

The Thai Journal of Veterinary Medicine

Volume 41
Issue 2 July, 2011

Article 17

7-1-2011

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Recommended Citation

Buranakarl, Chollada and Chansaisakorn, Winai (2011) "ECG Quiz," *The Thai Journal of Veterinary Medicine*: Vol. 41: Iss. 2, Article 17.

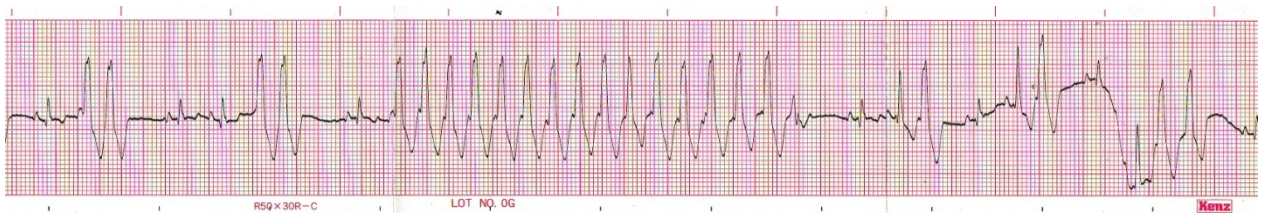
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ECG Quiz

Chollada Buranakarl^{1*} Winai Chansaisakorn²

Tracing I



Tracing II



History

A nine years old female-non neutered boxer weighing 25.5 kg came to Small Animal Hospital, Chulalongkorn University with a history of weight loss, anorexia and heavy dental tartar. The epulis was found at the gum. The owner requested his dog to have the tartar and mass removal. By physical examination, dog was cachexia and showed sign of tachypnea. The heart sound was murmur with arrhythmia. Thoracic radiograph showed cardiomegaly with interstitial infiltration. Blood collection showed normal blood count with biochemical profiles of normal liver and kidney panels. The blood pressure was hypotensive. The ECG

was recorded as seen in tracing I and II. Echocardiography was performed and ventricular chamber dilation was found. The fractional shortening was 12.1% and EPSS was 16 mm. The dilated cardiomyopathy was diagnosed. Dog was treated with enalapril, furosemide and digoxin to improve cardiac function. After 1 week of treatment, she was more alert and regained appetite. The antiarrhythmic drug, amiodalone was added to control heart rhythm and the ECG was repeated 2 weeks later with respiratory sinus arrhythmia and periodic PVC. The dog was clinically healthy with weight gain after treatment.

Please answer before turning to the next page.

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Interpretation

Sinus rhythm with paroxysmal ventricular tachycardia (PVT)



Both lead II tracing showed the ECG waveforms which were originated from both sinus (straight arrows) and ventricular locations (curve arrows) known as ventricular premature complexes (VPCs). The abrupt onset and termination of tachycardia makes it a paroxysmal event. The QRS complexes during the tachycardia (bracket) were identical to those of VPCs, identifying them as ventricular in origin. The long one lasted for 7 seconds making the unstable cardiac output. The sinus rate was approximately 160 beats per minute but the rate of VPCs rhythm was higher (250 beats per minute). The morphology of ectopic beats and the coupling interval of the first beat in each run were the same as the single VPC. The constant coupling at the beginning of the runs of VPCs, the absence of fusion beats at the beginning or at the end of any run, and the fact that the runs end without the sinus beats reaching a heart rate that supersedes the ventricular tachycardia rate could distinguish this as a true paroxysmal ventricular tachycardia rather than accelerated idioventricular rhythm. At heart rate faster than 160 beats per minute, the passive ventricular filling would be affected while at heart rate over 200, a transient fall in blood pressure would be expected. Hypotension may not be sufficient to produce clinical signs while the dog was not being physically exerted. The VPCs's morphology may be differed although they may not come from multiple origins (multifoci). Some sinus complexes interacted

with VPCs producing variable degree of fusion. One sinus complex occurs at about the same time and transmits an impulse which fuses with another VPC, altering its morphology (star). Some sinus complexes occur at the end of T-wave and conduct faster and reach the ventricle just after the VPC is triggered. Therefore, the degree of fusion is only slight and the QRS complexes resemble the sinus beats more closely than the VPCs (solid dots). This unstable hemodynamic if occurred frequently can cause a possible of ventricular tachycardia and should be considered for treatment.

The echocardiographic data showed low fractional shortening with the severe dilated heart known as dilated cardiomyopathy (DCM). The amiodalone, class III anti-arrhythmic agent was given and the ECG waveform recorded 2 weeks later seems to be improved. The drug has sodium channel blocking effects with milder beta-blocker and calcium channel blocking effects. It has been used in veterinary patients to treat dogs with DCM and ventricular arrhythmias. In this case, electrical instability was related to the organic disease of the heart itself. Boxer is one of the breed predilections for this disease which may require carnitine and/or taurine supplementation. Improvement of ECG waveform after treatment with lower number of VPCs, however, did not assure either the longer survival of the animal or the prediction of the disease progression.