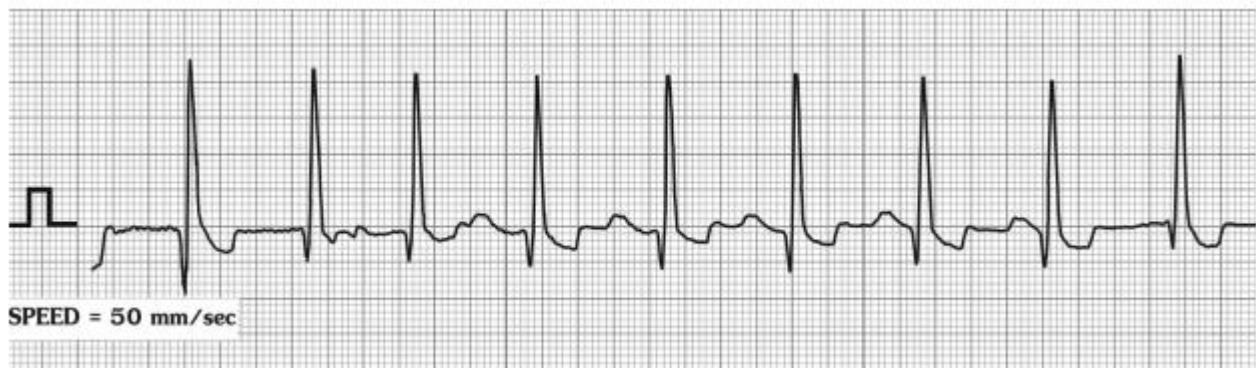


ECG Quiz

Chollada Buranakarl* Kris Angkanaporn



This complex lead II strip was recorded from a 6 month-old female Labrador Retriever, weighing 17.5 kg, with a history of anorexia, exercise intolerance, panting and emaciation. The physical examination revealed the dog had a systolic murmur grade III/VI, pale mucous membranes, dehydration, and fluid in the abdomen. A complete blood count showed anemia and the white blood cell counts were slightly increased. Serum chemistry profiles were within normal limits.

A thoracic radiograph revealed whole heart enlargement with alveolar pneumonia of both cranial lung lobes and the left caudal lung lobe. The dog received enalapril, digoxin, lasix and moduretic. Echocardiography revealed atrial dilatation, subaortic stenosis and thickening of the mitral valve.

Please make your interpretation before turning to the next page.

Supraventricular tachycardia with three premature atrial complexes



The heart rate was approximately 180 beats / minute. Irregular P waves were present in strip I and a wide duration of 0.1 second can be detected in strip II when the speed changed to 50 mm per second (normal = 0.04 second). Some P waves showed notching (dark arrow in strip II). Please notice the tall QRS complexes with a height of 4.6 mV in all waveforms.

The P wave represents atrial depolarization. The QRS shape resembles the basic QRS, suggesting the impulse was from a supraventricular origin. Some waves had QRS complexes without the preceding P wave, which indicates atrial fibrillation may occur. Please notice three premature atrial complexes with a P' wave (open arrow) in strip I, which can be detected by the shorter R-R interval. In strip II, the wide P wave indicates left atrial enlargement, since the latter portion of the P wave is produced primarily by the left atrium. The notch (dark arrow) occurred from superimposition of the asynchronous right and left atrial conduction. The prolong duration of a P wave is known as "P mitrale". The term P mitrale can be misleading because mitral valvular disease may not be present. Atrial enlargement can be caused by various heart

defects especially congenital heart diseases such as aortic stenosis, ventricular septal defects and patent ductus arteriosus. In this case, the echocardiographic result confirms the diagnosis of possible subaortic stenosis. The dilated atrium coincided with a defect in impulse generation and conduction in the atrium, causing atrial fibrillation, which can be detected by the non existent P wave prior to the QRS wave at the beginning and at the end of ECG strip II.

The abnormally tall QRS (greater than 3.0 mV) indicated dilatation and or hypertrophy of the left ventricle. The pressure overload (concentric hypertrophy) and volume overload (eccentric hypertrophy) or combinations of both are responsible for the ventricular enlargement seen in the thoracic radiograph. The amplitude of the R wave is greater in animals with volume overload than in those with pressure overload. In this case, subaortic stenosis is considered to be a pressure overload. However, the voltage criteria can be inaccurate since it can be influenced by the distance between the electrode and heart. The conditions that block or enhance the conduction velocity can also change the amplitude of the QRS wave.