

## Health and welfare information about your cat from Vetlexicon Felis.



### Horner syndrome

A syndrome is a term given to a group of signs that have significance when they all occur together. It is important to realize that having a syndrome is not the same as having a diagnosis. A syndrome, however, often has a limited number of causes such that recognizing a specific syndrome allows us to look more clearly for a small number of possible disease causes (ie the diagnosis).

Horner syndrome is a collection of signs resulting in a constricted, small pupil (miosis); drooping of the upper eyelid; a slightly sunken eyeball in the eye socket (enophthalmos) and protrusion of the third eyelid. The condition is caused by damage to sympathetic nervous system as it supplies the eye on the affected side of the head.

### What is the sympathetic nervous system?

Our bodies have numerous functions that are controlled by our nervous systems, yet we are completely unaware of them. Our heart and respiratory rates, the amount of sweat and we produce, circulation to different body areas, pupil dilation and constriction are all regulated by our nervous systems automatically and without our knowledge or control. The part of our

nervous system dedicated to these automatic systems is called the autonomic nervous system.

The autonomic nervous system is divided into the sympathetic nervous system and the parasympathetic nervous system. The parasympathetic system maintains a status quo, 'rest and digest'; the sympathetic system prepares the body for a 'fight or flight' situation. Some changes that might be stimulated by the sympathetic system include: increased sweating, dilated pupils, increased heart rate, and increased blood flow to muscles. Both systems coexist in balance in the healthy body.

In the eye, the sympathetic nerve fibers dilate the pupil, widen the eye lids, drop the third eyelid, and keep the eye in a forward position in the socket. The parasympathetic nerves constrict the pupil, raise the third eyelid and retract the eye for protection. Both systems are working at the same time, one system slightly dominating the other depending on what is happening.

When the sympathetic nerves controlling one of the eyes is damaged, only the parasympathetic nerves work and Horner syndrome is seen.

### **Why does my cat have Horner syndrome?**

The sympathetic nerve supply to the eye is carried by tiny nerve fibers called neurons. This is a long, three-neuron pathway and damage to any part of it can cause Horner syndrome. Not only that, but certain types of injuries are more likely to occur at certain areas along the path. Therefore, knowledge of where in the pathway the problem is likely to be will help understand the diagnosis.

The path begins in the cat's hypothalamus (part of the brain). This neuron exits the brain, traveling through the brainstem and down the spinal cord in the neck to the start of the chest. This is known as the first order neuron or the central neuron.

This neuron then synapses (connects) with the second neuron in the pathway. Here it exits just inside the chest at the level of the first, second and third thoracic vertebra. The neuron then forms the cervical sympathetic trunk, a bundle of nerves that travels back up the neck, this time outside the spinal cord, to the vicinity of the middle ear. This segment is known as the second order neuron or the pre-ganglionic neuron.

From there, the nerves synapse to the last segment of nerves known as the third order neuron or postganglionic neuron. This segment starts just below the ear and travels all the way to the eye.

Disease can occur in the region of the neck, spinal cord, chest, neck, ear or eye. Disease can result from the damage caused by trauma, the presence of a tumor, infarction (abnormal blood clot), ear infection, or diseases of the eye itself. Each segment of the nerve pathway is vulnerable to different types of damage so that knowing which segment is involved gives us a good idea of what caused the damage.

### **What signs will my cat show?**

Commonly cats will exhibit the following signs:

- Ptosis - drooping of the upper eyelid.
- Miosis - constriction of the pupil (so the affected pupil will be smaller than the unaffected pupil).
- Enophthalmos - a slightly sunken eyeball in the eye socket (occurs due to loss of innervation of the muscles in the orbit making them relax, sinking the eye).
- Protrusion of the third eyelid (occurs passively due to the enophthalmos described above).
- Conjunctival hyperemia (reddening of the white of the eye).

On occasion it is possible to see only two or three of the above signs. This is sometimes known as partial Horner syndrome.

### **How will my veterinarian diagnose it?**

Ideally your cat will need to have a neurological examination to see if any other signs are present that allow us to know where in the sympathetic nerve supply the problem is likely to be. An MRI scan can help find out what disease process is affecting the nerve and subsequently to determine if treatment is possible. If the underlying cause is middle ear disease then treatment will also be required for this, as well as any necessary supportive treatment such as pain relief.

### **What diseases affect the first order neuron?**

This is the most uncommon location for Horner syndrome. Typically, diseases causing first order Horner syndrome also have other signs present that are usually more concerning than the Horner syndrome itself. Diseases that affect nerve fibers in the brain, brainstem, or spinal cord include tumors, vascular accidents (such as a stroke), ischemic myelopathy in the spinal cord (eg fibrocartilaginous embolism where a small piece of intervertebral disk material blocks a small spinal vessel), or even a herniated intervertebral disk in the area of the neck. Horner syndrome stemming from any injury such as one of these might prompt a search for other neurological issues such as lameness, weakness or wobbliness in the limbs, abnormal awareness or pain. However, these other signs are usually readily apparent. Advanced imaging such as an MRI might be a good idea.

### **What diseases affect the second order neuron?**

Diseases that affecting the cervical sympathetic trunk include forelimb injuries, especially following trauma if the leg is pulled and the nerves that exit the spinal cord in the armpit area become over-stretched. A tumor growing slowly in these nerves can also cause an initial forelimb lameness that slowly progresses and results in Horner syndrome several weeks or months later. Sometimes a mass in the chest (in the region called the cranial mediastinum), such as a tumor, will damage the sympathetic trunk. Neck trauma such as a cat being caught by the collar and accidentally strangled can be severe enough to cause a second order lesion.

### **What diseases affect the third order neuron?**

These are the most common causes of Horner syndrome with ear disease and idiopathic Horner syndrome being seen the most. Inflammation in the middle ear can easily lead to a Horner syndrome. Middle ear infection is sometimes associated with vestibular disease (ie a head tilt, balance issues and abnormal flicking of the eyes - called nystagmus) and/or weakness/paralysis of the face on the same side as the Horner syndrome. In cats, ear polyps can occur which are small warts that develop within the ear canal and cause fluid to build up

resulting in infection. It is important to get your cat's ear checked with Horner syndrome in case one of these polyps is visible. These need removal if found. However, a final and common cause for Horner syndrome is idiopathic. This is a term that means we do not know the underlying cause but the problem tends to resolve by itself at an average of 8 weeks (though can take up to several months) without causing any long-term ill effects. Therefore if the above investigations draw a blank, this is the most likely diagnosis.

### **How do I treat Horner syndrome?**

It is not necessary to treat Horner syndrome. The syndrome is not painful and does not interfere with vision. The significance of the syndrome is that it indicates nerve damage that must be recognized. If you wish to treat the syndrome for cosmetic reasons, phenylephrine eye drops can be prescribed to relieve clinical signs but this is not recommended. The most important thing is to determine what caused the Horner syndrome. The Horner syndrome itself probably does not need treatment, but its underlying cause very well might. Therefore treatment is aimed at management/treatment of the underlying cause/s of the disease and supportive care. Therefore, advanced imaging, including MRI, is imperative to ascertain if middle ear disease or another disease process (tumor etc) is the underlying cause, and to decide on the most appropriate treatment, ie surgery on the middle ear, drainage options or medical management.