Topic Overview

Although the combination of low back pain and sciatica is common in humans, it can be challenging to not only diagnose but also differentiate these conditions in dogs. As in humans, low back pain and sciatica in dogs can be significant, impair ability to perform normal daily activities, and decrease quality of life. Treatment with oral anti-inflammatories and other analgesics may relieve pain but does not always provide long-lasting control. Therapeutic epidural injections can be considered for dogs with incomplete resolution of clinical signs or those presenting with severe pain. This article reviews common presentations, physical examination findings, differential diagnoses, diagnostics, and treatment options with a focus on epidural injection.

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PAIN MANAGEMENT

Pain Management in Dogs With Low Back Pain and Sciatica

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Low back pain in dogs is a relatively common finding during a thorough musculoskeletal examination. Dogs with low back pain may present to the veterinarian with client complaints of hindlimb lameness or weakness. The pain can be intermittent and difficult to localize. Lameness may be localized to 1 or both hindlimbs; if both hindlimbs appear affected, the lameness may shift between them in severity.

Dogs with low back pain may be reluctant or unable to perform tasks of daily living, such as jumping onto furniture or into vehicles, going up stairs, or holding a normal posture for elimination. Less severely affected dogs may demonstrate reduced performance during normal activities, such as rapid tiring during play or reduced success during sports activities. Occasionally, dogs may present with urinary and/or fecal incontinence. Dog owners may also notice their pet is in pain if the dog flinches when touched on its back.

Learning Objectives

- Dogs with low back pain often present with hindlimb lameness, weakness, and reluctance to jump. Owners may notice signs of pain, such as flinching when the back is touched.
- Signs include postural changes, abnormal grooming behaviors, and gait abnormalities ranging from mild stiffness to a "walking on eggshells" appearance or unilateral lameness.
- Pain in the caudal lumbar spine is common during palpation. Tail dorsiflexion, hip extension, and hamstring stretches may also elicit pain.
- Degenerative lumbosacral disease is the most common cause of low back pain in dogs. Middle-aged, male, large-breed dogs are predisposed to lumbosacral disease.
- Advanced diagnostic imaging is often needed for definitive diagnosis of the cause of low back pain. Conventional radiography is useful as a screening tool for concurrent orthopedic conditions and may provide a diagnosis in some cases.
- A multimodal approach combining oral analgesics, therapeutic modalities, and therapeutic exercises can effectively manage pain and improve mobility.
- Epidural steroid injections (methylprednisolone acetate) offer targeted, long-lasting relief for severe cases of sciatica or nerve root impingement, especially when conservative treatments are insufficient.

Affected dogs may frequently lick or bite their hip or lower back, which may be seen on examination as focal areas of alopecia or wounds.

EXAMINATION FINDINGS CONSISTENT WITH LOW BACK PAIN IN DOGS

Dogs with low back pain may change posture in an attempt to reduce pain or compensate for weakness. Kyphosis of the lumbar spine and dorsal tilting of the cranial pelvis may be seen to varying degrees with weight shifting off 1 or both hindlimbs (**FIGURE 1**). Affected dogs may frequently lick or bite their hip or lower back, which may be seen on examination as focal areas of alopecia or wounds. They may frequently shift weight side to side between the hindlimbs trying to find a comfortable position and may be hesitant to change positions or adopt a particular recumbency.

Gait abnormalities may vary depending on the underlying cause and the severity of pain. Dogs with degenerative changes or centralized intervertebral disk protrusion may be sound but demonstrate paresis or have a bilaterally stiff hindlimb gait. With more intense pain, they may adopt a short-strided gait in both hindlimbs, creating an appearance of "walking on eggshells." With lateralized lesions, lameness is more common but may range from intermittent to consistent and from mild to non–weight bearing.

During hands-on examination, pain is expected when the caudal lumbar spine is directly palpated. Dogs may additionally demonstrate pain or resistance to dorsiflexion of the tail, extension of the hips, or manipulations that alter the pelvic angle (the angle made between a line intersecting the iliac crest and ischium relative to the horizontal plane). For dogs with peripheral sciatic pain, palpation along the sciatic tract as the nerve courses around the greater trochanter and caudal to the femur can elicit pain or induce lameness. Targeted stretching of the sciatic nerve via a hamstring stretch may elicit tightness, resistance, or a painful response. A hamstring stretch is achieved via concurrent flexion of the hip with extension of the stifle; extension of the digits can be performed as part of the stretch but has not been shown to add strain to the sciatic nerve.[1]

Neurologic examination findings may appear normal or may be consistent with an L4–S1 myelopathy with reduced to absent patellar and withdrawal reflexes and/or altered conscious proprioception of the pelvic limbs.

CAUSES OF LOW BACK PAIN IN DOGS

Lumbosacral Disease

Lumbosacral disease is the most common cause of low back pain in dogs.[2] Stenosis of the lumbosacral spinal

FIGURE 1. A 13-year-old female spayed Italian greyhound with lumbosacral pain due to severe L7–S1 intervertebral disk extrusion and nerve compression. **(A)** Significant lumbar kyphosis is seen, with marked dorsal rotation of the cranial pelvis and a tucked hindlimb posture. **(B)** Improvement in pelvic and hindlimb positioning 2 weeks postepidural injection.

canal and compression of the cauda equina occur following a cascade of degenerative events. These degenerative events may be due to repetitive stress on the lumbosacral junction, congenital narrowing of the vertebral canal, transitional vertebra, or lumbosacral osteochondrosis lesions.[2]

Primary changes seen with degenerative lumbosacral disease include lumbosacral intervertebral disk protrusion or extrusion, hypertrophy of the interarcuate or dorsal longitudinal ligament, facet joint osteophytosis and capsular hypertrophy, and dynamic ventral subluxation of the sacrum in relation to the seventh lumbar vertebral body (lumbosacral instability).[3,4] Secondary changes may follow, including lumbosacral spondylosis, sclerosis of the L7 and S1 vertebral endplates, and narrowing or collapse of the intervertebral disk space and/or intervertebral foramen. Degenerative lumbosacral disease is most common in middle-aged male dogs, with medium-to-large working breeds such as the German shepherd appearing predisposed.[2,3] Discogenic pain may occur even in early stages of intervertebral disk degeneration prior to visible cauda equina compression.[4]

Discospondylitis

Infection (bacterial or fungal) of the intervertebral disk and the surrounding vertebral endplates can directly cause low back pain and may lead to degenerative changes resulting in chronic pain after resolution of the infection. In a study of 386 dogs, middle-aged, large-breed, male dogs were overrepresented, with the most commonly affected breeds including mixed breed, Labrador retriever, and German shepherd.[5] The L7–S1 intervertebral disk was most commonly affected.[5]

Neoplasia

Many tumors affect the spinal cord and nerve roots, although the lower back is not as frequently affected as other locations. Tumors may be classified as intradural-extramedullary or intramedullary, which affect the spinal cord directly, or extradural, which can cause nerve root compression. These tumors may be primary or metastatic lesions.

Peripheral nerve sheath tumors are reported to affect the lumbar and lumbosacral nerves, albeit less often than the nerves of the brachial plexus or cervical spine, similar to other tumor types.[6] Cases typically present with chronic lameness and severe muscle atrophy, which may increase clinical suspicion for a neoplastic lesion versus other differentials that may not cause similarly profound atrophy. A mass may be palpable via rectal examination.[6]

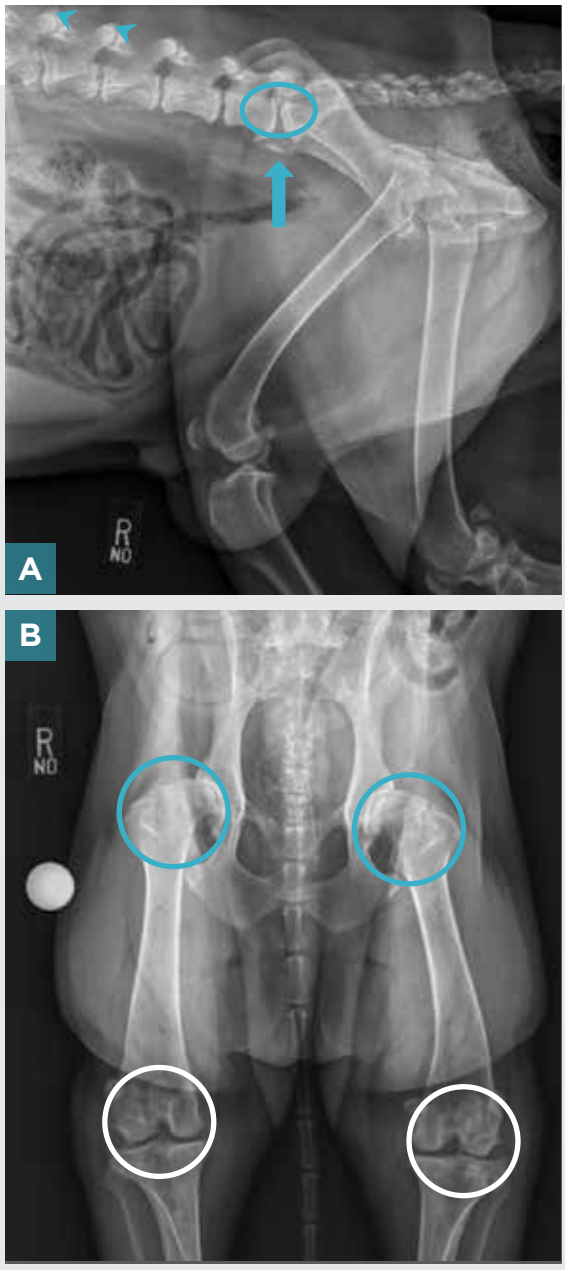

FIGURE 2. Radiographic images from an 8-year-old male castrated mastiff mix with bilateral hindlimb lameness. Radiographs demonstrate secondary changes suggestive of lumbosacral disease, including **(A)** L7–S1 endplate sclerosis **(circle)**, spondylosis deformans **(arrow)**, and multifocal osteoarthrosis of lumbar articular facets **(arrowheads)**. **(B)** The dog has concurrent severe coxofemoral **(blue circles)** and stifle **(white circles)** osteoarthritis.

Sciatic Neuritis

Sciatic neuritis, or sciatica, is irritation of the sciatic nerve. Most commonly, this is due to compression of the lumbosacral nerve roots by degenerative or protruding lumbar intervertebral disks or stenosis of the lumbosacral vertebral canal. Although uncommonly reported, sciatic impingement or entrapment may also occur, due to pathology of the muscles surrounding the pathway of the sciatic nerve as it travels peripherally into the hindlimb. Potentially affected muscles include the piriformis, obturator, gemelli, gluteals, and hamstrings (biceps femoris, semitendinosus, and semimembranosus); pathology may be primary from a traumatic injury or secondary to other orthopedic disorders, including coxofemoral or sacroiliac disease. In 1 study of 29 dogs with sciatic enlargement and a tentative diagnosis of sciatic neuritis via ultrasonography, the affected dogs were medium- to large-breed dogs of middle age.[7] Most of the dogs lived an active lifestyle and were training or competing in varying dog sports.[7]

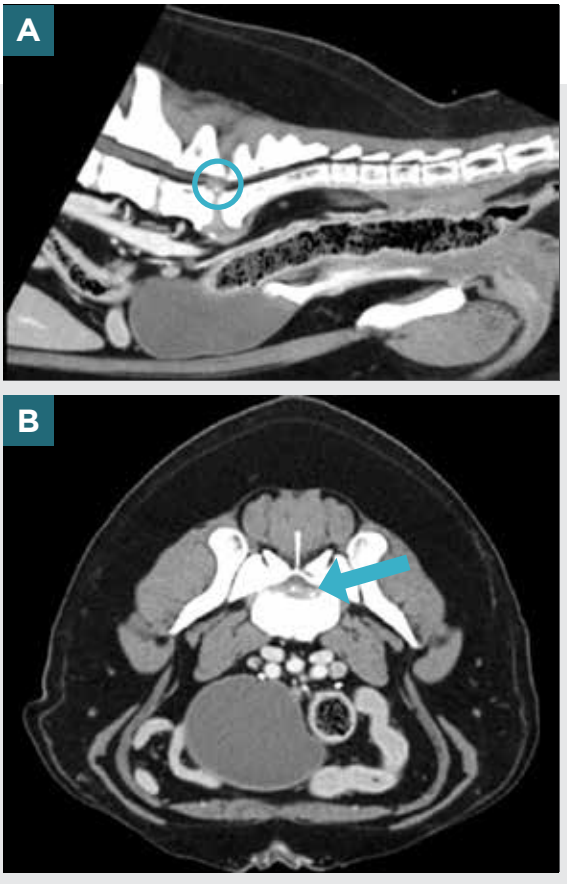

FIGURE 3. Computed tomography images from the same dog as in **FIGURE 2** showing **(A)** L7–S1 intervertebral disk protrusion **(circle)** and **(B)** significant cauda equina syndrome **(arrow)**.

DIAGNOSIS OF LOW BACK PAIN IN DOGS

Advanced imaging is required for definitive diagnosis of causes of low back pain in dogs.

Radiography

Survey radiography for low back pain is useful to assess for concurrent orthopedic disease such as coxofemoral osteoarthritis, which may present with similar clinical signs and examination findings. Congenital predisposing causes of low back pain, such as transitional vertebra or sacral osteochondrosis, may be visualized radiographically. Discospondylitis and bony neoplasms may be evident. Chronic changes secondary to degenerative lumbosacral disease may be present, including vertebral endplate sclerosis, lumbar facet

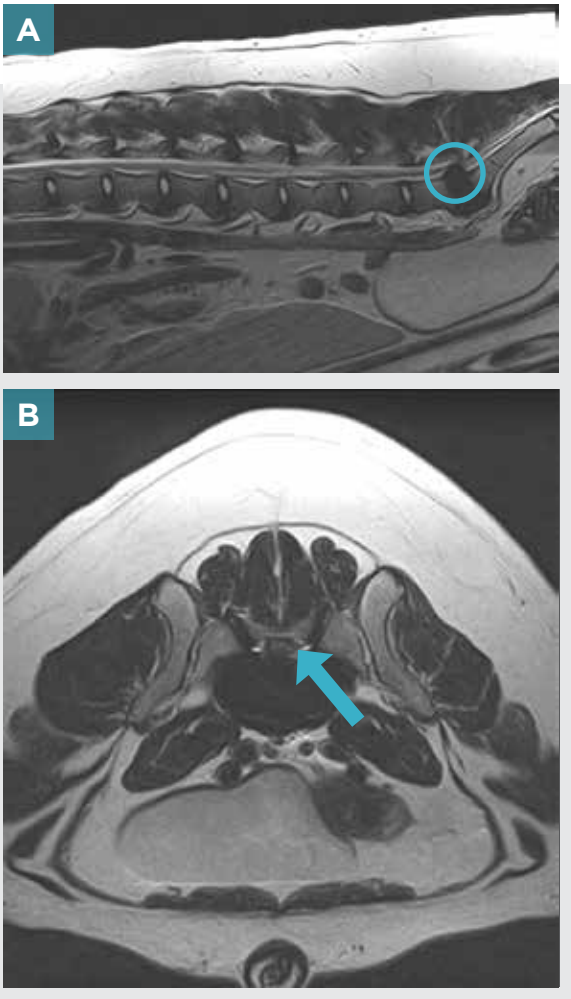

FIGURE 4. T2-weighted magnetic resonance imaging scans of the same dog as in **FIGURES 2 AND 3** showing **(A)** L7–S1 intervertebral disk protrusion **(circle)** and **(B)** significant cauda equina syndrome **(arrow)**.

osteoarthrosis, ventral or lateral spondylosis, and lumbosacral step formation (**FIGURE 2**).[2] Most of these conditions, aside from definitive evidence of discospondylitis or neoplasia, could also be incidental findings.

Computed Tomography

Computed tomography (CT) provides improved visualization compared with conventional radiography due to lack of superimposition and 3D reconstruction capabilities. Improved soft tissue resolution allows identification of intervertebral disk protrusion, ligamentous hypertrophy, facet joint capsular thickening, foraminal narrowing, and nerve entrapment (**FIGURE 3**).[2] It is advantageous to perform imaging with the lumbosacral junction in extension to assess for dynamically compressive lesions or intervertebral foraminal narrowing, which may be minimized when the lumbosacral space is placed neutrally.[4]

Magnetic Resonance Imaging

Magnetic resonance imaging (MRI) provides assessment capabilities similar to those of CT, with increased sensitivity to soft tissue abnormalities affecting the intervertebral disk, dural sac, nerve roots, and loss of epidural fat (**FIGURE 4**).

Musculoskeletal Ultrasonography

Focal ultrasonography of the sciatic nerve can be performed with little to no sedation in most patients. It allows imaging of the peripheral sciatic nerve and surrounding musculature to assess for nerve impingement or enlargement, muscle injury, and dynamic gliding of the nerve. The sciatic nerve can be readily identified in longitudinal orientation running between the greater trochanter and ischial tuberosity and traced proximally to the nerve root and distally through the hindlimb musculature. The sciatic nerve may be measured bilaterally to assess for enlargement (**FIGURE 5**).[7]

TREATMENT OPTIONS FOR LOW BACK PAIN IN DOGS

A multimodal approach combining oral analgesics, therapeutic modalities, and therapeutic exercises can often effectively manage pain and improve mobility.

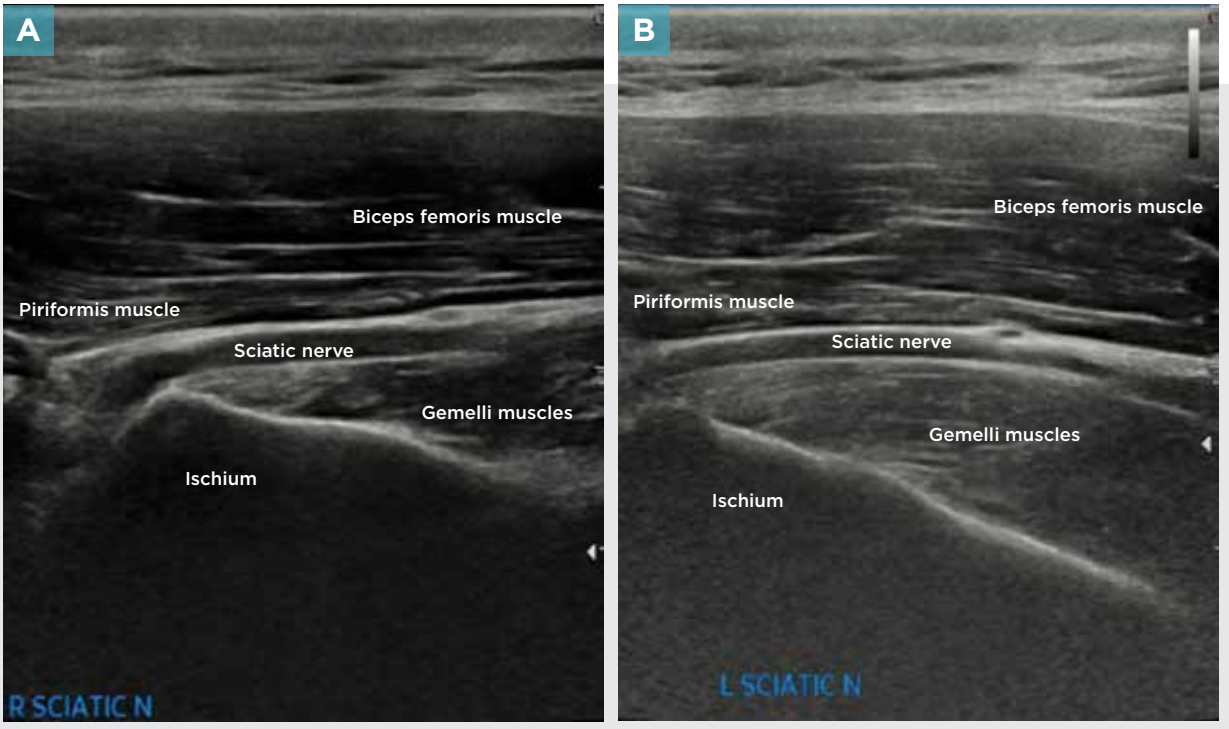

FIGURE 5. Ultrasonographic assessment of the sciatic nerves of a 3-year-old male intact Great Dane with right hindlimb lameness. **(A)** The right sciatic nerve appears thickened (measuring 2.3 mm) with thickening, mild irregularity, and increased hyperechogenicity of the perineural capsule compared with **(B)** the left (measuring 1.8 mm). Also note that the right gemelli muscles appear smaller than the left.

For severe cases, epidural steroid injections offer targeted, long-lasting relief, especially when conservative treatments are insufficient.

Oral Analgesics

- **NSAIDs:** NSAIDs are frequently used to manage pain and inflammation in cases of lumbosacral stenosis, providing relief in mild to moderate cases.[2,4]
- **Gabapentin/pregabalin:** These medications are effective for neuropathic pain associated with nerve root compression, offering relief when NSAIDs alone are insufficient.[3,8]
- **Amantadine:** Often used as an adjunct, amantadine targets central sensitization, enhancing the effects of other pain medications, especially in cases of chronic pain.[4]

Therapeutic Modalities

- **Photobiomodulation (laser) therapy:** Low-level laser therapy reduces pain and inflammation by promoting tissue healing, making it a useful noninvasive option for alleviating lumbosacral discomfort.[3]
- **Extracorporeal shockwave therapy (ESWT):** ESWT uses sound waves to stimulate healing and pain relief and has shown effectiveness in improving mobility in chronic musculoskeletal conditions, including lumbosacral stenosis (**FIGURE 6**).[9]
- **Transcutaneous electrical nerve stimulation (TENS):** TENS therapy uses low-voltage electrical currents to stimulate nerves and block pain signals. However, no strong scientific evidence currently supports TENS therapy's positive clinical effects in dogs with neurological and musculoskeletal conditions.[10]
- **Acupuncture:** Acupuncture is an alternative therapy often used as an analgesic to treat pain associated with neurological and musculoskeletal conditions. However, only a limited number of acupuncture studies in the human and veterinary medical literature are considered high-quality and demonstrate strong positive analgesic effects in conditions, such as back pain and osteoarthritis, and no studies have been performed in dogs with lumbosacral disease.[11,12]

FIGURE 6. Extracorporeal shockwave therapy being performed on a 9-year-old female spayed Chesapeake Bay retriever diagnosed with degenerative lumbosacral disease causing bilateral hindlimb lameness.

Therapeutic Exercises

- **Nerve gliding exercises:** Nerve gliding exercises gently mobilize the sciatic nerve within a safe range, reducing adhesions and promoting flexibility (**FIGURE 7**).

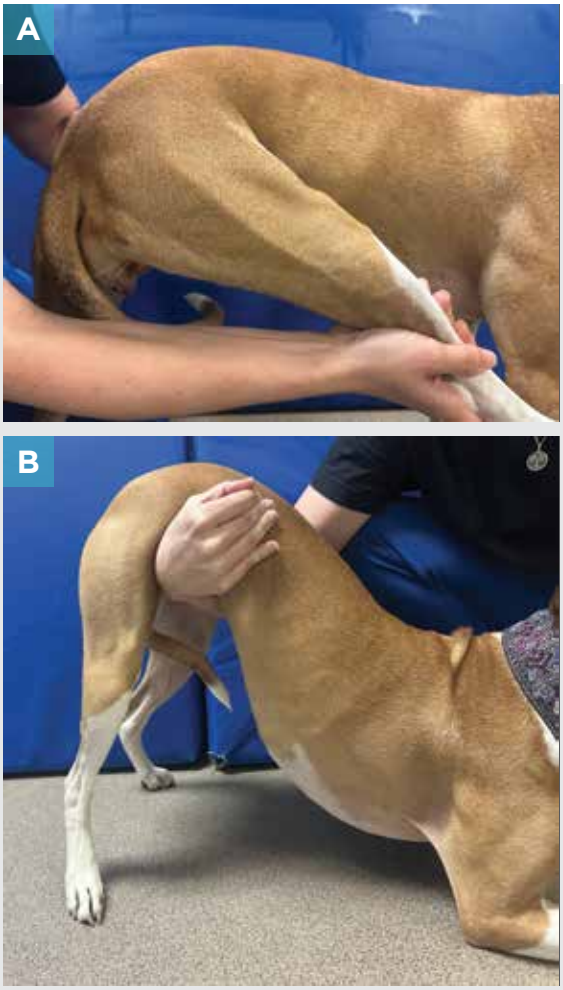

FIGURE 7. Nerve glide exercises. **(A)** Passive hamstring sciatic stretch, flexing the hip while extending the stifle. **(B)** Downward dog, an active sciatic stretch.

These exercises can effectively manage sciatic neuritis by improving nerve mobility without overstretching.[1]

- **Strengthening exercises:** Core-strengthening exercises provide support to the spine, helping to reduce strain on the lumbosacral area. Low-impact activities, such as walking on an underwater treadmill, build muscle without putting excess load on the spine, which is beneficial for dogs with lumbosacral stenosis.[4]

Epidural Steroid Injection

Methylprednisolone acetate is commonly used in epidural injections to provide localized anti-inflammatory effects, reducing pain and improving mobility in affected dogs.[2,9]

The injection is performed under sedation, with a Tuohy needle placed in the epidural space near the L7–S1 vertebrae (**FIGURE 8**). Accurate needle placement in the epidural space is confirmed using the "hanging

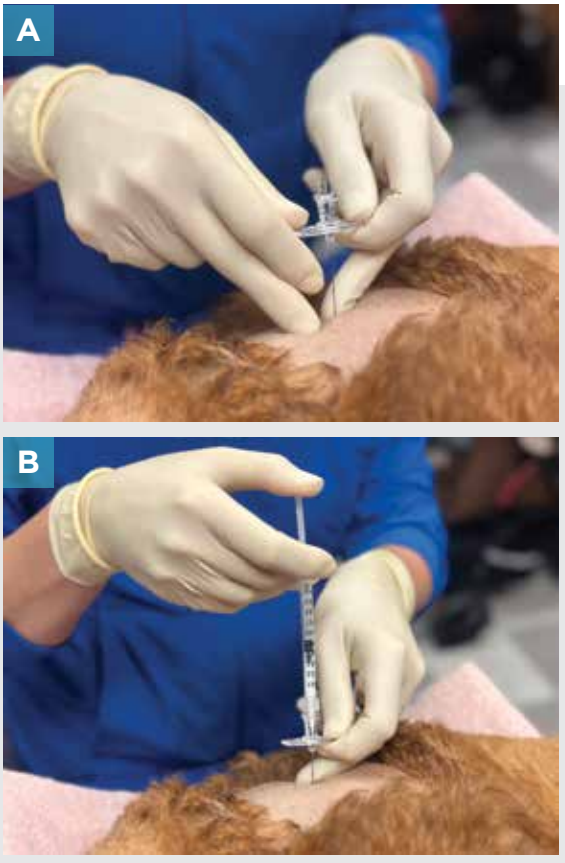

FIGURE 8. (A) Placement of Tuohy needle in the epidural space between the L7–S1 vertebrae using the "hanging drop" technique. **(B)** Injection of methylprednisolone acetate.

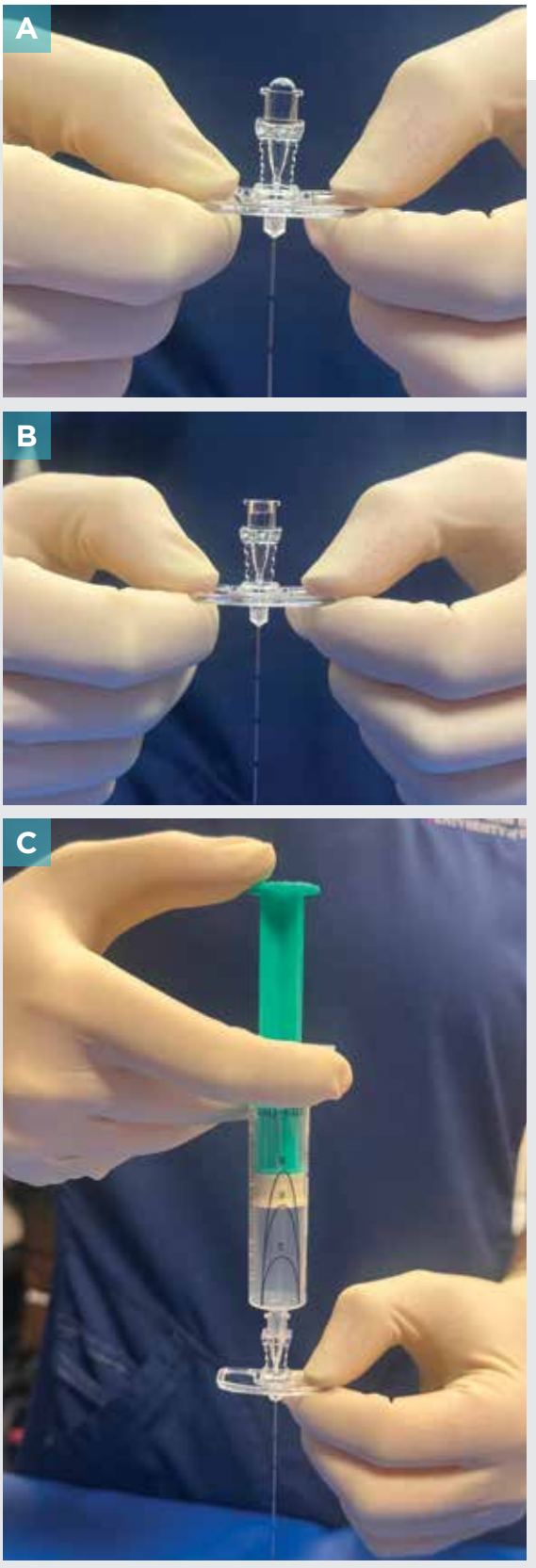

FIGURE 9. Hanging drop technique **(A)** before and **(B)** after entering the epidural space. **(C)** Loss of resistance syringe.

drop" technique with sterile saline or by using a "loss of resistance" syringe (**FIGURE 9**). A 1-mg/kg dose of methylprednisolone acetate is injected into the epidural space, followed by a small amount of saline to flush out any residual steroid in the needle. If 1 side/limb is affected, the patient is placed in lateral recumbency for 10 to 15 minutes to enhance the steroid's effect on that side. Janssens et al describe using a 3-dose protocol with a second epidural injection performed 2 weeks later, followed by a third injection 1 month later.[3] The authors have found this protocol to be highly successful, but based on experience, some patients may only need 1 or 2 doses, depending on their initial response to the treatment.

This minimally invasive procedure directly addresses inflammation at the nerve root, providing targeted relief with fewer systemic adverse effects than oral steroids. Pain relief can last for weeks or months.[3,8,9] However, procedures such as laminectomy and foraminotomy may be necessary for dogs with incontinence and/or severe or progressive lumbosacral stenosis to relieve nerve compression. TVP

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CE QUIZ QUESTIONS

1. **Which of the following is not a potential cause of low back pain in dogs?**
   a. Sciatic neuritis
   b. Degenerative myelopathy
   c. Neoplasia
   d. Discospondylitis

2. **Which of the following oral medication treatment options is most appropriate for managing neuropathic pain associated with sciatic neuritis?**
   a. NSAIDs
   b. Gabapentin/pregabalin
   c. Amantadine
   d. Prednisone

3. **Which of the following therapeutic exercises is intended to improve sciatic nerve mobility without causing overstretching?**
   a. Core strengthening
   b. Nerve gliding
   c. High-impact running
   d. Weighted limb

4. **What is the primary goal of epidural steroid injections in dogs with lumbosacral stenosis?**
   a. Increase mobility in the affected limb
   b. Promote resorption of protruding disk material
   c. Reduce inflammation around the nerve roots
   d. Permanently decompress the lumbosacral junction

5. **Extracorporeal shockwave therapy is primarily used in the management of lumbosacral stenosis for which of the following purposes?**
   a. To reduce inflammation and alleviate musculoskeletal pain
   b. To stimulate bone growth in the lumbosacral vertebrae
   c. To improve nerve regeneration in the sciatic nerve
   d. To enhance imaging clarity of the affected area