

Review Article

A Review: Emergency Management of Dogs With Suspected Epileptic Seizures



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Dogs with seizure disorders are commonly presented to the general practitioner for initial evaluation. The most common diagnosis provided is idiopathic epilepsy. As witnessing seizures is often traumatic for owners, it is important for the practitioner to understand seizure classification, know when to initiate antiepileptic drug therapy and be comfortable with client education regarding seizures. This review briefly discusses the most up-to-date classification of seizures, the necessity to obtain accurate histories and complete examinations, base-line diagnostics to perform, the importance of owner education, and when to start medications. This is not intended to discuss detailed differential lists, in-depth information on antiepileptic drug therapy, long-term management of epileptics or those refractory to their current treatment.

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Introduction

Seizure disorders represent the most common neurologic problem in dogs and often present to general practitioners for initial evaluation.^{1–3} The terms seizures and epilepsy are not synonymous. According to the ILAE in 2005, “an epileptic seizure is a transient occurrence of signs or symptoms due to abnormal excessive or synchronous neuronal activity in the brain.” Whereas the ILAE defines epilepsy as “a disorder of the brain characterized by an enduring predisposition to generate epileptic seizures and by the neurobiologic, cognitive, psychological, and social consequences of this condition. The definition of epilepsy requires the occurrence of at least 1 epileptic seizure.”^{4–6} It has been reported that epilepsy is the most frequent diagnosis in dogs presenting with a history of new-onset seizures.^{2,3} However, there are many causes for epileptic seizures in the emergent patient. For owners of dogs with newly diagnosed epilepsy, common concerns reported to clinicians include the possible source of seizures, the risk of seizure recurrence, and prognosis.^{5,7} Thus, it is important for the practitioner to be comfortable with these causes and inform owners. Successful management of patients with seizures is facilitated by an appropriate diagnostic workup, which may vary patient to patient and is dictated by the list of differential diagnoses considered by the evaluating clinician.⁸ This goal of this review is to discuss seizure classifications, diagnostics for epileptics in general practice and, briefly, treatments in the emergent setting for suspected epileptics. This is not intended to be a detailed review of differential diagnoses and their treatments.

Classifications

The International Veterinary Epilepsy Task Force (IVETF) has recently reported on current epilepsy definition, classification and

terminology in companion animals.⁶ As previously mentioned, the terms seizure and epilepsy are not interchangeable. A seizure is the clinical manifestation of abnormal electrical activity in the brain.⁴ A reactive (or provoked) seizure is a seizure occurring as a natural response from the normal brain to a transient disturbance in function, typically metabolic or toxic in nature. The responses are reversible when the cause is identified and treated appropriately. Epilepsy is defined as a disease of the brain characterized by an enduring predisposition to generate epileptic seizures. This definition is usually practically applied as having at least 2 unprovoked epileptic seizures > 24 hours apart.⁶

Focal epileptic seizures are theorized as originating within networks limited to one cerebral hemisphere. They may be discretely localized or more widely distributed and can progress to generalized seizures. Focal seizures have previously been referred to as partial seizures. Focal seizures have been shown to be difficult to diagnose amongst veterinarians.⁹ Generalized epileptic seizures indicate involvement of both cerebral hemispheres. Generalized epileptic seizures are theorized as originating at some point within, and rapidly engaging, bilaterally distributed networks. Generalized seizures have previously been referred to as grand-mal seizures. They are often associated with convulsions (tonic-clonic, tonic, or clonic), loss of consciousness and salivation, urination, or defecation. These are the most common type of seizure recognized in animals. Acute repetitive, or cluster, seizures are classified as 2 or more epileptic seizures in a 24-hour period.⁶ The most dangerous condition is known as status epilepticus (SE), in which epileptic seizures follow one another without recovery of consciousness between them or a seizure (ictal phase) lasting greater than 5 minutes.^{6,10,11}

Several classifications of epilepsy have been described, however, the 2 most commonly used by veterinarians are idiopathic epilepsy (IE) and structural epilepsy. IE is used when the nature is either known, or suspected to be, genetic in origin or when the underlying cause is unknown but with no indication of structural

epilepsy. In the clinical setting IE remains most commonly a diagnosis of exclusion following diagnostic investigations for causes of reactive seizures and structural epilepsy.¹² Structural epilepsy is characterized by epileptic seizures which are provoked by intracranial (cerebral) pathology. This may include vascular, inflammatory or infectious, traumatic, anomalous or developmental, neoplastic, and degenerative diseases. Structural epilepsy can only be confirmed by diagnostic imaging, cerebrospinal fluid (CSF) examination, DNA testing, or postmortem findings.⁶ However, the age at seizure onset and the presence of interictal neurologic abnormalities often suggest the likelihood of identifying structural cerebral disorders. In a study in a nonreferral canine population, structural epilepsy was statistically more probable in dogs < 1 year or > 7 years of age at seizure onset, whereas IE was statistically more probable in dogs aged 1–5 years at first seizure and when the interictal period was longer than 4 weeks.⁶ In a retrospective study on a referral population of 240 dog with epileptic seizures, seizure onset between 1 and 5 years of age was associated with a 3.25 times greater likelihood for IE than structural epilepsy and reactive seizures.¹³

History, Clinical Presentation, and Examination

In order to diagnose IE, it is important to rule-out other causes of epileptic seizures in your patient. History, signalment, and neurologic examination findings allow a standardized diagnostic approach based on the clinical picture to help determine the underlying cause of seizures.⁸ The most important first step for the practitioner is to determine if an epileptic seizure has occurred, as many other episodic disorders can mimic epileptic seizures; these include syncope, vestibular episodes, neuromuscular weakness, idiopathic head tremors or bobbing, cataplexy or narcolepsy, or even compulsive disorders. Thus, a detailed and accurate history of the event is the foundation for investigation of the seizure patient. The following are examples of important questions to consider when obtaining a history from the owner: When the first seizure was observed, what was the age of the patient and time of day? Was there any precipitating event (i.e., exercise and activity)? It is necessary to receive a complete description of the seizure (preictal, ictal, and postictal). Have the owners describe the pet's responsiveness to the owner during the episode. Ask about presence of autonomic signs (salivation, urination, defecation, vomiting), muscle tone, any facial involvement (eye movements, head tilt, or tremors), and evidence of lateralizing signs (one eye, one side of the face, one limb affected). Are there any changes to behavior, personality or sleeping patterns in between seizures? What was the duration of the event (ictal vs. postictal) and at what frequency do they occur? These types of questions can often assist in proper diagnosis of true seizure activity and lists for differential diagnoses. Many owners of animals have no idea what seizures look like and the duration is usually greatly overestimated, as owners typically include postictal phenomena in their timings. At times, owners may not have useful information regarding the behavior or the event description is vague. In these cases, it may be helpful to ask the owner to record the next episode to help determine if a proper diagnostic plan and treatment can be established. Additional questions regarding the patient should also be asked concerning familial history of seizures, significant head injuries, status of littermates, previous infections, vaccination status, and toxin exposure.⁸

Because seizures may be a sign of a wide variety of problems, after a complete history is obtained, thorough physical and neurologic examinations are critical. The general physical examination should be aimed at finding signs of systemic or multifocal disease (fever and weight loss) that might suggest an underlying cause for the seizure. The key components of the neurologic examination

include evaluation of mentation, gait and posture, cranial nerves, postural reactions, spinal reflexes, and cervical and thoracolumbar spinal palpation. The goal is to identify signs indicating structural disease of the forebrain, if present.⁸ However, caution is advised when performing and interpreting the neurologic examination shortly after a seizure. Neurologic impairment may simply be a manifestation of transient ictal or postictal disturbances vs. permanent structural damages. If deficits are present, it is recommended to repeat the examination in 24–48 hours to ensure reproducibility and differentiate postictal effects from fixed interictal deficits. Patients with primary epilepsy may present in SE or with acute repetitive (cluster) seizures as their first known seizure event; however, the presentation of SE or cluster seizures in a patient without previously observed or documented epilepsy should raise concern about underlying structural or metabolic disease.⁸

Diagnostic Tests

Based on accurate history and thorough examination, an appropriate list of differentials should be created by the clinician. For example, toxin ingestion or exposure or head trauma should be determined more, or less, likely based on detailed discussion and examination. If a patient is actively having a seizure, a rapid in-house evaluation of blood glucose and electrolytes is useful to guide treatment for reactive seizures. The most common cause of epileptic seizures in the dog is IE. Once epilepsy is suspected, the following diagnostics should be recommended to the owner in order to rule out metabolic causes of seizures: a complete blood count, serum biochemical profile, fasted preprandial and postprandial bile acids, serum ammonia, urinalysis, and blood pressure. As structural epilepsy cannot be diagnosed without advanced diagnostics, referral to a veterinary neurologist for additional testing such as magnetic resonance imaging (MRI) and CSF analysis should also be offered to the owner. Infectious disease titers can be considered based on geographical area and travel history; certain infectious disease tests are both sensitive and specific when performed on blood or urine, whereas others are more sensitive when performed on CSF. However, if there is not a strong clinical suspicion for structural disease, the owner may elect not to pursue additional testing with the guidance of the practitioner. In such cases, patients can be presumed to have IE and treated symptomatically for seizures, if appropriate. If at any point the dog is refractory to therapy, it should be strongly recommended for owners to pursue referral for MRI and discussion on additional antiepileptic drug (AED) therapy.^{8,11}

The International Veterinary Epilepsy Task Force suggests three tiers of confidence in the diagnosis of IE.¹² Tier I confidence level includes: history of 2 or more unprovoked epileptic seizures occurring at least 24 hours apart, age at epileptic seizure onset of between 6 months and 6 years, unremarkable interictal physical and neurologic examination (except for AED induced neurologic abnormalities and postictal neurologic deficits), and no clinically significant abnormalities on minimum data base blood tests (CBC and serum chemistry profile), and urinalysis. Tier II level consists of unremarkable fasting and postprandial bile acids, MRI of the brain and CSF analysis in addition to factors listed in tier I. The final tier, III, involves the identification of ictal or interictal electroencephalogram (EEG) abnormalities characteristic for seizure disorders according to criteria validated in human medicine, in addition to factors listed in tier I and II. However, this is not commonly performed in clinical veterinary practice.¹²

Client Education

Once epilepsy is diagnosed client education is, arguably, almost as important as the diagnosis itself because success of

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