Magnetic Resonance Imaging of Presumptive Diskospondylitis with Paravertebral Involvement in a 4 Year Old English Bulldog

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Abstract

"Bella", a four year old intact female English Bulldog presented to the Neurology Service at the Cornell University Hospital for Animals with severe acute onset back pain and difficulty walking. Neurologic examination revealed pain in the thoracolumbar spine and decreased proprioception in the pelvic limbs. On survey radiography, no obvious lesions were detected. However, several vertebral malformations were present in the spine. MRI was performed and revealed prominent contrast enhancement surrounding thoracic vertebrae 5-6. The presumptive diagnosis was diskospondylitis with focal cellulitis and meningitis.

Historically, survey radiography is established as a cornerstone for imaging of vertebral lesions. Spinal radiographs typically reveal characteristic lesions such as: lysis of vertebral endplates adjacent to the affected disk, collapse of the intervertebral disk space, varying degrees of endplate sclerosis, and ventral new bone formation. However, these lesions may not be detectable until 3-4 weeks post-infection.

This report will include a case summary and discussion of canine vertebral infections. Emphasis will be placed on diagnostic imaging and illustrating the use of MRI in the evaluation of presumptive diskospondylitis.

Case History

Bella, a 4 year old female intact English Bulldog, presented to triage on 9/3/09 with chief complaints of acute onset neck pain, difficulty walking, lethargy, and inappetance. She received an injection of buprenorphine at her referring veterinarian prior to arrival. She was then given hydromorphone overnight prior to referral to the Neurology Service.

Bella was obtained by her owner as a puppy and had no known history of medical conditions. She was on a organic raw food diet that was AAFCO certified.

Clinical Findings on Presentation

On physical examination, Bella was quiet, alert and responsive. Her vital signs (temperature, respiratory rate, and heart rate) were within normal limits. Her heart and lungs were normal on auscultation. She had bilateral patellar luxation graded at II/IV. She had recessed vulvar conformation.

On neurologic examination, she had moderate thoracolumbar spinal pain on palpation. She was neck guarding and had mild placing deficits in her pelvic limbs. Based on her neurologic examination she was neurolocalized to the T3-L3 region.

Differential Diagnoses

A list of differential diagnoses was developed with degenerative, anomalous, inflammatory, and infectious diseases ranked high on the list due to clinical signs and

signalment. Intervertebral disc disease (IVDD), discospondylitis, vertebral osteomyelitis, and meningitis were listed as potential diagnoses.

Initial Diagnostic Plan

Initial diagnostics included baseline bloodwork, radiographs of the thoracic and cervical spine. Hemogram revealed a stress leukogram with WBC: 18 thou/uL (5.7-14.2), segmented neutrophils: 15.8 thou/uL (2.7-9.4), eosinophils: 0.0 thou/uL (0.1-2.1). Chemistry panel was unremarkable.

Radiographs revealed several vertebral malformation in the T5-9 region including hemivertebrae, and butterfly vertebrae. This findings are consistent with conformational variations among screw tailed breeds. (Bailey) A very mild amount of new bone proliferation was present on the ventral aspect of the vertebral bodies of T5-7. No bony lysis was present.

She was referred for an MRI which revealed lesions in the area of T5-6 including hyperintensity of intervertebral disc space and paravertebral tissues, loss of subarachnoid columns. Incidental findings included a fluid filled esophagus, and vertebral malformations as seen on radiographs. Based on imaging she was given a diagnosis of probable discospondylitis in T5-6 region with focal cellulitits and meningitis

Considering her vertebral malformations and anecdotal experience of clinicians, it was theorized that her malformation may have created a nidus of infection due to microtrauma in the disc space.

After the MRI, Bella was re-admitted due to worsening signs. Her thoracolumbar pain was severe and her patellar reflexes were decreased bilaterally. She also had developed a very mild degree of interdigital and vulvar dermatitis as well as mucopurulent ocular discharge.

Additional diagnostic tests were performed including baseline bloodwork, blood culture, urine culture, and Brucella titer. Blood culture yielded growth with Staphylococcus intermedius. However, interpretation of these results as diagnostic was questionable due to risk of contamination despite sterile technique.

Treatment Plan

Bella was initially treated with acupuncture and homeopathic medicine while awaiting results of her MRI. She received Discus, a homeopathic medication containing plant, mineral, and animal derived ingredients.

She was admitted for treatment from 9/12/09-9/16/09. She was treated with crystalloid fluids IV, Unasyn IV for antibiotic, Fentanyl IV and gabapentin PO for analgesia, and methocarbamol IV for muscle relaxant. She vomited twice and was placed on Cerenia and famotidine IV. Her raw diet was cooked to minimize potential sources of infection. She was given artificial tears and antifungal wipes for her dermatitis. On 9/16/09 Bella showed marked improvement and no repeatable pain response was elicited on spinal palpation. She was discharged on 9/17/09 with oral medications including Clavamox 250 mg BID long term., methocarbamol 250 mg BID, famotidine 10 mg BID, and gabapentin 200mg BID. Her owners were instructed to limit exercise for 4-6 weeks.

Follow-up

At her 2 week recheck, Bella showed remarkable improvement in activity level. She had no neurologic defecits and no back pain on physical examination. Her owners were instructed to continue her Clavamox until further imaging, continue her Gabapentin for 5 days, and discontinue Methocarbamol. Recommendations included repeating MRI in 6 months in conjunction with ovariohysterectomy to minimize risk of uterine infection and episioplasty to correct vulvar conformation.

Discussion

Infections of the vertebral column and surrounding tissues are documented as having a variety of manifestations in dogs. These may include diskospondylitis, spondylitis, diskitis, osteomyelitis, physitis, and paravertebral abscess. [12,13]

Diskospondylitis is specifically defined as an infection of the intervertebral disk and adjacent vertebral end plates. Clinical signs associated with diskospondylitis include: acute-onset progressive spinal pain, stiff gait, reluctance to walk, inappetence, weight loss, and fever. Uncommonly, neurologic deficits in proprioception and/or motor function may be present. This may occur due to compression as a result of inflammation and bony deformation of adjacent tissues or with concurrent meningitis. [6, 12,13]

The source of infection in diskospondylitis may arise from hematogenous spread from another location or from a primary site of inoculation. Hematogenous spread of bacteria to the spine may occur secondary to infections in distant locations such as urinary tract infection, oral

infection, and skin infections. Direct inoculation may occur as a result of penetrating wounds, migrating foreign bodies, surgical incisions, and injection sites. [6, 7, 12]

Etiologic agents implicated in cases of diskospondylitis include bacterial and fungal organisms. *Stapylococcus spp*, specifically *Staphylococcus intermedius* and *Staphylococcus aureus*, are most commonly implicated as the inciting cause of infection. Other bacteria including *Brucella*, *Streptococcus*, and *Bordatella* in addition to fungi such as *Aspergillis*, have been reported in cases of canine diskospondylitis. However, in most cases a definitive etiology is not identified. [6,7,]

Typically, diskospondylitis affects large to giant breed dogs with German Shepherds, Rottweilers, and Great Danes being over-represented. Prevalence of diskospondylitis is also higher in dogs greater than 10 years of age and male dogs.[3] The most common site for diskospondylitis is the L7-S1 intervertebral disc space. T5-6 and T13-L1 are also common locations. [6, 9]

Baseline diagnostic procedures indicated in cases of diskospondylitis includes baseline bloodwork (Complete blood count, Chemistry Panel), urinalysis, and spinal radiographs. Bloodwork may reveal a non-specific leukocytosis associated with stress leukogram or systemic infection. Radiography often reveals bony lysis, sclerosis, and proliferation adjacent to the disc space. [8] Radiographic lesions may appear several weeks after infection and often lag behind onset of clinical signs. [3, 6, 12,14] Other diagnostic procedures may include: blood culture, urine culture, spinal fluid cytology, and percutaneous aspiration of lesions using fluoroscopy. [6,7,13]

Treatment includes long term antibiotic therapy typically 6 months to 1 year or until resolution of lesions on imaging. Lesions may be monitored by spinal radiographs every 1-2 months. Strict cage rest for 4-6 weeks is indicated. Symptomatic therapies include analgesics and muscle relaxants. In cases of severe neurologic deficits or abscess formation, surgery may be indicated. [6, 12,13] Prognosis is typically favorable for bacterial discospondyltis but poor for fungal due to the likelihood of widespread dissemination. [6]

Various modalities are available for imaging of vertebral lesions including: survey radiography, contrast radiography (ie. Myelography, discography), nuclear scintigraphy, computed tomography (CT), and Magnetic Resonance Imaging (MRI). [4, 5, 6, 8, 9, 10, 12, 14]

Historically, survey radiography is established as a cornerstone for imaging of vertebral lesions. Spinal radiographs typically reveal characteristic lesions such as: lysis of vertebral endplates adjacent to the affected disk, collapse of the intervertebral disk space, varying degrees of endplate sclerosis, and ventral new bone formation. However, these lesions may not be detectable until 2-4 weeks post-infection [6, 12,13].

Myelography is best used to characterize compressive lesions of the spinal cord resulting in neurologic deficits. [8,10] In one study, spinal cord compression was present in 56% of dogs with diskospondylitis with no correlation to neurologic deficits. [5]

Nuclear scintigraphy (bone scan) can detect bony changes occurring up to 3 days post-infection. However, nuclear scintgraphy offers very little anatomic detail and requires specialized equipment and facilities for the use of radioactive materials. [9] Computed

Tomography (CT) is useful for detecting bony lesions associated with diskospondylitis. CT may be helpful in determining the extensiveness of vertebral lesions. [8,10]

Magnetic Resonance Imaging (MRI) is the imaging modality of choice for spinal cord lesions in veterinary medicine. [8,] Additionally, MRI is considered the gold standard for spinal infections in human medicine with a sensitivity of 96% (compared to 82% for survey radiography). [11] A notable advantage of MRI over CT, is ability to detect subtle lesions of the paravertebral soft tissues.[1] This is potentially advantageous in cases of diskospondylitis in detecting early inflammatory changes prior to presence of bony lesions detectable by radiographs and CT.

In conclusion, MRI appears to be an excellent means of imaging the vertebral column in domestic species. It is non-invasive, provides excellent soft tissue detail, and produces multi-planar images. Preliminary data is available in some veterinary diseases, which suggests MRI is a sensitive means of detecting lesions and may assist in determining prognosis for functional recovery.[8] MRI may be considered useful in imaging vertebral infections in early stages when other imaging modalities are normal or non-specific.

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