ESVOT CONGRESS 2006

PROCEEDINGS

MUNICH, Germany
7th-10th September

“The Cutting Edge in Veterinary Orthopaedics”

European Society of Veterinary Orthopaedics and Traumatology
Diagnosis of cervical compressive myelopathy: value of radiography, myelography and ancillary diagnostics?

Jérôme Van Biervliet, DVM, DACVIM
Department of Clinical Sciences, Cornell University Hospital for Animals, Ithaca, NY. Currently at: Laboratory of Neuronal Cell Biology and Gene Transfer, Department of Molecular and Developmental Genetics, VIB, KU Leuven, Leuven, Belgium

In order to help confirm suspicion of CVCM, strictly lateral survey radiographs of the occiput, all the cervical vertebrae and T1 should be taken with the horse standing and the neck in a neutral posture, i.e. neither flexed nor extended. This can most easily be performed under light sedation, as long exposure times will require the horse to stand still. Several pathological changes can be recognized and these characteristic observations can be graded:

1. Mild subluxation of the vertebrae, seen as the degree of dorsal angulation between the adjacent vertebrae.
2. Physeal enlargement and dorsal projection of the caudal physis of the vertebral body.
3. Osteoarthritides and bony proliferation of the articular processes.
4. Osteochondrotic changes including incomplete or delayed postnatal ossification at the articular processes.
5. Apparent caudal extension of the dorsal aspect of the vertebral arch over the cranial physis of the next caudal vertebral body.

Additionally, a measurement of the sagittal ratio can help estimate the relative size of the vertebral foramen. The sagittal ratio is calculated as the ratio of the minimum sagittal diameter of the vertebral foramen to the maximum sagittal diameter of the vertebral body, taken at the cranial aspect of the vertebra and perpendicular to the vertebral canal. Because it is taken within the vertebral body it is also called the “intra-vertebral” sagittal ratio and, by virtue of taking two measurements in the same plane of magnification, it eliminates differences caused by body size and radiographic magnification. A ratio below 52% for C3-C4, C4-C5, C5-C6 and below 56% for C6-C7 is indicative of vertebral foramen narrowing and points towards a likely diagnosis of CVCM. The sensitivity and specificity of this test in detecting CVCM affected horses is approximately 90%. Some care should be taken in the individual case however, since this measurement likely does not indicate the site of compression accurately. In addition, depending on the prevalence of CVCM and of other differential diagnoses in a particular population of horses with signs of cervical spinal cord disease, the chance of classifying the individual horse correctly as affected or not based on sagittal ratios only may not be the same everywhere. It is therefore logical not to rely on sagittal ratios exclusively but to combine several read-outs from diagnostic tests [radiographs] to improve the overall accuracy of the diagnosis.

Recently, the inter-vertebral sagittal ratios have been proposed as read-outs taken from survey radiographs that could assist in the diagnosis of spinal cord compression. In essence, this is a ratio of the minimal distance taken from the most craniodorsal aspect of the vertebral body to the most caudal aspect of the vertebral arch of the more cranial vertebra and the maximal sagittal diameter of the cranial region of the caudal vertebral body. The hypothesis for using it is that it may correlate more closely to the occurrence of spinal cord compression, since, in CVCM, this compression occurs most often at the articulation of two adjacent vertebrae. From preliminary studies, it seems that the intervertebral sagittal ratios are statistically lower in CVCM affected horses, but due to the overlap between CVCM affected and non-affected horses it remains to be shown whether it will offer real advantages over the intra-vertebral sagittal ratios, especially in indicating the site of compression and in populations of horses in the Americas where the common disease, equine protozoal myeloencephalitis is a major differential diagnosis for CVCM.

Cervical myelography can be a useful asset in helping to confirm a diagnosis of CVCM and remains in many cases the only tool to assist in defining the site of spinal cord compression with the intention of a surgical correction. It should be iterated that the diagnostic criteria for compression based on myelographic observations have not been definitively established. Reduction of the dorsal myelographic column at the intervertebral junction to a value of 50% or less of that within the vertebra was traditionally used to predict compression at this site. Recent studies however indicate that this result should be interpreted conservatively, as the diagnostic accuracy of this criterion is less than desirable. It is likely that more compression (up to 70% reduction of the dorsal myelographic column) is necessary to avoid false positive diagnoses. Possibly, reduction of the total height of the dural sac, represented in a ratio of the minimal dural diameter at the intervertebral junction to the maximal dural diameter at the level of the mid-vertebral body, might reflect spinal cord compression more accurately. Greater than a 20% reduction has been suggested as potentially being useful in diagnosis of CVM.
Regardless of the above discussion, it should be stressed that it is especially difficult to diagnose definitively the site of compression correctly in all CVCM cases, as affected horses seem to have a narrowed vertebral canal at several sites and compression could be located at any or several of these. Flexion of the neck can exacerbate the cord compression in CVCM cases, especially in the mid-cervical region. However, flexion may also create reduction of the dorsal myelographic column in normal horses or, more importantly, at functionally non-affected sites, thus leading to a false positive diagnosis. Myelography is relatively safe, although a proportion of the horses can have complications. Complications range from prolonged recovery from anesthesia, seizures and cortical blindness to non-suppurative meningitis and associated fever. Mostly these complications are self-limiting. Computed tomography to diagnose CVCM is of limited value due to size limitations, as most machines will only accommodate the horse’s head and neck up to C4, and to the fact that the horse’s neck must remain in extension during the procedure preventing any flexion studies.

One should consider the process of the clinical evaluation and ancillary diagnostic procedures as tests that are run in series and in parallel, which will improve the overall accuracy of diagnosis of CVCM. Importantly, there is in all likelihood no diagnostic test that is accurate enough on its own. The problem remains however to find the site of compression with the intention of a surgical correction. It can be hoped that either development in CT and MRI hardware may make these [and other] imaging modalities available for use in the diagnosis of CVCM, or that functional conduction studies may be established to determine the site of conduction block. Interestingly, though elderly human patients with cervical spondylotic myelopathy have a different pathogenesis than equine CVCM patients, they also frequently have multilevel vertebral canal narrowing, and a comparison of the MRI imaging with functional conduction testing has revealed that the sites of maximal compression did not always correlate to the site of maximal functional conduction block.