

Case Study

Resolution of Cauda Equina Syndrome Following Chiropractic Care in a 7-Year-Old Dachshund with Lumbar Disc Herniation: A Case Study & Review of the Literature

Pamela Stone-McCoy DACCP, DC¹

Sarah Friedrich DC²

1. Private Practice of Chiropractic, Kennesaw, GA
2. Chiropractor, Powder Springs, GA

Abstract

Objective: To report on the outcomes following chiropractic intervention in a canine suffering from cauda equine syndrome secondary to disc herniation.

Clinical Feature: The patient was a 7-year-old Dachshund canine that was experiencing a decrease in appetite, defecation issues, decreased reflexes in his hind legs, and could not do a full body shake. Imaging confirmed an L1/L2 disc herniation.

Interventions and Outcomes: Diversified technique was utilized and over the course of two visits, the patient's symptomatology was alleviated, indicated by the return of hind leg reflexes, appetite, bladder and bowel control and full body shake.

Conclusion: This case report provides supporting evidence that conservative chiropractic adjustment to subluxations can be beneficial to canines suffering from symptomatic lumbar disc herniation and cauda equine syndrome.

Key Indexing terms: *disc herniation, dogs, chiropractic, canine, spinal injury, motion palpation, chondrodystrophoids, adjustment, vertebral subluxation*

Introduction

Like humans, canines can develop herniated discs and cauda equine syndrome. The intervertebral disc acts as a cushion between the vertebrae of the spine. When the disc becomes herniated the soft center known as the nucleus starts pushing through the cracks of the tougher exterior, known as the annulus. When the nucleus starts protruding out, it can begin to irritate the nerves exiting the spinal cord and can compress the spinal cord itself. Disc protrusion can lead to symptoms such as pain, numbness, tingling, and/or weakness in the extremities. Pain associated with a herniated disc in the lumbar region usually exists in the buttocks, thigh, or calf but can travel as far down the leg as the foot.

When a person or canine experiences numbness or tingling, it will usually follow a specific pattern associated with the affected nerve. An example of this is if the lateral femoral cutaneous nerve was affected, then the lateral side of the thigh would experience numbness and tingling. The same could be said for weakness; the muscles affected are the ones innervated by the same nerve. However, not all herniations are symptomatic.¹

Unlike other diseases and problems that have an unknown etiology, the causes and risk factors for disc herniations in the lumbar spine are known. These known risks include genetics, family history, loading the lumbar, intensive physical work, time urgency, poor spinal stabilization from muscle weakness, and other instabilities within the spine.² The primary cause associated with disc herniation is by repetitive wear and tear over the years with a combination of degenerative disc disease which is considered a normal biological process. As a person or canine ages, the disc begins to lose water and thus leads to a decrease in disc height and flexibility, which increases the incidents of tearing.¹

Plain film x-rays are not able to detect a disc herniation but can be useful ruling in or out other possible reasons for symptomatology and positive tests. An MRI is used to confirm the exact location of the herniation and can reveal to the doctor what nerves are being affected. The abnormal imaging would be consistent with the patient's complaints.^{1,2}

Upon confirming a disc herniation with an MRI, it is then classified as either protrusion, prolapse, extrusion, or sequestration. The first two stages, protrusion and prolapse, are considered incomplete because the nucleus is still within the annular fibers of the disc. The last two stages are complete due to the nucleus pushing through the barrier of the annular fibers. Sequestration is when the nucleus separates fully from the disc into the spinal canal.³

Today, many alternative modalities that humans seek out have transitioned over to helping animals. These alternative means are being used to help canines with issues such as disc herniations. Currently, chiropractic care is the most common alternative therapy compared to the other traditional therapies such as homeopathy, veterinary naturopathy, acupuncture, hydrotherapy, and more. Chiropractors use an adjustment, a specific manual thrust done with their hands, to correct subluxations in the spine. A subluxation is defined as a misalignment of a vertebra, in relation to the one above and below it. This causes a biomechanical change that in turn causes interference in the nervous system causing it to be unable to properly communicate with the different parts of the body.⁴

Leeman et al. reported on a human patient with disc herniation improving after receiving a high velocity, low amplitude adjustment. The adjustment was delivered at the level of the herniation without any adverse effects experienced by the patient. To further support the benefits of chiropractic care, Peterson et al compared two groups with disc herniations. One group received a high velocity, low force adjustment, while the other was treated with a nerve root injection. The study found that both groups greatly improved in symptomatology with no clinically significant differences between one group versus the other.⁵

Upon investigation, there was no reported prevalence or incident rates for the frequency of canines diagnosed with disc herniations. In humans, disc herniations are seen in 5 to 20 cases per every 1000 adults per year. Although this pathology can occur in almost any decade, it is primarily seen in the third to fifth decade favoring males 2:1.⁶

In the following case report, there was a connection between the MRI disc pathology finding and the subluxations found. As the subluxations were addressed and corrected, the canine's symptoms cleared or decreased in severity.

Case Report

History

The patient was a 7-year-old male Dachshund canine that was adopted by his owner when he was eight weeks old, the youngest a canine can be separated from its mother. The owner described the dog as always being "a very active dog and still is. He would jump everywhere..." Due to Dachshund being part of a group of dogs known as chondrodystrophoids, they can develop angular deformities in the limbs and degeneration of the nucleus pulposus⁷ of the spinal disc. The owner tried to teach the dog to use stairs instead of jumping on and off surfaces such as the couch. However, the attempt was futile, as the patient would jump over the stairs, avoiding their

use altogether.

When the dog was a puppy he was never restricted to a cage and when he went out for walks he would run up and down a flight of stairs to get to and from the apartment. He never showed any signs of pain or discomfort at the time. He was a very active dog.

In June of 2016, the owner started to notice the dog running with a 'high step.' His hind legs would lift higher than his normal stride as if he were marching with his hind legs. However, this did not interfere with his ability to jump and he showed no signs of being in pain. The owner was unsure if the difference in the patient's gait occurred earlier than June. Upon realizing that the dog's gait was altered, she brought him to a chiropractor to be adjusted a few weeks later. The patient received Logan technique and a sacrum/pelvis adjustment. After an adjustment, the canine responded positively with his gait returning to normal. After the initial visit, adjustments continued twice a quarter. The techniques primarily used on the patient were Logan and Activator. Due to the owner's change in situation, the patient stopped getting adjusted regularly in January of 2017. At the time he did not have any debilitating problems although an occasional 'high step' gait was observed.

In May of 2017, the canine experienced several changes that lead to a negative impact. These changes included a new apartment located on the third floor and jumping off a higher bed. In August, the dog jumped off the bed and yelped in pain. By the next day he refused to jump on the couch and when going down the stairs his body would curve to the right instead of staying straight. He was brought back to the Chiropractor where he received an adjustment to his sacrum and lumbar via Logan and Activator. Almost immediately he was back to being able to jump on and off the furniture and went up and down the stairs without any problems. In September of 2017 the chiropractor moved out of state so the canine was not adjusted.

On December 26, 2017, the canine started whining and would not jump onto the couch, but rather would lay on the floor and did not eat much. The owner stated there was unknown etiology and it was a sudden change. There were no changes in his bowel or bladder habits and he was still able to walk down the stairs. The owner became especially concerned when the next day she gave him a dog treats with peanut butter icing, which he barely ate. This was abnormal behavior as his owner described him as being "obsessed with treats." Later that night, he woke up to vomit and had a bowel movement. The owner made an appointment with his veterinarian.

Through a neurological exam, the veterinarian found a lack of hind leg reflexes on the left side with reduced reaction on the right. When the veterinarian applied pressure to the hind legs, the left side had a delayed reaction. He was referred to a veterinary neurologist for further testing with a prescription of anti-inflammatories, a steroid, and painkillers.

The pills were taken every twenty-four hours and according to the owner helped a little. He mainly slept and although he was urinating normally, he did not have any bowel movements. On January 2, 2018, he had an appointment with the veterinary

neurologist who ordered an MRI. Upon review of the imaging, the doctor wanted to do same day surgery. The owner decided against the same day surgery. The canine was prescribed another medication and was restricted to the kennel only being able to leave when the owner carried him out to use the bathroom. During this time, he whined in pain whenever he moved, he stopped eating, and had little to no bowel movements. He was still able to drink water and urinate. The veterinary neurologist agreed to refer to an animal chiropractor.

The beginning of January 2018 the canine sought chiropractic care by a different certified animal chiropractor due to the original chiropractor moving. The patient was seen by the referred chiropractor on January 6, 2018. After the chiropractor reviewed the MRI and examined and adjusted the patient as described below, the owner noticed immediate improvement. According to the owner he was back to his normal self. She still had him on cage restriction that night and carried him out to use the bathroom, but his appetite returned and he had normal bladder and bowel movements.

Upon a follow-up visit with the veterinary neurologist, the doctor was impressed by his progress. Three weeks after his first visit to the chiropractic office he had a second appointment. The owner reported the canine had returned to his “normal youthful self.”

Examination

The patient was a 7-year-old male long haired Dachshund canine referred to a chiropractor by his veterinarian. He presented to the office with decreased appetite, difficulty defecating, disc herniation at L1-L2 confirmed via an MRI, decreased reflexes of the hind legs as stated by the veterinarian who referred the dog to the chiropractic office, and only being able to shake his front half of his body but not his rear.

At the first visit the dog was on Tramadol, prednisone, gabapentin, and methocarbamol. Tramadol is a narcotic prescribed by physicians for patients with moderate to severe pain.⁸ Gabapentin is used both as a nerve pain medication and anticonvulsant.⁹ In the following case, the drug was used for nerve pain not as an anticonvulsant. Prednisone is a steroid used to decrease systemic inflammation in the body.¹⁰ Methocarbamol is a prescribed muscle relaxant.¹¹

Intervention and Outcomes

Each of the following chiropractic listings were determined using Diversified technique. The goal of using this technique is to deliver an adjustment that will increase the mobility of the joint that is restricted. To find the restricted vertebrae, the chiropractor motioned each segment feeling for loss of motion/restriction/fixation and then delivering a low amplitude, high velocity force (adjustment) into the segment. The vertebra was then re-motioned to ensure there was increased mobility and range of motion.¹² On the first visit the chiropractor adjusted a left Anterior Superior (AS) ilium, Posterior spinous process left (PL) L4, Atlas Right Posterior (ARP), muscle work on the left Psoas, and performed manual traction.

Following the first adjustment the dog walked better and gave a full body shake that he had previously been unable to do. At his second adjustment, three weeks later, the doctor adjusted a left AS ilium, Posterior left L4, Atlas Superior Left (ASL), metacarpals, trigger point and massage work on the left Psoas, and long axis manual traction.

After the first adjustments were administered the patient did a full body shake with the above segmental listings increased in movement. Upon the second visit the owner of the patient reported the dog was “totally back to normal,” he was able to do a full body shake. The neurologist said there was vast improvement, his hind leg reflexes were present, and he was eating normally. He had normal bladder and bowel movements.

Upon a follow-up visit with the veterinary neurologist, the doctor was impressed by his progress. Three weeks after his first visit to the chiropractic office he had a second appointment. The owner reported the canine had returned to his “normal youthful self.” Between the first and second visit the patient had been taken off of prednisone and methocarbamol, but was still taking Tramadol and Gabapentin.

Technique

The technique used by the chiropractor was Motion Palpation technique with a high velocity, low amplitude adjustment. The doctor did static and motion palpation for subluxations within the canine’s spine in order to determine a listing and then manually adjusted the subluxations. To find the subluxated levels, the doctor motioned it looking for decreased motion in the four cardinal directions: flexion, extension, rotation, and lateral flexion. It must be noted that a vertebra may be restricted in one, two, or all three directions. It could have decrease range of motion in flexion/extension, flexion/extension and rotation, or flexion/extension, rotation, and lateral flexion.¹²

Once the listing is known to the chiropractor, using specific hand placements, the right tension in the correct line of drive, and a high velocity thrust, she was able to break adhesion and increased the ROM of the vertebra back to normal.

Before being referred to the chiropractor, the patient had an MRI taken of his lumbar region due to a suspected herniation. The film below, Figure 1, confirmed an L1/L2 disc herniation.

Through motion palpation the chiropractor was able to objectively find subluxations within the patient’s spine and extremities. The subjective findings were reported via the owner who informed the doctor of the canine’s symptoms that had been noticed and what the veterinarian had said in regards to decreased hind leg reflexes and MRI.

Discussion

Some alternative medicines that have been around for centuries include chiropractic, acupuncture, homeopathy, etc. these are all categorized as ‘holistic medicines’ and are seen by many as a positive alternative to regular veterinary medicine.⁴

A disc herniation treatment is based on the severity of the damage the spinal cord has experienced. Thus the course of treatment can range from conservative care to the canine having to go through surgery. If caught early enough or the protrusion is not too severe, conservative measures are used usually via medication and rest. Steroids and anti-inflammatories are used to reduce any swelling in the spinal cord while the canine is confined to its kennel for up to six weeks. Afterwards, the canine can be gradually reintroduced to its normal daily activities. Some doctors may also refer the canine to a chiropractor as what happened in this case. However, depending on state laws animal chiropractic care may not be an option.¹³

Other conservative measures that can be taken if the animal is experiencing muscle spasm include heat to relax the muscles and massage along with muscle relaxers. The two most commonly used relaxants are Diazepam which calms the animal and also treats convulsions, and methocarbamol which directly acts on the nervous system. The canine in this case was prescribed the latter medication for the muscle spasms he was experiencing.¹³

In more severe cases where the canine experiences paralysis and/or incontinence, doctors may opt for emergency laminectomy. The surgery entails opening up the spinal canal more by removing part of the posterior portion of the vertebra giving more room to the spinal cord. Like with all surgeries, the canine may not fully recover and still have some residual symptoms.¹³

The canine in the case described in the paper has demonstrated improvement since first receiving chiropractic care. By the second visit the symptoms from the L1/2 disc herniation were almost fully resolved and the patient was taken off two of the four medications.⁴

The problems experienced by the patient can be linked to what chiropractors call the vertebral subluxation complex. As described above a subluxation is a misalignment of a bone that causes a neurological deficit. The theory behind a subluxation has five components to it: spinal kinesiotherapy, neuropathophysiology, myopathy, histopathology, and pathophysiology. Together these five parts create the Vertebral Subluxation Complex.¹⁴

Spinal kinesiology includes anything that has to do with the abnormal movement and alignment of a particular bone. This occurs through trauma, imbalance in musculature, repeated movements, and/or sitting or standing for long periods of time. Once a bone is misaligned it can lead to the next component which is neuropathophysiology or aberrant signals to and from the body.¹⁴

When a subluxation occurs it leads to a cascading event that alters signals going in and eventually out of the nervous system. This is called the persistent reflex in which the bone misaligns leading to an irritation in the recurrent meningeal nerves and the posterior primary ramus. This irritation due to biomechanical dysfunction leads to the body being bombarded with nociceptive signals in the dorsal horn. When more pain is perceived than necessary there is a greater motor output thus leading to an increase in muscle spasms. Due to the cyclical

effect the muscle remains in spasm (muscle splinting) maintaining the abnormal position of the bone.¹⁵ At this point there is a contribution from the third component: myopathy.¹⁴ Once the motor unit is activated, the dorsal horn begins to release proteolytic enzymes that eventually lead to degeneration of the joint that is subluxated. This creates a positive feedback loop due to the degeneration causing more nociceptive signals to be activated in the dorsal horn leading to the release of more proteoglycan enzymes.¹⁶

Researchers have found that the anterior portion of the lumbar intervertebral disc is innervated by sympathetic nerve fibers. These fibers once they enter the spinal cord, run through the same rami as the somatosensory afferent fibers. These sympathetic nerves when bombarded by the same nociceptive signals as the somatosensory afferent nerves.¹⁶ The longer the cycle is activated it eventually leads to altered visceral functions and pathophysiology.¹⁵

In the neurodystrophic model it is suggested that when there is neural dysfunction due to the tissues of the body becomes stressed and can cause immune responses to be initiated even when there is no need for them. Due to this unwanted rise in the immune system, researches have begun studying the correlation between an overactive immune system and different pathologies. One researcher, Korr, proposed that spinal 'lesions' (subluxations), may be associated with the body being overly sympathetic leading to an exaggeration in paraspinal muscle tone. If this occurs, there is a possibility that there may be an alteration in visceral and tissue response to hormones, infectious agents, and blood components. The mechanism put forth in this model was if there was a decrease in threshold for a motor action potential this could lead to an increase in 'impulse traffic' to somatic and visceral structures.¹⁶

The relationship was further studied by Murray et al. when researchers had test subjects exercise to exhaustion. The point was to increase sympathetic immune system response. The researchers found when the immune system was activated by acute sympathetic activities, there was a release of selective immunoregulatory cells into the bloodstream. There was also a subsequent change in cellular immune function. The nervous system has an intimate relationship with the inflammatory response. According to Udem, with nerve stimulation, especially sympathetic nerves, there is a noted effect of growth and function on inflammatory cells. These alterations to the immune system could cause global issues the longer they occur such as behavioral or pathological.¹⁶

A study done by Selano et al. found a decrease in CD 4 cells in HIV patients that received an upper cervical adjustment. The control group received a placebo adjustment via an inactive instrument on the mastoid, while the experimental group was analyzed via Grostic technique. After six months of care, the control group had a decrease of 7.92% in CD4 cells compared to the experimental group that had a decrease of 48%. The study shed light on not only the affect chiropractic can have on patients with infectious diseases, but also the importance of maintaining a healthy immune and nervous system.¹⁶ In order to ensure a healthy body, the three systems, nervous, immune, and endocrine, must be working together in harmony.

In a previous study by Rohdin et al. there has been a correlation with radiographic disc calcification and extruded discs in Dachshund canines. Due to the patient having been confirmed with a herniated disc of L1/L2, it would be highly suggested to watch for any calcification of the disc since there is an increased risk of the herniation worsening to an extruded disc. Calcification had been seen most commonly in the middle aged canine group (5-7 years of age), while least common in the young group (up to 5 years old). If the canine did not show calcification on x-rays before age seven, its prevalence decreased in frequency. However, the study also found that not every dog with an extruded disc had radiological calcification; 13% of the dogs did not.¹⁷

Review of Literature

There is currently little research on canines with disc herniations who have received chiropractic care in regards to their symptoms. This is due possibly to the fact that it is a common belief in the medical model that chiropractic increases the risk of disc herniation even though there is no evidence supporting the claim. In a study by Hincapie et al. 47 clinicians were interviewed on whether or not they believed chiropractic care could cause a herniated disc. While the chiropractors were optimistic that they did not increase the risk, the family physicians and spinal surgeons were more pessimistic in their beliefs. The clinicians who were optimistic believed a chiropractic spinal manipulation treatment could decrease the incidence of lumbar disc herniation by approximately 60%. Those who held more pessimistic views indicated the belief that chiropractors could increase the risk by about 30%.¹⁸

Cole describes a case of a Shih Tzu/Bichon mix that was experiencing complete paraplegia in its hind legs. The dog benefited from chiropractic care by receiving specific adjustments at the sites of subluxations. Another paper by Thule linked the benefits of chiropractic adjustments with canines that have structural abnormalities resulting in urinary incontinence.⁴ More recently there was a report of a Great Dane puppy with orthostatic intention tremors. The canine received an Activator adjustment at the initial visit to the chiropractor and three days later was showing improvement. He started standing and walking when he previously was unable to do so, although some tremors still remained.

Two weeks after the first visit the canine was re-evaluated by the doctor where his physical examination was within normal limits and did not exhibit any tremors and overall was improving. At the second visit he received another Activator adjustment to subluxations found and the owner was told to call if the canine's tremors returned.¹⁹

Cole and Tully discussed the Reversal of Paraplegia Secondary to Intervertebral Disc Disease in 24 Canines with Vertebral Subluxation. Each of the 24 canines was diagnosed with intervertebral disc disease by their veterinarian. Each canine was evaluated and adjusted. Vertebral subluxations were found throughout the spine but were concentrated in the lower thoracic and upper lumbar spine which correlated with the location of intervertebral disc disease. Each canine that presented for care eventually regained the ability to walk.²⁰

Certain dogs such as the Dachshund were selected exclusively for certain traits, but achieving these features also came with the inheritance of the chondrodysplasia phenotype. The polygenic trait changes the way different receptors respond to hormones, the matrix components or other factors in the cellular environment that respond to chondrocyte proliferation/differentiation/maturation/and degeneration of the growth plate in the long bones of the breed of dogs with this disorder.²¹

A study done by Jensen included 40 Dachshunds between the ages of six months to two years of age. At the initial visit the canines were asymptomatic with intervertebral disc calcification. Interestingly, twelve dogs were followed up three to four years later revealing a disappearance of the calcification alongside the degeneration process indicating that it is part of the degeneration phenomenon. It is hypothesized that the pathophysiology of severe disc degeneration seen in chondrodysploids includes annular tearing in severe cases followed by an inflammatory response towards the nuclear material of the disc and phagocytic resorption of the surrounding calcified material.²²

Limitation

One limitation to this study is that it is only one case. Another limitation was the lack of subjective data able to be collected. Due to the patient being a canine and unable to articulate any pain felt or fill out Outcome Assessment forms, the doctor can only base the patient's progress through observation and a report from the owner.

Conclusion

This case report provides supporting evidence that the use of conservative chiropractic care to find and adjust subluxations can be beneficial to canines suffering from symptomatic lumbar disc herniation. Due to the shortage of research on the benefit of chiropractic for animals with symptomatic disc herniations, there is a call for more research to be done on the subject.

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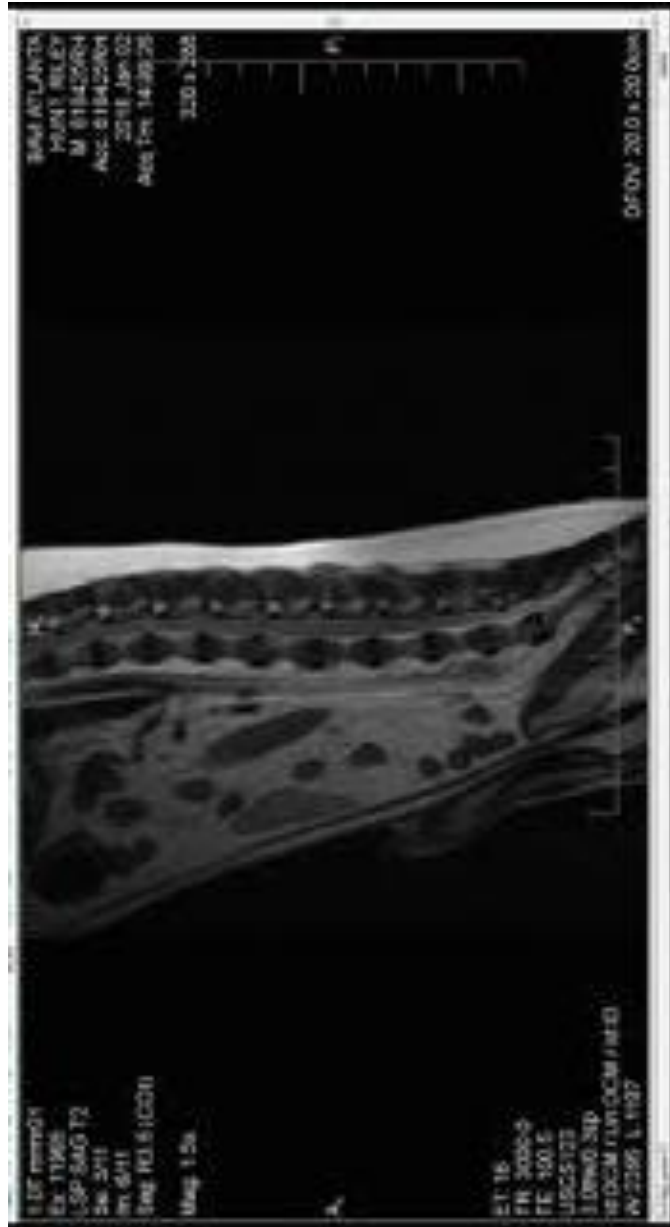


Figure 1. MRI confirmation of L1-L2 Disc herniation in the patient.