

ECG quiz

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Introduction

A 32-year-old male patient presented to emergency department (ED) with on and off central chest pain for two days. The pain was not related to exertion and there was no radiation. The pain was increased by inspiration but not varied with postural change. There was mild shortness of breath. He was a smoker and enjoyed good past health. Vital signs were normal. Examination was essentially normal.

Chest x-ray was taken, lungs were clear. There was no pneumothorax and pleural effusion.

An electrocardiogram was done which is shown in Figure 1.

Questions

1. What are the ECG findings?
2. What is the diagnosis?



Figure 1.

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Answer

1. Elevation of J point, notching of terminal portion of QRS complex and ST segment elevation which is concave upward at I, II, III, aVF and V3 to V6.
2. Benign early repolarisation (BER).

Discussion

Chest pain is a common complaint among ED patients. A significant proportion of these patients may be suffering from acute myocardial infarction (AMI). The emergency physicians are obliged to identify those patients who are eligible for thrombolytic therapy according to departmental policy.

However ST segment elevation is not specific for AMI. Many other conditions may also cause ST segment elevation (Table 1) and cause difficulty in diagnosis.

Benign early repolarisation is a normal variant. The prevalence is about 1% in the general population and in 13-48% in ED patients presented with chest pain. It is important to recognise this condition, otherwise patients may be subjected to unnecessary thrombolytic therapy which is not without risk. In one study, 11% of patients who received thrombolytic therapy did not have AMI and the ECG changes was due to BER in 30% of these cases.

Table 1. Causes of ST segment elevation.

Cardiac
Acute myocardial infarction
Acute pericarditis
Left ventricular aneurysm
Left ventricular hypertrophy
Bundle branch blocks (RBBB, LBBB, non-specific intraventricular block)
Metabolic
Hyperkalaemia
Hypothermia
Hyperventilation
Miscellaneous
Acute abdominal disorders (pancreatitis, cholecystitis, peritonitis)
CNS haemorrhage
Drugs (Class 1 anti-arrhythmic agent, isoprenaline)
Body habitus
Idiopathic

BER is usually found in patients below 50 years of age and is rarely seen in individuals over the age of 70 (3.5%). It is relatively stable over time. Availability of old ECG for comparison is the most reliable method for diagnosis.

ECG changes typical of BER include elevation of J-point; notching or irregular contour of J point; ST segment elevation with upward concavity, the extent of ST elevation is usually less than 2 mm in 80 to 90% of cases. It is usually associated with tall, symmetrical and concordant T wave. The ratio of ST segment elevation to height of T wave (ST/T) is usually less than 0.25. The changes of BER is usually found at V2 to V5 and may be present in inferior leads as well, but rarely in inferior leads alone. The ST elevation may be reduced with exercise or isoprenaline infusion (which is dangerous if the patient is suffering from acute coronary syndrome).

However, presence of ECG changes suggestive of BER, like patients with normal or non-diagnostic ECG, does not exclude ACS and the management plan for each patient should be individualised.

AMI is usually associated with ST segment elevation which is localised to inferior, anterior or anteroseptal region although it may be extensive in some cases. The ECG changes exhibit classical evolution over time. Reciprocal changes are highly suggestive of AMI. The ST elevation is typically convex upward, but may be concave upward.

In acute pericarditis, the ST elevation tends to be more widespread, although localised pericarditis has been reported. Depressed PR segment and ST/T ratio of more than 0.25 suggest acute pericarditis. The ECG changes of acute pericarditis evolve over several hours to days.

In conclusion, emergency physicians should be able to recognise this condition to avoid inappropriate administration of thrombolytic therapy. Patient management should be individualised.

Recommended reading

1. Brady WJ. Benign early repolarization: electrocardiographic manifestations and differentiation from others ST segment elevation syndromes. *Am J Emerg Med* 1998;16(6):592-7.