

## SURGERY CAN BE PERFORMED IN CASES OF INTERVERTEBRAL DISC DISEASE

### Aims:

- decompression of the spinal cord by removal of disc material
- prevention of continued extrusion of disc material.

There are two main decompressive surgical procedures that can be performed:

- **VENTRAL SLOT** is performed in cases of neck (cervical) lesions. The approach is from the front of the neck, displacing the windpipe to the side to reach the disc from underneath. Bone and disc are carefully burred until the disc material in the spinal canal can be reached and removed.
- **DORSAL HEMILAMINECTOMY** involves approaching from the back of the spine to reach the lamina (the layer of bone overlying the spinal cord) of the vertebrae. Removal of the lamina on one side ("hemilaminectomy") allows visualisation of the cord and removal of any disc material around it. Following this, **fenestration** is performed (an opening is created through the annulus fibrosus on the side of the affected disc) to prevent further extrusion of disc material into the site in the future.

With certain breeds (such as the dachshund) there is a 15% chance of disc problems occurring elsewhere in the spine at a later stage.

### POST-OPERATIVE CARE

The patient's signs following spinal surgery may be temporarily worsened due to inflammation around the area of surgery. This usually lasts no more than a few days.

The length of hospitalisation will vary with each patient. Hospitalisation may involve bladder management in animals with urinary incontinence, and intensive physiotherapy (electrotherapy, ultrasound, massage, hydrotherapy in our underwater treadmill, passive range of movement exercises). We will discuss your animal's progress with you on a daily basis throughout his/her period of stay.

Upon discharge, spinal patients will require a specific aftercare regimen, for which written instructions will be provided.

Ideally the patient should be confined to a cage or one room with non-slip flooring. Soft bedding should be available, preferably with the ability to draw urine away from the patient, should the bedding become soiled. Lead-held trips to the garden for toileting are encouraged with waist band support for weaker patients. Stairs should be avoided where possible; if necessary, carry the patient.

Physiotherapy and hydrotherapy advice will be provided by us and should commence as soon as instructed.

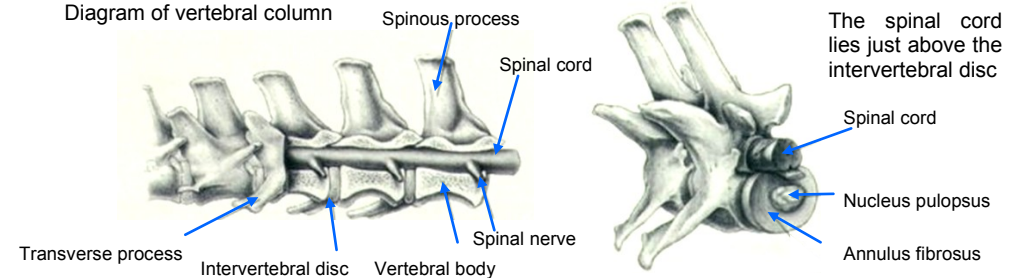
## SPINAL DISORDERS

### RELEVANT ANATOMY

The spinal cord is the neurological connection between the brain and the rest of the body. It is very delicate, therefore it is protected within a bony canal formed by overlapping vertebrae.

Intervertebral discs are located between the vertebrae. These discs are situated just below the spinal cord. They provide stability and shock absorption and allow for flexibility of the spine. A normal intervertebral disc has two distinct components - a fibrous outer casing (annulus fibrosus) and an inner gelatinous centre (nucleus pulposus). These discs become brittle with age. This is especially common in chondrodystrophoid breeds (short legs, long back e.g. dachshund).

Diagram of vertebral column



Blood vessels run parallel to the spinal cord, and very fine blood vessels also run within the tissue of the spinal cord.

Cerebro-spinal fluid is created in spaces within the brain called 'ventricles' and this fluid suspends the entire central nervous system (CNS- the brain and spinal cord).

### WHAT CAN GO WRONG?

Problems in the spinal cord produce signs of pain and neurological dysfunction.

Fibrocartilaginous embolism, intervertebral disc disease, syringo-hydromyelia and inflammatory CNS diseases are discussed in this leaflet.

### F.C.E.

A small amount of intervertebral disc material may dislodge and enter the arteries that feed the spinal cord, causing a blockage. This is termed fibrocartilaginous embolism (FCE). The section of spinal cord normally supplied by the blocked arteries becomes necrotic (dies). The location and severity of the embolism will determine the degree of nervous dysfunction. This is normally a pain-free condition after the initial 24 hours.

**Diagnosis of FCE** involves excluding other causes of spinal pain and neurological dysfunction. Spinal x-rays, myelography and MRI (magnetic resonance imaging) may be performed to rule out other possible causes. MRI may identify areas of spinal cord with changes suggestive of FCE in some instances.

**INTERVERTEBRAL DISC DISEASE: DISC PROTRUSION**

As the annulus fibrosus degenerates it become weak and may bulge upwards into the spinal canal, causing compression of the spinal cord. Spinal cord compression causes signs of pain and disruption of normal nervous function. Compression also interferes with the spinal cord's blood supply, causing longer term damage due to oxygen deprivation.

**INTERVERTEBRAL DISC DISEASE: DISC EXTRUSION**

The annulus fibrosus can rupture completely allowing nucleus pulposus into the spinal canal. The presence of this material plus local inflammation results in compression of the spinal cord. This is more common than protrusion, particularly in small breed dogs.

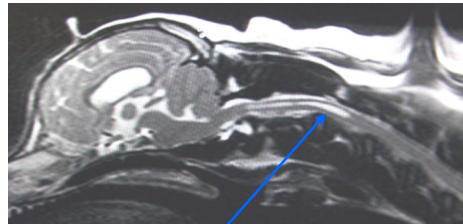
Diagnosis of intervertebral disc disease (protrusion or extrusion) usually involves xrays, myelography and/or CT or MRI.

Treatment can involve conservative therapy (once the associated inflammation reduces, nervous function may improve) or surgical removal of extruded disc material (see back page).

**SYRINGO-HYDROMYELIA**

CSF not only bathes the brain and spinal cord, but also runs in a channel in the centre of the spinal cord. In certain breeds (the cavalier King Charles spaniel, particularly) the flow of CSF through the spinal cord is blocked by the shape of the skull or vertebrae and pressure increases in the CSF, causing compression of spinal cord tissue.

MRI is used to confirm syringo-hydromyelia.



MRI of head and neck showing a dilated central canal (white area within the spinal cord). This is indicative of syringohydromyelia.

**INFLAMMATORY CNS DISEASES**

Various inflammatory diseases of the CNS and soft tissues around the CNS (i.e. meningitis) are seen in the dog.

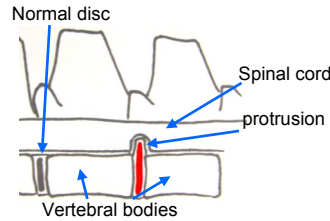
MRI and CSF fluid analysis are useful in diagnosis of these conditions.

Some of these get better with no treatment, some require short term or permanent medication, and some are untreatable.

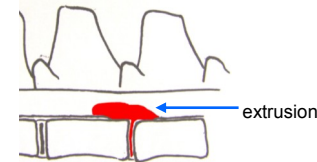
**NEOPLASIA**

Tumours within or around the CNS can cause similar symptoms to the above diseases.

Xrays, CT and MRI may be useful in diagnosis. Prognosis is often poor.



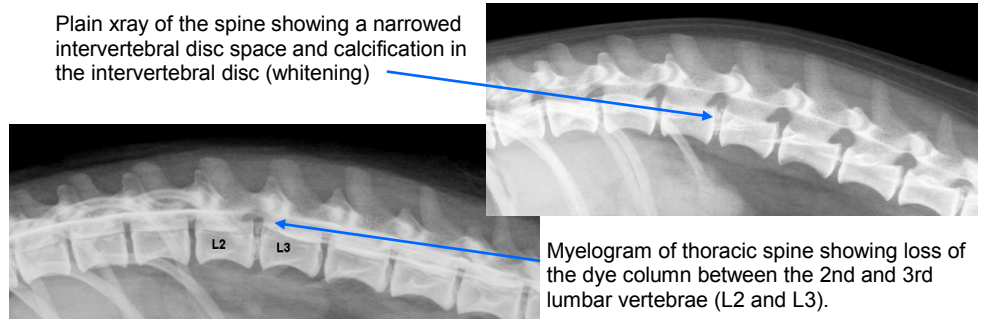
Diagrams representing intervertebral disc protrusion (above) and extrusion (below).



**DIAGNOSTIC TECHNIQUES EXPLAINED:**

**X-RAYS** (radiography) will be performed before any other imaging modality in most cases. Radiography can rule out certain causes of spinal problems, though does not always give a diagnosis, necessitating further imaging.

Plain xray of the spine showing a narrowed intervertebral disc space and calcification in the intervertebral disc (whitening)



Myelogram of thoracic spine showing loss of the dye column between the 2nd and 3rd lumbar vertebrae (L2 and L3).

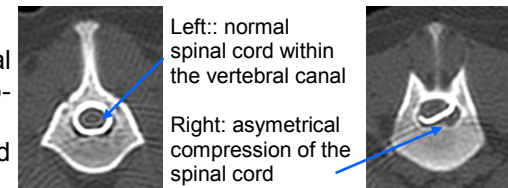
**MYELOGRAPHY**

The spinal cord itself is made of soft tissue and therefore does not appear on plain x-rays. Myelography involves injecting a dye (or more correctly a 'contrast agent') into the vertebral canal to outline the spinal cord thereby revealing compression in x-ray images. This technique also enables us to determine where the compression is located and whether it is greater on one side than the other.

**COMPUTED TOMOGRAPHY (CT)**

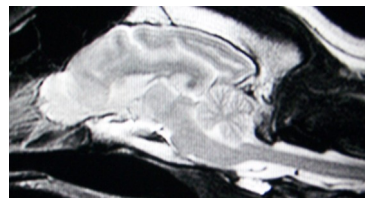
CT can generate a three-dimensional image of objects from a series of two-dimensional x-ray images.

CT can help us visualise the site and extent of spinal cord compression.



Left: normal spinal cord within the vertebral canal

Right: asymmetrical compression of the spinal cord



**MAGNETIC RESONANCE IMAGING (MRI)**

MRI can give images of soft tissue as well as bone, making it especially useful in neurological imaging.

We can reconstruct 3-dimensional pictures from MRI images, which aid us in interpretation.

**CEREBROSPINAL FLUID EXAMINATION (CSF)**

Fluid is sometimes obtained from around the spinal cord and submitted to a laboratory for further testing.

CSF analysis can reveal inflammation or blood and determine the presence of infection or sometimes tumours.