Idiopathic *vs* Symptomatic Epilepsy: Clinical Guidelines for Making this Vital Distinction

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Some studies show more than 1 in 20 dogs will suffer from recurrent seizure in their lifetime. When a client presents a recent onset seizure patient they are keenly interested in the diagnosis and prognosis along with best course of action. Some cases will be of unknown or genetic cause (idiopathic) and others will have a specific (structural) cause for the seizure. The diagnostic plan, prognosis and treatment plan can be very different between dogs with an unknown cause for their seizure and dogs with a structural problem (brain tumor, encephalitis, stroke, malformation). Considering the age of onset, breed, weight, historical and neurological exam findings are crucial in estimating the likelihood that there is a structural cause for the seizure. This talk will discuss the current terminology and rational for grouping seizure by their underlying cause and frequency and then discuss how to make the distinction between structural versus idiopathic epilepsy.

Epilepsy vs. reactive seizure

Epilepsy generally means recurrent seizure, however in humans after just one seizure you can be considered epileptic if the seizure is associated with an enduring alteration of the brain that increases the likelihood of seizure. Reactive seizures occur when the brain is normal but reacting to an extra-cranial toxic or metabolic insult.

Epilepsy terminology

In 1989 the International League Against Epilepsy (ILAE) distinguished 3 etiologies of epilepsy which were then adopted in veterinary medicine. Idiopathic or primary epilepsy is diagnosed if no underlying cause can be determined other than a possible hereditary predisposition. Symptomatic epilepsy is a consequence of an identifiable brain disorder. Cryptogenic (probable symptomatic) epilepsy a heritable cause is not likely and an underlying pathologic change in the brain suspected but not proven. In 2005 these terms for epilepsy were changed by the ILAE to genetic, structural and unknown cause and now these are the terms used in published veterinary literature.

Genetic epilepsy can be diagnosed when the prevalence in a breed exceeds that of the general population. Making this distinction is important because certain breeds may have a particularly severe form of genetic epilepsy. For example in the Border Collie survival from seizure onset is 2 years with a 94% rate of cluster seizure and 53% rate of status epilepticus. Conversely genetic epilepsy in the Lagotto Ramagnolo starts at 6 weeks of age and resolves by 16 weeks of age. Structural epilepsy is diagnosed when there is a physical disruption of the brain from a malformation, infection, inflammation, stroke or brain tumor. Epilepsy of unknown cause is diagnosed when a cause for the seizure has not been determined.

Classification by seizure frequency

Progression of disease and a worse prognosis is often indicated when seizure becomes more frequent. Therefore applying other terms for more frequent or longer seizures is valuable. A **cluster seizure** is noted there are 2 or more seizure within 24 hours and **acute repetitive seizure** is 2 or more seizure within 5-12 hours. **Status epilepticus** (SE) is present when the seizure lasts 5 minutes or longer, 2 seizures where the patient is unable to respond to commands or walk between seizure, or patient having a seizure at presentation. SE may not respond to initial treatment with Benzodiazepine, Phenobarbital and/or Levetiracetam at which time it is called **refractory status epilepticus** (RSE). In these cases electroencephalography (EEG) often shows continued seizure activity despite few to no physical manifestation of the seizure, a condition called **non-convulsive status epilepticus** (NCSE). SE and NCSE have an associated 25 and 50% mortality rate in human and veterinary medicine.

Age of onset

A recent study of dogs 7 or older at time of first seizure that had a MRI determined that 79% of dogs had structural epilepsy and 21% had cryptogenic epilepsy (now called seizure of unknown origin). Furthermore when the dogs were 10 or older at seizure onset there was an 87% chance of an abnormal MRI showing a structural cause for the seizure. In the dogs with structural epilepsy, 72% had a brain tumor with stroke and encephalitis being the next most common causes of seizure. At other end of spectrum, dogs younger than 6 months of age are very likely to have a genetic or seizure of unknown cause.

Breed

Genetic epilepsy and epilepsy of unknown cause is the most prevalent diagnosis in dogs between 6 months and 7 years of age. However, within this age group encephalitis in young dogs and prevalent in many small breeds (Pug, Chihuahua, Yorkshire terrier, Maltese, Westie, Dachshund, Minature poodle, Shih Tzu, others). Therefore in young, small breed dogs encephalitis should be highly

suspected as the cause of seizure, especially when seizure are clustered, progressive over a few weeks to a few months or there are examination or behavioral changes. A recent study showed a statistically higher incidence of brain tumors in the breeds Golden Retriever, Boxers, French Bulldog, Rat Terrier and Boston Terriers. Increasing age and weight were also correlated with higher rates of brain tumor. Therefore in these breeds and dogs > 15 kg, a recent onset seizure when 5 or older should raise a high suspicion for brain tumor.

Behavior

In dogs with seizure from structural brain disease the seizure can be the only symptom, however there are often subtle behavioral changes. When these behavioral changes are noted in a seizure patient then this should raise suspicion for a structural brain problem. These include inappropriate defecation, inappropriate urination, not greeting the owners, restless at night, sleeping more in the day, irritability, not playing, and aggression.

Exam findings

Seizure is generated from lesions in the forebrain or thalamus. Lesions in this area can cause patients to circle towards the side of the lesion and have contralateral menace and postural deficits. Since strength and gait are generated from the brainstem, a focal forebrain lesion would not be expected to cause weakness or ataxia. If a patient has a unilateral menace deficit with normal pupillary light responses and normal palpebral response then a contralateral forebrain mass lesion should be suspected. Similarly if the gait is normal but there is a unilateral postural deficit (paw flip test, tactile placing, hopping) then a contralateral forebrain lesion should be suspected. Lastly, while in the exam room if a patient circles to only one side then a forebrain lesion is very likely and will be located on the side towards which they are circling. In a recent study of dogs and cats where only neck pain was noted almost 10% had only a focal brain tumor. The presence of neck pain in a seizure patient should suggest there is a structural cause of the seizure. However an abnormal exam is not always noted and about 30% of patients with a mass lesion will have a normal neurological exam.

Conclusion

Your client expects a sense of the diagnosis, treatment plan and prognosis when they present with a pet with recent onset seizure. Prior to starting AED or/and referral for MRI and neurological consultation, you can make an accurate guess as to the diagnosis by considering age, breed, weight, historical findings and then performing a 5 minute neurological examination.

Selected references

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