



## Cauda Equina Syndrome

Spinal disorders affecting animals can involve the spinal cord, the membranes surrounding the spinal cord (meninges) or the spinal rootlets and nerves exiting the spinal cord as it sits within the vertebral canal. The termination of the spinal cord within the vertebral canal is dependent upon the size of the animal, as the vertebrae grow faster than the spinal cord. In cats and small dogs, the spinal cord descends to the level of the vertebral bodies of S1-S3. In large dogs, such as the German shepherd dog, the spinal cord terminates at the mid-body of the 6<sup>th</sup> lumbar vertebrae. For reference, there are seven lumbar vertebrae and three sacral vertebrae (fused together to make up the sacrum or “tail bone”) in the dog and cat.

Within the vertebral canal of the vertebrae, the spinal cord ends in the shape of a cone, termed the “cones medullaris”. It is continued by paired (right and left) spinal rootlets leaving their respective spinal cord segments and punching through the meninges to continue along the vertebral canal as the spinal nerves. The spinal nerves exit through bony holes created at the junction of two vertebrae, termed the “intervertebral foramen”. If viewed from the top, the streaming appearance of the spinal rootlets as they flow back and out of the intervertebral foramen, has the appearance of a horse’s tail, and has been named the “cauda equina”.

Multiple syndromes in companion animals can result in dysfunction of the nerves of the cauda equina. Some of the more common syndromes include abnormal formation and development of the vertebrae (lumbosacral malformation/malarticulation complex), intervertebral disk extrusions, tumors, infection of the intervertebral disc space of L7-S1 (diskospondylitis) and inflammation of the spinal rootlets and nerves, termed “cauda equina neuritis”.

Clinical signs of cauda equina syndrome are characterized by nerve dysfunction. Change in sensation to the rear legs, tail and anus and bladder can be appreciated. The loss of sensation (analgesia) or abnormal sensation (dysthesia or hyperesthesia) and pain (hyperpathia) can result in the clinical signs of knuckling (standing on top of the toes), chewing or self-mutilating the back of the thigh or outside region of the foot and toes and lameness. This can be noted in one or both rear legs. Lameness is usually pronounced when doing upward oriented activities, including standing from a sitting position. Animals will often yelp, hold up the limb and gradually begin to use the leg when walking along flat surfaces. Exercise and attempts to perform upward oriented activities are often avoided and result in pain. The loss of function of the motor nerves results in weakness or paralysis of the tail, anus and bladder, and weakness of the hocks (ankles). This can manifest as sagging of the ankles / walking on the bottom of the back of the ankle, loss of continence of urine and stool, and a paralyzed tail.

The diagnosis of cauda equina syndromes is based upon the clinical signs, findings of the physical and neurological examination and ancillary testing. Plain radiographs (x-rays), magnetic resonance imaging (MRI) or computed axial tomography (CT) and electrodiagnostic testing (electromyography, motor and sensory nerve conduction studies) are the commonly utilized tests. MRI remains the preferred test for visualization of the cauda equina in companion animals. The neurologist will determine the proper course of testing to accurately diagnose and treat your pet’s problem.

Long-term prognosis with cauda equina disease is based upon the underlying cause and the degree of sensory and motor nerve dysfunction. Like spinal cord disease, nerve injuries can be permanent despite correcting the underlying problem. Nerve recovery is also slow, with repair occurring at less than 1 millimeter per day. This exemplifies the need for early diagnosis and appropriate and aggressive management for the greatest degree of resolution of nerve pain and motor function. It also stresses the importance of post-diagnosis physiotherapy and hydrotherapy during the recovery period.