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CUTTING EDGE

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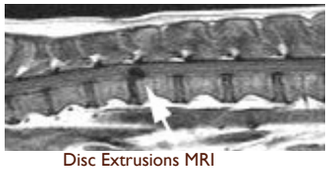
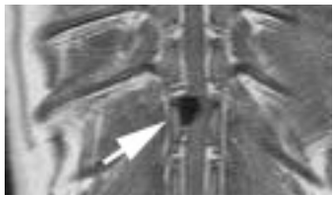
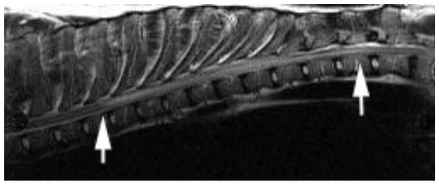
Orthopedic and neurologic diseases involving the spinal cord are a common occurrence in companion animals. The most common clinical symptoms noted are ataxia, spinal pain, or paresis/paralysis. The current modalities used to diagnose spinal cord lesions include radiographs (with & without contrast), computed tomography (CT) (with & without contrast), and magnetic resonance imaging (MRI). For the purpose of this article, orthopedic spinal cord diseases and lesions will be the primary focus. There are pros and cons for using each imaging modality and the use of multiple modalities may be necessary.



Disc Extrusions MRI



ADVANCES IN SPINAL IMAGING IN SMALL ANIMALS



MRI showing an area of hyperintensity (brightness) within the spinal cord, marked by white arrows

IVDD Herniation

Plain radiographs do not show the actual spinal cord or the intervertebral discs. However, they can show bony changes and or anomalies such as hemivertebrae, spinal fractures, some spinal tumors, and lysis of the vertebrae (discospondylitis). Radiographs with contrast (myelogram) allow visualization of disc extrusion and extradural spinal cord tumors a majority of the time.

Myelography can be used with radiographs and CT, and involves injecting contrast into the subarachnoid space to help outline the spinal cord. Patients are placed under general anesthesia for myelography. Some risks associated with contrast include post myelogram seizures and possible worsening of the neurological condition. Some common diseases involving the spine include intervertebral disc disease (IVDD), cervical spondylopathy (wobbler syndrome), spinal tumors, infections of the vertebrae, and spinal trauma.

Computed Tomography (CT) produces a series of equally spaced images to obtain summed images. Overall, CT is better for imaging bone versus soft tissue, requires less time, and is less expensive than MRI. For evaluating spinal fractures, bone tumors, and bone lysis, CT is the best modality. Type I intervertebral disc disease is common in chrondrodystrophic breeds such as Dachshunds and other small breeds. The disc extrusion is often mineralized and can be seen readily on a CT. Type II intervertebral disc disease occurs more often in larger breed dogs and often times the disc material is not mineralized, so it may not be readily seen on CT. CT requires general anesthesia and usually takes less than 30 minutes depending on the size of the animal.

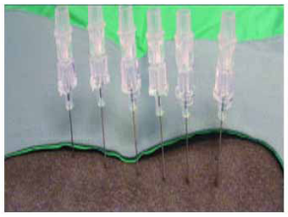
Magnetic Resonance Imaging (MRI) involves a magnet which detects atoms within the body, creating a magnetic field. Magnetic field gradients cause nuclei at different locations within the body to rotate at different speeds and be constructed into a more detailed radiograph resulting in a 3D image. MRI provides excellent contrast between the different soft tissue structures within the body (fat, ligament, muscle, etc). Contrast can be used, but it does not require ionizing radiation (compared to CT & radiographs). MRI requires general anesthesia, takes approximately one hour (depending on the location of the suspect lesion) and is the most expensive modality to use for diagnosing spinal cord injury.

Intervertebral disc disease can be classified as Hansen's Type I or Hansen's Type II disc herniation. The intervertebral disc is composed of two different tissues. The outer portion is comprised of fibrocartilage and is called the annulus fibrosus and functions to support the disc space. Inside the annulus fibrosus, a soft centered portion called the nucleus pulposus is contained which functions to absorb forces. The majority of IVDD occurs in chondrodystrophic breeds (Dachshund, Pekingese, Beagle, Lhasa apso, etc.) and results in a Hansen's Type I disc herniation. Hansen's Type I involves early mineralization of the IVD, the nucleus pulposus becomes harder, like cartilage, and undergoes calcification, which eventually ruptures through the weakened annulus fibrosus into the spinal canal. This can occur at more than one site at a time and usually occurs between the ages of 3-6 years. Large breed dogs (nonchondrodystrophic) are more affected by disc degeneration, in which the center of the disc (nucleus pulposus) undergoes fibroid metaplasia.

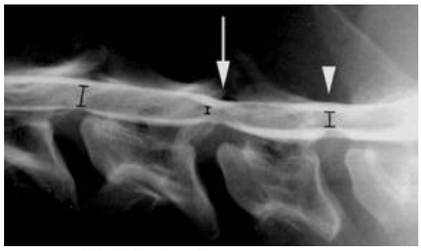
Over time, the disc bulges into the spinal canal causing compression of the spinal cord resulting in Hansen's Type II disc herniation. These dogs typically present between 5-12 years of age. Chondrodystrophoid breed dogs account for the vast majority of all intervertebral disc ruptures, with the Dachshund accounting for 45-70% of all cases. In these dogs, average onset of clinical signs is between 3-6 years of age. Thoracolumbar disc herniations (T11-T12, T12-T13,T13-L1) account for 85% of all disc ruptures, while cervical account for up to 15%.

Ho:YAG Laser

Laser Disc Ablation (LDA), is a minimally invasive preventative procedure for degenerative disc disease in dogs. This procedure has been shown to be 97% effective in preventing future disc rupture. LDA was first introduced in 1993 at Oklahoma State University. This procedure is recommended as a prophylactic procedure to reduce the risk of disc extrusion into the spinal canal. LDA is a procedure that takes ~30 minutes. Patients undergo general anesthesia and eight needles are placed through the skin into the center of the disc spaces. Fluoroscopy is used to visualize correct placement of the needles. A laser (Ho:YAG) is used to vaporize and coagulate the center of the disc. This drastically reduces the chance for future rupture. LDA is not used for acute ruptures. It can be used after an animal has had IVDD surgery, as long as they are four weeks postoperative and are pain free. Dogs usually go home the day after the procedure with strict cage rest for two to three weeks. *The Dallas Veterinary Surgical Center is one of the few private practices in the country offering this procedure.*


LDA Needle Placement

Caudal cervical spondylomyelopathy, or Wobbler syndrome, typically occurs in mid to older, large breed dogs and results from instability between adjacent cervical vertebrae. This form of Wobblers generally presents as either recurring neck pain and/or progressive ataxia to the rear legs. Definitive diagnosis is made by performing a "dynamic myelogram" or a dynamic CT scan to determine where compression or instability is present .


Wobbler Syndrome

Surgical distraction and stabilization is the treatment of choice for "Wobbler"s" resulting from vertebral instability and generally carries a fair to good prognosis. A complete discectomy is performed. Small holes are drilled in the vertebral endplates to facilitate the vascular ingrowth. Traction is applied across the affected vertebra to distract the disc space and an allogenic cortical bone block (Bergman's Bone Block) combined with an autogenous cancellous graft is inserted into the disc space to maintain the affected vertebra in a distracted position. Two bone plates using "Locking Screw" (Figures 1and 2) technology are positioned over the vertebra and screws are inserted into the vertebral bodies with the aid of intraoperative fluoroscopy. *Distraction and stabilization for Wobbler's has been performed by surgeons at the DVSC for over 20 years with very predictable results.*

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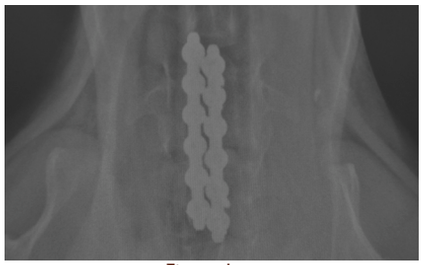
Figure 1


Figure 2

Author: Dr. Chrissie Mamone

Mark your calendars: The third annual Animal Emergency Hospital and Veterinary Specialty Center Continuing Education meeting in Grapevine will be February 9, 2013. Please visit **www.dfwvetspecialty .com** for more information or to register.

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