A Review of the Equine Neurologic Examination
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Whether the horse is presented with the complaint of neurologic disease or something different, it is important for field practitioners to recognize patients that have a component of neurologic disease and require a full neurologic examination. Thus, when a physical examination is performed on any horse, the patient should be observed for general signs of neurologic disease and a full examination performed if necessary. The neurologic examination is not a complicated or overwhelming procedure to perform. The most important thing is to develop a routine and perform the examination in a systematic manner. A standardized form can be useful for ensuring that a complete neurologic examination is performed. Examples of these forms can be accessed on the American Association of Equine Practitioners website or in the listed references.

When performing a neurologic examination, the deceptively simple question of whether the horse is neurologically normal or abnormal must be answered. This may seem very simple, but it can be difficult. For example, lameness can be in some situations difficult to differentiate from mild neurologic disease. In addition to establishing the presence or absence of neurologic disease, the goal of the neurologic examination is to attempt to localize the lesion to a particular area of the neurologic system. Thus, a basic understanding of neuroanatomy and function is necessary for full interpretation of the neurologic examination.

The Equine Neurologic Examination

It should be stated that a complete physical examination should always be performed in conjunction with the neurologic examination. A complete history should be obtained, with special focus on age and signalment, potential exposure to infectious agents or toxins, any potential trauma, and the time frame of the appearance of the clinical signs. The equine neurologic examination is comprised of several components, including general observation and palpation (completed in general physical examination), the cranial nerve examination, limb and placement responses, gait analysis, and assessment of reflexes and sensation.

General Observation

The animal should be observed with special note taken of mental status (normal, “depressed” or lethargic, stuporous, comatose), posture (head tilt, positioning of trunk and limbs), and general manner of going.

Palpation and Close Examination

Muscle groups and the skeletal system should be palpated and visually examined for signs of symmetry. Standing over the horse on a step stool and observing from above can sometimes reveal asymmetry in muscle groups, for example over the shoulders, that might otherwise not be obvious. Uneven wearing of the hooves could be associated with paresis or proprioceptive deficits. The cervical vertebrae and back should be palpated and the horse’s neck should be maneuvered down, up, and to each side to detect limitations of motion or pain. “Carrot stretches,” or using a treat to entice the horse, can be useful in getting the horse to stretch its neck willingly in different directions.

Cranial Nerve Examination
Basic cranial nerve tests and potential interpretations are presented in table 1. The olfactory nerve (I) is not routinely directly tested (for example, with a noxious odor).

Table 1 (Adapted from Furr and Reed, *Equine Neurology*)

<table>
<thead>
<tr>
<th>Test</th>
<th>Nerve Tested</th>
<th>Abnormal Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menace</td>
<td>Optic (II) and Facial (VII)</td>
<td>No eye blink</td>
</tr>
<tr>
<td>Pupillary light response</td>
<td>Optic (II) and Oculomotor (III)</td>
<td>No pupillary constriction when bright light is directed into eye</td>
</tr>
<tr>
<td>Strabismus</td>
<td>Oculomotor (III), Trochlear (IV), and Abducent (VI)</td>
<td>Abnormal position of eye</td>
</tr>
<tr>
<td>Facial Sensation</td>
<td>Trigeminal (V) – sensory and Facial (VII) – motor</td>
<td>Fails to respond to stimulation of facial skin with tapping of finger or blunt object</td>
</tr>
<tr>
<td>Facial Expression and Symmetry</td>
<td>Facial (VII) – motor</td>
<td>Asymmetry of muzzle, ear droop, feed impaction in cheek</td>
</tr>
<tr>
<td>Palpebral Reflex</td>
<td>Trigeminal (V) – sensory and Facial (VII) – motor</td>
<td>Fails to blink when skin around eye is stimulated</td>
</tr>
<tr>
<td>Nystagmus</td>
<td>Oculomotor (III) and Vestibular (VIII)</td>
<td>Central lesions are associated with positional nystagmus; peripheral lesions are not positional</td>
</tr>
<tr>
<td>Swallow</td>
<td>Glossopharyngeal (IX), Vagus (X)</td>
<td>Inability to swallow as observed by attempting to feed</td>
</tr>
<tr>
<td>Tongue Tone</td>
<td>Hypoglossal (XII)</td>
<td>Failure to withdraw tongue or weak tongue tone</td>
</tr>
</tbody>
</table>

*Limb and Placement Responses*

These tests suffer from a lack of sensitivity and specificity, but they can be quickly and easily performed and can be potentially useful for detection of paresis or conscious proprioceptive deficits. It is easiest to perform these tests on the forelimbs. One front hoof is lifted and crossed over the other. The horse should quickly return the limb to the correct position. The limb can also be moved into a “base-wide” stance and the horse should again correct this quickly. The demeanor of the horse must be taken into account when interpreting these tests; many older, well-trained horses that are normal neurologically are quite amenable to their limbs being placed in abnormal positions, and so the test should not be given undue weight in these patients.

*Gait Analysis*

This important part of the neurologic examination allows the observation of the horse in motion and undergoing specific movements that can accentuate neurologic abnormalities. These specific movements can include walking with the head elevated, tail pulls, sway test, turning in tight circles, walking up and down hills, backing, movement over obstacles, and abrupt changes in speed and direction. Neurologic abnormalities that can be revealed include ataxia (incoordination), paresis, and dysmetria or spasticity. In order to protect the horse, handler,
and examiner, care should be taken to not overtax the abilities of a horse with neurologic deficits when performing these tests.

A grading system from 0 to 5 is typically used when assessing gait in the neurologic examination. Grade 0 indicates no deficits, grade 1 describes deficits that are not detected at a normal gait but are made apparent by specific movements, grade 2 indicates that deficits are easily detected at a normal gait and worsened by specific movements, grade 3 describes a patient with very prominent deficits at the walk with a tendency to fall when more complicated movements are requested, grade 4 indicates the horse stumbles, trips, and falls spontaneously, and grade 5 describes a recumbent patient.

**Reflexes**

It is not possible to test spinal reflexes (i.e. quadriceps, cranial tibial, triceps, or flexor reflexes) unless the patient is recumbent.

Reflexes that can be tested in the standing horse include the panniculus response, perineal/anal tone and reflex, and cervicofacial reflex.

**Sensation**

Sensation is indirectly assessed by examination of the cranial nerves, reflexes, and proprioceptive positioning in gait and limb placement analysis. Testing for hyperesthesia and pain perception can be specifically performed by varying pressures of palpation or gentle pricking or pinching of the skin in the regions of interest.

**Localization of Neurologic Lesions**

The nervous system is divided into the central (brain and spinal cord) and peripheral nervous systems (CNS and PNS respectively) and the autonomic nervous system. The autonomic nervous system, which innervates the viscera, is organized into sympathetic and parasympathetic divisions. Simply stated, the sympathetic system governs the “fight or flight” response while the parasympathetic system is responsible for the “rest and recovery” functions of the body.

On a basic level, the CNS can functionally be classified into motor (efferent) and sensory (afferent) systems. Lorenz and Kornegay divide the major functions of the CNS into motor (upper and lower motor neuron), sensory (general proprioception, general sensory, and special sensory), cerebellar, and cognitive systems. Information gathered from the neurologic examination can be used to categorize the clinical signs seen as a disturbance in one or more of these functions and further used to localize the lesion to specific areas of the nervous system. At this point, a logical list of differential diagnoses can be made and a diagnostic plan designed.

**References:**

