ECG Quiz

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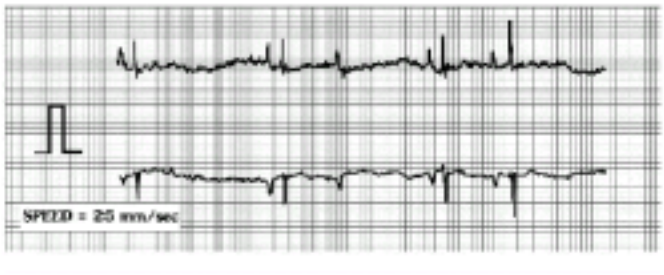

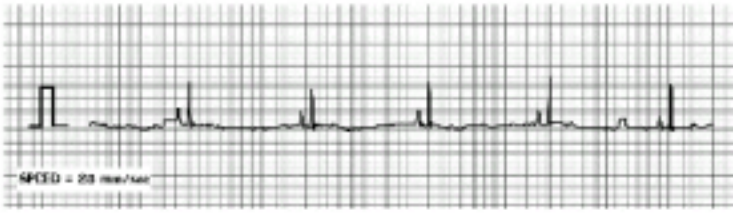

This lead II was recorded from a 6 year old, male Poodle weighing 4.5 kg that came to the hospital with a history of periodic seizures (once to twice a year) over the last few years. The owner noticed that the frequency and duration of seizures had become more frequent. The dog showed persistent vomiting for the past 2-3 days. It was diagnosed by a private veterinarian as having heart disease and heart medications were given for 7 days. Heartguard was used to prevent heart worm infection. On physical examination, the dog had a normal body temperature. Heart rate was 57 beats/minute with normal heart and lung sounds. A thoracic radiograph showed right heart enlargement but a normal lung field. Biochemical profiles showed a normal kidney panel with increased ALT (105 unit). Plasma sodium and potassium were within normal limits. Serum lipase and amylase were also within the reference ranges. A complete blood count showed a normal number of red and white blood cells. A electrocardiogram was performed and the strip is shown above.

Please make your interpretation and turn to the next page to see the answer

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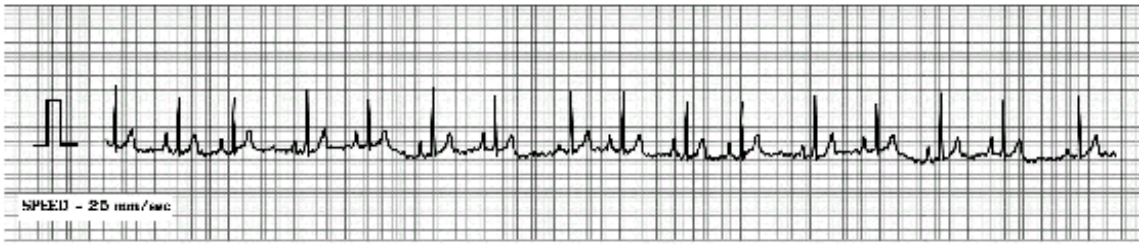
Heart rate	57	bpm
P duration	0.04	sec
P amplitude	0.4	mV
P-R interval	0.12	sec
QRS duration	0.04	sec
QRS amplitude	1.1	mV
Q-T interval	0.28	sec

Sinus bradycardia with second degree AV block.

In this ECG strip, the morphology of the P and QRS waves were normal. Measurement of the heart rate showed bradycardia (heart rate < 60 beats/min). Since there was no sinus pause or severe blockage of the conducting pathway, the seizure may not involve the heart. The dog had signs of vomiting after heart medication and toxicosis was suspected. The presence of two consecutive P waves, known as second degree AV block, was a typical ECG finding along with a slow heart rate, due to parasympathetic stimulation. An inverse relationship between the heart rate and the Q-T interval was found. In severe cases, digoxin toxicity may cause a second and third degree AV block and increased automaticity of the junctional and His-Purkinje tissue. The cellular mechanisms of digitalis toxicity are (1) intracellular calcium overload that predisposes to calcium dependent delayed afterpolarizations; (2) excessive vagal stimulation; (3) depressive effects on nodal tissue; and (4) sympathetic stimulation.

From the medication history given by the owner, digoxin had been given to the dog at a dose of 0.056 mg/kg. Fluid therapy was recommended for this dog and the digoxin was discontinued. The dog also received phenobarbital sodium to control the seizures. The dog improved within a few days and showed no vomiting. One week after stoping digoxin an ECG was performed again and was normal, as shown below. Plasma digoxin level should be checked to confirm the diagnosis.



Heart rate	120	bpm
P-R interval	0.12	sec
Q-T interval	0.18	sec