The basics of the equine neurological examination

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The examination consists of evaluation of the head, evaluation of the entire body and finally evaluation of gait and posture. The first two of these can be carried out when the patient is at rest and preferably in a box, followed by an examination while the animal moves freely in hand. After completion of the neurological examination, the examiner may be able to decide if and where any possible lesion exists. Sites include the basic areas of the cerebrum, brain stem, peripheral cranial nerves, cerebellum, spinal cord, peripheral spinal nerves, neuromuscular junctions and muscles.

Head: An evaluation of the patient’s behavior, mentation, head posture and movement and then cranial nerve function is carried out to determine if there is evidence of brain or cranial nerve disease. Prominent changes in behavior and a markedly depressed mental attitude are seen with many forms of cerebral disease. Various degrees of deviation of the head and neck from the midline can be seen with asymmetric brain lesions at many locations. The presence of a head tilt may indicate an ipsilateral vestibular lesion. To evaluate cranial nerves it is quicker to evaluate firstly the eyes and associated structures, then the head and face and finally the mouth, larynx and pharynx, rather than painstakingly going through all tests involving each individual cranial nerve. The following tests should be performed:

- Direct and swinging light pupillary light responses: light is shone into one eye and after pupillary constriction is complete, the light is quickly transferred to the opposite eye in which further pupillary constriction is expected to occur (optic nerve, midbrain, oculomotor nerve)
- Menace response: blink in response to a threatening gesture indicates vision (optic nerve, occipital cortex, brainstem, facial nerve, cerebellum)
- Physiologic nystagmus: fast and slow eye saccades when moving the head from left to right (oculomotor, trochlear and abducens nerves, vestibular system)
- Eye position on lifting the head (eye drop indicates ipsilateral vestibular lesion)
- Position of eyelids (ptosis most commonly indicates Horner’s syndrome, ie loss of sympathetic input to the eye)
- Nasal septum response: pulling head away when the nasal septum is gently touched with a probe (sensory trigeminal nerve, contralateral forebrain function)
- Tongue tone (hypoglossal nerve)

Neck and trunk: In addition to observation for evidence of bony and muscular asymmetry, localized sweating and areas of decreased pain perception, the following reflexes should be examined to test peripheral nerves and focal spinal cord function:

- Thoracolaryngeal ("slap") test (sensory spinal nerves, cervical spinal cord, brainstem, vagus nerve, vagosympathetic trunk, intrinsic laryngeal musculature)
- Local cervical reflex & cervicofacial responses (local cervical segments and spinal nerves, facial nucleus)
- Cutaneous trunci reflex (spinal cord cranial to stimulation, lateral thoracic nerve).
Gait: Neurological gait abnormalities involve degrees of paresis (weakness) and ataxia (incoordination). Paresis may predominantly involve flexor or extensor muscle groups. In horses with spinal cord disease pulling on the tail while the horse is walking can often reveal prominent paresis. Extensor paresis in a limb is best evaluated by observing for muscle trembling, buckling on a limb when turning, and the ease with which the patient can be pulled to the side, either while standing still or while moving. Flexor paresis may be more evident as dragging of a toe, a low foot flight and stumbling, particularly while turning. Ataxia can be characterized as having components of hypometria (decreased joint movement), and hypermetria (increased joint movement). Loss of balance due to vestibular lesions will be markedly exacerbated when a blindfold is applied; blindfolding a horse with spinal cord disease usually does not add anything substantial to the neurological evaluation.

Pelvic limb and/or thoracic limb paresis can be detected by pulling on the halter and tail at the same time while guiding the horse to circle the handler. This is particularly useful if there is asymmetry in the degree of weakness. Normal, alert horses resist such pulling whereas a weak animal is easy to pull to the side. Releasing the tail abruptly often results in the horse leaving the limbs in an abnormal positions.

To detect milder degrees of ataxia, additional postural maneuvers may need to be performed. These include:
1. Serpentine maneuvers
2. Circling wide and tight
3. Elevating the head while walking the animal on a flat and on a sloping surface (up and down)
4. Turning tightly when stopping abruptly from a trot
5. Backing

These maneuvers alter the visual, gravitational, vestibular and proprioceptive inputs to the nervous system such that any subtle sensory or motor deficit will become more clearly expressed as errors in movement. The overall severity of any gait abnormality in each of the four limbs can be graded 1 through 4 as subtle, mild, moderate or severe.

In a horse that is still ambulatory the following serves as guidelines to localize spinal cord lesions:
C1-T2: Ataxia and paresis in all four limbs, hypalgesia and hyporeflexia sometimes evident on neck.
T3 - L3: Thoracic limbs normal, pelvic limb ataxia and pelvic limb paresis on tail pull. Normal tail and anal tone and reflexes. With spinal cord compression clinical signs invariably worse in the pelvic limbs: a two grade difference is clinical severity is possible with a single lesions such that a cervical lesion may present as normal or mild thoracic limbs despite mild to moderate pelvic limb signs!
L4 - S2: Thoracic limbs normal. Pelvic limb ataxia and prominent paraparesis to paraplegia. Atrophy of hind limb muscles particularly quadriceps [L3-4] and gluteals [L6]. Hypalgesia and analgesia caudal to cranial edge of the lesion.
Sacrococcygeal segments [cauda equina]: Usually only subtle pelvic limb gait abnormality. Decreased or absent tail and anal reflexes and tone. Hypalgesia to analgesia over perineum. Coccygeal muscle atrophy. Urine and fecal retention.