

Accessory Pathway and associated arrhythmias

What is an accessory pathway (AP)?

- Normally, the atria are electrically isolated from the ventricles except at the location of the atrioventricular (AV) node, which allows electrical conduction from the atria to the ventricles. An accessory pathway is a fetal abnormality in which an extra piece of tissue in the heart connects the atria and the ventricles. The most common location of AP tissue in dogs is in the right atrium near the tricuspid valve. Rarely, more than one accessory pathway exists.
- An AP can have different properties, allowing fast conduction from the atria to the ventricles, from the ventricles back up to the atria, or allowing conduction in both directions. This can result in changes on the ECG and potential for arrhythmias.
- Conduction from the atria to the ventricles through the AP will result in faster activation of the ventricles compared to normal conduction through the AV node. This is termed pre-excitation and results in changes on the surface ECG, including a short PR interval and early ventricular depolarization (activation).
- Conduction from the ventricles to the atria can result in an abnormal circuit that continuously re-excites the heart and results in a rapid arrhythmia, termed orthodromic AV reciprocating tachycardia.

Breeds predisposed

- Accessory pathways and the associated arrhythmia can be seen in any breed, but more commonly found in Labrador Retrievers, Boxers, and the American Shorthair cat.

How are accessory pathways diagnosed?

- An electrocardiogram (ECG) is required to make the diagnosis of an accessory pathway. The cardiologist may also have a high suspicion for the presence of an accessory pathway and/or orthodromic AV reciprocating tachycardia, but sometimes cannot be confirmed at the initial assessment and until treatment of the arrhythmia.



This is an ECG of a dog with an accessory pathway (AP) and evidence of pre-excitation. The timing from atrial to ventricular activation is shortened due to faster conduction through the AP, shown on the ECG as a shortened PR interval, along with pre-excitation (early activation of the ventricles), which are denoted with line.



This is an ECG of a dog with orthodromic AV reciprocating tachycardia, a rapid arrhythmia due to the circuit made by the normal heart conduction tissue and the presence of an accessory pathway. The heart rate is 330 beats per minute.

Treatment

- The cardiologist will assess your pet's risk for symptoms from the arrhythmia to determine a treatment and monitoring plan.
- Options for treatment involve either oral antiarrhythmic medication(s) with the goal to control the periods of orthodromic AV reciprocating tachycardia or a procedure to target the accessory pathway and permanently disrupt the arrhythmia, termed radiofrequency catheter ablation. The ablation procedure requires referral to a tertiary facility and general anesthesia.

Follow up plan

- Depending which treatment option is chosen, your pet's cardiologist will recommend follow up ECGs (+/- ambulatory 24 hour ECG termed a Holter monitor) to assess if the arrhythmia is progressing, if the management plan is working, and to help make adjustments.