



Intervertebral Disc Disease in the Canine Athlete

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Two weeks ago, a former colleague brought her eight-year-old robust yellow Labrador to VOSM for evaluation of acute neck pain of seven days duration. Seamus is an active Lab, but this particular incident was not associated with known trauma. He had been started on an oral corticosteroid and muscle relaxant, with little to no improvement. Upon examination, he could barely lift his head without vocalizing in pain. An MRI revealed a disc rupture between his fourth and fifth cervical vertebra. The following day, Seamus underwent surgery to alleviate the spinal cord compression in his neck. A large amount of disc material was removed from the vertebral canal, and Seamus was a new dog a mere 24 hours after surgery. Unfortunately, this is a scenario that presents all too often at our hospital. Let's take a closer look so you can become more familiar with this condition.

Anatomy

The normal canine spine is comprised of seven cervical, thirteen thoracic, seven lumbar, three sacral, and a varying number of coccygeal (tail) vertebrae that house and protect the spinal cord. Intervertebral discs exist between all adjacent vertebrae, with the exception of the first two cervical vertebrae and the sacral vertebrae. These discs provide stability and flexibility to the vertebral column, and act as shock absorbers for the spine. Each disc is like a jelly donut, composed of an outer shell (annulus fibrosus) and a central jelly-like portion (nucleus pulposus). The fluid nature of the inner disc allows it to absorb shock. The capacity to absorb shock is diminished with the loss of the normal composition of the gelatinous center.

Predisposing Factors

Intervertebral disc disease (IVDD) can affect any size or breed of dog. Commonly affected small breed dogs include the Dachshund, Poodle, Pekingese, Cocker Spaniel, Shih Tzu, Lhasa Apso, and Beagle. Basset Hounds, German Shepherds, Labrador Retrievers, and Doberman Pinschers are the most commonly affected large breed dogs. Dogs that participate in agility are at

higher risk for developing this condition as compared to dogs that participate in other sports due to the repetitive flexion and extension of the spine over various pieces of equipment.

Types of Disc Disease

Intervertebral disc degeneration occurs with aging and may precede disc herniation. There are two main types of disc degeneration in dogs: 1) chondroid metaplasia and 2) fibroid metaplasia.

Chondroid Metaplasia (Hansen Type I IVDD)

This type of degeneration occurs mostly in chondrodystrophic breeds (those that have genetic mutations that affect the development of cartilage like the Dachshund, Pekingese, Shih Tzu, and so on) with the changes starting during the first two years of life. A peak clinical incidence



of this type of disc disease occurs between three and six years of age. As the disc degenerates, it dehydrates and the inner gelatinous portion becomes less like jelly. These processes interfere with the ability of the discs to absorb shock and place additional mechanical stress on the outer portion of the disc. Normal wear and tear often causes further weakening until the nucleus pulposus is allowed to leak into the vertebral canal causing a concussive trauma (bruising) to the cord and secondary displacement or compression of the spinal cord due to the presence of disc material within the canal.

Fibroid Metaplasia (Hansen Type II IVDD)

This typically occurs in non-chondrodystrophoid breeds later in life. The discs dehydrate more slowly and dogs are usually minimally affected while they are young and active. Clinical problems generally arise between ages six and eight and may or may not cause clinical signs. With this type of disc disease, the outer shell bulges into the vertebral canal, causing chronic spinal cord compression (but does not cause the acute spinal cord bruising like the more explosive Type I disc rupture).



History and Clinical Signs

Disc herniation can present as a sudden or chronic injury. The way a dog exhibits signs of disc herniation can vary significantly

from a human, and this is largely related to how forces are distributed through the body of a biped as compared to a quadruped, and differences in spinal cord anatomy. In the human, the spinal cord ends and splits into nerve roots much higher than the spinal cord of the dog. A disc bulge of the lower back in a person may present with severe pain or sciatica in one leg, but a dog with a herniation in the same location may be unable to walk. Clinical signs vary depending on the affected segment of the spinal cord and with the type of disc rupture. Neck or back pain is often the earliest or only clinical sign, which is often mistaken for abdominal pain or constipation. It is typical for agility patients to perform subpar, knock bars, or appear “roached” in the back. More severely affected dogs may have decreased awareness of where their paws are placed when walking, or even lose the ability to move their legs. Urinary retention, fecal incontinence, complete paralysis, and loss of feeling in the feet can also develop.

This progressive spinal cord dysfunction can take minutes to months to occur. Typically, dogs with a disc rupture in their neck remain ambulatory but experience a great deal of discomfort. If the herniated disc occurs in the mid to lower back, clinical signs are typically more severe (due to the smaller size of the vertebral canal) and only affect the hind limbs.

Examination

Patients that present with spinal pain should be thoroughly evaluated to rule out underlying orthopedic conditions (bilateral cranial cruciate ruptures are commonly mistaken for disc ruptures) and metabolic abnormalities. A proper neurological



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examination should be able to identify the source of discomfort as a neurological condition and isolate the injury to one of four anatomic regions: the upper neck, lower neck, mid chest to upper lumbar back, and sacral regions. Based on the examination findings and severity of clinical signs, diagnostic imaging and referral to a board-certified veterinary surgeon or neurologist may be recommended.

Board-certified Surgeon or Neurologist?

When it comes to spinal surgery, who is better qualified to evaluate spinal injuries and perform surgery if necessary? The answer is not a simple one, as both specialties are capable of performing the neurological procedures. The American College of Veterinary Surgery requires that each surgeon perform a minimum of 40 neurosurgeries before sitting for the board certification exam, thus surgical residents are provided with direct training and supervision during this time period. Neurology is a subset of the American College of Internal Medicine, and until 2008, the college did not require a neurology resident to log or document surgical training. Currently, the college requires neurology residents to observe or participate in at least 50 hours of neurosurgery before being board eligible. Neurologists have a high level of knowledge regarding the nervous system, and although not required by the college, many neurologists have extensive surgical experience. Your primary care veterinarian is best qualified to make recommendations on appropriate specialists in your area.

Diagnostic Imaging

It is recommended or required that all imaging of the spinal canal be performed under heavy sedation or general anesthesia.

Radiography

X-rays are readily available and are a good tool for ruling out other causes of spinal cord injury, including fractures, disc infection (discospondylitis), and vertebral tumors. X-rays do not provide enough information to confirm spinal cord compression, thus are not appropriate to use alone for surgical planning.

Myelography

Myelography has been used for decades to identify spinal cord abnormalities and compression. An injection of a radiopaque contrast material is placed around the spinal cord. Then, radiographs are made and the spinal cord is outlined in white by the contrast material. Myelography is inexpensive, readily available, and identifies the area of spinal cord compression in 85.7 to 98% of cases. However, a certain level of expertise and training is required to perform the injection and interpret the radiographs. Severe spinal cord swelling can also make identification of the herniated disc site difficult. In addition, myelography carries a low risk of complication (5%), which can include irritation of the outer tissue of the spinal cord, which in some cases, can cause seizures.

Computed Tomography (CT)

CT is essentially a high-resolution three-dimensional x-ray that offers excellent visualization of bone anatomy and mineralized disc material. It is quick, relatively affordable, and does a good

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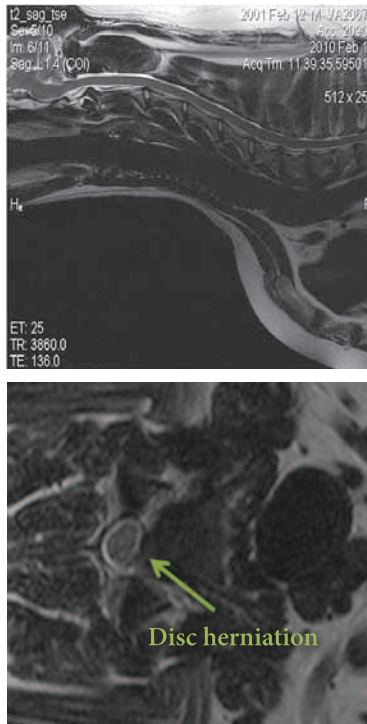
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job of identifying Type I disc ruptures. However, soft tissue detail is not as clear, which can make judging soft tissue swelling and Type II disc ruptures challenging. If necessary, CT can be combined with myelography.

Magnetic Resonance Imaging (MRI)

MRI provides the best soft-tissue detail of any imaging modality and thus is considered the gold standard for assessing the spinal cord by most surgeons and neurologists. As with CT, the entire spinal column is visualized in cross section. MRI has the advantage of allowing internal assessment of the spinal cord, which may help determine prognosis. It also demonstrates early and subtle degenerative changes within the intervertebral disc. The quality of the MRI can vary significantly depending on the type of machine (open vs. closed, size of magnet) and software used to obtain the images. It is also the most expensive type of advanced imaging.



Treatment

Nonsurgical Management

In performance patients, this is typically only recommended in dogs with short-term discomfort and no or only mild neurological weakness. If the dog is unable to bear his own weight, surgery is usually recommended. The paramount of conservative management of IVDD is strict exercise restriction for four to six weeks to allow the spinal cord to heal and analgesic (opioids and/or anti-inflammatory) therapy. Rehabilitation therapy, chiropractic adjustment, and/or acupuncture may also be of significant benefit and the use of such treatment is supported in the veterinary literature. If the neurological status worsens, then surgery may become warranted.

Surgical Management

Surgery involves an approach to the spinal canal and removal of the compressive lesion. Advanced imaging (myelogram, CT, or

MRI) is performed before surgery to correctly identify the location of the compression. Surgery involves making a window in the vertebral bone above (dorsal laminectomy), below (ventral slot), or along the side (hemilaminectomy) of the vertebral canal to gain access to the spinal cord. The disc material is then removed from around the cord or nerve root and the remaining disc material that is still present between the vertebra is removed (termed fenestration).

Rehabilitation Therapy

Veterinary rehabilitation plays an integral role in the care of an IVDD patient, whether medical or surgical management is recommended. The combination of manual techniques, laser therapy, acupuncture, appropriate home exercise plans, and hydrotherapy have all been shown to aid the recovery process. Recent research demonstrates that laser treatments not only alleviate pain, but are also capable of healing tissues at the cellular level. Hydrotherapy has the added benefit of allowing the patient the ability to bear weight and encouraging ambulation. Many pets find it mentally rewarding as well, which cannot be overlooked in the overall healing process. Finding a therapist to tailor a treatment plan for your pet both at home and in the clinic setting will prove invaluable.

Prognosis

Nonsurgical Management

Little is known about IVDD prognosis with conservative therapy. Studies have reported varying success rate with medical management alone. Success with conservative therapy will also depend on anatomic location and type of disc rupture, severity of clinical signs, breed, and duration of injury. The reported recurrence rate is as high as 40%.

Surgical Management

The most important prognostic variable is the presence or absence of deep nociception (the recognition of pain by the dog's brain when the toes are squeezed, noted by facial reaction, vocalization or an attempt to bite). Deep nociception fibers run deeply within the spinal cord; if these deep fibers are damaged then the compression is very severe and those dogs have a worse prognosis. The prognosis for the return to ambulation in a dog with surgical decompression and intact deep nociception ranges from 72% to 100%. In our practice, we have greater than a 95% surgical success rate at restoring function in patients that present with deep pain sensation intact. If deep nociception is lost, the chance of recovery to ambulation falls to 25% to 78%. The postsurgical recurrence rate (disc rupture at a different site) is 10% to 20%. 🐾

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Dr. Faith Lotsikas earned her veterinary degree from the Virginia-Maryland Regional College of Veterinary Medicine. She has always had a strong interest in whole pet wellness. For that reason, she also became a certified canine rehabilitation therapist. Dr. Faith now offers rehabilitation services as a mobile veterinarian in the Washington D.C. area, and at Gunny's Rainbow in Bethesda. She also enjoys being an amateur veterinary medical illustrator.