SMALL ANIMALS/ EXOTIC

Clinical signs and outcome of dogs treated medically for degenerative lumbosacral stenosis: 98 cases (2004–2012)

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Objective—To compare clinical signs of dogs treated medically or surgically for degenerative lumbosacral stenosis (DLSS) and assess outcome after medical treatment.

Design—Retrospective case series.

Animals—Client-owned dogs treated medically (n = 49) or surgically (49) for DLSS.

Procedures—Medical records from 2004 to 2012 were reviewed. Dogs were included if they had clinical signs, clinical examination findings, and MRI abnormalities consistent with DLSS. Several variables were compared between surgically and medically treated dogs: age, sex, duration of clinical signs, presence or absence of neurologic deficits, urinary and fecal incontinence, concurrent medical conditions, and medical treatment before referral. Medical treatment after obtaining a final diagnosis of DLSS consisted of restricted exercise in combination with anti-inflammatory and analgesic drugs. Surgical treatment consisted of dorsal lumbosacral laminectomy. Outcome for medically treated dogs was obtained via a standardized questionnaire.

Results—Neurologic deficits were observed significantly more often in surgically treated dogs. Surgically treated dogs had unsuccessful medical treatment before referral significantly more often than did medically treated dogs. Thirty-one of 49 (63.3%) medically treated dogs were available for follow-up evaluation. Of these 31 dogs, 17 (55%) were managed successfully, 10 (32.3%) were managed unsuccessfully and underwent surgical treatment, 3 (9.7%) were euthanized because of progression of clinical signs, and 1 (3.2%) was alive but had an increase in severity of clinical signs after medical management.

Conclusions and Clinical Relevance—Clinical signs differed in dogs treated medically or surgically for DLSS. Medical treatment for dogs with DLSS was associated with a fair prognosis. (*J Am Vet Med Assoc* 2014;245:408–413)

Degenerative lumbosacral stenosis is a multifactorial disorder in which a combination of bony and soft tissue abnormalities causes progressive stenosis of the lumbosacral region of the vertebral canal with subsequent compression of the cauda equina.[1,2] Vertebral canal stenosis can be caused by a combination of Hansen type-II intervertebral disk protrusion, ligamentous and articular process hypertrophy, osteophyte formation, and vertebral misalignment. Degenerative lumbosacral stenosis generally affects mature large-breed dogs, in particular German Shepherd Dogs.[1–9] Clinical signs are variable and include signs of pain in the lumbosacral region without neurologic deficits, unilateral or bilateral pelvic limb lameness, paraparesis, difficulty jumping or climbing stairs, abnormal tail carriage, and urinary and fecal incontinence.[1–9]

Several surgical procedures have been described for the treatment of DLSS, with variable (although generally favorable) success rates.[5–11] Although medical treatment has been suggested for dogs with mild to moderate clinical signs without neurologic deficits,[1,2,12] little is known about the clinical signs and outcome of dogs treated medically for DLSS. Therefore, the objectives of the study reported here were to characterize the population of dogs treated medically for DLSS at a referral institution (by comparing the signalment and clinical signs of dogs treated medically or surgically for DLSS) and investigate the outcome for dogs after medical treatment for DLSS.

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Abbreviations	
DLSS	Degenerative lumbosacral stenosis
IQR	Interquartile range

Materials and Methods

Case selection—Medical records from the University of London Royal Veterinary College Small Animal Referral Hospital between 2004 and 2012 were searched to identify dogs with DLSS. Search terms used were degenerative lumbosacral stenosis, lumbosacral stenosis, lumbosacral disease, and cauda equina syndrome. Dogs with complete medical records, clinical signs and neurologic examination findings compatible with DLSS, and a diagnosis of DLSS confirmed by MRI were included in the study. Dogs that received surgical or medical treatments (or both) were included. The study was approved by the Royal Veterinary College Ethics and Welfare Committee.

Medical records review—Information retrieved from the medical records included signalment, duration and type of clinical signs before initial evaluation, physical examination findings, presence or absence of neurologic deficits, urinary or fecal incontinence, concurrent medical conditions, and results of medical treatment before referral. Neurologic deficits were defined as one or more of the following: proprioceptive deficits, reduced pelvic limb spinal reflexes, reduced perianal reflex, reduced anal tone, reduced tail tone, and reduced nociception in the tail, perianal region, or digits. Concurrent medical conditions were further categorized as orthopedic or nonorthopedic. For dogs that received medical treatment before referral, a static or deteriorated clinical status before initial evaluation at the Royal Veterinary College was considered as unsuccessful medical treatment before referral.

All dogs were anesthetized, and MRI was performed with a 1.5-T magnet.[a] Although anesthetic protocols differed among dogs, a commonly used protocol included premedication with a combination of acepromazine maleate (0.01 mg/kg [0.0045 mg/lb], IV) and methadone (0.1 to 0.2 mg/kg [0.045 to 0.091 mg/lb], IV), which was followed by anesthetic induction with propofol (4 to 6 mg/kg [1.82 to 2.73 mg/lb], IV) and maintenance of anesthesia with isoflurane in oxygen. Dogs were positioned in dorsal recumbency with flexed limbs (ie, frog-leg position). All imaging series were available for review and included at least T1- and T2-weighted sagittal and transverse sequences. Images for the transverse plane were aligned perpendicular to the lumbosacral intervertebral disks.

Treatment and follow-up evaluation—Owners were informed that a final diagnosis of DLSS had been made. Owners then consulted with a board-certified veterinary neurologist or resident in a veterinary neurology training program regarding available treatment options. The final decision for medical or surgical treatment was made by the owner of each dog. Medical treatment consisted of restricted activity for a period of 4 to 6 weeks. This was combined, as needed, with NSAIDs with or without gabapentin (10 mg/kg [4.5 mg/lb], PO, q 12 h) for a variable amount of time. Surgical treatment consisted of decompressive dorsal lumbosacral laminectomy. For purposes of the study, dogs medically treated at our referral veterinary hospital but that had unsuccessful medical treatment and thus subsequently received surgical treatment were included in both treatment groups with regard to respective signalment and clinical signs.

All follow-up information for medically treated dogs was collected by the same person (LAW). Short-term follow-up information was retrieved from medical records of reexamination visits at the Royal Veterinary College 4 to 6 weeks after the diagnosis of DLSS was made. Long-term follow-up information was initially obtained via telephone interview with referring veterinarians. For the dogs that were deceased at the time of data collection, date and cause of death as well as the last documented clinical and neurologic status were recorded.

Conforming to local ethics and welfare committee guidelines, only owners of medically treated dogs that were still alive at the time of data collection were contacted. Those owners were mailed a letter informing them about the study; they also were mailed a standardized questionnaire[b] that had been reviewed and approved by a local ethics and welfare committee. Telephone interviews were conducted by use of the questionnaire to obtain data from the owners and referring veterinarians. The questionnaire was based on previously described questionnaires developed to assess the quality of life in dogs[13,14] and surgical outcome for dogs with DLSS.[15,16] It included questions covering specific aspects of the disease, such as signs of pain, amount of activity, lameness, paresis, incontinence, and self-mutilation. It also included questions about the type of medical treatment received, perception of the owners regarding response to medical treatment, and each owner's perceived quality of life of their dog. More specifically, owners were asked to grade their dog's quality of life (scale of 1 [could not be worse] to 7 [could not be better]). Acceptable quality of life was defined as a grade of 5 or higher (fairly good, good, or could not be better). Failure of medical treatment was defined as progressive or static clinical signs attributable to DLSS, a quality of life grade < 5, a change to surgical treatment after unsuccessful medical treatment for DLSS, or euthanasia because of progression of clinical signs attributable to DLSS. Successful medical treatment was defined as resolution or improvement, as determined by a veterinarian or owner, of clinical signs in any dog, with or without intermittent medical treatment for DLSS.

Statistical analysis—Data analysis was performed with the aid of a standard statistical software package.[c] A Mann-Whitney *U* test was used to compare age and duration of clinical signs between medically and surgically treated dogs. A Fisher exact test was used to compare differences in sex, presence of neurologic deficits, urinary and fecal incontinence, concurrent medical conditions, concurrent orthopedic conditions, concurrent nonorthopedic conditions, medical treatment before referral, and successful or nonsuccessful medical treatment before referral. Numerical variables (age and duration of clinical signs) were expressed as median and IQR. Values of $P < 0.05$ were considered significant.

Results

Patient population—Ninety-eight dogs were included in the study, of which 49 were treated medically and 49 were treated surgically. All dogs were client-owned pets.

Medically treated dogs—Forty-nine dogs were treated medically **(Table 1)**. Breeds represented were German Shepherd Dog (n = 8), Labrador Retriever (7), Dalmatian (4), and Golden Retriever (4); there were 16 breeds represented by 1 dog each, and 10 dogs were crossbreeds. Twenty-five male and 24 female dogs (median age, 7.3 years) were included in this group. Median duration of clinical signs was 60 days and included signs of lumbosacral pain elicited by palpation (n = 31), difficulty jumping (16), pelvic limb lameness (12), difficulty standing or lying down (9), difficulty climbing stairs (8), low tail carriage (8), urinary incontinence (1), and fecal incontinence (1). There were 17 dogs

Table 1—Signalment and clinical signs of dogs treated medically (n = 49) and surgically (49) for DLSS at a small animal referral hospital.

Variable	Medically treated (n = 49)	Surgically treated (n = 49)	*P* value*
Male	25 (51)	40 (82)	0.003
Female	24 (49)	9 (18)	0.003
Age (y)	7.3 (4.4–9.2)	6.9 (5.2–9.5)	0.98
Duration of clinical signs (d)	60 (14–124)	92 (26–184)	0.13
Neurologic deficits	33 (67)	43 (88)	0.028
Urinary incontinence	1 (2)	4 (8)	0.36
Fecal incontinence	1 (2)	4 (8)	0.36
Medical treatment before diagnosis	33 (67)	40 (82)	0.16
Improvement	21 (64)	4 (10)	< 0.001
No improvement	12 (36)	36 (90)	< 0.001
Concurrent medical condition†	32 (65)	24 (49)	0.15
Concurrent orthopedic condition	20 (41)	15 (31)	0.40
Concurrent nonorthopedic condition	20 (41)	12 (25)	0.13

Values are No. (%) or median (IQR).

*Values differ significantly at $P < 0.05$. †Eight medically treated and 3 surgically treated dogs had both a concurrent orthopedic condition and a concurrent nonorthopedic condition.

with 1 clinical sign, 27 dogs with 2 clinical signs, and 5 dogs with 3 clinical signs. Neurologic deficits were detected in 33 (67%) dogs and included proprioceptive deficits (n = 31), reduced pelvic limb withdrawal reflexes (21), decreased tail tone (3), and decreased perianal reflex (2). There were 10 dogs with 1 neurologic deficit, 22 dogs with 2 neurologic deficits, and 1 dog with 3 neurologic deficits. Thirty-three (67%) dogs received medical treatment before referral. This consisted of NSAIDs (n = 30 dogs), tramadol (1), a combination of NSAIDs and tramadol (1), or prednisolone (1). This resulted in an improved clinical status in 21 of the 33 dogs before initial evaluation at our referral veterinary hospital. Thirty-two (65%) dogs had 1 or more concurrent medical conditions when DLSS was diagnosed. Specifically, concurrent orthopedic conditions were detected in 20 (41%) dogs and included cervical or thoracolumbar intervertebral disk protrusion with mild spinal cord compression (n = 10 dogs); hip dysplasia (4); degenerative stifle joint disease (2); elbow joint dysplasia (2); a combination of mild intervertebral disk disease, hip dysplasia, and a healed ileum fracture (1); and a combination of mild intervertebral disk disease, elbow joint dysplasia, degenerative stifle joint disease, and hip dysplasia (1). Concurrent nonorthopedic conditions were detected in 20 (41%) dogs and included idiopathic epilepsy (n = 4 dogs), benign prostatic hyperplasia (2), chronic cough (2), recurrent cystitis (2), allergic skin disease (2), inflammatory bowel disease (1), recurrent otitis externa (1), nonregenerative anemia (1), unilateral facial nerve paralysis (1), hypothyroidism (1), a combination of inflammatory bowel disease and cognitive dysfunction (1), a combination of idiopathic epilepsy and protein-losing nephropathy (1), and a combination of laryngeal paralysis and myasthenia gravis (1). Eight medically treated dogs had both a concurrent orthopedic condition and a concurrent nonorthopedic condition.

Surgically treated dogs—Forty-nine dogs were treated surgically (Table 1). Breeds represented were German Shepherd Dog (n = 11), Labrador Retriever (10), Golden Retriever (3), Bernese Mountain Dog (2), Dalmatian (2), Schnauzer (2), and Welsh Springer Spaniel (2); there were 12 breeds represented by 1 dog each, and 5 dogs were crossbreds. This group consisted of 40 males and 9 females; median age of the group was 6.92 years. Median duration of clinical signs was 62 days and included signs of lumbosacral pain elicited by palpation (n = 39), pelvic limb lameness (17), low tail carriage (9), difficulty jumping (7), difficulty standing or lying down (5), difficulty climbing stairs (4), urinary incontinence (1), fecal incontinence (1), and concurrent urinary and fecal incontinence (3). There were 20 dogs with 1 clinical sign, 24 dogs with 2 clinical signs, 3 dogs with 3 clinical signs, 1 dog with 4 clinical signs, and 1 dog with 5 clinical signs. Neurologic deficits were detected in 43 (88%) dogs and included proprioceptive deficits (n = 37), reduced pelvic limb withdrawal reflexes (28), decreased tail tone (5), and decreased perianal reflex (3). There were 14 dogs with 1 neurologic deficit, 28 dogs with 2 neurologic deficits, and 1 dog with 3 neurologic deficits. Forty (82%) dogs received medical treatment before referral. This consisted of NSAIDs (n = 26 dogs), gabapentin (6), a combination of NSAIDs and gabapentin (4), or a combination of NSAIDs and tramadol (4). This resulted in an improved clinical status in 4 of these 40 dogs before initial evaluation at our referral veterinary hospital. Twenty-four (49%) dogs had ≥ 1 concurrent medical conditions when DLSS was diagnosed. Specifically, concurrent orthopedic conditions were detected in 15 (31%) dogs and included cervical or thoracolumbar intervertebral disk protrusion with mild spinal cord compression (n = 9 dogs), a combination of hip and elbow joint dysplasia (2), hip dysplasia (1), prior cranial cruciate ligament surgery (1), a combination of mild thoracolumbar intervertebral disk protrusion and diffuse idiopathic skeletal hyperostosis (1), and mild cervical intervertebral disk protrusion and a healed pelvic fracture (1). Concurrent nonorthopedic conditions were detected in 12 (24%) dogs and included lupoid onychodystrophy (n = 2 dogs), laryngeal paralysis (2), idiopathic epilepsy (2), a combination of inflammatory bowel disease and allergic skin disease (2), inflammatory bowel disease (1), a combination of myasthenia gravis and idiopathic renal hematuria (1), granulomatous eosinophilic lesions of the tongue (1), and diabetes mellitus (1). Three surgically treated dogs had both a concurrent orthopedic condition and a concurrent nonorthopedic condition.

Comparison of clinical signs between medically and surgically treated dogs—Significantly ($P = 0.003$) more male dogs were included in the surgically treated group than in the medically treated group. Compared with the medically treated dogs, surgically treated dogs had neurologic deficits significantly ($P = 0.028$) more often and had unsuccessful medical management before referral significantly ($P < 0.001$) more often (Table 1). There was no significant difference between medically and surgically treated dogs with regard to age, duration of clinical signs, urinary or fecal incontinence, number of dogs that received medical treatment before referral, number of dogs with concurrent medical conditions overall, and number of dogs with concurrent orthopedic or nonorthopedic medical conditions.

Treatment and follow-up evaluation of medically treated dogs—All medically treated dogs had restricted exercise for 4 to 6 weeks. In addition, 35 dogs received NSAIDs, 8 dogs received gabapentin, and 6 dogs received a combination of NSAIDs and gabapentin. Short-term follow-up information was available for 46 of 49 medically treated dogs. Ten of the 46 (22%) dogs underwent surgical treatment because of unsuccessful treatment after referral to our veterinary hospital. Interval from diagnosis until surgery ranged from 18 to 98 days (mean, 36 days; median, 43.3 days). Surgery in these 10 dogs was considered routine, and all dogs recovered well and had an improved clinical status during postsurgical reexamination visits at our veterinary hospital. The neurologic examination 4 to 6 weeks after surgery yielded unremarkable results for 8 of these dogs, whereas both of the remaining 2 dogs had moderately decreased tone and movement of the tail.

For the other 36 dogs that underwent medical management and for which information was available, 22 had died and 14 were alive at the time of data collection. Long-term follow-up information was available for 21 of the 36 dogs by interviewing the referring veterinarian (n = 14), owner (1), or both (6). Interval from diagnosis until collection of follow-up information ranged from 4 to 94 months (mean, 38.5 months; median, 38 months). Seventeen of the 21 dogs had obvious improvement or resolution of clinical signs of DLSS; 1 dog was alive but had slow, progressive deterioration of clinical signs of DLSS; and 3 dogs were euthanized because of continued progression of clinical signs attributable to DLSS. These 3 dogs were euthanized 4, 24, and 35 months after a diagnosis of DLSS was made.

Seven owners completed and returned the questionnaire and provided information during telephone interviews. All 7 owners perceived that their dogs had an acceptable quality of life after medical treatment for DLSS.

Therefore, 17 of 31 (55%) dogs for which complete follow-up information was available were considered to have a successful outcome after medical treatment for DLSS. Fourteen (45%) dogs were considered to have an unsuccessful outcome after medical treatment for DLSS.

Discussion

In the study reported here, clinical signs of dogs treated medically or surgically for DLSS were compared and the outcome of medically treated dogs was assessed. To the best of our knowledge, no other studies have been conducted to investigate the role of medical management for dogs with DLSS. In the present study, we did not compare the outcome between medically and surgically treated dogs. This was deemed inappropriate because dogs treated medically or surgically differed significantly with regard to clinical signs. Compared with medically treated dogs, dogs treated surgically for DLSS significantly more often were males, had neurologic deficits, and received unsuccessful medical treatment before initial evaluation at our referral veterinary hospital. The exact reason that male dogs were overrepresented in the surgically treated group is unknown.

Not surprisingly, results of this study suggested that response to medical treatment before referral could be an important factor in selection of the most appropriate treatment (medical vs surgical) after a final diagnosis of DLSS has been made. It is indeed reasonable to continue medical treatment when a dog has already had clinical improvement, and it appears justified to consider surgery when a dog has not responded favorably to medical treatment. This also supports the general consensus that surgical decompression is generally recommended in dogs that have failed to respond successfully to medical treatment.[1,2] In the present study, dogs treated surgically for DLSS significantly more often had neurologic deficits than did medically treated dogs. Although it is subject to debate, it is possible that dogs with confirmed DLSS and observable neurologic deficits represented a category of more severely affected animals. This supports the widely accepted hypothesis that surgical decompression is a suggested treatment modality for dogs with moderate to severe clinical signs of DLSS.[1,2,12]

In the present study, medical treatment of DLSS was associated with an overall success rate of 55% (17/31). The dogs had all been referred to the University of London Royal Veterinary College. Given that these referrals may have been slightly skewed toward more severe cases of DLSS, a small bias could be evident in these results. However, a success rate of 55% is similar to previously reported success rates for medical management of suspected cervical[17] and lumbar[18] intervertebral disk herniation and is slightly higher than success rates reported for medical management of disk-associated cervical spondylomyelopathy.[19,20] Because results of the present study suggested that the clinical signs of medically and surgically treated dogs differed significantly, care should be taken when comparing results of this study with previously reported outcomes after surgical management for DLSS. More than 20% of the dogs in the study reported here underwent surgical decompression of the cauda equina after unsuccessful medical treatment. These dogs recovered without complications and improved clinically after surgery, which indicated that results of surgical treatment are not necessarily negatively influenced by initial medical management. This further supports the hypothesis that surgical treatment for DLSS should be considered in dogs that have failed to respond successfully to medical treatment.[1,2] It also offers the opportunity to improve selection of surgical candidates and avoid unnecessary surgery in dogs that will improve with medical treatment for DLSS. Importantly, none of the dogs that underwent surgery after initial unsuccessful medical treatment had urinary or fecal incontinence. Chronic urinary incontinence has been associated with a poor prognosis after surgical decompression for DLSS.[6] Therefore, dogs with urinary or fecal incontinence should not be considered good candidates for medical treatment of DLSS. Surgical decompression should not be delayed in these dogs to optimize their chances to recover full bladder and bowel control.

It has been suggested that dogs with DLSS potentially represent a model for lumbar intervertebral disk disease in humans.[2] Similar to the situation in dogs, there is uncertainty and controversy about the role of nonsurgical management of lower back pain attributable to degenerative intervertebral disk disease in humans.[21,22] Definitive proof of treatment efficacy for both surgical and nonsurgical management is lacking.[22,23] People with the highest degree of disability experience considerable clinical improvement after surgical management, whereas medical management results in only minimal improvement.[23] In agreement with results for the present study in dogs, there appears to be a treatment bias in that severely disabled people receive surgical treatment and mildly affected people receive nonsurgical treatment.[21,23]

The present study was limited by its retrospective nature. This complicated standardization of medical treatment among dogs, evaluation of objective outcome measures, and grading and comparing severity of clinical signs among affected dogs. Prospectively recorded spinal cord injury scores are more reliable than retrospectively assessed spinal cord injury scores.[24] Although several veterinary scoring systems have been described and validated to grade acute thoracolumbar spinal cord injuries,[25–27] there currently is no accepted grading system for dogs with DLSS. In the study reported here, we assumed that the presence of neurologic deficits would indicate a higher degree of disease severity. However, it currently is unclear whether this assumption is justified. It can be questioned whether a dog with a non–weight-bearing lameness because of nerve root damage is less severely affected than an ambulatory dog with proprioceptive deficits.

Long-term outcome of medically treated dogs was assessed via standardized telephone interviews and written questionnaires. Although questionnaires provide useful information and have previously been used to evaluate the surgical treatment of dogs with DLSS,[15,16] it represents a subjective evaluation tool for treatment efficacy.[16] Although most owners will be able to assess overall clinical improvement or deterioration of their pet, it might be more difficult to recognize some of the subtle and nonspecific clinical signs of DLSS. Complete follow-up information was available for only 31 of 49 (63%) medically treated dogs. This probably was related to the ethical and welfare committee approval of this study, which dictated that only owners of dogs that were still alive could be contacted. This resulted in a relatively small proportion of owners eligible to complete the questionnaire and provide follow-up information.

Despite the limitations for the present study, valuable information was revealed about the medical management of DLSS in dogs. Analysis of results of the study suggested that dogs treated medically and surgically for DLSS differed in their clinical signs because surgically treated dogs more often were males, had neurologic deficits, and had unsuccessful medical treatment before referral. Medical treatment of DLSS was associated with a fair prognosis with an overall success rate of 55% (17/31). Failure of medical treatment can be followed by successful surgical decompression of the cauda equina. Further studies are needed to develop a clinical grading system for dogs with DLSS, prospectively compare medical with surgical treatment, and evaluate prognostic indicators for medically treated dogs with DLSS.

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a. Intera 1.5 T, Philips Medical Systems, Eindhoven, The Netherlands.
b. Questionnaire available from corresponding author on request.
c. Prism, version 6 for Windows, GraphPad Software Inc, La Jolla, Calif.

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