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Research Article

COMPARATIVE THERAPEUTIC EVALUATION OF STEROIDS FOR MANAGEMENT OF SPONDYLOSIS IN CANINES

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ABSTRACT
Comparative therapeutic efficacy of various steroids for the clinical management of spondylosis was evaluated. Treatment protocol included Methyl prednisolone, Isoflupredone and Prednisolone acetate along with physiotherapy on different groups of affected dogs (N=10) for 28 days. A common supportive and ancillary treatment with antacids, multivitamins, analgesic and necessary fluid therapy was given. Maximum therapeutic efficacy of 90% in Methyl prednisolone treated group was seen, followed by Isoflupredone (70%) and Prednisolone acetate (3%). On the basis of clinical and diagnostic parameter recovery, physiotherapy along with methyl prednisolone was found as the choice for management of spondylosis along with supportive and ancillary treatment
Key Words- Spondylosis, Physiotherapy, Methyl Predinisolone, Predinisolone, Isofluperidone

INTRODUCTION

The dogs are being utilized in different areas like domestic pets, forensic medicine, tracking, mining, sports, defence/guardian, space science, medical science and many more. The dogs are considered most intelligent and loyal pet animal to the mankind. During their service to the mankind, they suffer from many ailments [1]. This impact on human society has given them the nickname "Man's Best Friend" in the Western world. The dog is the nonhuman species for which the largest numbers of genetic disorders are known[2]. Spondylosis deformans is a generalized disease of aging that is secondary to the degeneration of intervertebral disks that affects the vertebral bodies of all animals. It is characterized by the formation of bony spurs or, less commonly, complete bony bridges around the diseased disk and thus re-establishes stability to the weakened amphiarthrodial joint. Osteophytes create pressure on exiting spinal nerve roots, resulting neurologic deficits viz., pain, weakness, or paresis.

REVIEW OF LITERATURE

A constellation of pain symptoms encompassed in the term, the neurogenic claudication (NC). NC may include (to varying extents) lower back pain, leg pain, as well as numbness and motor weakness to lower extremities that worsen with upright stance and walking, and improve with sitting and supine positioning [3].

Axial neck pain is the most common syndrome seen in clinical practice [4]. Improper posture, muscle fatigue and poor ergonomics which occur as a consequence of muscular and ligamentous factors are major contributing factors to axial neck pain [5]. Patients can present with arm pain, sensory deficits, neck pain, paraesthesia, reflex deficits, motor deficits, scapular pain, anterior chest pain and rarely with left-sided chest and arm pain or cervical angina [6,7]. Cervical myelopathy as a result of spondylosis is the most common cause of nontraumatic paraparesis and quadriparesis.

Patients also demonstrate spasticity with exaggerated reflexes below the level of cord compression, motor weakness, sensory loss, and extensor plantar responses [4].

With limited ability to isolate causative sources of chronic back pain, there is a little consensus with regard to a definitive treatment approach. Substantial variation in management by conservative and invasive approaches exists between practitioners throughout USA [8].

Treatments for spondylosis focus on providing pain relief and lowering the risk of permanent damage. Non-surgical methods are usually very effective.

Physical therapy helps to stretch the neck and shoulder muscles and makes them stronger, which helps relieve pain. One might also have neck traction, which involves using weights to increase the space between the cervical joints and relieve the pressure on the cervical discs and nerve roots. Exercise therapy (ET) remains one of the conservative mainstay of treatment for chronic lumbar spine pain, and may be tailored to include aerobic exercise, muscle strengthening, and stretching exercises [9]. Significant variation in regimen, intensity, and frequency of prescribed programs presents challenges to assessing efficacy among patients [10].

Intramuscular/ Intravenous steroidal injections have been effectively used for the management of pain arising due to increased pressure on nerves due to periarticular osteophytes. Main advantage of these injections over epidural or facet injections may be that they need less specialization and no sophisticated instrument [11, 12, 13].

MATERIAL AND METHODS

The present study was conducted in the Department of Veterinary Medicine and Veterinary Teaching Clinical Complex, C.V.A.Sc., GBPUA&T, Pantnagar, U.S. Nagar (Uttarakhand).

Preliminary screening of dogs for spondylosis was based on the patient's history, clinical signs and routine radiography. On the basis of preliminary screening, 30 screened dogs affected with spondylosis were randomly divided into three major categories i.e. Group A, Group B, Group C, comprising of 10 animals in each group irrespective of their sex, breed and age. Another group of 10 healthy dogs, subjected for health screening in TVCC, Pantnagar, were taken as healthy group and were designated as group D. Overt clinical signs and pathological observations were recorded from all the dogs, which were taken for this study, irrespective of their breed, age and sex suffering from spondylosis just before and after treatment i.e. on day- 0, 7, 14, 21, 28.

Clinical revealed loss of appetite in some cases, while signs of acute pain were evident while sitting. Cessation of defecation was a common finding as well as disorientation, physical weakness and loss of co-ordination.

Ventro-dorsal and lateral radiographs of vertebral column as described by **Thrall (2002)** were taken for the evaluation of cervical, thoracic, lumber and sacral vertebrae. Plain film radiograph will be obtained using 60 mA mobile machines (Allengers Medical System Ltd, Chandigarh).

In respect to therapeutic management of clinical spondylosis, each group of dogs were treated by steroids in standard dose and intra muscular route for 14-28 days. Group A was administered with Methyl Predinisolone (Depo Medrol (40 mg/ml) M/s Pfizer product India pvt. ltd) @ 1 mg/kg once daily, group B with Isofluperidone (Sefticort (2 mg/ml) M/s Virbac Animal Health India Pvt Ltd) @ 2mg per day and group C with Predinisolone acetate (Prednisolone Acetate Injectable Suspension (10 mg/ml) M/s Intervet India Pvt. Ltd) @ 0.5- 1 mg/ kg body weight.

In addition to steroid a common ancillary and supportive treatment to all the groups of dogs except group D were made with antibiotics like amoxicillin and sulbactum (Amoxirum Forte (300 mg) M/s Virbac Animal Health India Pvt Ltd,) @10mg/kg b.wt intramuscularly for 3-5 days, analgesic like Tramadol HCl (Tramef (50 mg/ml)M/s Alkem Laboratories) @2 mg/kg b.wt for 3-5 days. In addition to these multivitamins like Vit B_1, B_6, B_{12} (Neurobion Forte M/s,Mercks limited) @ 1tab twice a day for 14-28 days and Famotidine (Topcid-40 (40 mg tab) M/s Torrent Pharmaceuticals) @ 1mg/kg B.wt was given till the end of primary treatment.

Physiological fluids (Ringers lactate, Normal saline*, 5% DNS) were administered through intravenous route after evaluation of severity and nature of dehydration and for this purpose isotonic fluid was given after measuring fluid deficit by using the following formula;

Plasma deficit (ml) = 100 A (1- C/B)

Where,

A = Body weight in kg
B= Normal PCV
C = Measured PCV in dehydrated animal

Affected dogs were subjected to daily physical therapy by applying traction from the head and tail region in opposite directions for at least 5 minutes.

RESULT AND DISCUSSION

During the course of clinical screening of dogs with spondylosis at Veterinary Teaching Hospital, a total of 32 cases were found positive, among them 30 were selected and subjected for detail study of clinical abnormality present. The most striking clinical finding was in-coordinated gait which was seen in 66.67 per cent cases followed by difficulty in standing in 63.34 per cent cases. The detailed overt clinical examination results of dogs suffering from spondylosis are presented in Table 1.

Table 1: Frequency distribution of clinical signs verified during clinical evaluation of affected dogs (N=30).

S. No	Type of clinical sign	No of affected animals	FOD of clinical signs (%)
1.	Pain in neck and adjoining region	3	10
2.	Pain / unable to bear weight on fore limbs	1	3.33
3.	Hind quarter paralysis	8	26.67
4.	Difficulty in standing	19	63.34
5.	Uncoordinated/abnormal gait	20	66.67
6.	Pain on palpation	12	40
7.	Inability to defecate	7	23.33
8.	Anorexia	4	13.34

FOD: Frequency of Distribution

All these findings were in agreement with the signs and symptoms described by **Mccormack and Weinstein,1996; Davidson *et al.*, 1981; Snyder *et al.*, 2004; Rao *et al.*, 2007; Kelly *et al.*, 2011**;

Radiographic Examination

Separate centres of ossification were found frequently in the ventral portion of the annulus and often appeared as “fractured fragment.” It is possible for osteophytes forming on the cranial and caudal ends of a given vertebral body to become so large that they met at the ventral midpoint of the vertebral body, causing an increase in dorsoventral diameter of the vertebral body (Fig.1).

Fig.1: Lateral abdominal radiograph of a dog with grade 2 (L_{1-2}, L_{2-3}) and grade 3 (L_{3-4}, L_{4-5}, L_{5-6}, L_{6-7}) lumber spondylosis and an increased dorsoventral diameter of the vertebral body.

End plates appeared as radiographically smooth and often had a sclerotic appearance. The associated intervertibral disk space may be of normal width but more commonly became narrow (Fig. 2).

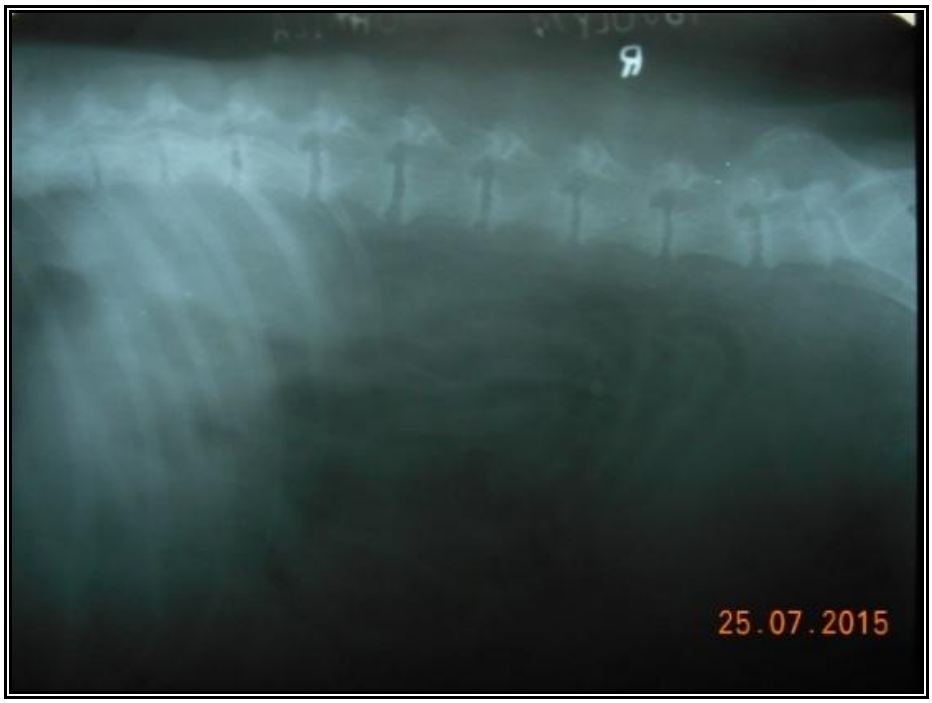

Fig. 2: Lateral abdominal radiograph of a dog showing a grade 2 lumber spondylosis (L_{2-3}, L_{3-4}) and a smooth end plates with variable intervertibral disk space.

Osteophytes may involve one or more joining vertebrae or many separate area within the vertebral column (Fig. 3).

Fig. 3: Lateral abdominal radiograph of a dog with grade 2 (L_{1-2}, L_{2-3}) and grade 3 lumber spondylosis (L_{4-5}) and many separate joining area within the vertebral column.

Osteophytes occurred at any location along the circumference of the end- plate of the vertebral body except for the area, that creates the floor of the spinal canal. Thus the lateral radiograph will clearly demonstrated only body osteophytes that project laterally [17].

The basic criteria for comparative evaluation of therapeutic efficacy were recovery from clinical signs and restoration of normal physical activity of individual at the earliest days of medication.

The recovery from symptoms in the patients was found maximum in group A (methyl predinisolone treated dog) where, out of 10 dogs 9 dogs recovered for their symptoms while the closely following group B (treated by isofluperidone) showed 7 out of 10 recovery. The third group C which was treated by predinisolone showed only 3 out of 10 recoveries (Table 2).

Table 2: Frequency distribution of patient recovery in the group (N=30).

Groups	Total number of Patients	Number of Patients recovered	FOD (%)
Group A	10	9	90
Group B	10	7	70
Group C	10	3	30

The time taken for the recovery was minimum in methyl predinisolone treated group- A where dogs started showing improvement from 4th day onward and by the starting of 2nd week most of the patients (9/10) were showing no or minimal symptoms. Recovered dog started walking normally and sign of pain during various activities was minimal. This group was followed by isofluperidone treated group B, where the dogs started showing signs of relief post 1st week; pain sensation was minimum but were still unable to coordinate in gait. Pain on palpation was still present. All these vanished by the end of 2nd week in some of the patients, while rest still were reluctant to move. By the end of 4th week most of the members (7/10) of the groups, were standing on their feet without any difficulty. Group C which was treated by predinisolone showed least recoveries (3/10) as compared to other two groups and also took longest time to give relief. The dog which showed relief started the improvement almost after 14 days. Twenty-eight days after onset of treatment, the recovered dogs still showed some signs of discomfort. Recovery in number of clinical signs as shown on day 0 after 28 days are represented in Table 3.

Table 3: Frequency distribution of clinical signs recovered after 28 day treatment in affected dogs.

S. No	Type of clinical sign	AA	AR	FOD (%)
1.	Pain in neck and adjoining region	3	2	66.66
2.	Pain / unable to bear weight on fore limbs	1	1	100
3.	Hind quarter paralysis	8	7	87.5
4.	Difficulty in standing	19	16	84.21
5.	Uncoordinated/abnormal gait	20	15	75
6.	Pain on palpation	12	10	83.34
7.	Inability to defecate	7	7	100
8.	Anorexia	4	2	50

AA: Animal Affected AR: Animal Recovered FOD: Frequency of distribution

Corticosteroids therapy has become standard care in the management of acute spinal cord injury [18]. Steroid injections reduce the pain of cervical radiculopathy and hence reduce the need for surgical intervention [19, 20].

SUMMARY AND CONCLUSION

The present study was aimed to identify spondylosis deformans among the canines. Anamnesis, overt clinical examination and radiography were the main diagnostic tools employed for the detection and grading of spondylosis. For the management of the condition, efficacies of certain steroids were assessed along with a common supportive and ancillary therapy.

Anorexia, pain in neck and adjoining region, pain / inability to bear weight on fore/ hind limbs, hind quarter paralysis, difficulty in standing, uncoordinated/abnormal gait, pain on palpation, inability to defecate were important clinical signs suggestive of spondylosis.

Radiography was an irreplaceable tool for the diagnosis and identification of spondylosis.

In present study, an attempt of comparative therapeutic evaluation of methyl prednisolone, isofluperidone and prednisolone along with physiotherapy was made along with a common supportive and ancillary treatment with antibiotic, multivitamins, analgesics and fluid therapy wherever necessary. The therapeutic efficacy and choice of treatment was assessed on the basis of recovery from clinical signs, least alteration in the number of parameters of blood and restoration of normal physical activity of individual at the earliest days of medication.

Among the three steroids used along with physiotherapy, methyl prednisolone with physiotherapy was found most efficacious than the other in respect to early recovery, hence it is of primary choice. Isofluperidone was found as secondary choice for management of spondylosis. Prednisolone was designated as a tertiary choice as per our findings. Moreover, variation in secondary complications may also be a contributory factor of variable therapeutic efficacy.

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