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Discal Cyst in a Malamute Dog

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Abstract : A 7-year-old, male Alaskan malamute was referred for a routine dental management. On the physical examination, the right hindlimb ataxia with a mild delay in proprioception was noted. On magnetic resonance images, an extradural ventral cystic structure compressing the spinal cord was found at the level between the first and second lumbar vertebra. The cyst showed hypointense on a T1-weighted image with rim enhancement and hyperintense on a T2-weighted image. The cystic lesion was removed through right-side hemilaminectomy. In the histopathological examination, evenly distributed fibroblasts and collagenous stroma with several cartilaginous materials were seen. The neurological signs of the right hindlimb were successfully recovered within a week in follow-up neurological examination and showed normal gait at 6 months after surgery.

Key words **:** discal cyst, extradural spinal cyst, dog.

Introduction

A discal cyst is defined as an extradural cystic structure that communicates with the adjacent intervertebral disc with a thin capsule (12,14). These cysts cause lumbar radiculopathy in humans and are mainly diagnosed by magnetic resonance imaging (MRI), computed tomography, and discography (12,14).

Reported MRI features of discal cysts in humans include a hypo- to isointense appearance on T1-weighted (T1W) image and a hyperintense appearance on T2-weighted (T2W) image, ventrolateral extradural cysts just dorsal to the intervertebral disc, and rim enhancement of cyst walls (8,14). The other possibilities considered in the differential diagnosis include intervertebral disc disease, extradural arachnoid cysts, and synovial cysts (10).

The aims of this case report were to describe a case of discal cyst in a dog, provide MRI features, and indicate the intraoperative and histopathological findings.

Case

A 7-year-old, weighing 37 kg, male Alaskan Malamute dog was admitted for a dental check-up. The owner appealed the dog could not chew, probably because of dental problems, and had not eaten much for the last 3 days.

On the physical examination, mild right hindlimb ataxia accompanying the proprioception was examined when compared to that of the contralateral side. Both spinal reflexes in the hindlimb and pain responses on spinal palpation, however, were not distinct. There were no abnormal findings on routine radiography and complete blood count and serum biochemical profiles.

MRI of the brain and thoracolumbar spine was performed for differentiation of neurological problems using a 1.5-Tesla scanner (ESSENZA, Siemens, Germany). Contrast-enhanced images were obtained after administration of 0.1 mmol/kg gadolinium.

The T1W images showed a round, well-demarcated, 14 × 5 × 11 mm hypointense cystic lesion at the vertebral canal just dorsal to the intervertebral disc space between the first and second lumbar vertebra. On the transverse plane, the cyst was located slightly to the right side. The spinal cord deviated dorsally with severe compression (Fig 1A, 1C). On the T2W image, the cystic lesion showed hyperintensity. In addition, the intervertebral disc ventral to the cyst, especially between the 1st and 2nd lumbar vertebra, showed degenerative changes such as decreased disc volume and loss of signal (Fig 1B, 1D). Other MRI findings include mild intervertebral disc disease between the 13th thoracic vertebra and the 1st lumbar vertebra. Analysis of cerebrospinal fluid taken from the cerebromedullary cistern showed no remarkable findings. On MRI findings, the dog could be diagnosed tentatively as having extradural spinal cyst with mild intervertebral disc degeneration.

To alleviate hindlimb neuropathy and decompress the spinal cord, we performed right-side hemilaminectomy between the first and second lumbar vertebra and surgical removal of the cystic component. The dog was anesthetized with 0.6 mg/kg/IV propofol, and the anesthesia was maintained using isoflurane (1.5 MAC) with sternal recumbency. Direct observation of the cyst showed extradural ventral compression of the spinal cord (Fig 2).

The cyst was aspirated and contained about 0.3 ml of serous fluid, and then it was removed completely without adherence to the dura. The bacterial culture of the intracystic

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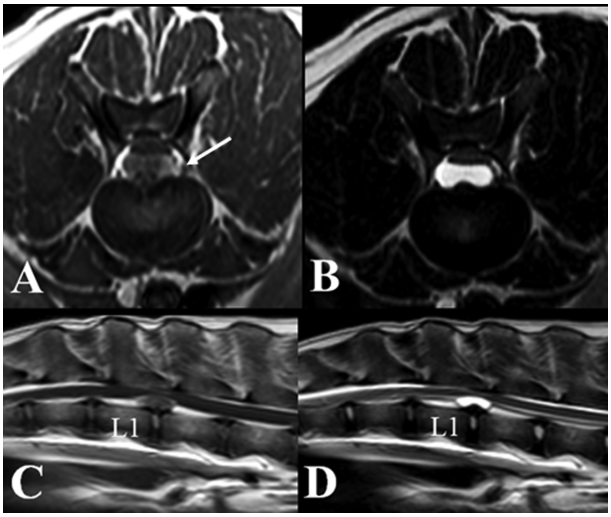

Fig 1. Magnetic resonance imaging shows cystic lesion with cap-like appearance dorsal to the intervertebral disc space. The cyst severely compresses the spinal cord dorsally. The wall of the cyst is contrast enhanced after gadolinium administration (arrow). Note that the intervertebral disc, ventral to the cyst, shows decreased volume and loss of signal. (A: contrast-enhanced, transverse T1-weighted image; B: transverse T2-weighted image; C: contrast-enhanced, mid-sagittal T1-weighted image; D: mid-sagittal T2-weighted image; L1: first lumbar vertebra).

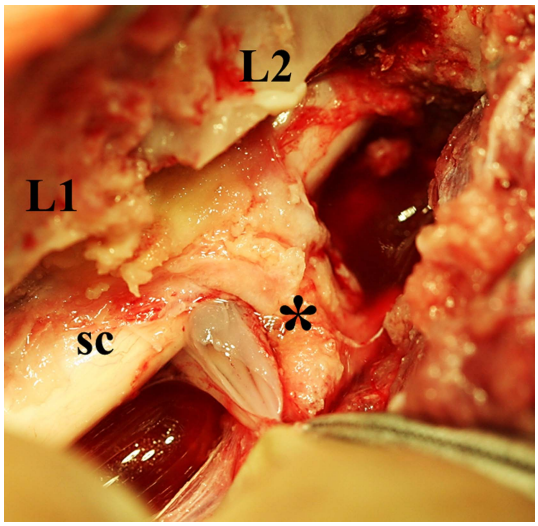

Fig 2. Photo image of discal cyst: the cyst (asterisk) compresses the spinal cord dorsally. (L1: first lumbar vertebra; L2: second lumbar vertebra; sc, spinal cord).

fluid yielded negative findings.

In the histopathologic examination, the specimen showed evenly distributed fibroblasts and collagenous stroma. The wall of the cyst was composed of irregular fibrous tissue with several small nodular areas of cartilaginous material (Fig 3), and showed mild to moderate infiltration of lymphocytes and plasma cells. Rarely, a macrophage contains hemosiderin pigment. There was no neoplastic change.

The dog attempted to stand up 3 days after surgery and completely bore a weight 5 days after surgery. The ataxia of right hindlimb on the neurological examination was disappeared 14 days after surgery. The dog completely and uneventfully recovered from surgery and showed normal gait with no abnormality on neurologic examination after 6 months.

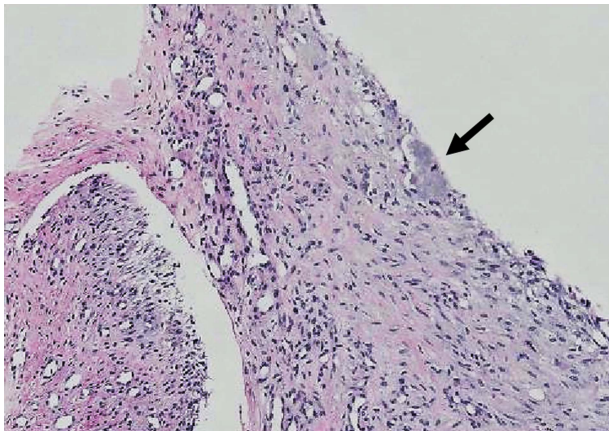

Fig 3. Histopathological image of discal cyst: histopathologic findings of the cyst wall show fibrous tissue with clumps of basophilic disc material (arrow). (× 100, H&E staining).

Discussion

Discal cyst, a new disease entity, is defined as an intraspinal extradural cyst with a distinct communication with the adjacent intervertebral disc (8). It is a rare lesion that can present with spinal radiculopathy similar to that caused by intervertebral disc disease. Discal cyst was first reported in 1999 in humans (13) and similar lesions were reported in 7 dogs in 2008 (12). To our best knowledge, however, this is the first case description of a discal cyst in Korea, and the first presentation of a discal cyst at the lumbar spine in veterinary literature.

Imaging features of discal cysts are well established (2,8, 12,17). Most plain radiographs demonstrate no remarkable findings, such as narrowing of intervertebral disc space, spondylosis, or malalignment (2). MRI is the most sensitive imaging modality for the diagnosis of a discal cyst. The MRI features of discal cysts are round to oval extradural, ventral cystic lesions just dorsal to the intervertebral disc, a cap-like appearance, hypo- to isointensity on T1W images, and hyperintensity on T2W images, with rim enhancement following gadolinium administration. Theoretically, the fluid-attenuated inversion recovery (FLAIR) sequence can be used to differentiate discal cysts from the cerebrospinal fluid-filled structures. Because the FLAIR sequence is highly sensitive to the protein content of fluid in the cysts, however, it can show different signal intensities even in the same lesion (1,9). Indeed, the FLAIR sequence has not been widely used to identify discal cysts in humans (2,14) and based on the previous study (12), discal cysts in dogs show different signal intensities on the FLAIR sequence. For this reason, in the present case, we did not perform FLAIR sequence to evaluate intracystic fluid.

Because of the similarity of cyst features in dogs, such as MRI characteristics, ventral location, and relationship to the adjacent intervertebral disc, one veterinary study considered them analogous to human discal cysts (2,12). Although similar features are seen, there are some differences between

human and canine discal cysts. The location of these cysts in humans is primarily in the lumbar spine region, whereas dogs more commonly show cysts in the lower cervical region (2, 12,14). In addition, discal cysts mainly occur ventrally in dogs but ventrolaterally without crossing the midline in humans (12,13). Upon neurological examination, human patients with discal cysts usually present with chronic lumbar radioculopathy whereas in canine patients, most patients present with acute, non-painful cervical myelopathy (12,15). Lastly, there are some reports that discal cysts erode the adjacent vertebra in humans (13,14), but there have been no reports of bony erosion associated with discal cysts in veterinary medicine.

The causes and pathogenesis of discal cysts remain unclear even in humans, but there are two main hypotheses regarding their formation. One is focal hemorrhage and hematoma formation from the venous plexus following disc herniation, because most of the cysts contain hemosiderin or hemorrhagic fluid (3,12). The other hypothesis posits that discal cysts are caused by focal degenerations of intervertebral discs and collagenous connective tissues (12). In this instance, there was spillage of fluid from the herniated disc material and encapsulated pseudocyst formation. According to this theory, fibrous connective tissue consistent with fragments from the annulus fibrosus and nucleus pulposus can be seen (3,13). In addition, during re-absorption of herniated discs, neovascularization and macrophage infiltration can occur (10). Indeed, on the MRI examination, most patients with discal cysts had adjacent disc disease with a contrast-enhanced cyst wall consistent with neovascularization (12,14). In the present case, we also confirmed the presence of fragments of the herniated disc via histopathologic examination.

Discal cyst treatments include surgical intervention, percutaneous computed tomography-guided aspiration with steroid injection, and conservative treatment, which may be followed by spontaneous regression (2,4,11). In humans, because the cysts mainly occur at the lumbosacral region, hemilaminectomy or dorsal laminectomy are the most common treatment procedures. In dogs, because the cysts mainly occur at the cervical region, ventral slot surgery is the usual treatment. Although the prognosis of discal cysts is usually good, surgical treatment is recommended because recurrence is more likely if the cyst is only partially removed (2,14). One study reported that 15 dogs with presumed discal cysts or hydrated nucleus pulposus extrusions syndrome successfully recovered after conservative or surgical therapy (15). In the present case, we surgically removed the cyst successfully, and the dog had an excellent prognosis at the 6-month follow-up.

Intraspinal cystic lesions, such as synovial cyst, ganglion cyst, meningeal cyst, and extradural arachnoid cyst, are the possibilities considered in the differential diagnosis of discal cysts (6,13,15,17). There have, however, been no reports of these cysts in connection with the intervertebral disc. Synovial cyst and ganglion cyst mainly arise from the dorsolateral epidural space. These cysts are filled with synovial fluid and are connected to the dorsal intervertebral joints (5,13,15,18). Histopathologically, the walls of ganglion cysts are made up of connective tissues, and lack synovial lining cells (13). Dermoid and epidermoid cysts are skin and subcutaneous lesions with connections to the vertebral canal or intramedullary. These cysts appear hyperintense on T1W and T2W images, without contrast enhancement (6,13). Meningeal cysts, as described in Shar Pei dogs, involve the dorsal subarachnoid space at the level of the 12th thoracic vertebral body (7). Extradural arachnoid cysts are mainly located in the thoracic spine and dorsal aspect of the dural sac without rim-enhancement (6,13,16).

The limitations of the present case include our inability to perform discography in order to confirm communication between the cyst and the intervertebral disc. That being noted, discography has usually not been performed in human patients either, due to the distinct features of discal cysts evident in MRI examination, and the pathological features such as fibrous pieces of annulus fibrosus and necrotic nucleus pulposus (15). In addition, because the dog in this case was admitted for a dental check-up, we could not identify the onset and severity of the neurological signs. We concluded, however, that the cyst lesion in this case was a discal cyst based on the MRI findings and contrast-enhanced pattern, anatomical location, adjacent disc degeneration, and the presence of fragmented disc materials evident on histopathologic examination.

Conclusion

Discal cyst is a rare cause of neuropathy in dogs. When a cyst appears hypo- to isointense on a T1W image with rim enhancement and hyperintense on a T2W image, especially just dorsal to the intervertebral disc, and displays a cap-like appearance, a diagnosis of discal cyst should be considered.

References

1. Aprile I, Iaiza F, Lavaroni A, Budai R, Dolso P, Scott CA, Beltrami CA, Fabris G. Analysis of Cystic Intracranial Lesions Performed with Fluid-Attenuated Inversion Recovery MR Imaging. Am J Neuroradiol 1999; 20: 1259-1267.
2. Aydin S, Abuzayed B, Yildirim H, Bozkus H, Vural M. Discal cysts of the lumbar spine: report of five cases and review of the literature. Eur Spine J 2010; 19: 1621-1626.
3. Chiba K, Toyama Y, Matsumoto M, Maruiwa H, Watanabe M, Nishizawa T. Intraspinal cyst communicating with the intervertebral disc in the lumbar spine: discal cyst. Spine 2001; 26: 2112-2118.
4. Chou D, Smith JS, Chin CT. Spontaneous regression of a discal cyst. J Neurosurg Spine 2007; 6: 81-84.
5. Dickinson PJ, Sturges BK, Berry WL, Vernau KM, Koblik PD, LeCouteur RA. Extradural spinal synovial cysts in nine dogs. J Small Anim Pract 2001; 42: 502-509.
6. Gavin PR, Bagley RS. Practical Small Animal MRI. Wiley-Blackwell: Iowa 2011; 123-226.
7. Hardie RJ, Linn KA, Rendano VT. Spinal meningeal cyst in a dog: a case report and literature review. J Am Anim Hosp Assoc 1996; 32: 477-480.
8. Hwang JH, Park IS, Kang D-H, Jung J-M. Discal Cyst of the Lumbar Spine. J Korean Neurosurg. Soc. 2008; 44: 262-264.
9. Kates R, Atkinson D, Brant-Zawadzki M. Fluid-attenuated inversion recovery (FLAIR): clinical prospectus of current and future applications. Top Magn Reson Imaging 1996; 8: 389-396.
10. Kobayashi S, Takeno K, Uchida K, Yayama T, Nakajima

H, Miyazaki T, Guerrero A, Baba H. Pathogenesis of the discal cysts communicating with an adjacent herniated disc. Histological and ultrastructual studies of two cases. Joint Bone Spine 2010; 77: 184-186.
11. Koga H, Yone K, Yamamoto T, Komiya S. Percutaneous CT-guided puncture and steroid injection for the treatment of lumbar discal cyst: a case report. Spine 2003; 28: E212-216.
12. Konar M, Lang J, Flühmann G, Forterre F. Ventral intraspinal cysts associated with the intervertebral disc: magnetic resonance imaging observations in seven dogs. Vet Surg 2008; 37: 94-101.
13. Kono K, Nakamura H, Inoue Y, Okamura T, Shakudo M, Yamada R. Intraspinal Extradural Cysts Communicating with Adjacent Herniated Disks: Imaging Characteristics and Possible Pathogenesis. Am J Neuroradiol 1999; 20: 1373-1377.
14. Lee HK, Lee DH, Choi CG, Kim SJ, Suh DC, Kahng SK, Roh SW, Rhim SC. Discal cyst of the lumbar spine: MR imaging features. Clin Imaging 2006; 30: 326-330.
15. Lowrie ML, Platt SR, Garosi LS. Extramedullary Spinal Cysts in Dogs. Vet Surg 2014; 43: 650-662.
16. Rylander H, Lipsitz D, Berry WL, Stages BK, Vernau KM, Dickinson PJ, Añor SA, Higgins RJ, LeCouteur RA. Retrospective Analysis of Spinal Arachnoid Cysts in 14 Dogs. J Vet Intern Med 2002; 16: 690-696.
17. Thrall DE. Textbook of Veterinary Diagnostic Radiology. Elsevier Health Sciences, 2013; 194-221.
18. Webb AA, Pharr JW, Lew LJ, Tryon KA. Mr Imaging Findings in a Dog with Lumbar Ganglion Cysts. Vet Radiol Ultrasound 2001; 42: 9-13.

말라뮤트 개에서 발생한 디스크 낭종 증례

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요 약 : 7년령 수컷 말라뮤트 견이 정기적인 치과진료를 목적으로 내원하였다. 신체검사 상에서 뒷다리의 운동 실조가 확인되었으며, 우측 뒷다리의 고유 자세반응이 미약하게 지연되었다. 감별진단을 위한 MRI 검사에서, 허리뼈 1번과 2번 사이 척수강에 경막외 낭종이 확인되었다. 낭종은 디스크 바로 등쪽에서 척수실질 배쪽을 등쪽으로 심하게 압박하고 있었으며, T1 저신호, T2 고신호 및 낭종 벽을 따라 조영증강이 확인되었다. 편측성 추궁절제술을 통해 낭종을 제거하였고, 조직검사 결과 낭종의 벽은 섬유소 및 섬유아세포가 혼재되어 있었으며 일부분에서 호염성 디스크 물질이 확인되어 디스크 낭종으로 진단하였다. 환자는 수술 후 신경증상은 정상적으로 회복하였으며, 6개월 후 신체검사에서 정상적인 보행 이 관찰되었다.

주요어 : 디스크 낭종, 경막외척수낭종, 개