Treating neck pain in dogs – neurological five-step approach

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ABSTRACT

Neck pain is a common presenting complaint in small animal practice. In this article the author uses a practical, step-wise diagnostic approach and discusses management of common conditions. Signalment history, physical and neurological examination, creating a list of differentials, reaching the diagnosis and selecting the most suitable treatment are five easy steps to implement on any case with history of neck pain. The age group and presence of neurological deficits or not is also very useful information to shorten the list of differentials. When present, neurological deficits associated with neck pain are often referable to C1 to C5 or C6 to T2 spinal cord segments (tetraparesis/hemiparesis, ataxia, reduced postural reactions on all four limbs in the absence of cranial nerve deficits and normal mentation). However, sometimes neck pain can be the main manifestation of an intracranial disease or a multifocal problem. Deficits from other parts of the nervous system may also be present.

Using the mnemonic VITAMIN D, the most common causes are discussed, as well as how to create a relevant list of differentials based on history and examination findings. Having the most likely differentials in mind, clinicians can select the most appropriate tests to reach a diagnosis.

Neck pain is a common presenting complaint in dogs and can arise due to many different causes.

Analgesia can alleviate the pain temporarily, but, unless the underlying cause is addressed, the pain can quickly relapse or become difficult to control.

A systematic approach to cases presenting with neck pain can help clinicians create a list of differentials and plan a diagnostic investigation wisely.
Although examining the neck may seem an obvious place to start, clinicians should always begin with a detailed history and thorough physical examination. A neurological examination should then be performed to distinguish whether the neck pain is associated with neurological deficits or not. If deficits are present, they can help localise the part of the nervous system affected.

The anatomical basis of neck pain reflects involvement of at least one of the following structures: muscles, meninges, nerve roots, intervertebral disc (annulus fibrosus) or vertebrae (including articular facets). Various mechanisms can affect these to cause neck pain, but usually it is the result of inflammation, compression or destruction.

Sometimes, the main cause of neck pain is not localised in the neck. For example, brain space-occupying lesions can increase the intracranial pressure and affect the normal CSF flow, resulting in neck pain. Likewise, neck pain may be part of a multifocal problem.

**Signalment and client history**

Knowing the breed and age of the dog is an important first step in your investigation.

Chondrodystrophic breeds may be prone to intervertebral disc extrusions, whereas young dogs may be susceptible to inflammatory diseases – for example, meningoencephalitis – or malformations of the vertebral column, such as atlantoaxial subluxation.

A detailed history should be obtained from every case presenting with signs of neck pain. Information about the onset (acute versus chronic), progression and history of trauma can help to rule in or out diseases.

**Ruling out non-neurological causes**

A thorough general physical examination should be performed in every case. Findings from the physical examination may give you clues about the underlying cause of pain.

Not all causes of neck pain are due to a neurological disease. For example, stick injuries in the oropharyngeal area, severe otitis associated with para-aural abscessation or salivary gland diseases, such as carcinoma, can present with neck pain.

Even when the general clinical examination does not give you a conclusive answer, it may give you clues about the underlying cause.

For instance, fever can be more associated with inflammatory or infectious diseases, multiple joint pain and effusion can be suggestive of polyarthritis and masses in other areas in the body can be connected to neoplastic lesions with possible spinal involvement.
Neurological examination

Neurological examination is essential for two main reasons: some causes of neck pain are associated with neurological deficits while others are not and the presence of neurological signs will help you localise the lesion to a portion of the CNS.

In most cases, the latter refers to a C1 to C5 or C6 to T2 cervical myelopathy or it may be suggestive of a lesion other than the cervical spinal cord, such as intracranial.

A complete neurological examination should include assessment of mentation, posture, gait, postural reactions, cranial nerves, spinal reflexes and spinal palpation.

Palpation of the neck should be the final part of the examination to avoid stressing the patient. Observation of the dog’s posture is very important, especially in stoic dogs or where examination is difficult. Most dogs will have a low head carriage and the neck is held in an extended position, avoiding flexion.

Ataxia in all four limbs, tetraparesis, delayed postural reactions with normal segmental spinal reflexes (C1 to C5 myelopathy) or reduced in thoracic limbs (C6 to T2 myelopathy) can be found.

Differential diagnosis

Figure 1. A flow chart outlining an approach to creating a list of most common differentials in dogs with neck pain. SRMA: steroid-responsive meningitis-arteritis, CCSM: caudal cervical spondylomyelopathy, IVDD: intervertebral disc disease.

Cases with neck pain can be placed into two main groups based on their age: young dogs less than three-years-old and dogs more than three years old.
The age group and the presence or absence of neurological deficits (Figure 1), as well as whether the onset was acute or chronic, can be helpful when creating a list of differentials. The mnemonic VITAMIN D can be useful in making sure important differentials are not missed.

**V: vascular**

Vascular diseases are not usually painful. Occasionally, spinal haemorrhage can cause pain due to compression, but this is an uncommon cause.

**I: inflammatory/infectious**

**Steroid-responsive meningitis-arteritis**

This is a common cause of neck pain in young dogs. Breeds such as beagle, Bernese mountain dog, boxer and Nova Scotia duck tolling retriever tend to be overrepresented. It is manifested with lethargy, neck pain with no neurological deficits, fever and, in a small number of dogs, polyarthritis.

Diagnosis is confirmed by CSF analysis, which usually reveals a neutrophilic pleocytosis and treatment consists of immunosuppressive therapy with corticosteroids with or without the addition of other drugs – for example, azathioprine. Prognosis is usually good; however, relapses can be seen in some dogs and long-term treatment is required.

**Polyarthritis**

Inflammatory polyarthritis can cause neck pain, as part of a more diffuse spinal pain, in about 30% of cases. Usually, neck pain is accompanied with appendicular joint effusion, although in early stages the effusion may not be easily detected. Inflammatory polyarthritis can be infectious (less common in the UK) or immune-mediated.

Affected cases will have a stiff gait, can sometimes be lame and will be reluctant to lie down or jump.

Multiple joint taps and synovial fluid analysis can confirm the diagnosis.

With immune-mediated polyarthritis, immunosuppressive treatment usually has a good outcome if it is instilled early enough, but long-term treatment may be required.

**Discospondylitis/osteomyelitis**

Discospondylitis is an infection of the intervertebral disc and adjacent end plates and can manifest with severe neck pain if the cervical vertebral column is affected. It can affect any age, but the mean age is 6.8 years.
In Europe, bacterial discospondylitis is the most common infection type of the vertebral column, whereas fungal infections are rare. *Staphylococcus intermedius* and *S. aureus* are the most common bacterial isolates.

MRI is the most sensitive diagnostic imaging modality; however, CT or plain radiography can also be diagnostic in more advanced cases.

Diagnosis is supported by urine and blood cultures, which are positive in 50% and 75% of the cases, respectively.

The choice of antibiotics should be based on the antibiotic sensitivity results, but if no infectious agent is isolated then a broad-spectrum antibiotic (amoxicillin/clavulanate or cephalexin) should be considered. Antibiotic treatment should be combined with analgesia and exercise restriction, and usually is required for a long period of time (8 to 16 weeks).

Decompressive spinal surgery is rarely required if there is significant compression of neural structures, which is usually secondary to vertebral instability, empyema or disc herniation.

**Meningomyelitis**

Meningomyelitis refers to inflammation of the meninges and the spinal cord. It is most commonly sterile (presumed immune-mediated), but rarely can be infectious (bacterial or protozoal).

The inflammation can be isolated to the spinal cord, or it may be a manifestation of a multifocal CNS disease.

Small/toy breeds – such as Yorkshire terrier, Maltese or Chihuahua – and hounds are overrepresented and young dogs (under three years old) are 13 times more likely to develop the disease compared to older dogs.

Diagnosis is achieved with MRI and CSF analysis, which usually reveals mononuclear pleocytosis. Multimodal immunosuppressive treatment with corticosteroids and, typically, cytarabine or ciclosporin is required. Prognosis is guarded to good, but long-term treatment is necessary in some cases.

**T:traumatic**

Usually the history is suggestive of trauma and, depending on the severity and the structures involved, spinal trauma may or may not be associated with neurological deficits.

Where neurological deficits are present they suggest spinal cord contusion or compression, due to a traumatic disc extrusion, haemorrhage or displaced fracture. When trauma is suspected, any
manipulation of the neck should be avoided and orthogonal radiographs should be taken with extra care. Soft tissue injuries in the neck can be treated with exercise restriction and analgesia, whereas more severe traumas, including spinal fractures, may require surgical stabilisation.

A: anomalous

Atlantoaxial subluxation

Figure 2. A lateral plain radiograph of the cervical vertebral column of an 11-month-old Chihuahua presented with severe neck pain, tetraparesis and ataxia. The radiograph reveals severe atlantoaxial subluxation (red arrow). Flexion of the neck is strongly contraindicated in a case like this.

Atlantoaxial subluxation is the result of instability between C1 to C2 vertebrae. This joint in the vertebral column is unique because it does not have an intervertebral disc supporting the vertebrae. Instead, stability relies on extra ligaments and a bony process of C2, called the dens.

Trauma to the neck can lead to rupture of the supportive ligaments and instability, but most commonly congenital malformations, such as hypoplastic or aplastic dens can also lead to the same problem. Yorkshire terriers and other toy breeds are more prone to this instability.

Radiographs are usually sufficient to diagnose atlantoaxial subluxation (Figure 2), but advanced imaging (CT or MRI) can be helpful for surgical planning. Very young or mildly affected patients can be treated with strict rest and analgesia, but the majority of cases require surgical stabilisation.

Success rate is around 72% in conservatively treated patients and 82% in cases that undergo surgical stabilisation. However, reported complication rate (minor to severe) can be as high as 40%.

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Chiari-like malformation/syringomyelia

Figure 3. An MRI study of the head and neck of a three-year-old cavalier King Charles spaniel presented with intermittent episodes of neck pain. This sagittal T2-weighted image revealed mild Chiari-like malformation (blue arrow) and syringomyelia affecting the cranial cervical spinal cord (red arrow).

Chiari-like malformation refers to a mismatch between the size of the skull and the brain, resulting in overcrowding of the caudal part of the cranial cavity (caudal cranial fossa).

This overcrowding compromises the normal spinal fluid flow leading to the creation of pockets of fluid within the spinal cord (syringomyelia). Most commonly seen in cavalier King Charles spaniels and griffon Bruxellois but other, mainly smaller, breeds can also be affected.

Typically affected dogs exhibit screaming or yelping episodes for no apparent reason. These episodes may be accompanied with scratching in the air (phantom scratching) and facial rubbing. On examination most affected dogs appear relatively “normal”, but on direct palpation of the cervical spine they usually have hyperaesthesia.

An MRI scan is required to achieve diagnosis (Figure 3) and treatment consists mainly of medical management of the clinical signs. Gabapentin or pregabalin with or without NSAIDs usually control the signs of neuropathic pain; however, the clinical signs can be progressive in up to 75% of cases.\textsuperscript{9,10}

Surgery to decompress the caudal part of the brain (occipital craniectomy) can be performed in cases that fail to respond to medical management.

M:metabolic

Metabolic diseases do not usually cause neck pain. However, they should be ruled out by
performing a haematology and biochemistry, especially if further investigation for neck pain will involve general anaesthesia.

**I: idiopathic**

There are not recognised idiopathic diseases causing neck pain; however, where the cause cannot be identified a soft-tissue injury should be considered.

**N: neoplastic/ Nutritional**

**Neoplasia**

Different types of neoplasia that can cause neck pain could affect the muscles in the neck, the vertebral column, nerve roots or meninges, such as meningioma or lymphoma.

Intramedullary tumours, such as gliomas, are not usually painful. Prognosis depends on the size, location and type of neoplasia.

**Nutritional diseases**

Osteopaenia from nutritional hyperparathyroidism can cause neck pain (as part of a multifocal skeletal pain), but this is uncommon since the introduction of commercially prepared, balanced diets.

**D: degenerative**

**Intervertebral disc disease**

![Figure 4. An MRI study of the cervical region of a five-year-old cocker spaniel presented with an acute history of neck pain. This sagittal T2-weighted image reveals a markedly compressive C2 to](image-url)
C3 intervertebral disc extrusion.

Acute extrusions (type-one) or chronic protrusions (type-two) in the cervical spine are common causes of neck pain in dogs more than three years of age. Chondrodystrophic breeds (French bulldogs, dachshunds and beagles) are overrepresented.

Plain radiography is rarely useful in diagnosing intervertebral disc extrusions/protrusions and advanced imaging (Figure 4) or myelography is required.

Mildly affected cases can be treated with strict cage rest, analgesia and muscle relaxants, whereas more severely affected cases require decompressive spinal surgery.

**Caudal cervical spondylomyelopathy**

Cervical spondylomyelopathy can affect any breed; however, younger great Danes and older Dobermanns tend to be more affected.

Young dogs affected by caudal cervical spondylomyelopathy (CCSM) usually have an osseous abnormality or degeneration and remodeling of the articular facets leading to vertebral canal narrowing (stenotic myelopathy). Older dogs are more affected by the disc-associated CCSM, which is the most common type in Dobermanns. 

Pain is usually mild, but signs of tetraparesis and ataxia can be more obvious. Advanced imaging or myelography is required for diagnosis.

Treatment can be medical or surgical, with surgery giving a better outcome in the early stages.

**Diagnosis and treatment**

After creating a list of differentials, the appropriate diagnostic tests should be performed to achieve a diagnosis and treat the patients accordingly.

To conclude, a systematic approach to cases with neck pain is the key to correct diagnosis and treatment. Clinicians should always take a detailed history, perform a thorough physical examination and, most importantly, think outside the box in challenging cases.

- Please note, some drugs mentioned in this article are used under the cascade.

**References**

2. Platt S and Garosi L (2012). *Small Animal Neurological Emergencies* (9th edn), Manson