UPSTATE VETERINARY SPECIALTIES PLLC
152 Sparrowbush Road
Latham NY 12110
t: 518.783.3198
f: 518.783.3199
e: info@uvsonline.com
www.uvsonline.com

VESTIBULAR DISEASE

The vestibular system helps the body maintain balance and helps to coordinate the position of your head, eyes, neck, and limbs in space. When this system malfunctions, it can lead to symptoms including: dizziness, nausea, head tilt, rapid eye movements, abnormal eye position, ataxia (wobbliness), leaning, falling, rolling, circling, or inability to stand.

The vestibular system is located in two areas: peripherally (outside the brain) in the inner ear and centrally (inside the brain) in the brainstem and cerebellum.

CAUSES OF PERIPHERAL VESTIBULAR DISEASE

Idiopathic Vestibular Syndrome

Idiopathic vestibular syndrome is a common cause of peripheral vestibular disease, particularly in dogs. This is also known as "geriatric" or "old dog" vestibular disease as it is usually seen in older patients. Animals typically have a very sudden onset of head tilt, balance loss, and rapid eye movements. This syndrome can only be diagnosed by ruling-out other causes of vestibular disease with an MRI. Most animals will begin to improve within 72 hours with supportive care (nausea drugs, fluid therapy, assisting patients to stand and walk). Full improvement can take up to 2 months, and some animals can have residual neurologic deficits that do not fully resolve (such as a head tilt).

Otitis Media/Interna

Otitis media/interna (middle/inner ear infections) causes up to 50% of vestibular disease in dogs and cats. The bacteria commonly responsible for this disease are *Staphylococcus* spp., *Streptococcus* spp., *E. coli*, and *Pseudomonas* spp. Diagnosis can be made by performing MRI or CT scan to evaluate the inner ears and performing a myringotomy. With this procedure, the eardrum is punctured to remove a sample for bacterial culture. This helps to ensure the patient is treated with the appropriate antibiotic course. Antibiotic therapy should be continued for 6-8 weeks.

The vestibular signs may resolve in 1-2 weeks, but if antibiotics are prematurely discontinued, the clinical signs and infection recur and can be more difficult to treat. Corticosteroids are usually not required and are avoided if osteomyelitis is present. In animals with recurring infections, underlying dermatologic problems such as atopy or

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hypothyroidism should be investigated and treated. Ear hygiene should be monitored, but care should be taken when cleaning the external ear canals. Some refractory cases can require surgery (External ear canal ablation and bulla osteotomy).

Nasopharyngeal Polyps

Polyps are pedunculated masses that arise from the lining of the tympanic cavity, eustachian tube, or nasopharynx. Polyps may occur as a result of chronic middle ear infection or from ascending infection from the nasopharynx. Diagnosis may require advanced imaging if physical examination and skull radiographs are not helpful.

Neoplasia

Neoplasia of the structures of the ear includes squamous cell carcinoma, ceruminous gland adenocarcinoma and lymphoma.

Ototoxicity

There are many drugs listed as being ototoxic and can potentially cause both vestibular dysfunction and deafness. The deafness caused by such drugs is often permanent, whereas the vestibular disease may resolve, or at least the dog may compensate for the abnormality. Drugs that can cause toxicity include chlorhexidine and aminoglycoside antibiotics.

Trauma

Head trauma may cause vestibular disease, which may be peripheral or central depending upon the severity of the trauma. Middle ear hemorrhage subsequent to a trauma may cause peripheral vestibular disease seen with or without facial paresis and Horner's syndrome.

Congenital Disease

Peripheral vestibular disease may be evident in young animals and attributed to a congenital malformation or degeneration of the inner ear structures. If the abnormality is bilateral, these animals may not have a head tilt or nystagmus; however, they will frequently have a symmetrical ataxia, a wide-based stance, and a side-to-side movement of the head in the horizontal plane. They may also be deaf.

Numerous breeds have been associated with congenital vestibular disease (German Shepherd, Doberman, English Cocker Spaniel, Beagle, Siamese, Burmese, Tonkinese). Clinical signs usually begin around 3-4 weeks of age (when

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the animal begins to ambulate) and may consist of a head tilt, nystagmus, strabismus, ataxia, circling, falling, rolling, and abnormal head movements. Many learn to compensate by 2-4 months of age, but some will remain permanently affected.

CAUSES OF CENTRAL VESTIBULAR DISEASE

Inflammatory Disease

The common infectious diseases responsible for inflammation of the brain and its structures are canine distemper, feline infectious peritonitis (FIP), *Toxoplasma*, bacteria, and *Cryptococcus*. Whilst all the above infections can cause vestibular disease, they often have a multifocal central nervous system distribution and may also cause profound systemic abnormalities. The prognosis for each patient not only depends on the infectious etiology but also on the severity of the presenting signs, neurological as well as systemic. There are several sterile inflammatory diseases that are immune-mediated. These include granulomatous meningoencephalitis (GME) and necrotizing meningoencephalitis; these can both affect the central vestibular system as part of a multifocal disease.

Neoplasia

Tumors such as meningioma, glioma, lymphoma, or others, can directly cause vestibular signs if they affect the brainstem or cerebellum. Tumors can also cause vestibular disease by increasing pressure in the brain.

Metronidazole Toxicity

Metronidazole dosed at greater than 30 mg/kg/day can result in vestibular disease. The onset is acute and usually occurs when animals receive high doses for a long duration (e.g., after being on high doses for 7 to 12 days). Removal of the drug and supportive care usually results in quick recovery. Occasionally, deficits are permanent.

Cerebrovascular Disease

Cerebrovascular disease (CVD), or stroke, may cause a sudden onset of central vestibular signs. Strokes can be ischemic (loss of blood supply) or hemorrhagic (bleeding into the brain). There are a variety of underlying causes of CVD, though no cause can be found in about 50% of animals. Recovery from this disorder can be complete but can depend on the underlying disorder.