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TITLE OF CASE
Successful medical management of an epidural abscess in a dog
SUMMARY
<p>A seven-month-old male entire Doberman presented with acute onset of neck pain and left thoracic limb lameness. The dog had a similar episode eight weeks prior to presentation that responded to meloxicam. A cervical spinal epidural abscess secondary to <i>Staphylococcus pseudointermedius</i> bacteraemia was diagnosed following investigations, including magnetic resonance imaging (MRI) of the cervical vertebral column and blood cultures. Treatment with cephalexin, gabapentin and meloxicam was started. The dog was doing clinically well one month later. A control MRI and radiographs of the cervical vertebral column showed evidence of discospondylitis and resolution of the primary lesion, therefore the treatment course with cephalexin was continued. Three months after initial presentation the clinical signs had resolved, radiographs showed improvement of the discospondylitis and antibiotics were stopped. Seven months later the dog continued doing well with no relapse.</p>
BACKGROUND
<p>Spinal epidural abscesses (SEA) are rarely reported in veterinary medicine (Cherrone and others 2002, Schmiedt and Thomas 2005, Linon and others 2014). Infection results from haematogenous bacterial spread or direct local extension (Cherrone and others 2002, Monforte Lavelly and others 2006, Song and others 2015, Monteiro and others 2016). The most common bacteriae isolated as the causative agent for spinal epidural infections in humans and dogs are <i>Staphylococcus</i> and <i>Streptococcus</i> spp (Cherrone and others 2002, Schmiedt and Thomas 2005, Lavelly and others 2006, Linon and others 2014). Epidural infections can present as a diffuse purulent exudate in a natural cavity without a capsule (empyema) or in a newly formed cavity (abscess) (Linon and others 2014, Monforte Monteiro and others 2016). The former is uncommonly reported in the veterinary literature and the latter has only rarely been described (Remedios and others 1996, Cherrone and others 2002, Nykamp and others 2003, Schmiedt and Thomas 2005, Lavelly and others 2006, De Stefani and others 2007, Granger and others 2007, Escriou and others 2011, Linon and others 2014, Song and others 2015, Monforte Monteiro and others 2016). Although both terms are distinct, they are usually used interchangeably in the literature. Clinical signs are commonly non-specific, and neurological signs may initially be absent (Linon and others 2014). The imaging test of choice for the diagnosis of spinal epidural abscess is magnetic resonance imaging (MRI) (Nykamp and others 2003, Schmiedt and Thomas 2005, Song and others 2015). Although historically myelography has been the most widely used diagnostic tool (Cherrone and others 2002). The current treatment of choice is surgical drainage and decompression (Lavelly and others 2006, Granger and others 2007), although medical management has recently been described (Remedios and others 1996, Escriou and others 2011, Song and others 2015, Monforte Monteiro and others 2016) suggesting non-surgical treatment should also be considered an option.</p> <p>This case report describes the successful medical management and MRI features at initial presentation and follow-up of a cervical spinal epidural abscess in a dog.</p>

CASE PRESENTATION

A seven-month-old male entire Doberman dog presented to the Neurology Service of the University of Glasgow for investigation of acute onset neck pain and left thoracic limb lameness. The dog had one episode of left thoracic limb lameness two months prior to presentation that responded well to meloxicam.

Physical examination showed mild to moderate prescapular lymphadenomegaly and was otherwise unremarkable. Orthopaedic examination was unremarkable. Neurological examination showed normal mentation. The dog was ambulatory with intermittent left thoracic limb lameness. Cranial nerve examination was within normal limits. Proprioception was normal in all four limbs. A reduced withdrawal reflex was noted on the left thoracic limb when assessing the spinal reflexes. Marked pain was elicited on manipulation of the neck. The neuro-anatomical localisation was left brachial plexus or lateralised C6-T2 spinal cord segments.

INVESTIGATIONS

Complete blood count, biochemistry profile, clotting times and buccal mucosal bleeding time were unremarkable. Magnetic resonance imaging (MRI) of the cervical vertebral column was performed using a 1.5-Tesla unit (Siemens Magnetom Essenza; Frimley). T2-weighted (T2w) and T1-weighted (T1w) images were acquired in the sagittal plane. Transverse T2w, T1w and T2* images were also obtained. Post-contrast T1w images were acquired in the sagittal and transverse planes after intravenous administration of gadolinium (0.1mmol/kg; Gadovist, Bayer plc). MRI showed a left-sided well-defined small and ovoid extradural (epidural) T2w and T2* hyperintense mass lesion outlined by a hypointense halo, dorsal to mid C6 vertebral body (Fig 1). The lesion was iso- to hypointense in the centre relative to spinal cord parenchyma on T1w images, with a surrounding mildly hyperintense peripheral rim, which was markedly enhancing on T1w post-contrast sequences. The lesion was causing a moderate mass effect with moderate spinal cord compression and right dorsolateral displacement. The caudal half of C6 vertebral body and the left C6 transverse process were hypointense on T1w sequences relative to adjacent normal vertebrae and showed marked diffuse contrast-enhancement. There was marked enhancement of C6 and cranial C7 hypaxial muscles just adjacent to the ventral vertebral bodies, more pronounced on the left.

A cerebrospinal fluid (CSF) sample was obtained but marked iatrogenic blood contamination precluded reliable interpretation of analysis results. Two blood sample cultures taken from different veins (right and left saphenous veins, 10 minutes apart) were positive for *Staphylococcus pseudointermedius* and serologies for *Toxoplasma gondii* and *Neospora caninum* were negative.

DIFFERENTIAL DIAGNOSIS

Differential diagnoses after general and neurological examination included inflammatory/infectious process (e.g. meningitis, neuritis, discospondylitis), traumatic injury, congenital vertebral malformation or haemorrhage causing spinal cord or nerve root compression, and less likely neoplasia (e.g. lymphoma).

An infectious condition was considered most likely following MRI (i.e. epidural abscess with early physitis / osteomyelitis), likely secondary to haematogenous spread infection or to unidentified foreign body migration. Less likely differential diagnoses included focal epidural haemorrhage or an epidural cystic lesion.

TREATMENT

The patient was admitted and treated with meloxicam (0.1mg/kg PO q24h), methadone (0.26mg/kg IM q6h) and gabapentin (10.5mg/kg PO q8h). After MRI, CSF analysis and sampling for blood cultures, a course of cephalexin (19.7mg/kg, PO, q8h), metronidazole (15.8mg/kg PO q12h) and omeprazole (1mg/kg PO q12h) was started in addition to the former treatment. After 12 days the dog was discharged and continued on gabapentin, cephalexin and meloxicam.

OUTCOME AND FOLLOW-UP

A complete clinical recovery was seen at re-examination six weeks after initial presentation and gabapentin and meloxicam were stopped. General and neurological examinations were within normal limits. Lateral radiography of the cervical vertebral column showed fairly well-defined rounded lytic lesions in C6/7 end-plates (larger in caudal C6) with surrounding sclerosis and narrowing of the intervertebral disc space (Fig 2). These findings were consistent with discospondylitis, which was not present at the time of diagnosis. Follow-up MRI including a sagittal short tau inversion recovery (STIR) sequence, showed complete resolution of the spinal epidural abscess (Fig 3A). C6/7 endplates were hypointense on T2w and T1w sequences, hyperintense on STIR and showed diffuse contrast-enhancement (Fig 3B-D). The intervertebral disc space was markedly narrowed with mild focal T2w and STIR hyperintensity of the intervertebral disc mildly extending into the end plates. These findings confirmed the radiographic changes. Follow-up radiographs of the cervical vertebral column three months after initial diagnosis showed improvement of the lytic changes with increased sclerotic changes and, therefore, antibiotics were stopped. At telephonic follow up with the owner seven months later, no further clinical signs were reported.

DISCUSSION

Epidural empyema is an uncommon diagnosis in dogs, and spinal epidural abscess has only rarely been described (Remedios and others 1996, Schmiedt and Thomas 2005, Linon and others 2014, Song and others 2015). Clinical signs are often non-specific and include pyrexia, spinal pain and/or neurological dysfunction that may be progressive, however the lesions may be subclinical (Linon and others 2014).

Magnetic resonance imaging has recently been reported as the imaging test of choice for the diagnosis of spinal epidural abscess (Nykamp and others 2003, Schmiedt and Thomas 2005, Song and others 2015). In the case presented herein, a lesion consistent with spinal epidural abscess was identified by MRI, in addition to positive blood cultures with a pathogen commonly involved in this type of lesion (*Staphylococcus* spp). Discospondylitis has been described as a cause of spinal epidural abscess or diagnosed concomitantly to it. In this case, however, no obvious signs of typical discospondylitis were observed on initial MRI, although there were some imaging features indicative of C6 vertebral osteomyelitis and physitis (Jimenez and O'Callaghan 1995). Thus, it could have been possible that an early stage discospondylitis was developing at the time of initial MRI, and post-contrast fat-suppression T1w or STIR sequences would have aided its diagnosis.

The current treatment of choice is surgical drainage and decompression (Lavelly and others 2006, Granger and others 2007). Successful medical management has been recently described in veterinary medicine suggesting that non-surgical treatment should also be considered (Remedios and others 1996, Escriou and others 2011, Song and others 2015, Monforte Monteiro and others 2016).

This case report describes a case of spinal epidural abscess treated medically with complete resolution of the clinical signs and epidural lesion. To the authors' knowledge there are only eight previous cases described in the veterinary literature of spinal epidural infections and successful

medical management, of which only two were described as abscesses (Remedios and others 1996, Song and others 2015) as opposed to empyemas/infections (Escriou and others 2011, Monforte Monteiro and others 2016,). In one case the abscess was localised at the level of the lumbosacral junction (Remedios and others 1996) and in the other it extended from the foramen magnum to C2 (Song and others 2015).

Therefore, this case report supports the emerging idea that medical treatment for spinal epidural abscess, as well as in spinal epidural empyemas, should be considered an option for suitable cases.

Unfortunately, there is no reported criterion in the veterinary literature to differentiate the cases that may only be treated medically from the ones that may require surgical treatment. The human literature describes medical approach as a reasonable option in the following scenarios: if decompressive laminectomy is declined by the patient or is contraindicated due to high operative risk, if paralysis has been present for over 24-36 hours (making paralysis unlikely to be reversed), in cases of panspinal infection in which surgery may cause instability of the vertebral column or in neurologically intact patients (Darouiche 2006). However, these recommendations should be carefully considered in veterinary patients, and the treatment modality should be selected based on the history, clinical signs and imaging findings.

Our criteria to decide to pursue medical instead of surgical treatment was based on the fact that the patient was ambulatory and that no deterioration was noted after starting medical therapy. We therefore believe that selected cases may be managed medically, mainly those with no or mild neurological deficits, especially when the history is not rapidly progressive and an early response to treatment with no further deterioration is shown. In these cases, close monitoring is essential and referral to a specialist centre is indicated in progressive or severely affected cases.

LEARNING POINTS/TAKE HOME MESSAGES

- Spinal epidural abscesses can have a successful outcome with medical management
- Further studies are needed to identify the criteria for medical management in epidural infections, but in general it is accepted that progressive or severely affected cases should be treated as surgical emergencies.

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FIGURE/VIDEO CAPTIONS

Figure legends:

Figure 1: Parasagittal T2-weighted (T2w) (A), T1-weighted (T1w) (B), T1w post-contrast (C), and transverse T2w (D), T1w (E) and T1w post-contrast (F) MR images demonstrating a T2w hyperintense and T1w iso- to slightly hypointense extradural mass with a contrast medium-enhanced peripheral rim (arrows), moderately compressing the spinal cord at the level of mid C6 vertebral body. Note also the enhancement of the caudal half of C6 vertebral body, C6 left transverse process and the hypaxial muscles from C6 to C7 on T1w post-contrast images.

Figure 2: Lateral radiographic view of the caudal cervical spine six weeks after initial presentation revealing well-defined rounded lytic lesions in C6/7 end-plates, larger in caudal C6 (arrow), with surrounding sclerosis and narrowing of the intervertebral disc space.

Figure 3: Follow up MRI performed six weeks after initial diagnosis. Transverse T2-weighted (T2w) image at the level of mid C6 vertebral body demonstrating complete resolution of the epidural lesion (A); and midsagittal short tau inversion recovery (STIR) (B), T1-weighted (T1w) (C) and T1w post-contrast (D) images illustrating the observed discospondylitis. Note the C6/7 endplates appear hyperintense on STIR, hypointense on T1w and markedly enhancing on T1w post-contrast images. Note the narrowing of the intervertebral disc space with focal STIR hyperintensity of the disc mildly extending into the endplates.

OWNER'S PERSPECTIVE *Optional*

None

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