INTERVERTEBRAL DISK DISEASE - TRADITION VERSUS CURRENT VIEWS ON TREATMENT

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Approximately 2% of the canine population suffers from intervertebral disk disease (IVDD) with a prevalence of 25% in Dachshunds. Thoracolumbar disk herniation is most common and results in acute dysfunction, including paresis and paralysis. The severity and type of clinical signs depends on numerous factors including spinal cord diameter relative to vertebral canal diameter, location of the degenerative disk, rate of disk extrusion/protrusion, and volume of the compressive mass.

With progressive degrees of spinal cord compression, increased ischemia and demyelination occur. Accordingly, neurological function is lost in a predictable order according to the degree of demyelination and the diameter of the fibers that mediate a given function. Large, heavily myelinated fibers mediating conscious proprioception are the first to be affected, intermediate-sized fibers mediating voluntary motor function and slightly smaller fibers mediating superficial pain appreciation are affected next, and small fibers mediating deep pain sensation are affected last. The urinary bladder generally becomes dysfunctional around the same time as loss of limb motor, but this can be variable. Upon recovery, these functions return in reverse order. It is helpful to keep this in mind when devising a treatment plan since the degree of neurologic dysfunction determines the urgency of treatment and the treatment type recommended.

CLINICAL SIGNS

Animals with thoracolumbar disk disease can be divided into five categories based on their presenting neurological status.

<table>
<thead>
<tr>
<th>Neurologic Grade</th>
<th>Clinical Signs</th>
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<tr>
<td>Grade I</td>
<td>Painful, but no neurologic deficits</td>
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<tr>
<td>Grade II</td>
<td>Recurrent spinal pain and/or mild to moderate paraparesis (ambulatory, ataxic dogs).</td>
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<tr>
<td>Grade III</td>
<td>Severe paraparesis, non-ambulatory</td>
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<td>Grade IV</td>
<td>Complete loss of motor function, but sensory function is intact</td>
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<tr>
<td>Grade V</td>
<td>Loss of all motor and sensory function</td>
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Impaired urinary bladder function is also common in animals with substantial neurologic deficits (some grade II animals and most all grade III - V animals). Animals with cervical disk herniation mostly experience pain secondary to nerve root irritation. Neurological deficits are much less common since the spinal canal is larger in the cervical area than in the thoracolumbar spine and the spinal cord can move out of the way. Varying degrees of neurologic deficits such as ataxia, quadripareisis, and quadriplegia can be seen.

TREATMENT

Depending on the animal’s neurologic status and the owner’s ability to proceed with the recommended therapeutic plan, IVDD is managed conservatively or with surgical decompression of the spinal cord. The decision to try conservative management or to proceed with surgical decompression can be difficult, but the following guidelines should aid the decision making process.

For Thoracolumbar Disk Disease

If it is the patient’s first episode and the animal is experiencing spinal pain only, conservative management should be initiated (grade I disease). Most of these animals will respond to cage rest, but some may require surgery if the pain does not subside or if the animal begins to get worse.

Animals with thoracolumbar disk disease experiencing mild ataxia, but good ambulatory ability, can also be managed conservatively (grade II). However, these dogs need to be monitored carefully for disease progression and be referred for surgery if they begin to get worse.

High grade II and low Grade III dogs are in a gray zone for appropriate treatment. If the animal is weakly ambulatory, conservative management can be considered, but the animal should be kept in the hospital to serially monitor its neuro status every few hours. For animals at this stage, the owner should be informed that surgery may be the best treatment option and referral to a surgical facility should be considered. Although some surgeons may not operate the dog if it can still ambulate to some degree, the surgeon will have the option to monitor the animal closely and operate if needed. If the owner does not want referral and the animal is improving over the first 24-48 hours, then conservative management can be continued at home. If the animal is not improving over 24-48 hour period, then surgical decompression is recommended to the owner. If the animal worsens, then emergency surgery is recommended.

Non-ambulatory grade III and grade IV dogs are considered emergency surgical candidates. Conservative management is only considered if the owner will not accept referral. As long as pain sensation is still intact at the time of surgery, there is an 85-90% chance of complete recovery with surgical decompression of the spinal cord and removal of the herniated disk material.

If pain sensation is lost to the limbs, treatment options are more confusing. The prognosis is guarded to poor once sensation is lost, but if decompression is achieved within the first 24-48 hours of sensory loss, the chances of recovering are reported to be slightly improved than if more time is allowed to lapse. ***It usually very difficult to know when the animal actually lost sensation; so, if the owners are willing to accept the slim chance of recovery, these dogs are often operated on emergency. The owners should be made aware that the chance of complete recovery is low. Animals that have not had sensory function to its limbs for several days to
weeks are not likely to recover neurologic function with or without surgery. In those cases, if the owner wants to manage a paraplegic dog and the animal is painful from the spinal cord compression, surgery can be performed to help alleviate the spinal pain as a palliative procedure. However, most of the dogs will not undergo surgery due to the slim chance of recovery.

### Cervical Disk Disease

If the animal is experiencing its first episode of pain without neurologic deficits, then conservative management is initiated. Animals with concurrent neurological deficits are surgical candidates. If the animals condition does not improve within a week of starting conservative management, the animal is severely painful, or the animal has recurrent episodes of pain after improvement with conservative management, surgical decompression should be considered. Dogs with cervical disk disease should be walked on a harness rather than leash and collar to prevent unnecessary pressure on the cervical spine.

### Conservative Management

The most important part of conservative management for any animal suffering from disk herniation is **strict confinement for 4-6 weeks**. The purpose of confinement is to help prevent further herniation of disk material into the spinal canal while the ruptured annulus fibrosus seals. These animals should be kept in a crate only big enough to allow them to turn around and eat and drink. No running, jumping, off leash outdoor activity, house roaming, or playing with other animals should be allowed. Pain medication should be given if the animal is painful.

Worsening of clinical signs in spite of appropriate management occurs in some cases managed conservatively. Owners must be instructed to evaluate their pets frequently and to bring the pet in for immediate evaluation if worsening is noted. Failure of owner compliance is perhaps the most frustrating problem that can occur. Recurrence rates may be higher in animals undergoing conservative management for disk herniation and owners should be warned to continue to monitor their pets for problems even after recovery. Animals that don’t respond to conservative management, get worse on conservative management, or that have recurrent episodes should be considered candidates for surgical decompression. Warn owners early on that surgery may be necessary.

Drug therapy for spinal cord injury, including acute disk herniation, is controversial. Steroids are not the mainstay of treatment for the disease and do nothing to alleviate the compression on the spinal cord. If steroids are used, methylprednisolone sodium succinate (Solu-Medrol®) is recommended. Recent studies in humans recommend an initial dose of 30 mg/kg followed by a 2.5-5 mg/kg/hr infusion for 24 hours. Methylprednisolone sodium succinate is the only steroid shown to have a potential benefit in the treatment of acute spinal cord injury and the drug is only potentially beneficial if **given within the first 8 hours** of cord injury at the recommended dose. Administration of high dose steroids can be detrimental if administered greater than 8 hours after cord injury. High dose steroid use can also result in complications secondary to immunosuppression and their affect on the gastrointestinal tract. Gastrointestinal protectants such as H₂ blockers and/or prostaglandin analogs can be used concurrently, but these drugs have not been shown to prevent gastrointestinal ulceration in dogs given high doses of steroids. Dexamethasone may be linked to an increased incidence of gastrointestinal bleeding and fatal colonic perforation in the face of spinal cord injury and **should be avoided in dogs as a treatment of spinal cord injury**. Dexamethasone especially should not be given repeatedly to dogs with disk herniation. Prednisolone at a tapering dose of 0.25-0.5 mg/kg for 5-7 days may be helpful for managing severely painful animals (cervical disk herniation) to help decrease the inflammation associated with the disk herniation, but its benefit is unknown. **Long term steroid use is not recommended** in treating disk disease and should be avoided to prevent complications. If an animal has to be maintained on steroids to control its pain or clinical signs, then surgery should be considered.

Nonsteroidal anti-inflammatory drugs (NSAIDs) can be used for pain control instead of steroids. This therapy is becoming more popular in referral institutions to help prevent the potential side effects of steroid use and the potential detrimental effects of steroids on the healing spinal cord. NSAIDs and steroids should **never** be administered simultaneously since this combination can result in severe gastrointestinal ulceration. If conservative management (cage rest) is working effectively, long term administration of pain medication/anti-inflammatories should not be necessary.

For animals with cervical disk herniation, muscle relaxants (methocarbamol at 15-20 mg/kg P.O. TID or diazepam at 1.1 mg/kg P.O. BID) may be helpful. Their benefit is not proven, but muscle spasms associated with cervical disk herniation is a frequent finding and the addition of muscle relaxants could certainly help alleviate the pain from that.

Surgery does not negate the need for patient confinement. All animals undergoing surgical decompression should be cage rested for 4 weeks to allow the laminectomy site and soft-tissues to begin healing, and, for T-L lesions, allow the annulus fibrosus to scar over in hopes of decreasing the chance of further disk herniation.

Nonambulatory animals require special care to prevent the development of further problems. Down animals are prone to decubital ulcer formation and fecal and urine scald. These animals should be kept in a well-padded, clean area. They should be routinely monitored for fecal and urine soiling and be cleaned when necessary. Bladder function is monitored carefully. Animals that can not consciously urinate (dogs in the grade III or higher category) will require urinary bladder expression at least three times daily. Passive range of motion activity for joints and limb massages are important to help maintain muscle tone, joint range of motion, and to help prevent pressure sore formation. Since these animals can not move around easily, they should have easy access to water and food. Animals without pain sensation should be carefully monitored for self mutilation and an E-collar placed if chewing at the limbs occurs. A down animal should never be allowed to drag itself around since this can lead to severe wounding and excoriation, especially in animals without pain sensation.

Animals that do not recover from spinal cord injury can be managed in a cart. If the owners can provide the appropriate care, these animals can actually live a long, happy life in a cart. Animals should never be left unattended in a cart.
TRADITION VERSUS CURRENT RECOMMENDATIONS: A NOTE

Disk herniation has traditionally been treated with high dose steroid administration. Steroid administration has not really been proven beneficial in the treatment of disk herniation and can potentially be harmful. The beneficial effects of steroids in relation to spinal cord injury are related to the drug’s anti-oxidant activity. In order for the available drug population to have this effect, they have to be given at doses well above the anti-inflammatory dose. At these doses, the risk of side-effects is much higher and the amount of glucocorticoid activity is also tremendously increased. The glucocorticoid effects of steroids are potentially harmful to the spinal cord in that it can result in a worse outcome via glucocorticoid mediated interference with normal regeneration and neurodegeneration by inhibiting neuronal glucose uptake in the face of ischemia and glutamate-induced damage. The glucocorticoid effects of steroids might also negatively affect healing of the torn annulus fibrosus and has the potential to weaken collagenous structures such as those contained in the intervertebral disk with long term use. Because of these effects, high dose steroid use is only recommended within the first eight hours of spinal cord injury, if at all, and methylprednisolone sodium succinate is the only drug shown to have any benefit. Keep in mind, that the actual benefit of methylprednisolone sodium succinate has even been questioned.

Dexamethasone is commonly used to treat IVDD in the private sector. Not only has dexamethasone not been shown to be beneficial in treatment of spinal cord injury, it has potential fatal side effects. Fatal colonic perforation and a high incidence of gastrointestinal hemorrhage/ulcer formation is associated with its use. The perceived benefits of the drug may be related to reduced spinal cord edema, however, those dogs that are going to recover with conservative management will likely recover whether steroids were administered or not (and certainly not all dogs improve when the drug is given). Crate rest appears to be the most influential factor on management of these dogs. Based on the cited problems associated with steroid use in dogs suffering from IVDD and the lack of evidence to suggest a benefit, many referral institutions now avoid steroid use.

REFERENCES