TRIGEMINAL-MEDIATED HEADSHAKING

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Summary:
We will cover:
- What is headshaking?
- What is trigeminal-mediated headshaking?
- How I approach a case and reach a diagnosis at the moment;
- Current published treatment options.

What is headshaking?

Head shaking is just shaking your head; repeated vertical or horizontal movements of the head and neck. There are endless possible causes, for example: bad riding; naughty horse; foreign body; tooth root abscess; back pain. Facial pain or dysesthesia (abnormal sensation) is a cause. Facial pain may occur as a result of detectable gross pathology, such as a tooth root abscess, or unfortunately in the majority of headshakers (98% cases Lane and Mair, 1987) due to a trigeminal neuropathy; ‘trigeminal-mediated headshaking’.

Trigeminal-mediated headshaking:

The age of onset is usually young adult (in my experience 5-10 but with a fairly wide range 1-17) and it appears more common in geldings. Signs are often acute onset (to the point that owners can often give you an exact date and time) but some may be insidious.

Signs are usually classic and involve predominantly vertical head and neck movements, often with some sharp vertical twitches/flicks and accompanied by signs of nasal irritation such as snorting, twitching lips, rubbing the nose, striking at the nose. Both sides appear affected.

Signs may occur at rest but are usually worse at exercise. They may be seasonal (about 1/3) and if so, are usually Spring/Summer affected. They may be worse outdoors than indoors.

How I currently approach a case and reach a diagnosis:

i. History and observation:

These are of great importance to determining the index of suspicion for trigeminal-mediated headshaking. Consider signalment and when the signs occur, for example if worse at exercise than at rest. Determining if it occurs not just at exercise when ridden but loose or on the lunge, or also in the stable and/or field, helps rule out many possible causes such as poor riding, bad behaviour and ill-fitting tack – even in cases where those factors are concurrent! If it only occurs when at rest or eating then even where signs are those consistent with neuropathic pain, look for gross pathology (for example) dental which could be causing pain. If the horse responds to a nosenet then it is likely to be neuropathic pain, although about three-quarters of trigeminal-mediated headshakers do not respond to a nosenet so failure to respond does not help with diagnosis. Response to NSAIDs suggests non-neuropathic pain and response to corticosteroids suggests allergy.

Observe the horse headshaking. Some will not headshake every day or if very excited (central over-ride??) so ask the owners to obtain videos for you as well. Most trigeminal-
mediated headshakers do display the classic signs described above. If they do not, then keep an open mind for other causes.

ii. **Grade the severity:**

0/3 no headshaking  
1/3 headshaking at exercise but not sufficient as to interfere with ridden exercise  
2/3 headshaking at exercise making the horse impossible or dangerous to ride  
3/3 headshaking even at rest  
(Roberts, 2014)

iii. **Is the headshaking due to facial pain?**

Diagnostic local anaesthesia has a place in proving, although not disproving or showing why, that there is facial pain. Not every case is suitable and it is not perhaps vital. I find it is most useful where signs are not classic or there is a, usually owner-led concern, that there is another cause. If the horse is a trigeminal-mediated headshaker and does not respond to treatment leaving euthanasia as the next option, then it can be reassuring to have proved pain as long as owners understand that a negative result does not rule out pain.

Bilateral rostral infraorbital anaesthesia is not very reliable and whilst simple to perform, can be quite aversive to some horses. Bilateral caudal infraorbital anaesthesia is probably just a maxillary block…….

A positive result will confirm facial pain (but not show why there is facial pain) although a negative result will not rule it out. Importance of experience of the technique - Wilmink et al, 2015 – showed needle placement was accurate in 80% cases if performed by an ‘experienced’ vet but around 20% for those who did not perform the technique regularly.

iv. **Is there gross pathology which would cause facial pain or if not, is the pain likely to be from a trigeminal neuropathy?**

I perform as a standard:  
Clinical exam!  
Oral exam;  
Ophthalmic exam;  
Upper respiratory tract and guttural pouch endoscopy;  
Computed tomography.  

Treat any detected possibly significant abnormalities and see if headshaking resolves (Lane and Mair, 1987).

v. **Diagnosis:**

Diagnosis of trigeminal mediated headshaking can be made on the grounds of:  
- Positive response to diagnostic local anaesthesia in the absence of pathology;  
- Negative response to diagnostic local anaesthesia or unable to perform it, but absence of pathology and a high index of suspicion.
Perhaps the gold standard would be measurement of somatosensory-evoked potentials but we need more data and the procedure needs to be performed under general anesthesia.

**Current treatment/management options for trigeminal-mediated headshaking:**

The best way to treat a disease is to target what has caused it / repair the damage made – but of course, in trigeminal-mediated headshaking, we do not know the pathology or the cause. There are apparent clinical similarities to trigeminal neuralgia and cluster headache in people but to my knowledge there are no exact parallels. Whilst there is a condition of post-herpetic neuralgia, herpes is not thought to be involved in trigeminal-mediated headshaking (Aleman et al., 2012).

Recent advances are that the trigeminal nerve is sensitised. Threshold potentials can be tested under general anaesthesis, using somatosensory-evoked potentials. The trigeminal nerve of affected horses fires at too low a threshold (Aleman et al 2013 and Pickles et al 2011) although we do need more information, for example about seasonal headshakers. The nerve appears normal microscopically (Aleman et al 2013 and Roberts et al 2014) but is functionally abnormal – might that mean it is reversible? Certainly seasonal headshakers appear to reverse – is it all the same condition?

The rationale behind most current therapies, intended or not, appears to be to reduce sensory input from the trigeminal nerve, even before sensitisation was shown to occur.

i. Nose net:

This is the first treatment to try as it is cheap, non-invasive, risk-free and is allowed in most competition at most levels. It is reported to give up to 70% relief in 25% cases (Newton et al, 2000). The mechanism is likely to be similar to gate control theory – why rubbing your elbow after you bang it makes it feel better.

ii. Face mask:

Covering the eyes could reduce stimulation of the ophthalmic branch of the trigeminal nerve. If an eye mask alone is effective, you can try tinted contact lenses. In my experience it is rarely enough on its own but it is worth trying and you can also try a full facemask.

iii. Pharmaceuticals:

Cyproheptadine and or carbamazepine are published (Madigan and Bell 2001, Newton et al, 2000), certainly vets try gabapentin but to my knowledge there is nothing published. In people with neuropathic pain, these drugs have inconsistent results. Results can be short-lived although this can still be useful for diagnosis. Some people have side effects such as drowsiness. In trigeminal-mediated headshakers, these drugs have inconsistent results or have not been published. Results may be short-term and some horses may be affected by drowsiness so there may need to be consideration as to whether they are safe to ride/handle. Use of these medications would not be allowed in competition. Pharmacology and therefore dosing regimen is often uncertain. Some individuals can respond well so these drugs can be worth trying as long as expectations are managed.

iv. Other published treatments

- Feed supplement

Talbot et al, 2013, published a double-blinded placebo controlled trial of a feed supplement. There was no real effect of the supplement or the placebo as judged by vets but there was huge placebo effect of both the supplement and the placebo to the owner. This demonstrates the importance of looking at what the criteria for success were in any other
study – ‘I feel my horse is better’ means little – the true test must be that they go back to work at the previous level.

- Homeopathy

(Mathie et al, 2010) 93.3% owners felt their horses were improved.

- Various – owner survey Madigan and Bell, 2001

Owner reported diagnosis and outcomes with success of treatment judged by owner impression of improvement. No treatment stood out, from: antihistamines, antimicrobials, corticosteroids, NSAIDs, melatonin, chiropractic treatment, acupuncture.

- Gonadotrophin releasing hormone vaccine (Pickles et al, 2011)

In a study of 15 horses, there was no actual improvement but 1/3 of owners felt their horses were improved. 4/15 had vaccination reactions.

- Sodium cromoglycate eye drops (Stalin et al, 2008)

Success in three horses, which I have been unable to replicate.

- Pulsed high dose dexamethasone (Tomlinson et al, 2013)

There was no response.

v. Surgery:

Bilateral infraorbital neurectomy (Mair et al 1992 and Mair, 1999) was effective in 3/19 horses with serious side effects being common; however, it was important to show involvement of the trigeminal nerve.

Caudal ablation of the infraorbital nerve via coil compression had better results (Roberts et al, 2009 and Roberts et al, 2013) with about a 50% success rate in 57 horses but 26% relapsed with a median time of nine months (range two months to five years). Most horses developed side effects of nose rubbing which were short-term in most cases but 4/58 were euthanased due to severity or non-resolution of these side effects. It can be considered where euthanasia is the only other option.

vi. EquiPENS Neuromodulation

Recent advances in knowledge on headshaking are:

- The nerve is sensitised;
- There appears to be no gross pathology;
- This appears to be a functional rather than a structural problem;
- Which may be reversible;
- Huge amounts are unknown.

We work with Nik Patel, amongst others, a neurosurgeon at Southmead Hospital, through an established collaboration as the Schools of Veterinary Science and Clinical Sciences are both within the University of Bristol Faculty of Health Sciences. With this new information we sought to find another treatment.

There are many treatment options for people suffering neuropathic pain, which unfortunately suggests there is no one, safe and reliably effective treatment available and there will be variation between individuals as well as conditions in response to treatment.
PENS neuromodulation is one treatment, available on the NHS under NICE guidelines, for people suffering neuropathic pain. It is minimally invasive; in fact, people say once the probe is in place, that it is quite a pleasant sensation. Side effects in people are only reported to be a bruise at the site of probe insertion. Experiences with the procedure vary but here is a broad guide; if patients respond, they can expect on average to have pain relief for a few hours up to a week after the first treatment, a few days up to two weeks from the second treatment and then an average of two months from the third with a broad range between individuals. After the third treatment the required treatment interval in people seems to stay about the same. It is important to repeat treatments as close as possible to the return of signs of pain. If there is no response to treatment, three treatments should be attempted before giving up as some people will respond to later treatments only. Equally, it is possible to respond to treatments initially but then not respond to repeat treatments.

Working with Algotec Research and Development UK Ltd who make the equipment and funded by the Langford Trust for Animal Health and Welfare, we at the University of Bristol (Langford Veterinary Services) began a clinical trial of PENS neuromodulation in horses in August 2013. This was a trial of seven horses with trigeminal-mediated headshaking which we published in 2016 (Roberts et al, 2016). All the horses tolerated the procedure extremely well under standing sedation, although there remains a risk to performing any procedure in a conscious horse. Side effects have been minimal, with a few horses having a haematoma at the site of probe insertion which resolved uneventfully without treatment and did not appear to cause any problems. Five horses returned to ridden work following their third procedure, with an average remission time of 15.5 weeks. One horse responded to the first procedure but not to later ones.

We have continued to offer EquiPENS neuromodulation for the management of trigeminal-mediated headshaking in cases which have not responded to a nosenet. At the time of writing (February 2016) we have performed the procedure 138 times (48 horses). We continue to have no significant adverse effects. Some horses can have a few bad headshaking days after one or more procedures but this has not been sustained and some still go into remission. People sometimes report increased pain for a days or weeks but can still go into remission and anecdotally can then experience a longer remission. The increase in pain in people is not anecdotally reported to be more severe than was possible before treatment and has in fact, not been officially reported as an adverse effect. So far all horses have tolerated the procedure well under standing sedation. Some horses have not responded at all. Others have responded for too short a time to be practical. However, some have done very well, with 38% returning to ridden work for at least 2 months on-going, up to 2 years and ongoing. It certainly seems to be the case that horses can respond to the third treatment when they did not to earlier ones, so we should try three procedures before deciding if the horse will respond to treatment. Some horses have a promising start but then fail to respond to later treatments. It is my early impression that where horses respond, but for insufficient time, length of remission may increase with repeated procedures. It is still very early days and we have a lot to learn and refine.

You may find it interesting to follow the progress of Xanthus, a four star eventer ridden by Blyth Tait, on www.blythtait.com.
There is further information on headshaking available on my webinar, at http://www.langfordvets.co.uk/CPD/CPD-events/online-cpd.