Proceedings of the 15th ESVOT Congress

September 15 - 18, 2010
Bologna, Italy

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How subjective is the detection of lameness and nerve block results in horses?

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Visual scoring of lameness is an essential part of clinical lameness examinations. During clinical lameness examinations horses are often assessed in a straight line as well as on a lunge line on different surfaces (hard/soft) and at different gaits (walk, trot, and canter), as an aid to identify the likely site(s) of lameness. In horses that are not either sound or very lame which would carry a risk, and have no definitive localizing signs, diagnostic analgesia (‘nerve’ and ‘joint’ blocks) are then most frequently used to identify the site of the lameness. This assessment is most frequently undertaken at the trot in a straight line and on the lunge (particularly useful when there is bilateral lameness) before and after each diagnostic analgesic technique as this gait is the most consistent and easily graded. In order to evaluate whether diagnostic analgesia has alleviated the lameness, a visual lameness grade is given to the lameness on each occasion from which a percentage improvement can be semi-objectively determined. Different grading systems, varying from 0-4, 0-5, 0-8, and 0-10, has been described, where 0 is sound and the maximum grade is non-weight-bearing, but they have been shown to have limited inter-observer agreement, to improve with experience (Keegan et al, 1998, Keegan et al, 2010) and to be influenced by bias (Arkell et al, 2006). Recently it has been argued that the limits of human perception might play a role in particular with mild lamenesses (less than 25% asymmetry) (Parkes et al, 2009).

Technological advances, in particular over the last decade or so, has improved our objectivity in lameness exams, from the simplest, using high definition video cameras, to the development of more practical sensor based gait scoring systems which can be deployed within the constraints of clinical lameness workups (e.g. Keegan et al, 2002, 2004, Pfau et al, 2007, 2009). With these systems essential lameness related parameters (e.g. head nod or hip hike) can be objectively quantified and we are currently evaluating whether this can assist clinicians, in particular with mild lamenesses and/or to monitor progress over a longer time period. In particular we have started to use a five sensor inertial sensor based system during routine clinical lameness exams and have begun to compare the output of these devices with the semi-objective visual scoring of an experienced lameness clinician.

Sensors were attached to the head, withers sacrum and both tuber coxae of lame horses at the beginning of the lameness examination. Horses were trotted in a straight line and on the lunge on both reins and were videoed. Vertical displacement amplitudes during left and right stance were determined before and after nerve blocks and symmetry ratios compared. Compression and push off were lower in the lame limb. Prior to diagnostic analgesia, some horses exhibited a compensatory increase in loading and push off from the non-lame limb. All horses showed an increased lameness score during straight and with the lame limb on the inside of the circle, in comparison with the other rein. After diagnostic analgesia, symmetry ratios increased by > 20% associated with a change in visual locomotion score in all horses.

The system does not interfere substantially with the routine lameness examination and these preliminary results indicate that sensor based methods can detect partial improvements after diagnostic analgesia. Hence such systems can be a practical way of assisting clinical decision-making in complex lamenesses by providing objective evidence. The use for long term monitoring seems particular appealing and the objectivity of this and similar systems could prove beneficial to deal with clinical bias.

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