

DEM BONES, DEM BONES, DEM BACKBONES:



Canine Spinal Cord Diseases Affecting Bernese Mountain Dogs

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*"If you would seek health,
look first to the spine."*

Socrates

Like their human counterparts, our dogs can suffer from a variety of spinal diseases. While Bernese Mountain Dog owners are familiar with degenerative myelopathy (DM), a range of other spinal cord diseases is also seen in the breed. Some can be easily diagnosed, while others are diagnosed by exclusion. There can be misdiagnoses that can only be clarified upon necropsy. Fortunately, Berners are not a breed that experiences these diseases at rates exceeding the average for all breeds (with degenerative myelopathy and wobbler syndrome being possible exceptions); nevertheless, they do occur in our dogs.

The purpose of this article is to develop a basic understanding of the array of spinal cord diseases in the Bernese Mountain Dog. Subsequent articles will offer details of specific higher frequency diseases in the breed (e.g. DM, IVDD/FCE, and wobbler syndrome).

SPINAL DISEASES AFFECTING BERNESE MOUNTAIN DOGS

Spinal diseases/conditions that affect Bernese Mountain Dogs include but are not limited to ataxia, cauda equina syndrome/lumbosacral disease, degenerative disk disease, DM, discospondylitis, herniated disks, intervertebral disk disease (IVDD), fibrocartilaginous emboli (FCE), neoplasia/tumor, trauma and wobbler syndrome.

Spinal diseases are complex diseases to diagnose, often requiring the skills of a canine neurologist and advanced imaging techniques. A number of these diseases have very similar symptoms or a complex array of overlapping clinical signs that can confuse or delay diagnosis. Some diseases can only be diagnosed by exclusion. Others can only be diagnosed definitively by necropsy. A number of these spinal diseases can benefit from early diagnosis (e.g. within 48 hours of loss of deep pain sensitivity) and initiation of treatment before further damage is allowed to occur (e.g. IVDD). This being the case, dog owners should know generally what to look for in any dog potentially suffering from a spinal cord disease, because in some cases it can make a significant difference in prognosis.

Table 1 depicts the current status of Bernese Mountain Dogs suffering from various forms of spinal disease as reported in the Berner-Garde

database. Most of these spinal conditions, as reported, are unfortunately anecdotally (subjectively) diagnosed. Had the dogs been definitively diagnosed using advanced imaging or necropsy, the disease might have been classified slightly differently and more specifically. For many reasons ranging from financial constraints to the dog's age or condition, a dog owner may choose not to invest in advanced diagnostics or necropsy. Most likely we have more or fewer dogs with these problems than are described here. As such, these data should be considered a point-in-time, approximate view of spinal cord disease in our breed.



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There are several limitations in the data reported. It does not include immune-mediated diseases that can affect the spinal cord and mobility. Clearly, several immune-mediated diseases can exhibit symptoms like neurologically-based spinal diseases. For example, immune-mediated steroid-responsive meningitis and/or meningeal-vasculitis have been reported in young dogs of many breeds. Indeed, a more severe form of this syndrome (i.e. necrotizing vasculitis) has been reported in a few breeds, including in Bernese Mountain Dogs. This overlap highlights the complexity of competing diagnoses when dealing with spinal cord diseases.

Several DM categories (e.g. at risk, carrier, symptomatic, asymptomatic, presumptive) exist in the Berner-Garde database. Nowhere in the database are these categories defined or differentiated, and there is some confusion as to how to interpret the various categories regarding dogs who are affected. To avoid double counting the overlapping categories of dogs, we reported only the primary "degenerative myelopathy" category, which contained the most diagnosed (versus anecdotally diagnosed) cases, and the degenerative myelopathy-symptomatic, presumptive and at risk (only diagnosed) categories. The distinction between DM-symptomatic or DM-presumptive and an anecdotal diagnosis in the general DM category lends itself to confusion and possible misinterpretation. For that reason, separate counts for those categories are provided for the user to

interpret for themselves. It should be noted that for any disease, anything other than "diagnosed" increases the equivocality of a diagnosis. This is particularly relevant with spinal cord diseases since several of them have very similar symptoms.

Similarly, other more general disease categories may be a more general diagnosis of a more specific disease that has yet to be diagnosed (e.g. paresis/paralysis may be FCE or IVDD or DM). We included the general disease category.

Any entry that was missing a response for accuracy of diagnosis was interpreted as anecdotal rather than diagnosed. Additionally, the neoplasia/tumor (spine) numbers from Berner-Garde must be qualified because many are unspecified as to the precise diagnosis or they are obviously not relevant to neurological disease. For that reason, only nerve sheath, neurofibroma and meningioma neoplasia/tumor data relevant to the spine/limbs are reported.

In sum, the point of this table is simply to illustrate that our Berners suffer from these diseases, the number of them who suffer is probably understated in the BGF database and it may prove beneficial to our dogs if their owners have some basic knowledge of them.

TABLE 1:
Selected Berner Garde Data on Spinal Cord Diseases

Disease	Anecdotally Diagnosed	Diagnosed	Total Frequency
Ataxia (not always neurological)	8	3	11
Cauda equina syndrome	7	4	11
Degenerative disk disease	11	5	16
Degenerative myelopathy (DM)/ DM symptomatic/ DM presumptive	26/53/275	39/4/6	65/57/281
Discospondylitis	6	6	12
Intervertebral disk disease (IVDD)	21	27	48
Neoplasia/tumors (spine, specifically nerve sheath/ neurofibroma/meningioma)	11/0/0	12/3/4	23/3/4
Fibrocartilaginous emboli (FCE)	11	31	42
Paresis/paralysis	57	6	63
Ruptured/herniated disk	57	17	74
Trauma (spine/neck, typically caused by accidents)	20/1	2/0	22/1
Wobbler syndrome	76	37	113

CHARACTERISTICS OF SELECTED SPINAL CORD DISEASES

A veterinarian once told me, "Veterinarians should listen to dog owners. The owners are with their dogs twenty-four hours a day for seven days a week. I see the dog for only 15 or 20 minutes. Owners can have valuable information that will expedite my diagnosis."

Spinal cord diseases affecting dogs can be distinguished in terms of location, age at onset, relative pain level and progression. By noticing these factors, a dog owner can aid their veterinarian in making a prompt diagnosis. For example, the part of the spine that is affected matters in achieving an accurate diagnosis. Is it focused at the neck, the middle or lower back? Similarly, did the condition occur suddenly during play or as gradual deterioration? How old is the dog? Was the progression of the disease rapid (in days or hours) or slow (in weeks or months)? Finally, does your dog seem to be in pain? Answers to these questions based on observation by the owner can often eliminate some disease candidates and focus attention on others.

TABLE 2:

What to Observe in a Dog Showing Symptoms of Spinal Cord Disease	
Location	Neck, mid back or lower back
Onset type	Acute or chronic (over time)
Onset age	Young, middle age or older
Progression	Suddenly worse or gradual worsening
Pain level	Little or no pain, possibly painful or painful

To illustrate, if we focus on location of the disease, some diseases can occur anywhere in the spine such as IVDD, discospondylitis, tumor, trauma, myelitis and fibrocartilaginous emboli (FCE). In contrast, wobbler syndrome affects primarily the neck area, DM is focused on the mid back, and cauda equina syndrome/lumbosacral disease syndrome targets the lower back. If we consider the age at onset, wobbler syndrome, trauma and discospondylitis tend to affect younger dogs whereas DM and neoplasia/spinal tumors tend to occur in older dogs. Some spinal cord diseases are painful, and others are not. Painful diseases include IVDD, discospondylitis, neoplasia/tumor and myelitis. Spinal cord diseases with little or no pain include FCE, wobbler syndrome and DM. In some diseases, time matters, and delays in obtaining a diagnosis can have tragic effects on prognosis (e.g. IVDD). Table 3 offers a summary of these characteristics by disease.

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CAN THESE DISEASES BE PREVENTED?

Wise people tell us to be forewarned is to be forearmed. This article provides a rudimentary knowledge of the canine spinal diseases affecting Berners. A logical question for owners to ask is, can spinal diseases be prevented? The honest answer is that most of the tools we currently have are blunt instruments, but they are getting sharper and better. Genetic tests are our sharpest tools to date, but there are few of them for spinal cord diseases.

With DM, we do have a genetic test that can guide breeders in reducing the incidence of this disease in future generations. Over time and with the DM test, breeders can gradually eliminate the mutations in their lines without losing the other genetic benefits those carriers might possess (e.g. lower risk on the histiosarcoma pretest, beautiful conformation). With the help of the DM test, a breeder can easily breed those carriers or at-risk dogs to DM clear dogs without producing at-risk puppies. Over a couple of generations, the breeder should have produced several nice DM clear puppies from those carrier-clear or at-risk-clear matings who can carry on their lines – bringing forward all the good stuff but leaving behind the two DM mutations.

If we look at advice in articles on spinal diseases targeting the dog owner, we see commonality in the recommendations for owners. The recommendations here are less sharp, but they might help in subtle ways, particularly in cases in which infection triggers disease.

- Do not let your dog become overweight.
- Feed a quality food.
- Keep your dog physically fit.
- Avoid body slamming or rough play with other dogs.
- When possible, use a body harness instead of a neck collar to reduce stress on the neck.

TABLE 3:
General Overview of Spinal Cord Disease Characteristics

Spinal Disease	Cause	Location	Diagnosis	Onset Age/ Progression	Pain Level	Treatment
Cauda equina syndrome/ Lumbosacral disease	There is a narrowing of the canal in the "horse's tail" section of the spine. It can be caused by arthritis, intervertebral disk herniation, an infection in the disc, trauma, congenital malformation or a spinal tumor.	Lower back.	Diagnosis supported by radiographs or advanced imaging (e.g., MRI, CT).	Middle aged to older.	Painful.	Depending on cause, medical management or surgery.
Degenerative myelopathy	Genetic component, but incomplete penetrance.	Mid back.	Diagnosis by exclusion of other diseases or necropsy (definitive).	Not usually seen in dogs under 5 years old. Slow onset, chronic progression.	Little or no pain.	No specific treatment. Supportive care/physical assistance. Current studies evaluating the drug, Riluzole.
Discospondylitis/ spondylitis	Bacterial or fungal infection of the disk space and/or vertebrae.	Any part of spine.	Diagnosis supported by radiographs (if vertebrae affected) & blood/urine cultures or advanced imaging (e.g., MRI, CT).	Younger, larger breeds.	Painful.	Appropriate antibiotic or antifungal.
Intervertebral disk disease	Compression of the spinal cord. Breeds with long backs/short legs most prone but IVDD is found in all breeds. Hanson Type 1 most common.	Herniation can be at any place in the spine below the neck.	Diagnosis by MRI or myelography. Radiograph is not definitive.	Hanson Type I - Acute (compressive, extrusion of the nucleus pulposus into the vertebral canal), rapid progression. Hanson Type II - Slow protrusion of the intervertebral disk into the canal), chronic progression.	Painful.	Medical management / crate rest for mildly affected. Surgery for acute cases (unable to support weight). Prognosis is excellent (85% will walk again) if they possess deep pain sensation or lost it less than 48 hours previously. Absence of deep pain indicates necrosis and surgery is futile. Consider euthanasia.
Fibrocartilaginous emboli	Fibrocartilage blocks spinal cord blood supply. Unknown exactly how the cartilage enters the blood supply.	Any part of spine.	Diagnosis by exclusion. MRI or necropsy (definitive).	Typically, in young adults between 3-5, but has been reported in puppies and 10-year-olds. Males more often than females. Acute, often triggered by mild trauma or play.	Little or no pain.	No specific treatment. If deep pain sensation remains, prognosis is good to regain useful function. If not, prognosis is poor. Supportive care/physical assistance.
Neoplasia/Tumor	Unknown.	Any part of spine but often on the dura mater, the outer, toughest fibrous of the three membranes covering the cord.	Diagnosis by MRI, CT or myelography. Bone tumors can be seen with x-ray.	Older. Depends on tumor type. Other neoplasia may also be present.	Painful.	Surgical removal, radiation therapy, etc. Prognosis depends on type, if it has penetrated the cord, etc.
Trauma	Injury (preventable).	Any part of spine.	X-ray, etc.	Typically, younger. Depends on injury.	Possibly painful.	Depends on injury.
Wobbler (There are 14 different names used for this disease, which accounts for some confusion in data capture).	Unknown but possibly a genetic component. Two forms: disk compression or malformed vertebrae.	Neck.	Diagnosis by MRI, CT or myelography.	Disease presents differently in different breeds. Occurs in Dobermans in younger dogs, but in Danes it occurs in middle-aged dogs. Rarely seen in small breeds. Bernese are considered a breed at risk.	Little or no pain.	No cure. Treatment is medical management or surgery (21 types of surgery). Outcomes of both approaches are similar.

NOTE: These are general tendencies for each disease and should not be used to diagnose your dog.



While it is easy to be devastated when a dog is diagnosed with one of these spinal diseases, there is reason to believe the future for these dogs will get better with research and development of new genetic tests, treatments and maybe even cures.

- Do not allow your dog to drink or eat from public bowls.
- Do not allow wounds or sores to become infected.
- Protect your dog from fleas, ticks and parasites.
- Stay away from dogs of unknown health and vaccination status.
- Keep up to date on veterinary care.

uncover the genetic biomarkers and the genetic basis of wobbler syndrome. Additionally, calls for new research on wobbler syndrome emphasize innovative advancements in medical, nutritional, surgical, immunotherapy and complementary interventions. These efforts promise to improve the quality of life for all large-breed dogs affected by wobbler syndrome. Research in one breed often benefits others. The experience in wobbler's research is typical of the direction research is taking on many of these spinal cord diseases.

Finally, dog owners and their dogs are critical elements in research that uncovers the genetic basis of these spinal cord diseases. These research programs enable development of new genetic tests, better diagnostic tools, innovative treatments and possibly even cures. When there are opportunities for research participation with your dog, please participate.

LOOKING TO THE FUTURE

Progress is being made by researchers to better understand the causes of these diseases. Some spinal diseases may have a genetic component. Some have an infectious one. Some may be congenital and not genetic.

We have already seen the scientific process in action with the genetic testing of DM in Berners where knowledge moved from a single DM mutation to the discovery of a second one. That research continues.

Wobbler syndrome is a disease that affects Bernese Mountain Dogs as well as Dobermans and Danes. In my private conversations, one researcher expressed his suspicion that many anecdotally diagnosed DM cases in Bernese might be wobblers syndrome. New research is currently being funded by Morris Animal Foundation and various affected breeds to

On the clinical side, surgical procedures are also improving. This is particularly noteworthy in IVDD which can often be effectively treated with surgery. Techniques and drugs used in managing or slowing down human spinal disease are being tried and tested for efficacy in our dogs. Currently, drugs used in treating human ALS are being evaluated in dogs with DM.

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About the Author

Nancy's articles on canine health have won multiple Dog Writers Association of America Maxwell Medallions, a Morris Animal Foundation Advances in Canine Veterinary Medicine Award and multiple American Kennel Club Publication Excellence Awards. She is Editor Emerita of The Alpenhorn and served on the boards of the Berner-Garde Foundation and Bernese Auction Rescue Coalition. She currently serves on the board of the Nederlandse Kooikerhondje Club of the USA (NKCUSA) and chairs the NKCUSA Health and Genetics Committee. She breeds under the kennel names ThornCreek Bernese, Reg'd. and Eendenkooi Nederlandse Kooikerhondje.