

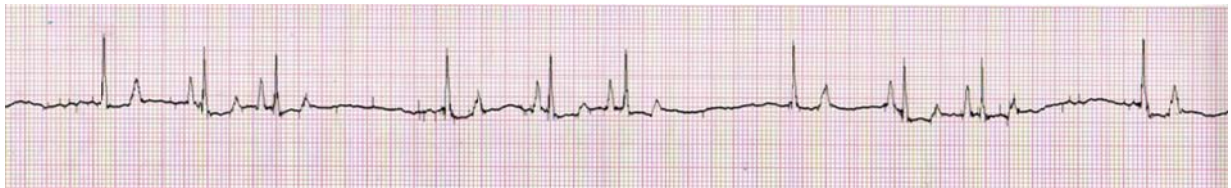
ECG Quiz

Chollada Buranakarl* Kittipong Tachampa

Paper speed 50 mm/sec



Tracing1 First admission



Tracing2 Before atropine administration



Tracing3 After atropine administration

These lead II ECG strips were recorded from a 9 years old Yorkshire Terrier weighting 2.78 kg that came to the Small Animal Hospital, Chulalongkorn University for a checkup before dental scaling. The history taking showed no clinical signs related to heart and no evidence of syncope. Physical examinations revealed that dog had pale to pink mucous membrane, strong femoral pulse, normal hydration status with severe dental tartar. By auscultation, the soft systolic murmur with arrhythmia was found while lung sound was fairly normal. Blood collection was performed and the result showed that the complete blood count, liver

enzyme (ALT) and plasma creatinine concentration were within normal limits. The thoracic radiograph showed left atrial enlargement which was confirmed by echocardiogram with LA/Ao ratio of 1.51 (normal: 0.8-1.1). However, no mitral regurgitation was found. The fractional shortening was 66% with cardiac compensation.

The electrophysiology was performed on the day of first admission (tracing 1) and on the day of challenging with atropine (tracing 2 and 3). The dog was on enalapril treatment without any clinical signs.

Please answer before turning to the next page.

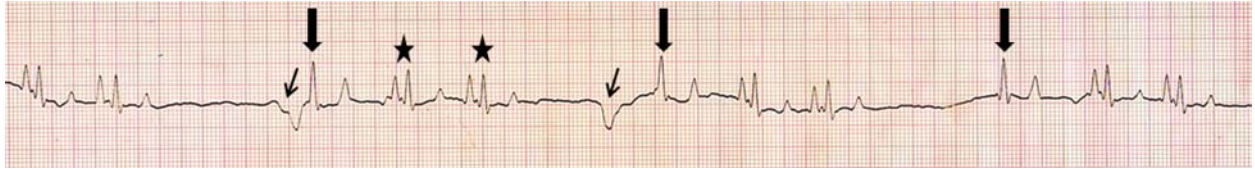
Interpretation

Tracing 1 - Sino-atrial arrest with supra-ventricular and ventricular escape beats

Tracing 2 - Sino-atrial arrest with supra-ventricular escape beats

Tracing 3 - Respiratory sinus arrhythmia

Paper speed 50 mm/sec



Tracing 1 First admission



Tracing 2 Before atropine administration



Tracing 3 After atropine administration

The ventricular rate of this dog at first admission (tracing 1) was 120 beats per minute. Please notice three different shapes of ECG waveforms. The first waveform (stars) had shape similar to normal QRS complexes that originated from sinus although the P-waves were slightly tall. The second waveform (small arrow) occurred after a long pause with negative deflection suggesting that the pacemaker was originated somewhere beyond the ventricle. Since the ventricular ectopic beats were presented right after the pause, the term "ventricular escaped beats" was commonly used. The big arrows that followed after the ventricular escape beats had no P-waves and the QRS complexes showed positive deflection similar to the normal QRS complexes passing through Bundle of His. Thus, the pacemaker was originated supraventricular location near the atrioventricular node. The term escape beats were still applied since they were appeared after the long pause of sinus.

Tracing 2 showed the ECG waveforms recorded on the day of atropine test before drug administration. The heart rate was still the same as

previous recording. The sino-atrial pause was followed by supraventricular ectopic beats (big arrows) without ventricular intervention. After atropine administration (tracing 3), all complexes became sinus in origin. No pause occurred and heart rate was increased up to 200 beats/minutes. The electrophysiologic abnormalities with aberrant conduction in this case may not be related to physically atrial enlargement shown by echocardiography. Blood pressure should be measured and cause of cardiac overload in this case should be identified. Since the heart rate measuring while animal had sino-atrial pause was within the acceptable range, the cardiac output was not compromised. No anti-arrhythmic drugs were required but the cause and progression of heart overload should be monitored. The electrocardiography should be re-performed every 6 months to 1 year to evaluate the life threatening of long sinus arrest. The angiotensin converting enzyme inhibitor can be useful to reduce the cardiac overload in this case.