

Thoracolumbar Intervertebral Disk Disease

Basics

OVERVIEW

- The spine is composed of multiple bones (vertebrae) with disks (intervertebral disks) located in between adjacent bones; the disks act as shock absorbers and allow movement of the spine; the vertebrae are named according to their location—cervical vertebrae are located in the neck and are numbered as cervical vertebrae one through seven or C1–C7; thoracic vertebrae are located from the area of the shoulders to the end of the ribs and are numbered as thoracic vertebrae one through thirteen or T1–T13; lumbar vertebrae start at the end of the ribs and continue to the pelvis and are numbered as lumbar vertebrae one through seven or L1–L7; the remaining vertebrae are the sacral (located at the pelvis) and coccygeal (tail) vertebrae
- Each disk is composed of a central gel-like area, known as the “nucleus pulposus,” and an outer fibrous ring, known as the “annulus fibrosis”
- “Thoracolumbar intervertebral disk disease” refers to degenerative changes in the disks involving the thoracic and lumbar backbones (vertebrae) of the spine
- Degeneration of thoracolumbar intervertebral disks causes protrusion or extrusion of disk material into the spinal canal; the protruded or extruded disk material causes pressure on the spinal-cord itself (known as “spinal-cord compression” or “myelopathy”) and/or nerve-root compression (known as “radiculopathy”)
- Protrusion is defined as the disk bulging into the spinal canal with the fibrous ring of the disk being intact; extrusion is defined as the center or nucleus of the disk being forced out of its normal position into the spinal canal with the fibrous ring of the disk being ruptured
- Two types of protrusion/extrusion (“slipped disk”) have been reported in dogs: sudden (acute) disk herniation is Hansen type I and long-term (chronic) disk herniation is Hansen type II; Hansen type I involves degeneration of the center or nucleus of the disk with rupture of the fibrous ring and resulting movement of the center into the spinal cord (extrusion) while Hansen type II involves degeneration of the disk, followed by bulging of the disk into the spinal cord with the fibrous ring remaining intact (protrusion)
- Thoracolumbar disk disease comprises 85% of all disk herniations in dogs



GENETICS

- Early studies suggest a polygenetic model with no dominance or sex linkage

SIGNALMENT/DESCRIPTION OF PET

Species

- Dogs
- Cats—occasionally

Breed Predispositions

- Hansen type I—dachshund, shih tzu, Lhasa apso, Pekingese, cocker spaniels, Welsh corgis, and toy and miniature poodles
- Hansen type II disease—large-breed dogs, but may occur in any breed; cats

Mean Age and Range

- Hansen type I disease—dogs, 3–6 years of age
- Hansen type II disease—dogs, 8–10 years of age; cats, mean age of 10 years

SIGNS/OBSERVED CHANGES IN THE PET

- Signs depend on location and type of disk herniation (protrusion or extrusion), the velocity of disk contact with the spinal cord, and the amount and duration of spinal cord compression, and location in the spine
- Onset may be very sudden (peracute) or sudden (acute) in chondrodystrophic dogs (Hansen type I disease), and may occur during vigorous activity
- Larger dogs or smaller dogs with Hansen type II disease have a more subtle onset and tend to worsen with time
- Thoracolumbar pain is common in dogs; reluctance to move and hunched posture
- Often some degree of weakness of the hind limbs (known as “paraparesis”)
- Spinal reflexes in the hind limbs usually are exaggerated when the spinal cord lesion is located between the third thoracic (T3) and third lumbar (L3) vertebrae; reflexes are decreased when the spinal lesion is behind the third lumbar (L3) vertebra
- Pain perception may be decreased or absent in the rear limbs; presence of deep pain sensation is the single most reliable prognostic factor for return to acceptable function
- Front leg function usually is normal
- Lack of ability to control urination (known as “urinary incontinence”) is common when the spinal lesion affects motor function
- Pain is less obvious in cats; the site of disk herniation often involves the lumbar vertebrae

CAUSES

- Degeneration of the thoracolumbar intervertebral disks
- 15% of pets with spinal fractures/dislocations have been reported to have disk extrusions, in addition to the fracture/dislocation

RISK FACTORS

- Hansen type I disease most often affects chondrodystrophic breeds (breeds with shortened legs that are bowed to some degree)

Treatment

HEALTH CARE

- Guidelines for therapy based on classification of clinical condition, as follows:
- Class 1—back pain only
- Class 2—recurrent back pain; wobbly, incoordinated or “drunken”-appearing gait or movement (known as “ataxia”); mild weakness of the hind limbs (paraparesis); motor ability good
- Class 3—weakness severe in the back limbs, abnormalities in which normal subconscious awareness of the location of the limbs and movement is altered (known as “proprioceptive deficits”); motor ability affected, but still present
- Class 4A—complete paralysis (no motor ability) of the hind limbs, with deep pain perception present
- Class 4B—complete paralysis of the hind limbs, no deep pain perception present

- Treatment recommendations as follows:
- Class 1 patients treated medically, unless pain persists
- Class 2 patients treated medically initially with serial nervous system examinations, surgery if the pet's condition remains static or declines
- Classes 3 and 4A need immediate surgical therapy
- Class 4B surgical therapy, if within the first 12–48 hours of occurrence; prognosis poor if no pain sensation for more than 48 hours
- Ongoing examination to monitor nerve function is important for all affected animals
- Absolute confinement for 2-4 weeks or until can walk again
- Minimize spinal manipulation and support spine when handling the pet
- Recumbent pets will be kept clean on padded bedding, placed on elevated cage racks, and turned frequently to prevent formation of “bed sores” (known as “decubital ulcers”)
- Ensure ability to urinate or consider bladder expression, intermittent catheterization, or indwelling urinary catheter for pets in classes 3–4B
- Evacuation of the bowel or enemas may be necessary to promote defecation, as directed by your pet's veterinarian
- Physical therapy with passive manipulation of rear limbs begun early followed by more intense therapy (hydrotherapy) for pets with nervous system deficits
- Carts are useful in many pets in promoting return to function; pet tolerance to the use of the cart is the limiting factor

ACTIVITY

- Restricted activity and movement are most important part of medical management; some restriction of activity may be necessary for the lifespan
- Cage rest in hospital or enforced cage rest as an outpatient for 2–4 weeks for class 1 patients or post-operative pets

DIET

- Weight reduction, if pet is overweight or obese

SURGERY

- Strongly indicated for pets in classes 3 and 4A and within the first 12–48 hours for class 4B dogs; also indicated for static or worsening class 1 and 2 dogs
- Primary surgical goal is to relieve spinal cord compression by removal of the herniated intervertebral disk (surgical procedures include hemilaminectomy, dorsal laminectomy, foramenotomy and pediculectomy)

Medications

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

- Steroids given to animals without simultaneous strict cage confinement could decrease pain enough to worsen disk extrusion by encouraging exercise, thus worsening the condition
- Nonsteroidal anti-inflammatory drugs (NSAIDs) or narcotics can be used to relieve pain (known as “analgesics”) in Class 1 pets
- Gabapentin may be useful for chronic pain in dogs
- Post-operative pain medicines such as hydromorphone, transdermal fentanyl or lidocaine may be used for comfort
- Muscle relaxants (such as methocarbamol) may be useful in cases where muscle spasm is contributing to pain
- Bethanechol and phenoxybenzamine or prazosin may be helpful in managing bladder dysfunction associated with spinal-cord lesions
- Acupuncture use has been described; efficacy not determined

Follow-Up Care

PATIENT MONITORING

- Serial nervous system examinations are important for all affected pets
- Pets treated medically should be reevaluated 2–3 times daily for worsening nervous system signs for the first 48 hours after onset
- If stable, reevaluate daily, then weekly, until clinical signs have resolved
- Pets treated surgically are evaluated twice daily until improvement is noted; urinary bladder function is the limiting factor for hospitalization

PREVENTIONS AND AVOIDANCE

- Prevention of obesity and avoiding strenuous exercise or jumping may or may not avoid worsening of clinical signs

POSSIBLE COMPLICATIONS

- Recurrence of signs associated with disk herniation at original or new site of the spinal cord
- Deterioration of clinical signs with or without surgery; hard-to-predict clinical course in some cases, especially those with severe Hansen type I lesions
- Rarely, development of ascending or descending myelomalacia—condition in which the motor neurons (nerve cells that control muscles) are destroyed, leading to progressive spinal cord disease that is not reversible; occurs in class 4A or 4B dogs at 3–5 days following injury and characterized by variable and changing nervous system findings, possible fever, possible difficulty breathing (known as “dyspnea”); extreme pain; euthanasia often performed when myelomalacia is diagnosed

EXPECTED COURSE AND PROGNOSIS

- Overall prognosis for dogs in classes 1–4A is good to excellent; those treated conservatively may experience recurrence of clinical signs
- Recurrence rates of dogs without fenestration at the time of surgical removal of the herniated disk material (laminectomy) range from 5% to 30%
- Dogs in class 4B have a variable (10–75%) chance of recovery; overall a guarded, but seemingly favorable prognosis if surgery is performed within 48 hours and the pet is allowed sufficient time to recover

Key Points

- If clinical signs of nervous system disease become worse, the pet should be reevaluated by the veterinarian as soon as possible
- Restricted activity and movement are most important part of medical management
- Cage rest in hospital or enforced cage rest as an outpatient for 2–4 weeks for class 1 patients or post-operative pets
- Most pets in classes 1–4 have a good-to-excellent prognosis for return to function (that is, ability to walk and have control of urination and bowel movements); patients in class 5 have a poorer but not hopeless prognosis