2017 Northeastern Veterinary Pathology Conference – Joint Pathology Center April 1-2

Case Submission Form

NEVPC CASE #16

IDENTIFICATION NUMBER ON SOURCE MATERIAL: 188674-16, Cornell University

INSTITUTION: [1]Cornell University, College of Veterinary Medicine, Department of Biomedical Sciences, Section of Anatomic Pathology

SIGNALMENT: 6 year old, male neutered, English bulldog

HISTORY: 5.5 month history of progressive ataxia of the pelvic limbs, worse on the right to eventual non-ambulation. Neurological examination localized the lesion to thoracolumbar (T3-L3) spinal cord section. The dog was euthanized and submitted to Cornell University for necropsy.

GROSS FINDINGS:

Gross examination reveals no significant gross lesions.

HISTOPATHOLOGIC FINDINGS:

From approximately T6 to L5, the white matter, and to a lesser extent, the gray matter has a multifocal to coalescing, poorly demarcated, unencapsulated, dense infiltrate of neoplastic cells throughout the parenchyma. Neoplastic cells have distinct cell margins, a scant amount of cytoplasm, and round to elongated nuclei with hyperchromatic chromatin and indistinct nucleoli. No mitotic figures are noted in ten 400X fields. There are mild anisocytosis and anisokaryosis. The marginal distinction between the white and gray matter is often multifocally to completely obscured by the neoplastic cells. The affected white matter has variable numbers of swollen axons (spheroids) and myelin degeneration and vacuolation. The proximal sections of the thoracic spinal cord are relatively normal outside of scattered myelin vacuolation and degeneration.

Immunohistochemistry:

Olig2 (transcription factor expressed predominately in neoplastic glial cells (both oligodendrocytes and astrocytes)): ~60% of the neoplastic cells have strong intranuclear immunoreactivity.

GFAP (intermediate filament of astrocytes): Approximately 20-30% of the neoplastic cells have moderate intracytoplasmic immunoreactivity.

CNPase (myelinating enzyme): Rare neoplastic cells have faint cytoplasmic immunoreactivity.

Iba1 (calcium binding protein, pan-macrophage): Neoplastic cells have no immunoreactivity.

MORPHOLOGIC/ETIOLOGIC DIAGNOSIS:

Mid thoracic to lumber spinal cord: Gliomatosis cerebri

DISCUSSION:

Gliomatosis cerebri is a glial neoplasm that has wide and diffuse infiltration of the central nervous system in at least three separate brain lobes or throughout the spinal cord[1]. Traditionally gliomatosis cerebri is generally classified as type I or type II. Type I lacks the formation of a mass and is characterized by diffuse parenchymal infiltration with relative preservation of normal architecture and type II features a mass formation with ill-defined margins in addition to the widespread infiltration[2]. Although gliomatosis cerebri is still recognized and diagnosed in veterinary neuropathology, the diagnosis of gliomatosis cerebri in human neuropathology has recent been fallen out of favor. Most cases of gliomatosis cerebri in humans are now diagnosed on the molecular level and grouped accordingly (i.e. diffuse astrocytoma), and it is a descriptive term of the growth pattern (i.e. gliomatosis cerebri growth pattern)[3]. Gliomatosis cerebri is rare in veterinary species with dogs most commonly affected although reports also exist in cats and a goat[4 – 17]. Brain involvement is more common than the spinal cord involvment[5,10,12, 13], which is consistent with the incidence of spinal cord gliomas in dogs, which are relatively uncommon compared to their counterparts in the brain[13]. In the affected dogs with gliomatosis cerebri, ages ranged from 3 to 11 years[4 – 11, 16, 17]. No clear breed predilection is evident in dogs although brachycephalic breeds seem to predominante[12, 13, 18]. As in human cases, gliomatosis cerebri in dogs affects white matter more than gray matter[8,9,10]. This case represents a type I gliomatosis cerebri with the involvement of both gray and white matter where the white matter in more severely affected.

Neoplastic cells in most human gliomatosis cerebri cases are astrocytic in origin, although oligodendroglial and mixed phenotypes have been described[2,19]. Gliomatosis cerebri in veterinary medicine is currently classified as glial origin; however, the origin of the neoplastic cells in the canine cases is still controversial, as they often have variable GFAP immunoreactivity[4 – 11, 18, 20, 21]. Some reports indicate immunopositivity with Olig2[7, 12], nestin[5,8,11], vimentin[5,7], CD18[5] and Iba1[11]. In this case, immunohistochemical stains support an astrocytic origin.

REFERENCES:

1. Higgins RJ., Bollen AW., Dickinson PJ., Siso-Llonch S. (2017). Tumors of the Nervous System. In: Tumors in Domestic Animals, ed. Meuten D.J. 5th edition. Ames: Wiley Blackwell, p 837-844
2. Louis DN., Ohgaki H., Wiestler OD., Cavenee WK., eds. (2007). WHO Classification of Tumors of the Central nervous System. 4th edn. Lyon, IARC, 2007, p 90-91
3. Louis DN., Ohgaki H., Wiestler OD., Cavenee WK., eds. (2016). WHO Classification of Tumours of the Central nervous System. Revised 4th edn. Lyon, IARC, 2016, p 23, 27, 30
4. Ricciardi M., DeSimone A., Giannuzzi P., et al. (2014). Bilateral Telencephalic Gliomatosis Cerebri in a Dog. Case Reports in Vet Med, 2014, p 1-5

5. Plattner BL., Kent M., Summers B., Platt SR., et al. (2012). Gliomatosis Cerebri in Two Dogs. J Am Anim Hosp Assoc, 48, 359-365.
6. Martin-Vaquero P., DaCosta RC., Wolk KE., et al. (2012). MRI Features of Gliomatosis Cerebri in a dog. Vel Radiol Ultrasound, 53(2), p 189-192
7. Fabiano JF., deSant A., Barros CSL. (2011.) Gliomatosis Cerebri in a Dog. Braz J Vet Pathol, 4(1), p 58-61
8. Galan A., Guil-Luna S., Milan Y., et al. (2010). Oligodendroglial Gliomatosis cerebri in a Poodle. Vet Comp Onc, 8, p 254-262
9. Gruber A., Leschnik M., Kneissl S., Schmidt P. (2006). Gliomatosis cerebri in a dog. J Vet Med, 53, p 435-438
10. Porter B., De Lahunta A., and Summers B. (2003). Gliomatosis Cerebri in Six Dogs. Vet Pathol, 40, p 97-102
11. Ide T., Uchida K., Kikuta F. et al. (2010). Immunohistochemical characterization of canine neuroepithelial tumors. Vet Pathol, 47, p 741-750
12. Bentley RT., Burcham GN., Heng HG., et al. (2014). A comparison of clinical, magnetic resonance imaging and pathological findings in dogs with gliomatosis cerebri, focusing on cases with minimal magnetic resonance imaging changes. Vet Comp Onc, 14, 3, p 318-330
13. Rissi DR., Barber R., Burnum A. (2017). Canine spinal cord glioma: a case series and review of the literature. Vet Diagn Invest, 29(1), p 126-132
14. Shrader S., Lai S., Cline K., Moon R. (2016). Gliomatosis Cerebri in the Brain of a Cat. Vet Sci, 3(13), p1-9
15. Hammond JJ., deLahunta A., Glass EN., et al. (2014). Feline spinal cord gliomas: clinicopathological and diagnostic features of seven cases. J Vet Diagn Invest, 26, p 513-520
16. Jelinek F. (2013) Gliomatosis of the spinal cord in a cat: a case report. Veterinarni Medicina, 58(6), p 331-337
17. Braun U., Hilbe M., Ehrensperger F. (2005). Clinical and pathological findings in a goat with cerebral gliomatosis. Vet J, 170, p 381-383
18. Cantile C., Youssef S. Nervous System. (2016). In: Jubb, Kennedy, and Palmer's Pathology of Domestic Animals, ed. Maxie M.G. 6th edition. Philadelphia: Elsevier, vol 1, p 398-400
19. Artigas J., Cervos-Navarro J., Iglesias JR, et al. (1985) Gliomatosis cerebri: clinical and histological findings. Clin Neuropathol, 4(4), p 135-148
20. Koestner A., Bilzer T., Fatzer R., et al. (1999). Histological classification of tumor of the nervous system of domestic animals. World Health Organization International Histological Classification of Tumors of Domestic Animals. 2nd series. Washington, DC: Armed Forces Institute of Pathology, vol. V, 1999, p 17-27
21. Summers BA., Cummings JF., de Lahunta A. (1995). Veterinary Neuropathology. 1st edition. St. Louis[etc.]: Mosby, p 380