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Ophthalmology

Differentiating Between Exophthalmos and Buphtalmos

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Exophthalmos is a normal-sized globe that is being pushed forward by a space occupying lesion in the orbit, most commonly a retrobulbar abscess/cellulitis or neoplasia; myositis of the extraocular muscles, and salivary cysts/mucoceles are also possible (though rare) causes of exophthalmos. Buphtalmos, on the other hand, is a normally-positioned globe that is enlarged due to elevated intraocular pressure (IOP), i.e., glaucoma. However, despite differences in globe size and causes, clinicians may find it difficult to differentiate between the two syndromes, as both present with an asymmetric appearance of the globe.

Some tests, such as ultrasound or tonometry (discussed later), may provide a definitive diagnosis. However, frequently it may be possible to differentiate between exophthalmos and buphtalmos during examination, without resorting to other instrumentation. Signs that clinicians should evaluate include:

1. Glaucoma and buphtalmos may present as either a unilateral or a bilateral disease. However, in most cases exophthalmos will present as a unilateral problem. Therefore, bilateral presentation usually indicates that the primary problem is glaucoma.

2. A history of acute vs. chronic, progressive presentation is not helpful in differentiating between exophthalmos and buphtalmos, as both presentations are possible in both syndromes. However, once the clinician has established the presence of exophthalmos, the history may help in determining the primary cause. A majority of retrobulbar tumors present with progressive exophthalmos, while a majority of retrobulbar abscesses present with acute exophthalmos.

3. Amount of visible conjunctiva. In exophthalmos the eye is pushed forward, and therefore excessive conjunctiva is visible. In buphtalmos, the eye is stretched but remains in its normal position inside the orbit. Therefore, excess conjunctiva is usually not visible.

4. Observe the animal from the top of the head. For the reasons just explained, exophthalmos may be readily visible from the top, as the lids are pushed forward. In buphtalmos, they should be in normal position.

5. Evaluate the position of the third eyelid. This is normal in most cases of glaucoma (though severe pain may sometimes cause enophthalmos and passive elevation of the third eyelid). The third eyelid is usually elevated in exophthalmos, as the space occupying retrobulbar mass usually pushes against the third lid, causing its elevation.
6 Estimate the diameter of the cornea. It is normal in exophthalmos, and increased in buphthalmos due to stretching of the globe. This examination sounds a little “far fetched”, but in fact it is a very sensitive test. In many cases you will be able to detect even a slight increase in corneal diameter, especially in unilateral cases, when you can compare the two corneas.

7 Perform a retropulsion test. Use 2 fingers to gently push on the globe, through the upper eyelid. In buphthalmos, the eye may feel hard but it will sink readily into the orbit. In exophthalmos, there will be resistance to the retropulsion, caused by the presence of a retrobulbar space occupying mass. Note that this test is not a measurement of IOP, but of resistance.

8 Are there signs of conjunctivitis? As noted in the “Red Eye” abstract elsewhere in these proceedings, glaucoma may present with a red “ciliary flush” and some lacrimation, but the conjunctiva is of normal consistency. The conjunctiva is also normal-appearing in most exophthalmos cases that are caused by a retrobulbar tumor. However, exophthalmos caused by a retrobulbar abscess/cellulitis is usually accompanied by conjunctivitis and purulent discharge.

9 Check for evidence of pain. Glaucoma, retrobulbar abscesses and retrobulbar tumors are all potentially painful diseases (though a retrobulbar tumor may be less painful in the initial stages). However, in retrobulbar disease causing exophthalmos there is an increase in the amount of pain when the clinician attempts to open the patient’s mouth. This is because opening the mouth causes the ramus of the mandibula to press against the retrobulbar mass. Therefore, the animal may yell or struggle. In glaucoma, opening the mouth will not affect the degree of pain.

10 If you succeeded in opening the mouth, look behind the last upper molar. It will be normal looking in glaucoma. Retrobulbar disease may sometimes present with a draining fistula or changes in the color or consistency of the soft palate.

11 Are there unique signs associated with either syndrome? For example, striate keratopathy or corneal edema are associated with glaucoma, but not with causes of exophthalmos. On the other hand, mandibular lymph nodes may be enlarged in many cases of exophthalmos (caused by either a retrobulbar tumor or abscess), but will be normal-size in glaucoma. Vision and the presence of PLR are not reliable differential signs, as optic nerve damage may occur in all diseases.

All of the above tests can be performed without any special instrumentation, and in many cases they are sufficient for a tentative diagnosis. However, several specialized tests can give a conclusive answer:

1. Tonometry, or measurement of IOP. Pressure will be normal in exophthalmos and elevated in glaucoma. However, remember that tonometry measures IOP in the anterior chamber. In cases of 360° (annular) posterior synechia, it is possible that the animal is suffering from elevated IOP in the posterior chamber and buphthalmos, but tonometry will be normal. Also, because of loss of scleral elasticity in old age, buphthalmos may persist even after IOP has been lowered, as the sclera does not readily contract.

2. Imaging. An ultrasound is very useful for imaging of retrobulbar masses in cases of exophthalmos. It can also be used to measure the axial length of the globe, and determine whether it is normal or enlarged. Advanced imaging techniques, such as CT or MRI, may yield additional diagnostic information in cases of exophthalmos.

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