THE 5 MOST COMMON ARRHYTHMIAS IN PRACTICE

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Although arrhythmology can be a complex science, identifying patterns of the most frequent arrhythmias can help the clinician to get the right diagnosis and, in many cases, save the life of the animal. We will discuss the diagnosis of respiratory sinus arrhythmia, third-degree atrioventricular block, atrial fibrillation, ventricular premature complexes, and will talk about the therapeutic approach to ventricular tachycardia.

Respiratory sinus arrhythmia (RSA)

This is probably the most frequent arrhythmia in daily practice. During inspiration, the decrease in vagal tone (parasympathetic) as well as other cardiac reflexes increases the heart rate, and the opposite happens during expiration. Sometimes this is accompanied by a migratory pacemaker, which is observed as a change in altitude of the p waves.

This arrhythmia is often present in normal healthy athletic dogs, in which the influence of the parasympathetic system on sinus predominates over the sympathetic system. It is also observed in dogs with a pathological high vagal tone (respiratory, gastrointestinal, neurological and ocular).

The RSA is especially useful in dogs with heart disease. In dogs with significant disease that develop or are close to develop congestive heart failure, we can see signs of compensatory mechanisms that the organism carries out to maintain cardiac output. One of these mechanisms is the increase of the sympathetic system and the typical clinical finding is a sinus tachycardia, or absence of respiratory sinus arrhythmia.

Third-degree atrioventricular block

In normal patients, the electrical impulse generated in the sinus node (SN) reaches the ventricles through the atrioventricular node (AVN). In some patients, the AVN degenerates preventing normal functioning. Sinus rhythm will be evident in the electrocardiogram, where P waves are seen following a rhythmic pattern. However, ventricular depolarisations (QRS complex) following these P-waves won't be seen. Cardiac output, which keeps these patients alive, can originate below the AVN (QRS complexes appear narrow and with frequencies between 40 and 60 bpm, or in Purkinje fibres (wide complexes with frequencies between 20 and 40 bpm)). Dogs with clinical symptoms (syncope or exercise intolerance) will require a pacemaker.
Atrial Fibrillation (AF)

In dogs, this arrhythmia is usually seen when there is a significant atrial dilatation, and congestive heart failure should be ruled out whenever we see a patient with this arrhythmia. AF belongs to the group of supraventricular arrhythmias, therefore with narrow QRS complexes. However, this may not be the case if there are enlarged ventricular chambers. Normally, the heart rate is high, especially if the dog also has congestive heart failure. Due to the large number of depolarisations that come from the left atrium, P-waves are not distinguished as such. On the other hand, an undulating based wave is usually seen, although sometimes it is not easily seen. One of the most important characteristics of this arrhythmia is the irregularly irregular rhythm (with no pattern) with a very characteristic auscultation. The treatment of AF is aimed to slow the heart rate and thereby improve ventricular filling and therefore cardiac output. It is important to remember that dogs with atrial fibrillation where the left atrium is dilated, the pace does not usually return to a sinus rhythm.

Premature Ventricular Complexes (PVCs)

Arrhythmias that originate in the ventricles appear as width complexes without p-waves preceding them in the electrocardiogram. This is due to a more slowly conduction through the cardiac cells, and often appear prematurely. In dogs, these arrhythmias may be due to extra-cardiac problems (spleen mass, neurological disease, hypoxia, etc...) or myocardial problems (dilated, hypertrophic cardiomyopathy, right ventricular arrhythmogenic cardiomyopathy, etc...). We can suspect if they originate in the left or right ventricle thanks to the morphology of these complexes. For example, in a Boxer dog, ventricular complexes with morphology of left bundle branch block in lead II (positive) suggest that he source of this arrhythmia is in the right ventricle, probably caused by a right ventricular arrhythmogenic cardiomyopathy, or Boxer Cardiomyopathy. PVCs appearing negative in lead II suggest a left ventricular origin, more commonly observed in extra-cardiac disease or dilated cardiomyopathy.

The decision to treat these complexes will be based on the number of complexes, but mainly on some criteria of malignancy (complexes appearing in pairs, high intrinsic frequency, R on T phenomenon, different morphology, etc.) and the presence of symptoms (intolerance to exercise or syncope).

Ventricular tachycardia is, without a doubt, one of the most common arrhythmias in emergency centres. Treatment usually begins with boluses of lidocaine and constant rate infusions of this drug if it is effective. It is important to remember that the levels of potassium and magnesium must be right for the lidocaine being effective. Depending on the response to lidocaine, other Class I antiarrhythmics such as procainamide can be considered, as well as short-acting beta blockers (esmolol). Ventricular tachycardias refractory to these antiarrhythmic drugs may need amiodarone and even electrical cardioversion. However, it is important to question our diagnosis in certain arrhythmias, since supraventricular
Arrhythmias with anomalous intraventricular conduction (branch or ventricular pre-excitation block) can be incorrectly diagnosed as ventricular tachycardia.