

**ACVR CT/MRI society – Case of the Month
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This month's case was provided by:

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- **Signalment:**
 - 10-year-old MN Italian Greyhound

- **History:**
 - Progressive asymmetrical tetraparesis (left greater than right)
 - Clinical signs began in the left pelvic limb approximately 6 days prior to presentation. 5 days prior to presentation the left thoracic limb was also affected.
 - Around a similar time, a firm lump was appreciated along the dorsal skull.
 - This lump was aspirated at the rDVM prior to presentation and was non-diagnostic.
 - Not painful.
 - No seizures.

- **Study performed:**
 - Brain MRI (pre and post contrast). 1.5T GE Signa.
 - Imaging sequences include:
 - Pre-contrast: Sagittal T2, Dorsal T2, Transverse T2, Transverse T1, Transverse FLAIR, Transverse T2*, 3DT2 FSE, Dorsal STIR.
 - Post-contrast: Transverse T1 fat-sat, Dorsal T1, Sagittal T1.

- **Findings:**
 - A peripherally contrast enhancing extra-axial isointense mass is noted within the right dorsal frontal lobe. A moderate amount of peritumoral hyperintensity (likely edema) is noted within this region. Moderate right lateral ventricular compression and left falx cerebri shift is noted. Moderate regional meningeal thickening and contrast enhancing is noted along the dorsal aspect of the right frontal lobe extending to the left of midline.
 - Within the dorsal superficial soft tissues of the left and right frontal bone near the level of the extra-axial mass lesion, a rounded T1 mixed to isointense, T2 hyperintense, heterogeneously contrast enhancing mass is present. This mass outwardly deforms the lateral cutaneous margin in this region. The calvarium at this level is subjectively mildly thick with multiple T1 and T2 hypointensities.
 - Severe thinning of the frontal bone is noted at the level of the orbital sinuses with loss of normal diploic bone architecture.
 - Cranial to this, within the right frontal sinus, a rounded contrast enhancing T1/T2 isointensity is noted.
 - No brain herniation noted.

- **Conclusions:**
 - The primary differential for the findings was a soft tissue sarcoma or chondrosarcoma. Less likely, a non-mineralized surface osteosarcoma/MLO or round cell neoplasia such as lymphoma.
 - Conclusion comments (ie. Other thoughts I had):
 - Given the appearance of the mass, pattern of contrast enhancement, meningioma was considered not likely despite reports of extra-calvarial extension.
 - No evidence or history of penetrating wound or associated soft tissue changes suggestive of a penetrating lesion.
 - Although no overt lesions of complete frontal bone lysis is identified, it is highly likely that these lesions are associated with one another communicating through small not identified regions of lysis that are not definitively identified.
- **Outcome/Follow up:**
 - A craniotomy was performed and the extra-axial mass was debulked, the dorsal soft tissues mass was excised with approach. Both were submitted for histopathology. Trephination of the frontal sinus was not performed.
 - Histopathology result (w/immunohistochemical staining): Histiocytic sarcoma.
 - Results indicated that there is involvement of bone, however not apparent whether the neoplasm arose from the bone or if it was invaded.
- **Case Comments:**
 - I found this case to be very interesting and hope you did as well. To my knowledge, extracalvarial extension or flat bone origin intracranial histiocytic sarcoma has not been reported. Extracalvarial extension however has been associated with suspected pressure atrophy in a meningioma¹. A clear demarcation of lysis, as seen in that case, was not apparent in this case.
 - Intracranial histiocytic sarcoma is noted to have a varying appearance of sometimes having characteristics similar to meningioma and other more similar to encephalitis².
 - T2W imaging characteristics and characteristics on MR-angiography (MRA) have been suggested in determining intra-cranial meningioma from intracranial histiocytic sarcoma³. The imaging characteristics of this mass on T2W imaging are similar to those suggested by these authors. MRA was not performed.
 - The use of diffusion weighted imaging (DWI) and fractional anisotropy (FA) may also allow for further differentiation between histiocytic sarcoma and meningioma⁴. DWI or diffusion tensor imaging generating FA was not performed in this patient.

- References:
 - 1-Mercier, M, et al. Imaging Diagnosis—Hyperostosis Associated with Meningioma in a Dog. *Vet Radiol Ultrasound*. 2007, 48(5):421-423
 - 2- Tamura, A, et al. MR imaging of histiocytic sarcoma of the canine brain. *Vet Radiol Ultrasound*. 2009, **50**(2):178-81.
 - 3- Ishikawa, C, et al. Comparison of conventional magnetic resonance imaging and nonenhanced three-dimensional time-of-flight magnetic resonance angiography findings between dogs with meningioma and dogs with intracranial histiocytic sarcoma: 19 cases (2010–2014), *Journal of the American Veterinary Medical Association*. 2016, **248** (10): 1139-47.
 - 4-Wada, M. Comparisons among MRI signs, apparent diffusion coefficient, and fractional anisotropy in dogs with a solitary intracranial meningioma or histiocytic sarcoma. *Vet Radiol Ultrasound*. 2017 Jul;58(4):422-432.