Hallmarq
Advanced Veterinary Imaging

Cerebral Microbleeds

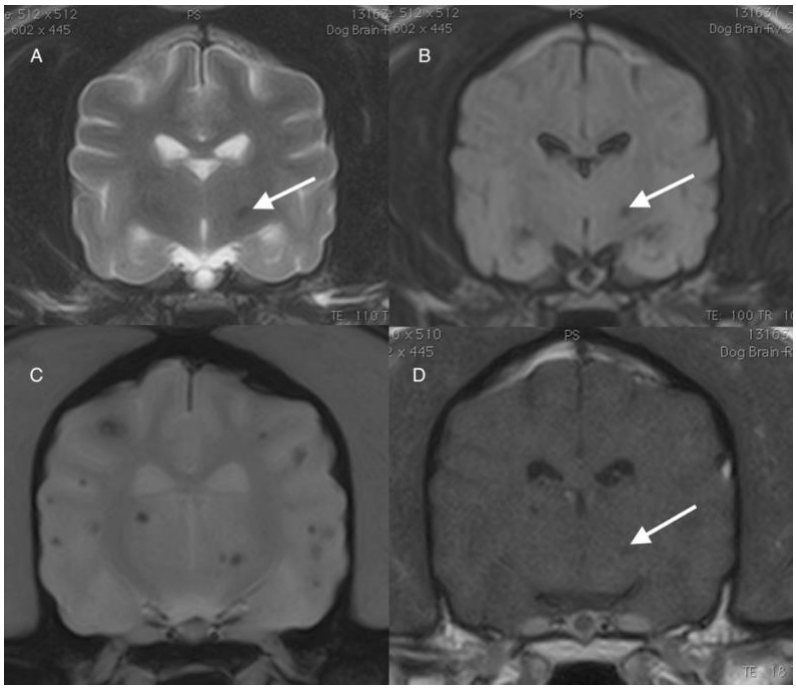
Clinical Presentation

A 14-year-old, female spayed Pug dog presented with seizures. Otherwise considered healthy, the dog underwent MRI using the Hallmarq 2nd generation 1.5T unit.

Diagnostic Investigation

(A) T2W, (B) FLAIR, (C) T2* GRE and (D) T1W post contrast images identify multiple, well defined punctate intra-parenchymal lesions, the majority of which are at the grey-white matter junctions. They are of homogenously T2W and T1W hypointense without notable enhancement and are seen as signal voids on T2* images. The lesions, which are all less than 5mm in diameter, are barely seen on most sequences with the most significant one being identified within the left thalamus (A, B and D arrow), but they are easily visible on T2*, emphasizing the essential need for this sequence on all brain imaging studies.

The T2*-weighted sequence is very sensitive to magnetic susceptibilities, and it is primarily used to detect hemorrhage. Any hemorrhagic lesion (regardless of the age of the hemorrhage) will show signal void as seen in (C).



Hallmarq
Advanced Veterinary Imaging

Imaging Interpretation

In this dog, the imaging appearance of the multiple signal voids is compatible with intraparenchymal hemorrhages. Hemorrhagic lesions less than 5mm in size are called cerebral microbleeds (CMBs) and are often incidental. In the absence of imaging features such as marked signal heterogeneity, perilesional edema or contrast enhancement, a neoplastic etiology is unlikely. Cerebral microbleeds are common in people and in dogs. They result from chronic hemorrhage presumed to be due to leakage from small blood vessels and are markers of underlying vascular pathology. The MRI changes associated with these are caused by small foci of hemosiderin within macrophages. In an otherwise normal brain the MRI appearance of microbleeds is similar in dogs and people, most commonly arising from the grey white matter junction of the cerebral cortices. The sensitivity of MRI for the detection of small spontaneous intraparenchymal hemorrhages is highly dependent on the magnetic field strength and pulse sequences used. Higher field strengths and gradient echo based sequences are essential for their detection.

Diagnosis and Treatment

This dog was diagnosed with cerebral microbleeds. In one recent canine study, CMBs occurred in 54 of 582 (9.3%) of dogs undergoing brain MRI, being more common in older (median age 13 yrs) and smaller (median weight 8.7kg) dogs. Small (toy and miniature) poodles and Shih Tzus are most frequently affected with CMBs based on this study. Additionally, compared to matched controls, dogs with CMBs appear to present more frequently for vestibular signs, more commonly have proteinuria. Dogs with CMBs have also been found to have a shorter median survival time but one study of dogs with non-traumatic cerebral bleeds <5mm in diameter found that 8/12 (66%) had a good prognosis. Some smaller reports have also identified hypertension, diabetes mellitus, hypothyroidism and hyperadrenocorticism as concurrent systemic disorders in dogs with CMB. Dogs exhibiting CMBs should be evaluated for elevations of blood pressure and systemic disease. Treatment is non-specific and symptomatic, in this case for seizures.

Hallmarq
Advanced Veterinary Imaging

References

Fulkerson CV, Young BD, Jackson ND, Porter B, Levine JM. MRI characteristics of cerebral microbleeds in four dogs. Vet Radiol Ultrasound. 2012 Jul-Aug;53(4):389-93

Kerwin SC, Levine JM, Budke CM, Griffin JF Th, Boudreau CE. Putative Cerebral Microbleeds in Dogs Undergoing Magnetic Resonance Imaging of the Head: A Retrospective Study of Demographics, Clinical Associations, and Relationship to Case Outcome. J Vet Intern Med. 2017 Jul;31(4):1140-1148

Lowrie M, De Risio L, Dennis R, et al. Concurrent medical conditions and long-term outcome in dogs with nontraumatic intracranial hemorrhage. Vet Radiol Ultrasound 2012;53:381–388