



Summer 2011

## Welcome to the latest Torrington Orthopaedics Newsletter.

In this edition we will look at Cervical spinal lesions, from assessment to management.



Cervical spinal lesions are a common presentation in clinical practice. Although many are dramatic in presentation causing significant pain, and occasionally significant neurological dysfunction, they can in some instances be life threatening.

The key to successful management of any spinal lesion is appropriate assessment, appropriate investigation and appropriate treatment, all delivered in a timely fashion.

Common presenting signs of cervical lesions include: pain (intermittent vocalisation, abnormal head carriage, reluctance to move the head, or reluctance to move, lameness, variable gait dysfunction, behavioural abnormalities (e.g. scratching at the air).



Even at this early stage, before we have laid hands on the patient, we should already have started a mental list of

differential diagnoses – ruling conditions in and out on the basis of the history.

### Assessment

This starts with obtaining a true and accurate history pertinent to the presenting condition. Some key facts to establish are:

- The patient's age and breed (although some of this may be self evident!).
- The owner's version of the presenting signs - sometimes we will see only a small part of the behaviour during our consultation.
- Rate of onset of clinical signs.
- Duration of signs.
- Are the signs progressive, static or episodic?
- Previous history of similar clinical behaviour.
- Any obvious inciting cause to the clinical signs (e.g. trauma etc).
- Concurrent medical problems.
- Has the owner given the pet any medication?

The clinical examination is one of the most valuable tools we have at our disposal for narrowing that differential list even further, and it should guide us as to what further diagnostic tests maybe worthwhile:

- gait examination
- general physical examination
- neurological examination

Whenever possible a gait assessment should be performed. Ideally this should be done on a flat, non-slip surface (e.g. the car park). Gait should be assessed with the patient walking in a straight line and then circling in either direction. Gait abnormalities to watch for include ataxia (inco-ordination), paresis (weakness but still with motor function), paralysis (absent voluntary motor function) and lameness. Depending on the limbs affected, this may be further described as para (paresis/

paralysis) – hindlimbs only affected; tetra (paresis/paralysis)– all four limbs affected; hemi (paresis/paralysis) – left or right side of the body affected only and mono (paresis/paralysis) – one limb affected. Although ataxia and paresis are different, it can be difficult to distinguish them clinically and the terms are often used interchangeably. Subtle proprioceptive deficits may be identified as the animals circle. In addition, scuffing of nails may be audible as they move.

Many animals with cervical lesions present with neck pain and no evidence of gait abnormalities at all. Where we do get neurological dysfunction, we would expect that all four limbs should be affected, however more caudal cervical lesions may spare the forelimbs and affect only the hindlimbs. Forelimb lameness can be a feature of cervical lesions (due to nerve root pain) in the absence of any other gait abnormality, and a cervical lesion should be considered as a differential in all dogs with forelimb lameness.

A routine physical examination is essential to assess for any concurrent or underlying condition(s). These may have a bearing on the treatment/prognosis of the cervical lesion. Be watchful for systemic medical conditions, or bilateral orthopaedic problems which may mimic spinal disease e.g. myopathies, polymyositis, polyarthritis or bilateral cruciate ligament disease.

The objective of the neurological examination is to determine the site of the lesion and to characterise the severity of the lesion. Most clinicians will have their own set order to the examination, but it is important to be both methodical and thorough, following the same pattern for every patient irrespective of how they present. Some institutions have developed a neurological exam check list which is filled in as the exam proceeds.

**Mentation:** - bright and alert, or dull, depressed and non-responsive

**Proprioceptive tests:** - paw placement (knuckling), paper slide, hopping, reflex step.

## Myotatic reflexes

Tests include the biceps/triceps/extensor carpi radialis reflexes in the forelimb and the patellar and cranial tibial reflexes in the hindlimb. Withdrawal should be assessed in all limbs.

Interpretation of these tests takes practice, and it is worth performing them on healthy dogs to get an appreciation of 'normal'. The forelimb reflexes, with the exception of the withdrawal reflex, are very variable, and cannot be appreciated in many dogs. However it is still worth attempting them in every case. It is important to remember that the tests should be performed on all four limbs. The tests can be performed equally well in the recumbent as in the standing dog. If the patient is recumbent, assess the uppermost limbs, then roll the patient. The one exception to this may be with the patellar reflex, where animals often tense the upper hindlimb and voluntarily overcome the reflex. Testing the reflex in the opposite limb in that instance may give a more true response.

Although proprioception is generally a subconscious response, it can be consciously controlled and animals that have no neurological lesions, but are very painful, can ignore the knuckled paw. Depending on the situation, this may be overcome by supporting the majority of the animals weight and just allowing the paws to touch the ground.



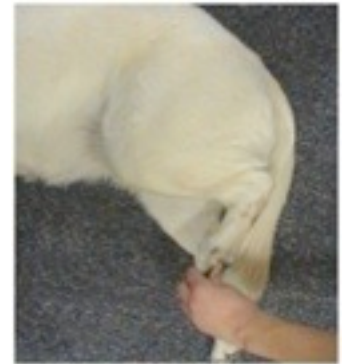
Each test should be repeated a number of times to optimise the chances of getting accurate information. If proprioceptive deficits are detected, they indicate some sort of neurological dysfunction, but give no indication as to where the lesion may be – it could be anywhere from the distal limb (poor sensation) to the brain (failure to recognise the incoming information or failure to act on that information).

Hopping tests and wheelbarrow tests can be challenging to perform, especially in larger patients, and in some cases may cause distress to the animal. If proprioceptive deficits have already been identified on paw placement tests, then hopping tests are unlikely to add significantly to the clinical information. However they can be useful in cases of subtle deficits where the paw placement is equivocal, and lateralised deficits may be more readily identified.

Key points to remember with these tests

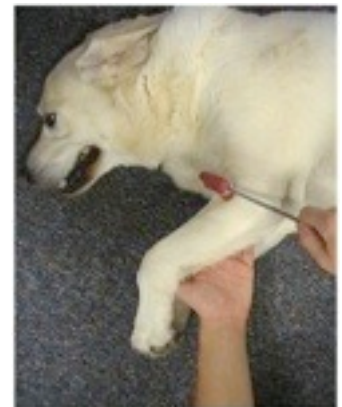
- Animals can voluntarily suppress the reflexes, particularly if they are very tense or painful, so take the general picture into consideration when interpreting the results.
- For many patients, the reflexes can only be characterised as present or absent. Increased or reduced reflexes are often a subjective interpretation and should be treated with caution.
- As with the proprioceptive tests, repetition of the test is the key to getting consistent and accurate information.
- The hindlimb withdrawal reflex is a complex reflex involving both stifle and hock flexion. Observe the action and record whether both joints flex. More caudal lumbar lesions may affect only hock flexion, although the patient will still withdraw the limb.
- Do not confuse a brisk withdrawal reflex with conscious pain perception.

The panniculus reflex (or cutaneous trunci) reflex is the reflex twitch observed on stimulating the skin on the caudodorsal trunk. Derangements of the reflex are typically associated with thoracolumbar lesions (T11 to L1 dermatomes) however the afferent limb of this reflex originates in the caudal cervical region (C8-T1) and therefore very caudal cervical lesions may affect this.



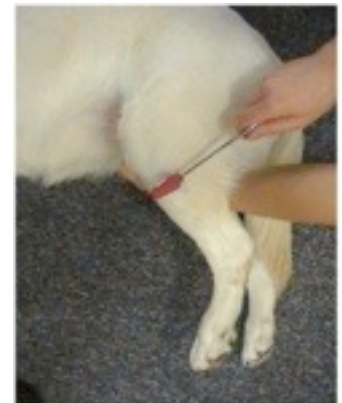
Conscious pain can be assessed by squeezing the digits and seeing if there is a conscious response to this stimulation – i.e. does the patient turn its head towards you, does it vocalise or try to escape the stimulus. Most normal patients will respond to finger-pinch of the interdigital webbing, but some more stoic animals may only respond to forceps applied across the nail bed.

Absence of deep pain sensation is generally indicative of a very guarded or poor prognosis, therefore it is vital that it is interpreted correctly. In the literature, loss of deep pain sensation is defined as absence of conscious response to the application of a significantly noxious trauma (e.g. application of pump pliers across the digits, the calcaneus or distal tibia). If it feels like you could crush the animals bone before it would respond, then deep pain is clearly absent. Any, even slight response to this level of noxious stimulus, indicates some degree of nociception.



Spinal pain is assessed by a combination of palpation and manipulation. When assessing cervical pain, the neck would generally be flexed and extended, then manipulated laterally (right and left). If there is a suspicion of an unstable cervical lesion (e.g. atlantoaxial subluxation or fracture), great care should be taken during manipulation, or manipulation should be avoided altogether.

If forelimb lameness was identified as a presenting sign, axillary palpation may be worthwhile to assess if there is any nerve root pain, or any palpable masses.



Cranial nerve assessment: - Many people shy away from this part of the examination because central neuroanatomy is extremely daunting. However some simple tests should allow a basic assessment of many of the cranial nerves. This includes observation of the patient for evidence of visual deficits, facial asymmetry or Horner's syndrome. Other tests include simple vision tests (is the patient knocking into things in the consulting room or in the waiting room?), auditory tests (does it respond to auditory stimuli?), papillary light reflexes, the gag response, facial sensation, jaw tone, presence of the palpebral reflex. A consistent abnormality in any of these reflexes would indicate a lesion affecting a cranial nerve – either within the brain or affecting the nerve itself.



When the neurological examination is completed, you will hopefully have a much better idea of the lesion location and you should also have an indication of the severity of the lesion. Thoracolumbar lesions are

generally graded on a 0-5 scale. This scale does not really apply to cervical lesions, however a grading scale is useful (see table below).

| Grade | Signs   |
|-------|---|
| 0     | Normal  |
| 1     | Pain only   |
| 2     | ambulatory paretic (para/tetra)                               |
| 3     | non-ambulatory paretic  |
| 4     | plegic (generally tetraplegic)                                |
| 5     | Tetraplegic with loss of pain sensation - this is rarely seen |

- Young versus old patients
- Acute versus chronic presentations
- Breed predispositions
- DAMNIT V (or VITAMN D)

Most people use a combination of these systems, however in general the **DAMNIT V** is the most useful.

- D** – Degenerative, Developmental
- A** – Anomalous
- M** – Metabolic
- N** – Neoplastic
- I** – Iatrogenic, Idiopathic, Infectious, Inflammatory
- T** – Traumatic, Toxic
- V** – Vascular

Few people can remember all the conditions that affect the cervical spine, but there are a number of mnemonic systems which can assist in arriving at a list of differential diagnoses.

## Key Differential Diagnoses

- Cervical intervertebral disc disease – type I and type II discs – by far the most common of all the cervical spine condition
- Caudal cervical spondylomyelopathy (CCSM) - canine Wobblers syndrome – including both vertebral malformation and Disc Associated Wobblers Syndrome (DAWS)
- Vascular incident (fibrocartilagenous embolism – FCE)
- Syringomyelia
- Meningitis/meningomyelitis
- Discospondylitis
- Atlantoaxial subluxation
- Trauma – fracture or luxation
- Neoplasia – meningiomas, nerve root tumours
- Haemorrhage – linked with neoplasia, toxins, parasites
- Infection – Toxoplasma/Neospora
- Arachnoid cysts
- Facet joint pain
- Synovial cysts

## Further Investigations

It is always worth taking survey radiographs of the spine – although many lesions will not be identified, some key differentials may be excluded. Ideally at least two views of the spine should be obtained. In patients where an unstable lesion is suspected, great care must be taken to minimise the risk of causing additional spinal damage. Flexion and extension views can also be beneficial, particularly where Atlanto-Axial (AA) or CCSM instability is suspected. However as with any other potentially unstable or dynamic lesion, care must be taken not to exacerbate the pathology.

### Advanced imaging – Myelography, CT and MRI.

A number of factors must be taken into account when deciding which imaging modality is most appropriate to your patient including likely diagnosis, access to imaging (waiting time/proximity) and cost.

#### Myelography

- Readily accessible.
- Good for assessing extradural compressive spinal lesions.
- Can be excellent for assessment of dynamic disc lesions.
- Relatively cheap.

- Invasive procedure that carries risk of potentially serious complications.
- Not so good for intradural or intramedullary lesions.
- No use for nerve root lesions.

#### CT

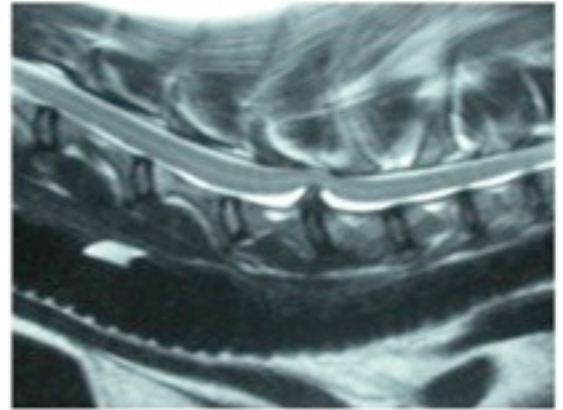
- Excellent for osseous lesions.
- Can be useful for disc lesions +/- low dose myelography.
- Non-invasive.
- Excellent for detection of pulmonary metastasis.
- Access/Cost.
- Poor for intradural, intramedullary or nerve root lesions.
- Difficult to perform dynamic studies.

#### MRI

- Excellent soft tissue definition – can distinguish between intramedullary and extramedullary lesions. Can usually identify spinal cord swelling.
- Good for soft tissue neoplasms.
- Good for disc lesions – although may not differentiate between type I and type II discs.

- Can identify foraminal lesions (e.g very lateralised disc lesions).
- Can perform dynamic studies for CCSM.
- Good for nerve root lesions.
- Minimally invasive.
- Less good for osseous lesions.
- Cost/access.
- Interpretation. MRI is one of the imaging modalities where the experience of the imager will have a huge

- bearing on the quality of the information that can be extracted from the images. Inexperienced imagers may miss subtle lesions or over-interpret images.
- Image quality. This is affected by the size of the magnet. Although smaller MRI units can image small dog/cat spines relatively well, the bulk of the caudal cervical spine can make imaging of this area difficult/impossible.



## Treatment Options

### Conservative management

This combines strict exercise restriction (generally cage confinement) and appropriate analgesia. Although conservative management can be successful in many cases, the outcome is not guaranteed, and clinical improvement can often take weeks. Catastrophic neurological deterioration is less likely than with thoracolumbar disc disease, but it can occur.

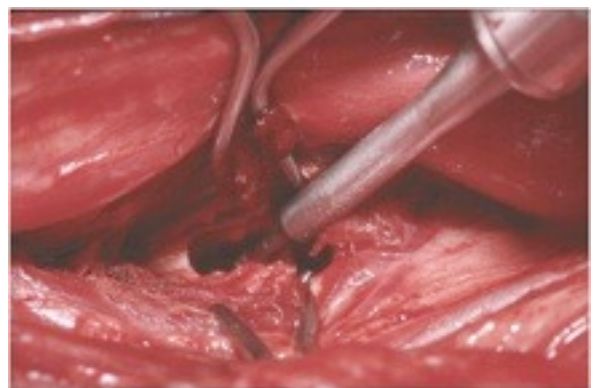
### Fenestration



There is some controversy about the role of fenestration in the management of cervical intervertebral disc disease as it provides no direct decompression, but in theory can prevent further disc extrusion. The existing extruded disc material is effectively managed conservatively. The success of the technique in limiting further disc extrusion depends on the skill of the surgeon. There are reports of animals getting worse following fenestration, where disc material has been pushed into the vertebral canal rather than removed. In general, fenestration is not appropriate for compressive spinal lesions, but may be combined with a

definitive decompressive surgery where there is evidence of degenerative disc disease. However if there is evidence of early type II disc degeneration, then fenestration is contra-indicated.

### Ventral Slot



This is the definitive decompressive surgery for type I disc lesions. Although a complex technical procedure, it is generally associated with good to excellent outcomes in the majority of patients with rapid resolution of clinical signs anticipated. It does increase cervical instability, so post-operative restriction is essential. For some surgeons, this is the surgery of choice for disc associated wobblers syndrome (DAWS). The perceived disadvantages of the technique for this condition include prolonged recovery times and incomplete retrieval of the compressive material, however satisfactory long term outcomes are reported.

## Distraction Stabilisation Surgery

This is the alternative type of surgery for treating DAWS. With DAWS, cord compression is due primarily to hypertrophy of the dorsal annulus. Many of these lesions are 'dynamic' or 'traction-responsive' where the compression is reduced when traction is applied to the cervical spine. The objective of the surgery is to maintain the vertebral bodies in this traction state, thus eliminating/reducing spinal cord compression. There are a number of methods described all of which appear to have similar clinical outcomes.

- Ventral pins/screw and Bone Cement.
- Use of intervertebral spacers which are maintained with screws or pins e.g. cement plug, McKee washer, cortical allograft/autograft, tantalum blocks, PEEK spacers or metal cages.



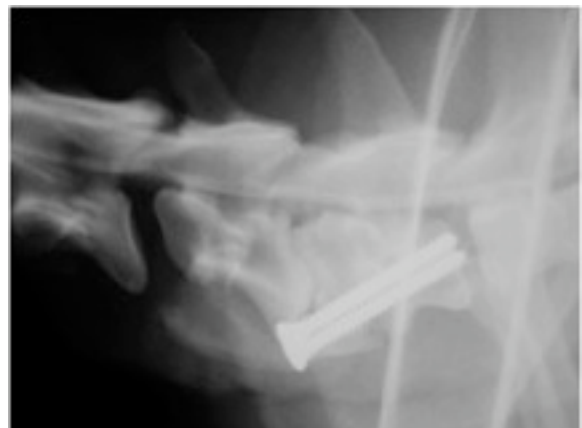
- Ventral stabilisation with plates +/- intervertebral spacer.

The recovery following this surgery is usually very rapid, however up to 20% complication rates are reported within the first months post-surgery due to implant failure or catastrophic end plate collapse.

## Dorsal Decompression (laminectomy)

This technique has been used for some cases of DAWS, but is more applicable to the osseous vertebral malformations commonly seen in the young great Danes.

Depending on the lesion location, the surgical approach can be very difficult. It is a surgery associated with high morbidity and a prolonged recovery.



## Surgical Complications

Every surgical procedure carries a risk of potential complications. Good pre-surgical planning, sound knowledge of anatomy and meticulous surgical technique can reduce the incidence of complications, but not eliminate them altogether.

- Haemorrhage. This is usually venous sinus bleeding which is rarely life threatening but will affect visibility at the surgical site and reduce the effectiveness of surgery. It can be life threatening in dogs with bleeding tendencies, or may cause large haematoma formation, which can cause additional spinal cord compression.
- Infection – rare.
- Wound problems – rare.
- Iatrogenic cord trauma.
- Respiratory compromise. This has been reported associated with cervical spinal cord surgery,

- where spinal cord swelling can suppress the central respiratory centres. It can be fatal. Affected cases can survive if managed aggressively with mechanical ventilation, but intensive treatment may be required for a number of days.
- Lesions in adjacent motion units (domino lesions). It is not clear whether surgery at one site alters the biomechanics of the spine so much as to trigger lesions in adjacent discs or whether these discs were always high risk and likely to be affected anyway. However the development of particularly type II disc lesions in adjacent discs following surgery in the caudal cervical spine is well recognised.
- Vertebral instability leading to spondylolisthesis. This is a relatively rare complication and is generally associated with poor surgical technique.

## Conclusion

Cervical disc disease is commonly encountered in practice. For most dogs, with appropriate diagnosis and treatment, the prognosis is favourable. Type I lesions that are surgically managed can have up to 90% recovery rates following surgery, with type II lesions having a slightly lower recovery rate due to the chronicity of the spinal cord injury, and the challenges in managing associated vertebral instability. Any questions? Call us for a chat..

If you require any further information or have any questions relating to the content of this newsletter please do not hesitate to contact our veterinary team by telephone on 0844 8808 051 or by e mail at [reception@torvet.co.uk](mailto:reception@torvet.co.uk).

