Epidural Spinal Empyema and Vertebral Osteomyelitis in a Cat

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ABSTRACT

A young adult neutered male domestic shorthair cat of unknown age was examined for a complaint of progressive hind limb paralysis. Neurologic examination revealed paraplegia with no deep pain sensation in both hind limbs and suggested a lesion localized between spinal cord segments T3 and L3. Survey radiography revealed at L2 multiple sites of lysis within the vertebra and a dense extradural soft tissue mass severely compressing the spinal cord. Computed tomography-guided needle aspiration was performed and a diagnosis of vertebral osteomyelitis and suspected spinal empyema was made. Emergency surgical decompression by pediculectomy exposed a firm, capsulated extradural tissue compressing the spinal cord. The abnormal tissue was removed and submitted to bacterial culture and sensitivity testing, resulting in isolation of *Staphylococcus aureus*. The cat was discharged ambulatory and eventually resumed normal gait. This is the first report of spinal epidural empyema and osteomyelitis and the third report of the former in cats. Computed tomography-guided fine needle aspiration from the vertebral lesion was helpful for diagnosing the cause of lesion and a rapid surgical decompression was beneficial.

INTRODUCTION

Spinal epidural empyema (SEE) is a suppurative and septic process occurring within the epidural space. Infection may occur by hematogenous spread of bacteria, or by direct local extension (1). Clinical signs may include lethargy, fever, anorexia, spinal pain, and progressive neurologic dysfunction. The neurologic signs are secondary to the combined effects of regional tissue inflammation and spinal cord compression by an epidural mass (1, 2). Diagnosis can be aided by myelography, computed tomography (CT), or magnetic resonance imaging (MRI), with the identification of an extradural compression extending over multiple spinal cord segments (1).

Spinal epidural empyema was previously reported in two cats (3, 4). In one, SEE was secondary to grass awn migration, (3) whereas in the other the cause was unknown. In the latter case, no bacteria were found in the aerobic culture despite the presence of bacteria in purulent secretions. (4) Therefore, anaerobic bacterial infection in a wound caused by biting or a sharp object was suspected.

Whereas SEE is extremely rare in domestic cats, osteomyelitis, defined as an infection that is confined to the vertebra, has never been documented in this species. Here, we describe the clinical course of adult male cat diagnosed with vertebral osteomyelitis and SEE.

CASE SUMMARY

A young adult neutered male domestic shorthair cat was referred to the Koret School of Veterinary Medicine Teaching Hospital (KSVMTH) after a few days of progressive hind limb paralysis. The cat had been adopted five months earlier and, according to the owner, was always less active than her other cats. Two week before admission, the cat started to avoid jumping on furniture and two days prior to presentation developed progressive hind limb paralysis. Physical examination revealed severe tenderness in the cranial lumbar region, muscle atrophy caudal to that region and an overdistended urinary bladder. Neurological examination revealed paraplegia with no deep pain sensation in both hind limbs,

Figure 1: Lateral radiograph demonstrated lytic area at the caudal part of L2 vertebra (black arrow), while the caudal end plate of the L2 appears intact. Sclerotic reaction at the margins of the lytic lesion is seen. L2-L3 intervertebral space is narrowed with marked spondylosis reaction.

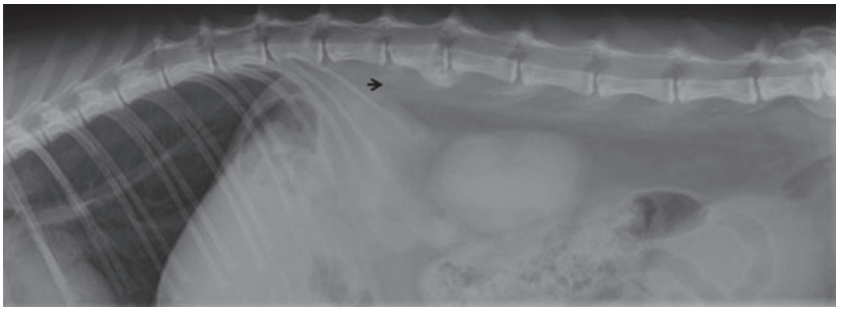
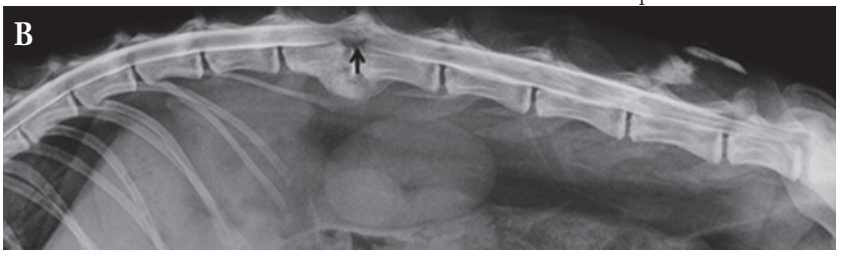


Figure 2: Ventrodorsal (A) and lateral (B) Myelography of the thoracolumbar area. The black arrows indicate the right (A) and dorsal (B) displacement of the contrast column by epidural fluid in the area of the second lumbar intervertebral space.



dull deep pain sensation in the tail and normal spinal reflexes, hence localizing the lesion to T3 and L3 spinal cord segment. Occasional hind limb movements were observed and assessed as spinal movements with no upper motor neuron control.

Complete blood count revealed leukocytosis (24.57 X 10^3 cells/μL; reference range, 6.3 to 19.6 x10^3 cells/μL) with mature neutrophilia and no evidence of toxicity. Serum biochemistry was unremarkable.

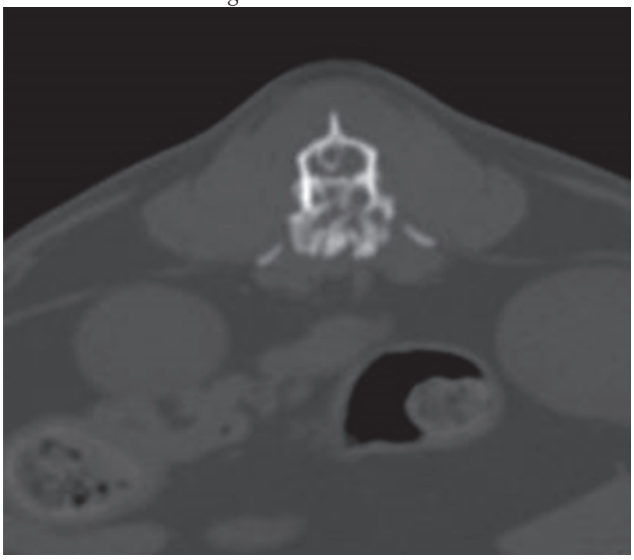
Survey radiographs of the spine revealed lysis of the caudal part of L2, which did not involve the caudal end plate. Sclerotic reaction was evident at the margins of the lytic lesion. The L2-L3 intervertebral space appeared narrowed, with marked spondylosis reaction (Figure 1). Cerebrospinal fluid (CSF) analysis was normal with total cell count of 2 cells/μl and normal cytology.

Iohexol (GE Healthcare, Cork, Ireland) myelography (0.3 ml/kg injected at L5-L6) lateral view showed a focal ventrolateral extradural lesion over the L2-L3 intervertebral space (Figure 2). Subsequent CT scan (ElscintTwin, Haifa, Israel) of L1-L4 vertebral column revealed several lytic sites within the caudal part of L2 vertebral body and adjacent periosteal proliferation. The extradural soft tissue mass compressing the spinal cord at the L2-L3 intervertebral space was also evident and was not enhanced following intravenous contrast administration (Iohexol, 2 ml/kg) (Figure 3).

Computed tomography guided fine needle aspiration (FNA) from the lytic L2 area revealed a large number of intra- and extracellular bacteria, neutrophils and macrophages. Bacterial osteomyelitis with secondary spinal empyema was suspected and the cat was admitted to decompressive surgery. Pediculectomy at the left side of L2-L3 exposed a firm, capsulated extradural tissue compressing the spinal cord. The tissue was carefully removed, the area was copiously irrigated with sterile saline solution and the surgical site was closed routinely. *Staphylococcus aureus* sensitive primarily to fluoroquinolones and clindamycin was isolated from the excised soft tissue mass. Thus, the cat was treated with enrofloxacin (Baytril 5%, Bayer, Leverkusen, Germany, 5 mg/kg, IV, q24h) and clindamycin (Rafa, Jerusalem, 10 mg/kg, IV, q12h) for 3 days and then orally for a month.

The cat improved dramatically following surgery. It regained deep pain sensation the morning after surgery, and voluntary hind limb movements and urinary control on day 2. The cat was discharged ambulatory 8 days after the surgery, with only mild hind limb ataxia and conscious proprioception deficit. The owners were instructed to keep him confined to a small room for one month and the cat continued treatment with ofloxacin (Teva pharmaceutical industries, Petah-Tikva, Israel, 5 mg/kg, PO, q24h) and clindamycin (Rafa, Jerusalem, 10 mg/kg, PO, q12h) for one month. Follow-up evaluation through telephone conversation 6 weeks later revealed significantly improved activity level with apparent normal gait.

Figure 3: Transverse CT at L2 shows multiple, irregular regions of bony lysis. The extradural soft tissue mass compressing the spinal cord at the level of the intervertebral space of L2-L3 from the left was not enhanced following intravenous contrast administration.



DISCUSSION

Spinal epidural empyema is a neurologic emergency characterized by the accumulation of purulent material within the vertebral canal (1).The source of SEE is often unidentified in veterinary medicine; however, potential causes include direct extension from a nearby contaminated area and hematogenous spread (1, 6). In this cat, the source could be the osteomyelitis of the nearby vertebra. This is the third report of SEE in cats, of which one was attributed to grass awn migration and in the other, the cause was not identified (3, 4). In the present case, the abundance of bacteria, neutrophils and macrophages in the lytic center of the L2 vertebra suggested that the SEE was a result of pyogenic infection extending from the vertebral body towards the spinal canal. Because the owner reported decreased activity level since the time of adoption, which improved after surgery, it is possible that the vertebral osteomyelitis was already present at the time of adoption.

The confinement of the lytic area to L2 vertebra alone, with no endplate involvement, is indicative of vertebral osteomyelitis rather than discospondylitis. Vertebral osteomyelitis has never been reported in cats before. Discospondylitis is rare in cats relative to dogs (5), with only five reports in felines (7-10). In four of these reports, abscesses or soft tissue injury were identified in proximity to the discospondylitis. (7, 9, 10, 11). In dogs, hematogenous spread is considered the main route of infection (5).It is yet to be determined why cats are more resistant to vertebral osteomyelitis and discospondylitis, which might be related to different routes of infection.

Staphylococcus aureus, the bacterium that was isolated from culture in the present case, is the most common causative agent of discospondylitis and osteomyelitis in dogs and cats. Other bacteria and fungi identified in non-vertebral osteomyelitis in cats include *Streptococcus* spp., *Bartonella vinsonii*, *Histoplasma capsulatum*, *Actinomyces* spp., *Bacteroides* spp., *Fusobacterium* spp., *Peptostreptococcus* spp., *Pasturella multocida* and *Clostridium perfringens* (12-15).

As expected, CSF analysis in the present cat was unremarkable, due to the localization of the disease process to the extradural space (16) and as previously reported in cats (4). In dogs with SEE, abnormal CSF including elevated protein concentration and cell count has been reported (6, 17, 18). However, it is difficult to draw conclusions regarding species differences due to the small number of reported cases.

Myelography, CT and MRI were reported to be helpful in the diagnosis of spinal empyema in cats (3, 4). The other major differential diagnosis to consider in cases of vertebral lytic lesions accompanied by spinal cord compression is neoplasia. Differentiation between the two processes is critical, because owners might elect euthanasia due to the poor long-term prognosis in cases of vertebral neoplasia. In a previous study, free-hand CT-guided FNA or tissue-core biopsy was established as an accurate diagnostic tool for primary or secondary bony lesions in small animals (100% and 83.3% accuracy, respectively) (19). In the present report, cytological evaluation of vertebral FNA provided a rapid and definitive diagnosis, which eventually led to an emergency surgical intervention.

Decompression of purulent material in dogs and in two cats with SEE was previously performed by hemilaminectomy or dorsal laminectomy (3, 4, 6, 17, 18, 20, 21). While both approaches offer the benefits of a large field of view and ease of material removal as compared to pediculectomy, they both involve a higher degree of instability. In the present cat, osteomyelitis was assumed to destabilize the vertebral body, hence, pediculectomy that spares the articular facets was chosen over hemilaminectomy. Internal stabilization of the spine was avoided due to the presence of infection and the cat was confined first to a cage and then to a room during the first post-operative month.

Similarly to our report, previously reported cases of SEE

in cats (3, 4) improved immediately following decompressive surgery despite severe neurological deficit on presentation. Due to the rare incidence of SEE in cats, no statistical data is available regarding the prognosis and outcome following surgical treatment. However, it seems that surgical intervention has a favorable prognosis.

In conclusion, this is the first report of SEE with vertebral osteomyelitis in a cat. CT-guided FNA from the vertebral lesion was helpful to differentiate between infection and neoplastic process and surgical decompressive surgery along with long-term antibiotics provided favorable results.

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