

ECG Quiz

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Strip 1



Strip 2

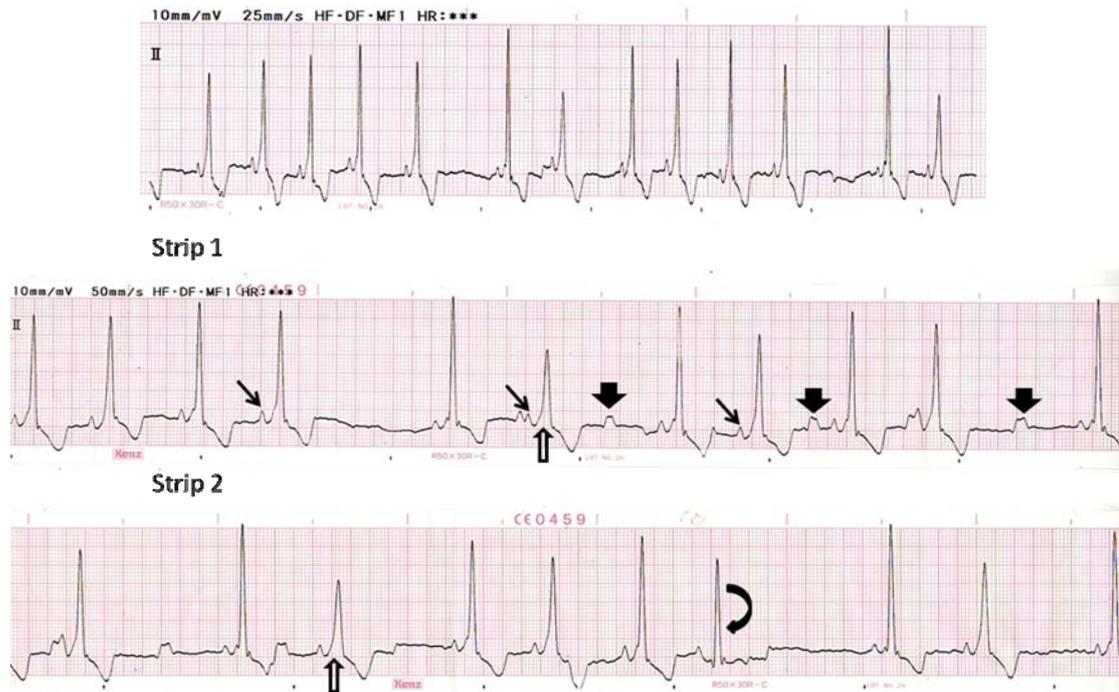


Strip 3

Strip 1, 2 and 3 were recorded from a 12 years old spayed female Golden retriever weighing 32 kilograms. In August, 2012, the dog had history of conjunctivitis due to entropion. At the end of the year, multiple nodules were found underneath the skin especially at the right cervical area. One soft tissue mass was ruptured at the ventral abdomen. Fine-needle biopsy revealed basal cell tumor in origin. The ECG was recorded prior to surgery and respiratory sinus arrhythmia was found. Thoracic radiograph showed normal heart size and normal lung appearance. All masses were surgically removed; pilomatricoma was histologically diagnosed. Six months later, small masses were detected again at the area of left hip, left body trunk and right elbow. The owner complained that the dog had frequent

coughing at night. Thoracic radiograph was re-evaluated. Normal heart size (VHS = 9.7) with bulging of the left ventricle, thickening of the lateral mediastinum and mild interstitial pattern of caudodorsal lung fields were found. The abdominal radiograph revealed two subcutaneous masses, of which the size was 2.7x2.3 cm² on the back area, dorsal to last rib and 4.3x3.4 cm² located at the caudal lumbar to proximal tail area. During this time, the dog had no syncope. The pulse was strong without pulse deficit. Complete blood counts as well as the liver and kidney profiles were within normal limits. The ECG was re-evaluated. The results were shown in strip 1, 2 and 3 with two different paper speeds.

Please answer before turning to the next page.



Interpretation

Ventricular pre-excitation

Heart rate was approximately 120 beats per minute. One normal P-QRS complex was seen (curve arrow) along with normal PR interval and negative Q wave deflection (strip 3). However, most of QRS complexes had variation of shape and height which indicates impulse differently travelling through the ventricles.

Ventricular pre-excitation occurs in this case when impulses originate from sinoatrial node or atrium and prematurely activate the portion of the ventricles through an accessory pathway. Impulses are able to reach the ventricles initially without going through the AV node. Most of the complexes had P-wave appearing closely just before the R waves (small straight arrows) and were followed by an early slur to the QRS complexes, which is called "a delta wave" (hollow arrows). This wave is caused by the portion of ventricle prematurely activated while the sinus impulse is conducted through the accessory pathway without delay. The remainder of the ventricles is then activated from both normal and accessory pathway. Many factors affecting the shape of the ECG waveforms include the location of the accessory pathway, the conduction time required inside the atria, the normal AV node - bundle of His pathway and the accessory pathway.

It was possible that the accessory pathway may cause the reentry circuit. If the ventricular pre-

excitation occurs with episode of paroxysmal supraventricular tachycardia, the Wolff-Parkinson-White (WPW) syndrome will be diagnosed.

The anatomic locations of ventricular pre-excitation were demonstrated as bundle of Kent (accessory AV conduction), James fiber (AV nodal bypass tracts) and Mahaim fibers (nodoventricular tract). Previous study in a dog using epicardial mapping showed that the bundle of Kent was the most important location.

Small waves (big straight arrows) represented normal P-waves that is originated from the SA node and travelled through atria via the normal tract. However, these normal P-waves were not followed by the normal QRS complexes suggesting that they did not reach the ventricle through the normal AV conduction pathway and were replaced by the competitive ectopic rhythm.

The ectopic impulses travelling through accessory pathway may occur temporary or may be sustained depending upon the patient's heart condition. The ventricular pre-excitation without tachycardia does not require treatment. However, if supraventricular tachycardia was manifested, treatments including ocular or carotid sinus compression, medication or direct current shock may be necessary.