

Pacific Tide

An informational newsletter

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December 2012
Volume 12, Issue 1



About our Author

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Dr. Kleman received her DVM from the University of Florida followed by an internship at the University of Pennsylvania and a cardiology residency at the University of Florida. Dr. Kleman conducted a prospective study funded by the AKC and the ACVIM - novel and successful interventional balloon valvuloplasty techniques for dogs with severe subaortic stenosis, which she has subsequently taught to other cardiologists throughout the US. In addition to life-saving interventional procedures, she is interested in complex arrhythmia diagnosis/management and novel approaches to chronic congestive heart failure. Most importantly, Dr. Kleman is passionate about helping to provide happy and fulfilling lives for dogs and cats with heart disease. Her philosophy balances the importance of communication, compassion, and knowledge while working closely with the families and veterinarians of her patients. When not working, Dr. Kleman loves to travel with her family and enjoys running, riding her horse, Shellie, or spending time at the beach.



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A Systematic Approach to Patients with Syncopal-like Episodes

Introduction:

Determining the underlying causes of syncope can be challenging in our patients. Additionally, it can be hard to distinguish true syncope from seizures or other causes of collapse. When evaluating a patient with syncopal-like episodes, it is important to classify syncope as a clinical sign rather than a specific diagnosis or disease. The specific underlying diagnosis causing the syncopal-like episodes must be determined for effective treatment. An adequate history, physical examination and understanding of the possible etiologies and pathophysiology, along with a stepwise approach to animals presenting with this clinical complaint, can uncover the underlying cause (or causes) and allow for effective and early intervention in these patients.

Syncope is the sudden, transient loss of consciousness associated with loss of postural tone as a result of abruptly reduced perfusion or essential substrate delivery to the brain. During a syncopal event, animals will usually collapse into lateral recumbency and may have concurrent stiffening of the limbs, opisthotonos, micturition, and vocalization. Animals with pre-syncope, where reduced brain perfusion is not severe enough to cause unconsciousness, may transiently become “wobbly” or weak in the rear limbs. Alternatively, profound hypotension and prolonged asystole can result in hypoxic “convulsive syncope,” with seizure-like activity or twitching. However, persistent facial fits, persistent tonic/clonic motion, post-ictal dementia and neurologic deficits are uncommon. Careful evaluation of history and/or observation can aid in differentiating convulsive syncope from seizures. The presence of a post-ictal phase after the episode is often the most helpful differentiating characteristic. Additionally, seizure episodes caused by

underlying neurologic disease may be preceded by atypical limb or facial movement or “staring spells” before the loss of postural tone.

Many diseases can result in syncope (see references for additional reading). Mechanisms underlying syncope usually involve either one or a combination of:

- Abrupt reduction in cardiac output (often related to arrhythmias, decreased cardiac filling, or outflow tract obstructions)

- Hypoxia or hypoglycemia with normal cerebral blood flow

- Decreased vascular resistance (often related to neurocardiogenic ‘vagal’ reflexes)

The most common causes of syncope in our patients are cardiogenic in nature. Approximately two-thirds of dogs and cats with syncope have an underlying cardiac disease. Most of these are related to arrhythmias, which are secondary to underlying cardiac disease. Underlying functional or structural cardiac abnormalities exacerbate the negative effect of arrhythmias on cardiac output. Severe valvular regurgitation, poor myocardial contractility, or various forms of impaired filling, such as found with pericardial disease or outflow tract obstructions, can all result in an inability of the heart to maintain sufficient cardiac output to meet an increased demand during excitable states; even with a normal cardiac rhythm.

Cough syncope is a form of ‘situational syncope’ that occurs fairly often in dogs, especially those with brachycephalic conformation, underlying airway disease or airway collapse, or severe chronic mitral regurgitation with left atrial enlargement. Coughing

transiently increases intrathoracic pressure (which reduces venous return to the heart), as well as, intracranial pressure. Inadequate cerebral perfusion then results from the reduction in cardiac output and cerebral perfusion pressure. In addition, coughing may reflexively stimulate a neurocardiogenic (vasovagal) reflex, especially in small-breed dogs with advanced valvular heart disease. In these cases of neurocardiogenic syncope, acute sympathetic activity (induced by excitement and/or coughing) provokes a strong reflexive vagal response that results in vagally-mediated bradycardia and vasodilation contributing to hypotension and syncope.

Non-cardiogenic diseases, such as those that result in increased intracranial pressure, can also result in syncope by reducing cerebral perfusion pressure via compressing intracranial vessels. While the majority of animals with severe hypoglycemia will present with weakness or seizures, a portion may present with syncopal-like episodes. Hypoxia as a result of right to left shunts, severe acute anemia or pulmonary disease can result in poor cerebral oxygen delivery and syncope.

Recurrent syncope is a general risk factor for sudden death in cats. In cats, syncope is often associated with cardiomyopathy associated with brady or tachyarrhythmias, myocardial infarction or thromboembolism, or congestive heart failure. Less commonly respiratory disease, neurologic conditions, and other systemic diseases, such as hyperthyroidism, diabetes mellitus, gastrointestinal disease, and chronic renal disease, may be contributing factors.

Approach To The Patient With Syncope:

Suspicion for an underlying cardiac cause for syncope can usually be generated by the combination of a thorough history, physical examination, routine medical database, ECG, and thoracic radiographs. The physical examination should be thorough and evaluate all body

systems with close attention to the cardiovascular system. This exam includes assessment of heart rate and rhythm, respiratory rate and character, and mucous membrane color/capillary refill time, as well as, jugular vein evaluation (for distension and/or abnormal pulsations), precordial and arterial pulse palpation, careful cardiac and pulmonary auscultation, abdominal palpation, and neurologic exam.

A routine medical database consisting of CBC, biochemical profile, urinalysis, heartworm test, and blood pressure measurement should be done. Although these tests are often normal, a contributing underlying disease may be revealed. Endocrine tests may be useful in some cases (i.e. insulinoma, pheochromocytoma, etc).

A baseline electrocardiogram (ECG) is recommended and should be evaluated for at least 1 minute (if not longer). A normal resting ECG does not rule out structural or functional heart disease or arrhythmias as the underlying cause of syncope. However, in some patients the resting ECG may suggest underlying cardiac enlargement, conduction abnormalities, or brady or tachyarrhythmias that could contribute to syncope. In bradycardic patients, the ECG should be evaluated a second time following the administration of atropine 0.04 mg/kg intravenously or subcutaneously.

Thoracic radiographs are recommended to evaluate the lungs, pleural space, mediastinum and pulmonary vasculature, as well as, cardiac size and shape. Echocardiography is useful to confirm the presence and severity of structural or functional cardiac abnormalities, such as advanced mitral regurgitation, myocardial failure, or pulmonary hypertension, and to rule out the presence of pericardial disease or obstructive cardiac masses, that could lead to syncope or be risk factors for ventricular tachycardia or other arrhythmias.

If all of the aforementioned tests are relatively normal (blood work, ECG, radiographs, and echocardiography) the clinician should consider ambulatory ECG monitoring with either a 24hr Holter or event monitor to help identify or exclude cardiac arrhythmias as a cause for syncope in some animals.

Ambulatory 24hr ECG (Holter) monitoring can be very useful for identifying or excluding cardiac arrhythmias as a cause for syncope, however a syncopal episode must occur during monitoring to make a definite diagnosis. Although arrhythmias without clinical signs often occur in animals, not all arrhythmias cause enough hemodynamic compromise to induce syncope. Holter monitoring is of most benefit in patients with multiple or frequent syncopal episodes over a short period of time. In general, holter monitoring is useful for quantifying the type, frequency, and severity of arrhythmias, for identifying arrhythmias in asymptomatic patients, and for assessing antiarrhythmic drug efficacy.

Continuous loop event monitors allow a longer monitoring period than holter monitoring, can be worn for weeks at a time, and are better suited for patients with infrequent symptoms. These digital loop recorders continuously monitor heart rhythm. When the event recording system is activated by the owner (via a large button), the ECG is saved into memory for a brief period prior to and following activation. Event monitors have a higher diagnostic yield than 24hr holter monitors for patients with syncope. However, disadvantages of event monitors are that they do not record potentially significant arrhythmias unless activated and they do not quantify the frequency or true severity of arrhythmias over a 24hr period.

Treatment Of The Patient With Syncope:

Therapy of animals with syncope is intended to manage the underlying disease while avoiding precipitating activities when possible (i.e.

coughing). Treatment of specific causes may be curative, such as correcting anemia, treating heartworm infestation, or effectively identifying and treating respiratory or metabolic disorders.

Addressing proper management of the patient with structural or functional heart disease or heart failure often resolves or reduces the frequency of syncopal events. Triple therapy with diuretics, angiotensin converting enzyme inhibitors (ACE-I), and inotropic support should be instituted when appropriate. Optimizing drug therapy dosages or the use of additional medications, such as additional diuretics or vasodilators, may help to improve the patient's underlying hemodynamic state in the case of patients who are already being treated with triple therapy and found to have controlled congestive heart failure. Managing comorbid conditions in geriatric patients with severe underlying heart disease should not be overlooked. The underlying causes and treatment for pulmonary hypertension should be managed appropriately without inducing systemic hypotension. Neurocardiogenic (vasovagal reflex) in advanced valvular heart disease can be managed effectively with anecdotal reports of various medical strategies (occasionally in combination with pacemaker therapy).

If tachyarrhythmias are the apparent cause, treating with the appropriate anti-arrhythmic therapy (or combination of anti-arrhythmic therapies) will reduce or eliminate syncope and the predisposition for sudden death. Arrhythmias cannot always be eliminated, such as in dogs with atrial fibrillation associated with advanced heart disease. In these cases, drug combinations are utilized to appropriately slow the heart rate enough to allow for appropriate ventricular filling, while balancing the concerns of myocardial failure and systemic hypotension.

Pacemaker therapy may be warranted in cases of bradyarrhythmias; especially those cases of complete heart block or sick sinus syndrome, which do not respond appropriately to atro-

pine. Pacemaker therapy in these cases is often extremely gratifying for patients, owners, and clinicians with a quick recovery time and resolution of clinical signs. Medical management alone, such as with theophylline, can be helpful for those patients with a partial response to atropine, by increasing the underlying resting heart rate, however this form of therapy can be effective initially, but may become ineffective over time.

Additional reading:

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Our Doctors

Internal Medicine

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Ryan Garcia, DVM, DACVIM

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Tom LaHue, DVM, DACVS

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Lillian Good, DVM, DACVECC

Oncology

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(Oncology)

Cardiology

Mandi Kleman, DVM, DACVIM
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Radiology (VRS)

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Mark Lee, DVM, DACVR

Emergency

Chrisian Robison, DVM
Kim Delkener, DVM
Mark Saphir, DVM
Jessica Kurek, DVM

Behavior

Jan Brennan, DVM (practice
limited to behavior)

About Our Hospitals

PVSES was founded to provide high quality, specialized medical care to companion animal patients. Our practice is dedicated to serving the veterinary community as a partner in total patient care. We offer comprehensive specialized services including endoscopy, Doppler ultrasound, surgery, 24-hour ICU care, and emergency and critical care. Our staff is committed to providing compassionate and thorough medical care that meets the needs of the patient, client, and referring veterinarian. In September 2011 we opened PVSM and offer internal medicine, oncology, and cardiology Tuesday through Thursday in Monterey. Behavior consultation by appointment is available on Mondays.

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