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Surgical Treatment of Lumbosacral Stenosis Caused by Bacterial Discospondylitis in a Great Dane Dog

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Abstract : A 6-year-old, 26 kg spayed female Great Dane presented with back pain and hindlimb paresis. On neurological examination, severe pain was detected on the lumbosacral joint displaying nerve-root signature. The animal presented with lower motor neuron paresis with normal deep pain perception. Radiographic examination revealed narrowing of the lumbosacral joint disc space with endplate destructive lysis. Magnetic resonance imaging of the lumbosacral joint revealed a cauda equina compression, especially on the left. On T2 and T1-weighted images, a mass sized 1 × 1 cm was identified laterally to the left of the lumbosacral joint with hyperintense signal. The lumbosacral joint was stabilized by applying the dorsal distraction fixation-fusion technique and dorsal laminectomy. The soft tissue mass was removed, and a bacterial culture was performed. Coagulase-negative *Staphylococcus* spp. were detected and discospondylitis was treated with clindamycin for 6 weeks. The patient showed clinical improvement without pain and hindlimb paresis until 6 months follow-up postoperatively.

Key words **:** discospondylitis, dorsal laminectomy, dorsal distraction fixation-fusion technique, bacterial culture, dog.

Introduction

Discospondylitis, an infection of intervertebral discs and adjacent vertebral endplates, causes destruction and proliferation of bone (12). The condition predominantly affects dogs and occasionally cats. The breeds most commonly affected are Great Danes, Labrador Retrievers, Rottweilers, German Shepherd Dogs, Doberman Pinschers, and English Bulldogs. Discospondylitis is more common in males than in females with the majority of occurrence in young to middle-aged adult dogs (14).

Infection of the vertebral end plates and the intervertebral disc typically occurs secondary to hematogenous or lymphatic spread of bacteria from remote foci within the body (1). The primary infection sites include the genitourinary system, skin, heart valves, and mouth (8,14). The clinical signs of lumbosacral discospondylitis are quite similar to those of lumbosacral disease. They vary from lumbosacral pain without neurological deficits to non-ambulatory paraparesis. Systemic signs and urinary and fecal incontinence may also occur (5,18). This report describes the clinical signs, diagnosis, and treatment of bacterial lumbosacral discospondylitis, suspected to be a hematogenous infection.

Case Report

A 6-year-old, 26 kg spayed female Great Dane was referred to our hospital due to left hindlimb paresis and back pain in the lumbar region. Two weeks prior, she underwent right forelimb digit resection at the local animal hospital due to snakebite approximately 3 months previously. The hindlimb lameness did not improve with continuous experience of back pain and anorexia.

Physical examination revealed a body condition score of 1/9 indicating borderline thin, and the capillary refill time was mildly delayed, indicating mild dehydration. The patient showed muscular atrophy in the left hind limb, severe pain during palpation of the lumbosacral joint, and a nerve root sign, such as reluctance to move. The gait evaluation showed intermittent non weight-bearing lameness in the left hind

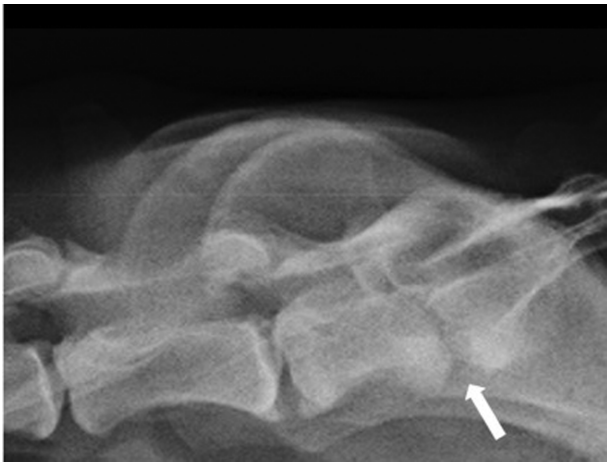

Fig 1. Lumbar radiography lateral view: On lumbar radiography, disc space between L7 and S1 end plates was narrow and irregular margins were identified with osteolysis (arrow).

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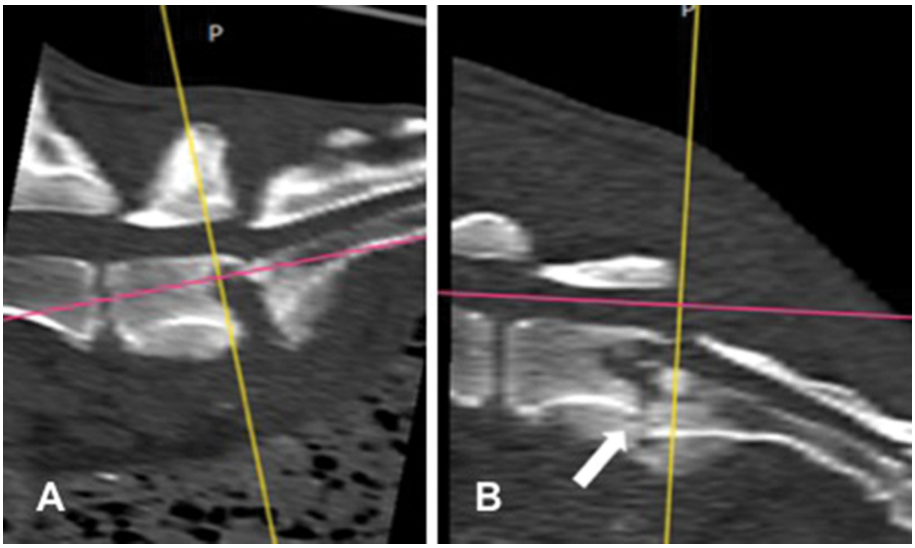

Fig 2. Lumbar computed tomography. (A) Extension position, (B) Flexion position. On lumbar computed tomography in flexion position, the sacrum lamina entered under the L7 dorsal plate confirming joint instability (arrow).

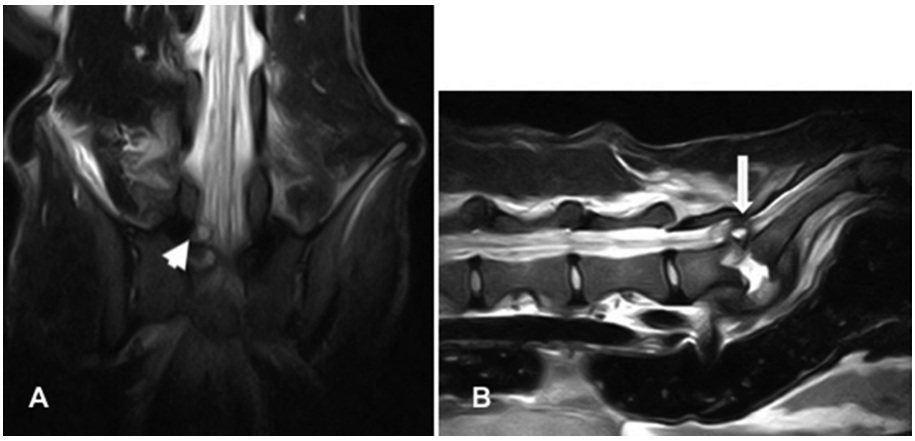

Fig 3. Lumbar magnetic resonance imaging. (A) T2 weighted coronal view, (B) T2 weighted sagittal view. Lumbosacral joint presented cauda equina compression, especially on the left (arrow head). A mass sized 1 × 1 cm was identified left laterally from the lumbosacral joint with hyper intense signal (arrow).

limb. The complete blood count was unremarkable, and serum chemistry revealed mildly increased globulin (5.1, reference range: 2.5-4.5 U/L). Bacteria were not detected in the urine culture.

Radiography revealed a narrow disc space between the L7 and S1 end plates and irregular margins identified with osteolysis (Fig 1). Computed topography (CT) was taken with the hind limbs bent forward and the waist bent as much as possible. When bent at the waist, the sacrum lamina entered under the L7 dorsal plate, confirming joint instability and bone lysis (Fig 2). On MRI, T1-hypointense, T2-hypointense, and hyperintense in short tau inversion recovery (STIR) images were observed in the L7 and S1 endplates. T2-weighted MRI, a hyperintensity mass of 1 × 1 cm was observed on the left side of the L7-S1 joint, resulting in cauda equina compression (Fig 3).

Based on physical examination, laboratory, and diagnostic imaging findings, the differential diagnoses included L7-S1 intervertebral disc disease, vertebral neoplasia, and discospondylitis. Due to severe pain during palpation of the lumbosacral site and obvious instability on CT, surgery for decompression with dorsal laminectomy, and fixation with screws was planned.

The patient was premedicated with atropine (0.04 mg/kg, SC; Atropine®; Jeil Pharmaceutical Co., Daegu, Korea), butorphanol (0.2 mg/kg, SC; Butophan injection; Myungmoon Pharm Co., Seoul, Korea), diazepam (0.2 mg/kg, IV; Samjin Diazepam Injection; SamJin Parm Co., Seoul, Korea) and cefazolin (25 mg/kg, intravenous (IV); Cefazol; Hankook Korus Pharm Co., Seoul, Korea). Etomidate (2 mg/kg) was administered IV for induction, and isoflurane was used to maintain anesthesia. The patient was placed in ventral recumbency, and sterile skin preparation was performed routinely using povidone iodine and 70% alcohol.

The caudal half of the dorsal lamina of L7 and cranial half of the dorsal lamina of S1 were removed. The soft tissue mass located on the left ventral side of the spinal cord was removed using a rongeur after L7-S1 dorsal laminectomy

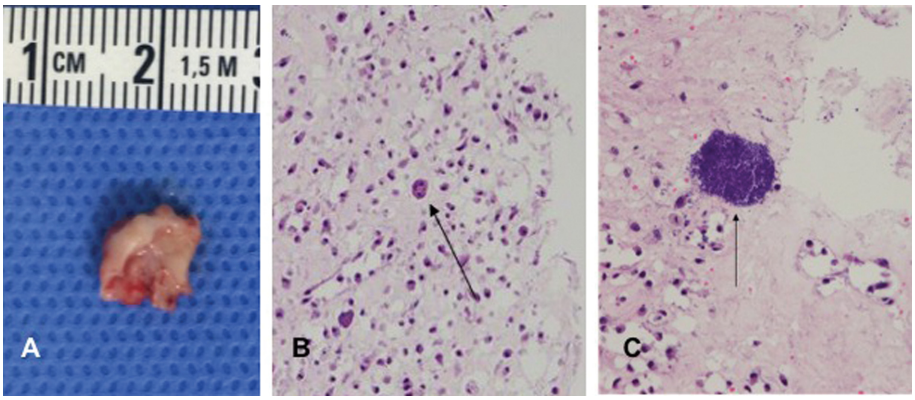

Fig 4. Soft tissue mass adjacent to the lumbar disc. 4A: Gross morphology of the mass. 4B: Homogeneous fibrotic tissues of loose cellularity, H&E stain, (200× magnification). 4C: Bacterial colony and macrophages were shown in the soft tissue mass. H&E stain, (400× magnification).

(Fig 4). After mass removal, L7 and S1 were distracted using a Gelpi retractor. Two cortical screws with a diameter of 3.5 mm and a length of 30 mm were inserted into the S1 body in the L7 articular process for fixation. Subsequently, the dorsal laminectomy area was covered with subcutaneous fat.

The soft tissue mass was submitted to NT-proBNP (IDEXX Laboratories Inc., Westbrook, ME, USA) for antibiotic susceptibility testing and biopsy. On the second day after surgery, the gait evaluation showed weight-bearing lameness in the left hind limb. On the seventh day after surgery, gait evaluation showed slight lameness in the left hind limb with a BCS score of 3/9. The soft tissue mass revealed the bacterial colonies, macrophages, lymphocytes, and plasma cells in the homogeneous fibrotic matrix. About 10 days post-surgery, the bacteria were confirmed as coagulase-negative *Staphylococcus* by antibiotic susceptibility testing of NT-proBNP (IDEXX Laboratories Inc., Westbrook, ME, USA) (Fig 4). Based on antibiotic susceptibility assessment, clindamycin (11 mg/kg, PO; Fullgram; Samjin Pharm Co., Seoul, Korea) was prescribed for 6 weeks. At 6 weeks post-surgery, the gait test showed a normal gait without lameness and no back pain. The weight increased by 3 kg from the time of the visit and measured 29 kg. The BCS score was measured as 4/9.

Discussion

This animal in this case presented with back pain and hindlimb paresis, and was treated with surgical dorsal laminectomy and screw fixation. Historically, the dog bitten by a snake, underwent digit resection before visiting the GAMC. Through evaluation of the soft tissue material extracted during surgery, coagulase-negative *Staphylococcus* were detected. Based on the antibiotic susceptibility test, clindamycin was prescribed for 2 months and the clinical symptoms improved.

Degenerative lumbosacral stenosis is a disease of back pain with or without neurologic dysfunction associated with compression of the cauda equine nerve roots (22). The most common cause of degenerative lumbosacral stenosis is intervertebral disc herniation and other cause include lumbosacral vertebrae fracture, lumbosacral joint luxation, neoplasia and discospondylitis (6,19). Discospondylitis is uncommon in dogs and can occur in the highly vascular, slow flowing metaphyseal and epiphyseal capillary beds with extension into the disc (10,20). It is less likely that the intervertebral disc becomes infected directly as a healthy disc has few blood vessels (17). The cause of the infection can be autogenous or iatrogenic. Most cases are thought to be result from hematogeneous spread of an infection from a distant site, such as the genitourinary tract, skin, teeth or heart. In addition, the lumbosacral disc is the most commonly affected site in dogs (1). This can be attributed to the high mobility of this intervertebral disc space. A possible explanation is the intermittent venous occlusion of blood flow at the lumbosacral junction during movement, which may lead to focal endplate necrosis. An episode of bacteremia could then lead to focal colonization (3). In this case, a nerve root sign was seen on physical examination, the intervertebral space was narrowed on radiography and cauda eqina compression was observed on MRI. During surgery, soft tissue mass located on the left ventral side of the spinal cord was removed and was revealed the bacterial colonies.

Microbial culture of tissue samples is crucial for definitive diagnosis (15). Results of urine microbial culture of reported 50% success rate for detection of an infectious agent (4,11). The most commonly reported bacterial agents are coagulase-positive *Staphylococcus* with *S. aureus* or *S. intermedius* being isolated most commonly (5,9). In this case, bacteria were not found on urinalysis, but were detected on soft tissue mass extracted during surgery, and coagulase-negative *Staphylococcus* was detected as a result of antibiotic susceptibility.

The diagnostic support for discospondylitis may include radiology, CT, and MRI. Discospondylitis is radiographically characterized by narrowing of the intervertebral disc space and focal lysis of the vertebral end plates (1,16,21). CT and MRI are more sensitive for noticing pathologic changes within the vertebral end plates, vertebral bodies, and intervertebral discs (15). MRI is the most sensitive imaging method, revealing T1-hypointensity and T2-hypointensity, and hyperintensity in STIR images on the vertebral endplate, accompanied by endplate destruction (2,7,13). In this case, T1-hypointense, T2-hypointense, and hyperintense in STIR images

were observed in the L7 and S1 endplates on MRI. In bent at the waist, lumbosacral joint instability and bone lysis was observed in CT. So, the dorsal distraction fixation-fusion technique with 3.5 mm screws was performed to stabilize the instability of the lumbosacral joint. The clinical symptoms improved after 6 weeks of operation, and no implant failure occurred.

This case report describes the diagnosis and treatment of discospondylitis in the lumbosacral region. Prior to two weeks, she experienced right forelimb digit resection at the local animal hospital because snakebite about 3 months previously. However, identification of the primary cause of discospondylitis is difficult.

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