Thoracolumbar Disc Disease

Intervertebral disc disease is the most common neurological syndrome seen in dogs and thoracolumbar lesions are the most frequent of all intervertebral disc problems. Dogs with disc disease have chronic degenerative changes affecting the discs. Disc degeneration has been reported in 84 breeds with susceptibility in some breeds, including the Dachshund, French Bulldog, Pekinese, Poodle and Beagle. They have characteristic skeletal changes and the discs are predisposed to degenerate at a very early age. There are two types of disc disease; Hansen type 1 and Hansen type 2.

Hansen Type 1 Disc Disease

Intervertebral discs act as cushions between the vertebrae and function as the shock absorbers of the spine. A normal disc has two regions: a spongy gelatinous centre (nucleus pulposus) and an outer fibrous ring that encircles the nucleus pulposus (Fig. 1). Degeneration of the discs causes them to gradually harden, calcify and become more brittle. The degenerative discs sometimes rupture (Fig. 2) allowing inner disc material (nucleus pulposus) to squeeze out into the spinal canal causing spinal cord compression. This is referred to as nuclear extrusion or Hansen type 1 disc disease. One-sided disc ruptures (Fig. 3) are easier to access surgically. Access is more difficult when the disc ruptures centrally. (Fig. 4)

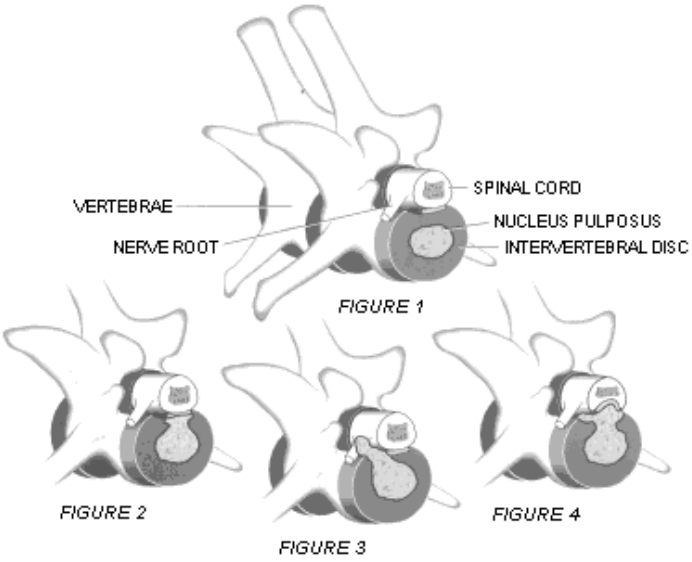

FIGURE 1

FIGURE 2

FIGURE 3

FIGURE 4

Hansen type 1 disc disease may have an acute onset, and can sometimes be dramatic; if a disc ruptures forcefully a dog can become immediately paraplegic. Because the discs are weak and brittle this can happen without warning, and dogs can rupture discs with activities as innocuous as walking on a lead. Paraplegic dogs should be treated as emergencies and require treatment as soon as possible. Sometimes the onset is gradual - an owner may notice their dog becoming a little "grumpy" for a few days; this is due to back pain secondary to spinal cord compression resulting from disc material gradually squeezing out of the disc into the canal. Some dogs will progressively worsen, becoming "wobbly" in the back legs (ataxic gait), walking as though inebriated (drunk). Hindlimb weakness may gradually worsen or may stabilise; in either case there is still significant risk of further disc material "leaking out" into the spinal canal exacerbating the compression of the spinal cord, with potentially disastrous consequences. Dogs with suspected spinal cord compression should always be considered for further investigation (spinal imaging by either myelography, CT or MRI), as even dogs presenting with back pain only can still have marked spinal cord compression.

Hansen Type 2 Disc Disease

A disc may compress the spinal cord without rupturing; this is called annular protrusion or Hansen type 2-disc disease. The outer fibrous ring (annulus) thickens and changes shape, progressively bulging into the spinal canal causing spinal cord compression. The onset is more insidious; often by the time it becomes clinically apparent the spinal cord has been suffering months of compression with resultant permanent atrophy (reduction in signal transmission).

Diagnostic Imaging

Myelography will be performed to identify the site/s of spinal cord compression. More advanced forms of imaging include CT, CT-myelogram or MRI.

- Myelography is a contrast study of the spine. A contrast agent ("dye") is injected into the fluid surrounding the spinal cord before performing either radiography or CT. The contrast agent outlines the spinal cord in the images.
- CT (computed tomography) is in essence an advanced form of x-ray machine, able to produce images in different planes; additionally, computer programs can use the information obtained to build 3 dimensional images.

Sometimes a myelographic injection will be given prior to performing computed tomography to obtain a CT-myelogram.

- MRI (magnetic resonance imaging) uses powerful magnetic fields rather than radiation to obtain images. Like CT images can be obtained in multiple planes.

For neurological imaging MRI is unquestionably the gold standard, however, myelography is still a useful tool when access to MRI is restricted, and there are select instances where CT-myelography may be as good as MRI.

Thoracolumbar Hemilaminectomy

The most commonly performed surgery to manage thoracolumbar disc disease is the hemilaminectomy. Other surgeries are sometimes used to manage specific types of thoracolumbar disc disease; these include pediculectomy (mini-hemilaminectomy), dorsal laminectomy, corpectomy and stabilisation procedures.

The approach for hemilaminectomy is an incision along the back. The muscles are elevated and a "window" cut in the side of the vertebrae on either side of the affected disc (or discs) with a high-speed neuro-drill, providing access to the spinal canal; extruded disc material is meticulously removed relieving compression on the spinal cord. In specific instances, stabilisation of the affected space may be performed by applying special bone plates and screws.

Prognosis:

Dogs with Hansen type 1 **disc extrusion** typically have an excellent prognosis following surgery; **approximately 90 to 95% of paraplegic dogs** with the presence of deep pain sensation will recover satisfactory (and majority very good to excellent) ambulation following surgical decompression; the mean time to walking again is approximately 11 days.

Negative prognostic factors (factors that reduce chance of recovery) include:

- peracute onset e.g. previously "normal" dog yelps and is immediately paralysed
- disc material located in the ventral midline (i.e. centrally - Fig. 4) as access is more difficult and retrieval may require a more complex approach i.e. corpectomy, or manipulation of the spinal cord.
- duration of signs; a longer duration of compression/reduced blood supply results in greater damage to the spinal cord. Additionally, if the spinal cord has been compressed for a long-time permanent atrophy of the cord occurs i.e. the spinal cord "shrinks" and has permanently reduced ability to carry signals.
- **loss of deep pain sensation**. Dogs with no deep pain sensation have only a 50-60% of functional recovery provided they are operated within 48 hours, after which the chance of recovery progressively worsens.

For dogs with Hansen type 2 **annular protrusions** the prognosis following surgery may be reasonable, but is certainly less favourable than for Hansen type 1 discs for the following reasons;

- Some degree of permanent spinal cord atrophy is inevitable i.e. permanent reduction in signal transmission.
- The surgery is more complex, typically requires corpectomy and involves cutting protruding material away from the cord; this may be combined with stabilisation procedures, or they may be performed as an alternative.
- Sometimes (but not always) the disc will slowly continue to thicken (compressive material may gradually grow back), so over time spinal cord compression may return.

Complications:

As with any surgery, complications may arise and are detailed below, although serious complications are uncommon.

- Myelography involves the injection of contrast agent into the fluid surrounding the spine. This may cause transient neurological deterioration and seizure activity (readily controlled with benzodiazepines) in the recovery period after anaesthesia. Anaphylactic shock and permanent neurological deterioration are rare but serious complications of myelography.
- It is not uncommon for patients to show transient deterioration immediately after surgery. This is typically followed by gradual improvement.

- Haemorrhage may occur during surgery due to the proximity of the vertebral arteries. This reduces visualisation and may inhibit the removal of compressive disc material, however, it is unlikely to be life-threatening.
- The spinal cord is an incredibly delicate structure; spinal surgery inherently carries a risk of injury to the cord.
- Surgery performed in the lower back (i.e. base of spine) has additional risk associated with the proximity of major nerve roots to the hindlimbs i.e. risk of damage occurring to vital nerve roots during surgery.
- Infection is an uncommon complication as strict sterile technique is used during the surgery and antibiotics are administered in the operative period.
- Imaging may diagnose other spinal conditions e.g. spinal tumour, spinal fracture/subluxation, spinal cysts. Myelography may occasionally be inconclusive; advanced imaging may be necessary to pursue a diagnosis.

Aftercare of your dog following thoracolumbar spinal surgery:

Confinement: Your dog should be kept confined to a cage or baby's play-pen.

Ice packs for 10 to 15 minutes several times daily **are recommended** in the first few days following surgery to reduce swelling and improve comfort.

Food and Water: Ensure that food and water bowls are always within easy reach. Water must always be available. Feed a good quality diet. Do not over feed.

Toileting & Bladder management: You will need to carefully carry your dog outside for toileting. maintaining a short lead and providing abdominal sling support as necessary to encourage walking. Confinement should be maintained at all other times. Note that some patients do not have bladder control initially; most commonly this is an inability to empty the bladder. The bladder can become so full that urine spills out involuntarily. Urine overflow needs to be avoided to prevent permanent damage to the bladder and to minimise the risk of urinary infections. If necessary you will be shown how to manually express the bladder and/or how to catheterise the bladder; this should normally be done 2-3 times a day. Defaecation is not usually a problem, although constipation can occur. If needed, a small amount (½ to 2 teaspoonfuls) of liquid paraffin can be added to the food as a laxative until normal motions occur. If you notice blood in the urine or stools contact your Vet.

Bedding: Provide a soft surface as a bed with an absorbent top-layer – e.g. Vetbed® or incontinence sheet. Bedding may need changing frequently. Ensure the skin remains clean, dry and free of urine or faecal soiling. This may require frequent sponge-bathing. Always dry thoroughly after bathing.

Physiotherapy: Massage and passive flexion and extension exercises should be performed on both back legs. Massaging and manipulating helps sensation return and aids circulation. Supported standing and assisted walking aids neurological recovery, especially once movement is beginning to return. You will be shown how to provide abdominal sling support (towel or custom-made sling) for assisted walking. This can also stimulate urination if dogs are allowed to walk outside. Five minutes, 3-4 times daily is usually sufficient, but do not over-exert your pet at this stage.

Hydrotherapy: Assisted walking in a partially filled tepid bath (fill between belly and shoulder height to provide buoyancy) is recommended and may commence immediately; ensure the surgery-site remains dry. Perform for 5 minutes 3 to 4 times daily. Swimming in a pool may commence following suture removal.

Declaration:

I have read the information contained herein and am satisfied I have a sufficient understanding of the surgical procedures my dog is scheduled to undergo, including potential complications that may occur & requirements for aftercare following surgery. I hereby consent for my dog to undergo radiographic myelography and spinal surgery.

Owner's name: Dog's Name:

Owner's signature: Date: