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RESEARCH ARTICLE

Studies on Clinical Variants and Incidence of Canine Hind Quarter Weakness Neurological Disorder

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ABSTRACT

The records of all clinical cases of dogs (n=6704) ranging from four months to thirteen years of age reported at referral veterinary polyclinic of the institute were screened in a comprehensive manner to study clinical variants and incidence of hind quarter weakness disorder during 6 year period. Diagnosis of hind quarter weakness in these dogs was confirmed by clinical history, neurological and radiological examination at the time of presentation. The naturally occurring disorders of hind quarter weakness were manifested by the clinical signs such as dragging the hind quarter while trying to walk with flaccidity of limbs, wide base stance, crouching and reluctance in movement, rigid hyperextension of with spasticity both hind limbs, unable to stand or can stand only for short periods of time generally without the normal arched back. It may result as a squelae to the spinal cord disorder either by fall, jump from height, road traffic accident, dog bite over the vertebral column, malicious blow by stick, rod, stone, crush by heavy object, fracture and myoclonus form of canine distemper. A total (n=386) cases of hind quarter weakness were reported in dogs during this period. The data revealed that incidence of hind quarter weakness was 5.75% in canines. The disorder was detected in as many as 12 breeds of dogs with more predisposition in Mongrel (33.16%), followed by Spitz (25.12%), Labrador retriever (16.06%), German shepherd (13.47%), Doberman pinscher (3.62%), Great dane (2.33%), Rottweiler (1.81%), Boxer and Bhutia (1.29% each) and Mastiff, Cocker Spanial and Pug (0.25% each). Incidence of hind quarter weakness in dogs was reported maximum during summer. There was no history of physical trauma in majority of the cases (46.11%). In rest of the cases, trauma was the known causative factor of the disease, which included fall from height in 27.46%, hitting by hard object in 11.13%, automobile accident in 8.03% and dog bite in 7.25% dogs. Male dogs of 1-5 years of age were mostly affected and brought for treatment within a week of illness.

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INTRODUCTION

Neurological disorders may occur with varying degree of compression, contusion, laceration, hemorrhage, edema or necrosis of spinal cord (Luttgen *et al.*, 1988). Painful and or debilitating neurological disorders primarily involving the vertebral column and spinal cord are commonly encountered in small animal practice, especially in dogs. Animals with spinal disorders are presented with focal or generalized pain, varying degrees of paresis, paralysis and inability to urinate (Nelson and Couto, 2004). The most frequent manifestation of spinal cord affections is hind quarter weakness (HQW). It is the loss of bilateral motor function of the rear limbs due to dysfunction of neural or muscular system. Such animals show difficulty to bear weight, paresis or paralysis of limbs associated with urinary and faecal incontinence (McGowan *et al*., 2007). Diseases resulting in mechanical compression of nociceptors or nociceptive pathway may also result in HQW, pain and paresis (Webb, 2003). Acute

pain associated with sudden onset of injury provokes abnormal physiological and psychological reactions which may precipitate into complications like increased stress response, prolonged recovery, increased morbidity, prolongation of disability and at time death (Kehlet, 1988; Bonica, 1990).

Diseases at the level of vertebrae L_5, L_6 and the lumbosacral junction behave like peripheral nervous system diseases. No ataxia is observed, although there may be proprioceptive deficits (knuckling) owing to involvement of dorsal roots. Weakness and decreased to absent reflexes and tone are present. Spinal pain may originate from bone, dorsal root ganglion and meninges. The most common disease with root pain is intervertebral disk disease. The two most common non-painful spinal cord diseases are fibrocartilagenous embolic myelopathy (acute) and degenerative myelopathy (chronic). The animal examined within the first 5 days after the onset, and pain perception is present, the prognosis for return to function is good. After 10 days, treatment is aimed primarily at stopping progression of disease. Upper motor neuron (UMN) disease produces clinical signs of paresis (loss of voluntary motor activity), ataxia (lack of coordination), hyperreflexia and hypertonia of the limbs distal to the affected area of the central nervous system, whereas, diseases affecting the Lower motor neuron (LMN) cause clinical signs of paresis, hypotonia, hyporeflexia and neurogenic muscle atrophy (Davis and Irwin, 2003). The clinical signs associated with spinal cord disease, in order of appearance, include proprioceptive ataxia with mild paresis followed by moderate to severe ataxia with obvious paresis, paralysis, urinary incontinence, and absence of pain perception caudal to the lesion. Whereas the presence of ataxia and weakness localizes the problem to the spinal cord, the nature of the reflexes dictates the exact location along the spinal cord. The recovery occurs in opposite order of clinical signs i.e. the last clinical sign to appear is the first to improve. Pain perception is the first function to return and proprioception is the last (Parent, 2000). Owing to diagnostic limitation actual incidence of canine hind quarter weakness has not been reported in India and it appears that with a better understanding of clinical progression and disease picture in totality, it will be diagnosed at many more places from where it has not been reported yet. Systemic large scale clinical studies on clinical variants in this disorder are lacking in this country. Therefore, the present clinical research was undertaken to undertaken to study clinical variants and incidence in naturally occurring cases of canine hind quarter weakness with a view to appraise veterinary clinicians with wide range of clinical symptoms.

MATERIALS AND METHODS

The records of all clinical cases of dogs (n=6704) ranging from four months to thirteen years of age reported at referral veterinary polyclinic of the institute were screened in a comprehensive manner to study clinical variants and incidence of hind quarter weakness during 6 year period (2006-2011). A total (n=386) cases of hind quarter weakness were reported in dogs during this period. The naturally occurring disorders of hind quarter weakness were manifested by the clinical signs such as dragging the hind quarter while trying to walk with flaccidity of limbs (Figure 1-2), wide base stance (Figure 3), crouching and arching of back (Figure 4), rigid hyperextension with spasticity of both hind limbs (Figure 5-7). On the day of presentation, the dogs were examined on the basis of history (treatment given by local veterinarian, etiology, duration of illness) and general appearance (posture, gait). Different neurological parameters like wheel barrowing, hemi-standing, hemi-standing, hopping, placing and pain perception tests were conducted as per the procedure of Hoerlein (1978), whereas, patellar, pelvic withdrawal, panniculus, anal and conscious proprioception reflexes as per Bali (2000). The dogs having intact pain sensation and diminished most of the hind limb spinal reflexes were selected for study. Dogs brought with the history of HQW are usually sent for survey radiography (plain) after a preliminary neurological examination (Figure 17), and it is mandatory if there is a history of trauma. Lateral (L) or ventro-dorsal (VD) radiograph of spine (thoracolumbar area) were taken in all the dogs and were used for radiological interpretation. The data was utilized to calculate the percentage of hind quarter weakness in dogs and its incidence as regards to different year, month, season, breed, sex, age, etiological factors and duration of illness was also recorded.

Statistical analysis

The data recorded, wherever applicable, was statistically analyzed using chai square test as per Snedecor and Cochran (1967).

RESULTS

The data revealed that incidence of HQW was 5.75% in canines. The incidence of HQW in canines increased alarmingly from the 4% to 10.75% during this period. Year wise distribution of cases showed a sharp increase in the number of HQW cases during the period and the cases increased from a total of 42 cases in 2006 to 132 cases in the year 2011. The year wise incidence was 4% in 2006, 4.01% in 2007, 4.83% in 2008, 4.20% in 2009, 6.05% in 2010 and 10.75% in 2011 (Figure 8).

Number of dogs affected with HQW observed was maximum in the month of May (13.47%) followed by June (10.88%), April (9.84%), February (9.06%), July (8.54%), December (8.29%), March (8.03%), September (7.77%), August (7.51%), November (6.73%), October (5.18%) and January (4.66%) (Figure 9). Thus, maximum number of cases (32.89%) were recorded during summer (May to July) followed by 26.93% in spring (February to April), 20.46% in autumn (August to October) and 19.68% in winter (November to January) (Figure 10). Breed wise, maximum number of affected dogs belonged to Mongrel (33.16%), followed by Spitz (25.12%), Labrador retriever (16.06%), German shepherd (13.47%), Doberman pinscher (3.62%), Great dane (2.33%), Rottweiler (1.81%), Boxer and Bhutia (1.29% each) and Mastiff, Cocker Spanial and Pug (0.25% each) (Figure 11). Further, male dogs exhibited higher incidence (61.65%) than females (38.34%) (Figure 12). Further, maximum incidence was found in dogs of 1- 5 years of age

Fig. 1-2: Dragging the hind quarter while trying to walk with flaccidity of limbs

Fig. 3: Wide base stance

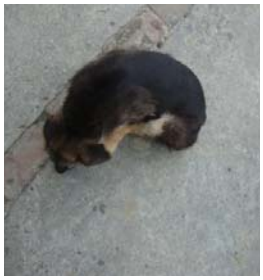

Fig. 4: Unable to stand spontaneously, crouching and arching of back

Fig. 5-7: HQW with spasticity and extended limbs

(34.19%) and a minimum in more than 10 years old (4.40%). Whereas, 29.01% cases were reported between 0-1 years, 32.38% between 5-10 years of age (Figure 13). There was no history of physical trauma in majority of the HQW cases (46.11%). In rest of the cases, trauma was the known causative factor of the disease, which included fall from height in 27.46%, hitting by hard object in 11.13%, automobile accident in 8.03% and dog bite in 7.25% dogs (Figure 14). Duration of illness as reported by the owner was also recorded. Majority of the cases were brought to the polyclinics within 1 week of commencement of the illness (54.41%), whereas, 38.86% animals were reported after 1 week but within a month and 6.73% after 1 month of the illness (Figure 15).

Wheel barrowing showed normal walking with head extended in normal position in all the animals. Hemi-standing was also normal in all dogs at the time of presentation. Ninety percent dogs exhibited normal hemi-walking, whereas, 10% showed abnormal hemi-walking. Hopping reaction was normal in forelimbs in all the dogs. However, 90.00% dogs showed abnormal hopping reaction in hind limbs. Placing (visual and tactile) response in forelimbs was normal in all the dogs. Eighty seven percent cases showed abnormal placing of hind limbs. The proprioception deficit (absent, 0) was observed in 45% dogs. Twenty percent dogs affected with hind quarter weakness had normal patellar reflex, whereas, 80% showed diminished. Pelvic withdrawal reflex was found normal in 35% dogs, diminished in 45% and increased in 20%. Anal reflex was normal in 25% dogs and 75% dogs exhibited diminished reflex. Panniculus reflex was normal in 35% dogs, diminished in 40% dogs and increased in 25% dogs. Superficial and deep pain sensation along vertebral column was monitored and it was present in all the dogs. In the present study, radiographs of the vertebral column were reviewed for studying the disease processes involving vertebrae in dogs. None of the radiographs showed any untoward lesions/fracture site (Figure 16).

DISCUSSION

In the present study our results on clinical variants manifested by HQW are in agreement with the results of Nelson and Couto (2004) who reported similar clinical observation. It may result as a squelae to the spinal cord disorder either by fall, jump from height, road traffic accident, dog bite over the vertebral column, malicious blow by stick, rod, stone, crush by heavy object, fracture and myoclonus form of canine distemper. Similar findings have also reported by Hoerlein (1971).

Neurological examination provided very useful information regarding severity and exact location of injury. However, there was individual variation in the sensitivity among the animals showing similar clinical symptoms. Maiti *et al.* (2007) also recorded the similar observation in dogs suffering from HQW. Radiographically absence of lesions in vertebral column truly reflects the cases of HQW. Observations of our study were accordance with the finding made by Gopinathan (2006) in dogs suffering from HQW. Radiography is the primary diagnostic aid for vertebral disorders and can provide a diagnosis in majority of the cases (Wheeler, 1989).

Majority of the cases were brought to the polyclinics within 1 week of commencement of the illness. Brown *et al.* (1977) and Butterworth and Denny (1991) have also reported that the dogs with neurological deficit causing pain and also inability to bear weight and visible urinary/faecal incontinence are attended early by the owners as compared to those showing simple back pain alone or with other less severe deficits. Gopinathan (2006) also recorded that majority of the dogs suffering from HQW were reported within a week of the illness, however, Sharma (2005) recorded it during 10-30 days.

Incidence of HQW in canines increased alarmingly from the 4% to 10.75% during this period. Urbanization, multiplex housing and road traffic have restricted the free and safe movement of dogs and they are at greater risk to accidents. It may be the major factor for higher incidence of the disease. Maximum number of cases was recorded during summer and low incidence in winter. Low incidence in winter season might be due to the tendency of animals to remain inside the home in cold weather. Breed wise, maximum number of affected dogs belonged to Mongrel followed by Spitz, Labrador retriever and German shepherd. Similar higher incidence of HQW was

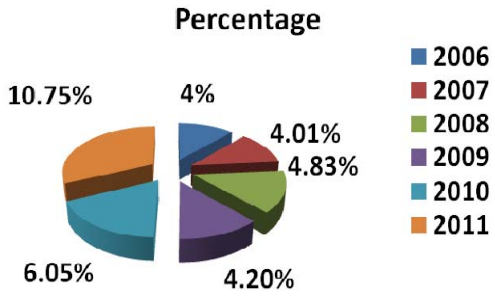

Fig. 8: Year wise occurrence of HQW in dogs

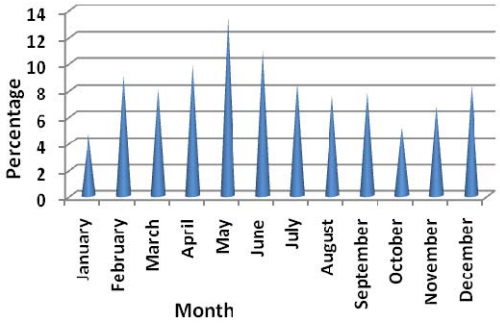

Fig. 9: Month wise occurrence of HQW in dogs

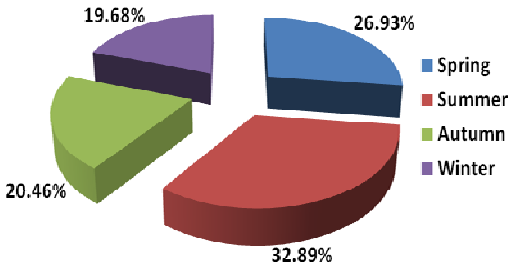

Fig. 10: Season wise occurrence of HQW in dogs

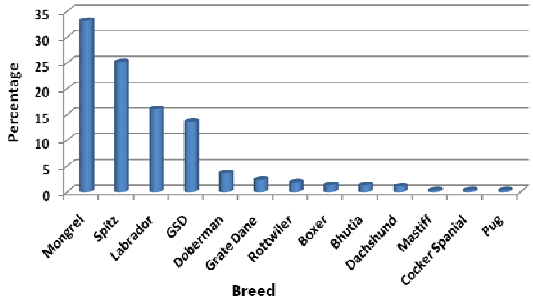

Fig. 11 : Breed wise occurrence of HQW

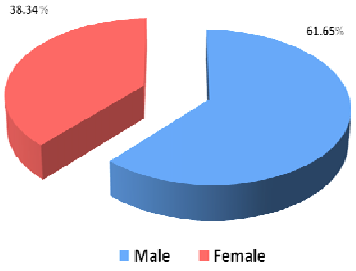

Fig. 12: Sex wise occurrence of HQW in dogs.

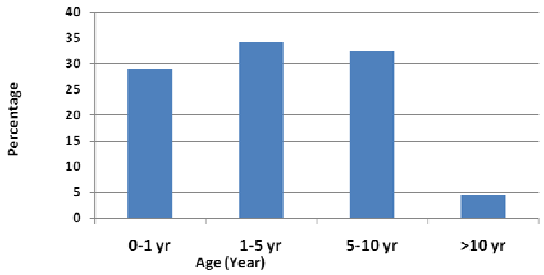

Fig. 13: Age wise occurrence of HQW in dogs.

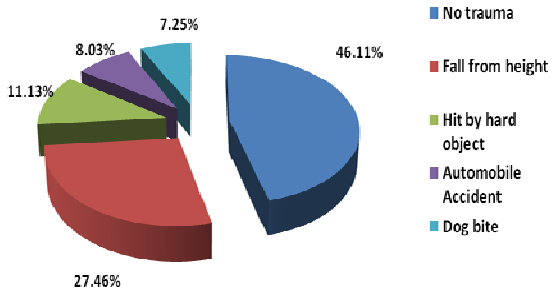

Fig. 14: Etiological factor wise occurrence of HQW in dogs.

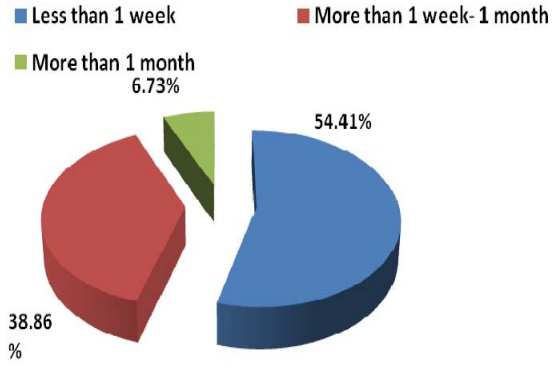

Fig. 15: Duration of illness wise occurrence of HQW in dogs.

also reported by Sharma (2005) and Gopinathan (2006) in dogs. This may be due to large number of mongrels (non-descript breed) are kept by lower and middle class of the society and only higher class can afford expensive exotic breeds in the represented area.

The male dogs were more affected than the females, as earlier workers (Sharma, 2005; Gopinathan, 2006) have also reported in their studies in dogs. This may be attributed to the facts that males dogs as pets are mostly preferred by owners (Dammerich, 1991) and they are more susceptible to trauma due to their high metabolic activity and aggressive and wandering behavior as compared to the female counterparts (Kolata *et al.*, 1993). Further, maximum incidence was found in dogs of 1-5 years of age (34.19%) and a minimum in more than 10 years old (4.40%). Whereas, 29.01% cases were reported between 0-1 years, 32.38% between 5-10 years of age. Higher occurrence of HQW in dogs of 1-4 or 5 years of age has also been noticed by Sharma (2005) and Gopinathan (2006) and is attributed to high activity and tendency to fight, jump and run during this age, which aggravate the damage to spinal cord and surrounding structures. Literature also shows a high incidence of

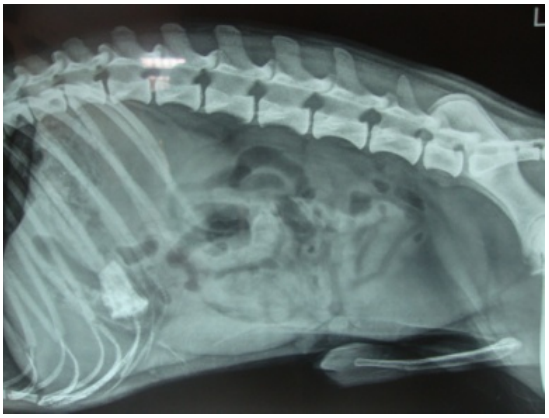

Fig. 16: Radiograph showing no spinal lesion

degenerative lumbo-sacral stenosis in 5 year old dogs (Ness, 1994). HQW is generally thought to be associated with old age but lesser health care and early death of old sick dogs may be the reason of low occurrence in older dogs as found in this study. Young animals are more affected to diseases like canine distemper that cause neurological disturbances leading to paresis or paralysis (Dammerich, 1991). There was no history of physical trauma in majority of the HQW cases. Many developmental disorders like generalized osteoporosis, hypovitaminosis "D" and hypocalcaemia exhibit clinical signs of HQW (Ettinger, 2000).

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