Alterations in thoracolumbosacral movement when pain causing lameness has been improved by diagnostic analgesia

It has been shown experimentally that horses adapt to hindlimb lameness by extending the thoracolumbar region and decreasing the range of motion of the lumbarosacral vertebral column. Riders often complain that the horse’s back feels ‘stiff’. Lameness, thoracolumbosacral pain and reduced range of motion (ROM) often coexist. A better understanding of their relationship is needed. The objectives of a recent study were to determine if thoracolumbosacral movement of horses changes when pain causing lameness is improved by diagnostic analgesia. We hypothesised that reduction of lameness will increase ROM of the thoracolumbosacral region. Thirteen horses with different types of hindlimb lameness were trotted in straight lines and lunged on a 10m diameter circle on left and right reins before and after lameness was subjectively substantially improved by diagnostic analgesia. Inertial sensor data were collected from the withers, the thirteenth (T13) and eighteenth thoracic (T18) vertebrae, the third lumbar (L3) vertebra, the tubera sacrale (TS), and the left and right tubera coxae. Range of motion of flexion-extension, axial rotation, lateral bending, dorsoventral motion, lateral-lateral motion and vertical movement symmetry were quantified at each thoracolumbar site. HipHike difference (HHD), maximum difference (MaxDiff) and minimum difference (MinDiff) for the pelvic sensors were measured to give an objective measurement of lameness. MinDiff and MaxDiff measure the differences in minimum and maximum displacement of the landmark to which the sensor is attached reached during and after the two stance phases. HipHike difference quantifies the difference in upward movement of each tuber coxae during contralateral hindlimb stance. Percentage changes for before and after diagnostic analgesia were calculated; mean ± standard deviation (SD) or median [interquartile range] were determined.

Associations between the change in pelvic versus thoracolumbar movement symmetry after each local analgesic technique were tested. After resolution of lameness, HHD decreased by 7% [68%] (P = 0.006). The MinDiff decreased significantly by 33% [61%] (P = 0.01), 45 ± 13% (P = 0.005) and 52 ± 23% (P = 0.04), for TS, L3 and T18, respectively. There was significantly increased range of motion in flexion-extension at T13, in axial rotation at T13, T18, L3 and in lateral-lateral range of motion at L3. Thoracolumbosacral asymmetry and reduced ROM associated with lameness were both altered immediately by improvement in lameness using diagnostic analgesia.

The results of the study have increased our understanding of thoracolumbosacral movement in lame horses in straight lines, in hand and on the lunge. Improvement in lameness by diagnostic analgesia results in increased thoracolumbosacral ROM and reduced asymmetry of movement. The movement changes took place under the caudal aspect of the saddle and behind the saddle and is consistent with clinical observations of riders that after resolution of lameness there is improved ‘swinging of the back’ behind the saddle. It is reasonable to assume, based on this reverse model, that lameness can induce reduced ROM of the thoracolumbosacral region and asymmetry of motion. This may explain the common clinical observations of increased tension in the epaxial muscles in the caudal thoracic and lumbar regions in association with hindlimb lameness, and asymmetry of muscle soreness.

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Abbey jumps for joy one year on thanks to AHT Oncology team...

Abbey is a 6yo grey Irish Draft mare who had a sarcoid on her left upper eyelid which was treated with High Dose Radiation brachytherapy (HDR) in April 2016. Thankfully, after treatment (two sessions delivered a week apart), she made a full recovery and is now enjoying life to the fullest. This lovely picture is to celebrate the one-year anniversary of Abbey’s HDR treatment. Here she is going double clear at Kelsall horse trials – well done Abbey!

Anna Hollis, the AHT’s Senior Equine Oncology Clinician said “Abbey is a beautiful girl. We are so pleased to hear from her owner that she is continuing to do well after her treatment a year ago. It is always a pleasure to hear updates on our patients, especially when we receive lovely photos like this one, and to see the treatment is so effective in improving a horse’s quality of life. We wish them both a happy and healthy future doing what they love.”

There are many treatments for skin tumours in horses, but with varying success rates. The most difficult to treat are those around the eye, like Abbey’s, as it is such a delicate area. We are very proud to be the only veterinary clinic in the UK that can offer HDR brachytherapy to treat horses with these invasive lesions. The technology is so advanced that each treatment is completely bespoke for each patient, and as you can see, results are hugely successful.

FREE EVENING CPD Seminars will start at 7.30pm
Wednesday 19 July Radiology of the hock region with Laura Quiney
Sponsored by Dechra Pharmaceutical PLC

Wednesday 20 September Frequency of, and risk factors for, equine laminitis in Britain: Results from the CARE cohort study with Dee Pollard

Wednesday 15 November How do we determine if neck or back stiffness is the cause of poor performance? with Dr Sue Dyson
Sponsored By Dechra Pharmaceutical PLC
Facial expressions research at the AHT will help recognition of pain in ridden horses, before it’s too late.

Many horses presumed to be sound by their riders, are not. Facial expression ethograms have previously been used to describe pain-related behaviour in horses, but there is a need for a facial ethogram to facilitate identification of pain specifically in ridden horses. Dr Sue Dyson and her team are on a mission to help vets, owners and riders recognise pain to enable early investigation, diagnosis and treatment.

There is undisputed evidence to show that owners, riders and trainers have a poor ability to recognise signs of pain seen when horses are ridden. As a result, problems are labelled as training-related, rider-related, behavioural, or deemed ‘normal’ for that horse because ‘that's how he's always gone’. Unfortunately that means pain-related problems are often disregarded, the horse continues in work, and the problem gets progressively worse. If pain goes unrecognised and is not referred to a lameness specialist early enough, problems become too advanced to be resolved, or managed as well as they might have been if spotted sooner. It may therefore be easier to educate riders and trainers to recognise changes in facial expression and behaviour rather than lameness, which may have important welfare consequences. Dr Sue Dyson, Head of Clinical Orthopaedics at the AHT, has developed an ethogram to help them identify signs of pain from a horse’s facial expressions when being ridden.

Stage 1 – Developing the ethogram

The objectives of this stage were to develop and test an ethogram to describe facial expressions in ridden horses and to determine whether individuals could interpret and correctly apply the ethogram, with consistency among assessors. An ethogram was developed by reference to previous publications and photographs of 150 lame and non-lame ridden horses, and a training manual was created. The ethogram consisted of a catalogue of facial expressions including the ears, eyes, nose, muzzle, mouth and head position. Thirteen assessors (veterinarians of variable experience, n=4; equine technicians, n=3; equine studies graduates, n=2; amateur horse owners, n=2; equine veterinary nurse, n=1; a British Horse Society Instructor, n=1) underwent a training session and, with reference to the training manual, evaluated still lateral photographs of 27 training heads. Features were graded as ‘Yes’, ‘No’ or ‘Cannot see’ (when it was not possible to determine the presence or absence of a feature). The ethogram was adapted and, after further training, the assessors blindly evaluated 30 test heads from non-lame and lame horses. Intra-class correlation (ICC) and free-margin Kappa tests were used to assess consensus among assessors. For the Training heads, single ICC matrix among observers resulted in an overall ICC of 0.50 (95% Confidence Intervals [CI], 0.40-0.62). There was no difference in assessors’ scoring related to their professional backgrounds. For the Test heads, mean inter-rater agreement among assessors was 87%. The mean percentage of overall agreement was 80% and the mean free-marginal Kappa value was 0.72, standard deviation (SD) ± 0.22. The large SD was the result of inconsistency in assessments of the eyes and muzzle. It was concluded that the developed ethogram could reliably be utilised to describe facial expressions of ridden horses by people from different professional backgrounds.

Stage 2 – Applying the ethogram to identify lameness

The ethogram was applied blindly by a trained analyst to photographs (n=519) of the head and neck of lame (n=76) and non-lame (n=25) horses acquired during ridden schooling-type work at both trot and canter. These included images of seven lame horses acquired before (n=30 photographs) and after diagnostic analgesia had abolished lameness (n=22 photographs). A pain score (0; 3:0 = normal, 1:3: abnormal) was applied to each feature in the ethogram, based on published descriptions of pain in horses. An amazing total of 27,407 facial markers were recorded, with those giving the greatest significant difference between lame and sound horses including ears back, eyes partially or fully closed, an open mouth with exposed teeth and being heavily above the bit. Pain scores were higher for lame horses than non-lame horses (p<0.001). Total pain score (p<0.05), total head position score (p<0.01), and total ear score (p<0.01) were reduced in lame horses after abolition of lameness. Severely ‘above the bit’, twisting the head, asymmetrical position of the bit, ear position (both ears backwards, one ear backwards and one to the side, one ear backwards and one ear forwards) and eye features (exposure of the sclera, the eye partially or completely closed, muscle tension caudal to the eye, an intense stare) were the best indicators of pain. Application of the ethogram and pain score could differentiate between lame and non-lame horses. Assessment of facial expression could potentially improve recognition of pain-related gait abnormalities in ridden horses.

The next stage

The importance of facial expression for pain recognition in horses, and its potential use across the industry, has been highlighted by this study. For Sue the study does not end here. The next exciting stage of the project is already underway, with the development of a whole horse ethogram and its application to non-lame and lame horses, to help to differentiate between manifestations of conflict behaviour, in response to the demands of the rider, and pain.

The future

Recognition of changes in facial expression could potentially save horses from needless suffering and chronic injuries, by enabling those working with horses to recognise pain sooner, and to get these horses the veterinary care that they need. Owners, riders, trainers and some vets are known to struggle with recognising when a horse is lame from looking at a horse's gait alone. Some lameness is so subtle that only an expert eye can see it. Development of a practical tool for recognising facial expressions, similar to that of a body condition score chart, could dramatically improve the health and welfare of all horses – which is something Sue and her team at the AHT continue to work towards.

From the horse’s mouth

Our video series explaining this study ignited a huge debate online about understanding equine behaviour and body language. We received comments from owners who now feel guilty for not taking note of these facial expressions sooner to help their horse, and from other professionals agreeing that these expressions can be recognised, but are amazed at how often they are not. The team are so pleased that the study has been so popular and has sparked debate – especially as awareness is so key to the study’s success. View and share the videos at www.youtube.com/ahttv

Working together to spread the word

“This exciting new concept and methodology is part of a worldwide effort to educate and inspire people towards improving the welfare of horses,” says Sue Palmer, author of “Understanding Horse Performance Brain, Pain, or Training?” This book and DVD is an excellent accompaniment to Sue Dyson’s work on facial expressions in horses. Sue Palmer has provided a roadmap to understand how our horse’s behaviour gives us the key to interpret whether their behaviour is triggered by pain, brain, or training. To order visit www.thehorsephysio.co.uk