Case Report

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Discal cysts of the cervical spine in two dogs

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Discal cysts, which lie directly over intervertebral discs, are rare. Two old dogs with tetraparesis were referred to our facility. In both animals, magnetic resonance imaging revealed intraspinal extradural cystic mass lesions that were dorsal to degenerative intervertebral discs at the C3−C4 level. These lesions had low signal intensity on T1-weighted images, and high signal intensity on T2-weighted images. A ventral slot approach was used to perform surgical decompression, after which the symptoms improved remarkably. Discal cysts should be included in the differential diagnosis of dogs with cervical pain and tetraparesis. One effective treatment for discal cysts is surgical intervention.

Keywords: cervical spine, discal cyst, dog, magnetic resonance imaging

Discal cysts are non-meningeal, extradural lesions that communicate with the intervertebral disc [3,7]. These cysts have also been reported in the human lumbar spine and were recently recognized in the cervical and thoracolumbar spines of dogs by Konar *et al*. [3,6,7]. Discal cysts cause symptoms similar to those of intervertebral disc disease, primarily resulting in cervical pain and paresis [6]. Discal cysts have a characteristic appearance on magnetic resonance imaging (MRI), which has allowed this modality to be used for diagnosis [6,8]. However, a limited number of discal cyst cases have been described in the literature. Therefore, there is little definitive information about them, and the ideal treatment is also unclear. Here, we present two canine cases with a presumptive diagnosis of discal cyst based on MRI findings. We also include a brief review of discal cysts based on the veterinary medical literature.

Two dogs presented for evaluation of tetraparesis that had begun a few days prior to presentation. Dog 1 was an 11-year-old, 6 kg male mixed-breed dog. Dog 2 was a 9-year-old, 3.5 kg neutered female Yorkshire terrier. Upon physical examination, both dogs appeared bright, alert, and responsive with mild cervical pain. Dog 1 was ambulatory, with postural reactions present, but reduced in all limbs. Dog 2 was non-ambulatory and had no postural reactions in her limbs. Both dogs had normal spinal reflexes and superficial pain sensation. There were no cranial nerve deficits, and the dogs had no abnormalities on orthopedic examination.

Based on the physical, neurological, and orthopedic examinations, the dogs were suspected to have lesions between C1 and C5. The results of complete blood counts and serum biochemical examinations were unremarkable in both cases. In Dog 1, a plain radiograph of the cervical spine was also unremarkable. In Dog 2, plain radiography revealed intervertebral space narrowing of C3−C4 and C4−C5, as well as spondylosis deformans of C7−T1. Both dogs also underwent MRI scans [Dog 1: Hitachi AIRIS Vento (0.3T); Hitachi Medical Corporation, Japan; Dog 2: Vet-MT Grandes (0.25T); Esaote, Italy]. In both dogs, MR imaging revealed cystic structures adjacent to the C3−C4 disc. There was also mild disc protrusion and degeneration of the nucleus pulposus at C3−C4 (Figs. 1 and 2). The cystic lesions were in the ventral aspect of the extradural space, displacing the spinal cord dorsally, and had low signal intensity on T1-weighted images. In contrast, the cysts had high signal intensity on T2-weighted and fluid attenuated inversion recovery (FLAIR) images. The cyst wall was enhanced on contrast (0.2 mL/kg, Magnevist; Schering, Germany) T1-weighted images (Fig. 1). The ventral intraspinal cysts were identified as discal cysts based on their appearance on MRI. The characteristic MRI findings include the cyst's anatomical relationship with the intervertebral disc, signal intensities, and contrast-enhancing walls.

The cysts did not respond to conservative treatment, including cage rest and analgesia. Therefore, the dogs underwent

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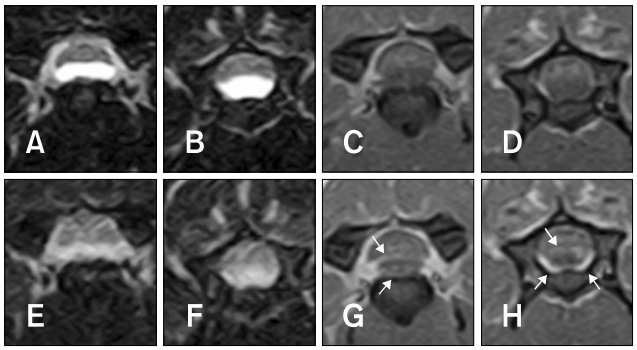

Fig. 1. Transverse T2-weighted (A and B), T1-weighted (C and D), FLAIR (E and F) and post-contrast T1-weighted (G and H) magnetic resonance images of Dog 1 at C3–C4. On T2-weighted (A and B) and FLAIR (E and F) images, a cyst is visible as a hyperintense structure on the ventral floor of the canal, compressing the spinal cord. On T1-weighted images (C and D), the cyst is slightly hypointense relative to the spinal cord. After administration of contrast medium (G and H), the cyst demonstrates capsular enhancement surrounding the hypointense fluid (arrows).

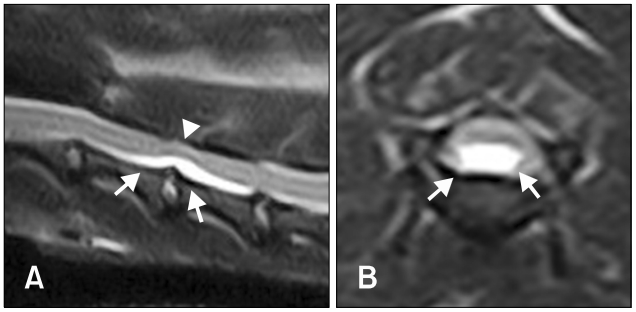

Fig. 2. Sagittal (A) and transverse (B) T2-weighted magnetic resonance images of Dog 2 at C3–C4. The discal cyst is hyperintense compared to the spinal cord and clearly visible in the ventral aspect of the canal (arrows). The spinal cord is deviated dorsally by the discal cyst on the sagittal and axial views (arrowhead).

surgery using the ventral slot technique. Anesthesia was induced by the intravenous administration of acepromazine (0.02 mg/kg, Sedaject; Samwoo Medical, Korea), tramadol (4 mg/kg, Toranzin; Samsung Pharmaceutical, Korea), and propofol (6 mg/kg, Provive 1%; Claris Lifesciences, India). Anesthesia was maintained with inhalant administration of isoflurane (Aerrane; Baxter, Canada) in oxygen. The dogs were treated with normal saline throughout surgery. Cephradine was administered immediately before induction and at the end of the surgery. It was impossible to directly observe the cysts and their attachments. During both surgeries, the cysts ruptured and their contents extravasated. Therefore, postoperative histologic examination could not be performed. After the dorsal portion of the annulus fibrosus was incised, serous fluid leaked from the cyst in Dog 1, while serous and viscous fluid leaked in Dog 2. The capsules were not identifiable after the cystic structures collapsed. The wounds were closed in a standard fashion.

There were no intraoperative or postoperative complications. Postoperatively, both dogs experienced an improvement in their clinical symptoms. Dog 2 regained ambulatory function four days after surgery. After one month, both dogs had completely recovered without any neurological deficits.

Discal cysts are extremely rare, non-meningeal extradural lesions that occur over an intervertebral disc [3,7]. Kono *et al*. [7] first described cysts in humans that communicate with the intervertebral disc through a ruptured annulus. In veterinary medicine, Konar *et al*. [6] reported similar cysts as a new clinical condition in the cervical and thoracolumbar spines of dogs, which were referred to as canine discal cysts based on their similarity to those in humans. Previously, several types of intraspinal cysts have been reported in dogs, including synovial, dermoid, meningeal, and arachnoid cysts. However, until discal cysts were identified, no canine cysts were reported to be closely related to intervertebral discs [9]. The various types of intraspinal cysts are differentiated based on their unique anatomic locations and imaging findings. Although discal cysts are usually diagnosed based on histopathological examination, we diagnosed discal cysts based on their ventral location, close relationship to the intervertebral disc, and MRI features (including signal characteristics and contrast media capsule enhancement). A previous study that described the MRI features of lumbar discal cysts in nine human patients suggested that MRI is the most effective modality for diagnosis [8]. The MRI features of discal cysts in humans are similar to those in dogs [6].

To the best of our knowledge, there are only 40 reported cases of discal cysts in the veterinary literature [2,4-6,10]. Therefore, there is little definitive information available regarding discal cysts and their ideal methods of treatment. We reviewed all of the published cases of canine discal cysts to identify predisposing factors. The mean age of affected animals was 9.5 ± 2.3 years. This age is not statistically different from the mean age of patients with intervertebral disc disease and cervical spondylomyelopathy [4]. The occurrence of discal cysts in older animals is compatible with the theory that they form secondary to intervertebral disc degeneration and subsequent fluid leakage from herniated disc material [7]. The two patients in this report were also considered geriatric dogs, at 11- and 9-years-old, respectively. In the literature, 30 dogs with discal cysts (75%) were male and 10 (25%) were female. This gender distribution is similar to that found in human patients with discal cysts. Discal cysts may be caused by mechanical-stress-induced focal degeneration of adjacent intervertebral discs, and it is possible that this occurs more frequently in males than in females because of increased physical activity and/or hormonal influences [1]. The cysts occurred at C4–C5 (21 dogs, 52.5%), C3–C4 (12 dogs, 30%), C5–6 (4 dogs, 10%), T13–L1 (2 dogs,

5%), and C6−7 (1 dog, 2.5%). Interestingly, all human cases of discal cysts have occurred in the lumbar spine. Dogs tend to be more commonly affected in the cervical spine. Both dogs in this report had discal cysts in the cervical area. This discrepancy between humans and dogs may result from biomechanical and/or nutritional differences in the intervertebral discs between species [6]. The C2−C3 intervertebral disc space is the most common site of an affected cervical disc [4]. However, 82.5% of affected discal cysts occurred in the C3−C4 and C4−C5 intervertebral spaces. In the present study, both cases occurred in the C3−C4 disc space. The C3−C4 and C4−C5 intervertebral spaces are thought to be affected by discal cysts more often than other spaces. Further investigation is required to determine which factors influence discal cyst formation in the C3−C4 and C4−C5 disc spaces. As described above, older male dogs with cervical lesions are at highest risk of developing discal cysts.

Both patients in this report presented with acute onset of tetraparesis. However, neither dog had signs of severe cervical discomfort. Interestingly, the most common symptom of a discal cyst is tetraparesis or paraparesis without cervical hyperesthesia. In contrast, intervertebral disc diseases tend to present predominantly with severe pain. This can be explained by the more rapid formation of focal cysts with compression of the spine [1,3,7].

The optimal treatment for discal cysts is uncertain. Based on previous reports, only four dogs have been successfully treated with conservative treatment. In contrast, surgery has produced rapid clinical relief and returned motor function in 15 dogs. [2,5]. Both patients investigated in the present study quickly improved after surgery. There are no standardized therapeutic guidelines for discal cysts because of the limited treatment results. However, surgery may be the optimal method for management of symptomatic canine discal cysts.

We have described two cases that demonstrate good surgical outcomes for discal cysts in dogs. MRI is useful for differentiating discal cysts from disc herniation and other types of intraspinal cysts.

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Conflict of Interest

There is no conflict of interest.

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