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CASE REPORT

Multifocal Discospondylitis in a Male Dog with Prostatic Abscess and Cystitis

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A B S T R A C T

A five-year-old, intact male, 31 kg, mixed breed dog was presented with progressive ataxic gait in the pelvic limb and reluctance to ambulate of one week duration. The thoracic vertebral region was severely painful on palpation. Pus at the tip of prepuce and perineal hernia were observed. Survey radiographs and computed tomography showed lysis of the endplates of T1-T2 and T5-T7 with irregular bony proliferations of the ventral aspect compatible with multiple discospondylitis. The enlarged prostate with multifocal hypoechoic cysts observed on ultrasonography was confirmed as a suppurative inflammation. Urine cultures yielded growth of *Listeria monocytogenes* and *Escherichia coli*. Three months after institution of treatment, the dog showed normal gait and sound general condition. This report shows diffuse discospondylitis related with cystitis and prostatic abscess.

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INTRODUCTION

Discospondylitis defined as intervertebral disc infection with concurrent osteomyelitis of adjacent vertebrae with usually single focal lesion (Shamir *et al*., 2001). The most common cause of discospondylitis is a bacterial infection with coagulase positive Staphylococci (*S. aureus* or *S. intermedius*), *Streptococcus*, *Escherichia coli* and *Brucella canis*. Fungal infections with *Aspergillus*, *Paecilomyces*, *Penicillium* and *Fusarium* spp, and *Coccidioides immitis* have also been reported (Burkert *et al*., 2005; Tipold and Stein, 2010). The clinical signs include spinal pain, weight loss, anorexia and pyrexia (Kinzel *et al*., 2005). The radiographic signs are the lysis of adjacent vertebral end-plates and new bone production (Shamir *et al*., 2001). Discospondilitis could be usually diagnosed based on clinical signs and diagnostic image such as radiography and computed tomography (CT). As reported in a study, prostatitis could be a main source of discospondylitis in male dogs, as same with this case (Burkert *et al*., 2005). Interestingly, *L. monocytogenes* was isolated from urine specimen with *E. coli* in this patient. *Listeria* infection in dogs is uncommon and only a few cases in dogs were reported (Läikkö *et al*., 2004). To the author's knowledge, *L. monocytogenes* has not been cultured from the urine in dogs with discospondylitis associated with cystitis and prostatic abscess. Multifocal discospondylitis in an intact dog with urogenital tract infection including cystitis and discrete prostatic abscess could be associated with discospondilitis in this case. The aim of this case report was to describe the clinical signs, imaging features and outcome of multifocal discospondylitis in an intact male dog with prostatic abscess.

History and clinical examination: A five-year-old, 31 kg, intact male, mixed breed dog was referred to Chonbuk Animal Medical Center at Chonbuk National University for evaluation of mild pelvic limb lameness and reluctance to ambulate. The dog was reported to have recent back pain intermittently for two months and behavior change showing aggressive attitude.

Physical examination revealed mild pyrexia (39.5^{o}C). Moderate hind limb lameness (Grade 2/6 subtle, consistent weight-bearing lameness) with stiff gait and mild muscle atrophy of the affected limbs were seen. Pain was elicited when the cervical and thoracic spinal regions were palpated. Postural reaction, cranial nerve examination and spinal reflexes of the hind limbs were normal except gastrocnemius reflex was decreased slightly. Pus at the tip of prepuce and perineal hernia at the right side of the anus was observed.

Diagnosis and treatment response: Pertinent clinicopathologic findings included mild leukocytosis (19.9 x10^{3}/ul, reference interval 6.0~17.0 x10^{3}/ul) with

neutrophilia, monocytosis, lymphopenia and mild hypercalcemia (12.1 mg/dl, reference interval 7.7-11.0mg/dl). Discospondylitis, physitis, spondylitis and Wobbler syndrome were included in the initial differential list. Diagnostic imaging study with radiography was carried initially, and CT study was performed for further evaluation of musculoskeletal system of cranial and thoracic spinal region and ultrasonography was carried out for abdominal abnormalities including urogenital tract disorder followed by laboratory examination.

The radiographs including thoracic and lumbar spine with coxofemoral joint were planned to differentiate the spinal diseases. There were irregular bony proliferations of the ventral aspect of T1-2 and T4-7 symmetrically (Fig. 1). The ventral aspect of the caudal endplate of T1, the ventral aspect of the cranial and caudal endplate of T2, the cranial endplate of T3 and the endplates of T5-7 had irregular lysis. Ventral endplate regions of T5-7 were fused. The lumbar spine and coxofemoral joint remained intact. In the abdominal radiograph, the urinary bladder was displaced cranially and prostate was enlarged slightly. A CT examination of the thoracic spine was performed to confirm the formation of thoracic vertebrae. Computed tomography study was performed with 120kVp, 80mA and 3mm slice thickness. The irregular bony proliferation across the ventral aspect of the T1-2 and T4-7 was seen markedly. Irregular bony lysis of T1-2, T5-7 adjacent vertebral end plates was observed (Fig. 2). We narrowed the differential list down to discospondylitis because these radiographic findings and CT findings were most consistent with the disease. Abdominal ultrasonography was performed to identify urinary tract infection which is the most common cause of the discospondylitis. The generalized wall thickening of the mildly distended urinary bladder was evident (5mm) and filled with cellular fluid. The prostate was enlarged and multifocal hypoechoic cysts were observed (Fig. 3).

Urine specimen, collected by cystocentesis, was analyzed and cultured, and ultrasound guided aspiration of the prostate was performed. A urine sediment microscopy revealed large amount of neutrophils and a few rod-shape bacteria. Urine culture presented growth of *E. coli* and a growth of *L. monocytogenes* in a mixed culture of sparse growth was found. The bacterium was identified on the basis of cell shape, Gram reaction, hemolytic reaction on horse blood agar, tumbling motility at 20°C, fermentation of glucose, rhamnose, lactose, maltose, saccarose, xylose and mannitol, hydrolysis of esculine and production of catalase.

The pus from the prostate byultrasound guided aspiration uncovered suppurative inflammation by the same bacteria, *L. monocytogenes and E. coli*, as from the urine sample. The blood culture did not demonstrate any evidence or pathogens pertinent to discospondyltis. Based on these findings, a diagnosis of diffuse discospondylitis secondary to urogenital tract infection including prostatic abscess and cystitis was made.

For treatment, antibiotics, Enrofloxain 20mg/kg PO SID and Amoxicillin 15 mg/kg PO BID were administered combined with acupuncture therapy for ten weeks. Meanwhile, castration was performed to resolve the prostatic abscess and perineal hernia was repaired by standard herniorrhaphy. Two weeks after the start of treatment, the prostatic abscess was resolved dramatically based on the ultrasonographic findings and few neutrophils and bacteria from urine cytology were observed. Eight weeks after management, the dog still had mild staggering but recovered from the pain and had normal behavior. Three months after treatment, the problems patient had were resolved fully. No abnormalities were identified upon scrutinized inspection including physical and neurologic examination, blood work. Follow up radiographs were made after 2 weeks, 4 weeks and 3 months respectively. There were no noticeable changes except mild sclerosis of the each endplates.

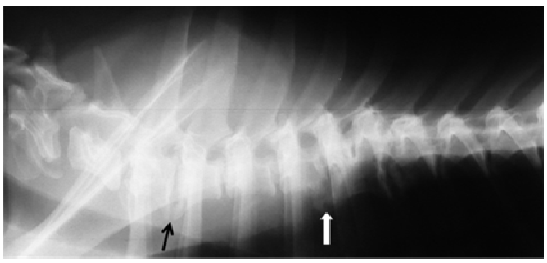

Fig. 1: Lateral radiograph of the thoracic spine at the time of diagnosis. Note the irregular margins and lytic appearance of the caudal endplate of T1-T2 (arrow) and fused region of T5-T7 ventral endplate (white arrow) compatible with discospondylitis. The radiopaque material on the intervertebral foramen between T1-T2, and narrow canal of T5-T7 were seen.

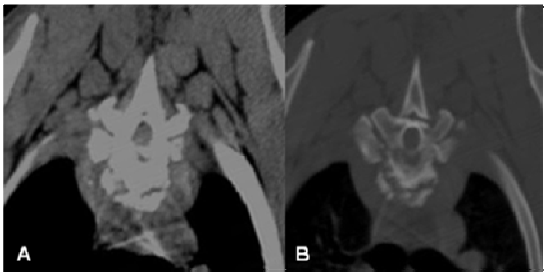

Fig. 2: Transverse images, obtained at the level of T1 vertebral body using a mediastinum window at the level of T1 (A) and a bone window at the same level (B). Note irregular new bone formation at the ventral and lateral surface of the vertebral body.

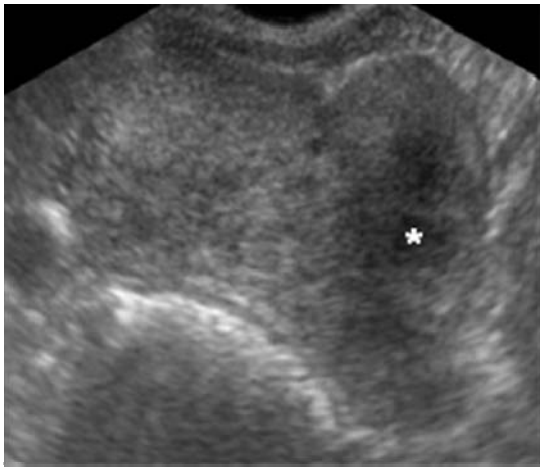

Fig. 3: Transverse ultrasonographic image of prostate obtained at the time of diagnosis. The right lobe of prostate was hypertrophic unilaterally and multifocal irregular anechoic region were observed (asterisk).

DISCUSSION

Urogenital tract infection is the most common cause of discospondylisis in dogs (Burkert *et al*., 2005). The cystitis and prostatic abscess were considered as the cause of discospondyltis based on the laboratory findings including urine culture and diagnostic imaging with radiographs, ultrasonography and CT study in this patient. As possible causative agents, *E. coli* and *L. monocytogenes* were found from urine culture.

The majority of discospondylitis is caused by a bacterial infection with coagulase positive Staphylococci such as *S. aureus* or *S. intermedius* followed by *Streptococcus*, *Escherichia coli*, and *Brucella canis*. Less common bacteria are *Pasteurella* spp., *Proteus* spp., *Corynebacterium* spp., *Actinomyces*, *Normardia* spp., *Bacteroides* spp., *Mycobacterium* spp., *Pseudomonas aeruginosa*, *Enterococcus faecalis*, and *Staphylococcus epidermidis*. Fungal infections with *Aspergillus*, *Paecilomyces*, *Penicillium*, *Fusarium* spp., and *Coccidioides immitis* have also been reported (Tipold and Stein, 2010). The prostatic abscess found in this patient could be developed as a complication of chronic prostatitis. It is the one of the common prostatic disease in dogs and the organisms generally causing prostatic infections are the same as those are involved in urinary tract infection. *Escherichia coli* are the organism most frequently isolated (White, 2000).

Interestingly, *L. monocytogenes* was isolated from urine culture. In the microscopic examination of the sample from the prostatic abscess, there were the same bacteria, *L. monocytogenes*, as the urine sample. *Listeria* spp. are normally found in the gastrointestinal microbiota and microbial flora in tonsils. *Listeria monocytogenes*, gram positive and rod-shape facultative anaerobe, is pathogenic to dogs among *Listeria* spp. It can be isolated from soil, water, sewage, dust, decaying plants, farm animal feed, food products produced from affected animals and canine feces. In human being, *L. monocytogenes* produces a blood borne bacteremia and septic embolization of many organs after penetration of the intestinal mucosa. Because of coccoid form of *Listeria*, it may be mistaken for *Streptococcus* and *Corynebacterium* (Czuprynski *et al*., 2010). Therefore characteristic properties of *Listeria* should be examined carefully by the laboratory diagnosis including morphology (Gram stain), hemolytic reaction, tumbling motility at 20°C, fermentation of glucose, rhamnose, la**c**tose, maltose, saccarose, xylose and mannitol, hydrolysis of esculine and production of catalase as in this patient.

Clinical signs such as fever, diarrhea and vomiting are caused by the degree of intestinal inflammation and the area of embolic microabscess formation (Czuprynski *et al*., 2010). Listeriosis caused by *L. monocytogenes* in dogs is relatively rare and a few cases such as septicemia with encephalomyelitishave been reported (Schroeder and van Rensburg, 1993). Unfortunately, observation at the prostatic abscess and urine sample does not warranty the secondary infection to the thoracic vertebrae causing discospondylitis since no attempt in order to aspirate and culture the infectious organism from the affected vertebra was tried in this case at owner's request.

The diagnosis of discospondylitis is based mainly on diagnostic imaging and laboratory results (Burkert *et al*., 2005). In this case, the causative agents, *E. coli* and *L. monocytogenes*, were found from urine culture. Diagnostic imaging revealed bone lysis with irregular bony proliferations at T1-2 and T4-7 on survey radiographs, and CT and prostatic abscess with cystitis on ultrasonography. Therefore, it was considered that prostatic abscess with cystitis by *E. coli* as a common agent and *L. monocytogenes* as an unusual microorganism could contribute to develop discospondylitis in this patient. It could be obvious that *E. coli* found from urine culture played a major role for primary urinary tract infection as a cause of discospondilitis, since *E. coli* is the most commonly isolated organism from urinary tract infection and discospondylitis (LeCouteur and Grandy, 2005). Considering that the low rate of isolation of the causative microorganism (29% to 78%) from blood and urine specimen and many patients have already been administered with antibiotics, isolation of the causative agents in canine patients with discospondylitis may not be possible (Burkert *et al*., 2005). The exact causal agents of discospondylitis were not confirmed because surgical biopsy or fluoroscopy-guided needle aspiration of the spinal lesions were not performed. Practically, the agent, *E. coli* isolated from urine specimen is a fitting evidence to treat this patient without further invasive examination such as surgical biopsy or needle aspiration may be indicated. The long term antibiotic treatment combined with castration and acupuncture resulted in good therapeutic outcome in this case. If a contributing organism is not isolated from blood or urine sample or broad-spectrum antibiotics are not effective on the patients, biopsy or needle aspiration may be indicated.

To the authors' knowledge, discospondylitis with prostatitic abscess and cystitis with *E. coli* and *L. monocytogenes* from urine specimen has never been reported in dogs. Though it should not be concluded that *L. monocytogenes* is one of the causative agents for discospondylitis, careful concern and further study must be made that *L. monocytogenes* could be responsible as a possible causative agent in dogs.

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