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Attending ACVIM? Visit CVCA at Booth #523

CVCA Cardiac Care for Pets will be at the Forum being held at the ACVIM Gaylord National Resort and Convention Center at the National Harbor.

We hope you stop by!

For more information on ACVIM, visit www.acvim.org

Save the Date! The Cardiology & Neurology Symposium

- **Date:** Sunday, October 15th, 2017, in Rockville, MD
- **Where:** Radisson Hotel in Rockville, MD

The first joint *Cardiology & Neurology Symposium*, CVCA Cardiac Care for Pets and Bush Veterinary Neurological Services (BVNS) are joining forces for a day of CE for both doctors and technicians.

More information coming soon!

Cardiac Emergencies in Private Practice

By: Sarah Beth Bordelon, DVM, MS, Diplomate, ACVIM (Cardiology)

The three most common cardiac emergencies seen in private practice are:

- Left sided congestive heart failure
- Ventricular tachycardia
- Pericardial effusion

This issue of The Murmur will discuss basic diagnostics and treatment of these three ailments.

*Continued on page 2*
1. CONGESTIVE HEART FAILURE

Congestive heart failure can be defined as the accumulation of fluid in the interstitial space secondary to elevated intra-cardiac pressures. We will discuss heart failure as either left or right-sided congestive heart failure and not focus on underlying causes of the heart failure.

Left-sided congestive heart failure:
Left sided congestive heart failure results from increased left ventricular diastolic pressures causing increased left atrial pressures. Chronic increases in left atrial pressure lead to increased pulmonary venous hydrostatic pressure which can result in secondary pulmonary edema (dogs and cats) and/or pleural effusion (cats).

Thoracic auscultation is usually not sufficient to diagnose pulmonary edema and/or pleural effusion. Normal lung sounds do not exclude pulmonary edema, and the presence of crackles does not necessarily indicate the presence of pulmonary edema. There are many non-cardiac diseases that can lead to pulmonary crackles (pulmonary fibrosis, neoplasia, pneumonia/infectious diseases, pulmonary thromboembolism, etc.). Decreased lung sounds are not pathognomonic for pleural effusion. In general practice, pulmonary edema should be considered a radiographic diagnosis and thoracic radiographs should be recommended in all patients with respiratory signs.

Dogs:
There are three radiographic changes indicative of cardiogenic pulmonary edema in dogs.

1. Left atrial enlargement (may not be present with acute chordae tendinae tears)
2. Dilation of the pulmonary veins
3. Interstitial and/or alveolar pulmonary pattern

There are some diseases in which one or more of these findings may not be present, such as acute ruptured chordae tendinae. In this case, the pressure change in the left atrium and pulmonary veins is so acute that left atrial enlargement and pulmonary venous distention may not be present. These are challenging cases to manage in practice and often require echocardiographic assessment of intracardiac/intrapulmonary pressures to determine if the clinical signs are secondary to congestive heart failure.

Cats:
Radiographic appearance of left sided CHF in cats can vary and may include pleural effusion and/or pulmonary edema.

The pattern of pulmonary edema in cats may initially have aventral distribution and tends to be more patchy than cardiogenic edema in dogs. Cats also tend to have pulmonary arterial and venous distention with dilation of pulmonary veins as they enter left atrium (best assessed on the right lateral radiographic projection). Pleural effusion can be noted on thoracic ultrasound or thoracic radiographs.
Right-sided congestive heart failure:
Right sided congestive heart failure results from increased right ventricular diastolic pressures causing increased right atrial pressures. Chronic increases in right atrial pressure lead to increased systemic venous hydrostatic pressure which can result in pleural effusion and/or ascites.

Management of congestive heart failure:
Stabilization of congestive heart failure patients in general practice generally consists of the following:
- Limit stress
- Diuretics
  - Loop diuretics –Furosemide is standard emergency diuretic in veterinary medicine
    - Administer IM (in epaxial muscles) or IV
    - Subcutaneous administration in patients with acute pulmonary edema is not effective
  - Furosemide dosing:
    - Canine: 1-4mg/kg IV or IM to effect (lowest effective dosage)
    - Feline: 0.5-2mg/kg IV or IM to effect (lowest effective dosage)
- Oxygen therapy (O2 cage vs. nasalcannula)
  - Shifts ventilation to functional portion of lungs
  - If pleural effusion present
    - Thoracocentesis
  - If ascites present
    - Abdominocentesis to improve comfort and increase efficacy of diuretics
  - Please note diuretics will not decrease large cavity effusions fast enough to provide relief in dyspneic patients
  - Diuretics are indicated after abdominocentesis to decrease rate of re-effusion

Additional treatments may include afterload reduction and positive inotropic agents. If a patient is not responding well to initial management for congestive heart failure, then consultation with a cardiologist is warranted to determine which of these additional treatments may be indicated.

Monitoring response to therapy for congestive heart failure:
- Respiratory Rate
  - As pulmonary edema/pleural effusion resolve, respiratory rate will decline
- Ensure appropriate urine output
- Thoracic radiographs
- Renal values and electrolytes
- Blood pressure

2. PERICARDIAL EFFUSION
Pericardial effusion can be acute or chronic:
- Chronic effusions allow for gradual increases in pericardial pressure resulting in a greater accumulation of fluid before development of clinical signs.
  - Chronic effusions lead to neurohormonal activation causing ascites and/or pleural effusion
- Acute effusions cause sudden increases in pericardial pressures leading to acute clinical signs of low cardiac output.

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The end result of large volume chronic effusions and acute effusions is cardiac tamponade. Cardiac tamponade is the equilibration of diastolic pressures in all four cardiac chambers.

- Cardiac tamponade decreases or prevents diastolic filling leading to decreased cardiac output. If left untreated, death results.

Clinical signs/symptoms of pericardial effusion:
- Weakness or collapse
- Tachycardia, +/- weak femoral pulses/pulsus paradoxus, +/- muffled heart sounds
- +/- Jugular venous distension
- Lethargy, anorexia, vomiting
- Ascites or pleural effusion (chronic effusions only)

Diagnosis of pericardial effusions:
Radiographs can provide a high index of suspicion for pericardial effusion, however, echocardiography/ultrasound are the most sensitive diagnostic modalities for detection of pericardial effusion.

Causes of pericardial effusion:
The most common cause of pericardial effusion in older dogs and cats is neoplasia. Other causes of pericardial effusion include:
- Left atrial tear/rupture
- Idiopathic/Inflammatory/Infectious
- Coagulopathies

Treatment of pericardial effusion:
Pericardiocentesis is the only definitive treatment for pericardial effusion. Diuretics are contraindicated in patients with clinical pericardial effusions as they will further decrease preload and exacerbate low cardiac output.

Performing a pericardiocentesis:
- Tap from the right side
  - US guidance ideal to find best location to tap
- If not available, pull elbow back into complete flexion and tap at point of the elbow
- ECG monitoring for ventricular arrhythmias
- Clip and steriley prepare the area to be tapped, block with small amount of lidocaine
- Small amount of pericardial effusion into red top tube to monitor for clots
- Collect samples for fluid analysis, cytology and culture

Risks of pericardiocentesis:
- Laceration of coronary artery leading to hemorrhage
- Penetration of myocardium
- Ventricular arrhythmias

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3. VENTRICULAR TACHYCARDIA

Identifying ventricular tachycardia:
- Greater than 4 ventricular complexes in a row with heart rate greater than 180 bpm
- QRS morphology is wide and bizarre
- May be unifocal (all ventricular beats look the same) or multifocal (ventricular beats look different)
- R-R interval may be regular or irregular
- Must differentiate accelerated idioventricular rhythms from ventricular tachycardia

Causes of ventricular tachycardia:
- Cardiac disease (primary or secondary):
  - Structural, traumatic, toxic, ischemic, or inflammatory myocardial disease
- Non-cardiac disease:
  - Gastric dilatation volvulus (GDV)
  - Splenic disease/surgery
  - Endocrine disease
  - Sepsis, anemia, hypoxia
  - Systemic infectious/inflammatory disease
  - Neoplasia/chemotherapy/radiation
  - Drugs (anti-arrhythmics, digoxin, anesthetic agents, catecholamines)

When and how to treat ventricular tachycardia:
The determination to treat ventricular tachycardia can be based on the presence of 3 major criteria of malignancy for ventricular arrhythmias:
- Hemodynamic compromise
- Heart rate of ventricular rhythm greater than 180 bpm
- R on T phenomenon

Emergency medical management of ventricular tachycardia:
In general practice first line treatment for ventricular tachycardia will be lidocaine.
- Sodium channel blocker – LIDOCAINE
Meet Dr. Julia Shih, CVCA's newest cardiologist!

Welcome Dr. Julia Shih to our Towson Location!

Dr. Shih received her Bachelor of Science in Biopsychology from Tufts University in 2006 and went on to graduate from the University of Pennsylvania School of Veterinary Medicine in 2010. She then completed a small animal rotating medical and surgical internship at Oradell Animal Hospital. After practicing emergency medicine for one year, she returned to Oradell Animal Hospital to pursue a residency in cardiology, and she achieved Diplomate status with the American College of Veterinary Internal Medicine (Cardiology) in July 2015. She spent two years as a veterinary cardiologist in Philadelphia before moving to Maryland to join CVCA.

Julia’s interests include the pathophysiology and medical management of acute and chronic congestive heart failure, management of thromboembolic complications, identification and management of congenital heart disease, and management of pulmonary arterial hypertension. She strongly believes in the importance of educating her clients so that together, they can devise the best treatment plan for their pet and their family.

Dr. Shih lives with her husband, their dachshund mix (“Wiley,” a.k.a “Longbody”) and their cat/pseudo-dog (“Miles”). She enjoys spending time with her family and friends, loves trying new restaurants and enjoys traveling. She is an avid Red Sox fan and looks forward to rooting for the Sox when they face the Orioles at Camden Field.

Cardiac Emergencies in Private Practice

- Lidocaine dosing (dogs): 2mg/kg bolus
  - Not to exceed 8mg/kg total to avoid adverse effects
- Lidocaine dosing (cats): 1-2mg/kg slow bolus
  - Higher risk for side effects in cats (acute Gl and neurologic signs)
  - Have Diazepam at the ready due to risk for seizures
  - Not to exceed 6mg/kg total dose to avoid adverse effects

If bolus is effective, then start lidocaine CRI at25-100mcg/kg/min.

If lidocaine is not effective to break the tachycardia other options may include: Procainamide (caution in cats), Amiodarone/Nexterone (dogs only) or esmolol. Evaluation by a board-certified cardiologist is recommended for all patients with sustained ventricular tachycardia to determine the cause of the arrhythmia as well as long-term management.
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5918 West Broad Street
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13160 Magisterial Drive
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- Email: cvcagaithersburg@cvcavets.com
- Website: www.cvcavets.com

CVCA in CARE Veterinary Center
1080 West Patrick Street
Frederick, MD 21703
- Phone: 240-457-4387
- Fax: 240-457-4487
- Email: cvcafredrick@cvcavets.com
- Website: www.cvcavets.com
Veterinarians - We want to hear from you!

Complete Survey by Saturday, July 1st

Let us know how we are doing! Visit www.cvcavets.com, go to the Feedback tab, and select Survey – For Primary Care Vets.

It takes about 2 minutes, and you will be entered into a drawing for a chance to win a Starbucks Gift card!

We look forward to hearing from you! Any questions, please email info@cvcavets.com

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Questions, feel free to email us at info@cvcavets.com
Virginia & Maryland Area CE Events

http://www.cvcavets.com/conferences-events/

June 8th– 10th — ACVIM Conference
Where: Gaylord National Resort and Convention Center, National Harbor in MD
Exhibiting: CVCA Cardiac Care for Pets – Booth #523

August 13th – PVMA Conference in Hershey, PA
Where: Hershey Lodge
Speakers: Coming Soon!

September 16th – VALVT Conference
Where: Blue Ridge Community College, Weyers Cave, VA
Speakers: Coming Soon!

September 24th – VCA SouthPaws Veterinary Specialists & Emergency Center – CE Extravaganza
Where: Arlington – Fairfax Elk Lodge, Fairfax, VA
Speakers: Neal Peckens, DVM, Diplomate, ACVIM (Cardiology)

October 15th – CVCA & BVNS CE Seminar
Where: Rockville, MD
When: Sunday, October 15th
More information coming soon!

Kentucky & Indiana Area CE Events

http://www.cvcavets.com/conferences-events/

June 4th – BluePearl Specialty & Emergency Pet Hospital CE
Where: TwinSpired at Churchill Downs
CVCA Lecture: Pulmonary Hypertension: When Chronic Cough leads to Cardiac Changes
CVCA Presenter: Sarah Clay Bells, DVM, MS, DACVIM – Cardiology
Time: 8:00 a.m. – 12:45 p.m. *Morning programs followed by lunch, cocktails and live racing!
CE Credits: 4.0 hours CE credits approved by the Kentucky Board of Veterinary Examiners
Contact Person: Justin.Ryan@bluepearlvet.com

June 15th – Southwestern Indiana Veterinary Medical Association CE
Where: The Bauerhaus in Evansville, IN CVCA
CVCA Lectures:
- Turn the Beat Around: Canine Arrhythmias
- Nutrition for the Cardiac Patient

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The Murmur
Exceptional Cardiac Care for Pets and their families since 1987.

**Speaker:** Sarah Clay Bell, DVM, Diplomate, ACVIM (Cardiology)
**Contact:** SWIVMA for more information to come!

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**September 2017 – KVMA Annual Conference**
**When:** September 29-30, 2017
**Where:** The Galt House Hotel – Suite Tower, Louisville, KY
**CVCA Lectures:**
- Congestive Heart Failure: Emergency Management
- Turn the Beat Around: Arrhythmia Diagnosis and Management
- The Coughing Dog: Is this Cardiac or Respiratory
- Feline Cardiology
**CVCA Speaker:** Sarah Clay Bell, DVM, Diplomate, ACVIM (Cardiology)
**Contact:** KVMA at info@kvma.org

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**October 2017 – Central IVMA Conference**
**When:** Wednesday, October 18th
**CVCA Speaker:** Sarah Clay Bell, DVM, Diplomate, ACVIM (Cardiology)
More information coming soon!

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**We Offer Payment Flexibility**
Did you know we accept Care Credit, offer interest free payment plans, accept all major credit cards and cash? For more information, visit: [www.cvcavets.com/for-pet-owners/payment-options/](http://www.cvcavets.com/for-pet-owners/payment-options/)

Questions, email us at info@cvcavets.com

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