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Gemistocytic Astrocytoma: a Case Report

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Introduction

The astrocytomas are neoplasic transformation of the astrocytes. They can be classified as protoplasmic and fibrillary astrocytes situated in the grey and white matter respectively. The astrocytes are cells which have an important immunologic function and may become active in the presence of central nervous system lesion (infarct-malacia, trauma, infection and neoplasia). The reactive astrocytes show a visible cytoplasm, excentrically located nucleus and show an increased size when compared with normal astrocytes. This type of cell is called gemistocyte.

Astroglial tumors are identified in 12-18% of all central nervous system neoplasias in the dog. Their localization is described to be mainly in the rostrotentorial compartment, although descriptions have been made of cerebellar astrocytomas in young people and animals. Recent studies exist that show genetic alterations in the gene p53 and genes responsible for the epithelial growth factor (EGFR) which are related to the degree of malignancy, as described in human medicine.

Depending on the classification used, several astrocytomas can be identified. The classical nomenclature (Kernohan, WHO) uses a 1-to-4 grading, with the first indicating a low grade and the last a high grade. This classification has a prognostic value. Burger et al. classify the astrocytomas in 3 variants: astrocytoma, anaplastic astrocytoma and glioblastoma multiforme, the last one showing the highest grade of malignancy. The astrocytomas can be further classified according to their histologic origin: protoplasmic, fibrillary, pilocytic and gemistocytic.

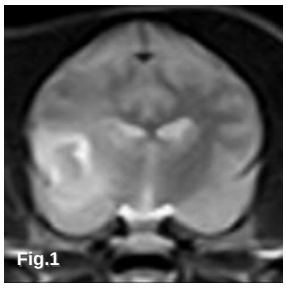
Fig.1

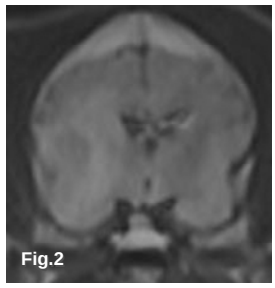
Fig.2

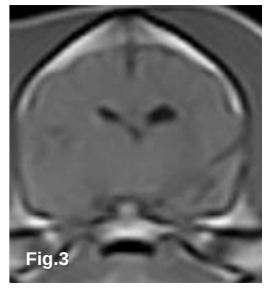
Fig.3

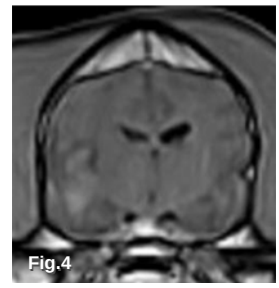
Fig.4

MRI study. Transverse images at the level of the 3rd ventricle showing the mass in the rigth temporal cortex and pyriform lobe. Fig.1 hyperintensity T2W, fig.2 hyperintensity sorrounding the lession in FLAIR, fig.3 hypointensity in T1W and fig.4 moderate contrast enhancement in T1W imaes.

Clinical Case

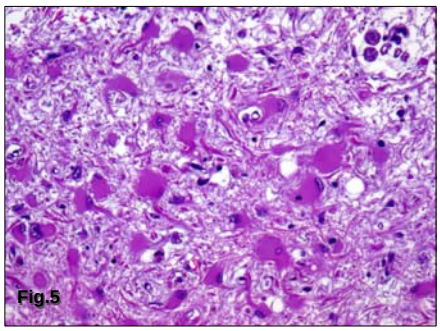
Fig.5

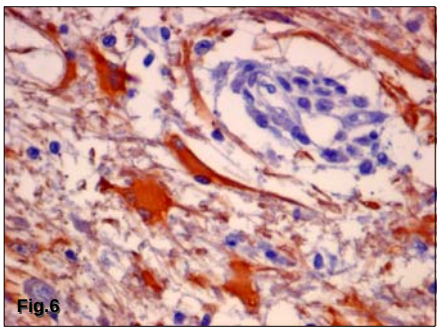
Fig.6

Pathology findings. Fig.5 H&Ex20. A large population of gemistocytes were seen in the white matter and internal capsule. Fig.6 GFAPx40. Positivity to glial fibrillar acidic protein.

A 13 year-old female cocker was presented in the emergency service for seizures that had started a few minutes before. On anamnesis, the owner commented that the patient presented increased agressivity, nervousness and barking behavior. No signs of systemic illness were detected.

Hospitalization was recommended to control the convulsions with phenobarital (3 mg/kg/BID) and to perform a diagnostic work-up. Complete bloodwork, bile acids and urinalysis were normal. The patient presented 2 more seizures during the first 24 hours of hospitalization. MRI study (Esaote vet-MRI) was performed 4 days later. The study consisted of a series of T1W and T2W, FLAIR and protonic density of the encephalus, before and after administration of gadolinium (gd-DTPA). A mass was detected at the level of the pyriform lobe and the right temporal cortex showed a hyperintense signal in T2W, protonic density and FLAIR and a hypointense signal in T1W. The ventricular system showed a displacement to the left side. The contrast enhancement by that tissue was poor. A differential diagnosis of primary neoplasia (glioma) or inflammatory disease was made. The CSF was within normal parameters in cytology (0 cells/microlitter), physical properties and Pandy test. A presumptive diagnosis of glioma was made and the patient was discharged with phenobarbital (3mg/kg/BID PO) and lomustine (CCNU) (60mg/m2 every 6 weeks). The patient did not present any clinical signs following hospitalization and phenobarbital levels were within therapeutic levels (22 mcg/dl).

The patient was admitted again 4 months after initial case presentation with disorientation, depressed mental status, compulsive walking, circling to the right side, blindness and deafness of acute presentation. The owner decided on euthanasia. At necropsy, a mass in the right cerebral temporal cortex that presented loss of normal neuropyl structure affecting mainly the white matter was identified. The lesion extended to the basal nuclei (c. striatum) and diencephalus affecting mainly the white matter and internal capsule. On microscopic inspection it presented a fibrillar appearance, and a great number of gemistocytes of altered morphology. Enlarged star-shaped cells with increased eosinophilic cytoplasm, with some degree of vacuolization and marked citoplasmatic prolongation were observed. The nucleus presented an excentric position with lax chromatin and in some instances more than one nucleolus was present. No mytosis were observed and the grade of anisokaryosis and anisocytosis was considered moderate. The gemistocytes infiltrated the adjacent grey matter mixing with normal neuronal bodies. Several perivascular cuffs composed of mononuclear cells were identified (foamy macrophages) in the vasculature of the affected tissue. The lesion was markedly positive to the glial fibrillary acidic protein (GFAP). Gliosis surrounding the lesion was also present. The final diagnosis was gemistocytic astrocytoma an uncommon variant of astrocytoma.

Discussion

The gemistocytes are activated astrocytes and can be found in central nervous system inflammation, mainly in the necrotizing presentations. In this case, a neoplastic nature of the gemistocytes can be considered, since their localization was within normal tissue and no the areas that presented inflammation. Furthermore, the gemistocytes were positive to GFAP and presented anisocytosis and anisokaryosis.

In the published bibliography we managed to locate 3 confirmed cases of gemistocytic astrocytoma in dogs, which indicates the low frequency of this presentation, the fibrillary and the protoplasmic being the more frequent. Generally, the astrocytomas are presented in the rostrotentorial compartment as well defined masses. Six gemistocytic astrocytomas were observed, mainly with cerebellar localization (R. J. Higgins- personal communication).

Acknowlegdements

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