Headshaking in Horses, A Literature Review
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Introduction to Headshaking

You and your horse are having a relaxing trail ride through the woods. It is a beautiful and sunny day and the shade of the woods and the cooling breeze keep you comfortable. All is going well and you feel it is time to turn for home. As you leave the woods and the shade and shelter it provides, the sunlight and breeze hit your horse in the face. Suddenly, your horse stops moving and starts flinging his head about as if he just rode through a swarm of bugs. For a few moments you have no control over your horse. He turns around so the wind and sun are behind him, and he relaxes. You dismount and lead your horse home the last few kilometres, as he tosses his head around the whole way back.

Headshaking is not actually a disorder, but is a symptom of many disorders. Since there are many possible causes of headshaking, there are also many possible treatments as well. Most horses examined for headshaking are considered idiopathic, which means there is no known cause, so often multiple treatments are tried before symptoms are reduced or resolved. Often the symptoms are not seen by the veterinarian as the milder cases may not show in a predictable manner, so the opinions of the owner or rider may be the only way to determine how effective any chosen treatment is (Mills et al, 2002).

Horses of any age, breed, or gender can experience headshaking. Geldings are more likely to experience headshaking, as are Thoroughbreds (Madigan et al, 2001). Initially headshaking was suspected of being a vice or evasion in response to poor riding technique, but since so many horses were described by their owners as being well behaved or very reliable except for the headshaking during an owner survey, research is generally now directed towards
identifying a physiological cause. Horses who headshake are no more likely to exhibit a behavioural stereotype than a horse who does not headshake.

**Symptoms**

Headshaking may be as mild as the occasional toss of the head, or as severe as the horse constantly throwing its head about non stop. How headshaking is treated depends entirely on how the symptoms present in the horse. There was no commonly used classification system for the severity of headshaking, but the following table describes the grading system used by Newton et. al. during their study in the year 2000.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Symptoms</th>
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<tbody>
<tr>
<td>1</td>
<td>Intermittent and mild clinical signs. Facial muscle twitching. Rideable.</td>
</tr>
<tr>
<td>2</td>
<td>Moderate clinical signs. Definable conditions under which they occur/develop. Rideable with some difficulty.</td>
</tr>
<tr>
<td>3</td>
<td>Rideable but unpleasant ride. Difficult to control.</td>
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<tr>
<td>4</td>
<td>Unrideable, uncontrollable.</td>
</tr>
<tr>
<td>5</td>
<td>Dangerous with bizarre behaviour patterns.</td>
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</table>

Headshaking is described as the vertical, horizontal, or circular tossing of the head, often in an uncontrollable manner (Voigt et al, 2009). The horse may act like insects have flown up their nose and they are trying to remove the irritant but no insects are present (Madigan et al, 2001). Horses who headshake often also rub their head more than non headshaking horses, typically on their own legs or other objects, and may snort excessively (Pickles et al, 2011). Horses have even been seen immersing their muzzle in water to get relief (Bell, 2004).
Often symptoms are only present during exercise. If this is the case, symptoms sometimes only occur at the trot but can be unpredictable or intermittent (Mills et al, 2002). Headshaking can occur at any gait depending on how badly the horse is affected though. Horses who show symptoms when not being exercised are typically much more severely affected than horses who only headshake when being worked (Voigt et al, 2009).

Many horses with headshaking will avoid having rain or wind striking them in the face (Mills et al, 2002). Another weather and climate related cause is sunlight (Stalin et al, 2008). Often when these horses are taken from a more dimly lit area like a barn into the bright sunlight the horse will react by shaking its head.

For many horses, headshaking symptoms are related to the seasons. For horses with an allergic cause to headshaking, the symptoms often start in the spring. Some horses may continue to headshake in the summer, but most horses have a reduction in symptoms in the fall and by winter are symptom free (Madigan et al, 2001).

**Why Does It Matter?**

Since headshaking in horses can be caused by so many potential illnesses or diseases, it can take some time to try and find a treatment that works. If the veterinarian cannot find a treatment, the horse may be referred to a specialized veterinary facility which may not be close by. This can be very expensive and time consuming for the owners of headshaking horses.

Horses that are badly enough affected that their balance is thrown off when headshaking can not be ridden safely, and any horse having a headshaking episode may result in temporary loss of control by the rider creating a further safety hazard (Stalin et al, 2008). Some horses are so severely affected they need to be euthanized as they are dangerous to handle on the ground as
well. Even with a post mortem exam for a headshaking horse, typically there are no abnormalities found when compared to horses who do not headshake (Newton et al, 2000).

So What Causes Headshaking?

One of the first suspected causes of headshaking is an allergic reaction, typically in the eye or nasal passages (Stalin et al, 2008). For horses with allergic conjunctivitis, exposure to the sun appears to irritate the horse and cause headshaking (Bell, 2004). For horses with allergies the headshaking presents seasonally, often resolving by the fall and not usually present during winter.

Sometimes an injury can cause headshaking. A horse can fracture their nuchal crest or damage the nuchal ligament. If the injury causes swelling or bone forms as the injury heals, and either causes pressure on the nerves in the poll area, headshaking can result (Voigt et al, 2009). Insertional desmitis of the nuchal ligament and damage to the tendons at the attachment point can also cause similar pressure on the nerves. For these horses, headshaking begins after an injury to the poll area and is described as an acute onset. Signs of trauma to the area appear in diagnostic images as bone formation or calcification within tendons and ligaments. For headshaking caused by bone growth or repair, horses may not begin headshaking until a few weeks after an injury.

Inner ear infections can stimulate the trigeminal nerve through the optic nerve, which can cause irritation leading to headshaking (Madigan et al, 2001). Exactly how this occurs is not yet known, but treating these affected horse's ear infections will resolve the headshaking. Horses with eye injuries or illness, like a corneal scratch, may also headshake, and symptoms resolve when the problem is treated.
A preliminary study has found that horses who headshake do transmit nerve signals through the trigeminal nerve differently than non-headshaking horses do (Pickles et al., 2011). The nerves from horses who headshake transmitted signals more quickly than nerves in non-affected horses. While scientists are not quite sure of what causes the nerves to react differently, they are developing techniques to measure the differences and look for a cause.

The reason some horses only headshake during exercise is not fully known. When horses exercise there is an increase in autonomic nerve activity (Madigan et al., 2001). If the horse already transmits nerve signals too quickly, then the additional stimulation from exercise can cause the horse to interpret the signals as pain or tingling. Most nerves have a threshold below which the signals are not sent, but if enough stimulation occurs the nerves will react. For mildly affected horses, riding into sunlight can be the stimulation level needed to cause the discomfort.

For horses who headshake with no discernable cause like allergies, the cause of headshaking is believed to be a trigeminal nerve disorder (Roberts et al., 2009). Humans suffer from a condition of neuropathic facial pain syndrome caused by abnormal nerve function, and a similar phenomenon is being investigated in horses. If the trigeminal nerve in the face is sending signals abnormally, then signals from it or the nerves connected to it such as the optic nerve may be distorted as well and the horse may interpret this as pain.

For horses who headshake in response to sunlight it is believed the sun stimulates the optic nerve, but the ophthalmic section of the trigeminal nerve is also activated. This would cause an itching or tingling sensation, similar to what causes humans to photic sneeze (Madigan et al., 2001). For horses who only headshake during exposure to sunlight, this could be the cause.
Unfortunately, the signs of headshaking are the same regardless of cause, so deciding which section of the nerve is problematic can be difficult.

As headshaking appears to have a large neural component, headshaking horses were examined to see if an infection of the EHV-1 could be causing the pain in many cases (Aleman et al, 2012). Nerve biopsies were taken from both known headshaking horses and horses known to be free of headshaking. When the nerves were specifically examined for the EHV-1 virus, only one headshaking horse had the virus present in the nerve, which was comparable to the viral presence in the non headshaking horses. At this time EHV-1 is not believed to be a significant cause of headshaking in horses.

**How To Treat A Headshaking Horse**

One treatment for headshaking that can be used when riding the horse is a nose net. It is thought the nose net stimulates a second nerve pathway that blocks or somehow competes with the trigeminal nerve and prevents the pain signals from being dominant (Roberts et al, 2009).

For horses who only headshake under saddle or are worse with weather or sun exposure, nose nets can reduce symptoms in 70% of affected horses (Mills et al, 2003). Horses who were affected when at rest or who displayed snorting behaviours typically did not find the same level of relief from nose nets. Half nets with elastic or a drawstring provided the most relief for the most horses, but whole nets also worked for some horses.

For horses whose symptoms were reduced when treated for allergic rhinitis, a long term solution can be a permanent tracheostomy (Newton et al, 2000). This can permanently resolve headshaking for these horses without the long term use of medications. These horses are typically headshaking due to irritants in the nasal cavity so bypassing the cavity will resolve their
headshaking. Sometimes tracheostomy resolves symptoms when other treatments fail to provide relief.

For horses whose headshaking was worse with sun exposure, relief can be found from using eye protection to reduce symptoms (Madigan et al, 1997). Using either tinted contact lenses or a fly mask can reduce sun exposure enough to provide relief for these horses. This can reduce nerve input to the optic nerves, and the trigeminal nerve as a result. Another option is to use eye drops containing sodium cromoglycate (Stalin et al, 2008). These eye drops prevent histamine from being released and stimulating the nerve. However, as the eye drops also get distributed through the nasolacrimal duct it is possible the drug acts in a different way, as other topical antihistamines do not necessarily work to reduce headshaking.

Where headshaking is caused by injury, such as nuchal ligament damage or fracture in the area, treating the injuries with corticosteroids or local anaesthetics can provide relief (Voigt et al, 2009). By reducing pressure on the nerves, you can reduce irritation in the area. Other treatments that may provide relief in this case include acupuncture, ultrasound or shockwave therapy, and magnetic field therapy, but the goal remains to reduce swelling in the area. Symptoms resolve when pressure on the nerves is reduced.

Cyproheptadine can completely resolve symptoms of headshaking in horses in around 15 days. It is an antihistamine, but may be effective for its serotonin blocking properties (Bell, 2004). By reducing the serotonin levels, a horse's ability to sense pain is thought to be reduced. Cyproheptadine can be given to horses orally. This drug, and carbemazepine, another drug occasionally used in combination with cyproheptadine, are banned substances for horses who compete and have been known to cause drowsiness in horses (Roberts et al, 2009). Therapeutic
dosing levels are not known and are figured out by trial and error in horses, and a safe maximum dose is also unknown. Expense is another factor with this treatment as headshaking may resume if the drug is stopped.

A final treatment for headshaking horse at this time is to perform surgery and place a platinum coil around the trigeminal nerve (Roberts et al, 2009). This causes atrophy in the nerve and reduces nerve signal transmission in the horse. While the technique is new and still being refined, it has helped 84.2% of horses who have undergone the procedure. The previously used procedure of neural sclerosis only provided short term benefits of weeks or months. It was not considered a long term cure for headshaking (Newton et al, 2000). Neural sclerosis does prevent the horse from experiencing pain as the nerve atrophies after platinum coil insertion though, so is recommended during the same operation.

Conclusion

You and your horse are back on the trail a few weeks later. It is just as beautiful a day, and the woods are peaceful. You notice the it's getting late so you head back towards home. At the edge of the woods you stop for a moment, just enjoying the day. Your horse whickers, reminding you it's close to supper time so you step out of the woods. Since you remembered to put a nose net on your horse before you left, both you and your horse relax and saunter back to the barn with no issues whatsoever.

Headshaking is a complex condition with many possible causes. Affected horses may only show the occasional toss of the head, or may be so affected they can not be ridden, or even so badly affected they are euthanized for safety. In cases where it is considered idiopathic,
experimentation with various treatments may be needed to bring relief to the horse. Current research is turning up new treatments that will be refined and may be more effective with time.
Resources:


