the mandible comes in contact with the pterygoid muscle. It is good to inform pet owners that this may be painful and that the mouth should be opened slowly (Fig 7).

### Causes of Exophthalmos

#### Retrobulbar Abscess or Cellulitis or Foreign Body

Orbital cellulitis and retrobulbar abscesses are usually characterized by acute onset, variable degrees of exophthalmos, extraconal swelling, periorbital swelling, fever, and pain.<sup>6</sup> These cases commonly present emergently because of the acute swelling and pain associated with them. The typical presentation is unilateral exophthalmos, third eyelid protrusion, serous or mucopurulent discharge, and episcleral vessel congestion.<sup>5</sup> Pain is typically present on palpation of the orbit or periorbital tissue and when attempting to open the mouth. A fluctuant swelling behind the last molar is also a common finding. Commonly cited causes of orbital abscesses or cellulitis are abscessation of molar teeth,<sup>7</sup> hematogenous spread, foreign body migration through the conjunctiva or the oral mucosa,<sup>8</sup> or trauma to the oropharynx.<sup>6</sup>

Other less common causes of retrobulbar abscess or cellulitis are extensions from otitis externa or media or interna,<sup>9</sup> bone,<sup>10</sup> sinus,<sup>11,12</sup> nasal cavity,<sup>5</sup> and salivary gland infections.<sup>13</sup>



**Fig. 2.** Clinical signs of exophthalmos.

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