Cardiac dysrhythmias: when to worry?

"Rhythm is something you either have or don't, but when you have it, you have it all over!" - Elvis Presley

This may have been a trite thing about rock and roll, but when it comes to the horse's heart, this is quite quite true. Many perfectly healthy horses have slightly irregular cardiac rhythm – in fact, the healthier and happier they are, the more the irregular heartbeat becomes.

How is the heart rhythm controlled?

In both horses and man, the cardiac rhythm is controlled by a pacemaker called the sino-atrial node (or SA node). This is a collection of specialized cells that is located within the right atrium, one of the four chambers of the heart.

These cells have an inherent rhythm and send out an electrical signal that spreads first through the atria and then on to the atrioventricular node (or AV node). An atrial impulse then travels more slowly through the AV node, is passes across the right (RA) and left (LA) atria, to the ventricles.

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The ECG is the primary tool that is used to determine heart rhythm. It involves essentially a map of how the electrical impulse makes its way through the different chambers of the heart. In practice, it is recorded by placing at least two electrodes on the surface of the horse's body. Detecting the electrical signal and displaying that as a waveform, either on paper, or more commonly with modern units, on a computer file that can be analyzed in real time.

What is a dysrhythmia?

Dysrhythmia is a catch-all term used to describe any form of irregularity of cardiac rhythm. The important thing to understand about the horse's cardiac rhythm is that it is often slightly irregular. As a species, horses have large hearts that are adapted for maximal exercise. At rest, the heart is much more powerful than it is needed. As a result, all horses have fairly slow heart rates, often around 30-40 beats per minute. The heart rate is adjusted to keep blood pressure fairly constant and to achieve this, horses will often skip or drop a beat. On the other hand, the cardiac rhythm can become irregular when the horse is sick or when there is cardiac disease.

Normal dysrhythmias

Survey of healthy horses monitored over prolonged periods, using systems which allow the horse to be studied overnight, have shown that around 40% of horses have second degree atrioventricular block, also known as 2AVB. Vets will often also pick this up when listening to horses with a stethoscope.

The important point about 2AVB is that it is a normal healthy process that allows the heart to adjust its heart rate and prevent its blood pressure being higher than it needs to be at rest.

When listening to a heart with 2AVB, a pause in the rhythm is heard, very similar to regular intervals, but between this, the cardiac rhythm is regular. Most often, one beat is dropped but in some healthy horses, two beats are dropped. When the horse's heart rate increases, for example in response to exercise or excitement, the cardiac rhythm becomes regular. This is the features a vet is looking for when the heart is listened to after exercise during a vetting examination.

With 2AVB, the same features are evident on an ECG. With a normal heart, the p wave represents the impulse starting in the pacemaker and spreading through the atria. It then travels more closely through the AV node, represented by the p-r interval and if the impulse passes on to the ventricles, this then shows a P-Q-T complex. With 2AVB, the impulse stays in the pacemaker and the p wave is present. But, instead of passing through the AV node, it is blocked here, so there is no QRS complex. This can arise both singly or in pairs.

When 2AVB is detected, as long as this does not occur with exercise, it is regarded as being completely normal and further investigations are not necessary.

Dysrhythmia is actually rather common in Standardbred and Thoroughbred racehorses and it accounts for around 1.5% of disappointingly poor performance. Usually it is a one-off occurrence and horses that have had this problem go on to race successfully again. Recently, the racehorses Sprinter Sacre and Sir Wido have been reported as having had an episode of paroxysmal atrial fibrillation.

If paroxysmal atrial fibrillation does not self correct, it may have to be treated. There are two basic approaches. Atrial fibrillation can be treated with various drugs, of which quinidine sulphate is the most common. Alternatively, some horses are treated with electrical shocks. Both options have pros and cons. The drugs require very careful monitoring and side effects mainly relating to gastrointestinal problems are common. Horses that have had atrial fibrillation for a fairly short period of time will typically respond well to quinidine sulphate treatment.

Electrocardiography is only available at one centre in the UK at the moment, Rossdales Equine Hospital. It is a quite a complex procedure and the results are delivered via electrodes inserted.

The ECG is a roadmap of how electrical impulses travel through the heart. The normal heart starts in the SA node, is passes across the right (RA) and left (LA) atria, to the AV node. There is a short delay then the impulse travels down into the right (RV) and left (LV) ventricles through a network of specialized fibres. A beat originating in the sinus (the SA node), has a specific pattern of a p formed of a double peak, followed by the q and r complex. An AVP is an abnormal impulse that starts in the atria and the p wave has a different shape. A VPD is an abnormal impulse that starts in the ventricles and the q wave has a different shape.

If the abnormal impulses are starting at several sites, the q waves will have several shapes. If there are multiple abnormal impulses in succession, this is called tachycardia.
**Vetwatch**

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**Rossdales Equine Hospital & Diagnostic Centre**
Cotton End Road, Exning, Newmarket, Suffolk CB8 7NN.
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The donkey filly had a pacemaker fitted by a team combining vets from Rossdales, the Royal Veterinary College and University of Nottingham. Here she is having an ECG to diagnose dysrhythmias associated with exercise.

**Ventricular dysrhythmias**

A tachycardia is when the heart beats over 100 beats per minute. When an incorrect sequence of depolarisations occurs, this is called a ventricular premature depolarisation (VPD). It could be normal or could be due to disease. An important factor is the duration that the VPD has been present. If it is less than 500 milliseconds, this is likely to be normal. If the VPD is over 1000 milliseconds, it is likely to be due to disease. If the VPD is over 2000 milliseconds, it is likely to be due to disease. The answer is 'it depends'. Some dysrhythmias are unstable and might cause the horse to faint or even die suddenly and the obviously places a rider at considerable risk of injury. This risk can exist even in horses that have shown absolutely no signs of problems at rest or at exercise previously. Fortunately, many horses that have dysrhythmias are not likely to destabilise during exercise. Most studies to date have been performed in racehorses, but there has also been research performed in dressage horses and showjumpers, so there is a growing body of evidence on what rhythm disturbances can be regarded as unlikely to cause problems during exercise. Exercising ECGs can easily be performed now. Typically, this might involve exercising the horse with ECG monitoring equipment on several occasions and at a level that matches or exceeds the horse’s usual workload. This sort of test can often be performed at home, although it may involve your local vet liaising with a specialist who can provide equipment and interpret the results. The message for horse owners and riders is do not to take any chances and have any suspicious dysrhythmia investigated by a cardiologist.

**Practitioner Guide**

It is important to remember that the overall safety of any intervention involves weighing the potential to cause fatal side effects. It is important to recognise that the overall safety of any intervention involves weighing the potential to cause fatal side effects. It is important to recognise that the overall safety of any intervention involves weighing the potential to cause fatal side effects. It is important to recognise that the overall safety of any intervention involves weighing the potential to cause fatal side effects. It is important to recognise that the overall safety of any intervention involves weighing the potential to cause fatal side effects. It is important to recognise that the overall safety of any intervention involves weighing the potential to cause fatal side effects. It is important to recognise that the overall safety of any intervention involves weighing the potential to cause fatal side effects. It is important to recognise that the overall safety of any intervention involves weighing the potential to cause fatal side effects.