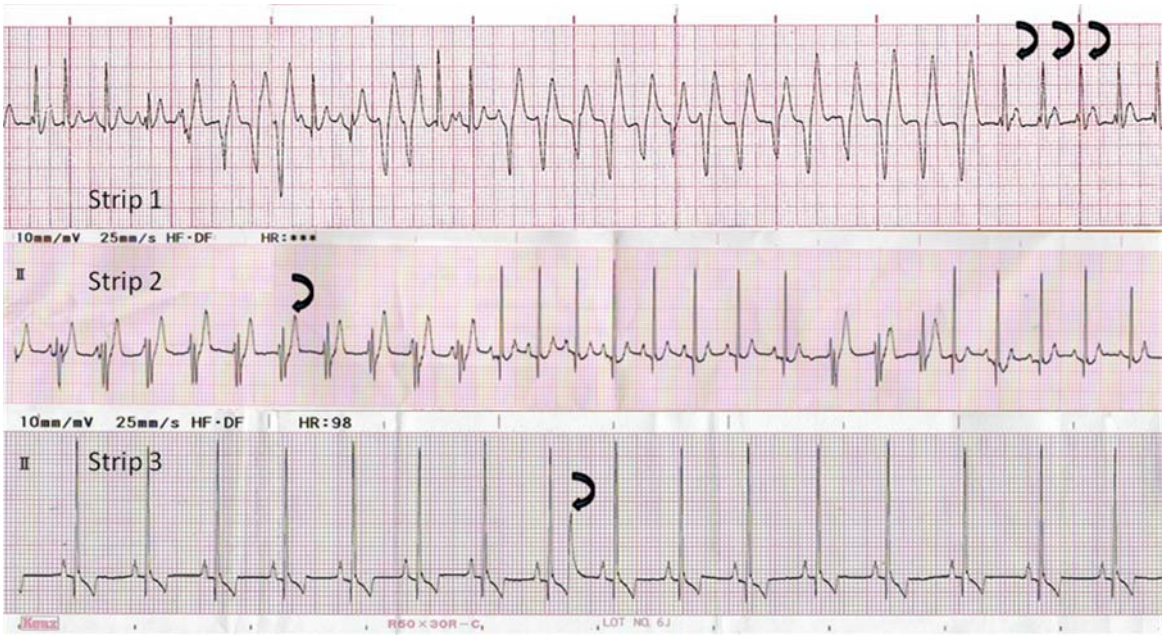
ECG Quiz

Chollada Buranakarl[1] Kris Angkanaporn[1] Sirilak Disatian[2]
Winai Chansaisakorn[3] Piyasiri Glangosol[4]



These lead II ECG strips were recorded from a 12 years old, female, Golden Retriever, weighing 29.5 kg that was referred to the emergency unit of The Small Animal Hospital, Chulalongkorn University. She had signs of panting and collapse. Clinical examinations revealed pale pink mucous membrane, weak pulse with normal heart and lung sound. The complete blood count, serum chemistry profiles and blood gas test were within normal limits. On the next day, she was still weak and panting. An enlarged lymph node, increased lung sound and arrhythmic heart sound with pulse deficit were examined. ECG was made as shown in strip 1. Echocardiography revealed pericardial effusion and cardiac temponade. Lidocaine at 50 µg/kg BW was dripped intravascularly with the rate of 50 ml/hr along with oxygen therapy.

The second ECG strip was recorded after lidocaine administration. Indirect blood pressure was 124/84 (systolic/diastolic pressure) and mean arterial pressure was 98 mmHg. Pericardiocentesis was performed and approximately 90 ml bloody fluid was collected. The fluid was sent to the laboratory for cytology examination, hematocrit determination and bacterial culture and sensitivity test. There was no bacterial growth and cytology test revealed chronic pericarditis induced by mesothelial cell proliferation or mesothelioma. The fluid contained some protein (0.8 g/dl) and the specific gravity was 1.037. Amiodarone, enalapril, silymarin and furosemide were prescribed and she was discharged from the hospital. A week later, she came to the hospital with the symptom of depress, anorexia, pale pink mucous membrane with no pulse deficit. An ECG was performed as demonstrated in strip 3. The dog died three days after the final visit.

Please answer before turning to the next page.

[1]Department of Physiology, [2]Department of Veterinary Medicine, [3]Small Animal Hospital, [4]Innovation Center for Teaching and Services in Companion Animal, Chulalongkorn 100th Anniversary Research Innovation Project, Faculty of Veterinary Science, Chulalongkorn University

Interpretation

First strip - Sinus arrhythmia with ventricular tachycardia
Second strip - Sinus rhythm with some ventricular ectopic beats
Third strip - Normal sinus rhythm with occasionally ventricular ectopic beat

From the first strip there were many different shapes of ECG complexes. Some complexes had normal QRS waveform although some of P-wave may not be visible. The P-waves were concealed by superimposing on the preceding T-wave (arrow). The rate of ventricular rhythm of 200 beats/minute is termed ventricular tachycardia. Some fusion beats with the shape in between sinus and ventricular origin occurred. The amplitude of R-wave may be varied along with changes in impulse conductivity due to pericardial fluid. The bizarre complexes with prolong duration implied that the impulses originated from the location below the Bundle of His. Fasting ventricular rate is the life threatening situation leading to very low cardiac output and sign of syncope. Therefore, the class IB antiarrhythmic drugs, lidocaine was introduced immediately to eradicate the ectopic beats and convert the impulses to become sinus in origin.

In strip 2, recorded after 2 hours of continuous lidocaine administration (before pericardiocentesis), the sinus rate appeared more frequent while the ventricular ectopic rhythm still existed with a lower rate than strip 1 (150 beats/minute) (arrow). The origin of the ectopic may be closed to the atrioventricular node or the Bundle of His. The cardiac output will improve but the periocardiocentesis is required in order to increase preload during diastole. Lidocaine is one of the effective drugs in controlling most ventricular arrhythmias by blocking the fast sodium channel resulting in the slow down the uprising depolarization in phase 0 of cardiac myocyte action potential. It is administered only by the intravenous route. However, some side effects such as nausea, CNS excitement leading to tonic-clonic seizures may be present.

After the dog was stable, amiodalone, the class III antiarrhythmic drug was prescribed to control the ectopic beats. The strip 3 ECG was recorded after one week of daily administration of amiodalone. The ECG revealed the normal sinus rhythm with the rate approximately 100 beats/minute and a few ventricular ectopic beat (arrow). Class III antiarrhythmic drug possesses qualities of all four antiarrhythmic groups. It blocks sodium channel, with mild beta blocking and calcium channel blocking effects. This drug has long half life and may have hepatotoxicity and neutropenia. Although the ECG waveform and the rate were practically normal, dog still showed signs of discomfort and severe depression. The result of modified transudate collected from the pericardial fluid suggests that the dog may be suffered from pericardial related disease. The dog died 3 days later and unfortunately, the autopsy was not performed.