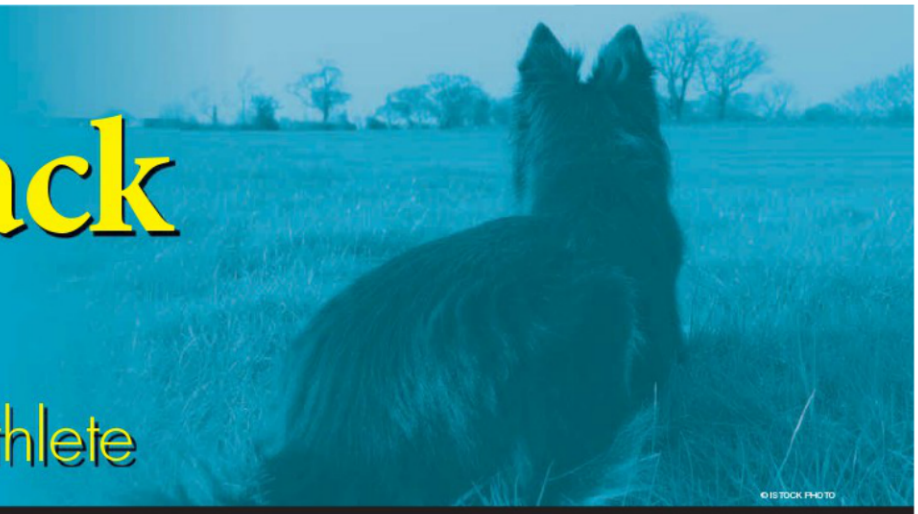
Low Back Pain

in the Canine Athlete



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Low back pain (sciatica) is a common cause of substandard performance in canine athletes. It can often be difficult to pinpoint due to the nebulous nature of the signs seen, but it is an important differential for any canine athlete that is having an unexplained drop in performance or pain referable to their hind end. Any hind limb lameness in an agility competitor, however subtle, usually warrants a visit to a veterinary specialist, most often beginning with a sports trainer or orthopedist to begin the process of diagnosing the cause of the lameness or discomfort. In some cases, this hind limb lameness can be contributed to a back injury, as other orthopedic and soft tissue causes are ruled out. As part of your dog's examination, a neurologic examination (or referral to a veterinary neurologist), should be performed to address any possible spinal causes of lameness or discomfort.

Anatomy

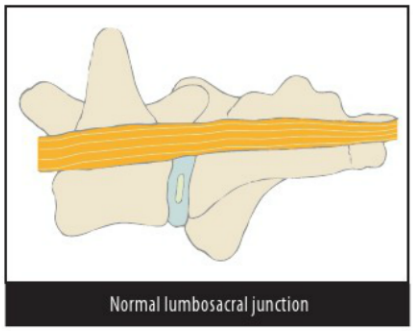
Somewhat simplistically, the vertebral column can be thought of as a tube of bone that the spinal cord and nerve roots pass through until exiting and traveling to various parts of the body to perform their function. Each individual vertebrae makes up a portion of this tube, and in between each vertebrae there are intervertebral discs which function as cushions or shock absorbers. The lumbosacral junction is where the seventh lumbar vertebrae articulates with the sacrum, which is three fused vertebrae that make up part of the pelvis. The lumbosacral junction is unique in that it undergoes a large amount of movement compared to other areas of the spine. As the primary connection of the pelvis to the rest of the spine, any dynamic movement incorporating the hind limbs (running, jumping) puts the lumbosacral junction through a full range of motion.

Clinical Signs

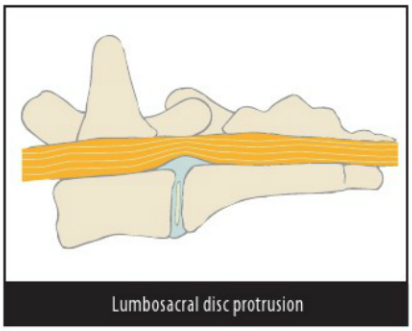
The severity of signs in dogs with low back pain/nerve root compression can vary quite a bit depending on the severity of compression, time of onset, and intended activities of the animal. In early cases of back pain in agility dogs, declining to jump, missing jumps, and nebulous unilateral or bilateral pelvic limb lameness are a frequent manifestation of low back pain. Discomfort associated with nerve compression can be quite severe compared with other causes of lameness, with dogs favoring or refusing to use the limb, even though orthopedically the limb is sound. In advanced or severe cases of canine back pain, hind limb weakness (dropped in the hocks), incoordination, weakness of the tail, and even urinary/fecal incontinence can manifest. Even in severe cases, the inability to walk is uncommon, which can sometimes make it easy to underestimate how compressed the nerve roots are compared to other spinal conditions. At examination for hind limb lameness or back pain, your veterinary specialist should perform a complete evaluation that includes physical, orthopedic, neurologic examinations, and possible imaging options. These tools will give your veterinary specialist a full picture of the cause of hind limb lameness, discomfort, or back pain.

Conditions

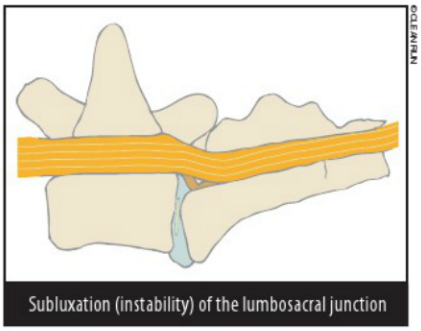
Lumbosacral disease (lumbosacral syndrome, lumbosacral stenosis, cauda equina syndrome) refers to a number of different changes in the low lumbar spine which all contribute to vertebral canal narrowing and nerve root compression. These changes can be seen as a primary degenerative "wear and tear" type process in canine athletes, although certain breeds (German Shepherds and related breeds) do have a clearly identified predisposition to instability at the site. German Shepherds are eight times as likely to develop degenerative changes at their lumbosacral junction compared to other breeds. While not having as clearly defined predisposition as German Shepherds, the condition does also occur commonly in Border Collies and Labrador Retrievers. The changes seen with lumbosacral disease include misalignment of the vertebrae (subluxation), degeneration and bulging of the intervertebral disc, and thickening of the bone and soft tissues/ligaments of the lumbosacral



Normal lumbosacral junction



Lumbosacral disc protrusion



Subluxation (instability) of the lumbosacral junction

junction. All of these changes individually, or in combination, lead to narrowing of the vertebral canal and nerve compression.

Diagnosis

Physical Examination

Given the often vague nature of the signs seen with lumbosacral nerve root compression, a thorough physical, orthopedic, and neurologic exam is often vital in pinpointing the area of concern. Orthopedic conditions such as hip osteoarthritis, bilateral cruciate ligament injury, and groin muscle strains should be screened for as their presentations can look quite similar to dogs with lumbosacral disease.

Radiographs (X-rays)

Radiographs are a useful tool for screening for certain conditions, and are frequently recommended as an initial screening tool in dogs with low back pain given their ease of acquiring. In particular, radiographs are useful for identifying bone conditions that can cause back pain (fractures, vertebral tumors), or infections of the intervertebral disc (discospondolytis). Changes supportive of lumbosacral disease may be seen radiographically such as bone proliferation, disc space collapse, or significant instability of the lumbosacral junction. However, one significant limitation of radiographs is that they do not provide detail of the soft tissue (nerve roots, intervertebral discs), which precludes definitive diagnosis of this lumbosacral disease.

Computed Tomography (CT Scanning)

CT scans utilize similar technology to radiographs to acquire three-dimensional imaging of the area of interest. Because CT provides images in three dimensions, the detail acquired is much higher than in with plain radiography. In particular, CT imaging is useful in screening for bone conditions that plain radiography is not sensitive enough to pick up, such as small fractures. Since CT is based on the same X-ray technology as radiographs, it does also share the limitations in soft tissue detail. While CT scans are relatively quick to obtain, the need for the patient to remain motionless during the scan often means that they need to be either sedated or placed under general anesthesia.

Magnetic Resonance Imaging (MRI)

Magnetic resonance imaging, in contrast with the above-mentioned technologies, provides excellent soft tissue detail and allows visualization of the spinal cord, nerve roots, and intervertebral discs. It is also a three-dimensional imaging modality, allowing for pinpoint identification of areas of concern. MRI imaging is currently the diagnostic modality of choice for identifying lumbosacral nerve root compression. Since an MRI study takes more time to obtain compared to radiographs or CT, during MRI scans general anesthesia is an absolute necessity.

Lumbosacral disc protrusion causing severe nerve root compression

Treatment

Nonsurgical

Nonsurgical management for lumbosacral disease consists of a course (usually 4-6 weeks) of enforced rest, medications, and rehabilitation therapy. Activity is limited to leash walks only and movements that exacerbate the compression (running, jumping) are strictly discouraged. Medications can consist of anti-inflammatory medications, pain medications, and muscle relaxants. Low-dose oral corticosteroid use has been extensively evaluated as a treatment modality; while the effectiveness of the anti-inflammatory and pain relieving effect can be greater than non-steroidal anti-inflammatories the adverse effects on muscle mass and

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strength make this a poor long-term choice for our canine athletes. One therapy that is quite popular in human medicine is injection of a steroid at the site of compression, giving the patient the benefits of a potent anti-inflammatory while minimizing the systemic side effects. While this seems to be an effective modality in some dogs, efficacy data in veterinary medicine is limited.

Surgical

There are quite a few surgical procedures described for the lumbosacral junction depending on the nature of the compression and degree of instability. The most common decompressive procedure is called a Dorsal Laminectomy, in which a window is created in the roof of the vertebral canal. This window allows access to remove protruding intervertebral disc, compressive bone, or soft tissues. Once the nerve roots have been adequately decompressed, the procedure is complete. In dogs with significant instability of the lumbosacral junction, stabilization or fusion may be elected. If necessary, stabilization is achieved through the use of implants to prevent movement across the lumbosacral junction.

Rehabilitation Therapy

Rehabilitation therapy is an extremely useful adjunctive therapy which can be an important part of any conservative or surgical management plan. Rehabilitation therapy can consist of manual therapies and hydrotherapy to improve conditioning and resolve muscle imbalances. Some therapeutic modalities such as acupuncture, cold laser, and transcutaneous electrical nerve stimulation (TENS) can also provide non-medication pain relief. As a part of rehabilitation therapy, a home exercise plan is also mapped out, allowing a dog owner to take an important role in their dog's recovery process.

Prognosis

Nonsurgical Therapy

Unfortunately, nonsurgical therapy is only effective in approximately 50% of dogs, likely due to the fact that any nerve root compression does not spontaneously resolve, as well as the dynamic nature of the lumbosacral junction. In particular, dogs returning to a high level of activity like agility and other sports are predisposed to exacerbations or "flare-ups" of their discomfort. Because the nature of lumbosacral disease is such that it tends to progress gradually, a trial of medical therapy may be elected as a first option with minimal risk, with more aggressive therapies pursued if the patient does not respond sufficiently.

Surgical Therapy

Overall, the prognosis with surgical therapy tends to be fairly good with success rates of between 75-90% reported in veterinary literature. Addressing any nerve root compression often leads to a rapid return to comfort once post-surgical discomfort has resolved. Neurologic deficits (weakness, incoordination) often do take weeks (occasionally months) to see the full extent of improvement, as nerve healing can take quite some time. The one scenario where the prognosis is more guarded, even with a successful surgical decompression, is in dogs that have developed urinary and fecal incontinence. The overall recovery rate for these dogs is guarded, with approximately 50% achieving return to continence.

Bob, one of Dr. Gallagher's patients, had a dorsal laminectomy for a lumbosacral disc protrusion in March 2014. Bob is active in sheep herding and has now returned to full function and competition.

Conclusion

Lower back pain can be an intimidating concern in agility and sporting dogs. There are often subtle changes in performance, such as unexplained decreased performance or hind limb lameness, which will warrant a visit to your veterinary specialist. Through a thorough examination and possible advanced diagnostics, your veterinary specialist will be able to get a better picture of your canine competitor's cause of injury. While canine back pain can be daunting, it is important to remember that advances in veterinary medicine are continuing to provide better patient outcomes over time, and your veterinary specialist is a key resource in your athlete's return to competition.

References and Continued Reading

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Dr. Ryan Gallagher completed his undergraduate degree in biology at Sonoma State University and then earned his Doctor of Veterinary Medicine at the University of California Davis School of Veterinary Medicine. Dr. Gallagher then completed a rotating internship at the University of Pennsylvania and a three-year residency program in neurology at North Carolina State University, after which he earned diplomate status from the American College of Veterinary Internal Medicine in neurology. Dr. Gallagher currently practices at The Spine Center at VOSM, partnered with Veterinary Orthopedic & Sports Medicine Group in Annapolis Junction, Maryland. For more information, visit www.vosm.com.