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A Case of Ependymoma in a Dog; Computed Tomography, Histopathological and Immunohistochemical Findings

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Abstract : An 11-year-old intact female Maltese was referred because of 1 week history of cluster seizure episodes. Based on brain CT scan, brain tumor was strongly suspected. The patient was euthanized according to client's request and we performed necropsy after euthanasia. The gross findings of the postmortem coronal sections of the brain showed that the mass was relatively well-demarcated, reddish in colored, and was present inside the left lateral ventricle and compressed adjacent tissues. The tumor mass had 2 distinct histopathological features: perivascular pseudorosette-like structures and a whirl-like arrangement of fibrillary cells. The immunohistochemical profile showed strong GFAP positivity and moderate S-100 expression, sparsely dotted staining with Ki-67. Based on the histopathological and immunohistochemical findings, the present case diagnosed to ependymoma.

Key words **:** ependymoma, computed tomography (CT), dog.

Introduction

Ependymoma is rare central nervous system (CNS) tumor in small animals (1,4-6,8,9). Ependymoma arise from the ependymal cell lining of the ventricular system of brain and the spinal cord (4,5).

This case report demonstrated that clinical and computed tomographic (CT) features, histopathological and immunohistochemical findings of ependymoma in a dog.

Case

An 11-year-old intact female Maltese, weighing 5.2 kg, was referred to the Gyeongsang National University Animal Medical Center because of 1 week history of cluster seizure episodes. The patient had no history of exposure to toxins or head trauma; moreover, it had no medical problems before this presentation. Physical and neurological examinations showed no neurological signs except mild depression. During neurological examination, the patient experienced several tonic-clonic seizures. Complete blood counts and serum biochemical examinations, radiography and urinalysis did not show any remarkable findings.

Brain CT scan was performed to rule out structural brain lesion. Non-contrast images showed an ill-defined hypoattenuating lesion that was incompletely surrounded by irregular hyperattenuating lesion (Fig 1C) in the left frontal lobe. Furthermore, nodular calcification was identified in the left temporo-occipital lobe (Fig 1E). Administration of contrast medium revealed peripheral ring enhancement of the hypoattenuating lesion, and excessive and patchy enhancements around the calcified lesions. Contrast enhanced CT images showed that the falx cerebri was shifted to the right side around the enhancing lesions.

After the CT scan, the patient was tentatively diagnosed with a brain tumor and was euthanized according to client's request. A necropsy was performed after euthanasia and the gross findings of the postmortem coronal sections of the brain showed that the mass was relatively well-demarcated, reddish in colored, and was present inside the left lateral ventricle and compressed adjacent tissues (Fig 2). The formalin-fixed paraffin embedded brain tissue was sectioned into 4 μm slices and stained with hematoxylin and eosin (H&E), for histopathological examination (Figs 3A, B, and C). Microscopic examination showed that brain tissues remote from the mass were relatively normal, but the parenchyma adjacent to the lateral ventricle showed perivascular infiltration of tumor cells. The tumor mass had 2 distinct histopathological features: perivascular pseudorosette-like structures and a whirl-like arrangement of fibrillary cells. The tumor cells of the pseudorosette-like lesion had round to oval shape nuclei and variable amounts of cytoplasm, but the tumor cells from

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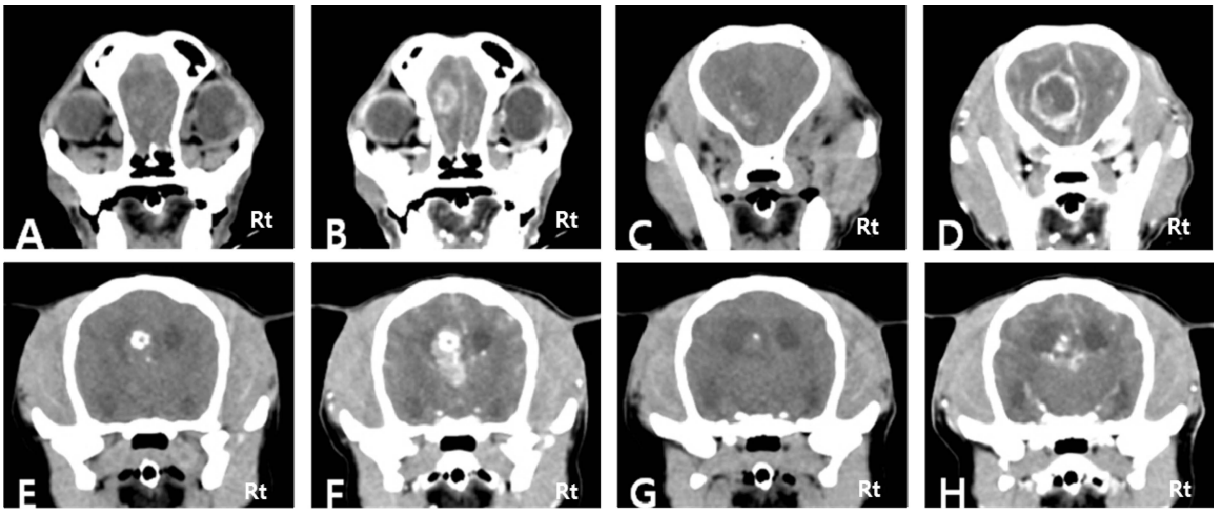

Fig 1. Transverse pre-contrast (A, C, E, and G) and post-contrast (B, D, F, and H) brain computed tomography images obtained at the level of the range from the rostral fossa to the lateral ventricle. Pre-contrast images show an ill-defined hypoattenuating lesion with a peripheral irregular hyperattenuating lesion in the left frontal lobe, and nodular calcification in the left temporo-occipital lobe. Post-contrast images show peripheral ring enhancement of a hypoattenuating lesion. The falx cerebri is shifted to the right side around the enhancing lesions.

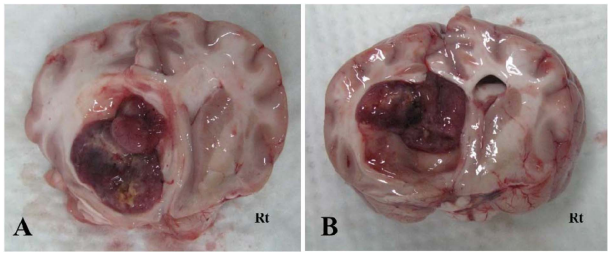

Fig 2. Necropsy findings of the present case. The mass is relatively well demarcated and reddish colored, and present within the left lateral ventricle and compressed adjacent tissues.

the whirl-like lesion had more elongated nuclei with fibrillary cytoplasm. True rosettes were not observed, and mitotic figures were hardly seen. The immunohistochemical profile showed strong glial fibrillary acidic protein (GFAP) positivity and moderate S-100 expression and sparsely dotted staining with Ki-67 (Fig 3).

Histopathological and immunohistochemical findings showed that the mass had features of ependymoma.

Discussion

According to previous reports (3,7,10), CT images of ependymoma revealed isodense or mildly hyperdense soft tissue portions of the tumor, calcifications in 50% of lesions, hemorrhage in approximately 10% and often heterogeneous enhancement. Magnetic resonance imaging (MRI) of intracranial ependymoma demonstated hypointensed T1-weighted images, hyperintensed T2-weighted images, and intermediate-to-hyperintensed fluid-attenuated inversion recovery (FLAIR) images (10). In most brain tumor cases, generally, MRI provides better images and informations compared to CT. However, CT is generally more sensitive for, and will demonstrate a greater number of, calcifications than most MRI sequences (10). The CT finding obtained in our case showed ill-defined hypoattenuating lesion that was incompletely surrounded by irregular hyperattenuating lesion and calcified lesion on non-contrast CT images, and contrast-enhanced lesion was also found after administration of contrast medium. Those CT findings were similar with previous description of ependymoma (3,7,10). However, our findings were non-specific, suggesting an intracranial mass on the CT images. We were unable to find any specific lesions on the CT scan that could differentiate the tumor observed in our case from other brain tumors.

Ependymoma is an uncommon tumor in domestic animals that is usually localized in the ventricle, has good vascular formation with high cellularity, and is characterized by perivascular pseudorosette formation and occasional true rosettes (2,4, 5). Ependymoma have round to oval nuclei, fibrillary cytoplasm with indistinct cell margins, low mitotic figures, and strong expression of GFAP immunoreactivity especially in pseudoresettes, and expression of S100 protein (4,5).

In the present case, the tumor cells of the pseudorosette-like lesion had round to oval shape nuclei and variable amounts of cytoplasm. True rosettes were not observed, and mitotic figures were hardly seen. Moreover, the tumor in the present case showed positive for GFAP, S-100, and Ki-67. These histopathological and immunohistochemocal findings suggested that the tumor in the present case had features similar to ependymoma.

In summary, we have documented the CT images and histological and immunohistochemical features of ependymoma in a dog.

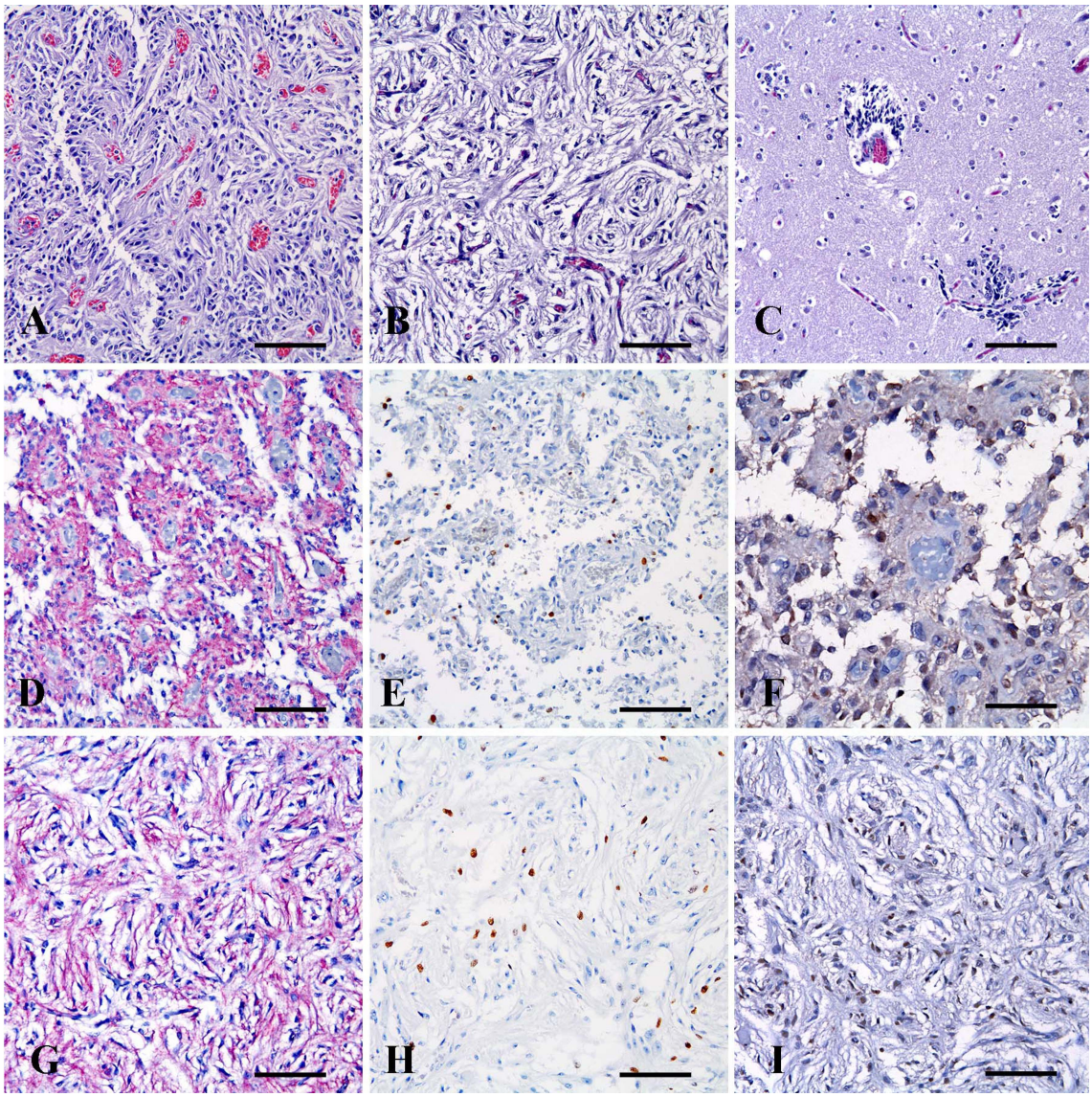

Fig 3. Histopathological and immunohistochemical findings of the present case. A, Pseudorosette structure of the tumor mass. Hematoxylin and eosin (H&E) staining. Bar = 98 μm; B, Fibrillary form of the tumor mass. H&E staining. Bar = 98 μm; C, Tumor infiltration of the adjacent brain parenchyma. H&E staining. Bar = 98 μm; D and G, Glial fibrillary acidic protein (GFAP) positive tumor cells from the pseudorosette (D) and fibrillary (G) tumor lesion. Bar = 98 μm; E and H, Ki-67 positive tumor cells from the pseudorosette (E) and fibrillary (H) tumor lesion. Bar = 98 μm; F and I, S-100 positive tumor cells from the pseudorosette (F) and fibrillary (I) tumor lesion. Bar = 49 μm (F), Bar = 98 μm (I).

Acknowledgments

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References

1. Borrelli A, Mattiazzi L, Capucchio MT, Biolatti C, Cagnasso A, Gianella P, D'Angelo A. Cachexia secondary to intracranial anaplastic (malignant) ependymoma in a boxer dog. J Small Anim Pract 2009; 50: 554-557.
2. Godfraind C. Classification and controversies in pathology of ependymomas. Childs Nerv Syst 2009; 25: 1185-1193.
3. Haque MZ, Karim ME, Al-Azad S, Mahmood-uz-jahan. Role of computed tomography in the evaluation of pediatric brain tumor. Bangladesh Med Res Counc Bull 2010; 36: 598-611.
4. Koestner A, Bilzer T, Schulman FY, Summers BA, Van Winkle TJ. World Health Organization: Histological Classification of Tumors of the Nervous System of Domestic Animals, Armed Forces Institute of Pathology, Washington, DC; 1999: 17-27.
5. Koestner A, Higgins RJ. Tumors of the nervous system. In: Tumors in Domestic Animals. Iowa, US: Iowa State Press;

2002: 712-723.
6. Michimae Y, Morita T, Sunagawa Y, Sawada M, Okamoto Y, Shimada A. Anaplastic ependymoma in the cervical spinal cord of a maltese dog. J Vet Med Sci. 2004; 66: 1155-8.
7. Swartz JD, Zimmerman RA, Bilaniuk LT. Computed tomography of intracranial ependymomas. Radiology 1982; 143: 97-101.
8. Traslavina RP, Kent MS, Mohr FC, Dickinson PJ, Vernau KM, Bollen AW, Higgins RJ. Clear cell ependymoma in a dog. J Comp Pathol 2013; 149: 53-56.
9. Vural SA, Besalti O, Ilhan F, Ozak A, Haligur M. Ventricular ependymoma in a German Shepherd dog. Vet J 2006; 172: 185-187.
10. Yuh EL, Barkovich AJ, Gupta N. Imaging of ependymomas: MRI and CT. Childs Nerv Syst 2009; 25: 1203-1213.

개에서 발생한 뇌실막종 증례; 컴퓨터 단층영상, 조직병리학적 그리고 면역조직화학적 소견

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요 약 : 11살의 암컷 말티즈견이 1주일간의 군집성 발작을 주증상으로 내원하였다. 뇌 컴퓨터 단층영상 결과를 기초로 뇌종양이 강하게 의심되었다. 보호자의 요청에 따라 환자의 안락사를 실시하고 부검이 진행되었다. 부검 상 뇌의 가로단면의 육안적인 소견은, 붉은색의 종양덩어리가 비교적 잘 구분되어있었고 왼쪽 외측 뇌실에 위치해 있었으며 주변 조직들이 압박되어 있었다. 종양덩어리는 2가지의 독특한 조직병리학적인 소견을 보였다: 혈관주위 거짓로제트 양상의 구조와 원섬유 세포의 소용돌이 구조. 면역조직화학적 검사에서 GFAP에 대한 강한 양성, S-100에 대한 중등도의 양성, Ki-67에 대한 드문드문한 점상 염색성이 확인되었다. 조직병리학적 및 면역조직화학적 소견을 기초로 이 환자는 뇌실막종으로 진단되었다.

주요어 : 뇌실막종, 컴퓨터 단층영상, 개