ARVC in Dogs – A Dangerous Heart Muscle Disease

In previous posts I reviewed various heart conditions, including dilated cardiomyopathy (DCM) in dogs and hypertrophic cardiomyopathy (HCM) in cats. This week's post is dedicated to another important cardiac condition called arrhythmogenic right ventricular cardiomyopathy or ARVC. I hope you find the information useful and will share it with other dog owners. Happy reading!

What is ARVC?

Arrhythmogenic right ventricular cardiomyopathy is a primary heart muscle disease. This condition is characterized by replacement of normal heart muscle tissue with fatty and fibrous tissue. This change contributes to the generation of abnormal and sometimes lethal abnormal ventricular heart rhythms. Possible causes of ARVC are:

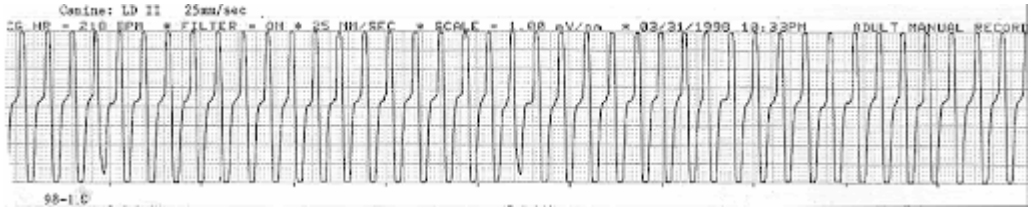
- Striatin (STRN) gene mutation

- Calstabin2 deficiency
- Ryanodine receptor (RyR2) mutation
- Desmoplakin gene mutation
- Plakoglobin gene mutation

What does it look like?

Arrhythmogenic right ventricular cardiomyopathy is most commonly diagnosed with boxer dogs. This disease has also been reported in English bulldogs and weimaraners. Males are over-represented, and the median age of onset is 6-8 years of age (range: 6 months – 15 years of age).

Classically, ARVC has been characterized by three forms: concealed, overt, and myocardial failure. Most dogs live with the concealed form, meaning they have no outward clinical signs. Those living with the overt form have episodes of exercise intolerance and exertion-induced syncope (collapse) due to an abnormal heart rhythm called ventricular tachycardia. Sudden death is possible. When myocardial or heart muscle failure develops, affected dogs commonly develop signs of congestive heart failure.



Electrocardiograph (ECG/EKG) of a dog with ventricular tachycardia (V-tach). Image courtesy of the University of Pennsylvania School of Veterinary Medicine.

How is ARVC diagnosed?

As series of non-invasive tests are indicated for dogs suspected of living with ARVC, the first of which is a complete physical examination. Veterinarians will listen for abnormal heart rhythms. It is important to note, however, that dogs with ARVC may have completely normal physical examinations. Other recommended tests include:

- *Electrocardiography (ECG/EKG)* – to detect ventricular arrhythmias
- *Holter monitoring* – this is the diagnostic test of choice to detect abnormal heart rhythms that are intermittent like those in dogs with ARVC. Dogs wear a small device that monitor their heart rhythm for 24 hours. Dogs with ARVC typically have more than 100 ventricular premature complexes (VPCs) during a 24-hour period.
- *Chest radiographs (x-rays)* – although usually normal, radiographs may show an enlarged heart and/or pulmonary edema in those with myocardial failure.
- *Echocardiography* – heart ultrasound examinations are usually normal in patients with ARVC, but occasionally right ventricular dysfunction is noted. Patients with myocardial failure often have changes consistent with left ventricular dilation and systolic (pumping) dysfunction.
- *Genetic testing* – veterinarians can submit a blood test to screen for ARVC in dogs. Those who test positive have a higher risk for developing disease *but* they don't necessarily develop clinical signs of disease. Furthermore, a negative test result does *not* guarantee a dog will not develop ARVC.

A boxer dog wearing a Holter monitor. Photo courtesy of Apex Boxers.

How is it treated?

The hallmark feature of the treatment of ARVC is administration of drugs to suppress abnormal heart rhythms. Drugs that may be prescribed include:

- Atenolol mixed with mexiletine
- Sotalol
- Procainamide

Patients in congestive heart failure require very aggressive critical care, including temporary supplemental oxygen therapy and diuretics. Supplementation with L-carnitine and omega-3 fatty acids may also be helpful for dogs living with ARVC. Dog owners are strongly encouraged to partner with a board-certified veterinary cardiologist to develop a logical and effective treatment plan. Many dogs with ARVC live long periods of time, and one study of 49 boxers with ARVC showed a median survival time similar to dogs without ARVC. With that being said, shorter survival times have been reported in dogs older than eight years of age at time of diagnosis, syncope, and more than 1000 premature ventricular contractions within a 24 hour period.

The take-away message about ARVC…

Arrhythmogenic or ARVC is a primary heart muscle disease characterized by abnormal ventricular rhythms. The disease is so common in boxer dogs that is often called Boxer cardiomyopathy. Common clinical signs are exercise intolerance and syncope. Many dogs have not outward clinical signs, but some may suddenly die. Treatment is administration of drugs to control abnormal heart rhythms.

To find a board-certified veterinary cardiologist, please visit the American College of Veterinary Internal Medicine.

Wishing you wet-nosed kisses,

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